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NTC ORLANDO
5090.3a

REMEDIAL INVESTIGATION FEASIBILITY STUDY WORK PLAN FOR OPERABLE UNIT 3 (OU 3) VOLUME 2 OF 2 NTC ORLANDO FL

6/1/1999

HARDING LAWSON ASSOCIATES

03.07.03.0002

ID-00191

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
OPERABLE UNIT 3

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

VOLUME II OF II: APPENDICES A THROUGH O

UNIT IDENTIFICATION CODE: N65928
CONTRACT NO.: N62467-89-D-0317/136

JUNE 1999

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA 29418

Harding Lawson Associates
Engineering and Environmental Services
2590 Executive Center Circle East
Tallahassee, Florida 32301 - (850) 656-1293

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APPENDIX A

SELECTED SECTIONS FROM COMPLETION REPORT FOR INTERIM REMEDIAL ACTIONS AT STUDY AREAS 8, 9, AND 52

COMPLETION REPORT

INTERIM REMEDIAL ACTION FOR
SA 8, SA 9, SA 52
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Prepared for:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON SC

Prepared by:

Supervisor of Shipbuilding, Conversion and Repair,
USN, (SUPSHIP) Portsmouth Va.,
Environmental Detachment Charleston, S.C.
1899 North Hobson Ave.
North Charleston, SC 29405-2106

November 13, 1997

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ACRONYMS, ABBREVIATIONS and SYMBOL

ABB-ES	ABB Environmental Services
BLS	Below Land Surface
CFR	Code of Federal Regulations
DET	Environmental Detachment Charleston
DRMO	Defense Reutilization and Marketing Office
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
IA	Immunoassay
IRA	Interim Remedial Action
NTC	Naval Training Center
OPT	Orlando Partnering Team
PPB	Parts Per Billion
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
SA	Study Area
SCG	Soil Cleanup Goals
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SUPSHIP	Supervisor of Shipbuilding, Conversion and Repair, USN
TSDF	Treatment, Storage and Disposal Facility
USEPA	United States Environmental Protection Agency
USN	United States Navy

1. INTRODUCTION

1.1 OBJECTIVE Southern Division Naval Facilities Engineering Command (SOUTHDIV) tasked Supervisor of Shipbuilding, Conversion and Repair, Portsmouth, Va. Environmental Detachment Charleston (DET) to provide an Interim Remedial Action (IRA) Work Plan for Study Areas (SA) 8 and 9 at the Naval Training Center (NTC) and for SA-52 at the McCoy Annex, Orlando, Florida. The objective of this IRA was to excavate and dispose of the arsenic, pesticide and benzo(a)pyrene contaminated soils at these three sites.

The arsenic contaminated soil at SA-8 was excavated to dimensions specified by ABB-Environmental Services, Inc. (ABB-ES) in their letter to SOUTHDIV dated April 14, 1997. Confirmation samples were not required at this site per the Orlando Partnering Team (OPT) instructions.

The original scope for SA-9 included immunoassay (IA) testing prior to excavation in order to delineate the extent of contamination. The IA tests were capable of detecting Chlordane and structurally similar organochloride pesticides at 10, 100 and 600 parts per billion (PPB). The excavation was to be based on these IA test results but was not to exceed an area 10′ X 10′ by 2′ in depth without OPT approval.

The pesticide contaminated soil at SA-52 was excavated based on ABB-ES sampling data and IA testing performed by the DET to determine the depth of contamination.

The cleanup goals for these sites are the residential limits specified by the Florida Department of Environmental Protection (FDEP) Soil Cleanup Goals (SCG), dated 29 September 1995, or the United States Environmental Protection Agency (EPA) Region III Risk Based Concentrations (RBCs), whichever specifies the stricter criteria. This IRA may not necessarily be the final remedial action taken at these sites. Additional actions may be required as determined by the Remedial Investigation/Feasibility Study (RI/FS) process. This IRA is consistent with the ultimate cleanup of

the site and is not intended to circumvent the public participation process inherent within environmental cleanup under Resource Conservation and Recovery Act (RCRA).

2. STUDY AREA- 8

2.1 SITE HISTORY SA-8 is located on Trident Lane. at the southern end of the golf course and east of Lake Baldwin. This site was the location of the greenskeeper's storage area and consists of Building 2134. several smaller storage sheds with various containers of pesticides. paints. oils. and portable fuel storage tanks.

Surface soil samples taken by ABB-ES in 1995 indicated elevated levels of arsenic at 7 sample locations. The contamination is thought to be the result of pesticides containing arsenic used for golf course maintenance. Refer to the table below for sample results.

SAMPLE ID NUMBER	ARSENIC mg/kg
08S00200	4
08S00300	9.7
08S00400	4.9
08S00500	7.2
08S00600	45.2
08S00700	577
08S00800	12.2

2.2 ACTIONS PERFORMED AT SA-8 The actions performed at SA-8 are listed below.

- Excavated 1 each 6′ X 6′ by 2′ in depth arsenic contaminated areas at ABB-ES 4 sample locations, 08S002 through 005, for a volume of approximately 11 cubic yards.

- Excavated 1 each 14′ X 30′ by 2′ in depth arsenic contaminated area at ABB-ES to encompass sample locations 08S006 through 008 for a volume of approximately 31 cubic yards.

2.3 OBSERVATIONS NOTED

The soil excavated at this site was dark silty sand.

2.4 SAMPLING EVOLUTIONS AND RESULTS FOR SA-8 In accordance with the original work plan, confirmation samples were not required at this site. However, 5 composite investigative samples were taken from the side walls for each excavation and tested for arsenic and pesticides. All samples were taken at the first interval (0' to 2'). All 5 samples had arsenic levels greater than the EPA residential limits for arsenic as a carcinogen as shown in the table below. See Appendix A for investigative sample results.

ug/kg	ARENIC(C)	CHLORDANE	DDD	DIELDRIN
SGC(RES)	700	800	4400	70
SGC(IND)	3000	2800	17000	300
RBC(RES)	430	490	2700	40
RBC(IND)	3800	4400	2400	360
NTC008S0001	28400	526		
NTC008S0002	45700		5440	
NTC008S0003	3260			
NTC008S0004	2580			
NTC008S0005	1660			76.5

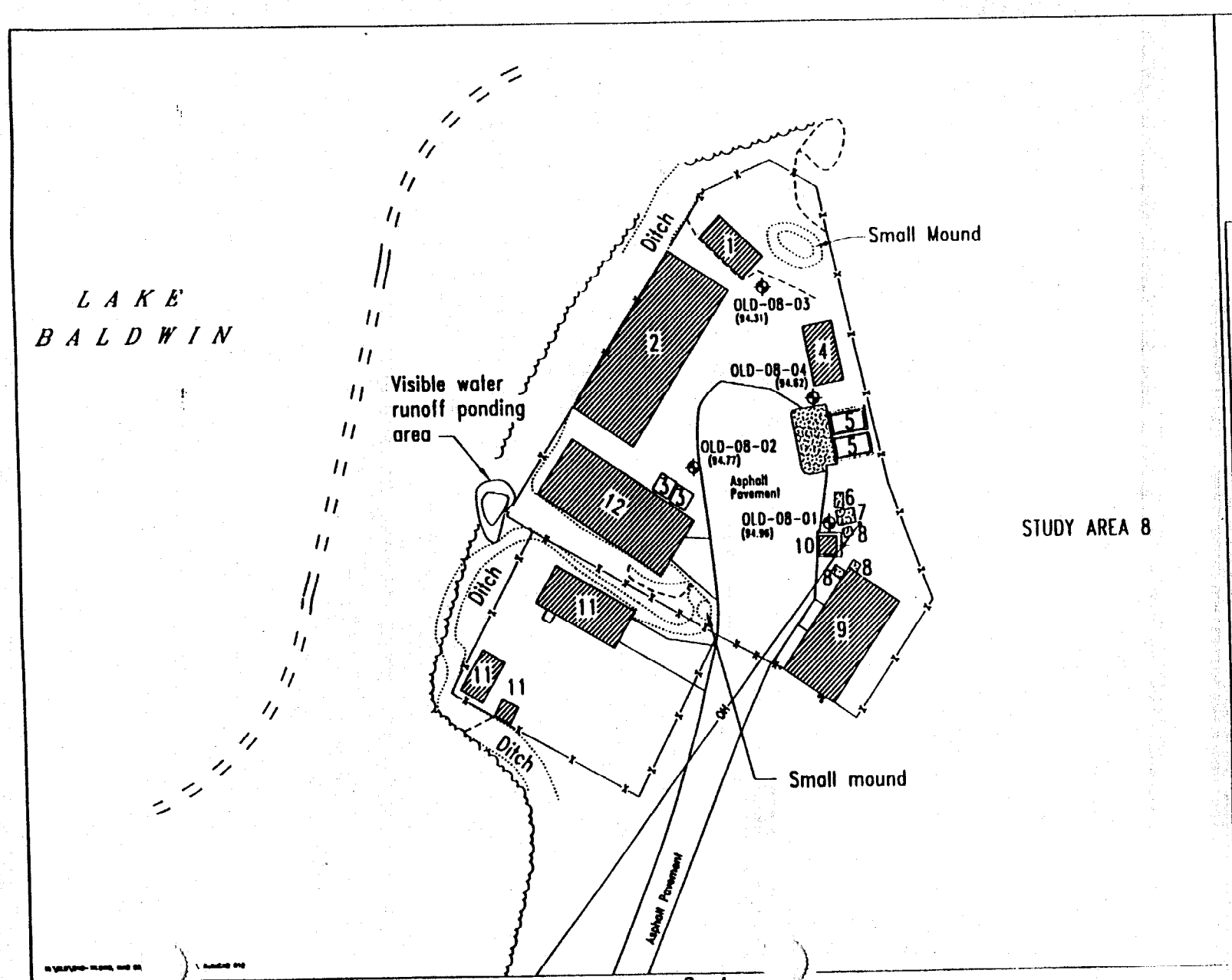
2.5 SITE CONDITIONS FOLLOWING COMPLETION OF WORK. Following completion of all site work on September 25, 1997, the DET had removed 36 tons of arsenic contaminated soil at SA-8. All excavations were filled with Florida certified clean soil, graded to surrounding conditions and seeded.

2.6 WASTE GENERATION All soil excavated from this site was considered hazardous and disposed of to a permitted Treatment, Storage and Disposal Facility (TSDF) in accordance with 40 Code of Federal Regulations (CFR), Part 264, through the Defense Reutilization and Marketing Office (DRMO).

2.7 SITE PHOTOGRAPHS/MAPS Site photographs are provided on page 2-3. Site maps are provided on pages 2-4 and 2-5.

TYPICAL 4' X 4' EXCAVATION AT SA - 8

SA- 8 AFTER BACKFILLING, SEEDING, AND MULCHING.



N

0 25 50
SCALE: 1 INCH = 50 FEET

LEGEND

- Evidence of stormwater runoff
- Fence
- OH Overhead utility
- Approximate limit of undergrowth

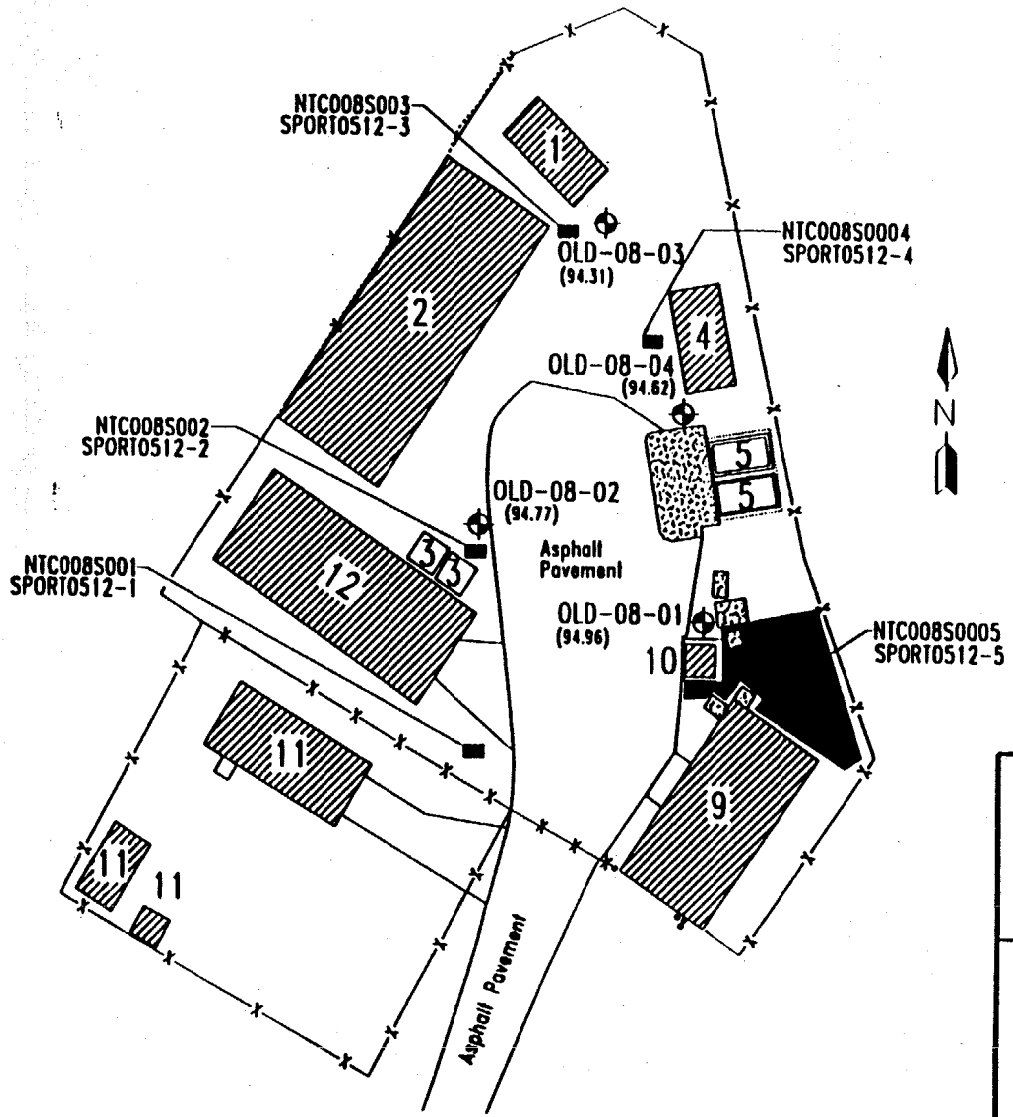
1 Metal building - Pesticide storage
2 Covered concrete slab with metal roof
3 Metal storage box
4 Metal building - Paint storage
5 Fuel tanks with concrete barriers
6 Metal storage on concrete slab
7 Tank on concrete slab
8 Concrete slab
9 Concrete block building
10 Metal building - Poison storage
11 Metal building
12 Metal building - Mower storage

DRAFT!!!

FIGURE 1
STUDY AREA 8 SITE PLAN

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY WORKPLAN

NAVAL [illegible]G CENTER
ORLAND[illegible] [illegible]IDA



SPORTENVDETCHASN
1899 North Hobson Ave.
North Charleston, SC 29405-2106
Ph. (803) 743-6777

NAVAL TRAINING CENTER
ORLANDO, FLORIDA
STUDY AREA 8

DWG DATE: 10/21/97	DWG NAME: FI SA8

3. STUDY AREA 9

3.1 SITE HISTORY SA-9 is located on Trident Lane near the southeastern shore of Lake Baldwin. This site was the location of a pesticide and herbicide storage building used by the Air Force and Navy between the 1950's to 1972. The building was demolished in 1981. Surface soil samples taken by ABB-ES in 1995 indicated one sample location with elevated levels of benzo(a)pyrene and alpha and gamma chlordane. Refer to the table below for sample results.

SAMPLE ID NUMBER	CONTAMINANT µg/kg	
09S001)0	Benzo(a)pyrene	780
09S001)0	alpha-Chlordane	2300
09S00100	gamma-Chlordane	2400

3.2 ACTIONS PERFORMEDAT SA-9 Several factors contributed to the growth of the original scope of SA- 9 and are listed below.

- IA samples were taken at 5′ and 10′ increments from ABB-ES sample location 09S001. These results indicated the pesticide levels at a depth of 6″ were > 600 ppb and extended to at least 45′ from 09S001 sample location on the east and south sides, 19′ on the north side and 35′ on the west side. The OPT instructed DET to continue excavation until the site was clean or until the disposal contract was expended.

- Confirmation samples were taken in the side walls and bottom once the excavation had reached approximately 80′ X 65′. The depth of the excavation was 2′ except in the area of monitoring well OLD-09-04, where there was evidence of groundwater contamination. This area was approximately 45′ X 15′ by 5′ in depth.

- The confirmation results indicated further excavation was required. The OPT instructed DET to excavate the south wall until excavated soil had filled the contractor's rail cars. This resulted in a final excavation of 80' X 85' and varied from 2' to 5' in depth. 2 additional confirmation samples were taken at the south wall.

3.3 OBSERVATIONS NOTED

- Even though the DET had obtained signed dig permits prior to start of excavation, several unmarked and unknown underground utilities were encountered at this site. These utilities consisted of a TV cable, 2" water line, and phone cables.

- The DET uncovered evidence of drainage systems possibly used for pesticide disposal. Two each 4" perforated pipes surrounded by gravel beds were uncovered during excavation. One of the pipes led to a buried 55 gallon drum filled with rock that was probably used as a sump (See page 3-5). Extremely high levels of pesticides were detected around these areas.

- From approximately 6" below land surface (BLS), the soil appeared to be fill dirt. From 6" to 1' BLS, there was a gravel type material, possibly the remains of a parking area. From 1' to 2' BLS, the soil was sandy. From 2' BLS to the bottom of the excavation at ground water, the soil was dark silty sand.

- An extremely strong odor of pesticides was detected when ground water was reached on the east wall and at a depth of approximately 2' on the south wall.

3.4 SAMPLING EVOLUTIONS AND RESULTS FOR SA-9

IA testing was used to delineate the site prior to excavation. Samples were taken at a depth of 6" at 5' and 10' intervals from ABB-ES sample point 09S001.

The initial excavation was 60' X 85'. 13 confirmation samples were taken from the side walls and bottom of the excavation at this point. Based on these results, the south wall was further excavated

and 2 additional samples were taken. All confirmation samples were taken at the first interval (0' to 2') except DET sample location NTC009S0013 which was taken at a depth of 5'. Samples NTC009S0003 through 0005 and 0008 through 0010 had pesticide and arsenic levels greater than the cleanup goals as shown below. See Appendix B for confirmation sample results.

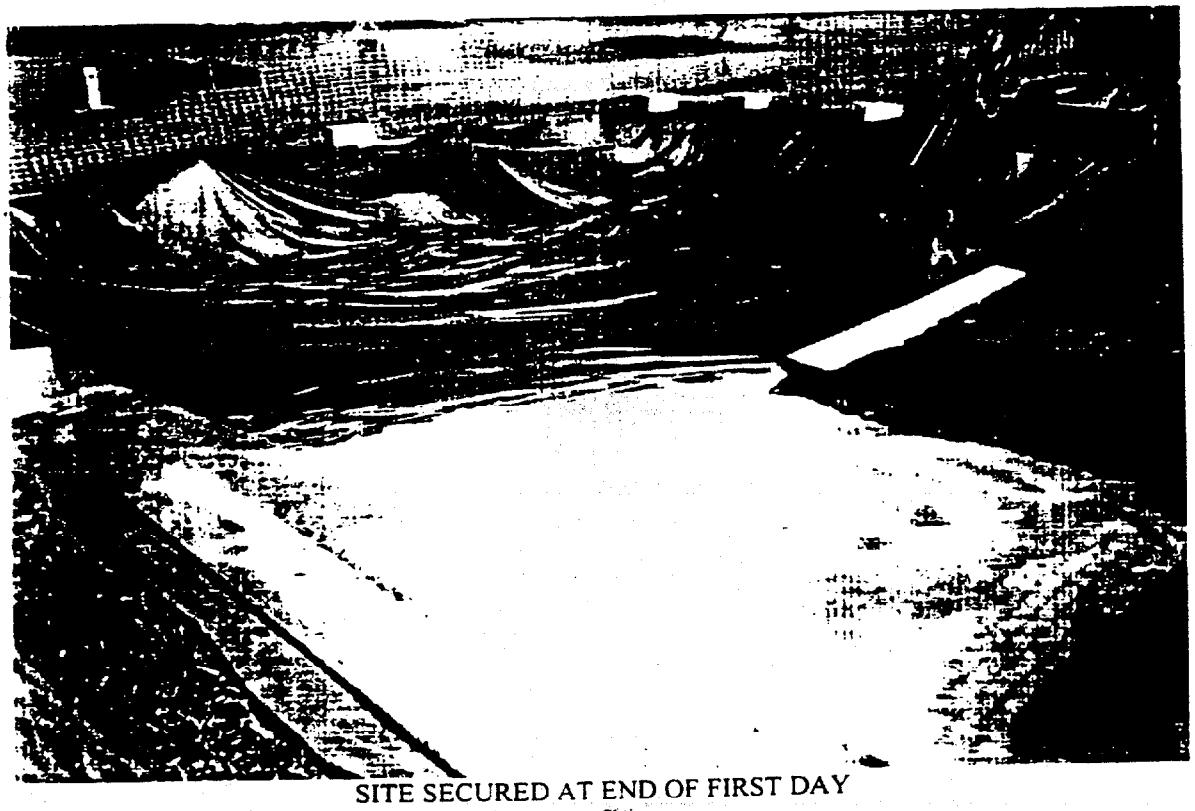
ug/kg	ARSENIC(C)	CHLORDANE
SGC(RES)	700	800
SGC(IND)	3000	2800
RBC(RES)	430	490
RBC(IND)	3800	4400
NTC009S0005-01		3980
NTC009S0008-01	2090	1710
NTC009S0009-01	640	910
NTC009S0010-01	24900	2060
NTC009S0013-01	3030	

3.5 SITE CONDITIONS FOLLOWING COMPLETION OF WORK. Following completion of all site work on September 25, 1997, the DET had removed 946 tons of pesticide contaminated soil at SA-9. The excavation was filled with Florida certified clean soil, graded to surrounding conditions and seeded. Plastic was left on the south side wall to act as a barrier between the clean fill and in place soil due to backfilling the excavation prior to receiving sample results.

3.6 WASTE GENERATION All soil excavated from this site was considered hazardous and disposed of to a permitted TSDF in accordance with 40 CFR, Part 264, through the DRMO.

3.7 SITE PHOTOGRAPHS/MAPS Site photographs are provided on pages 3-4 through 3-6. Site maps are provided on pages 3-7 and 3-8.

START OF EXCAVATION AT SA - 9



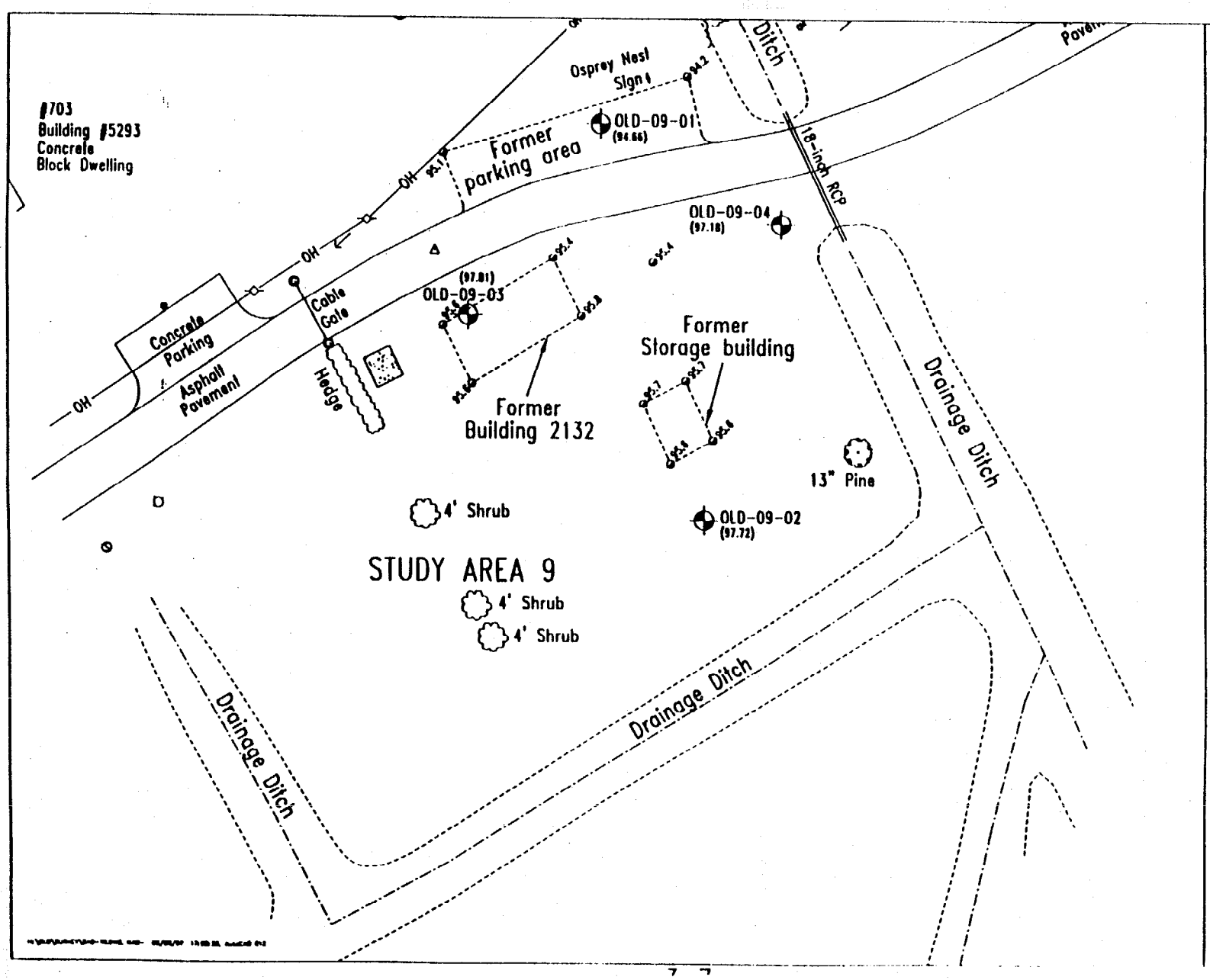
SITE SECURED AT END OF FIRST DAY

BURIED 55 GALLON DRUM

EXCAVATION TO GROUNDWATER ON EAST SIDE

FINAL EXCAVATION AT START OF BACKFILLING

SA - 9 AFTER BACKFILLING, SEEDING, AND MULCHING



LEGEND

- Fire hydrant
- Sanitary sewer manhole
- Tree line
- Overhead utility

DRAFT!!!!!

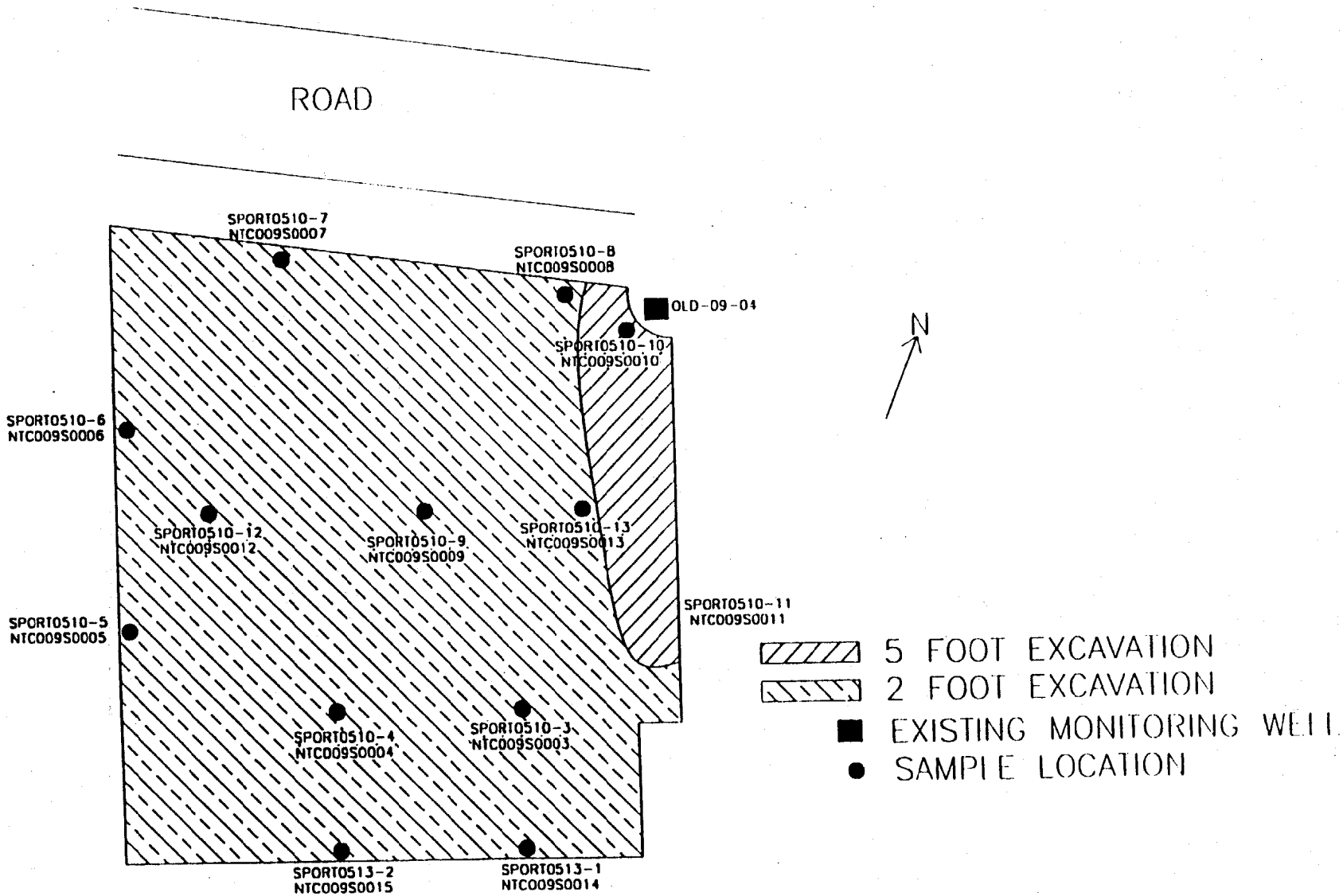
0 25 50

SCALE: 1 INCH = 50 FEET

FIGURE 2
STUDY AREA 9 SITE PLAN

REMEDIAL INVESTIGATION AND
FEASIBILITY STUDY WORKPLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA



SOIL SAMPLE LOCATIONS

SPORTENVDETCHASN 1899 North Hobson Ave. North Charleston, SC 29405-2106 Ph. (803) 743-6777	NAVAL TRAINING CENTER ORLANDO, FLORIDA STUDY AREA 9	
	DWG DATE: 10/21/97	DWG NA TLSA91

5 PLAN MODIFICATIONS AND JUSTIFICATIONS

5.1 ADDENDUM 1 An addendum to the original work plan was written on September 5, 1997 to incorporate comments received from EPA on September 4, 1997. Additionally, SA-27, a petroleum contaminated site was added to the work plan for remediation. Listed below are the specifics of the addendum.

- EPA's comments concerning sampling protocol were answered in the addendum. The DET supplied EPA with a copy of the Environmental Detachment Charleston Sampling Plan and the Florida certification number for General Engineering Laboratory of Charleston.

- The DET incorporated EPA RBCs as an alternate to FDEP SGC. Whichever specified the stricter criteria was to be used as a clean up goal.

- Florida certified clean fill dirt was specified as backfill material. Analytical data of a representative sample is provided in Appendix D.

5.2 DEVIATIONS TO ADDENDUM 1

- The OPT requested the DET excavate SA-27 if time allowed. Due to the growth of the SA-9 excavation, the DET was unable to accomplish this task.

APPENDIX A

SAMPLE DATA
SA - 8

GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 23, 1997

Sample ID	: SPORT0512-1
Lab ID	: 9709305-01
Matrix	: Soil
Date Collected	: 09/11/97
Date Received	: 09/12/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Method 8080 - Organochlorine Pesticides - 19 items											
4'-DDD		70.9	6.66	13.3	ug/kg	10.	JLS	09/22/97	1029	107839	1
4'-DDE		72.6	6.66	13.3	ug/kg	10.					
4,4'-DDT		20.1	6.66	13.3	ug/kg	10.					
Aldrin	U	0.00	3.33	6.66	ug/kg	10.					
Chlordane		526	41.6	83.3	ug/kg	10.					
Dieldrin	U	0.00	6.66	13.3	ug/kg	10.					
Endosulfan I	U	0.00	3.33	6.66	ug/kg	10.					
Endosulfan II	U	0.00	6.66	13.3	ug/kg	10.					
Endosulfan sulfate		34.6	6.66	13.3	ug/kg	10.					
Endrin	J	12.9	6.66	13.3	ug/kg	10.					
Endrin aldehyde	U	0.00	6.66	13.3	ug/kg	10.					
Heptachlor	U	0.00	3.33	6.66	ug/kg	10.					
Heptachlor epoxide		18.9	3.33	6.66	ug/kg	10.					
Methoxychlor	J	65.6	33.3	66.6	ug/kg	10.					
Toxaphene	U	0.00	167	333	ug/kg	10.					
alpha-BHC	U	0.00	3.33	6.66	ug/kg	10.					
beta-BHC	U	0.00	3.33	6.66	ug/kg	10.					
delta-BHC	U	0.00	3.33	6.66	ug/kg	10.					
gamma-BHC	U	0.00	3.33	6.66	ug/kg	10.					
Metals Analysis											
Arsenic		28400	298	500	ug/kg	2.0	MBL	09/17/97	2158	107827	2

The following prep procedures were performed:

esticides	JLS	09/18/97	2000	107839 3
RACE	FGD	09/15/97	1900	107827 4

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(803) 556-8171 • Fax (803) 766-1178

9709305-01

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 23, 1997

Sample ID : SPORT0512-1

Surrogate Recovery	Test	Percent%	Acceptable Limits
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8080
M 2	EPA 6010A
M 3	EPA 3550
M 4	EPA 3050

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/874[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 23, 1997

Sample ID : SPORT0512-2
Lab ID : 9709305-02
Matrix : Soil
Date Collected : 09/11/97
Date Received : 09/12/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD		5440	332	664	ug/kg	500	JLS	09/22/97	1105	107839	1
4,4'-DDE		880	332	664	ug/kg	500					
4,4'-DDT		1160	332	664	ug/kg	500					
Aldrin	U	0.00	166	332	ug/kg	500					
Chlordane	U	0.00	2080	4150	ug/kg	500					
Dieldrin	U	0.00	332	664	ug/kg	500					
Endosulfan I	U	0.00	166	332	ug/kg	500					
Endosulfan II	U	0.00	332	664	ug/kg	500					
Endosulfan sulfate	U	252	332	664	ug/kg	500					
Endrin	U	0.00	332	664	ug/kg	500					
Endrin aldehyde	U	0.00	332	664	ug/kg	500					
Heptachlor	U	0.00	166	332	ug/kg	500					
Heptachlor epoxide	U	0.00	166	332	ug/kg	500					
Methoxychlor	U	0.00	1660	3320	ug/kg	500					
Toxaphene	U	0.00	8300	16600	ug/kg	500					
alpha-BHC	U	0.00	166	332	ug/kg	500					
beta-BHC	U	0.00	166	332	ug/kg	500					
delta-BHC	U	0.00	166	332	ug/kg	500					
gamma-BHC	U	0.00	166	332	ug/kg	500					
Metals Analysis											
Arsenic		45700	292	490	ug/kg	2.0	MBL	09/17/97	2203	107827	2

The following prep procedures were performed:

Pesticides	JLS	09/18/97	2000	107839 3
RACE	FGD	09/15/97	1900	107827 4

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1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 23, 1997

Sample ID : SPORT0512-2

Surrogate Recovery	Test	Percent%	Acceptable Limits
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8080
M 2	EPA 6010A
M 3	EPA 3550
M 4	EPA 3050

Notes:
The qualifiers in this report are defined as follows:
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Reviewed By

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GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
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NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 23, 1997

Sample ID : SPORT0512-3
Lab ID : 9709305-03
Matrix : Soil
Date Collected : 09/11/97
Date Received : 09/12/97
Priority : Routine
Collector : Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Method 8080 - Organochlorine Pesticides - 19 items											
,4'-DDD		3.07	0.658	1.33	ug/kg	1.0	JLS	09/22/97	0954	107839	1
4,4'-DDE		7.96	0.658	1.33	ug/kg	1.0					
4,4'-DDT		4.47	0.658	1.33	ug/kg	1.0					
Aldrin		0.763	0.329	0.670	ug/kg	1.0					
Chlordane	U	0.00	4.11	8.33	ug/kg	1.0					
Dieldrin		3.42	0.658	1.33	ug/kg	1.0					
Endosulfan I	U	0.00	0.329	0.670	ug/kg	1.0					
Endosulfan II	J	1.28	0.658	1.33	ug/kg	1.0					
Endosulfan sulfate	J	1.14	0.658	1.33	ug/kg	1.0					
Endrin	J	0.799	0.658	1.33	ug/kg	1.0					
Endrin aldehyde	U	0.00	0.658	1.33	ug/kg	1.0					
Heptachlor	U	0.00	0.329	0.670	ug/kg	1.0					
Heptachlor epoxide	U	0.00	0.329	0.670	ug/kg	1.0					
Methoxychlor	U	0.00	3.29	6.67	ug/kg	1.0					
Toxaphene	U	0.00	16.5	33.0	ug/kg	1.0					
alpha-BHC	U	0.00	0.329	0.670	ug/kg	1.0					
beta-BHC	U	0.00	0.329	0.670	ug/kg	1.0					
delta-BHC	U	0.00	0.329	0.670	ug/kg	1.0					
gamma-BHC	U	0.00	0.329	0.670	ug/kg	1.0					
Metals Analysis											
Arsenic		3260	292	490	ug/kg	2.0	MBL	09/17/97	2208	107827	2

The following prep procedures were performed:

Pesticides	JLS	09/18/97	2000	107839	3
RACE	FGD	09/15/97	1900	107827	4

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9709305-03

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GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E8747
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 23, 1997

Sample ID : SPORT0512-3

Surrogate Recovery	Test	Percent%	Acceptable Limits
4CMX	P8080	84.0	(45.8 - 148.)
Dibutylchlorendate	P8080	105.	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8080
M 2	EPA 6010A
M 3	EPA 3550
M 4	EPA 3050

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8745
NC	223	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 23, 1997

Sample ID	: SPORT0512-4
Lab ID	: 9709305-04
Matrix	: Soil
Date Collected	: 09/11/97
Date Received	: 09/12/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	0.00	6.58	13.2	ug/kg	10.	JLS	09/17/97	1923	107881	1
4,4'-DDE	U	0.00	6.58	13.2	ug/kg	10.					
4,4'-DDT	U	0.00	6.58	13.2	ug/kg	10.					
Aldrin	U	0.00	3.29	6.58	ug/kg	10.					
Chlordane	U	0.00	41.1	82.3	ug/kg	10.					
Dieldrin	U	0.00	6.58	13.2	ug/kg	10.					
Endosulfan I	U	0.00	3.29	6.58	ug/kg	10.					
Endosulfan II	J	11.9	6.58	13.2	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.58	13.2	ug/kg	10.					
Endrin	U	0.00	6.58	13.2	ug/kg	10.					
Endrin aldehyde	U	0.00	6.58	13.2	ug/kg	10.					
Heptachlor	U	0.00	3.29	6.58	ug/kg	10.					
Heptachlor epoxide	U	0.00	3.29	6.58	ug/kg	10.					
Methoxychlor	U	0.00	32.9	65.8	ug/kg	10.					
Toxaphene	U	0.00	165	329	ug/kg	10.					
alpha-BHC	U	0.00	3.29	6.58	ug/kg	10.					
beta-BHC	U	0.00	3.29	6.58	ug/kg	10.					
delta-BHC	U	0.00	3.29	6.58	ug/kg	10.					
gamma-BHC	U	0.00	3.29	6.58	ug/kg	10.					
Metals Analysis											
Arsenic		2580	287	481	ug/kg	2.0	MBL	09/17/97	2213	107827	2

The following prep procedures were performed:

Pesticides	JLS	09/15/97	1200	107881	3
RACE	FGD	09/15/97	1900	107827	4

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87477
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 23, 1997

Sample ID : SPORT0512-4

Surrogate Recovery	Test	Percent%	Acceptable Limits
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8080
M 2	EPA 6010A
M 3	EPA 3550
M 4	EPA 3050

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8745
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 23, 1997

Sample ID	: SPORT0512-5
Lab ID	: 9709305-05
Matrix	: Soil
Date Collected	: 09/11/97
Date Received	: 09/12/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	0.00	6.62	13.2	ug/kg	10.	JLS	09/17/97	2112	107881	1
4,4'-DDE		26.9	6.62	13.2	ug/kg	10.					
4,4'-DDT		59.9	6.62	13.2	ug/kg	10.					
Aldrin	U	0.00	3.31	6.62	ug/kg	10.					
Chlordane		265	41.4	82.8	ug/kg	10.					
Dieldrin		76.5	6.62	13.2	ug/kg	10.					
Endosulfan I	U	0.00	3.31	6.62	ug/kg	10.					
Endosulfan II	U	0.00	6.62	13.2	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.62	13.2	ug/kg	10.					
Endrin	U	0.00	6.62	13.2	ug/kg	10.					
Endrin aldehyde	U	0.00	6.62	13.2	ug/kg	10.					
Heptachlor	U	0.00	3.31	6.62	ug/kg	10.					
Heptachlor epoxide		8.74	3.31	6.62	ug/kg	10.					
Methoxychlor	U	0.00	33.1	66.2	ug/kg	10.					
Toxaphene	U	0.00	166	331	ug/kg	10.					
alpha-BHC	U	0.00	3.31	6.62	ug/kg	10.					
beta-BHC	U	0.00	3.31	6.62	ug/kg	10.					
delta-BHC	U	3.11	3.31	6.62	ug/kg	10.					
gamma-BHC	U	0.00	3.31	6.62	ug/kg	10.					
Metals Analysis											
Arsenic		1660	289	485	ug/kg	2.0	MBL	09/17/97	2218	107827	2

The following prep procedures were performed:

Pesticides	JLS	09/15/97	1200	107881	3
TRACE	FGD	09/15/97	1900	107827	4

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 23, 1997

Sample ID : SPORT0512-5

Surrogate Recovery	Test	Percent%	Acceptable Limits
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8080
M 2	EPA 6010A
M 3	EPA 3550
M 4	EPA 3050

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
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APPENDIX B

SAMPLE DATA
SA - 9

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID	: SPORT0510-3
Lab ID	: 9709315-01
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	1660	3320	ug/kg	10.	WAM	09/16/97	1413	107869	1
Acenaphthylene	U	0.00	1660	3320	ug/kg	10.					
Anthracene	U	0.00	1660	3320	ug/kg	10.					
Benzo(a)anthracene	U	0.00	1660	3320	ug/kg	10.					
Benzo(a)pyrene	U	0.00	1660	3320	ug/kg	10.					
Benzo(b)fluoranthene	U	0.00	1660	3320	ug/kg	10.					
Benzo(ghi)perylene	U	0.00	1660	3320	ug/kg	10.					
Benzo(k)fluoranthene	U	0.00	1660	3320	ug/kg	10.					
Chrysene	U	0.00	1660	3320	ug/kg	10.					
Dibenzo(a,h)anthracene	U	0.00	1660	3320	ug/kg	10.					
Fluoranthene	U	0.00	1660	3320	ug/kg	10.					
Fluorene	U	0.00	1660	3320	ug/kg	10.					
Indeno(1,2,3-c,d)pyrene	U	0.00	1660	3320	ug/kg	10.					
Naphthalene	U	0.00	1660	3320	ug/kg	10.					
Phenanthrene	U	0.00	1660	3320	ug/kg	10.					
Pyrene	U	0.00	1660	3320	ug/kg	10.					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	J	34300	33300	66600	ug/kg	50000	JLS	09/17/97	0610	107880	2
4,4'-DDE	U	0.00	33300	66600	ug/kg	50000					
4,4'-DDT		176000	33300	66600	ug/kg	50000					
Aldrin		42500	16700	33300	ug/kg	50000					
Chlordane		9520000	833000	1670000	ug/kg	200000					
Dieldrin	U	0.00	33300	66600	ug/kg	50000					
Endosulfan I	U	0.00	16700	33300	ug/kg	50000					
Endosulfan II	U	0.00	33300	66600	ug/kg	50000					
Endosulfan sulfate	U	0.00	33300	66600	ug/kg	50000					
Endrin	U	0.00	33300	66600	ug/kg	50000					

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Laboratory Certification:

STATE	GEL	EPI
FL	E87156/87294	E87472/87
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-3

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	33300	66600	ug/kg	50000					
Heptachlor		246000	66600	133000	ug/kg	200000	JLS	09/17/97	0610	107880	2
Heptachlor epoxide	U	0.00	16700	33300	ug/kg	50000					
Methoxychlor	U	0.00	167000	333000	ug/kg	50000					
Toxaphene	U	0.00	833000	1670000	ug/kg	50000					
alpha-BHC	U	0.00	16700	33300	ug/kg	50000					
beta-BHC	U	0.00	16700	33300	ug/kg	50000					
delta-BHC	U	0.00	16700	33300	ug/kg	50000					
gamma-BHC	U	0.00	16700	33300	ug/kg	50000					
Metals Analysis											
Arsenic	J	342	298	500	ug/kg	2.0	MBL	09/16/97	1501	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Comments:
Revised report.

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	0.00*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-3

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
M 4	EPA 3550
M 5	EPA 3050

tes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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Laboratory Certification

STATE	GEL	EPA
FL	E87156/87294	E87472/3
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID	: SPORT0510-4
Lab ID	: 9709315-02
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	658	1320	ug/kg	4.0	WAM	09/16/97	1444	107869	1
Acenaphthylene	U	0.00	658	1320	ug/kg	4.0					
Anthracene	U	0.00	658	1320	ug/kg	4.0					
Benzo(a)anthracene	U	0.00	658	1320	ug/kg	4.0					
Benzo(a)pyrene	U	0.00	658	1320	ug/kg	4.0					
Benzo(b)fluoranthene	U	0.00	658	1320	ug/kg	4.0					
Benzo(ghi)perylene	U	0.00	658	1320	ug/kg	4.0					
Benzo(k)fluoranthene	U	0.00	658	1320	ug/kg	4.0					
Chrysene	U	0.00	658	1320	ug/kg	4.0					
Dibenzo(a,h)anthracene	U	0.00	658	1320	ug/kg	4.0					
Fluoranthene	U	0.00	658	1320	ug/kg	4.0					
Fluorene	U	0.00	658	1320	ug/kg	4.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	658	1320	ug/kg	4.0					
Naphthalene	U	0.00	658	1320	ug/kg	4.0					
Phenanthrene	U	0.00	658	1320	ug/kg	4.0					
Pyrene	U	0.00	658	1320	ug/kg	4.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD		53500	6600	13200	ug/kg	10000	JLS	09/17/97	0648	107880	2
4,4'-DDE	U	0.00	6600	13200	ug/kg	10000					
4,4'-DDT	U	0.00	6600	13200	ug/kg	10000					
Aldrin		8580	3300	6600	ug/kg	10000					
Chlordane		2060000	103000	206000	ug/kg	25000					
Dieldrin	U	0.00	6600	13200	ug/kg	10000					
Endosulfan I	U	0.00	3300	6600	ug/kg	10000					
Endosulfan II	U	0.00	6600	13200	ug/kg	10000					
Endosulfan sulfate	U	0.00	6600	13200	ug/kg	10000					
Endrin	U	0.00	6600	13200	ug/kg	10000					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-4

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	6600	13200	ug/kg	10000					
Heptachlor	U	1750	3300	6600	ug/kg	10000	JLS	09/17/97	0648	107880	2
Heptachlor epoxide	U	0.00	3300	6600	ug/kg	10000					
Methoxychlor	U	0.00	33000	66000	ug/kg	10000					
Toxaphene	U	0.00	165000	330000	ug/kg	10000					
alpha-BHC	U	0.00	3300	6600	ug/kg	10000					
beta-BHC	U	0.00	3300	6600	ug/kg	10000					
[illegible]BHC		11600	3300	6600	ug/kg	10000					
gamma-BHC	U	0.00	3300	6600	ug/kg	10000					
Metals Analysis											
Arsenic		635	284	476	ug/kg	2.0	MBL	09/16/97	1506	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	73.0	(30.0 - 115.)
Nitrobenzene-d5	M610	49.7	(23.0 - 120.)
p-Terphenyl-d14	M610	79.6	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
3	EPA 6010A
	EPA 3550
	EPA 3050

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-4

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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9709315-02

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID	: SPORT0510-5
Lab ID	: 9709315-03
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
[illegible]ynuclear Aromatic Hydrocarbons - 16 items											
[illegible]enaphthene	U	0.00	166	332	ug/kg	1.0	WAM	09/16/97	1514	107869	1
Acenaphthylene	U	0.00	166	332	ug/kg	1.0					
Anthracene	U	0.00	166	332	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	166	332	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	166	332	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	166	332	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	166	332	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	166	332	ug/kg	1.0					
Chrysene	U	0.00	166	332	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	166	332	ug/kg	1.0					
Fluoranthene	U	0.00	166	332	ug/kg	1.0					
Fluorene	U	0.00	166	332	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	166	332	ug/kg	1.0					
Naphthalene	U	0.00	166	332	ug/kg	1.0					
Phenanthrene	U	0.00	166	332	ug/kg	1.0					
Pyrene	U	0.00	166	332	ug/kg	1.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	0.00	33.3	66.6	ug/kg	50.	JLS	09/17/97	0726	107880	2
4,4'-DDE	U	0.00	33.3	66.6	ug/kg	50.					
4,4'-DDT	U	0.00	33.3	66.6	ug/kg	50.					
Aldrin	J	22.6	16.7	33.3	ug/kg	50.					
Chlordane		3980	208	416	ug/kg	50.					
Dieldrin	U	0.00	33.3	66.6	ug/kg	50.					
Endosulfan I	U	0.00	16.7	33.3	ug/kg	50.					
[illegible]sulfan II	U	0.00	33.3	66.6	ug/kg	50.					
[illegible]sulfan sulfate	U	0.00	33.3	66.6	ug/kg	50.					
[illegible]ndrin	U	0.00	33.3	66.6	ug/kg	50.					

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9709315-03

GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87-
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-5

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	33.3	66.6	ug/kg	50.					
Heptachlor		42.6	16.7	33.3	ug/kg	50.	JLS	09/17/97	0726	107880	2
Heptachlor epoxide	U	0.00	16.7	33.3	ug/kg	50.					
Methoxychlor	U	0.00	167	333	ug/kg	50.					
Toxaphene	U	0.00	833	1670	ug/kg	50.					
alpha-BHC	U	0.00	16.7	33.3	ug/kg	50.					
beta-BHC	U	0.00	16.7	33.3	ug/kg	50.					
delta-BHC	U	0.00	16.7	33.3	ug/kg	50.					
gamma-BHC	U	0.00	16.7	33.3	ug/kg	50.					
Metals Analysis											
Arsenic	U	280	292	490	ug/kg	2.0	MBL	09/16/97	1511	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	63.2	(30.0 - 115.)
Nitrobenzene-d5	M610	63.0	(23.0 - 120.)
p-Terphenyl-d14	M610	84.8	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
4	EPA 3550
5	EPA 3050

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STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID : SPORT0510-5

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
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U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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GENERAL ENGINEERING LABORATORIES

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STATE	GEL	EPI
FL	E87156/87294	E87472/8
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 | Report Date: September 18, 1997 |

Sample ID	: SPORT0510-6
Lab ID	: 9709315-04
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	164	330	ug/kg	1.0	WAM	09/16/97	1544	107869	1
Acenaphthylene	U	0.00	164	330	ug/kg	1.0					
Anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	164	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	164	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Chrysene	U	0.00	164	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	164	330	ug/kg	1.0					
Fluoranthene	U	0.00	164	330	ug/kg	1.0					
Fluorene	U	0.00	164	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	164	330	ug/kg	1.0					
Naphthalene	U	0.00	164	330	ug/kg	1.0					
Phenanthrene	U	0.00	164	330	ug/kg	1.0					
Pyrene	U	0.00	164	330	ug/kg	1.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	0.00	6.62	13.2	ug/kg	10.	JLS	09/17/97	0803	107880	2
4,4'-DDE	U	0.00	6.62	13.2	ug/kg	10.					
4,4'-DDT	U	0.00	6.62	13.2	ug/kg	10.					
Aldrin	U	0.00	3.31	6.62	ug/kg	10.					
Chlordane		146	41.4	82.8	ug/kg	10.					
Dieldrin	U	0.00	6.62	13.2	ug/kg	10.					
Endosulfan I	U	0.00	3.31	6.62	ug/kg	10.					
Endosulfan II	U	0.00	6.62	13.2	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.62	13.2	ug/kg	10.					
Endrin	U	0.00	6.62	13.2	ug/kg	10.					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID : SPORT0510-6

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	6.62	13.2	ug/kg	10.					
Heptachlor	U	0.00	3.31	6.62	ug/kg	10.	JLS	09/17/97	0803	107880	2
Heptachlor epoxide	U	0.00	3.31	6.62	ug/kg	10.					
Methoxychlor	U	0.00	33.1	66.2	ug/kg	10.					
Toxaphene	U	0.00	166	331	ug/kg	10.					
alpha-BHC	U	0.00	3.31	6.62	ug/kg	10.					
beta-BHC	U	0.00	3.31	6.62	ug/kg	10.					
delta-BHC	U	0.00	3.31	6.62	ug/kg	10.					
gamma-BHC	U	0.00	3.31	6.62	ug/kg	10.					
Metals Analysis											
Arsenic	U	164	289	485	ug/kg	2.0	MBL	09/16/97	1516	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	59.3	(30.0 - 115.)
Nitrobenzene-d5	M610	58.6	(23.0 - 120.)
p-Terphenyl-d14	M610	89.9	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
	EPA 3550
	EPA 3050

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87451
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-6

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
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U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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9709315-04

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID	: SPORT0510-7
Lab ID	: 9709315-05
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	165	330	ug/kg	1.0	WAM	09/16/97	1614	107869	1
Acenaphthylene	U	0.00	165	330	ug/kg	1.0					
Anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	165	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	165	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Chrysene	U	0.00	165	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	165	330	ug/kg	1.0					
Fluoranthene	U	0.00	165	330	ug/kg	1.0					
Fluorene	U	0.00	165	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	165	330	ug/kg	1.0					
Naphthalene	U	0.00	165	330	ug/kg	1.0					
Phenanthrene	U	0.00	165	330	ug/kg	1.0					
Pyrene	U	0.00	165	330	ug/kg	1.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	0.00	6.58	13.2	ug/kg	10.	JLS	09/17/97	0841	107880	2
4,4'-DDE	J	10.0	6.58	13.2	ug/kg	10.					
4,4'-DDT	U	0.00	6.58	13.2	ug/kg	10.					
Aldrin	U	0.00	3.29	6.58	ug/kg	10.					
Chlordane	J	76.7	41.1	82.3	ug/kg	10.					
Dieldrin	U	0.00	6.58	13.2	ug/kg	10.					
Endosulfan I	U	0.00	3.29	6.58	ug/kg	10.					
Endosulfan II	U	0.00	6.58	13.2	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.58	13.2	ug/kg	10.					
Endrin	U	0.00	6.58	13.2	ug/kg	10.					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-7

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	6.58	13.2	ug/kg	10.					
Heptachlor	U	0.00	3.29	6.58	ug/kg	10.	JLS	09/17/97	0841	107880	2
Heptachlor epoxide	U	0.00	3.29	6.58	ug/kg	10.					
Methoxychlor	U	0.00	32.9	65.8	ug/kg	10.					
Toxaphene	U	0.00	165	329	ug/kg	10.					
alpha-BHC	U	0.00	3.29	6.58	ug/kg	10.					
beta-BHC	U	0.00	3.29	6.58	ug/kg	10.					
delta-BHC	U	0.00	3.29	6.58	ug/kg	10.					
gamma-BHC	U	0.00	3.29	6.58	ug/kg	10.					
Metals Analysis											
Arsenic	U	181	298	500	ug/kg	2.0	MBL	09/16/97	1617	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	57.4	(30.0 - 115.)
Nitrobenzene-d5	M610	49.5	(23.0 - 120.)
p-Terphenyl-d14	M610	89.6	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
	EPA 3550
	EPA 3050

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-7

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
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U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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GENERAL ENGINEERING LABORATORIES

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID	: SPORT0510-8
Lab ID	: 9709315-06
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	1630	3260	ug/kg	10.	WAM	09/16/97	1645	107869	1
Acenaphthylene	U	0.00	1630	3260	ug/kg	10.					
Anthracene	U	0.00	1630	3260	ug/kg	10.					
Benzo(a)anthracene	U	0.00	1630	3260	ug/kg	10.					
Benzo(a)pyrene	U	0.00	1630	3260	ug/kg	10.					
Benzo(b)fluoranthene	U	0.00	1630	3260	ug/kg	10.					
Benzo(ghi)perylene	U	0.00	1630	3260	ug/kg	10.					
Benzo(k)fluoranthene	U	0.00	1630	3260	ug/kg	10.					
Chrysene	U	0.00	1630	3260	ug/kg	10.					
Dibenzo(a,h)anthracene	U	0.00	1630	3260	ug/kg	10.					
Fluoranthene	U	0.00	1630	3260	ug/kg	10.					
Fluorene	U	0.00	1630	3260	ug/kg	10.					
Indeno(1,2,3-c,d)pyrene	U	0.00	1630	3260	ug/kg	10.					
Naphthalene	U	0.00	1630	3260	ug/kg	10.					
Phenanthrene	U	0.00	1630	3260	ug/kg	10.					
Pyrene	U	0.00	1630	3260	ug/kg	10.					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	0.00	133	266	ug/kg	200	JLS	09/17/97	0919	107880	2
4,4'-DDE	U	0.00	133	266	ug/kg	200					
4,4'-DDT	U	0.00	133	266	ug/kg	200					
Aldrin	U	0.00	66.4	133	ug/kg	200					
Chlordane		1710	830	1660	ug/kg	200					
Dieldrin	U	0.00	133	266	ug/kg	200					
Endosulfan I	U	0.00	66.4	133	ug/kg	200					
Endosulfan II	U	0.00	133	266	ug/kg	200					
Endosulfan sulfate	U	0.00	133	266	ug/kg	200					
Endrin	U	0.00	133	266	ug/kg	200					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID : SPORT0510-8

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	133	266	ug/kg	200					
Heptachlor	U	0.00	66.4	133	ug/kg	200	JLS	09/17/97	0919	107880	2
Heptachlor epoxide	U	0.00	66.4	133	ug/kg	200					
Methoxychlor	U	0.00	664	1330	ug/kg	200					
Toxaphene	U	0.00	3320	6640	ug/kg	200					
alpha-BHC	U	0.00	66.4	133	ug/kg	200					
beta-BHC	U	0.00	66.4	133	ug/kg	200					
delta-BHC	U	0.00	66.4	133	ug/kg	200					
gamma-BHC	U	0.00	66.4	133	ug/kg	200					
Metals Analysis											
Arsenic		2090	276	463	ug/kg	2.0	MBL	09/16/97	1526	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	0.00*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
	EPA 3550
	EPA 3050

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9709315-06

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8745
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-8

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
indicates that the analyte was not detected at a concentration greater than the detection limit.
dicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87473
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID	: SPORT0510-9
Lab ID	: 9709315-07
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	164	330	ug/kg	1.0	WAM	09/16/97	1715	107869	1
Acenaphthylene	U	0.00	164	330	ug/kg	1.0					
Anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	164	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	164	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	164	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	164	330	ug/kg	1.0					
Chrysene	U	0.00	164	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	164	330	ug/kg	1.0					
Fluoranthene	U	0.00	164	330	ug/kg	1.0					
Fluorene	U	0.00	164	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	164	330	ug/kg	1.0					
Naphthalene	U	0.00	164	330	ug/kg	1.0					
Phenanthrene	U	0.00	164	330	ug/kg	1.0					
Pyrene	U	0.00	164	330	ug/kg	1.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD		80.8	6.62	13.2	ug/kg	10.	JLS	09/17/97	0957	107880	2
4,4'-DDE	U	0.00	6.62	13.2	ug/kg	10.					
4,4'-DDT		204	33.1	66.2	ug/kg	50.					
Aldrin		9.90	3.31	6.62	ug/kg	10.					
Chlordane		910	41.4	82.8	ug/kg	10.					
Dieldrin	U	0.00	6.62	13.2	ug/kg	10.					
Endosulfan I	U	0.00	3.31	6.62	ug/kg	10.					
Endosulfan II	U	0.00	6.62	13.2	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.62	13.2	ug/kg	10.					
Endrin	U	0.00	6.62	13.2	ug/kg	10.					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-9

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	6.62	13.2	ug/kg	10.					
Heptachlor	U	0.00	3.31	6.62	ug/kg	10.	JLS	09/17/97	0957	107880	2
Heptachlor epoxide	U	0.00	3.31	6.62	ug/kg	10.					
Methoxychlor	U	0.00	33.1	66.2	ug/kg	10.					
Toxaphene	U	0.00	166	331	ug/kg	10.					
alpha-BHC	U	0.00	3.31	6.62	ug/kg	10.					
beta-BHC	U	0.00	3.31	6.62	ug/kg	10.					
delta-BHC	U	0.00	3.31	6.62	ug/kg	10.					
gamma-BHC	U	0.00	3.31	6.62	ug/kg	10.					
Metals Analysis											
Arsenic		604	284	476	ug/kg	2.0	MBL	09/16/97	1531	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	68.5	(30.0 - 115.)
Nitrobenzene-d5	M610	62.8	(23.0 - 120.)
p-Terphenyl-d14	M610	84.1	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
[illegible]	EPA 3550
[illegible]	EPA 3050

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-9

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
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J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID	: SPORT0510-10
Lab ID	: 9709315-08
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
olynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	1630	3250	ug/kg	10.	WAM	09/16/97	1745	107869	1
Acenaphthylene	U	0.00	1630	3250	ug/kg	10.					
Anthracene	U	0.00	1630	3250	ug/kg	10.					
Benzo(a)anthracene	U	0.00	1630	3250	ug/kg	10.					
Benzo(a)pyrene	U	0.00	1630	3250	ug/kg	10.					
Benzo(b)fluoranthene	U	0.00	1630	3250	ug/kg	10.					
Benzo(ghi)perylene	U	0.00	1630	3250	ug/kg	10.					
Benzo(k)fluoranthene	U	0.00	1630	3250	ug/kg	10.					
Chrysene	U	0.00	1630	3250	ug/kg	10.					
Dibenzo(a,h)anthracene	U	0.00	1630	3250	ug/kg	10.					
Fluoranthene	U	0.00	1630	3250	ug/kg	10.					
Fluorene	U	0.00	1630	3250	ug/kg	10.					
Indeno(1,2,3-c,d)pyrene	U	0.00	1630	3250	ug/kg	10.					
Naphthalene	U	0.00	1630	3250	ug/kg	10.					
Phenanthrene	U	0.00	1630	3250	ug/kg	10.					
Pyrene	U	0.00	1630	3250	ug/kg	10.					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	73.7	132	263	ug/kg	200	JLS	09/17/97	1035	107880	2
4,4'-DDE	U	0.00	132	263	ug/kg	200					
4,4'-DDT	U	0.00	132	263	ug/kg	200					
Aldrin	U	0.00	65.8	132	ug/kg	200					
Chlordane		2060	823	1650	ug/kg	200					
Dieldrin	U	0.00	132	263	ug/kg	200					
Endosulfan I	U	0.00	65.8	132	ug/kg	200					
ıdosulfan II	U	0.00	132	263	ug/kg	200					
ıdosulfan sulfate	U	0.00	132	263	ug/kg	200					
Endrin	U	0.00	132	263	ug/kg	200					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID : SPORT0510-10

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	132	263	ug/kg	200					
Heptachlor	U	0.00	65.8	132	ug/kg	200	JLS	09/17/97	1035	107880	2
Heptachlor epoxide	U	0.00	65.8	132	ug/kg	200					
Methoxychlor	U	0.00	658	1320	ug/kg	200					
Toxaphene	U	0.00	3290	6580	ug/kg	200					
alpha-BHC	U	0.00	65.8	132	ug/kg	200					
beta-BHC	U	0.00	65.8	132	ug/kg	200					
delta-BHC	J	73.7	65.8	132	ug/kg	200					
gamma-BHC	U	0.00	65.8	132	ug/kg	200					
Metals Analysis											
Arsenic		24900	279	467	ug/kg	2.0	MBL	09/16/97	1546	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	0.00*	(30.0 - 115.)
Nitrobenzene-d5	M610	0.00*	(23.0 - 120.)
p-Terphenyl-d14	M610	0.00*	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
	EPA 3550
	EPA 3050

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-10

M = Method	Method-Description

Notes:
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U indicates that the analyte was not detected at a concentration greater than the detection limit.
indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID	: SPORT0510-11
Lab ID	: 9709315-09
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	332	664	ug/kg	2.0	WAM	09/16/97	1816	107869	1
Acenaphthylene	U	0.00	332	664	ug/kg	2.0					
Anthracene	U	0.00	332	664	ug/kg	2.0					
Benzo(a)anthracene	U	0.00	332	664	ug/kg	2.0					
Benzo(a)pyrene	U	0.00	332	664	ug/kg	2.0					
Benzo(b)fluoranthene	U	0.00	332	664	ug/kg	2.0					
Benzo(ghi)perylene	U	0.00	332	664	ug/kg	2.0					
Benzo(k)fluoranthene	U	0.00	332	664	ug/kg	2.0					
Chrysene	U	0.00	332	664	ug/kg	2.0					
Dibenzo(a,h)anthracene	U	0.00	332	664	ug/kg	2.0					
Fluoranthene	U	0.00	332	664	ug/kg	2.0					
Fluorene	U	0.00	332	664	ug/kg	2.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	332	664	ug/kg	2.0					
Naphthalene	U	0.00	332	664	ug/kg	2.0					
Phenanthrene	U	0.00	332	664	ug/kg	2.0					
Pyrene	U	0.00	332	664	ug/kg	2.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	0.00	6.60	13.2	ug/kg	10.	JLS	09/17/97	1113	107880	2
4,4'-DDE	U	0.00	6.60	13.2	ug/kg	10.					
4,4'-DDT	U	0.00	6.60	13.2	ug/kg	10.					
Aldrin	U	0.00	3.30	6.60	ug/kg	10.					
Chlordane	J	48.8	41.3	82.5	ug/kg	10.					
Dieldrin	U	0.00	6.60	13.2	ug/kg	10.					
Endosulfan I	U	0.00	3.30	6.60	ug/kg	10.					
Endosulfan II	U	0.00	6.60	13.2	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.60	13.2	ug/kg	10.					
Endrin	U	0.00	6.60	13.2	ug/kg	10.					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106
Contact: Mr. Bill Hiers
Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-11

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	6.60	13.2	ug/kg	10.					
Heptachlor	U	0.00	3.30	6.60	ug/kg	10.	JLS	09/17/97	1113	107880	2
Heptachlor epoxide	U	0.00	3.30	6.60	ug/kg	10.					
Methoxychlor	U	0.00	33.0	66.0	ug/kg	10.					
Toxaphene	U	0.00	165	330	ug/kg	10.					
alpha-BHC	U	0.00	3.30	6.60	ug/kg	10.					
beta-BHC		9.04	3.30	6.60	ug/kg	10.					
delta-BHC		7.69	3.30	6.60	ug/kg	10.					
gamma-BHC	U	0.00	3.30	6.60	ug/kg	10.					
Metals Analysis											
Arsenic	U	144	287	481	ug/kg	2.0	MBL	09/16/97	1551	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	68.4	(30.0 - 115.)
Nitrobenzene-d5	M610	57.1	(23.0 - 120.)
p-Terphenyl-d14	M610	96.7	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
4	EPA 3550
5	EPA 3050

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GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-11

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
[illegible]dicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/S...
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID	: SPORT0510-12
Lab ID	: 9709315-10
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	331	662	ug/kg	2.0	WAM	09/16/97	1846	107869	1
Acenaphthylene	U	0.00	331	662	ug/kg	2.0					
Anthracene	U	0.00	331	662	ug/kg	2.0					
Benzo(a)anthracene	U	0.00	331	662	ug/kg	2.0					
Benzo(a)pyrene	U	0.00	331	662	ug/kg	2.0					
Benzo(b)fluoranthene	U	0.00	331	662	ug/kg	2.0					
Benzo(ghi)perylene	U	0.00	331	662	ug/kg	2.0					
Benzo(k)fluoranthene	U	0.00	331	662	ug/kg	2.0					
Chrysene	U	0.00	331	662	ug/kg	2.0					
Dibenzo(a,h)anthracene	U	0.00	331	662	ug/kg	2.0					
Fluoranthene	U	0.00	331	662	ug/kg	2.0					
Fluorene	U	0.00	331	662	ug/kg	2.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	331	662	ug/kg	2.0					
Naphthalene	U	0.00	331	662	ug/kg	2.0					
Phenanthrene	U	0.00	331	662	ug/kg	2.0					
Pyrene	U	0.00	331	662	ug/kg	2.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	U	0.00	6.62	13.2	ug/kg	10.	JLS	09/17/97	1150	107880	2
4,4'-DDE	U	0.00	6.62	13.2	ug/kg	10.					
4,4'-DDT	U	0.00	6.62	13.2	ug/kg	10.					
Aldrin	U	0.00	3.31	6.62	ug/kg	10.					
Chlordane	U	0.00	41.4	82.8	ug/kg	10.					
Dieldrin	U	0.00	6.62	13.2	ug/kg	10.					
Endosulfan I	U	0.00	3.31	6.62	ug/kg	10.					
Endosulfan II	U	0.00	6.62	13.2	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.62	13.2	ug/kg	10.					
Endrin	U	0.00	6.62	13.2	ug/kg	10.					

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with ... vision for tomorrow

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID : SPORT0510-12

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	6.62	13.2	ug/kg	10.					
Heptachlor	U	0.00	3.31	6.62	ug/kg	10.	JLS	09/17/97	1150	107880	2
Heptachlor epoxide	U	0.00	3.31	6.62	ug/kg	10.					
Methoxychlor	U	0.00	33.1	66.2	ug/kg	10.					
Toxaphene	U	0.00	166	331	ug/kg	10.					
alpha-BHC	U	0.00	3.31	6.62	ug/kg	10.					
beta-BHC	U	0.00	3.31	6.62	ug/kg	10.					
delta-BHC	U	0.00	3.31	6.62	ug/kg	10.					
gamma-BHC	U	0.00	3.31	6.62	ug/kg	10.					
Metals Analysis											
Arsenic	U	223	298	500	ug/kg	2.0	MBL	09/16/97	1556	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	68.9	(30.0 - 115.)
Nitrobenzene-d5	M610	57.3	(23.0 - 120.)
p-Terphenyl-d14	M610	158.*	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
M 4	EPA 3550
M 5	EPA 3050

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GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E3747[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-12

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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GENERAL ENGINEERING LABORATORIES

Meeting Your Needs with Quality Service

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID	: SPORT0510-13
Lab ID	: 9709315-11
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Extractable Organics											
Polynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	166	331	ug/kg	1.0	RLC	09/18/97	0913	107869	1
Acenaphthylene	U	0.00	166	331	ug/kg	1.0					
Anthracene	U	0.00	166	331	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	166	331	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	166	331	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	166	331	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	166	331	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	166	331	ug/kg	1.0					
Chrysene	U	0.00	166	331	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	166	331	ug/kg	1.0					
Fluoranthene	U	0.00	166	331	ug/kg	1.0					
Fluorene	U	0.00	166	331	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	166	331	ug/kg	1.0					
Naphthalene		1480	166	331	ug/kg	1.0					
Phenanthrene	U	0.00	166	331	ug/kg	1.0					
Pyrene	U	0.00	166	331	ug/kg	1.0					
Parathion, methyl	U	0.00	8.30	16.6	ug/kg	10.	JLS	09/17/97	1306	107880	N
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	J	11.5	6.64	13.3	ug/kg	10.	JLS	09/17/97	1306	107880	2
4,4'-DDE	U	1.79	6.64	13.3	ug/kg	10.					
4,4'-DDT		123	6.64	13.3	ug/kg	10.					
Aldrin	U	1.46	3.32	6.64	ug/kg	10.					
Chlordane	J	69.7	41.5	83.0	ug/kg	10.					
Dieldrin	U	0.00	6.64	13.3	ug/kg	10.					
Endosulfan I	U	0.00	3.32	6.64	ug/kg	10.					
Endosulfan II	U	0.00	6.64	13.3	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.64	13.3	ug/kg	10.					

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with [illegible] tomorrow

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin	U	0.00	6.64	13.3	ug/kg	10.					
Endrin aldehyde	U	0.00	6.64	13.3	ug/kg	10.	JLS	09/17/97	1306	107880	2
Heptachlor	U	0.00	3.32	6.64	ug/kg	10.					
Heptachlor epoxide	U	0.00	3.32	6.64	ug/kg	10.					
Methoxychlor	U	0.00	33.2	66.4	ug/kg	10.					
Toxaphene	U	0.00	166	332	ug/kg	10.					
alpha-BHC	U	0.00	3.32	6.64	ug/kg	10.					
beta-BHC	U	0.00	3.32	6.64	ug/kg	10.					
delta-BHC	U	0.00	3.32	6.64	ug/kg	10.					
gamma-BHC	U	0.00	3.32	6.64	ug/kg	10.					
Parathion	U	0.00	8.30	16.6	ug/kg	10.					
Phorate	U	0.00	8.30	16.6	ug/kg	10.					
Metals Analysis											
Arsenic		3030	284	476	ug/kg	2.0	MBL	09/16/97	1601	107865	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	DDT	09/15/97	1600	107869	4
Pesticides	JLS	09/15/97	1200	107880	4
TRACE	FGD	09/15/97	1900	107865	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	77.3	(30.0 - 115.)
Nitrobenzene-d5	M610	70.5	(23.0 - 120.)
p-Terphenyl-d14	M610	93.7	(37.3 - 128.)
4CMX	MPRTHN-ECD	0.00*	(45.8 - 148.)
Dibutylchlorendate	MPRTHN-ECD	0.00*	(30.7 - 143.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)
4CMX	PARATHION	0.00*	(45.8 - 148.)
[illegible]butylchlorendate	PARATHION	0.00*	(30.7 - 143.)
[illegible]MX	PHORATE	0.00*	(45.8 - 148.)
[illegible]butylchlorendate	PHORATE	0.00*	(30.7 - 143.)

GENERAL ENGINEERING LABORATORIES

Meeting today's tests with a vision for tomorrow

Laboratory Certifications

STATE	GEL	EPI
FL	ES7156/87294	ES7472/S7455
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-13

Surrogate Recovery	Test	Percent%	Acceptable Limits

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
M 4	EPA 3550
M 5	EPA 3050

Notes:
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* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

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Karen Blakeney
Reviewed By

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GENERAL ENGINEERING LABORATORIES

Meeting [illegible] needs [illegible] tomorrow

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E5747[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID	: SPORT0510-13
Lab ID	: 9709315-12
Matrix	: Soil
Date Collected	: 09/13/97
Date Received	: 09/15/97
Priority	: Rush
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
Appendix IX Volatiles - 55 items											
1,1,1,2-Tetrachloroethane	U	0.00	10.0	20.0	ug/kg	10.	TCL	09/16/97	0949	107810	1
1,1,1-Trichloroethane	U	0.00	10.0	20.0	ug/kg	10.					
1,1,2,2-Tetrachloroethane	U	0.00	10.0	20.0	ug/kg	10.					
1,1,2-Trichloroethane	U	0.00	10.0	20.0	ug/kg	10.					
1,1-Dichloroethane	U	0.00	10.0	20.0	ug/kg	10.					
1,1-Dichloroethylene	U	0.00	10.0	20.0	ug/kg	10.					
1,2,3-Trichloropropane	U	0.00	10.0	20.0	ug/kg	10.					
1,2-Dibromo-3-chloropropane	U	0.00	10.0	20.0	ug/kg	10.					
1,2-Dibromoethane	U	0.00	10.0	20.0	ug/kg	10.					
1,2-Dichlorobenzene	U	0.00	10.0	20.0	ug/kg	10.					
1,2-Dichloroethane	U	0.00	10.0	20.0	ug/kg	10.					
1,2-Dichloropropane	U	0.00	10.0	20.0	ug/kg	10.					
1,2-cis-Dichloroethylene	U	0.00	10.0	20.0	ug/kg	10.					
1,2-trans-Dichloroethylene	U	0.00	10.0	20.0	ug/kg	10.					
2-Butanone	U	0.00	20.0	50.0	ug/kg	10.					
2-Hexanone	U	0.00	50.0	100	ug/kg	10.					
4-Methyl-2-pentanone	U	0.00	50.0	100	ug/kg	10.					
Acetone	U	0.00	50.0	100	ug/kg	10.					
Acetonitrile	U	0.00	20.0	100	ug/kg	10.					
Acrolein	U	0.00	100	200	ug/kg	10.					
Acrylonitrile	U	0.00	50.0	500	ug/kg	10.					
Allyl Chloride	U	0.00	50.0	100	ug/kg	10.					
Benzene	U	0.00	10.0	20.0	ug/kg	10.					
Bromoform	U	0.00	10.0	20.0	ug/kg	10.					
Carbon Disulfide	U	0.00	20.0	50.0	ug/kg	10.					
Carbon Tetrachloride	U	0.00	10.0	20.0	ug/kg	10.					
Chlorobenzene		22.0	10.0	20.0	ug/kg	10.					

GENERAL ENGINEERING LABORATORIES

Meeting Today's Needs & Tomorrow's Challenges

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Chlorodibromomethane	U	0.00	10.0	20.0	ug/kg	10.					
Chloroethane	U	0.00	10.0	20.0	ug/kg	10.	TCL	09/16/97	0949	107810	1
Chloroform	U	0.00	10.0	20.0	ug/kg	10.					
Chloroprene	U	0.00	20.0	20.0	ug/kg	10.					
Dibromomethane	U	0.00	10.0	20.0	ug/kg	10.					
Dichlorobromomethane	U	0.00	10.0	20.0	ug/kg	10.					
Dichlorodifluoromethane	U	0.00	10.0	20.0	ug/kg	10.					
Ethylbenzene		27.5	10.0	20.0	ug/kg	10.					
Isobutyl Alcohol	U	0.00	100	200	ug/kg	10.					
Methacrylonitrile	U	0.00	50.0	100	ug/kg	10.					
Methyl Bromide	U	0.00	10.0	20.0	ug/kg	10.					
Methyl Chloride	U	0.00	10.0	20.0	ug/kg	10.					
Methyl Iodide	U	0.00	20.0	50.0	ug/kg	10.					
Methyl Methacrylate	U	0.00	20.0	100	ug/kg	10.					
Methylene Chloride	U	0.00	10.0	50.0	ug/kg	10.					
Propionitrile	U	0.00	100	200	ug/kg	10.					
Styrene	U	0.00	10.0	20.0	ug/kg	10.					
Tetrachloroethylene	U	0.00	10.0	20.0	ug/kg	10.					
Toluene	U	0.00	10.0	20.0	ug/kg	10.					
Trichloroethylene	U	0.00	10.0	20.0	ug/kg	10.					
Trichlorofluoromethane	U	0.00	10.0	20.0	ug/kg	10.					
Vinyl Acetate	U	0.00	50.0	100	ug/kg	10.					
Vinyl chloride	U	0.00	10.0	20.0	ug/kg	10.					
Xylenes (TOTAL)		144	10.0	20.0	ug/kg	10.					
bis(2-Chloromethylethyl)ether	U	0.00	100	200	ug/kg	10.					
cis-1,3-Dichloropropylene	U	0.00	10.0	20.0	ug/kg	10.					
trans-1,3-Dichloropropylene	U	0.00	10.0	20.0	ug/kg	10.					
trans-1,4-Dichloro-2-butene	U	0.00	10.0	20.0	ug/kg	10.					
Extractable Organics											
Appendix IX Acid Compounds - 18 items											
2,3,4,6-Tetrachlorophenol	U	0.00	166	332	ug/kg	1.0	WAM	09/18/97	1631	108046	2
2,4,5-Trichlorophenol	U	0.00	166	332	ug/kg	1.0					
2,4,6-Trichlorophenol	U	0.00	166	332	ug/kg	1.0					
2,4-Dichlorophenol		332	166	332	ug/kg	1.0					
2,4-Dimethylphenol	U	0.00	166	332	ug/kg	1.0					

GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
2,4-Dinitrophenol	U	0.00	332	664	ug/kg	1.0					
2,6-Dichlorophenol	U	0.00	166	332	ug/kg	1.0	WAM	09/18/97	1631	108046	2
2-Chlorophenol	U	0.00	166	332	ug/kg	1.0					
2-Nitrophenol	U	0.00	166	332	ug/kg	1.0					
2-methyl-4,6-dinitrophenol	U	0.00	166	332	ug/kg	1.0					
2-sec-Butyl-4,6-Dinitrophenol	U	0.00	166	332	ug/kg	1.0					
4-Nitrophenol	U	0.00	166	332	ug/kg	1.0					
4-chloro-3-methyl phenol	U	0.00	166	332	ug/kg	1.0					
Hexachlorophene	U	0.00	8300	16600	ug/kg	1.0					
Pentachlorophenol	U	0.00	166	332	ug/kg	1.0					
Phenol	U	0.00	166	332	ug/kg	1.0					
m,p-Cresol	U	0.00	166	332	ug/kg	1.0					
o-Cresol	U	0.00	166	332	ug/kg	1.0					
Appendix IX Base/Neutral Compounds - 102 items											
1,2,4,5-Tetrachlorobenzene	U	0.00	166	332	ug/kg	1.0					
1,2,4-Trichlorobenzene	U	0.00	166	332	ug/kg	1.0					
1,2-Dichlorobenzene	U	0.00	166	332	ug/kg	1.0					
1,3-Dichlorobenzene	U	0.00	166	332	ug/kg	1.0					
1,4-Dichlorobenzene	U	0.00	166	332	ug/kg	1.0					
1,4-Dioxane	U	0.00	166	332	ug/kg	1.0					
1,4-Naphthoquinone	U	0.00	166	332	ug/kg	1.0					
1-Naphthylamine	U	0.00	166	332	ug/kg	1.0					
2,4-Dinitrotoluene	U	0.00	166	332	ug/kg	1.0					
2,6-Dinitrotoluene	U	0.00	166	332	ug/kg	1.0					
2-Acetylaminofluorene	U	0.00	166	332	ug/kg	1.0					
2-Chloronaphthalene	U	0.00	166	332	ug/kg	1.0					
2-Methylnaphthalene	J	295	166	332	ug/kg	1.0					
2-Naphthylamine	U	0.00	166	332	ug/kg	1.0					
2-Picoline	U	0.00	166	332	ug/kg	1.0					
3,3'-Dichlorobenzidine	U	0.00	1660	1660	ug/kg	1.0					
3,3'-Dimethylbenzidine	U	0.00	830	1660	ug/kg	1.0					
7-Methylcholanthrene	U	0.00	166	332	ug/kg	1.0					
Bromophenyl phenyl ether	U	0.00	166	332	ug/kg	1.0					
-Chloroaniline	U	0.00	199	332	ug/kg	1.0					
4-Chlorophenyl phenyl ether	U	0.00	166	332	ug/kg	1.0					

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8745
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
4-aminobiphenyl	U	0.00	166	332	ug/kg	1.0					
5-Nitro-o-toluidine	U	0.00	166	332	ug/kg	1.0	WAM	09/18/97	1631	108046	2
7,12-Dimethylbenz(a)anthracene	U	0.00	166	332	ug/kg	1.0					
Acenaphthene	U	0.00	166	332	ug/kg	1.0					
Acenaphthylene	U	0.00	166	332	ug/kg	1.0					
Acetophenone	U	0.00	166	332	ug/kg	1.0					
Aniline	U	0.00	166	332	ug/kg	1.0					
Anthracene	U	0.00	166	332	ug/kg	1.0					
Aramite	U	0.00	166	332	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	166	332	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	166	332	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	166	332	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	166	332	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	166	332	ug/kg	1.0					
Benzyl Alcohol	U	0.00	166	332	ug/kg	1.0					
Butyl benzyl phthalate	U	0.00	166	332	ug/kg	1.0					
Chlorobenzilate	U	0.00	830	1660	ug/kg	1.0					
Chrysene	U	0.00	166	332	ug/kg	1.0					
Di-n-butyl phthalate	U	0.00	166	332	ug/kg	1.0					
Di-n-octyl phthalate	U	0.00	166	332	ug/kg	1.0					
Diallate	U	0.00	166	332	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	166	332	ug/kg	1.0					
Dibenzofuran	U	0.00	166	332	ug/kg	1.0					
Diethyl phthalate	U	0.00	166	332	ug/kg	1.0					
Dimethoate	U	0.00	830	1660	ug/kg	1.0					
Dimethyl phthalate	U	0.00	166	332	ug/kg	1.0					
Diphenylamine	U	0.00	166	332	ug/kg	1.0					
Disulfoton	U	0.00	166	332	ug/kg	1.0					
Ethyl Methanesulfonate	U	0.00	166	332	ug/kg	1.0					
Ethyl methacrylate	U	0.00	166	330	ug/kg	1.0					
Famphur	U	0.00	166	332	ug/kg	1.0					
Fluoranthene	U	0.00	166	332	ug/kg	1.0					
Fluorene	U	0.00	166	332	ug/kg	1.0					
Hexachlorobenzene	U	0.00	199	332	ug/kg	1.0					
Hexachlorobutadiene	U	0.00	166	332	ug/kg	1.0					

GENERAL ENGINEERING LABORATORIES

Meeting [illegible] needs [illegible]

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E37472[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Hexachlorocyclopentadiene	U	0.00	166	332	ug/kg	1.0					
Hexachloroethane	U	0.00	166	332	ug/kg	1.0	WAM	09/18/97	1631	108046	2
Hexachloropropene	U	0.00	166	332	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	166	332	ug/kg	1.0					
Isodrin	U	0.00	166	332	ug/kg	1.0					
Isophorone	U	0.00	166	332	ug/kg	1.0					
Isosafrole	U	0.00	166	332	ug/kg	1.0					
Kepone	U	0.00	166	332	ug/kg	1.0					
Methapyrilene	U	0.00	830	1660	ug/kg	1.0					
Methyl Methanesulfonate	U	0.00	166	332	ug/kg	1.0					
N-Nitrosodi-n-butylamine	U	0.00	166	332	ug/kg	1.0					
N-Nitrosodiethylamine	U	0.00	166	332	ug/kg	1.0					
N-Nitrosodimethylamine	U	0.00	166	332	ug/kg	1.0					
N-Nitrosodiphenylamine	U	0.00	166	332	ug/kg	1.0					
N-Nitrosodipropylamine	U	0.00	166	332	ug/kg	1.0					
N-Nitrosomethylethylamine	U	0.00	166	332	ug/kg	1.0					
N-Nitrosomorpholine	U	0.00	166	332	ug/kg	1.0					
N-Nitrosopiperidine	U	0.00	166	332	ug/kg	1.0					
N-Nitrosopyrolidine	U	0.00	166	332	ug/kg	1.0					
Naphthalene		1530	166	332	ug/kg	1.0					
Nitrobenzene	U	0.00	166	332	ug/kg	1.0					
O,O,O-Triethylphosphorothioate	U	0.00	166	332	ug/kg	1.0					
Pentachlorobenzene	U	0.00	166	332	ug/kg	1.0					
Pentachloroethane	U	0.00	166	332	ug/kg	1.0					
Pentachloronitrobenzene	U	0.00	166	332	ug/kg	1.0					
Phenacetin	U	0.00	166	332	ug/kg	1.0					
Phenanthrene	U	0.00	166	332	ug/kg	1.0					
Pronamide	U	0.00	166	332	ug/kg	1.0					
Pyrene	U	0.00	166	332	ug/kg	1.0					
Pyridine	U	0.00	166	332	ug/kg	1.0					
Safrole	U	0.00	166	332	ug/kg	1.0					
Sulfotepp	U	0.00	166	332	ug/kg	1.0					
Sulfonazin	U	0.00	166	332	ug/kg	1.0					
a-,a-Dimethylphenethylamine	U	0.00	199	332	ug/kg	1.0					
bis(2-Chloroethoxy)methane	U	0.00	166	332	ug/kg	1.0					

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 18, 1997

Sample ID : SPORT0510-13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
bis(2-Chloroethyl) ether	U	0.00	166	332	ug/kg	1.0					
bis(2-Ethylhexyl)phthalate	U	0.00	166	332	ug/kg	1.0	WAM	09/18/97	1631	108046	2
m-Dinitrobenzene	U	0.00	166	332	ug/kg	1.0					
m-Nitroaniline	U	0.00	199	332	ug/kg	1.0					
o-Nitroaniline	U	0.00	166	332	ug/kg	1.0					
o-Toluidine	U	0.00	166	332	ug/kg	1.0					
p-Dimethylaminoazobenzene	U	0.00	166	332	ug/kg	1.0					
p-Nitroaniline	U	0.00	166	332	ug/kg	1.0					
p-Phenylenediamine	U	0.00	332	664	ug/kg	1.0					
sym-Trinitrobenzene	U	0.00	830	1660	ug/kg	1.0					
Appendix IX - Herbicides - 3 items											
2,4,5-T	U	0.00	16.4	40.0	ug/kg	200	JPA	09/18/97	1139	107916	3
2,4,5-TP		58.0	18.7	40.0	ug/kg	200					
2,4-D		704	18.1	40.0	ug/kg	200					
PCB analysis - 7 items											
PCB-1016	U	0.00	650	813	ug/kg	200	JPA	09/18/97	1622	107906	4
PCB-1221	U	0.00	650	813	ug/kg	200					
PCB-1232	U	0.00	650	813	ug/kg	200					
PCB-1242	U	0.00	650	813	ug/kg	200					
PCB-1248	U	0.00	650	813	ug/kg	200					
PCB-1254		2730	650	813	ug/kg	200					
PCB-1260	U	0.00	650	813	ug/kg	200					
Metals Analysis											
Mercury	U	0.0134	0.0139	0.0333	mg/kg	1.0	RMJ	09/16/97	1545	107871	5
Silver	J	118	59.0	476	ug/kg	2.0	MBL	09/16/97	1601	107901	6
Arsenic		3030	284	476	ug/kg	2.0					
Barium		954	31.6	476	ug/kg	2.0					
Beryllium	U	3.11	21.2	476	ug/kg	2.0					
Cadmium	J	27.3	19.8	476	ug/kg	2.0					
Cobalt	U	58.4	63.9	476	ug/kg	2.0					
Chromium		686	69.4	476	ug/kg	2.0					
Copper	J	148	126	476	ug/kg	2.0					
Nickel	U	41.2	216	476	ug/kg	2.0					
Lead		1370	64.5	476	ug/kg	2.0					
Antimony	U	75.4	156	952	ug/kg	2.0					

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STATE	GEL	EPI
FL	E87156/87294	E87472/87--
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-13

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Selenium	J	288	133	476	ug/kg	2.0					
Tin	J	554	280	952	ug/kg	2.0	MBL	09/16/97	1601	107901	6
Thallium	U	-178	250	952	ug/kg	2.0					
Vanadium		503	40.7	476	ug/kg	2.0					
Zinc		1580	92.0	476	ug/kg	2.0					

: following prep procedures were performed:

GC/MS Acid Compounds	GWL	09/17/97	2000	108046	7
GC/MS Base/Neutral Compounds	GWL	09/17/97	2000	108046	7
Herbicides	JPB	09/16/97	1100	107916	8
PCB's	HDB	09/16/97	1400	107906	7
Mercury	RMJ	09/16/97	1230	107871	5
TRACE	FGD	09/15/97	1900	107901	9

Surrogate Recovery	Test	Percent%	Acceptable Limits
2,4,6-Tribromophenol	APP 9 ACID	69.9	(40.3 - 122.)
2-Fluorophenol	APP 9 ACID	63.7	(25.0 - 121.)
Phenol-d6	APP 9 ACID	72.3	(24.0 - 113.)
2-Fluorobiphenyl	APP 9 B/N	66.8	(30.0 - 115.)
Nitrobenzene-d5	APP 9 B/N	61.8	(23.0 - 120.)
p-Terphenyl-d14	APP 9 B/N	74.7	(37.3 - 128.)
2,4-Dichlorophenylacetic acid	APP 9 HERBICIDES	0.00*	(51.9 - 180.)
4CMX	PCB	0.00*	(36.5 - 172.)
Bromofluorobenzene	APP 9 VOA-8260	99.8	(53.5 - 154.)
Dibromofluoromethane	APP 9 VOA-8260	97.8	(63.4 - 136.)
Toluene-d8	APP 9 VOA-8260	105.	(72.1 - 137.)

* = Method	Method-Description
	EPA 8260
.n 2	EPA 8270

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STATE	GEL	EPI
FL	E87156/87294	E87472/87453
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 18, 1997

Sample ID : SPORT0510-13

M = Method	Method-Description
M 3	EPA 8151 modified
M 4	EPA 8081
M 5	EPA 7471
M 6	EPA 6010A
M 7	EPA 3550
M 8	EPA 8150
M 9	EPA 3050

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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STATE	GEL	EPI
FL	E87156/87294	E87472
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SC	.0120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: October 08, 1997

Sample ID	: SPORT0513-1
Lab ID	: 9709676-01
Matrix	: Soil
Date Collected	: 09/19/97
Date Received	: 09/30/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
tractable Organics											
olynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	165	330	ug/kg	1.0	JCB	10/01/97	1937	108713	1
Acenaphthylene	U	0.00	165	330	ug/kg	1.0					
Anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	165	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	165	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	165	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	165	330	ug/kg	1.0					
Chrysene	U	0.00	165	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	165	330	ug/kg	1.0					
Fluoranthene	U	0.00	165	330	ug/kg	1.0					
Fluorene	U	0.00	165	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	165	330	ug/kg	1.0					
Naphthalene	U	0.00	165	330	ug/kg	1.0					
Phenanthrene	U	0.00	165	330	ug/kg	1.0					
Pyrene	U	0.00	165	330	ug/kg	1.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD		28.9	6.62	13.2	ug/kg	10.	JLS	10/02/97	0101	108610	2
4,4'-DDE		13.8	6.62	13.2	ug/kg	10.					
4,4'-DDT	U	0.00	6.62	13.2	ug/kg	10.					
Aldrin		16.9	3.31	6.62	ug/kg	10.					
Chlordane	U	0.00	41.4	82.8	ug/kg	10.					
Dieldrin		14.7	6.62	13.2	ug/kg	10.					
dosulfan I	U	0.00	3.31	6.62	ug/kg	10.					
dosulfan II	U	0.00	6.62	13.2	ug/kg	10.					
ndosulfan sulfate	U	2.33	6.62	13.2	ug/kg	10.					
Endrin	J	12.9	6.62	13.2	ug/kg	10.					

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: October 08, 1997

Sample ID : SPORT0513-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	6.62	13.2	ug/kg	10.					
Heptachlor		8.01	3.31	6.62	ug/kg	10.	JLS	10/02/97	0101	108610	2
Heptachlor epoxide		12.7	3.31	6.62	ug/kg	10.					
Methoxychlor	U	0.00	33.1	66.2	ug/kg	10.					
Toxaphene	U	0.00	166	331	ug/kg	10.					
alpha-BHC	U	0.00	3.31	6.62	ug/kg	10.					
[illegible]ta-BHC	U	0.00	3.31	6.62	ug/kg	10.					
[illegible]ta-BHC		19.7	3.31	6.62	ug/kg	10.					
gamma-BHC	J	4.70	3.31	6.62	ug/kg	10.					
Metals Analysis											
Arsenic	U	146	287	481	ug/kg	2.0	MBL	10/01/97	1829	108719	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	TSD	10/01/97	1530	108713	4
Pesticides	HDB	10/01/97	1630	108610	4
TRACE	FGD	10/01/97	1230	108719	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	72.1	(30.0 - 115.)
Nitrobenzene-d5	M610	74.3	(23.0 - 120.)
p-Terphenyl-d14	M610	99.6	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
[illegible]3	EPA 6010A
[illegible]	EPA 3550
[illegible]5	EPA 3050

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8[illegible]
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: October 08, 1997

Sample ID : SPORT0513-1

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
' indicates that the analyte was not detected at a concentration greater than the detection limit.
idicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: October 08, 1997

Sample ID	: SPORT0513-2
Lab ID	: 9709676-02
Matrix	: Soil
Date Collected	: 09/19/97
Date Received	: 09/30/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
ractable Organics											
olynuclear Aromatic Hydrocarbons - 16 items											
Acenaphthene	U	0.00	166	332	ug/kg	1.0	JCB	10/01/97	2010	108713	1
Acenaphthylene	U	0.00	166	332	ug/kg	1.0					
Anthracene	U	0.00	166	332	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	166	332	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	166	332	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	166	332	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	166	332	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	166	332	ug/kg	1.0					
Chrysene	U	0.00	166	332	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	166	332	ug/kg	1.0					
Fluoranthene	U	0.00	166	332	ug/kg	1.0					
Fluorene	U	0.00	166	332	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	166	332	ug/kg	1.0					
Naphthalene	U	0.00	166	332	ug/kg	1.0					
Phenanthrene	U	0.00	166	332	ug/kg	1.0					
Pyrene	U	0.00	166	332	ug/kg	1.0					
Method 8080 - Organochlorine Pesticides - 19 items											
4,4'-DDD	J	7.83	6.58	13.2	ug/kg	10.	JLS	10/02/97	0136	108610	2
4,4'-DDE	J	11.4	6.58	13.2	ug/kg	10.					
4,4'-DDT	U	0.00	6.58	13.2	ug/kg	10.					
Aldrin	J	5.95	3.29	6.58	ug/kg	10.					
Chlordane	U	0.00	41.1	82.3	ug/kg	10.					
Dieldrin	J	7.07	6.58	13.2	ug/kg	10.					
dosulfan I	U	0.00	3.29	6.58	ug/kg	10.					
dosulfan II	U	0.00	6.58	13.2	ug/kg	10.					
Endosulfan sulfate	U	0.00	6.58	13.2	ug/kg	10.					
Endrin	U	0.00	6.58	13.2	ug/kg	10.					

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87453
NC	232	
SC	10120	10582
TN	02534	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: October 08, 1997

Sample ID : SPORT0513-2

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Endrin aldehyde	U	0.00	6.58	13.2	ug/kg	10.					
Heptachlor	U	0.00	3.29	6.58	ug/kg	10.	JLS	10/02/97	0136	108610	2
Heptachlor epoxide	U	0.00	3.29	6.58	ug/kg	10.					
Methoxychlor	U	0.00	32.9	65.8	ug/kg	10.					
Toxaphene	U	0.00	165	329	ug/kg	10.					
alpha-BHC	U	0.00	3.29	6.58	ug/kg	10.					
beta-BHC	U	0.00	3.29	6.58	ug/kg	10.					
delta-BHC	U	0.00	3.29	6.58	ug/kg	10.					
gamma-BHC	U	0.00	3.29	6.58	ug/kg	10.					
Metals Analysis											
Arsenic	U	111	284	476	ug/kg	2.0	MBL	10/01/97	1834	108719	3

The following prep procedures were performed:

GC/MS Base/Neutral Compounds	TSD	10/01/97	1530	108713	4
Pesticides	HDB	10/01/97	1630	108610	4
TRACE	FGD	10/01/97	1230	108719	5

Surrogate Recovery	Test	Percent%	Acceptable Limits
2-Fluorobiphenyl	M610	71.3	(30.0 - 115.)
Nitrobenzene-d5	M610	75.7	(23.0 - 120.)
p-Terphenyl-d14	M610	99.9	(37.3 - 128.)
4CMX	P8080	0.00*	(45.8 - 148.)
Dibutylchlorendate	P8080	0.00*	(30.7 - 143.)

M = Method	Method-Description
M 1	EPA 8270
M 2	EPA 8080
M 3	EPA 6010A
M 4	EPA 3550
M 5	EPA 3050

GENERAL ENGINEERING LABORATORIES

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Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87458
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: October 08, 1997

Sample ID : SPORT0513-2

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
[illegible]dicates that the analyte was not detected at a concentration greater than the detection limit.
[illegible]icates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed
in accordance with General Engineering Laboratories
standard operating procedures. Please direct
any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

P O Box 30712 • Charleston, SC 29417 • 2040 Savage Road • 29414

(803) 556-8171 • Fax (803) 766-1178

9709676-02

APPENDIX D

SAMPLE DATA
FILL DIRT

GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87495
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 09, 1997

Sample ID	: SPORT0508-1
Lab ID	: 9709148-01
Matrix	: Soil
Date Collected	: 09/06/97
Date Received	: 09/08/97
Priority	: Urgent
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
Appendix IX Volatiles - 55 items											
1,1,2-Tetrachloroethane	U	0.00	1.00	2.00	ug/kg	1.0	RMB	09/08/97	1205	107548	1
1,1,1-Trichloroethane	U	0.00	1.00	2.00	ug/kg	1.0					
1,1,2,2-Tetrachloroethane	U	0.00	1.00	2.00	ug/kg	1.0					
1,1,2-Trichloroethane	U	0.00	1.00	2.00	ug/kg	1.0					
1,1-Dichloroethane	U	0.00	1.00	2.00	ug/kg	1.0					
1,1-Dichloroethylene	U	0.00	1.00	2.00	ug/kg	1.0					
1,2,3-Trichloropropane	U	0.00	1.00	2.00	ug/kg	1.0					
1,2-Dibromo-3-chloropropane	U	0.00	1.00	2.00	ug/kg	1.0					
1,2-Dibromoethane	U	0.00	1.00	2.00	ug/kg	1.0					
1,2-Dichlorobenzene	U	0.00	1.00	2.00	ug/kg	1.0					
1,2-Dichloroethane	U	0.00	1.00	2.00	ug/kg	1.0					
1,2-Dichloropropane	U	0.00	1.00	2.00	ug/kg	1.0					
1,2-cis-Dichloroethylene	U	0.00	1.00	2.00	ug/kg	1.0					
1,2-trans-Dichloroethylene	U	0.00	1.00	2.00	ug/kg	1.0					
2-Butanone	U	0.00	2.00	10.0	ug/kg	1.0					
2-Hexanone	U	0.00	5.00	10.0	ug/kg	1.0					
4-Methyl-2-pentanone	U	0.00	5.00	10.0	ug/kg	1.0					
Acetone	U	0.00	5.00	10.0	ug/kg	1.0					
Acetonitrile	U	0.00	2.00	10.0	ug/kg	1.0					
Acrolein	U	0.00	10.0	20.0	ug/kg	1.0					
Acrylonitrile	U	0.00	5.00	50.0	ug/kg	1.0					
Allyl Chloride	U	0.00	5.00	10.0	ug/kg	1.0					
Benzene	U	0.00	1.00	2.00	ug/kg	1.0					
Bromoform	U	0.00	1.00	2.00	ug/kg	1.0					
Carbon Disulfide	U	0.00	2.00	10.0	ug/kg	1.0					
Carbon Tetrachloride	U	0.00	1.00	2.00	ug/kg	1.0					
Chlorobenzene	U	0.00	1.00	2.00	ug/kg	1.0					

GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

Sample ID : SPORT0508-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Chlorodibromomethane	U	0.00	1.00	2.00	ug/kg	1.0					
Chloroethane	U	0.00	1.00	2.00	ug/kg	1.0	RMB	09/08/97	1205	107548	1
Chloroform	U	0.00	1.00	2.00	ug/kg	1.0					
Chloroprene	U	0.00	2.00	10.0	ug/kg	1.0					
Dibromomethane	U	0.00	1.00	2.00	ug/kg	1.0					
Dichlorobromomethane	U	0.00	1.00	2.00	ug/kg	1.0					
Dichlorodifluoromethane	U	0.00	1.00	2.00	ug/kg	1.0					
Ethylbenzene	U	0.00	1.00	2.00	ug/kg	1.0					
Isobutyl Alcohol	U	0.00	10.0	20.0	ug/kg	1.0					
Methacrylonitrile	U	0.00	5.00	10.0	ug/kg	1.0					
Methyl Bromide	U	0.00	1.00	2.00	ug/kg	1.0					
Methyl Chloride	U	0.00	1.00	2.00	ug/kg	1.0					
Methyl Iodide	U	0.00	2.00	5.00	ug/kg	1.0					
Methyl Methacrylate	U	0.00	2.00	10.0	ug/kg	1.0					
Methylene Chloride	U	0.00	1.00	5.00	ug/kg	1.0					
Propionitrile	U	0.00	10.0	20.0	ug/kg	1.0					
Styrene	U	0.00	1.00	2.00	ug/kg	1.0					
Tetrachloroethylene	U	0.00	1.00	2.00	ug/kg	1.0					
Toluene	U	0.00	1.00	2.00	ug/kg	1.0					
Trichloroethylene	U	0.00	1.00	2.00	ug/kg	1.0					
Trichlorofluoromethane	U	0.00	1.00	2.00	ug/kg	1.0					
Vinyl Acetate	U	0.00	5.00	10.0	ug/kg	1.0					
Vinyl chloride	U	0.00	1.00	2.00	ug/kg	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/kg	1.0					
bis(2-Chloromethylethyl)ether	U	0.00	10.0	20.0	ug/kg	1.0					
cis-1,3-Dichloropropylene	U	0.00	1.00	2.00	ug/kg	1.0					
trans-1,3-Dichloropropylene	U	0.00	1.00	2.00	ug/kg	1.0					
trans-1,4-Dichloro-2-butene	U	0.00	1.00	2.00	ug/kg	1.0					
Extractable Organics											
Appendix IX Acid Compounds - 18 items											
2,3,4,6-Tetrachlorophenol	U	0.00	163	330	ug/kg	1.0	JCB	09/08/97	1724	107546	2
2,4,5-Trichlorophenol	U	0.00	163	330	ug/kg	1.0					
4,6-Trichlorophenol	U	0.00	163	330	ug/kg	1.0					
4-Dichlorophenol	U	0.00	163	330	ug/kg	1.0					
4-Dimethylphenol	U	0.00	163	330	ug/kg	1.0					

GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/87455
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106
Contact: Mr. Bill Hiers
Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 09, 1997

Sample ID : SPORT0508-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
2,4-Dinitrophenol	U	0.00	325	660	ug/kg	1.0					
2,6-Dichlorophenol	U	0.00	163	330	ug/kg	1.0	JCB	09/08/97	1724	107546	2
2-Chlorophenol	U	0.00	163	330	ug/kg	1.0					
2-Nitrophenol	U	0.00	163	330	ug/kg	1.0					
2-methyl-4,6-dinitrophenol	U	0.00	163	330	ug/kg	1.0					
2-sec-Butyl-4,6-Dinitrophenol	U	0.00	163	330	ug/kg	1.0					
4-Nitrophenol	U	0.00	163	330	ug/kg	1.0					
4-chloro-3-methyl phenol	U	0.00	163	330	ug/kg	1.0					
Hexachlorophene	U	0.00	8130	16500	ug/kg	1.0					
Pentachlorophenol	U	0.00	163	330	ug/kg	1.0					
Phenol	U	0.00	163	330	ug/kg	1.0					
m,p-Cresol	U	0.00	163	330	ug/kg	1.0					
o-Cresol	U	0.00	163	330	ug/kg	1.0					
Appendix IX Base/Neutral Compounds - 102 items											
1,2,4,5-Tetrachlorobenzene	U	0.00	163	330	ug/kg	1.0					
1,2,4-Trichlorobenzene	U	0.00	163	330	ug/kg	1.0					
1,2-Dichlorobenzene	U	0.00	163	330	ug/kg	1.0					
1,3-Dichlorobenzene	U	0.00	163	330	ug/kg	1.0					
1,4-Dichlorobenzene	U	0.00	163	330	ug/kg	1.0					
1,4-Dioxane	U	0.00	163	330	ug/kg	1.0					
1,4-Naphthoquinone	U	0.00	163	330	ug/kg	1.0					
1-Naphthylamine	U	0.00	163	330	ug/kg	1.0					
2,4-Dinitrotoluene	U	0.00	163	330	ug/kg	1.0					
2,6-Dinitrotoluene	U	0.00	163	330	ug/kg	1.0					
2-Acetylaminofluorene	U	0.00	163	330	ug/kg	1.0					
2-Chloronaphthalene	U	0.00	163	330	ug/kg	1.0					
2-Methylnaphthalene	U	0.00	163	330	ug/kg	1.0					
2-Naphthylamine	U	0.00	163	330	ug/kg	1.0					
2-Picoline	U	0.00	163	330	ug/kg	1.0					
3,3'-Dichlorobenzidine	U	0.00	813	1650	ug/kg	1.0					
3,3'-Dimethylbenzidine	U	0.00	813	1650	ug/kg	1.0					
3-Methylcholanthrene	U	0.00	163	330	ug/kg	1.0					
4-Bromophenyl phenyl ether	U	0.00	163	330	ug/kg	1.0					
4-Chloroaniline	U	0.00	163	330	ug/kg	1.0					
4-Chlorophenyl phenyl ether	U	0.00	163	330	ug/kg	1.0					

GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E574
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 09, 1997

Sample ID : SPORT0508-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
4-aminobiphenyl	U	0.00	163	330	ug/kg	1.0					
5-Nitro-o-toluidine	U	0.00	163	330	ug/kg	1.0	JCB	09/08/97	1724	107546	2
7,12-Dimethylbenz(a)anthracene	U	0.00	163	330	ug/kg	1.0					
Acenaphthene	U	0.00	163	330	ug/kg	1.0					
Acenaphthylene	U	0.00	163	330	ug/kg	1.0					
Acetophenone	U	0.00	163	330	ug/kg	1.0					
Aniline	U	0.00	163	330	ug/kg	1.0					
Anthracene	U	0.00	163	330	ug/kg	1.0					
Aramite	U	0.00	163	330	ug/kg	1.0					
Benzo(a)anthracene	U	0.00	163	330	ug/kg	1.0					
Benzo(a)pyrene	U	0.00	163	330	ug/kg	1.0					
Benzo(b)fluoranthene	U	0.00	163	330	ug/kg	1.0					
Benzo(ghi)perylene	U	0.00	163	330	ug/kg	1.0					
Benzo(k)fluoranthene	U	0.00	163	330	ug/kg	1.0					
Benzyl Alcohol	U	0.00	163	330	ug/kg	1.0					
Butyl benzyl phthalate	U	0.00	163	330	ug/kg	1.0					
Chlorobenzilate	U	0.00	813	1650	ug/kg	1.0					
Chrysene	U	0.00	163	330	ug/kg	1.0					
Di-n-butyl phthalate	U	0.00	163	330	ug/kg	1.0					
Di-n-octyl phthalate	U	0.00	163	330	ug/kg	1.0					
Diallate	U	0.00	163	330	ug/kg	1.0					
Dibenzo(a,h)anthracene	U	0.00	163	330	ug/kg	1.0					
Dibenzofuran	U	0.00	163	330	ug/kg	1.0					
Diethyl phthalate	U	0.00	163	330	ug/kg	1.0					
Dimethoate	U	0.00	813	1650	ug/kg	1.0					
Dimethyl phthalate	U	0.00	163	330	ug/kg	1.0					
Diphenylamine	U	0.00	163	330	ug/kg	1.0					
Disulfoton	U	0.00	163	330	ug/kg	1.0					
Ethyl Methanesulfonate	U	0.00	163	330	ug/kg	1.0					
Ethyl methacrylate	U	0.00	163	330	ug/kg	1.0					
Famphur	U	0.00	163	330	ug/kg	1.0					
Fluoranthene	U	0.00	163	330	ug/kg	1.0					
Fluorene	U	0.00	163	330	ug/kg	1.0					
Hexachlorobenzene	U	0.00	163	330	ug/kg	1.0					
Hexachlorobutadiene	U	0.00	163	330	ug/kg	1.0					

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9709148-01

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GENERAL ENGINEERING LABORATORIES

Laboratory Certifications

STATE	GEL	EPI
FL	E87156/87294	E87472/8
NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 09, 1997

Sample ID : SPORT0508-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Hexachlorocyclopentadiene	U	0.00	163	330	ug/kg	1.0					
Hexachloroethane	U	0.00	163	330	ug/kg	1.0	JCB	09/08/97	1724	107546	2
Hexachloropropene	U	0.00	163	330	ug/kg	1.0					
Indeno(1,2,3-c,d)pyrene	U	0.00	163	330	ug/kg	1.0					
Isodrin	U	0.00	163	330	ug/kg	1.0					
Isophorone	U	0.00	163	330	ug/kg	1.0					
Isosafrole	U	0.00	163	330	ug/kg	1.0					
Kepone	U	0.00	163	330	ug/kg	1.0					
Methapyrilene	U	0.00	813	1650	ug/kg	1.0					
Methyl Methanesulfonate	U	0.00	163	330	ug/kg	1.0					
N-Nitrosodi-n-butylamine	U	0.00	163	330	ug/kg	1.0					
N-Nitrosodiethylamine	U	0.00	163	330	ug/kg	1.0					
N-Nitrosodimethylamine	U	0.00	163	330	ug/kg	1.0					
N-Nitrosodiphenylamine	U	0.00	163	330	ug/kg	1.0					
N-Nitrosodipropylamine	U	0.00	163	330	ug/kg	1.0					
N-Nitrosomethylethylamine	U	0.00	163	330	ug/kg	1.0					
N-Nitrosomorpholine	U	0.00	163	330	ug/kg	1.0					
N-Nitrosopiperidine	U	0.00	163	330	ug/kg	1.0					
N-Nitrosopyrolidine	U	0.00	163	330	ug/kg	1.0					
Naphthalene	U	0.00	163	330	ug/kg	1.0					
Nitrobenzene	U	0.00	163	330	ug/kg	1.0					
O,O,O-Triethylphosphorothioate	U	0.00	163	330	ug/kg	1.0					
Pentachlorobenzene	U	0.00	163	330	ug/kg	1.0					
Pentachloroethane	U	0.00	163	330	ug/kg	1.0					
Pentachloronitrobenzene	U	0.00	163	330	ug/kg	1.0					
Phenacetin	U	0.00	163	330	ug/kg	1.0					
Phenanthrene	U	0.00	163	330	ug/kg	1.0					
Pronamide	U	0.00	163	330	ug/kg	1.0					
Pyrene	U	0.00	163	330	ug/kg	1.0					
Pyridine	U	0.00	163	330	ug/kg	1.0					
Safrole	U	0.00	163	330	ug/kg	1.0					
Sulfotepp	U	0.00	163	330	ug/kg	1.0					
Thionazin	U	0.00	163	330	ug/kg	1.0					
,a-Dimethylphenethylamine	U	0.00	163	330	ug/kg	1.0					
s(2-Chloroethoxy)methane	U	0.00	163	330	ug/kg	1.0					

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FL	E87156/87294	E374
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SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 09, 1997

Sample ID : SPORT0508-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
bis(2-Chloroethyl) ether	U	0.00	163	330	ug/kg	1.0					
bis(2-Ethylhexyl)phthalate	U	0.00	163	330	ug/kg	1.0	JCB	09/08/97	1724	107546	2
m-Dinitrobenzene	U	0.00	163	330	ug/kg	1.0					
m-Nitroaniline	U	0.00	163	330	ug/kg	1.0					
o-Nitroaniline	U	0.00	163	330	ug/kg	1.0					
o-Toluidine	U	0.00	163	330	ug/kg	1.0					
p-Dimethylaminoazobenzene	U	0.00	163	330	ug/kg	1.0					
p-Nitroaniline	U	0.00	163	330	ug/kg	1.0					
p-Phenylenediamine	U	0.00	325	660	ug/kg	1.0					
sym-Trinitrobenzene	U	0.00	813	1650	ug/kg	1.0					
Appendix IX - Herbicides - 3 items											
2,4,5-T	U	0.00	1.00	3.00	ug/kg	10.	JPA	09/09/97	1019	107552	3
2,4,5-TP	U	0.00	0.500	3.00	ug/kg	10.					
2,4-D	U	0.00	1.00	3.00	ug/kg	10.					
Appendix IX - Pesticides & PCBs - 29 items											
4,4'-DDD	U	0.00	0.666	1.33	ug/kg	1.0	TLD	09/08/97	1657	107551	4
4,4'-DDE	U	0.00	0.666	1.33	ug/kg	1.0					
4,4'-DDT		1.69	0.666	1.33	ug/kg	1.0					
Aldrin	U	0.00	0.333	0.670	ug/kg	1.0					
Chlordane	U	0.00	4.16	8.33	ug/kg	1.0					
Dieldrin	U	0.00	0.666	1.33	ug/kg	1.0					
Endosulfan I	U	0.00	0.333	0.670	ug/kg	1.0					
Endosulfan II	U	0.00	0.666	1.33	ug/kg	1.0					
Endosulfan sulfate	U	0.00	0.666	1.33	ug/kg	1.0					
Endrin	U	0.00	0.666	1.33	ug/kg	1.0					
Endrin aldehyde	U	0.00	0.666	1.33	ug/kg	1.0					
Heptachlor	U	0.00	0.333	0.670	ug/kg	1.0					
Heptachlor epoxide	U	0.00	0.333	0.670	ug/kg	1.0					
Methoxychlor	U	0.00	3.33	6.67	ug/kg	1.0					
PCB-1016	U	0.00	3.33	4.17	ug/kg	1.0					
PCB-1221	U	0.00	3.33	4.17	ug/kg	1.0					
PCB-1232	U	0.00	3.33	4.17	ug/kg	1.0					
PCB-1242	U	0.00	3.33	4.17	ug/kg	1.0					
PCB-1248	U	0.00	3.33	4.17	ug/kg	1.0					
PCB-1254	U	0.00	3.33	4.17	ug/kg	1.0					

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TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 09, 1997

Sample ID : SPORT0508-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
PCB-1260	U	0.00	3.33	4.17	ug/kg	1.0					
Parathion	U	0.00	0.833	1.67	ug/kg	1.0	TLD	09/08/97	1657	107551	4
Parathion, methyl	U	0.00	0.833	1.67	ug/kg	1.0					
Phorate	U	0.00	0.833	1.67	ug/kg	1.0					
Toxaphene	U	0.00	16.7	33.3	ug/kg	1.0					
alpha-BHC	J	0.649	0.333	0.670	ug/kg	1.0					
beta-BHC	U	0.00	0.333	0.670	ug/kg	1.0					
delta-BHC	U	0.00	0.333	0.670	ug/kg	1.0					
gamma-BHC	U	0.00	0.333	0.670	ug/kg	1.0					
Metals Analysis											
Mercury	U	0.00586	0.0143	0.200	mg/kg	1.0	RMJ	09/08/97	1548	107554	5
Silver	J	61.1	20.6	500	ug/kg	1.0	MBL	09/09/97	1036	107506	6
Arsenic		975	134	500	ug/kg	1.0					
Barium		2530	12.0	500	ug/kg	1.0					
Beryllium	J	31.9	6.55	250	ug/kg	1.0					
Cadmium	U	-157	10.1	250	ug/kg	1.0					
Cobalt	U	13.6	27.8	500	ug/kg	1.0					
Chromium		6010	30.1	500	ug/kg	1.0					
Copper		3680	55.3	500	ug/kg	1.0					
Nickel		586	48.3	500	ug/kg	1.0					
Lead		1300	66.1	250	ug/kg	1.0					
Antimony	U	66.6	89.6	500	ug/kg	1.0					
Selenium	U	-165	111	250	ug/kg	1.0					
Tin		666	54.4	500	ug/kg	1.0					
Thallium	U	-85.2	118	500	ug/kg	1.0					
Vanadium		5960	27.8	500	ug/kg	1.0					
Zinc		2270	56.8	1000	ug/kg	1.0					

The following prep procedures were performed:

GC/MS Acid Compounds	TSD	09/08/97	1500	107546	7
GC/MS Base/Neutral Compounds	TSD	09/08/97	1500	107546	7
Herbicides	JPB	09/08/97	1200	107552	8
Pesticides	JPB	09/08/97	1200	107551	7
Mercury	RMJ	09/08/97	1245	107554	5

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TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 09, 1997

Sample ID : SPORT0508-1

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
TRACE							CRB	09/08/97	2100	107506	9

Surrogate Recovery	Test	Percent%	Acceptable Limits
2,4,6-Tribromophenol	APP 9 ACID	87.3	(40.3 - 122.)
2-Fluorophenol	APP 9 ACID	85.7	(25.0 - 121.)
Phenol-d6	APP 9 ACID	93.5	(24.0 - 113.)
2-Fluorobiphenyl	APP 9 B/N	89.6	(30.0 - 115.)
Nitrobenzene-d5	APP 9 B/N	88.1	(23.0 - 120.)
p-Terphenyl-d14	APP 9 B/N	114.	(37.3 - 128.)
2,4-Dichlorophenylacetic acid	APP 9 HERBICIDES	112.	(51.9 - 180.)
4CMX	APP 9 PESTICIDES	72.9	(45.8 - 148.)
Dibutylchlorendate	APP 9 PESTICIDES	76.6	(30.7 - 143.)
Bromofluorobenzene	APP 9 VOA-8260	105.	(53.5 - 154.)
Dibromofluoromethane	APP 9 VOA-8260	108.	(63.4 - 136.)
Toluene-d8	APP 9 VOA-8260	106.	(72.1 - 137.)

M = Method	Method-Description
M 1	EPA 8260
M 2	EPA 8270
M 3	EPA 8151 modified
M 4	EPA 8080
M 5	EPA 7471
M 6	EPA 6010A
M 7	EPA 3550
M 8	EPA 8150
M 9	EPA 3050

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NC	233	
SC	10120	10582
TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106
Contact: Mr. Bill Hiers
Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 09, 1997

Sample ID : SPORT0508-1

M = Method	Method-Description

Notes:
The qualifiers in this report are defined as follows:
ND indicates that the analyte was not detected at a concentration greater than the detection limit.
J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).
U indicates that the analyte was not detected at a concentration greater than the detection limit.
* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney
Reviewed By

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SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197

Report Date: September 15, 1997

Sample ID	: SPORT0508-2
Lab ID	: 9709148-02
Matrix	: GroundH2O
Date Collected	: 09/06/97
Date Received	: 09/08/97
Priority	: Routine
Collector	: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Volatile Organics											
Appendix IX Volatiles - 55 items											
1,1,1,2-Tetrachloroethane	U	0.00	1.00	2.00	ug/l	1.0	JEB	09/11/97	1747	107664	1
1,1,1-Trichloroethane	U	0.00	1.00	2.00	ug/l	1.0					
1,1,2,2-Tetrachloroethane	U	0.00	1.00	2.00	ug/l	1.0					
1,1,2-Trichloroethane	U	0.00	1.00	2.00	ug/l	1.0					
1,1-Dichloroethane	U	0.00	1.00	2.00	ug/l	1.0					
1,1-Dichloroethylene	U	0.00	1.00	2.00	ug/l	1.0					
1,2,3-Trichloropropane	U	0.00	1.00	2.00	ug/l	1.0					
1,2-Dibromo-3-chloropropane	U	0.00	1.00	2.00	ug/l	1.0					
1,2-Dibromoethane	U	0.00	1.00	2.00	ug/l	1.0					
1,2-Dichlorobenzene	U	0.00	1.00	2.00	ug/l	1.0					
1,2-Dichloroethane	U	0.00	1.00	2.00	ug/l	1.0					
1,2-Dichloropropane	U	0.00	1.00	2.00	ug/l	1.0					
1,2-cis-Dichloroethylene	U	0.00	1.00	2.00	ug/l	1.0					
1,2-trans-Dichloroethylene	U	0.00	1.00	2.00	ug/l	1.0					
2-Butanone	J	2.92	2.00	10.0	ug/l	1.0					
2-Hexanone	U	0.00	5.00	10.0	ug/l	1.0					
4-Methyl-2-pentanone	U	0.00	5.00	10.0	ug/l	1.0					
Acetone		14.9	5.00	10.0	ug/l	1.0					
Acetonitrile	U	0.870	2.00	10.0	ug/l	1.0					
Acrolein	U	0.00	10.0	20.0	ug/l	1.0					
Acrylonitrile	U	0.00	10.0	20.0	ug/l	1.0					
Allyl Chloride	U	0.00	5.00	10.0	ug/l	1.0					
Benzene	U	0.00	1.00	2.00	ug/l	1.0					
Bromoform	U	0.00	1.00	2.00	ug/l	1.0					
Carbon Disulfide	U	0.00	2.00	10.0	ug/l	1.0					
Carbon Tetrachloride	U	0.00	1.00	2.00	ug/l	1.0					
Chlorobenzene	U	0.00	1.00	2.00	ug/l	1.0					

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TN	02934	02934

Client: Supervisor of Ship Building & Conversion
SUPSHIP-Portsmouth Detachment-Env.
1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 15, 1997

Sample ID : SPORT0508-2

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	M
Chlorodibromomethane	U	0.00	1.00	2.00	ug/l	1.0					
Chloroethane	U	0.00	1.00	2.00	ug/l	1.0	JEB	09/11/97	1747	107664	1
Chloroform	U	0.00	1.00	2.00	ug/l	1.0					
Chloroprene	U	0.00	2.00	10.0	ug/l	1.0					
Dibromomethane	U	0.00	1.00	2.00	ug/l	1.0					
Dichlorobromomethane	U	0.00	1.00	2.00	ug/l	1.0					
Dichlorodifluoromethane	U	0.00	1.00	2.00	ug/l	1.0					
Ethylbenzene	U	0.00	1.00	2.00	ug/l	1.0					
Isobutyl Alcohol	U	0.00	10.0	20.0	ug/l	1.0					
Methacrylonitrile	U	0.00	5.00	10.0	ug/l	1.0					
Methyl Bromide	U	0.00	1.00	2.00	ug/l	1.0					
Methyl Chloride	U	0.00	1.00	2.00	ug/l	1.0					
Methyl Iodide	U	0.00	2.00	5.00	ug/l	1.0					
Methyl Methacrylate	U	0.00	2.00	10.0	ug/l	1.0					
Methylene Chloride	U	0.00	1.00	5.00	ug/l	1.0					
Propionitrile	U	0.00	10.0	20.0	ug/l	1.0					
Styrene	U	0.00	1.00	2.00	ug/l	1.0					
Tetrachloroethylene	U	0.00	1.00	2.00	ug/l	1.0					
Toluene	U	0.00	1.00	2.00	ug/l	1.0					
Trichloroethylene	U	0.00	1.00	2.00	ug/l	1.0					
Trichlorofluoromethane	U	0.00	1.00	2.00	ug/l	1.0					
Vinyl Acetate	U	0.00	5.00	10.0	ug/l	1.0					
Vinyl chloride	U	0.00	1.00	2.00	ug/l	1.0					
Xylenes (TOTAL)	U	0.00	1.00	4.00	ug/l	1.0					
bis(2-Chloromethylethyl)ether	U	0.00	10.0	20.0	ug/l	1.0					
cis-1,3-Dichloropropylene	U	0.00	1.00	2.00	ug/l	1.0					
trans-1,3-Dichloropropylene	U	0.00	1.00	2.00	ug/l	1.0					
trans-1,4-Dichloro-2-butene	U	0.00	1.00	2.00	ug/l	1.0					

Surrogate Recovery	Test	Percent%	Acceptable Limits
Bromofluorobenzene	APP 9 VOA-8260	110.	(73.8 - 128.)
Dibromofluoromethane	APP 9 VOA-8260	90.8	(63.9 - 139.)
Toluene-d8	APP 9 VOA-8260	99.4	(77.1 - 121.)

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TN	02934	02934

Client: Supervisor of Ship Building & Conversion
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1899 North Hobson Ave.
North Charleston, South Carolina 29405-2106

Contact: Mr. Bill Hiers

Project Description: SUPSHIP-Portsmouth Detachment

cc: NPWC00197 Report Date: September 15, 1997

Sample ID : SPORT0508-2

Surrogate Recovery	Test	Percent%	Acceptable Limits

M = Method	Method-Description
M 1	EPA 8260

Notes:

The qualifiers in this report are defined as follows:

ND indicates that the analyte was not detected at a concentration greater than the detection limit.

J indicates presence of analyte at a concentration less than the reporting limit (RL) and greater than the detection limit (DL).

U indicates that the analyte was not detected at a concentration greater than the detection limit.

* indicates that a quality control analyte recovery is outside of specified acceptance criteria.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories standard operating procedures. Please direct any questions to your Project Manager, Karen Blakeney at (803) 769-7386.

Karen Blakeney

Reviewed By

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APPENDIX B

FIELD INVESTIGATION DOCUMENTATION

APPENDIX B-1.1

SOIL SAMPLING LOGS
STUDY AREA 8

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 7546.05
Sample Location ID: 08S009
Time: Start: 13:42 End: 13:47

Site: SA C
Date: 11-12-92
Signature of Sampler: Mark Tolano

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk brown / black
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [X] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	2 x 8 oz.	[X]	SVOCs, pesticides, PCBs, herbicides, TAL inorganics
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S009 00 / 08S009 00 D (duplicate sample)
Sample time = 13:47

Soil description = High organic content, some silty sand, dark brown to black.

SM/PE

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 085L10
Time: Start: 13:44 End: 15:44

Site: SA 8
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR 1-4": tan
- [ ] 4"-12": very dk brown

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	3 x 8 oz.	[X]	SVOCs, pesticides, PCBs, inorganics, TAL metals
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]	[ ]		[ ]	

NOTES/SKETCH

Sample ID = 085010CO, 085010CO MS, 085010CO MSD
Sample time = 13:49

Soil description = Silty fine sand, poorly graded, loose, moist to wet, light tan (0-4") and very dark brown (4"-12"). SP-SM

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 08S011
Time: Start: 3:53 End: 3:58

Site: SA 8
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
[✓] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[✓] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[✓] SS bowl

TYPE OF SAMPLE COLLECTED:
[ ] DISCRETE
[✓] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR
[✓] COLOR dark brown
[ ]

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[✓] ETHYL ALCOHOL (isopropyl)
[ ] 25% METHANOL/75% ASTM TYPE II WATER
[✓] DEIONIZED WATER
[✓] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[✓] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
[ ] YES
[✓] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[✓]	SVOCs, pesticides, PCBs, herbicides, TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S01100
Sample time = 13:58

Soil description: Silty fine sand, poorly graded, loose, moist to wet, dark brown. SP-SM

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 2546.05
Sample Location ID: 08S012
Time: Start: 13:57 End: 14:02

Site: SA 8
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR Dk. brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs / Pesticides / PCBs / Herbicides / TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S01200
Sample time = 14:02

Soil description = Silty fine sand, poorly graded, medium dense, damp, dark brown, contains roots and worms. (SP-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 08S013
Time: Start: 14:03 End: 14:08

Site: SA 8
Date: 11-12-97
Signature of Sampler: Mark Todaro

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk. brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
X	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	X	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	Pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S01300
Sample time = 14:08

Soil description = silty fine sand, poorly graded, medium dense, damp, dark brown. (SP-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 2546.05
Sample Location ID: 08S01 4
Time: Start: 14:07 End: 14:12

Site: SA 8
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR [illegible]
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	Pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S01400
Sample time = 14:12

Soil description = Fine sand, uniform grade, loose, damp, light tan. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 1 8501 1
Time: Start: 14:20 End: 14:25

Site: SA 8
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR [illegible]
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs / pesticides / PCBs / herbicides / TAL inorganics
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08501500
Sample time = 14:25

Soil description = Silty fine sand, moderately graded, loose, damp, dark brown, contains roots, worms. SW-SM

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 08501502
Time: Start: 13:52 End: 13:54

Site: 003, SA-8
Date: 02-13-98
Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR DARK BROWN
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [X] CLAY
- [ ] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] SVOC	[ ]	[✓]	[ ]	Amber	[✓]	/ / /
[X] Pest/PCB	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[X] Herb	[ ]	[✓]	[ ]		[✓]	/ / /
[X] FeOZ	[ ]	[✓]	[ ]		[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[X] Ag SRX	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[X] TOC	[ ]	[✓]	[ ]	4oz	[✓]	/ / /

NOTES/SKETCH Silty Clay

SVOC / Pest / PCB / Herb / FeOZ 1 x 8oz

pH = 6.48 ORP = 301.1

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 08S01G
Time: Start: 14:13 End: 14:18

Site: SA 8
Date: 11-12-97
Signature of Sampler: Mark Tatum

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk brown/black
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE USE
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	Pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S01600
Sample time = 14:18

Soil description = High organic content, some silty sand, dark brown to black.

SM/Pt

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 08501
Time: Start: 14:24 End: 14:27

Site: SA 8
Date: 11-12-97
Signature of Sampler: Mark Todaro

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR gray
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE USE
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	Pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	Herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL inorganics
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08501700
Sample time = 14:29
Soil description = Silty fine sand, gray, moist.
(SW-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 08S01B
Time: Start: 15:05 End: 15:10

Site: SA 8
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR tk brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE USE
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[ ]	SVOCs, pesticides, PCBs, herbicides, TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S01B00
Sample time = 15:10

Soil description: Silty fine sand, moderately graded, loose, moist, dark brown, contains roots.

SW-SM

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 2546.05
Sample Location ID: 08501
Time: Start: 14:37 End: 14:37

Site: SA A
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR [illegible]
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE ID
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	Pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	Herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08501900
Sample time = 14:37

Soil description = Fine sand, poorly graded, loose, moist, light grayish tan.

(SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 08S020
Time: Start: 14:34 End: 14:44

Site: SA 8
Date: 11-12-97
Signature of Sampler: Mark Tolano

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[X] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[X] SS bowl

TYPE OF SAMPLE COLLECTED:
[ ] DISCRETE
[X] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR
[X] COLOR light tan
[ ]

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[X] ETHYL ALCOHOL (isopropyl)
[ ] 25% METHANOL/ 75% ASTM TYPE II WATER
[X] DEIONIZED WATER
[X] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE USE
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	Pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	Herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL inorganics
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S02000
Sample time = 14:44

Soil description = Fine sand, uniform grade, loose, damp, light tan. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 7546.05
Sample Location ID: 08S021
Time: Start: 14:44 End: 14:49

Site: SA 8
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk. brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs / pesticides / PCBs / herbicides / TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S02100
Sample time = 14:49

Soil description = Silty fine sand, poorly graded, loose, moist, dark brown, contains roots.

SP-SM

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 2546.05
Sample Location ID: 085022
Time: Start: 14:47 End: 14:52

Site: SA 8
Date: 11-12-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR light gray
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 085022 00
Sample time = 14:52

Soil description = Silty fine sand, poorly graded, loose, moist, light gray. SP-SM

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 08S023
Time: Start: 14:57 End: 15:02

Site: SA 8
Date: 11-12-97
Signature of Sampler: Sarah Manning

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR brown
- [ ]

DECONTAMINATION FLUIDS USED:
- [✓] ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs / /
[ ]	[ ]	[ ]		[ ]		[ ]	pesticides / /
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs / /
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides / /
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals / /
[ ]	[ ]	[ ]		[ ]		[ ]	/ /
[ ]	[ ]	[ ]		[ ]		[ ]	/ /

NOTES/SKETCH

Sample ID = 08S02300
Sample time = 15:02

Soil description = Silty fine sand, well graded, 10% fine gravel, loose, moist, brown. (SW-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S02400
Time: Start: 0915 End: 0923

Site: 003
Date: 11-17/98
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR dark brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[X] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]	_____	[ ]	___/___/___/___
[ ]	[ ]	[ ]	[ ]	_____	[ ]	___/___/___/___
[ ]	[ ]	[ ]	[ ]	_____	[ ]	___/___/___/___
[ ]	[ ]	[ ]	[ ]	_____	[ ]	___/___/___/___
[ ]	[ ]	[ ]	[ ]	_____	[ ]	___/___/___/___
[ ]	[ ]	[ ]	[ ]	_____	[ ]	___/___/___/___
[ ]	[ ]	[ ]	[ ]	_____	[ ]	___/___/___/___

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 2546.05
Sample Location ID: 08S025
Time: Start: 14:31 End: 14:36

Site: SA 8
Date: 11-12-97
Signature of Sampler: Mark Tolano

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR gray
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S02500
Sample time = 14:36

Soil description = Silty fine sand, gray, moist.
(SW-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08502600
Time: Start: 0848 End: 0853

Site: 003
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[ ] COLOR gray/Brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08 S02700
Time: Start: 0853 End: 0904

Site: OU 3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]	_____	[ ]	____/____/____/____
[ ]	[ ]	[ ]	[ ]	_____	[ ]	____/____/____/____
[ ]	[ ]	[ ]	[ ]	_____	[ ]	____/____/____/____
[ ]	[ ]	[ ]	[ ]	_____	[ ]	____/____/____/____
[ ]	[ ]	[ ]	[ ]	_____	[ ]	____/____/____/____
[ ]	[ ]	[ ]	[ ]	_____	[ ]	____/____/____/____
[ ]	[ ]	[ ]	[ ]	_____	[ ]	____/____/____/____

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 08S02802
Time: Start: 13:10 End: 13:12

Site: OU3, SA-8
Date: 02-13-98
Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-2'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] ____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR ____
- [X] COLOR Brown/Gray
- [ ] ____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [X] FIELD DUPLICATE COLLECTED
DUPLICATE ID 08S02802D

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] SVOC	[ ]	[X]	[ ]	Amber	[X]	/ / /
[X] Pest/PCB	[ ]	[X]	[ ]	8oz	[X]	/ / /
[X] Herb	[ ]	[X]	[ ]		[X]	/ / /
[X] Fe+2	[ ]	[X]	[ ]		[X]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[X] As Spec	[ ]	[X]	[ ]	8oz	[X]	/ / /
[X] TOC	[ ]	[X]	[ ]	4oz	[X]	/ / /

NOTES/SKETCH Fine Sand
SVOC/ Pest/PCB/ Herb/Fe+2 1x8oz

pH= 7.49 ORP= 164.5

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 09502800 (DUP4)
Time: Start: 0906 End: 0922

Site: 003
Date: 11-17-1987
Signature of Sampler: SM

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR Dark Brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[X] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S02900 (MS/MSD)
Time: Start: 0922 End: 0937

Site: OU3
Date: 11-17/97
Signature of Sampler: SM

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR dark brown
[ ] Metallic debris

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL/75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[X] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 085 030 00
Time: Start: 0923 End: 0935

Site: OU 3
Date: 11-17-9[illegible]7
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [X] ODOR Petroleum
- [X] COLOR Dark brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [ ] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [X] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3
Project Number: 2546.05
Sample Location ID: 08S031
Time: Start: 14:55 End: 15:00

Site: SA 8
Date: 11-12-97
Signature of Sampler: Mark Tolano

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR lt. gray
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz.	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 08S03100
Sample time = 15:00

Soil description: Silty fine sand, poorly graded, loose, moist, light gray. (SP-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08503200
Time: Start: 0935 End: 0942

Site: 003
Date: 11-17-97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[ ] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR dark brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[X] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb
TAL metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 085033 00
Time: Start: 0937 End: 0942

Site: OU3
Date: 11-17/97
Signature of Sampler: SM

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL/75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[X] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08503400
Time: Start: 0904 End: 0916

Site: 003
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR black
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL/75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08503500
Time: Start: 0916 End: 0922

Site: OU3
Date: 11-14-97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR black
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08503600
Time: Start: 0922 End: 0927

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown/gray
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08503700
Time: Start: 0927 End: 0931

Site: 003
Date: 11-14-97
Signature of Sampler: DAT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Brown
- [ ] LS _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [ ] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [X] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08503800 (Dup.)
Time: Start: 0931 End: 0936

Site: OU3
Date: 11-14-97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[ ] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546-05
Sample Location ID: 085 03900
Time: Start: 0936 End: 0941

Site: OU 3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0 - 1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR dark brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[X] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S04000
Time: Start: 0941 End: 0948

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR Cream
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[X] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08504100
Time: Start: 0948 End: 0951

Site: 003
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S04200
Time: Start: 0951 End: 0957

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL/75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB.
Herb.
TAL INORGANICS

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S04300
Time: Start: 0957 End: 1002

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [ ] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08504400
Time: Start: 1002 End: 1005

Site: 003
Date: 11-14-97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[ ] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08504500
Time: Start: 1008 End: 1013

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[ ] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[X] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL METALS

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08504600
Time: Start: 1013 End: 1019

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[X] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S04700
Time: Start: 1019 End: 1025

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR black
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[X] CLAY
[X] SAND
[X] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S04B00
Time: Start: 1025 End: 1031

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ]

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR
[X] COLOR Dark Brown
[ ]

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 08S04802
Time: Start: 12:30 End: 12:32

Site: OU3, SA-8
Date: 02-13-98
Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-2'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ]

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] Iron oxides	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[X] As spec	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[X] TOC	[ ]	[✓]	[ ]	4oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH Fine sand

pH = 7.69 ORP = 175.2 mV

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S04900
Time: Start: 1031 End: 1035

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0~1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR Brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[X] ORGANIC
[ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 08505002
Time: Start: 12:07 End: 12:09

Site: OU3, SA-8
Date: 02-13-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-2'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Gray
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] Iron oxides	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[X] As spec	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[X] TOC	[ ]	[✓]	[ ]	4oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH SAND and lime Rock

pH = 8.08 ORP = 173.5 mV

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08S05100 (DUP.)
Time: Start: 1340 End: 1305

Site: 003
Date: 11-14-97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[X] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals.

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 08505200
Time: Start: 1345 End: 1350

Site: OU3
Date: 11-14/97
Signature of Sampler: BB

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL/75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 08S00301
Time: Start: 15:00 End: 15:01

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Gray / brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/ PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL Metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 0250540 1
Time: Start: 15:22 End: 15:23

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/ PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL Metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH Silty SAND

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 08S05S01
Time: Start: 15:34 End: 15:35

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Dark Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [X] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL Metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

Clayey Silt and Sand

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: OS05056 01
Time: Start: 1545 End: 1546

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Dark Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [X] CLAY
- [ ] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL Metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH Clayey Silt

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 08S05Z01
Time: Start: 16:05 End: 16:06

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [✓] COLOR GRAY
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH medium SAND

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 08505702
Time: Start: 13:40 End: 13:42

Site: OU3, SA-8
Date: 02-13-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR GRAY
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] SVOC	[ ]	[X]	[ ]	Amber	[X]	/ / /
[X] ~~Pest~~ PCB	[ ]	[X]	[ ]	8oz	[X]	/ / /
[X] Herb	[ ]	[X]	[ ]		[X]	/ / /
[X] FeO2	[ ]	[X]	[ ]		[X]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[X] Ag Spec	[ ]	[X]	[ ]	3oz	[X]	/ / /
[X] TOC	[ ]	[X]	[ ]	4oz	[X]	/ / /

NOTES/SKETCH Fine SAND

pH = 5.47 ORP = 194.2 mV

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 08S05S01
Time: Start: 16:15 End: 16:16

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR DARK BROWN
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [X] CLAY
- [ ] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL Metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH Clay with Silt

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02546 05
Sample Location ID: 08505901
Time: Start: 16:22 End: 16:23

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Dark Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [X] CLAY
- [ ] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL Metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH: CLAY with Silt

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 08506001
Time: Start: 16:28 End: 16:38

Site: OU3 SA-P
Date: 02/10/98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [X] FIELD DUPLICATE COLLECTED
DUPLICATE ID 08506001MS
08506001MD

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	24oz	[✓]	/ / /
[✓] Pest/PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL Metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH FINE SAND

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 08S06101
Time: Start: 16:38 End: 16:39

Site: OU3 SA-8
Date: 08/10/98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR TAN / GRAY
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest / PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH Fine SAND

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: OR5062O1
Time: Start: 15:26 End: 15:27

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR gray
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL Metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 08506301
Time: Start: 15:08 End: 15:09

Site: OU3, SA-8
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Gray / brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [X] FIELD DUPLICATE COLLECTED
DUPLICATE ID 08506301D

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TCL SVOC	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] Pest/ PCB	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] Herb	[ ]	[✓]	[ ]		[ ]	/ / /
[✓] TAL metals	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: ORB01001
Time: Start: 12:55 End: 12:58

Site: OU3, SA-8
Date: 02-13-95
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 2-3'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X] SVOC	[ ]	[✓]	[ ]	Amber	[✓]	/ / /
[X] Pest/PCB	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[X] Herb	[ ]	[✓]	[ ]		[✓]	/ / /
[X] Fe O_2	[ ]	[✓]	[ ]		[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[X] As SPOC	[ ]	[ ]	[ ]	8oz	[✓]	/ / /
[X] TOC	[ ]	[ ]	[ ]	4oz	[✓]	/ / /

NOTES/SKETCH fine sand w/ Debris
SVOC / Pest / PCB / Herb / Fe O_2 1 x 8oz

pH = 7.44 ORP = 147.7 mV

APPENDIX B-1.2

SOIL SAMPLING LOGS
STUDY AREA 9

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3 2 I.
Project Number: 2546.05
Sample Location ID: 09SC05
Time: Start: 11:21 End: 11:21

Site: SA 1
Date: 11-11-17
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS BOWL

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR [illegible]
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ~~ETHAL~~ ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓]	[ ]	[ ]	[✓]	[ ]	2x 8oz	[✓]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	PCB/Pest
[ ]	[ ]	[ ]		[ ]		[ ]	Herbicide
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH Sample IDs = 09S00500
09S00500D (duplicate sample)
Sample time = 11:26
Soil description: Fine sand, poorly graded, loose, moist to wet, very dark brown, some roots. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 09500502
Time: Start: 0820 End: 0830

Site: 003
Date: 3-17-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-2'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Dark brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [ ] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	

NOTES/SKETCH

As spec.
Fe OX
TOC
pH = ~~5.90~~ WQO 6.02
ORP = ~~62.4 mV~~ WQO -167.4 mV

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: [illegible]
Project Number: 3541.[illegible]
Sample Location ID: [illegible]
Time: Start: 11:20 End: 11:28

Site: S4 [illegible]
Date: 11-11-92
Signature of Sampler: Mark [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-2"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS BOWL

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR Orange
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ~~ETHYL~~ ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓]	[ ]	[ ]	[✓]	[ ]	3 x 8 oz.	[✓]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	~~pest/PCBs~~
[ ]	[ ]	[ ]		[ ]		[ ]	~~herbicides~~
[ ]	[ ]	[ ]		[ ]		[ ]	~~TAL metals~~
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample IDs.
09S00600
09S00600 MS
09S00600 MSD

Sample time = 11:28

Soil: Fine sand, poorly graded, loose, moist to wet, brown. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3 2I
Project Number: 2546.05
Sample Location ID: 09500700
Time: Start: 11:46 End: 11:46

Site: SA 7
Date: 11-11-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS BOWL

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR white brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
✓			✓		1 x 8 oz.	✓	SVOCs, pesticides, PCBs, VOCs, TAL metals

NOTES/SKETCH

Sample ID = 09500700
Sample time = 11:46

Soil description: Silty or clayey fine sand, slightly plastic, loose, moist, dark brown. (SP-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 09500702
Time: Start: 0800 End: 0820

Site: 003
Date: 5-17-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-2'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR dark brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 28% METHANOL/ 75% ASTM TYPE II WATER
- [ ] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	

NOTES/SKETCH

As Spec.
Fe OX
TOC
pH = 5.98
ORP = 62.4 mV.

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: [illegible] 2I
Project Number: 2541[illegible]
Sample Location ID: 09SC08
Time: Start: 11:45 End: 11:50

Site: S4 9
Date: 11-11-97
Signature of Sampler: Mark [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS Bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR Dark brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ~~ETHYL~~ ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓]	[ ]	[ ]	[✓]	[ ]	1 x 8 oz	[✓]	SVOCs, pesticides, PCBs, Total metals, Inorganics
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH
Sample ID = 09SC0800
Sample time = 11:50

Soil description: Silty or clayey fine sand, slightly plastic, loose, moist, dark brown.
(SP-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02546.05
Sample Location ID: 09S008C2
Time: Start: 11:37 End: 11:39

Site: OU3, SA-9
Date: 02-13-98
Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0 - 1.5'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR gray
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] IRON oxides	[ ]	[✓]	[ ]	1x8oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[✓] As SPEC	[ ]	[✓]	[ ]	1x8oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[✓] TOC	[ ]	[✓]	[ ]	1x4oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH medium SAND

pH = 7.06 ORP = 177.9 mV

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: CLB 21
Project Number: 25461.15
Sample Location ID: 09S00900
Time: Start: 11:54 End: 11:59

Site: Site 9
Date: 11-11-94
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [x] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [x] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [x] SS mill

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [x] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [x] COLOR dark brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [✓] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [x] DEIONIZED WATER
- [x] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [x] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [x] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
✓			[✓]		1 x 8 oz	✓	SVOCs
							~~ABSE~~
							~~PCB~~
							~~pesticides~~
							~~TAL metals~~

NOTES/SKETCH

Sample ID = 09S00900
Sample time = 11:59

Soil description: Fine sand, moderately graded, some silt or clay, loose, moist, dark brown.
SP-SM

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: CU 2 2I
Project Number: 25460.05
Sample Location ID: 09SC10
Time: Start: 11:57 End: 12:02

Site: [illegible]
Date: 11-11-92
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR [illegible]
- [ ]

DECONTAMINATION FLUIDS USED:
- [✓] ALL USED
- [X] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓]	[ ]	[ ]	SOIL [✓]	1 x 8 oz	[✓]	SVOCs
[ ]	[ ]	[ ]	[ ]		[ ]	~~ACID~~
[ ]	[ ]	[ ]	[ ]		[ ]	~~PCBs~~
[ ]	[ ]	[ ]	[ ]		[ ]	~~WAD~~
[ ]	[ ]	[ ]	[ ]		[ ]	~~TAL metals~~
[ ]	[ ]	[ ]	[ ]		[ ]	
[ ]	[ ]	[ ]	[ ]		[ ]	

NOTES/SKETCH

Sample ID = ~~09SC02~~ (SM) 09S01000
Sample time = 12:02
Soil description: Silty sand, well graded, loose, grayish brown. (SW-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: [illegible]
Sample Location ID: [illegible]
Time: Start: 13:24 End: [illegible]

Site: 34 9
Date: [illegible]
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR [illegible]
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT		✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
✓	[ ]	[ ]	SOIL [illegible]	[ ]	1 x 4 OZ	✓	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	PESTICIDES
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	VOLATILES
[ ]	[ ]	[ ]		[ ]		[ ]	TAL METALS
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 09S01100
Sample time = 13:29

Soil description: Silty fine sand, well graded, loose, moist, dark brown. (SW-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 2 2T
Project Number: 2546.05
Sample Location ID: 09S013
Time: Start: 3:40 End: 3:45

Site: SA 9
Date: 4-1-93
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [x] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [x] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [x] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [x] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [x] COLOR dk-brn + lt-tan
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [x] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [x] DEIONIZED WATER
- [x] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [x] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [x] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
✓	[ ]	[ ]	✓	[ ]	1 x 8 oz.	✓	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	~~ASH~~
[ ]	[ ]	[ ]		[ ]		[ ]	~~TOC~~
[ ]	[ ]	[ ]		[ ]		[ ]	~~METALS~~
[ ]	[ ]	[ ]		[ ]		[ ]	~~TAL metals~~
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 09S01300
Sample time = 13:45

Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown grains and light tan grains. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3 RI
Project Number: 2546.05
Sample Location ID: 09SC12
Time: Start: ~~13:30~~ 13:25 End: ~~13:35~~ 13:30

Site: S.4.7
Date: 11-11-92
Signature of Sampler: Mark Tribble

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR lt. grayish brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
✓		SOIL ✓		1 x 8oz	✓	SVOCs
						pesticides
						TPCBs
						herbicides
						TAL metals

NOTES/SKETCH Sample ID = 09SC1200
Sample time = 13:30
Soil description: Silty sand, well graded, moist, light grayish brown. SW-SM

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3 2I
Project Number: 2541.[illegible]
Sample Location ID: 09S014
Time: Start: 13:38 End: [illegible]:43

Site: S 49
Date: 11-1-92
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS, small

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR Dark brown
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓]	[ ]	[ ]	[✓]	[ ]	1 x 8 oz	[✓]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	~~pesticides~~
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	~~herbicides~~
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 09S01400
Sample time = 13:43

Soil description: Silty fine sand, well graded, loose, moist, dark brown. (SW-SM)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NUI 3 2I
Project Number: 2546 05
Sample Location ID: 09S015
Time: Start: 13:50 End: 13:55

Site: SA 9
Date: 1-11-97
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk brown/tan
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	SOIL	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	PESTI
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	~~TAL metals~~
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID= 09S01500
Sample time= 13:55

Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown grains and light tan grains. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU3 RI
Project Number: 3546.05
Sample Location ID: 09S0116
Time: Start: 13:46 End: 13:53

Site: 24 J
Date: 11-7-7
Signature of Sampler: Mark Todd

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk brown/tan
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT		✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	SOIL [X]	[ ]	1 x 8 oz	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	PESTICIDES
[ ]	[ ]	[ ]		[ ]		[ ]	TPH
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH Sample ID= 09S0160C
Sample time= 13:53
Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown grains and light tan grains. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 2546.05
Sample Location ID: 09S017
Time: Start: 13:59 End: 14:04

Site: S4 9
Date: 11/17
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk brown/lt tan
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (ISOPROPYL)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE USE
✓	[ ]	[ ]	[✓]	[ ]	1 x 8 oz	✓	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	herbicides
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 09S01700
Sample time = 14:04

Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown and light tan.

(SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3 RI
Project Number: 2546 IT
Sample Location ID: 09SO1E
Time: Start: 14:01 End: 14:06

Site: SA 7
Date: 1MAY 1
Signature of Sampler: Mark Tarzan

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS TROWEL

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk brown + lt. tan
- [ ]

DECONTAMINATION FLUIDS USED:
✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE USE
[X]	[ ]	[ ]	[X]	[ ]	2 x 8 oz	[X]	SVOCs / PESTICIDES / PCBs / HERBICIDES / TAL METALS
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 09SO1800
09SO1800D (duplicate sample)

Sample time = 14:06

Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown and light tan. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NU 3 2I
Project Number: 2546 05
Sample Location ID: 095014
Time: Start: 14:17 End: 14:17

Site: S4 0
Date: 4-11-92
Signature of Sampler: Mark Todaro

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS BOWL

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk. brown
- [ ] lt. tan

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (Isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE USE
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz	[X]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	Pesticides
[ ]	[ ]	[ ]		[ ]		[ ]	PCBs
[ ]	[ ]	[ ]		[ ]		[ ]	Inorganics
[ ]	[ ]	[ ]		[ ]		[ ]	TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID= 09501900
Sample time = 14:17

Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown and light tan.
SF

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3 RI
Project Number: 2546.05
Sample Location ID: 09S02C
Time: Start: 14:13 End: 14:16

Site: CA 9
Date: 11-4-7
Signature of Sampler: Sarah Wangsni

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk brown/ lt tan
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓]	[ ]	[ ]	[✓]	[ ]	1 x 8 oz	[✓]	SVOCs
[ ]	[ ]	[ ]		[ ]		[ ]	~~pesticides~~
[ ]	[ ]	[ ]		[ ]		[ ]	~~PCBs~~
[ ]	[ ]	[ ]		[ ]		[ ]	~~herbicides~~
[ ]	[ ]	[ ]		[ ]		[ ]	~~TAL metals~~
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID: 09S02000
Sample time = 14:18

Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown and light tan. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3
Project Number: 2546.05
Sample Location ID: 09S021
Time: Start: 14:23 End: 14:28

Site: SA 9
Date: 1-11-97
Signature of Sampler: Mark Tobin

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS bowl

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR dk. brown/lt. tan
- [ ]

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
X			X		1x8 oz	X	SVOCs
							Pesticides
							PCBs
							Herbicides
							TAL metals

NOTES/SKETCH Sample ID = 09S02100
Sample time = 14:28

Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown and light tan.

(SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: OU 3 RI
Project Number: 2596.05
Sample Location ID: 09S022
Time: Start: 14:24 End: 14:29

Site: SA 9
Date: 11-11-92
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-12"

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [X] SS BOWL

TYPE OF SAMPLE COLLECTED:
- [ ] DISCRETE
- [X] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR
- [X] COLOR lt. brown
- [ ] lt. tan

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [X] ETHYL ALCOHOL (isopropyl)
- [ ] 25% METHANOL/ 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	MATRIX: SOIL	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[X]	[ ]	[ ]	[X]	[ ]	1 x 8 oz	[X]	SVOCs, pesticides, PCBs, herbicides, TAL metals
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	
[ ]	[ ]	[ ]		[ ]		[ ]	

NOTES/SKETCH

Sample ID = 09S02220
Sample time = 14:29

Soil description: Fine sand, poorly graded, loose, damp, mix of dark brown grains and light tan grains. (SP)

FIGURE 4-5

EXAMPLE SURFACE SOIL SAMPLE FIELD DATA RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 09502300
Time: Start: 1350 End: 1401

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [ ] COLOR gray/black
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [ ] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
Pest/PCB
Herb
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 09502400
Time: Start: 1352 End: 1407

Site: OU3
Date: 11-14/97
Signature of Sampler: BB

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR gray/brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL 75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[X] ORGANIC
[ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 095 02500
Time: Start: 1401 End: 1408

Site: OU3
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Gray/black
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [ ] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 0256.05
Sample Location ID: 09502600
Time: Start: 1407 End: 1417

Site: OU3
Date: 11-14/97
Signature of Sampler: BB

SOIL SAMPLE

DEPTH OF SAMPLE 0-2'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[ ] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL/75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 09502700
Time: Start: 1408 End: 1428

Site: 003
Date: 11-14/97
Signature of Sampler: MT

SOIL SAMPLE

DEPTH OF SAMPLE 0-2'

EQUIPMENT USED FOR COLLECTION:
[X] HAND AUGER
[ ] S.S. SPLIT SPOON
[ ] SHOVEL
[ ] HAND SPOON
[ ] ALUMINUM PANS
[ ] SS BUCKET
[ ] _____

TYPE OF SAMPLE COLLECTED:
[X] DISCRETE
[ ] COMPOSITE

SAMPLE OBSERVATIONS:
[ ] ODOR _____
[X] COLOR brown
[ ] _____

DECONTAMINATION FLUIDS USED:
✓ ALL USED
[ ] ETHYL ALCOHOL
[ ] 25% METHANOL/75% ASTM TYPE II WATER
[ ] DEIONIZED WATER
[ ] LIQUINOX SOLUTION
[ ] HEXANE
[ ] HNO_3 SOLUTION
[ ] POTABLE WATER
[ ] NONE

SOIL TYPE:
[ ] CLAY
[X] SAND
[ ] ORGANIC
[ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
[ ] YES
[X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb.
TAC Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: 09S02800 (MS/MSD)
Time: Start: 1417 End: 1428

Site: OU3
Date: 11-14-97
Signature of Sampler: BB

SOIL SAMPLE

DEPTH OF SAMPLE 0-2'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [ ] HAND SPOON
- [ ] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR brown/gray
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [ ] DEIONIZED WATER
- [ ] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [X] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SVOC
PEST/PCB
Herb-
TAL Metals

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 0902901
Time: Start: 14:32 End: 14:34

Site: OU3, SA-9
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR gray
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [X] FIELD DUPLICATE COLLECTED
DUPLICATE ID 0902901D

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TAL Metals	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] TCL Pest	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 09503C001
Time: Start: 13:55 End: 13:56

Site: OU3 SA-9
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Dark Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [X] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TAL Metals	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] TCL Pest	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 04503101
Time: Start: 14:00 End: 14:07

Site: OU3 SA-9
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR DARK BROWN
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [X] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TAL Metals	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] TCL Pest	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 09S03201
Time: Start: 13:50 End: 13:52

Site: OU3, SA-9
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR DARK BROWN
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TAL metals	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] TCL Pest	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: C9503202
Time: Start: 11:22 End: 11:24

Site: OU3, SA-9
Date: 02-13-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1.5'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Dark Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID/BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] Iron Oxides	[ ]	[✓]	[ ]	1x8oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[✓] As Spec	[ ]	[✓]	[ ]	1x8oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[✓] TOC	[ ]	[✓]	[ ]	1x4oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH Medium Sand & Silt

pH = 6.83 ORP = 189.6 mV

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 09503301
Time: Start: 14:05 End: 14:06

Site: OU3, SA-9
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Dark Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [X] CLAY
- [ ] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TAL Metals	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] TCL Pest	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE DATA RECORD

Project: NTC Orlando
Project Number: 02646.05
Sample Location ID: 09503302
Time: Start: 11:07 End: 11:09

Site: OU3, SA-9
Date: 02-13-98
Signature of Sampler: [signature]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1'

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR DARK BROWN
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [X] POTABLE WATER
- [ ] NONE

SOIL TYPE:
- [X] CLAY
- [ ] SAND
- [X] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] IRON Oxides	[ ]	[✓]	[ ]	1x8oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[✓] As Spec	[ ]	[✓]	[ ]	1x8oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[✓] TOC	[ ]	[✓]	[ ]	1x4oz	[✓]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH w/ Plant material

pH = 6.70 ORP = 208.0 mV

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 09503401
Time: Start: 14:10 End: 14:11

Site: OU3 SA-9
Date: 02-10-98
Signature of Sampler: William D Olson

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Dark Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TAL Metals	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] TCL Pest	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
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[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02546 05
Sample Location ID: 09503501
Time: Start: 14:37 End: 14:36

Site: OU3 SA-9
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Gray
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL 75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD QC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TAL Metals	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] TCL Pest	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH

SURFACE SOIL SAMPLE FIELD DATA RECORD

Project: NTC Orlando
Project Number: 02646 05
Sample Location ID: 09503601
Time: Start: 14:42 End: 14:43

Site: OU3 SA-9
Date: 02-10-98
Signature of Sampler: [illegible]

SOIL SAMPLE

DEPTH OF SAMPLE 0-1

EQUIPMENT USED FOR COLLECTION:
- [X] HAND AUGER
- [ ] S.S. SPLIT SPOON
- [ ] SHOVEL
- [X] HAND SPOON
- [X] ALUMINUM PANS
- [ ] SS BUCKET
- [ ] _____

TYPE OF SAMPLE COLLECTED:
- [X] DISCRETE
- [ ] COMPOSITE

SAMPLE OBSERVATIONS:
- [ ] ODOR _____
- [X] COLOR Brown
- [ ] _____

DECONTAMINATION FLUIDS USED:
- ✓ ALL USED
- [ ] ETHYL ALCOHOL
- [ ] 25% METHANOL/75% ASTM TYPE II WATER
- [X] DEIONIZED WATER
- [X] LIQUINOX SOLUTION
- [ ] HEXANE
- [ ] HNO_3 SOLUTION
- [ ] POTABLE WATER
- [X] NONE

SOIL TYPE:
- [ ] CLAY
- [X] SAND
- [ ] ORGANIC
- [ ] GRAVEL

FIELD GC DATA: [ ] FIELD DUPLICATE COLLECTED
DUPLICATE ID _____

SAMPLE LOCATION SKETCH:
- [ ] YES
- [ ] NO

SAMPLES COLLECTED

✓ IF REQUIRED AT THIS LOCATION	MATRIX: SURFACE WATER	MATRIX: SEDIMENT	✓ IF PRESERVED WITH ACID-BASE	VOLUME REQUIRED	✓ IF SAMPLE COLLECTED	SAMPLE BOTTLE IDS
[✓] TAL metals	[ ]	[✓]	[ ]	8oz	[✓]	/ / /
[✓] TCL Pest	[ ]	[✓]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /
[ ]	[ ]	[ ]	[ ]		[ ]	/ / /

NOTES/SKETCH Limerock / Gray SAND / Silty SAND

APPENDIX B-2.1

WELL CONSTRUCTION LOGS
STUDY AREA 8

Project: BRAC NTC, Orlando, Group I, Site Screening	**Well ID:** OLD-08-01		**Boring ID:** 08B004
Client: SOUTHNAVFACENGCOM	**Contractor:** Groundwater Protection, Inc.		**Job No.:** CTO-107
Northing: 1540115.44	**Easting:** 554299.99	**Date started:** 09/01/94	**Compltd:** 09/01/94
Method: 4.25" Hollow stem auger	**Casing dia.:** 2 in.	**Screened int.:** 3-13 ft. bls	**Protection level:** D
TOC elev.: 94.17 Ft.	**Type of OVM.:** Porta FID	**Total dpth:** 13.5Ft.	**Dpth to** ∇ 2.0* Ft.
ABB Rep.: S. Grietens	**Well development date:** 09/13/94		**Site:** Study Area 08

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
				0	QUARTZ SAND: Gray/brown, fine grained, good sorting, good to moderate rounding, trace silts and fine organics.		SP	posthole	
	08B00401		90%	0				10,15,18,20	
			95%	0	QUARTZ SAND: Gray, same as .5 to 4 feet, with trace phosphates.			5,7,10,12	
5			95%	0				10,18,18,20	
			95%		QUARTZ SAND: Dark brown/black, same as .5 to 4 feet, with slight plasticity.				
			95%	0				5,9,10,12	
10			90%	0				8,9,8,9	
			95%	0				5,3,4,4	
					QUARTZ SAND: Tan, same as 7 to 13 feet.				
15									

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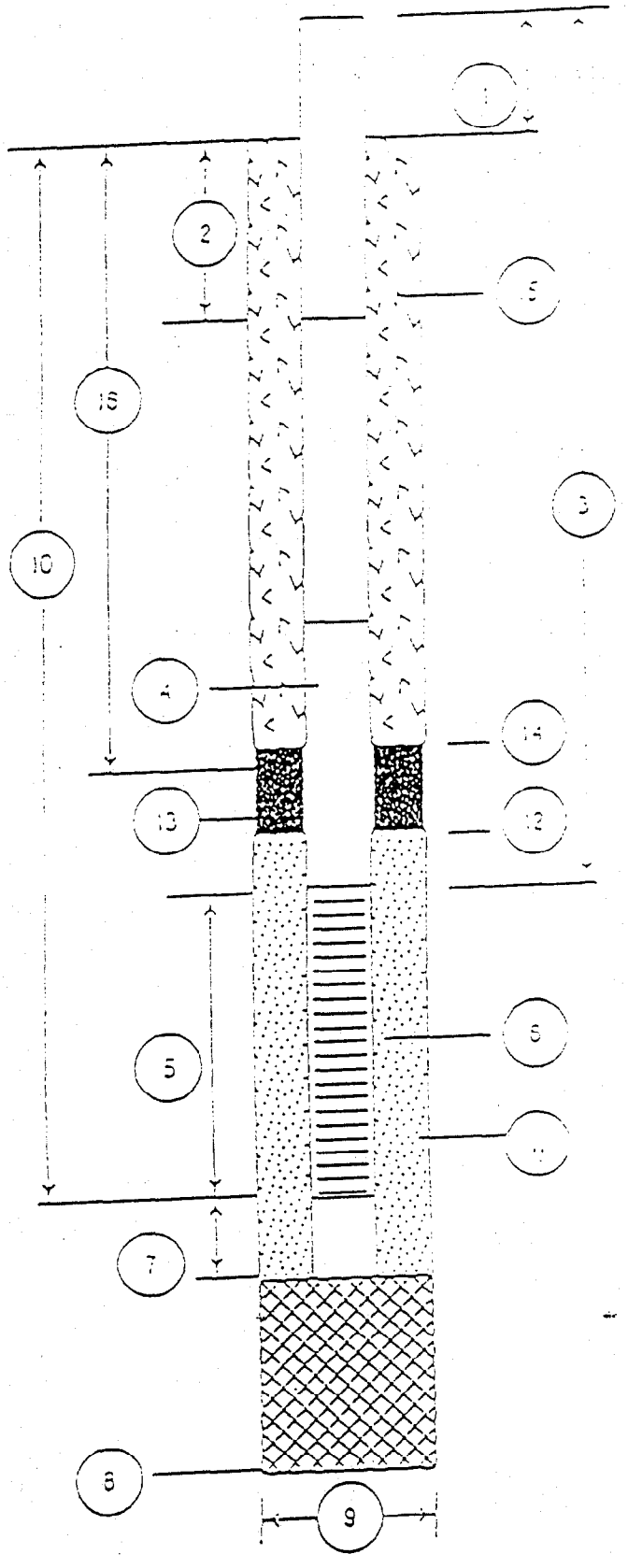
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.



OF CONSTRUCTION DETAIL

WELL NUMBER: OLD-08-01

DATE OF INSTALLATION: 9/1/94

1. Height of Casing above ground: 0
2. Depth to first Coupling: 3'
   Coupling Interval Depths: 10'
3. Total Length of Riser Pipe: 3'
4. Type of Riser Pipe: 2" Ø Schedule 40 PVC
5. Length of Screen: 10'
6. Type of Screen: 2" Ø Schedule 40 PVC .010 Slot Screen
7. Length of Sump: 6"
8. Total Depth of Boring: 13.5'
9. Diameter of Boring: 6.25"
10. Depth to Bottom of Screen: 13'
11. Type of Screen Filter: 20/30 Silica Sand
    Quantity Used: 300 lb Size: ____
12. Depth to Top of Filter: 2'
13. Type of Seal: Bentonite
    Quantity Used: 20 lb
14. Depth to Top of Seal: 1.5'
15. Type of Grout: Portland Cement
    Grout Mixture:
    Method of Placement: POURED
16. Tot. Depth of 6 in. Steel Casing: N/A

Project: BRAC NTC, Orlando, Group I, Site Screening	**Well ID:** OLD-08-02	**Boring ID:** 08B001
Client: SOUTHNAVFACENGCOM	**Contractor:** Groundwater Protection, Inc.	**Job No.:** CTO-107
Northing: 1540039.8239	**Easting:** 554297.2500	**Date started:** 08/31/94
Completed: 08/31/94	**Method:** 4.25" Hollow stem auger	**Casing dia.:** 2 in.
Screened int.: 3-13 ft. bls	**Protection level:** D	**TOC elev.:** 94.85 Ft.
Type of OVM.: Porta FID	**Total dpth:** 13.5Ft.	**Dpth to** ∇ 2.0* Ft.
ABB Rep.: S. Grietens	**Well development date:** 09/13/94	**Site:** Study Area 08

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
					QUARTZ SAND: Gray/brown, fine grained, good sorting, good to moderate rounding, trace silts and fine organics.		SP	posthole	
	08B00101		95%	0				5,12,13,23	
			100%	0	QUARTZ SAND: Gray, same as .5 to 4 feet.			5,6,14,18	
5			90%	0	QUARTZ SAND: Dark brown/black, same as .5 to 4 feet, with slight plasticity.			2,9,7,5,	
			90%	0				4,3,4,3	
10			95%	0				3,3,5,6	
			95%	0				3,4,5,6	
					QUARTZ SAND: Tan, same as 6 to 13 feet.				
15									

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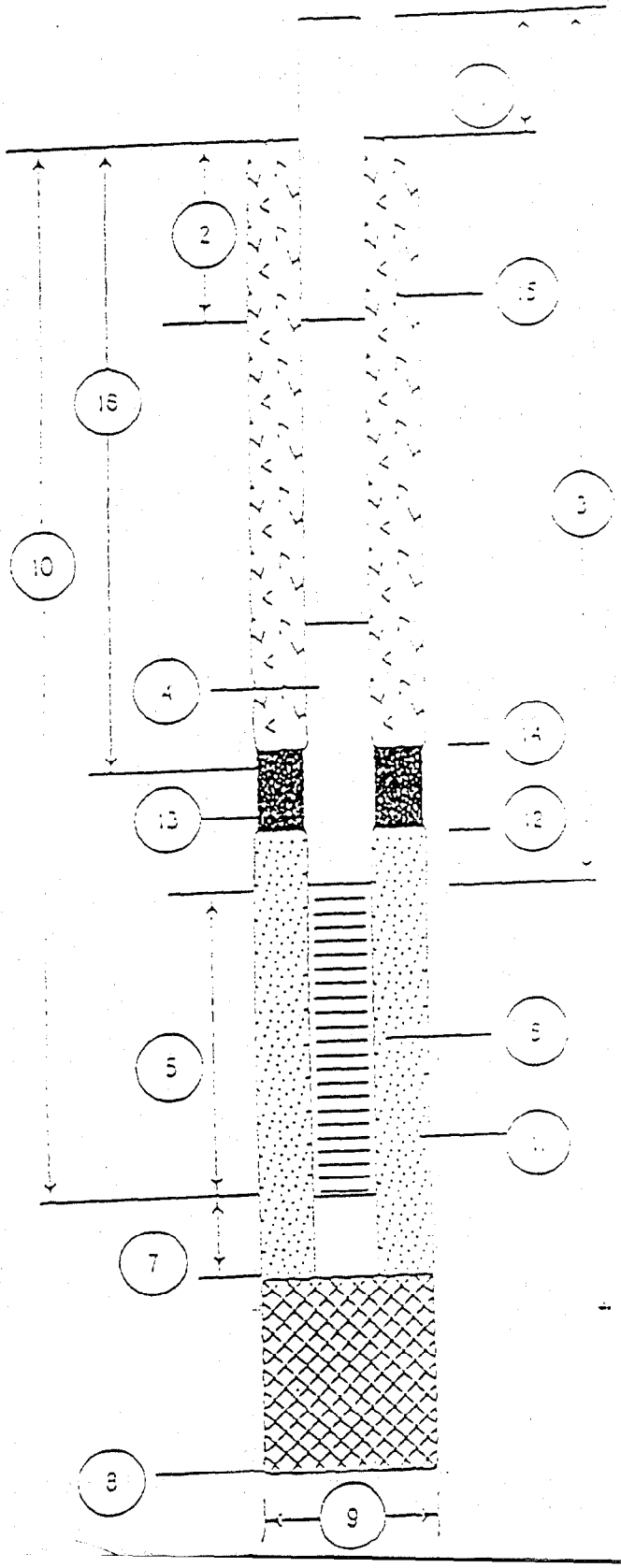

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-08-02

DATE OF INSTALLATION: 3/31/94

1. Height of Casing above ground: 0
2. Depth to first Coupling: 3'
   Coupling Interval Depths: 10'
3. Total Length of Riser Pipe: 3'
4. Type of Riser Pipe: 2" Ø Schedule 40 PVC
5. Length of Screen: 10'
6. Type of Screen: 2" Ø Schedule 40 PVC .010 Slot Screen
7. Length of Sump: 6"
8. Total Depth of Boring: 13.5'
9. Diameter of Boring: 6.25"
10. Depth to Bottom of Screen: ~~12.5'~~ 13'
11. Type of Screen Filter: 20/30 Silica Sand
    Quantity Used: 250 lb Size: ____
12. Depth to Top of Filter: 2'
13. Type of Seal: Bentonite
    Quantity Used: 25 lb
14. Depth to Top of Seal: 1.5'
15. Type of Grout: Portland Cement
    Grout Mixture:
    Method of Placement: POURED
16. Total Depth of 6 in. Steel Casing: N/A

Project: BRAC NTC, Orlando, Group I, Site Screening	**Well ID:** OLD-08-03		**Boring ID:** 08B002
Client: SOUTHNAVFACENGCOM	**Contractor:** Groundwater Protection, Inc.		**Job No.:** CTO-107
Northing: 1540097.8207	**Easting:** 554322.3738	**Date started:** 08/31/94	**Completd:** 08/31/94
Method: 4.25" Hollow stem auger	**Casing dia.:** 2 in.	**Screened int.:** 3-13 ft. bls	**Protection level:** D
TOC elev.: 94.40 Ft.	**Type of OVM.:** Porta FID	**Total dpth:** 13.5Ft.	**Dpth to** ▽ 2.0* Ft.
ABB Rep.: S. Grietens	**Well development date:** 09/13/94		**Site:** Study Area 08

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
				10	QUARTZ SAND: Gray/brown, fine grained, good sorting, good to moderate rounding, trace silts and fine organics.		SP	posthole	
	08B00201		95%	0				10,13,10,18	
5			90%	10	QUARTZ SAND: Gray, same as .5 to 4 feet.			4,6,6,12	
			90%	0	QUARTZ SAND: Dark brown/black, same as .5 to 4 feet, with slight plasticity.			17,23,50/3"	
			95%	0				4,8,8,10	
10			95%	0				10,10,12,12	
			100%	0	QUARTZ SAND: Tan, same as 8 to 13 feet.			10,8,12,12	
15									

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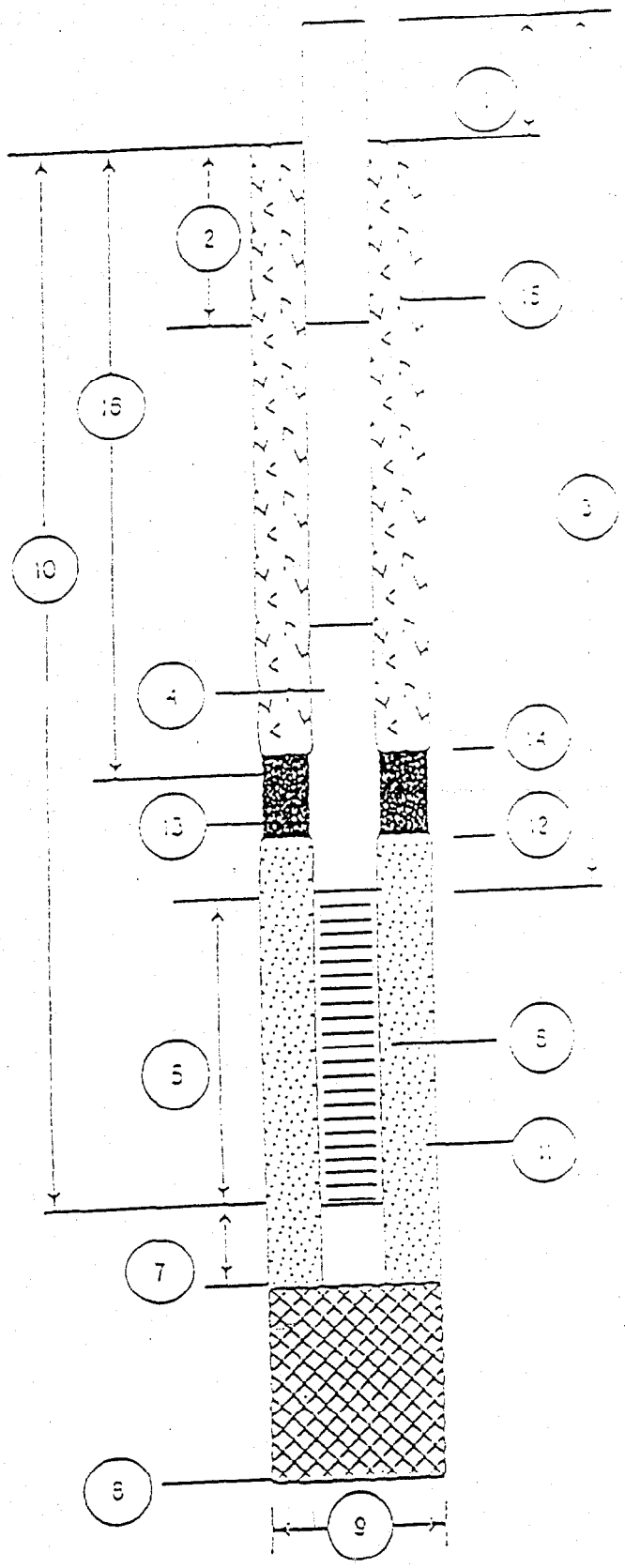

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-08-03

DATE OF INSTALLATION: 8/31/04

1. Height of Casing above ground: 0
2. Depth to First Coupling: 3'
   Coupling Interval Depths: 10'
3. Total Length of Riser Pipe: 3'
4. Type of Riser Pipe: 2" ϕ Schedule 40 PVC
5. Length of Screen: 10'
6. Type of Screen: 2" ϕ Schedule 40 PVC .010 Slot Screen
7. Length of Sump: 6"
8. Total Depth of Boring: 13.5'
9. Diameter of Boring: 6.25"
10. Depth to Bottom of Screen: 13'
11. Type of Screen Filter: 20/30 Silica Sand
    Quantity Used: 300 lb Size: ____
12. Depth to Top of Filter: 2'
13. Type of Seal: Bentonite
    Quantity Used: 15 lb
14. Depth to Top of Seal: 1.5'
15. Type of Grout: Portland Cement
    Grout Mixture:
    Method of Placement: Poured
16. Total Depth of 8 in. Steel Casing: N/A

Project: BRAC NTC, Orlando, Group I, Site Screening	**Well ID:** OLD-08-04	**Boring ID:** 08B003
Client: SOUTHNAVFACENGCOM	**Contractor:** Groundwater Protection, Inc.	**Job No.:** CTO-107
Northing: 1540039.82	**Easting:** 554289.88 / **Date started:** 09/01/94	**Completd:** 09/01/94
Method: 4.25" Hollow stem auger	**Casing dia.:** 2 in. / **Screened int.:** 3-13 ft. bls	**Protection level:** D
TOC elev.: 94.88 Ft.	**Type of OVM.:** Porta FID / **Total dpth:** 13.5Ft.	**Dpth to** ∇ 2.0* Ft.
ABB Rep.: S. Grietens	**Well development date:** 09/13/94	**Site:** Study Area 08

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
					QUARTZ SAND: Gray/brown, fine grained, good sorting, good to moderate rounding, trace silts and fine organics.		SP	posthole	
	08B00301		95%	0				4,5,6,5	
			90%	0	QUARTZ SAND: Gray, same as .5 to 4 feet.			3,3,5,6	
5			90%	0	QUARTZ SAND: Dark brown/black, same as .5 to 4 feet, with slight plasticity.			2,7,20,16	
			60%	0				4,26,20,14	
10			95%	0				8,11,9,9	
			95%	0	QUARTZ SAND: Tan, same as 6 to 13 feet.			8,8,9,10	
15									

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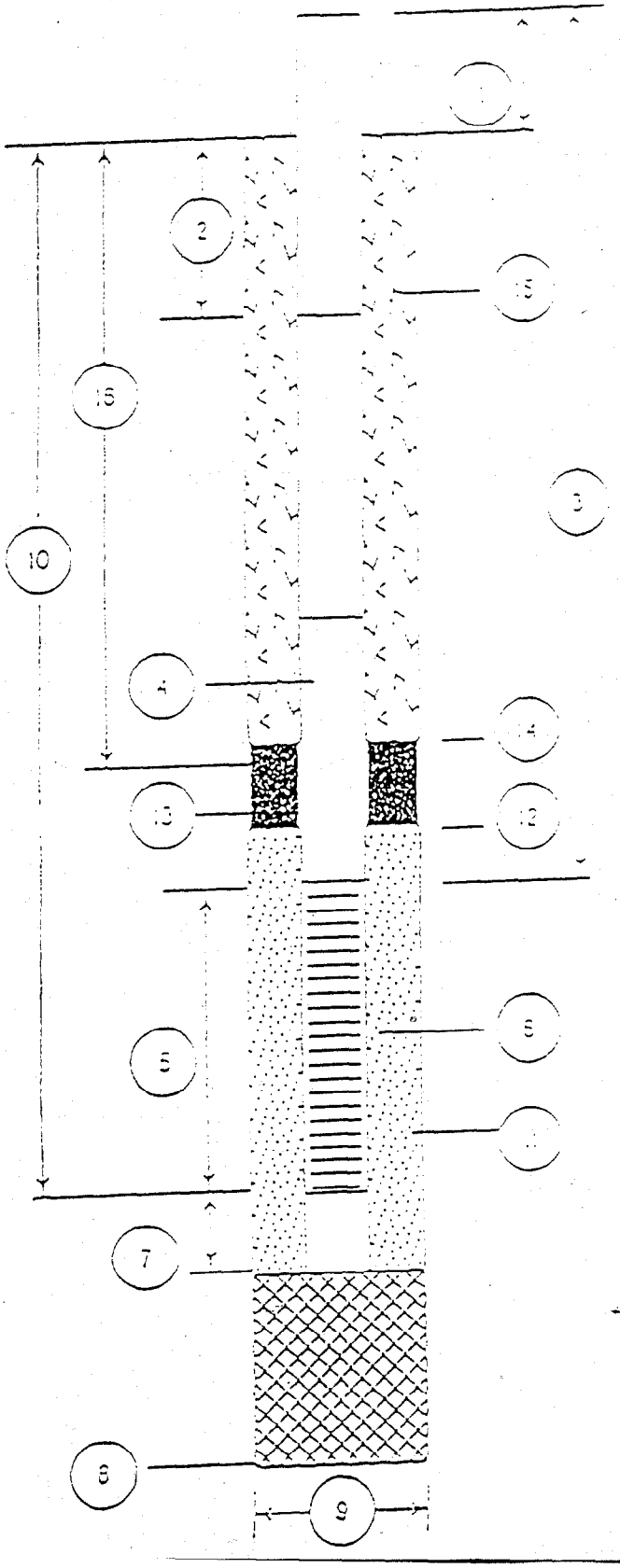


WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-03-04

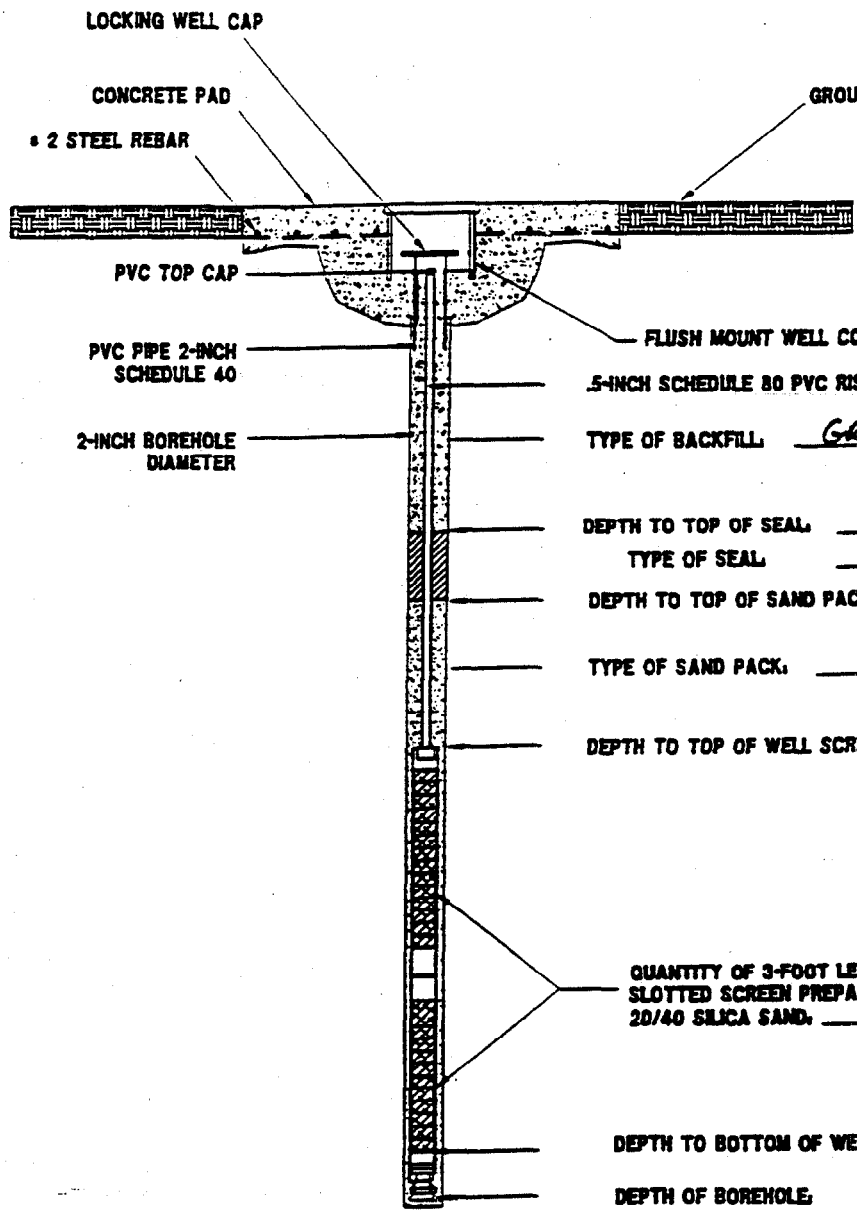
DATE OF INSTALLATION: 9/1/94

1. Height of Casing above ground: 2
2. Depth to First Coupling: 3'
   Coupling Interval Depths: 10'
3. Total Length of Riser Pipe: 3'
4. Type of Riser Pipe: 2" Ø Schedule 40 PVC
5. Length of Screen: 10'
6. Type of Screen: 2" Ø Schedule 40 PVC .010 Slot Screen
7. Length of Sump: 6"
8. Total Depth of Boring: 13.5'
9. Diameter of Boring: 6.25"
10. Depth to Bottom of Screen: 13'
11. Type of Screen Filter: 20/30 Silica Sand
    Quantity Used: 300 lb Size: ____
12. Depth to Top of Filter: 2'
13. Type of Seal: Bentonite
    Quantity Used: 20 lb
14. Depth to Top of Seal: 1.5'
15. Type of Grout: Portland Cement
    Grout Mixture:
    Method of Placement: Pressure
16. Total Depth of 8 in. Steel Casing: N/A

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-08-05
FIELD PERSONNEL: S. DONELKIL, P. CRAINE

SITE NAME: OU3/SA8
DATE INSTALLED: 10-8-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 0.3 ft.
TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 0.5 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 1 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 ft.

DEPTH TO BOTTOM OF WELL SCREEN: 10 ft.

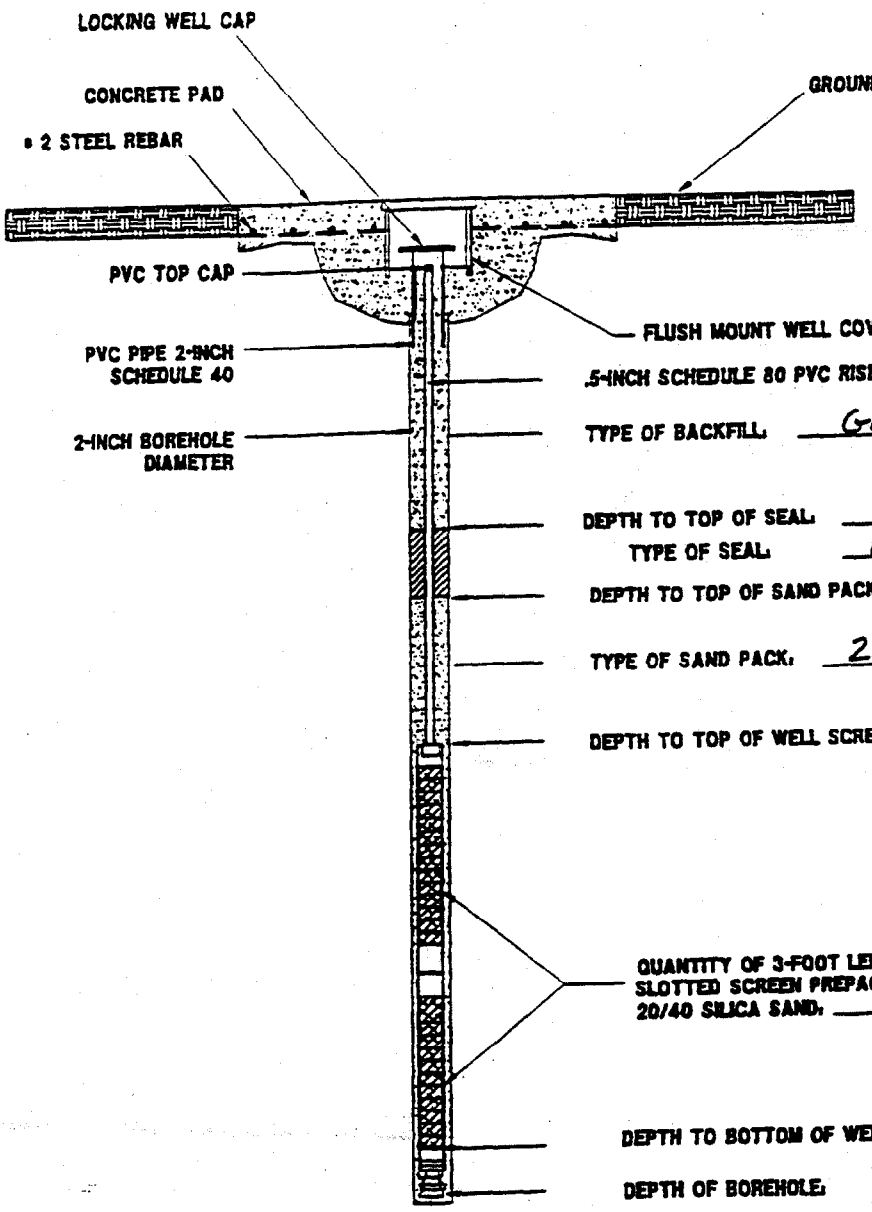
DEPTH OF BOREHOLE: 10 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-08-06
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3/SA 8
DATE INSTALLED: 10-8-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 0.3 ft.
TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 0.5 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 1 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 ft.

DEPTH TO BOTTOM OF WELL SCREEN: 10 ft.

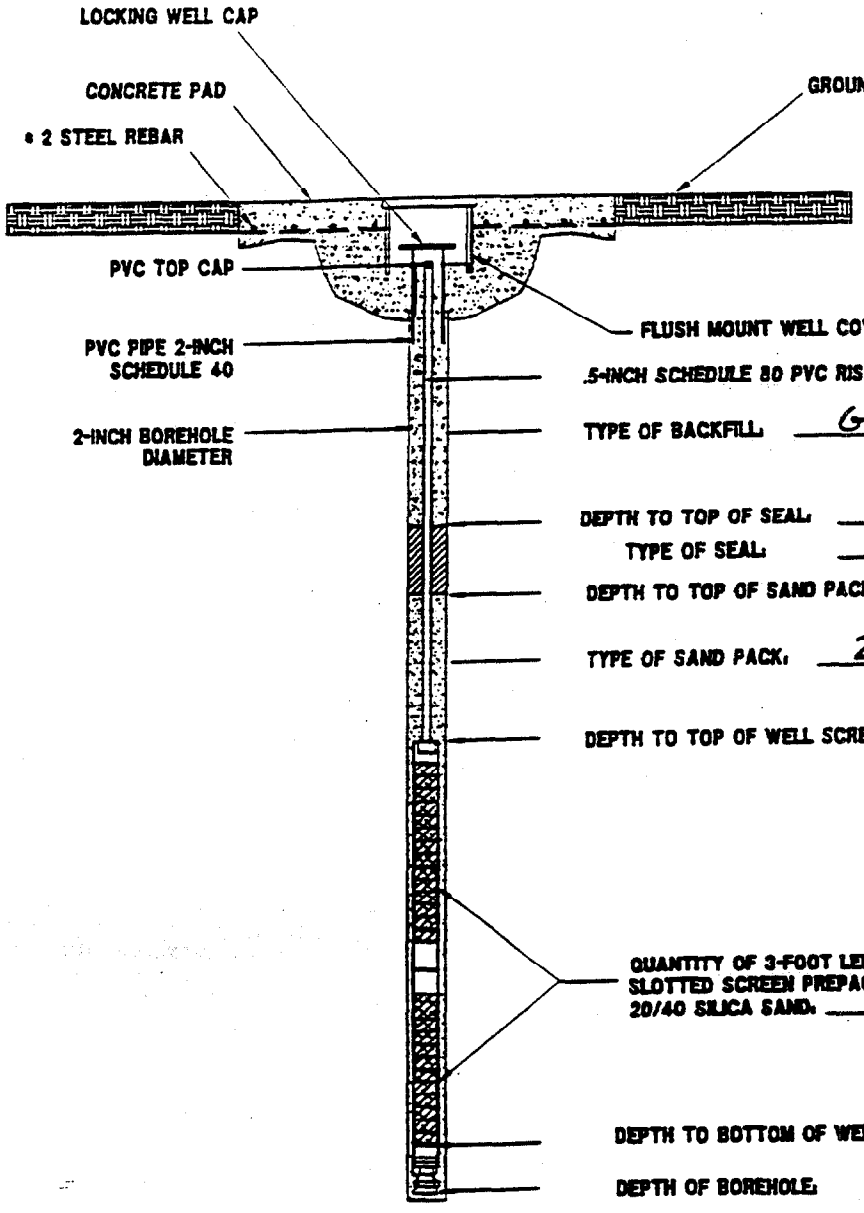
DEPTH OF BOREHOLE: 10 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-08-07
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: 043/SA8
DATE INSTALLED: 10-8-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 0.3 ft.
TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 0.5 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 1 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 ft.

DEPTH TO BOTTOM OF WELL SCREEN: 10 ft.

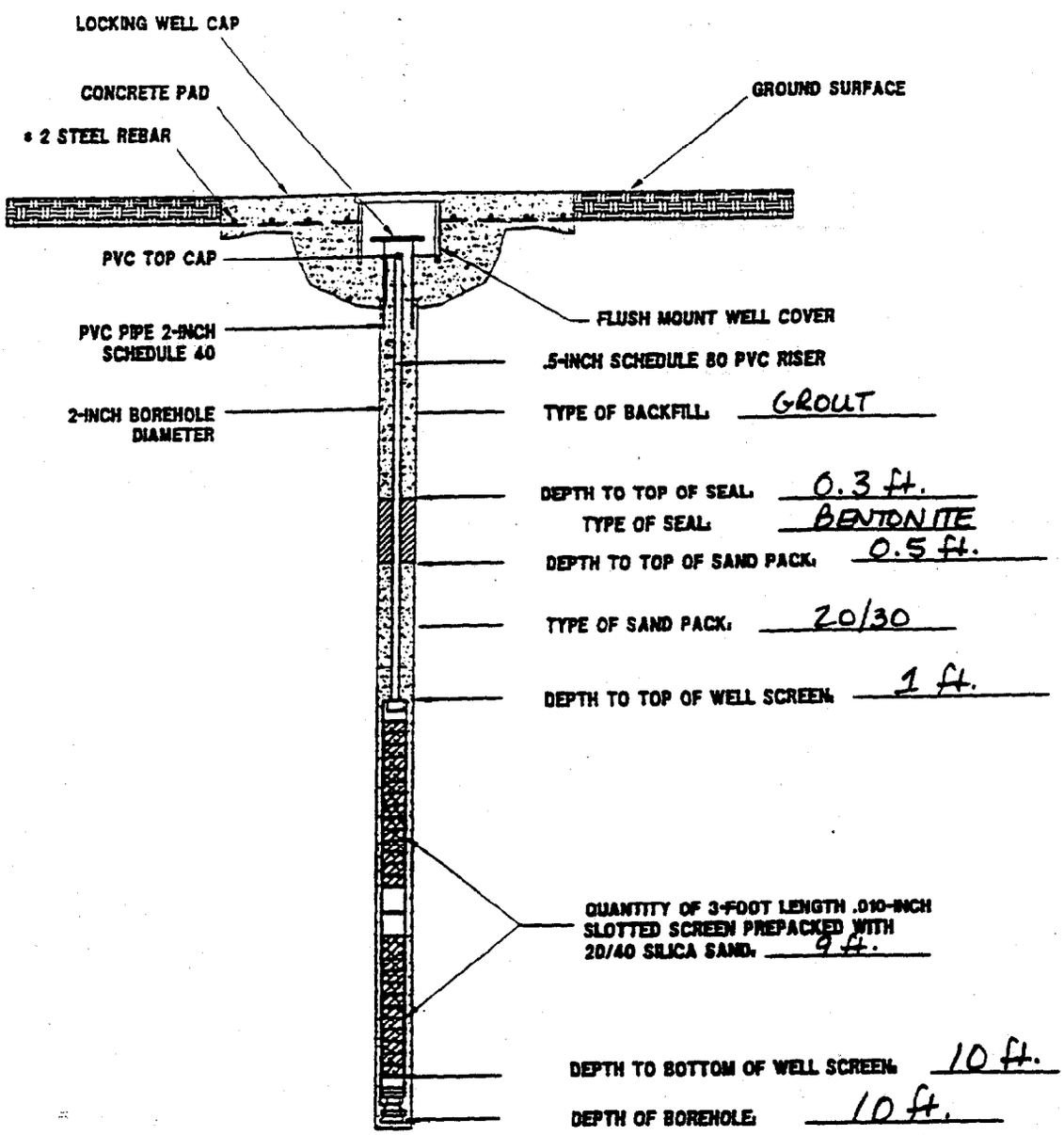
DEPTH OF BOREHOLE: 10 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-08-08
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3/SA8
DATE INSTALLED: 10-8-97
INSTALLATION METHOD: TERRAPROBE

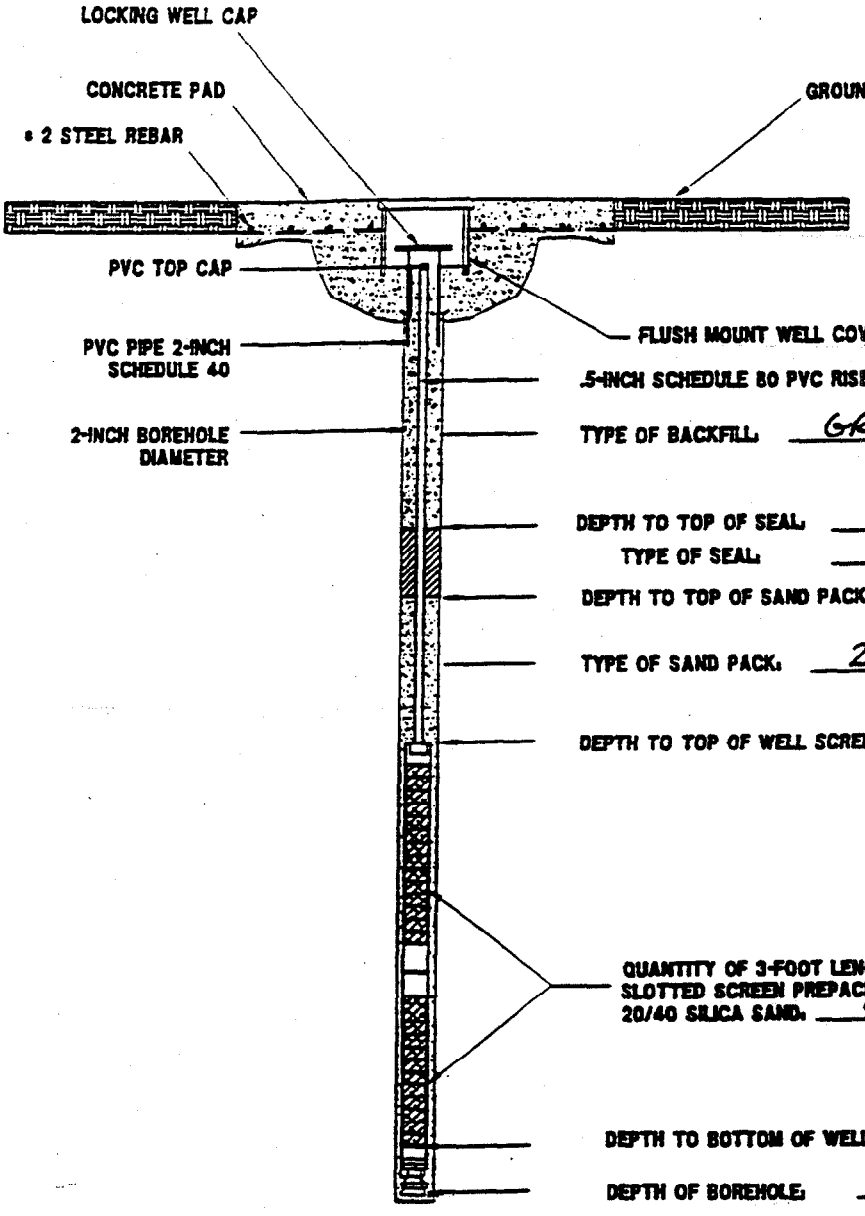


NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-08-09
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3/SA8
DATE INSTALLED: 10-8-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 0.3 ft.

TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 0.5 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 1 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 ft.

DEPTH TO BOTTOM OF WELL SCREEN: 10 ft.

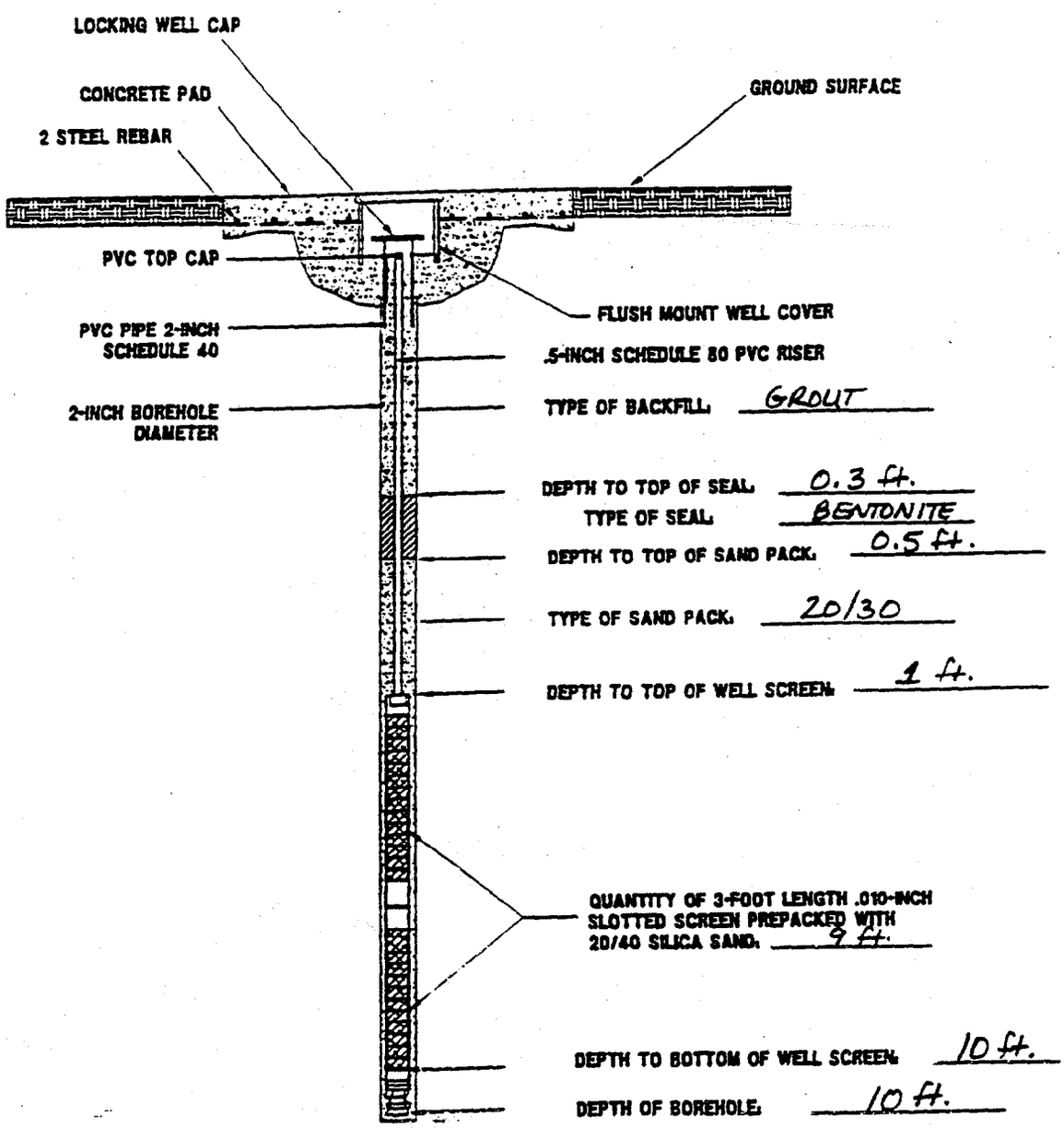
DEPTH OF BOREHOLE: 10 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-08-10
FIELD PERSONNEL: S. DONELICK, P. CRAINE, M. ALONSO

SITE NAME: OU3/SA8
DATE INSTALLED: 10-10-97
INSTALLATION METHOD: TERRAPROBE

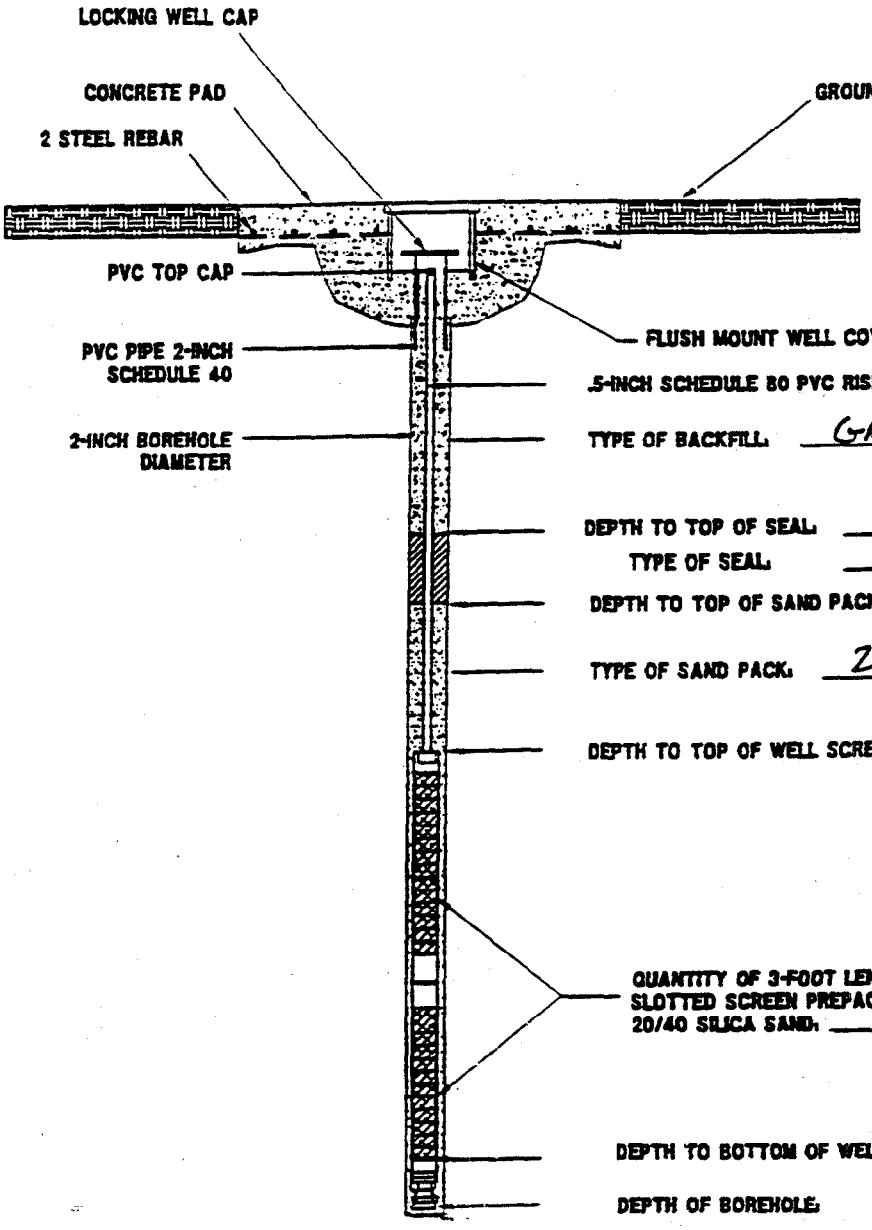


NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-08-11
FIELD PERSONNEL: S. DONELICK, P. CRAINE, M. ALONSO

SITE NAME: OU3/SA8
DATE INSTALLED: 10-10-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 0.3 ft.

TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 0.5 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 1 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 ft.

DEPTH TO BOTTOM OF WELL SCREEN: 10 ft.

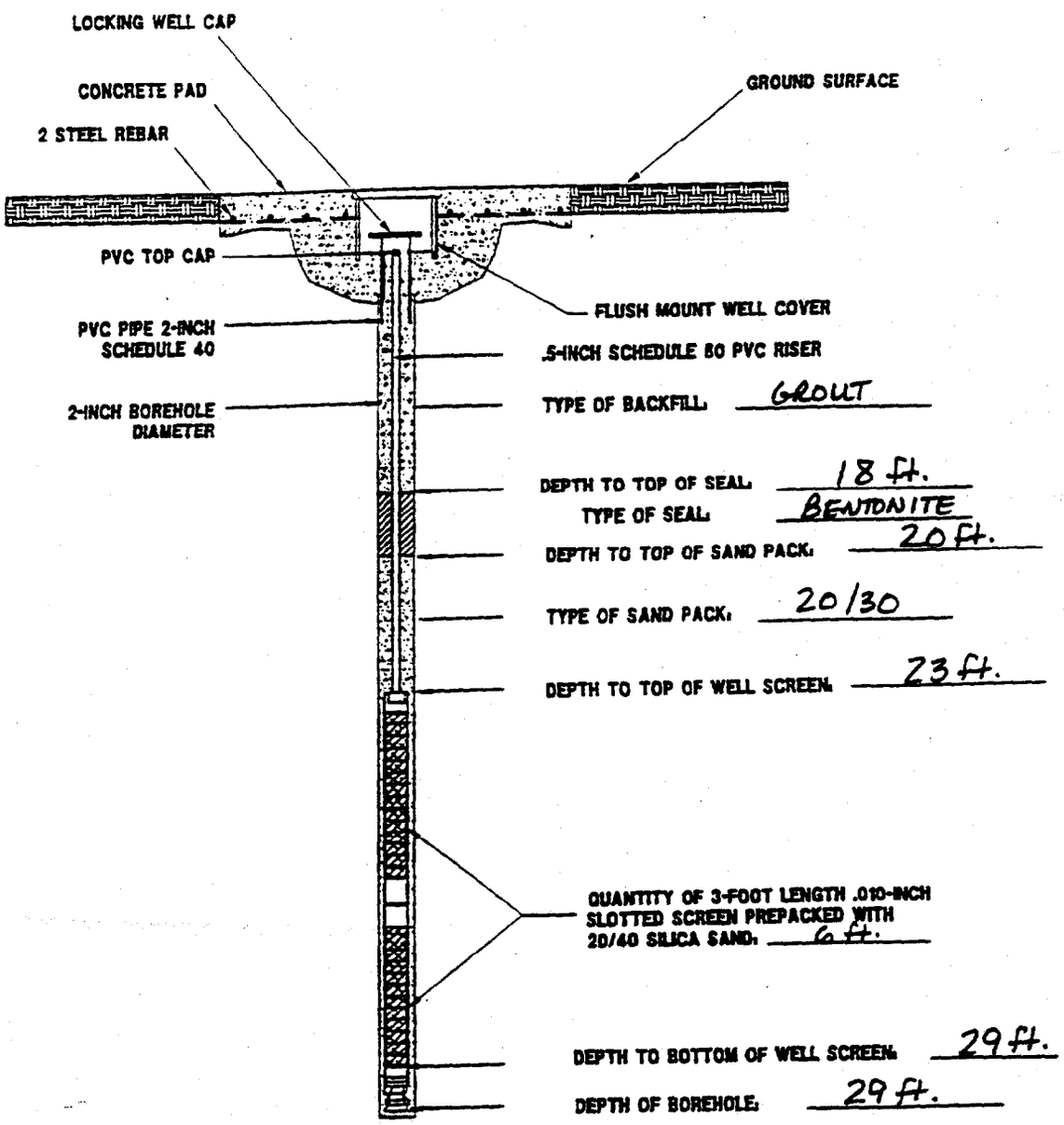
DEPTH OF BOREHOLE: 10 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-08-12
FIELD PERSONNEL: S. DONELICK, P. CRAINE, M. ALONSO

SITE NAME: OU3/SA8
DATE INSTALLED: 10-9-97
INSTALLATION METHOD: TERRAPROBE



NOT TO SCALE

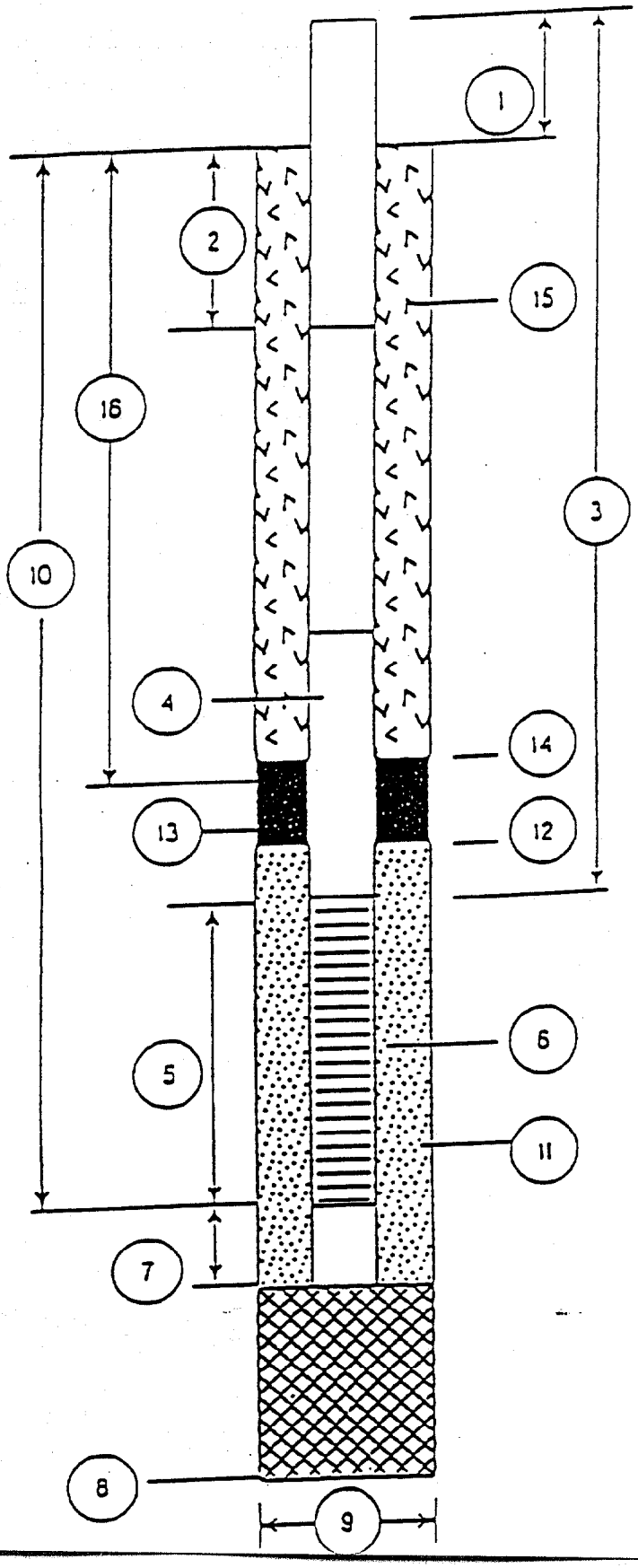
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-08-13

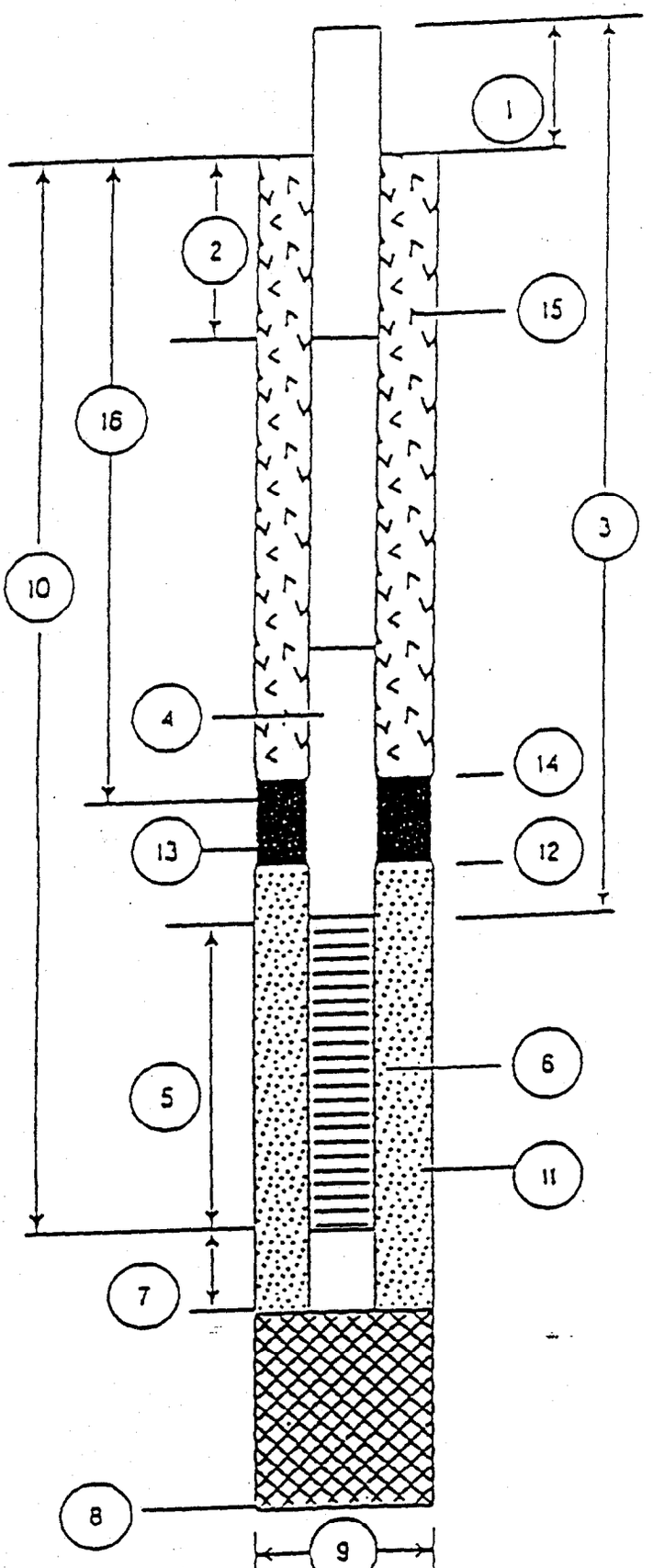
DATE OF INSTALLATION: ——



1. Height of Casing above ground: 3.87
2. Depth to first Coupling: 1.13
   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 5'
4. Type of Riser Pipe: 1/2" sched 40 PVC
5. Length of Screen: 6'
6. Type of Screen: Geoprobe Prepacked 0.010S
7. Length of Sump: NA
8. Total Depth of Boring: 7.14
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 7.13
11. Type of Screen Filter: 20/30 prepacked
    Quantity Used: —— Size: ——
12. Depth to Top of Filter: 0.63
13. Type of Seal: bentonite
    Quantity Used: NR
14. Depth to Top of Seal: Ø
15. Type of Grout: NA
    Grout Mixture:
    Method of Placement: ——
16. Tot. Depth of 6 in. Steel Casing: NA

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.



WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-08-14

DATE OF INSTALLATION.

1. Height of Casing above ground: 3.88
2. Depth to first Coupling: 1.12

   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 5'
4. Type of Riser Pipe: 1/2" Schod. 40 PVC
5. Length of Screen: 6'
6. Type of Screen: Geoprobe Prepacked 0.010 s
7. Length of Sump: NA
8. Total Depth of Boring: 7.13
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 7.12
11. Type of Screen Filter: 20/30 Prepacked

    Quantity Used: ——— Size: -
12. Depth to Top of Filter: 0.62
13. Type of Seal: bentonite

    Quantity Used: ———
14. Depth to Top of Seal: Ø
15. Type of Grout: NA

    Grout Mixture:

    Method of Placement: ———
16. Tot. Depth of 6 in. Steel Casing: NA

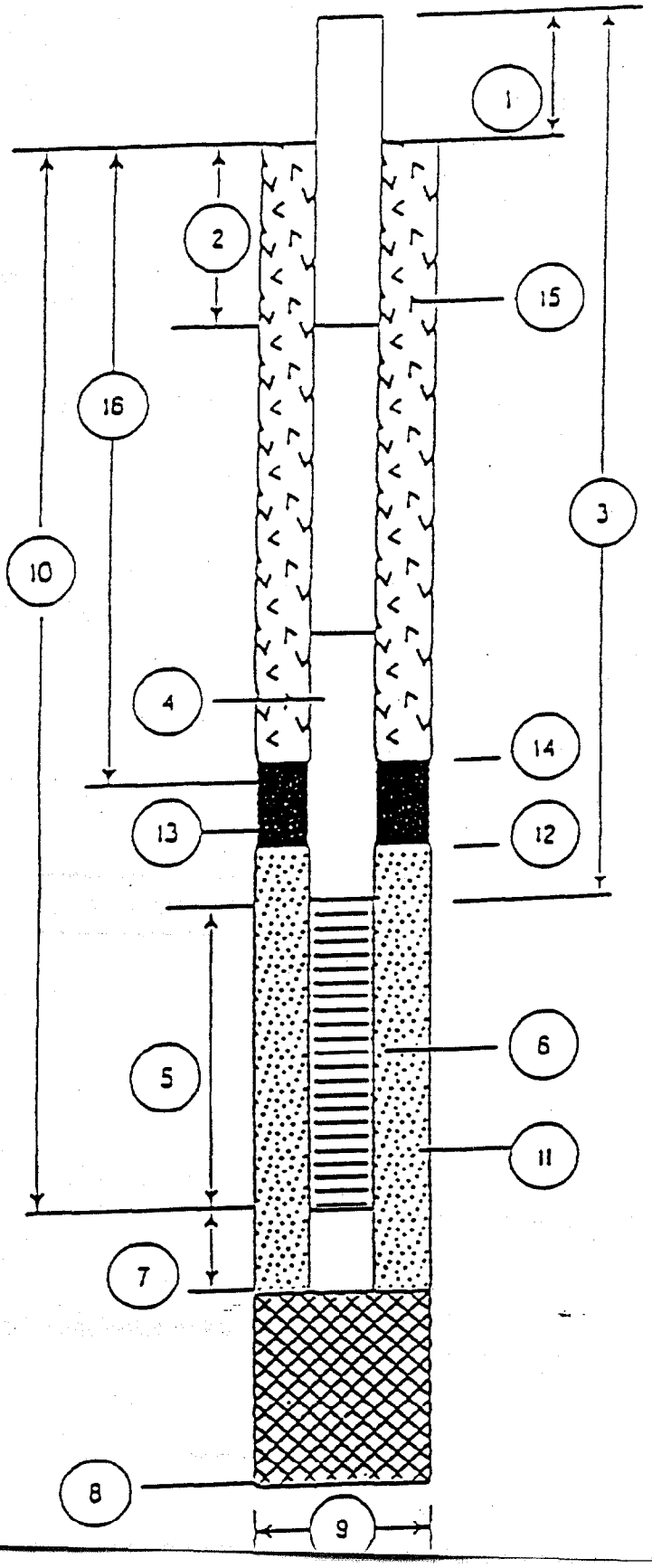
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-08-15

DATE OF INSTALLATION: ——



1. Height of Casing above ground: 3.78
2. Depth to first Coupling: 1.22

   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 5'
4. Type of Riser Pipe: 1½" Sched. 40 PVC
5. Length of Screen: 6'
6. Type of Screen: Geoprobe Prepacked 0.010 slot
7. Length of Sump: NA
8. Total Depth of Boring: 7.23
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 7.22
11. Type of Screen Filter: 20/30 Prepacked

    Quantity Used: —— Size: ——
12. Depth to Top of Filter: 0.62
13. Type of Seal: bentonite

    Quantity Used: NR
14. Depth to Top of Seal: Ø
15. Type of Grout: NA

    Grout Mixture:

    Method of Placement: ——
16. Tot. Depth of 6 in. Steel Casing: NA

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO

PROJECT NO. : 02546.05

DATE INSTALLED : 02/04/98

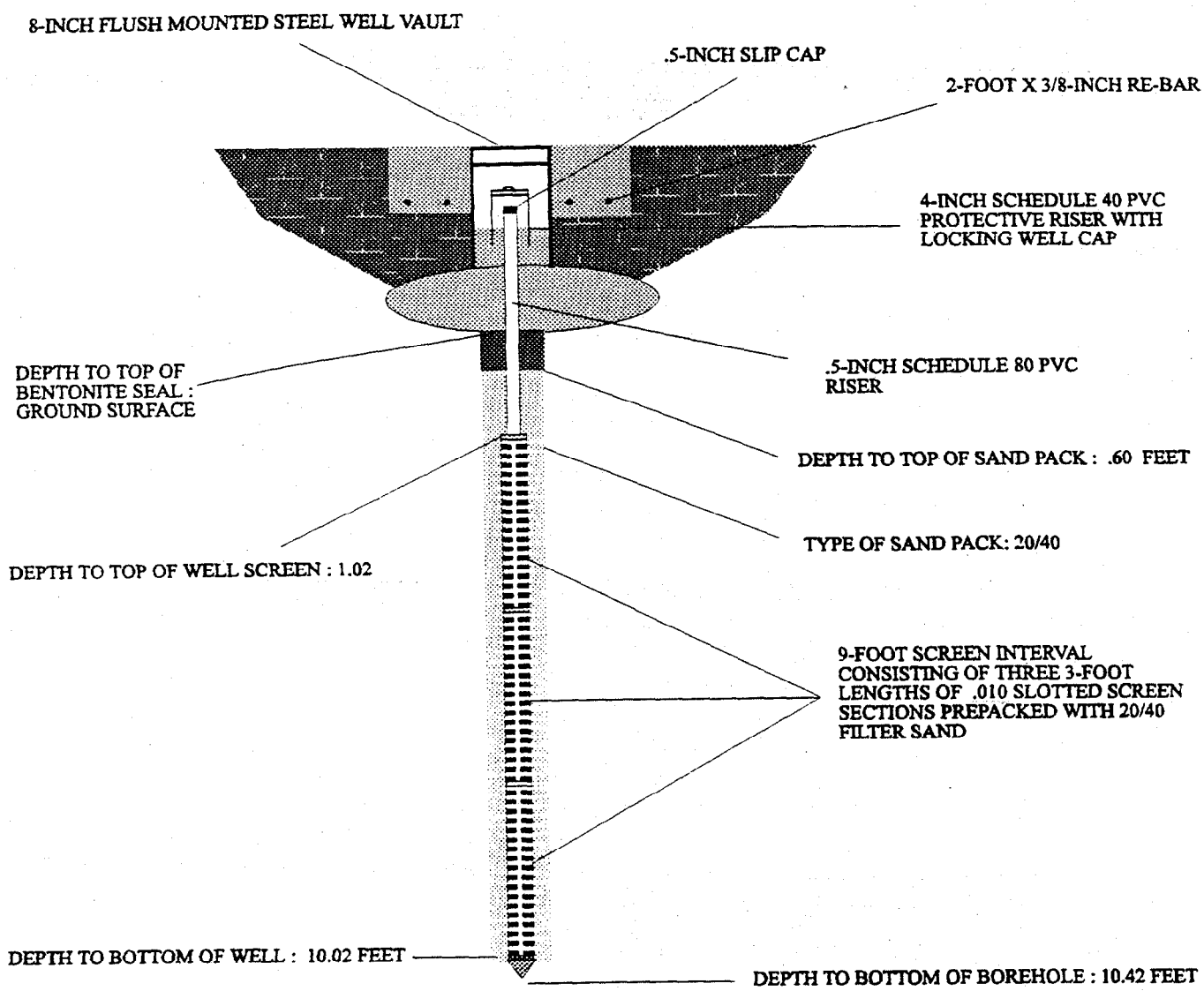
DEVELOPMENT DATE: 02/09/98

SITE NAME: OU3, SA8

WELL ID NO. : OLD-08-16

INSTALLATION METHOD : GEOPROBE

PERSONNEL : B. OLSON / P.CRAINE



NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO

PROJECT NO. : 02546.05

DATE INSTALLED : 02/04/98

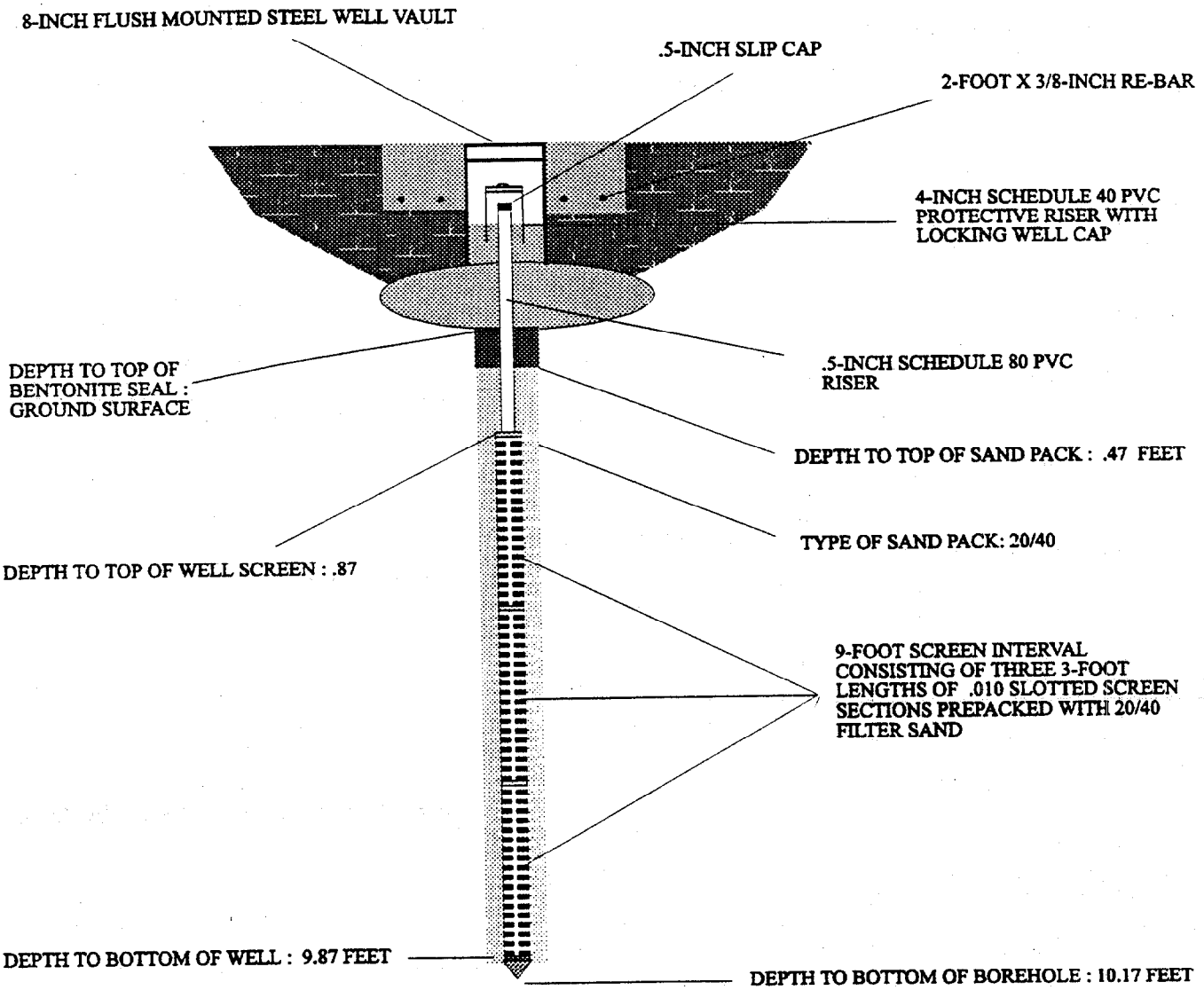
DEVELOPMENT DATE: 02/09/98

SITE NAME: OU3, SA8

WELL ID NO. : OLD-08-17

INSTALLATION METHOD : GEOPROBE

PERSONNEL : B. OLSON / P.CRAINE



NOT TO SCALE

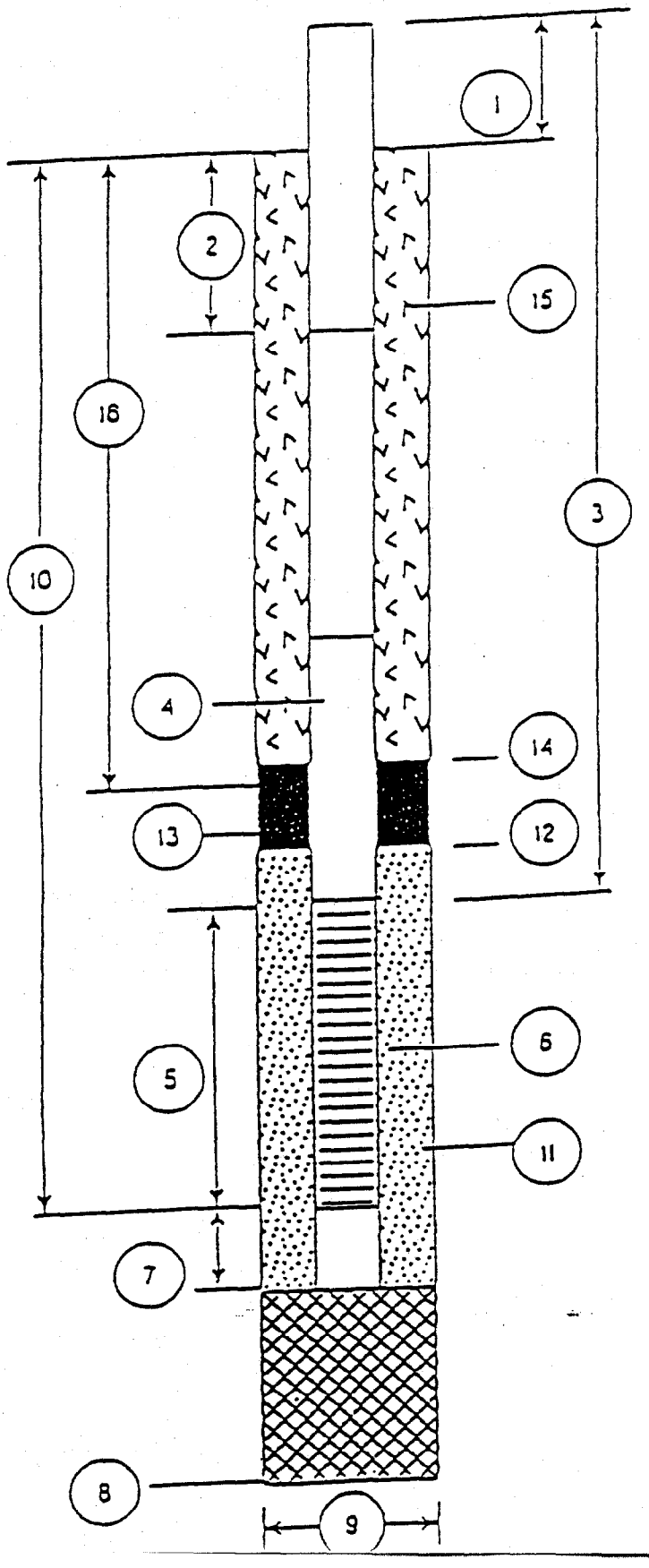
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.

WELL CONSTRUCTION DETAIL

WELL NUMBER: OA-08-18

DATE OF INSTALLATION:



1. Height of Casing above ground: 2.88
2. Depth to first Coupling: 2.12

   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 5'
4. Type of Riser Pipe: 1½" sched. 40 PVC
5. Length of Screen: 9'
6. Type of Screen: geoprobe prepacked 0.020 SS
7. Length of Sump: NA
8. Total Depth of Boring: 11.13
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 11.12
11. Type of Screen Filter: 20/30 prepacked

    Quantity Used: ——— Size:
12. Depth to Top of Filter: 1
13. Type of Seal: bentonite

    Quantity Used: ———
14. Depth to Top of Seal: Ø
15. Type of Grout: NA

    Grout Mixture:

    Method of Placement: ———
16. Tot. Depth of 6 in. Steel Casing: NA

APPENDIX B-2.2

WELL CONSTRUCTION LOGS
STUDY AREA 9

Project: BRAC NTC, Orlando, Group I, Site Screening	**Well ID:** OLD-09-01	**Boring ID:** 09B001
Client: SOUTHNAVFACENGCOM	**Contractor:** Groundwater Protection, Inc.	**Job No.:** DTO-107
Northing: 1539392.00	**Easting:** 553787.22	**Date started:** 08/30/94 **Completd:** 09/30/94
Method: 4.25" Hollow stem auger	**Casing dia.:** 2 in.	**Screened int.:** 3-13 ft. bls **Protection level:** D
TOC elev.: 94.77 Ft.	**Type of OVM.:** Porta FID	**Total dpth:** 13.5Ft. **Dpth to** ▼ 4.0* Ft.
ABB Rep.: S. Grietens/T.Cramer	**Well development date:** 09/09/94	**Site:** Study Area 09

Depth Ft.	Laboratory Sample ID.	Sample	Recovery	Headspace (ppm)	Soil/Rock Description and comments	Lithologic symbol	Soil class.	Blows/6-in.	Well diag.
				0	QUARTZ SAND: Light gray, medium grained.		SP	postrole	
	09B00101		100%	0				4,9,7,10	
5			100%	0	QUARTZ SAND: Light brown, medium grained, trace silts, good sorting, good to moderate rounding.			4,4,5,8	
			75%	0				8,9,12,11	
			100%	0	QUARTZ SAND: Dark brown/black, same as 4 to 8 feet, with trace fines and trace silts.			10,9,11,8	
10			100%	25				4,19,15,23	
			100%	0				12,14,20,20	
15									

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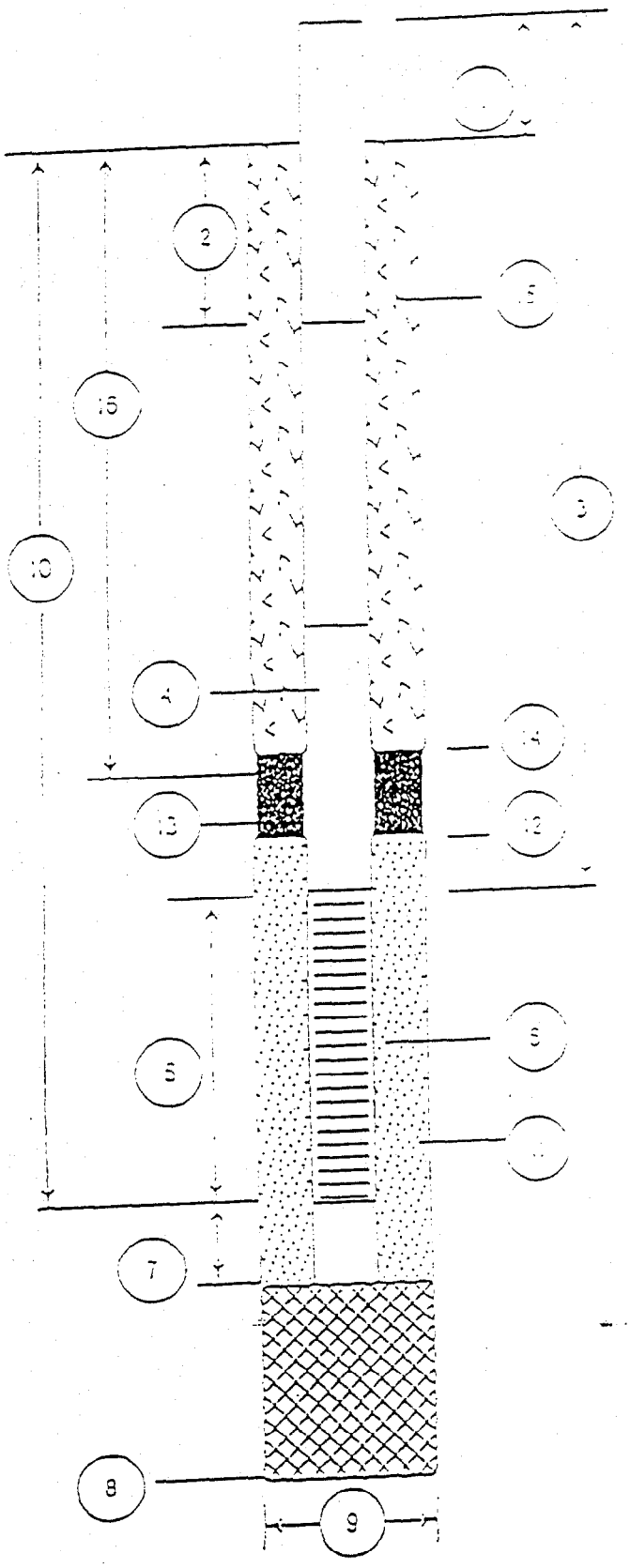
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.



WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-09-0~~8~~1

DATE OF INSTALLATION: 8/30/94

1. Height of Casing above ground: 0
2. Depth to first Coupling: 3'
   Coupling Interval Depths: 10'
3. Total Length of Riser Pipe: 3'
4. Type of Riser Pipe: 2" Ø Schedule 40 PVC
5. Length of Screen: 10'
6. Type of Screen: 2" Ø Schedule 40 PVC .010 Slot Screen
7. Length of Sump: 6"
8. Total Depth of Boring: 13.5'
9. Diameter of Boring: 6.25"
10. Depth to Bottom of Screen: 13'
11. Type of Screen Filter: 20/30 Silica Sand
    Quantity Used: 325 lb Size: ____
12. Depth to Top of Filter: 2'
13. Type of Seal: Bentonite
    Quantity Used: 25 lb
14. Depth to Top of Seal: 1.5'
15. Type of Grout: Portland Cement
    Grout Mixture:
    Method of Placement: POURED
16. Total Depth of 6 in. Steel Casing: N/A

Geraghty & Miller, Inc.

Two pages from the G&M Verification Study represent all the information available for wells OLD-09-02, OLD-09-03, and OLD-09-04

LITHOLOGIC LOG FOR MONITOR WELL OLM-14

Description	Depth (ft)	Thickness (ft)
Asphalt and sand, fine-grained, dark brown stained.....	0 - 2.0	2.0
Sand, fine-grained, light tan to white, stained.....	2.0 - 8.0	6.0
Sand, silty, fine-grained, light tan to brown, some shells.....	8.0 - 10.0	2.0
Sand, medium-grained, white to light tan...	10.0 - 14.0	4.0

LITHOLOGIC LOG FOR MONITOR WELL OLM-15

Description	Depth (ft)	Thickness (ft)
Asphalt and sand, dark brown stained.....	0 - 2.0	2.0
[illegible]nd, fine-grained, light tan to white, [illegible]ained.....	2.0 - 14.0	12.0

LITHOLOGIC LOG FOR MONITOR WELL OLM-16 (OLD-09-02)

Description	Depth (ft)	Thickness (ft)
Soil and sand, light gray.....	0 - 2.0	2.0
Sand, medium-grained, light gray.....	2.0 - 4.0	2.0
Sand, clayey, medium to coarse-grained, dark brown.....	4.0 - 14.0	10.0

LITHOLOGIC LOG FOR MONITOR WELL OLM-17 (OLD-09-03)

Description	Depth (ft)	Thickness (ft)
Soil and sand, medium-grained, light gray to white.....	0 - 4.0	4.0
[illegible]nd, medium to coarse-grained, white to [illegible]ray, stained.....	4.0 - 14.0	10.0

LITHOLOGIC LOG FOR MONITOR WELL OLM-13 (OLD-09-04)

Description	Depth (ft)	Thickness (ft)
Soil, dark gray.....	0 - 2.0	2.0
Sand, slightly clayey, medium to coarse-grained, dark brown.....	2.0 - 14.0	12.0

099939

OLM 16 = OLD-09-02
OLM 17 = OLD-09-03
OLM 18 = OLD-09-04

404/32

Table 2. Construction Details of Monitor Wells

MONITOR WELL NUMBER	SITE NUMBER	TOTAL DEPTH (ft below land surface)	SCREEN SETTING (ft below land surface)	MEASURING POINT ELEVATION 2/ (ft msl)
OLM 1	Site 1	13.5	8.5 - 13.5	125.07
OLM 2	Site 1	21.0	16.0 - 21.0	114.86
OLM 3	Site 1	21.0	16.0 - 21.0	113.19
OLM 4	Site 1	21.0	16.0 - 21.0	113.99
OLM 5	Site 3	12.0	7.0 - 12.0	93.70
OLM 6	Site 10	12.0	7.0 - 12.0	92.88
OLM 7	Site 10	11.9	6.9 - 11.9	91.81
OLM 8	Site 3	13.0	8.0 - 13.0	91.25
OLM 9	Site 3	13.5	8.5 - 13.5	91.35
OLM 10	Site 3	12.0	7.0 - 12.0	92.16
OLM 11 1/	Site 3	16.6	11.6 - 16.6	90.70
OLM 12 1/	Site 3	17.1	12.1 - 17.1	92.01
OLM 13	Site 3	14.0	9.0 - 14.0	92.21
OLM 14	Site 6	13.6	8.6 - 13.6	— 3/
OLM 15	Site 6	13.6	8.6 - 13.6	—
OLM 16	Site 8	12.0	7.0 - 12.0	97.74
OLM 17	Site 8	12.0	7.0 - 12.0	97.75
OLM 18	Site 8	12.0	7.0 - 12.0	97.16

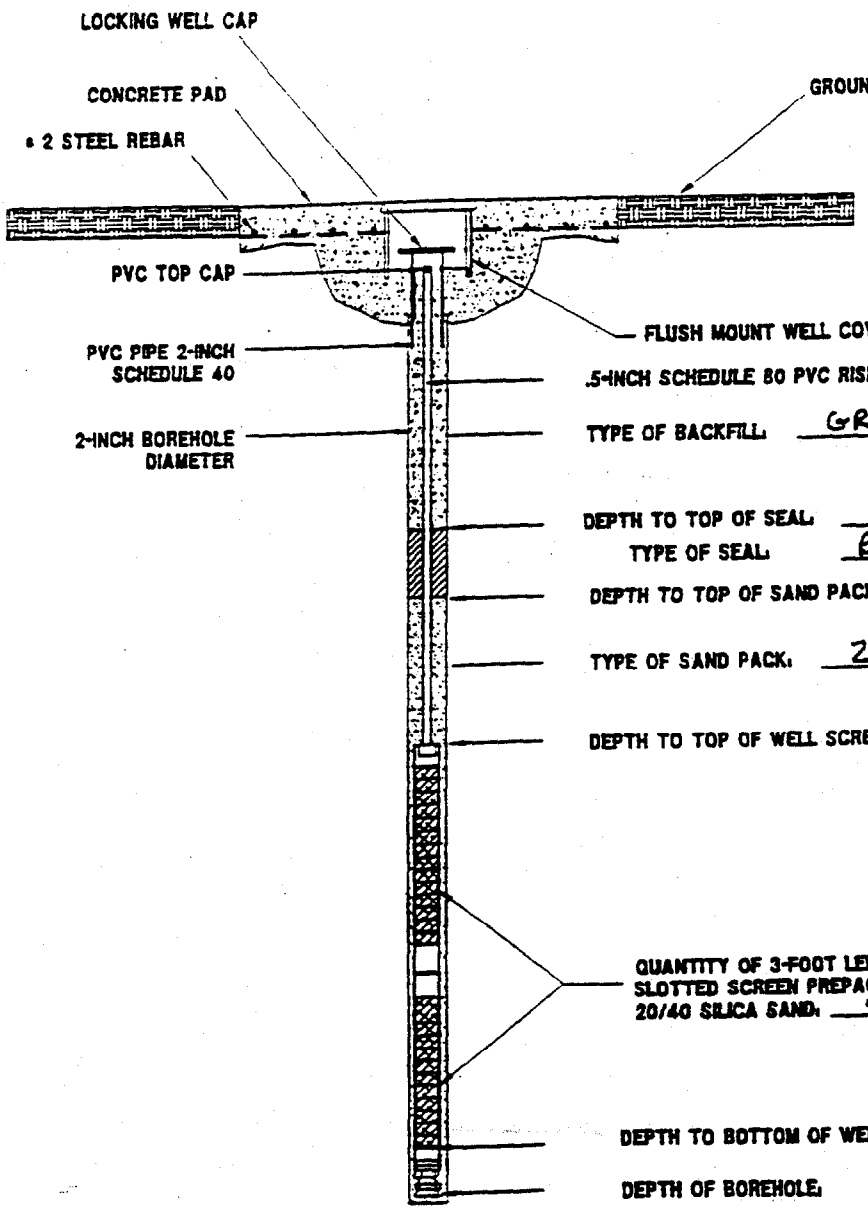
1/ OLM-11 and OLM-12 were installed previously.
2/ Measuring point is the top of the PVC well casing. Elevation is feet above mean sea level.
3/ Blank space means measuring point elevation was not determined.

All wells 2-inch ID PVC

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-05
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3/SA9
DATE INSTALLED: 10-6-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 0.4 ft.
TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 0.7 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 1 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 feet

DEPTH TO BOTTOM OF WELL SCREEN: 10 ft.

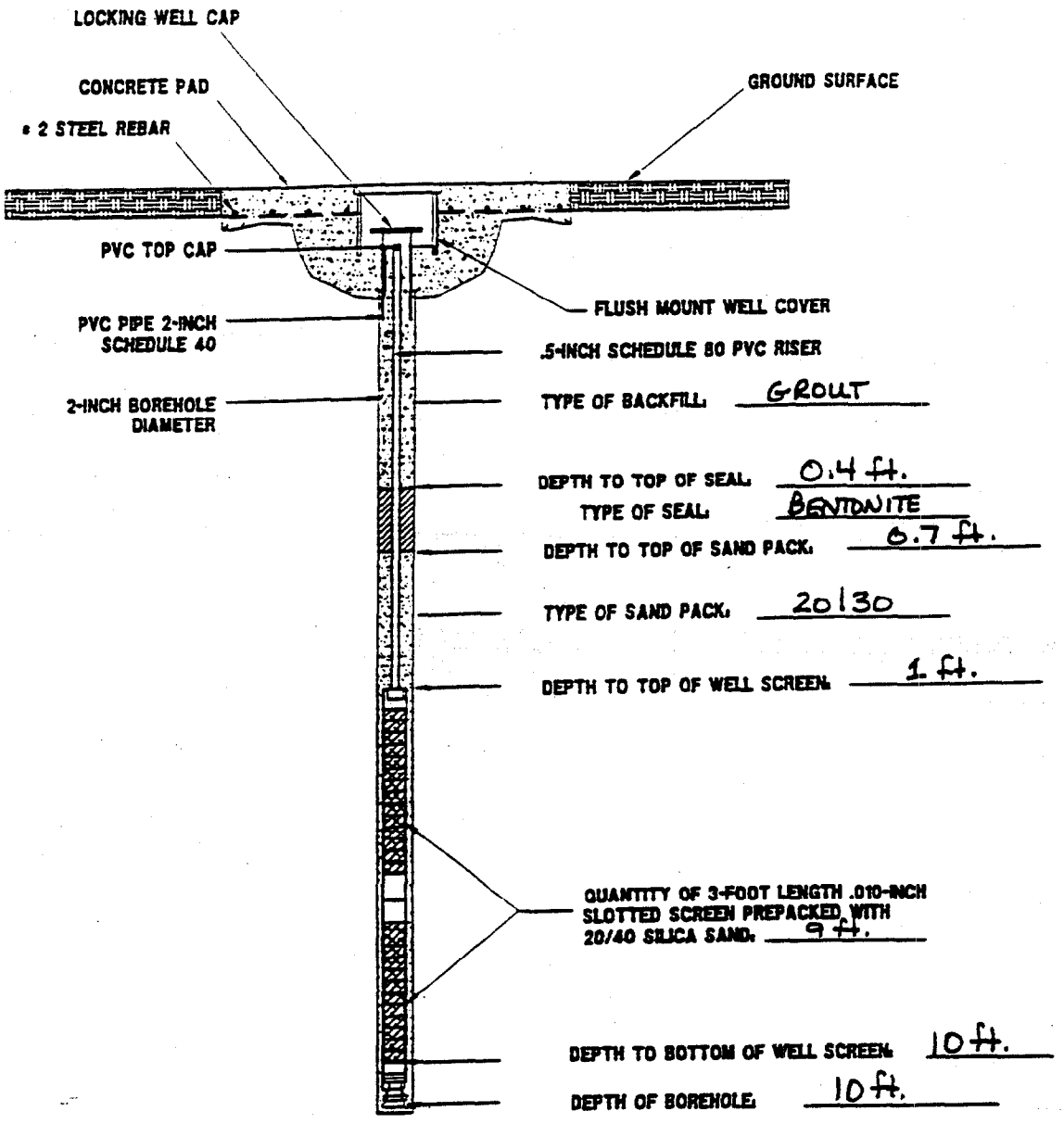
DEPTH OF BOREHOLE: 10 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-06
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3 / SA9
DATE INSTALLED: 10-6-97
INSTALLATION METHOD: TERRAPROBE

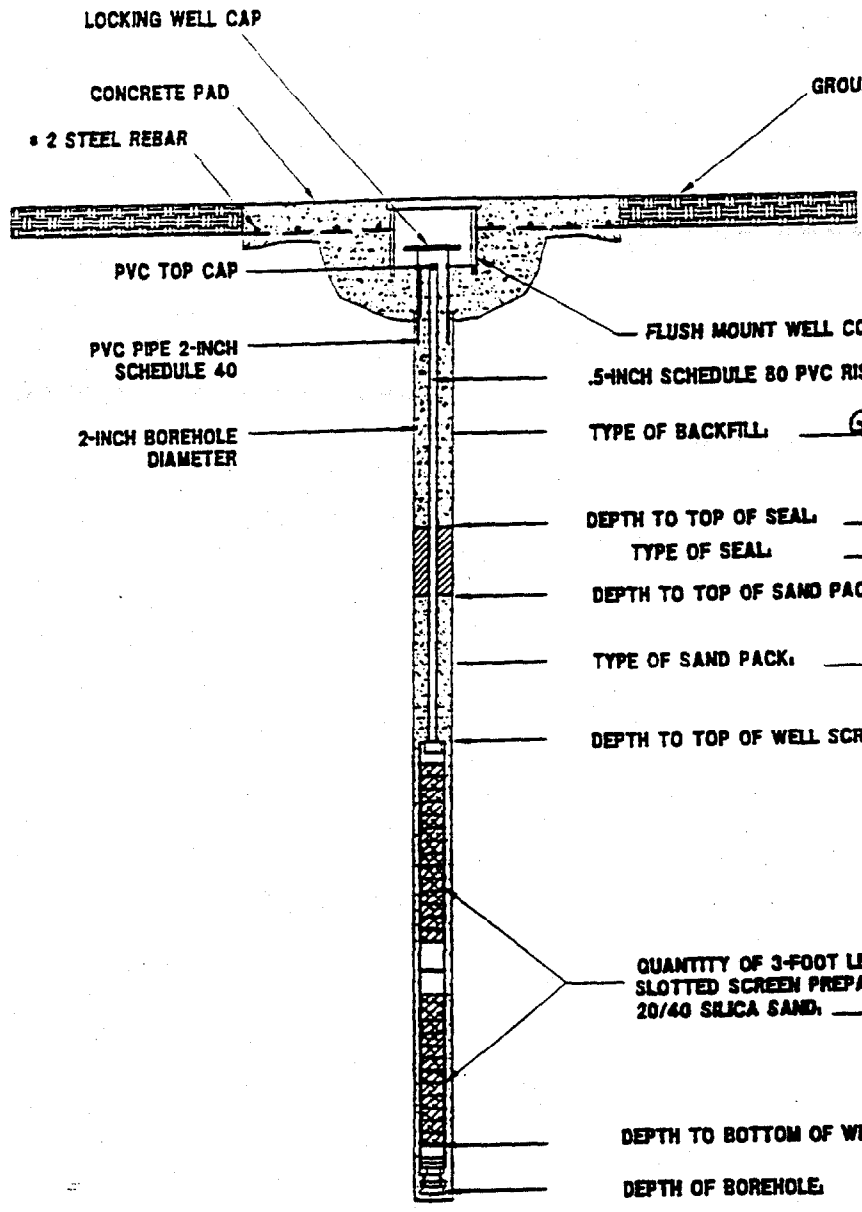


NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-07
FIELD PERSONNEL: S. DONELICK, D. CRAINE

SITE NAME: OU3/SA9
DATE INSTALLED: 10-6-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 1 ft.
TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 2 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 3 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 ft.

DEPTH TO BOTTOM OF WELL SCREEN: 12 ft.

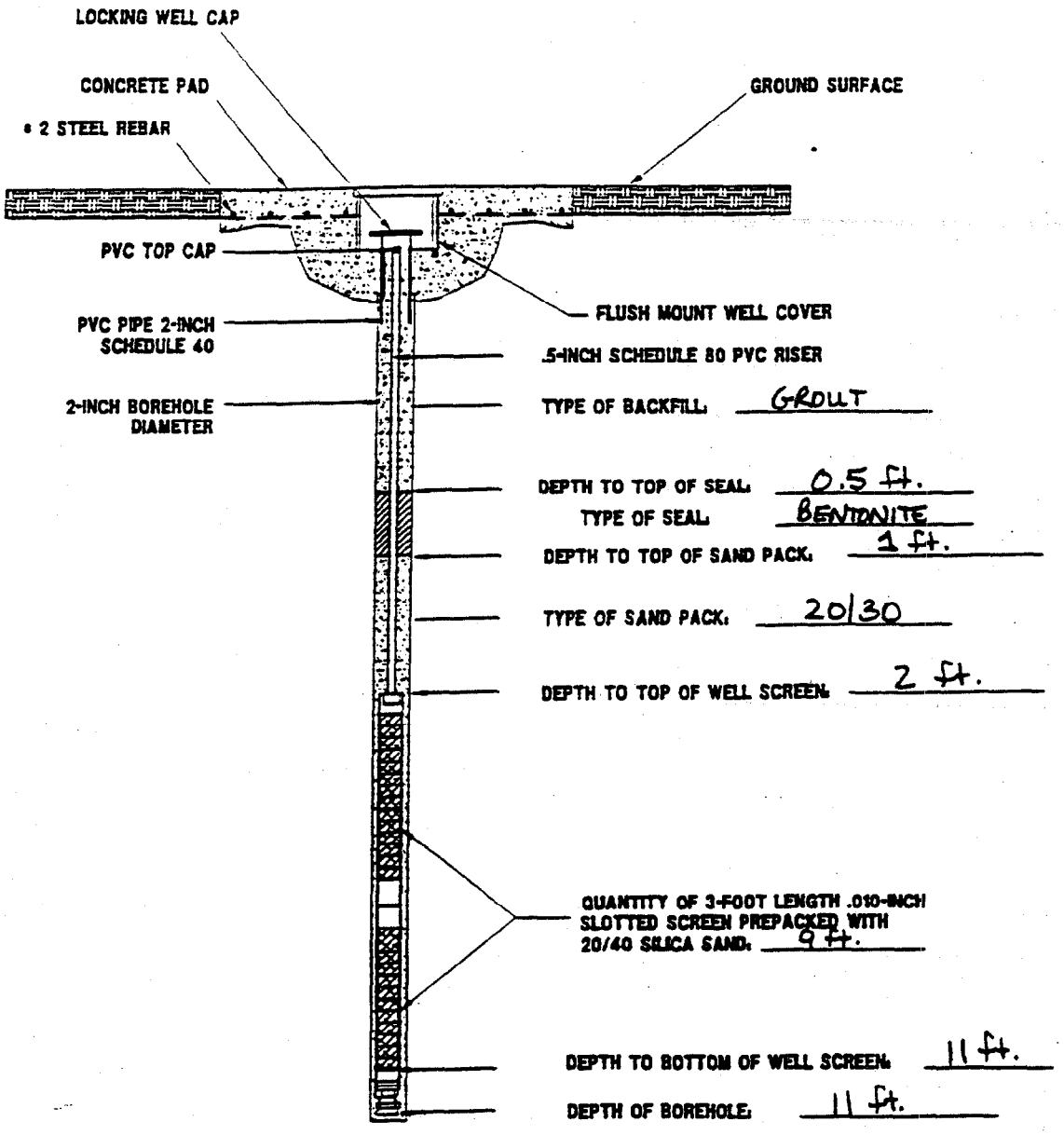
DEPTH OF BOREHOLE: 12 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-08
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3 / SA9
DATE INSTALLED: 10-6-97
INSTALLATION METHOD: TERRAPROBE

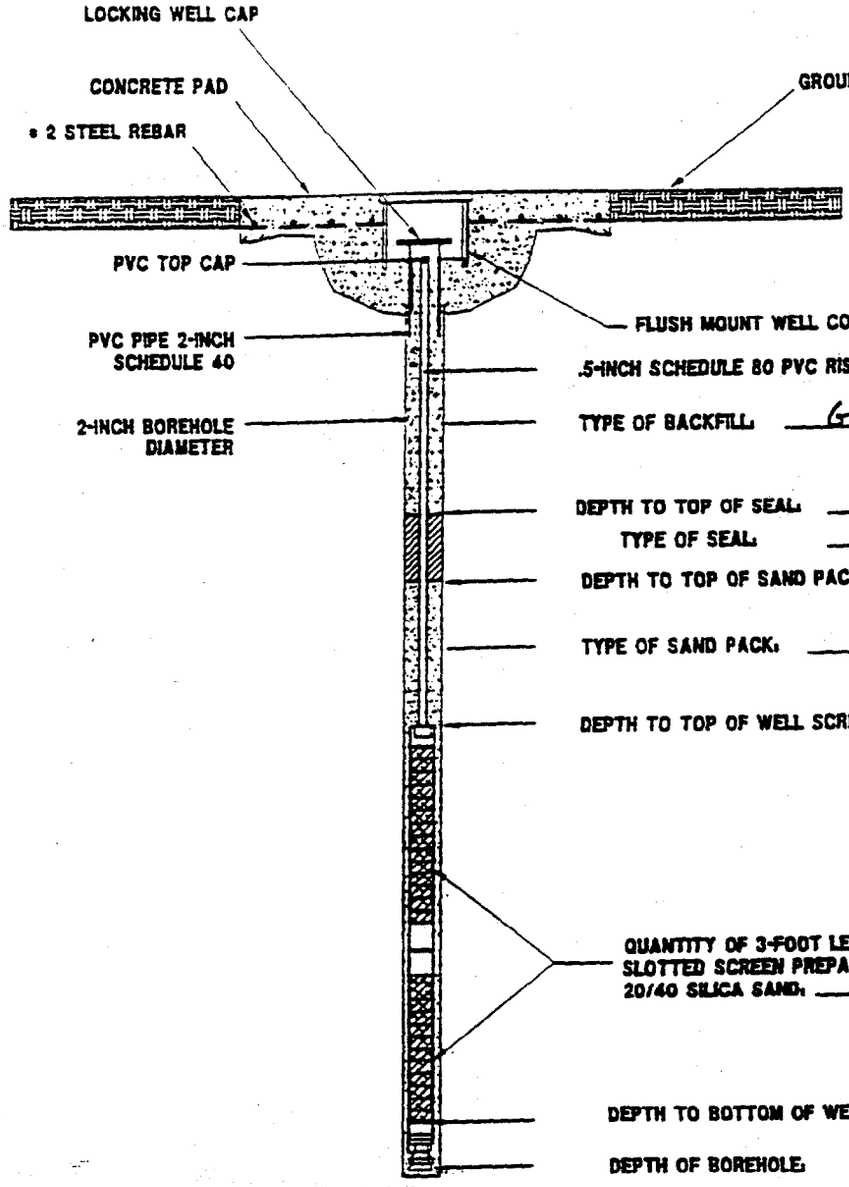


NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-09
FIELD PERSONNEL: S.DONELICK, D.CRAINE

SITE NAME: OU3 / SA9
DATE INSTALLED: 10-6-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 0.4 ft.
TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 0.7 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 1 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 ft.

DEPTH TO BOTTOM OF WELL SCREEN: 10 ft.

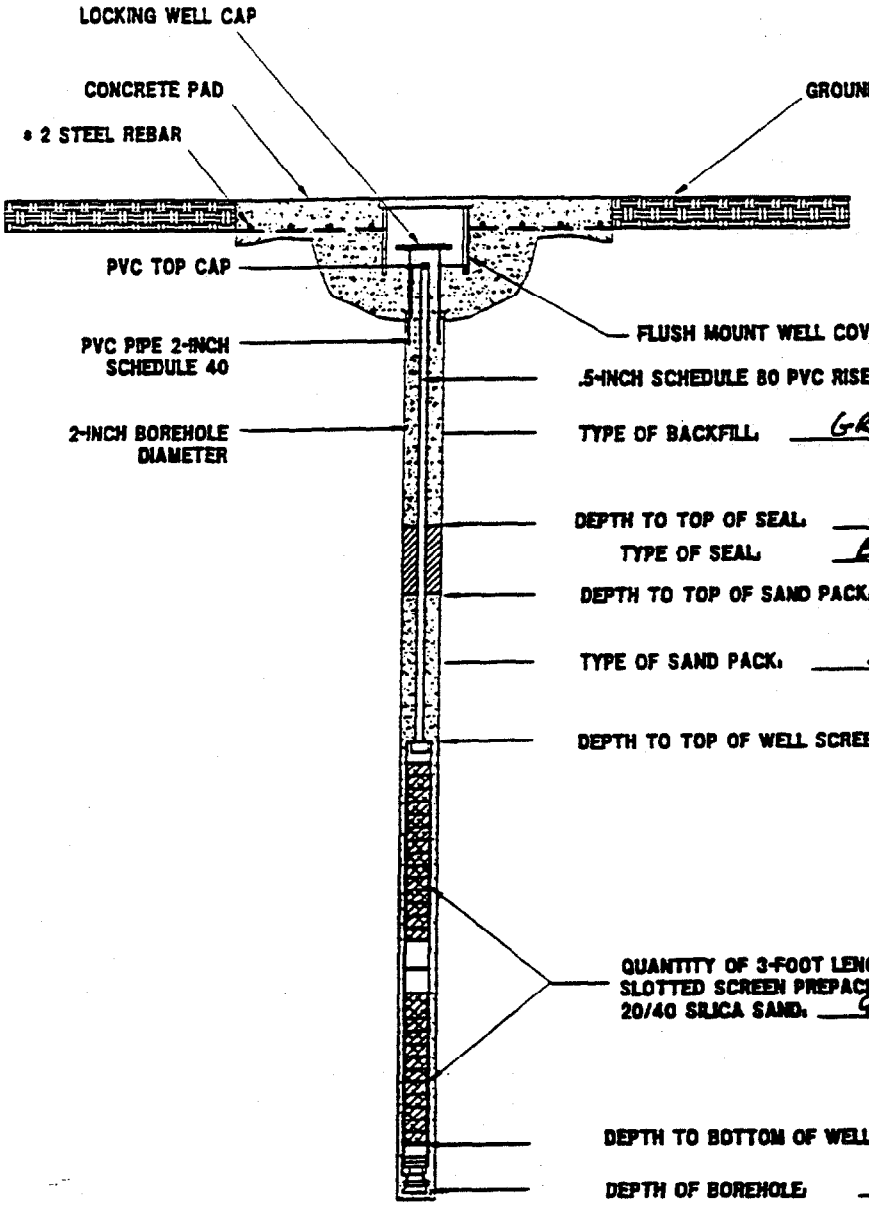
DEPTH OF BOREHOLE: 10 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-10
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3/SA9
DATE INSTALLED: 10-7-97
INSTALLATION METHOD: TERRAPROBE



TYPE OF BACKFILL: GROUT

DEPTH TO TOP OF SEAL: 0.4 ft.
TYPE OF SEAL: BENTONITE

DEPTH TO TOP OF SAND PACK: 0.7 ft.

TYPE OF SAND PACK: 20/30

DEPTH TO TOP OF WELL SCREEN: 1 ft.

QUANTITY OF 3-FOOT LENGTH .010-INCH SLOTTED SCREEN PREPACKED WITH 20/40 SILICA SAND: 9 ft.

DEPTH TO BOTTOM OF WELL SCREEN: 10 ft.

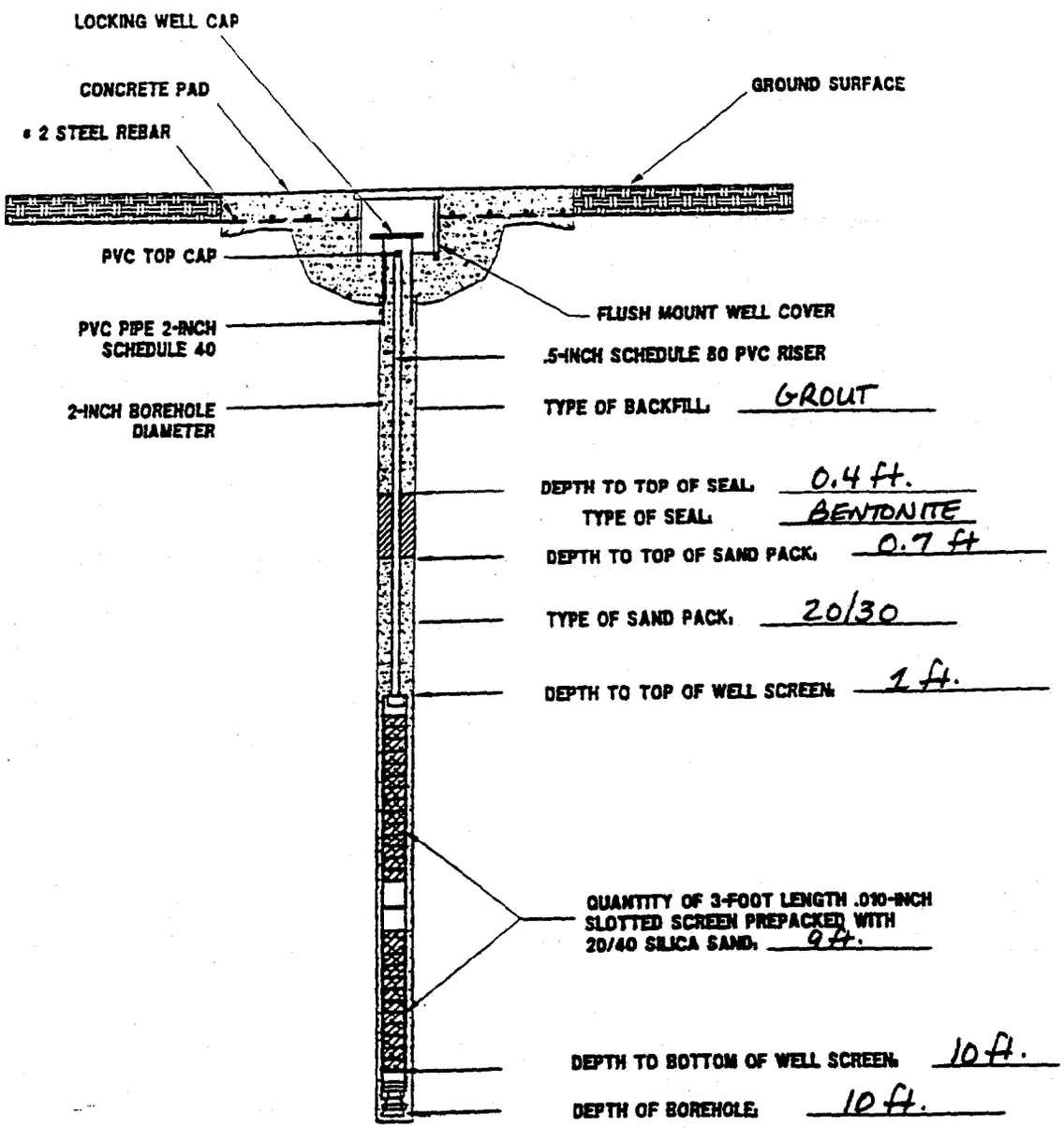
DEPTH OF BOREHOLE: 10 ft.

NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-11
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3/SA9
DATE INSTALLED: 10-7-97
INSTALLATION METHOD: TERRAPROBE

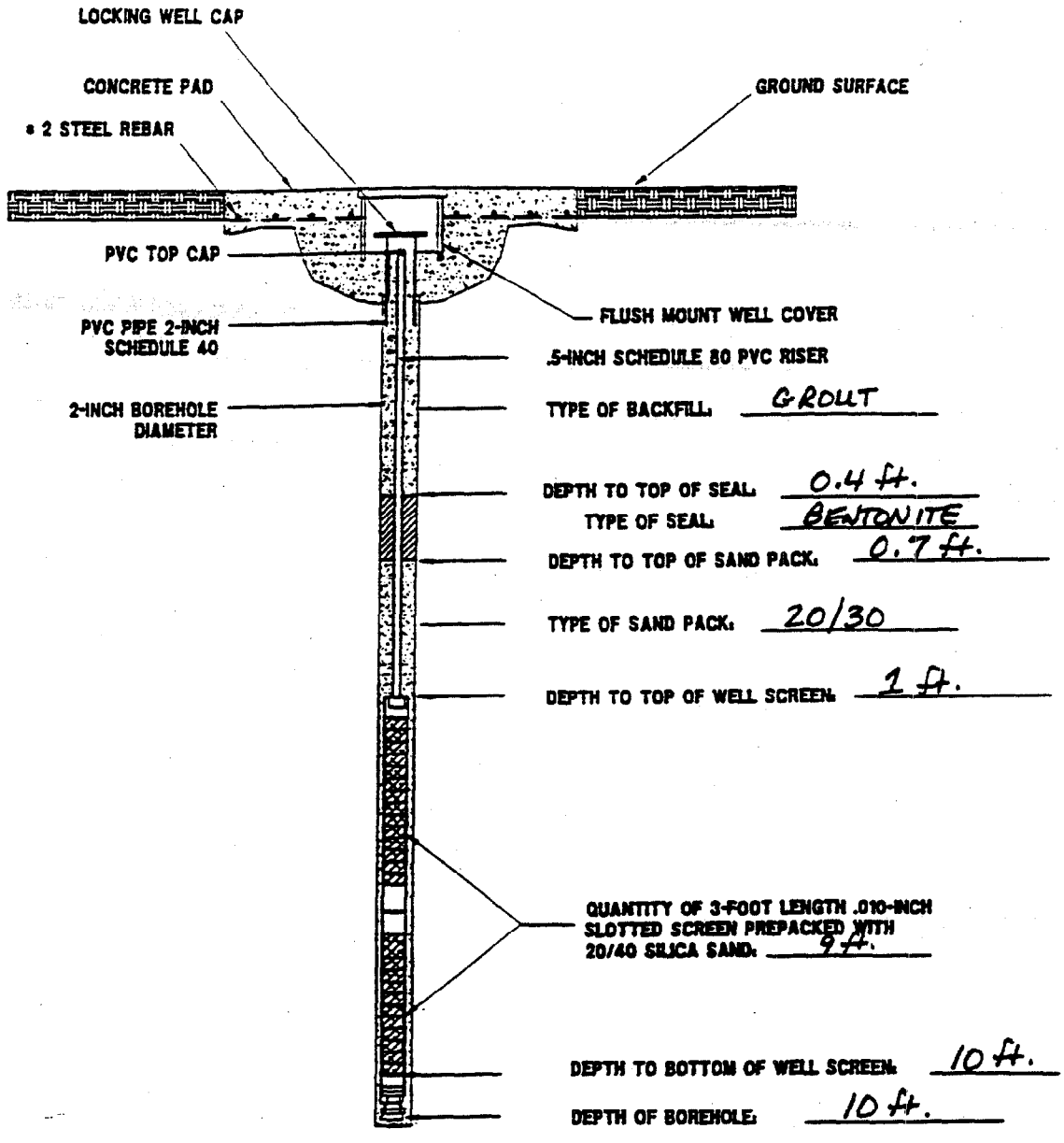


NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-12
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3/SA9
DATE INSTALLED: 10-7-97
INSTALLATION METHOD: TERRAPROBE

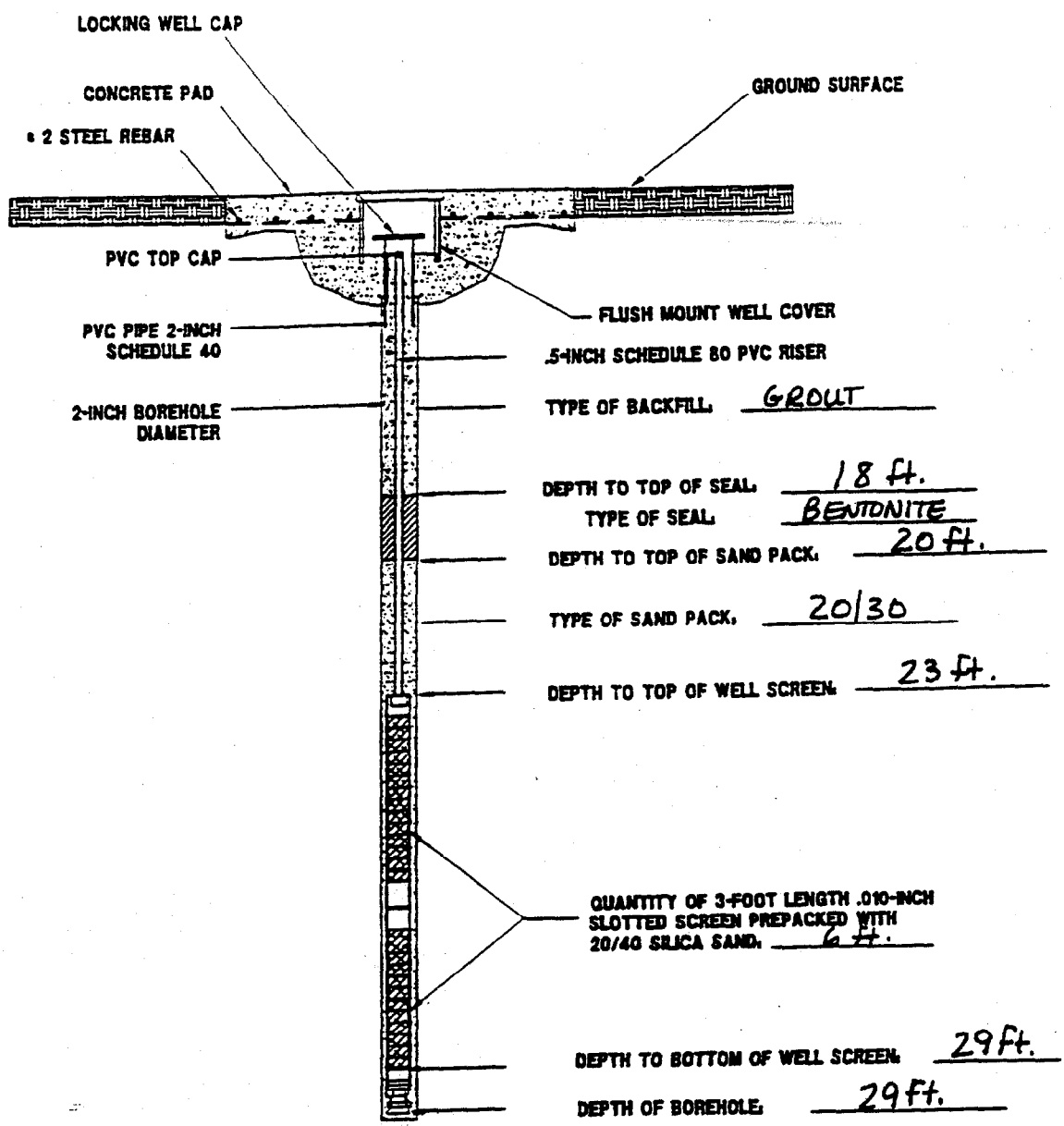


NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO
PROJECT NO: 2546-05
WELL ID: OLD-09-13
FIELD PERSONNEL: S. DONELICK, P. CRAINE

SITE NAME: OU3 / SA9
DATE INSTALLED: 10-7-97
INSTALLATION METHOD: TERRAPROBE



NOT TO SCALE

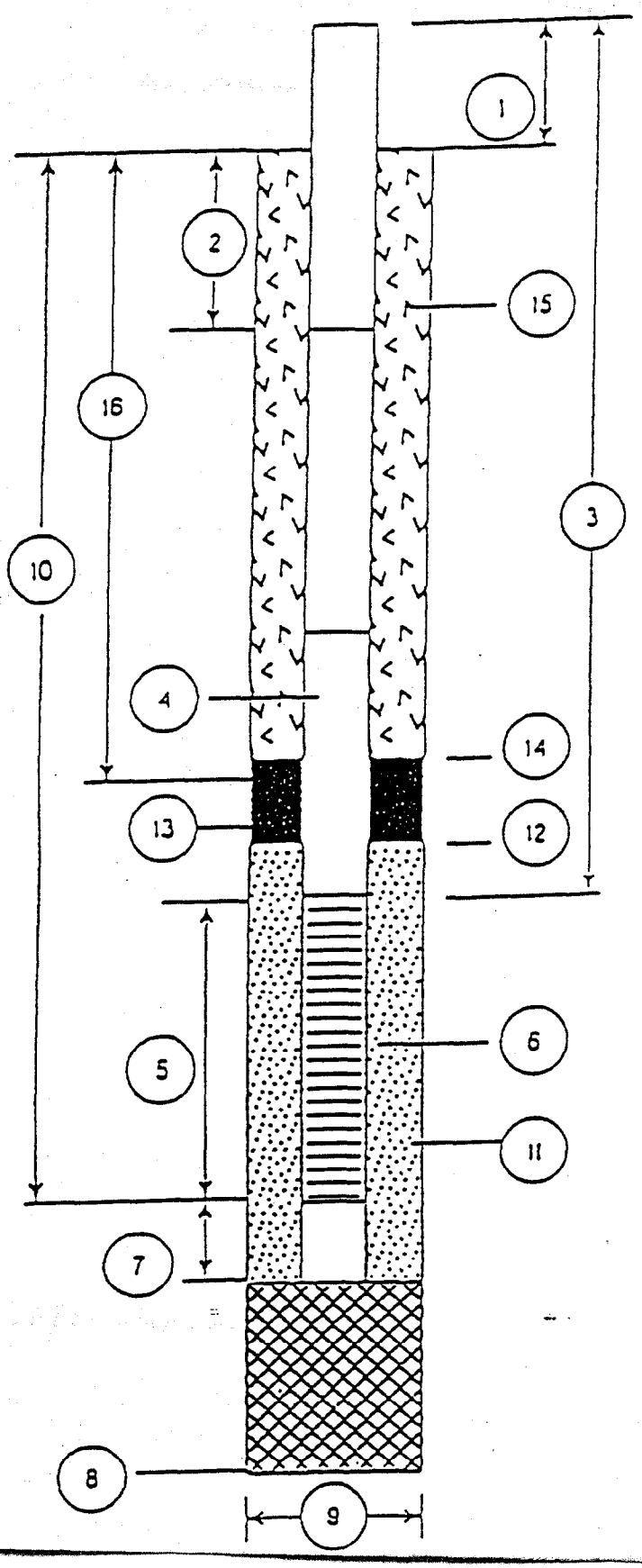
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-09-14

DATE OF INSTALLATION: ____



1. Height of Casing above ground: 3.61
2. Depth to first Coupling: 1.39

   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 4.88
4. Type of Riser Pipe: 1/2" scined. 40 PVC
5. Length of Screen: 6'
6. Type of Screen: Geoprobe Pre-Packed 0.010 S
7. Length of Sump: NA
8. Total Depth of Boring: 7.4
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 7.39
11. Type of Screen Filter: 20/30 PrepAcked

    Quantity Used: ____ Size: ____
12. Depth to Top of Filter: 0.39
13. Type of Seal: bentonite

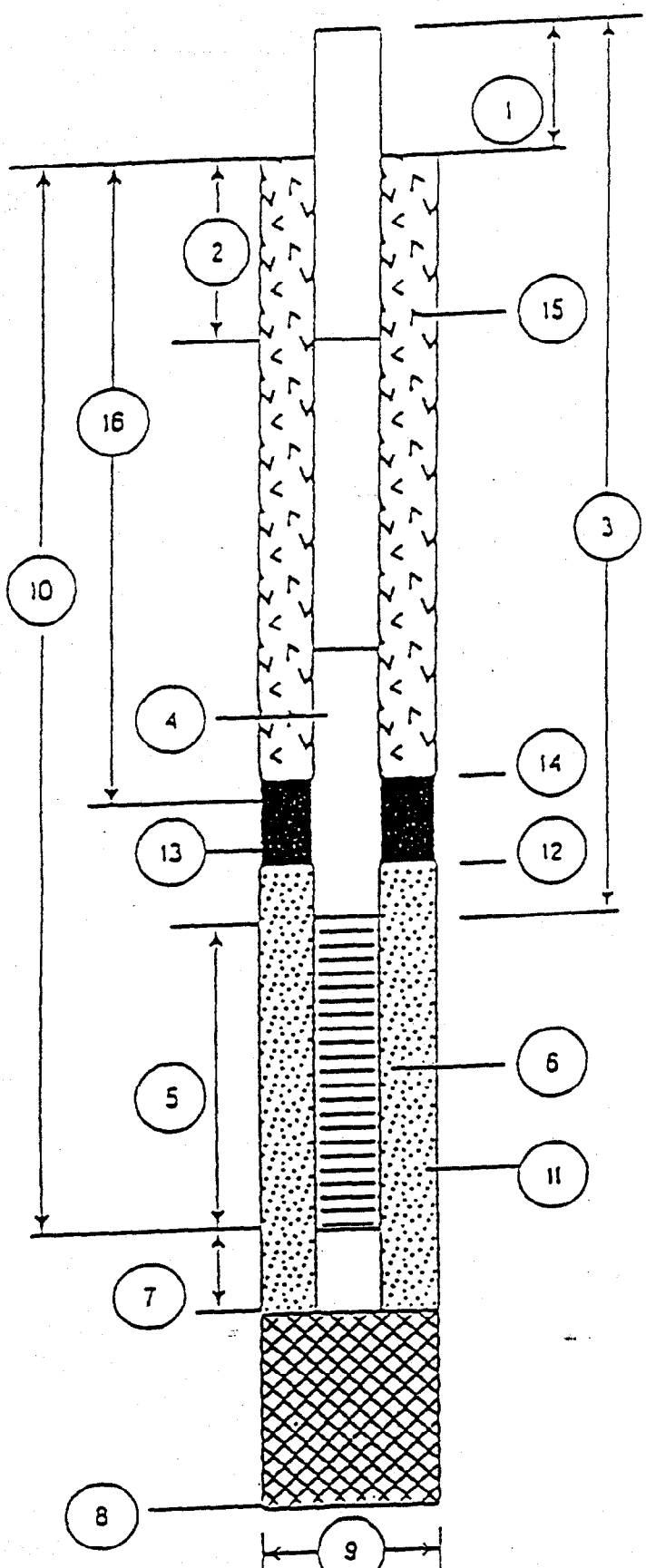
    Quantity Used: NR
14. Depth to Top of Seal: Ø
15. Type of Grout: NA

    Grout Mixture:

    Method of Placement: ____
16. Tot. Depth of 6 in. Steel Casing: NA

DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.



WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-09-15

DATE OF INSTALLATION:

1. Height of Casing above ground: 3.82
2. Depth to first Coupling: 1.18
   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 5'
4. Type of Riser Pipe: 1/2" Sched. 40 PVC
5. Length of Screen: 6'
6. Type of Screen: Geoprobe Prepacked 0.010 Si
7. Length of Sump: NA
8. Total Depth of Boring: 7.19
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 7.18
11. Type of Screen Filter: 20/30 Prepacked
    Quantity Used: ——— Size:
12. Depth to Top of Filter: 0.68
13. Type of Seal: bentonite
    Quantity Used: NR
14. Depth to Top of Seal: Ø
15. Type of Grout: NA
    Grout Mixture:
    Method of Placement: ———
16. Tot. Depth of 6 in. Steel Casing: NA

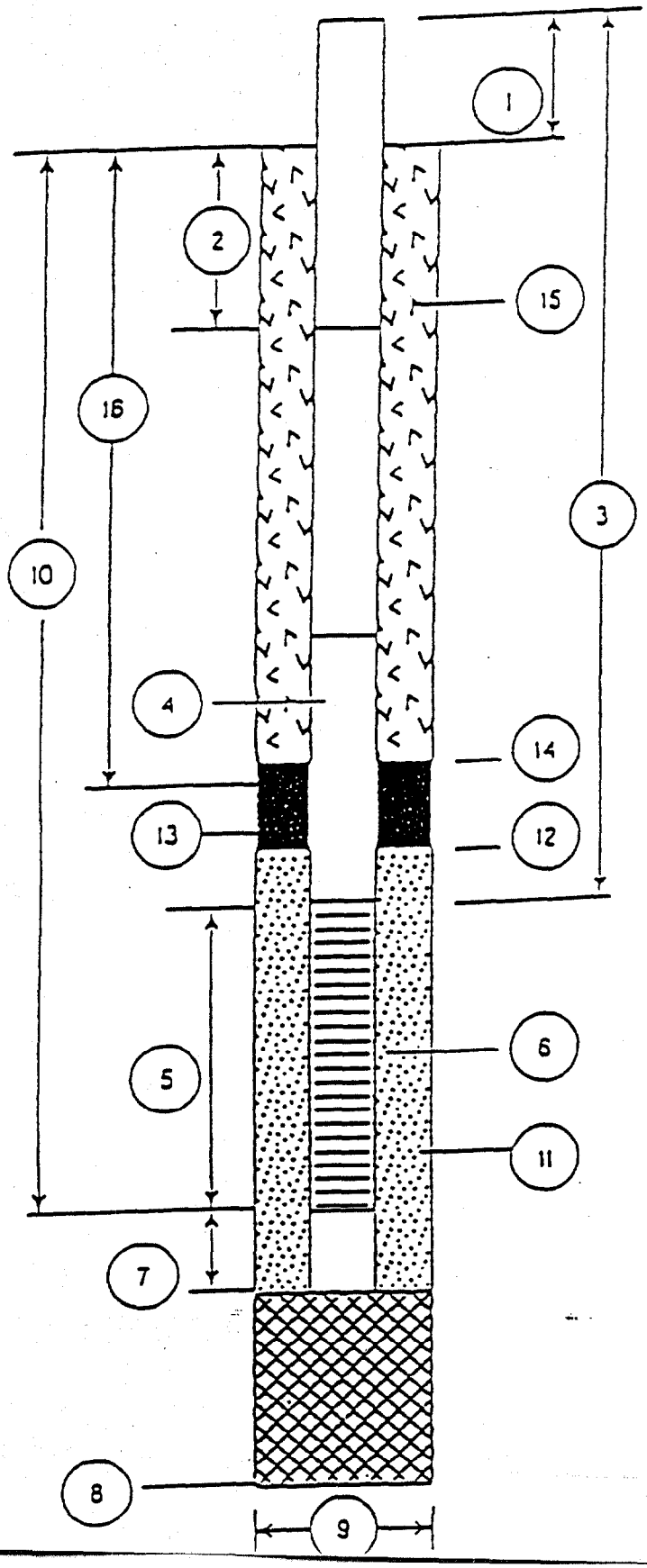
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SC.

WELL CONSTRUCTION DETAIL

WELL NUMBER: OLD-09-16

DATE OF INSTALLATION: ——



1. Height of Casing above ground: 3.89
2. Depth to first Coupling: 1.11

   Coupling Interval Depths: NA
3. Total Length of Riser Pipe: 5'
4. Type of Riser Pipe: 1/2" Sched 40 PVC
5. Length of Screen: 6'
6. Type of Screen: Geoprobe Prepack 0.010 slot
7. Length of Sump: NA
8. Total Depth of Boring: 7.12
9. Diameter of Boring: 4"
10. Depth to Bottom of Screen: 7.11
11. Type of Screen Filter: 20/30 Prepacked

    Quantity Used: —— Size: ——
12. Depth to Top of Filter: 0.61
13. Type of Seal: bentonite

    Quantity Used: NR
14. Depth to Top of Seal: Ø
15. Type of Grout: NA

    Grout Mixture:

    Method of Placement: ——
16. Tot. Depth of 6 in. Steel Casing: NA

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO

PROJECT NO. : 02546.05

DATE INSTALLED : 02/04/98

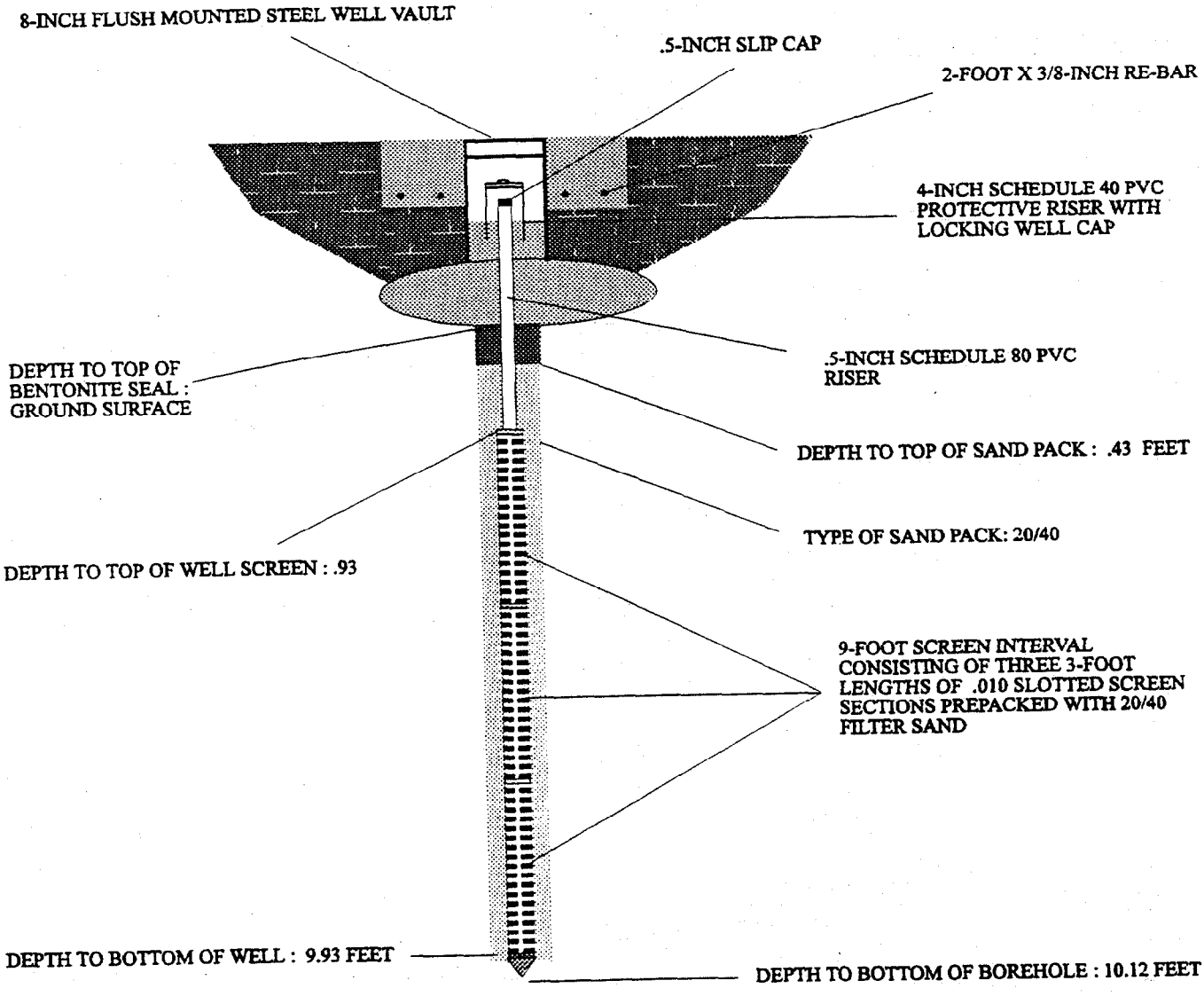
DEVELOPMENT DATE: 02/09/98

SITE NAME: OU3, SA9

WELL ID NO. : OLD-09-17

INSTALLATION METHOD : GEOPROBE

PERSONNEL : B. OLSON / P.CRAINE



NOT TO SCALE

MICROWELL CONSTRUCTION DIAGRAM

PROJECT: NTC ORLANDO

PROJECT NO. : 02546.05

DATE INSTALLED : 02/05/98

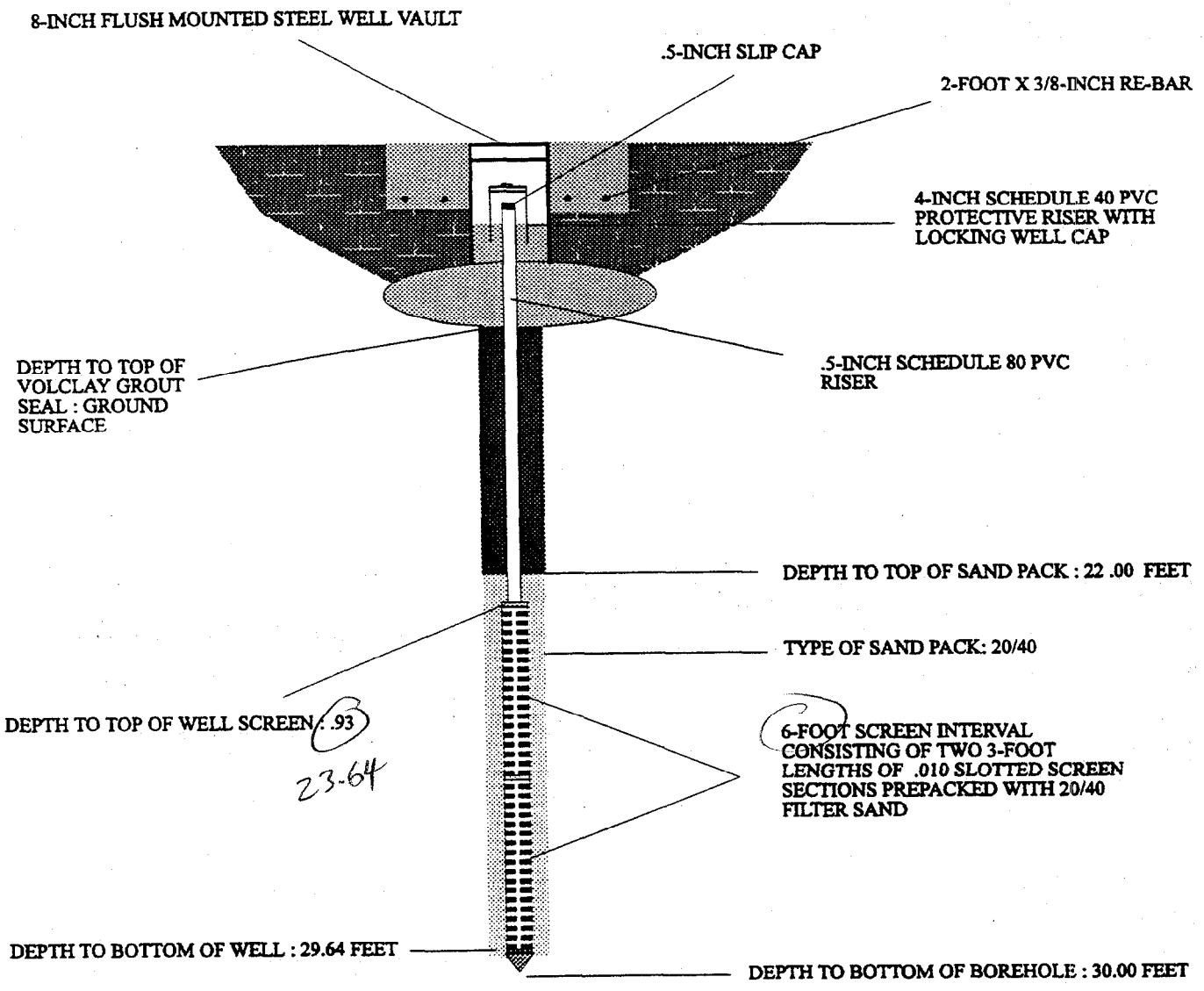
DEVELOPMENT DATE: 02/06/98

SITE NAME: OU3, SA9

WELL ID NO. : OLD-09-18

INSTALLATION METHOD : GEOPROBE

PERSONNEL : B. OLSON / P.CRAINE



NOT TO SCALE

APPENDIX B-3.1

WELL DEVELOPMENT LOGS
STUDY AREA 8

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-6-97 1000		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-15-97	Logged by: B. Dennis	Checked by:
Well/Site I.D.: OLD-08-15	Weather: NR	Start Date: 10-15-97	Finish Date: 10-15-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.084	Start Time: 13:21	Finish Time: 14:47

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 1.21	Initial Depth to Well Bottom: 9.37

Water Level during Initial Pumping/Purging (ft): 1.21

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (ntus)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
13:29	25.5	5.72	285	175.5	-168.6	—	0
13:36	25.0	5.68	280	25.0	-166.1	0.55	5
13:50	25.0	5.67	282	19.6	-171.0	0.83	15
14:07	25.0	5.63	280	11.2	-169.3	0.35	21
14:23	25.0	5.68	285	5.6	-161.8	0.25	25
14:31	25.0	5.72	285	3.4	-154.4	0.25	27

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

14:42	25.0	5.63	285	4.0	-159.4	0.27	30

Total vol. purged = 30 gal

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-6-97/ 09:31		Project No. 2546.05
Client: SOUTHDIVNAVFACENGCOM	Well Development Date and Time: 10-15-97	Logged by: B Bu...	Checked by:
Well/Site I.D.: OLD-GB-1...	Weather: NR	Start Date: 10-15-97	Finish Date: 10-15-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.072	Start Time: 13:21	Finish Time: 16:40

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 2.00	Initial Depth to Well Bottom: 8.56

Water Level during Initial Pumping/Purging (ft): 2.00

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
13:28	27.5	5.72	252	>200	-149	—	0
13:37	26.0	5.50	262	129.2	-168.1	0.55	5
13:47	26.0	5.58	268	80	-149.2	1.5	20
14:02	26.0	5.57	272	12.6	-162.9	0.47	27
14:20	26.0	5.56	278	51	-152.3	0.55	37
14:38	26.0	5.61	278	34.6	-145.1	0.44	45

END OF WELL DEVELOPMENT

15:00	26.0	5.68	285	25.2	-171.1	0.48	55
15:25	26.0	5.70	285	19.9	-146.3	0.44	66
15:46	26.0	5.70	280	17.7	-276.5	0.45	85
16:10	26.0	5.65	272	15.5	-149.6	0.49	110
16:21	NR	NR	NR	13.5	NR	NR	NR
16:40	26.0	5.57	268	12.4	-143.9	0.49	125

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Total vol. purged = 125 gal

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-4-92 / 09:02		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-15-92	Logged by: S Brown	Checked by:
Well/Site I.D.: CLD-OB-07 / S4 G	Weather: NR	Start Date: 10-15-92	Finish Date: 10-15-92
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 1.07	Start Time: 09:42	Finish Time: 12:31

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 2.20

Initial Depth to Well Bottom: 7.38

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR

Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
09:42	25.5	6.78	432	>200	-109.4	—	0
10:50	26.0	6.24	300	128.9	-107.7	1.11	15
11:05	26.5	6.20	295	55.4	-87.8	0.33	20
11:25	27.5	6.31	295	19.7	-170.7	0.50	30
11:41	26.0	6.34	295	14.5	-139.9	0.27	37
12:01	26.0	6.35	295	10.7	-145.9	0.40	45

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

12:14	27.0	6.33	295	9.7	-146.8	0.38	50
12:23	26.0	6.35	295	8.1	-146.1	0.35	55
12:30	26.0	6.36	298	7.8	-129.1	0.29	57

09:55 Pump broke down
10:41 Resume purging

Well Developer's Signature

Total vol. purged = 58 gal

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 1-6-71 11:05		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: [illegible]	Logged by: B. Paulus	Checked by:
Well/Site I.D.: OLD-TB-09 [illegible]	Weather: [illegible]	Start Date: [illegible]	Finish Date: [illegible]
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.074	Start Time: 09:47	Finish Time: [illegible]

Installed Depth From Top of Well Casing to Bottom of Well: 10

Initial Depth to Water (ft): 2.23	Initial Depth to Well Bottom: 9.44

Water Level during Initial Pumping/Purging (ft): ~~2.20~~ 2.23

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
09:47	26.0	6.45	780	>200	-280.6	—	0
10:01	26.0	6.40	700	117	-221.3	0.71	10
10:17	26.5	6.40	720	2.3	-219.2	0.38	16
10:26	27.0	6.42	750	1.1	-210.1	0.44	20
10:32	27.0	6.47	720	1.2	-219.4	0.45	25

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Total vol. purged = 26 gal

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-6-97 / 10:30		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-15-97	Logged by: B. Ferris	Checked by:
Well/Site I.D.: CLD-38-04 / 1550	Weather: NR	Start Date: 10-15-97	Finish Date: 10-15-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.076	Start Time: 1550	Finish Time: 17:51

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 2.10	Initial Depth to Well Bottom: 7.53

Water Level during Initial Pumping/Purging (ft): 2.10

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (ntus)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
17:10	24.5	5.88	387	>200	-167.5	—	0
17:30	24.5	5.71	310	18.8	-193.8	0.55	11
17:38	24.5	5.68	292	7.0	-181.9	0.51	15
17:44	24.5	5.63	280	4.8	-187.8	0.41	17
17:57	24.5	5.62	280	3.3	-180.7	0.39	20

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Total vol. purged = 21 gal

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-16-97 / 10:31		Project No.: 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-15-97	Logged by: D Davis	Checked by:
Well/Site I.D.: OLD-08-10 / S4 E	Weather: NR	Start Date: 10-15-97	Finish Date: 10-15-97
Volume of Drilling Fluid Lost (gal.): N/A	Volume of Water in Well and Filter Pack (gal.): 0.080	Start Time: 15:50	Finish Time: 18:00

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 1.58	Initial Depth to Well Bottom: 9.42

Water Level during Initial Pumping/Purging (ft): 1.58

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (ntus)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
16:02	24.5	5.46	140	>200	-126.3	—	8
16:16	24.0	5.16	112	49.5	-126.2	0.5	7
16:26	24.0	5.11	115	10.5	-106.2	0.4	11
16:36	24.0	5.40	110	35.1	-90.4	0.5	16
17:16	24.0	5.20	115	42.5	-129.9	0.48	35
17:35	24.0	5.16	115	23.6	-131.6	0.51	45

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

17:41	24.0	5.14	115	22.9	-139.5	0.52	50
17:48	24.0	5.03	110	7.5	-141.1	0.21	52
17:56	24.0	5.07	108	6.2	-145.3	0.11	53
18:00	24.0	4.94	103	6.0	-137.8	0.11	55

Total vol. purged = 55 gal

Well Developers Signature

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-10-97 / 11:07		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-15-97	Logged by: B Burns	Checked by:
Well/Site I.D.: OLD-OB-11 / SL-G	Weather: NR	Start Date: 10-15-97	Finish Date: 10-15-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 10	Start Time: 14:47	Finish Time: 15:50

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 1.45	Initial Depth to Well Bottom: 7.65

Water Level during Initial Pumping/Purging (ft):

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (ntus)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
14:52	25.0	6.44	700	>200	-223.7	—	0
15:09	25.0	6.41	680	27.6	-203.6	0.35	6
15:20	25.0	6.48	700	14.4	-207.4	0.54	12
15:29	25.0	6.41	700	9.8	-195.4	0.88	20
15:41	25.0	6.57	700	6.3	-295.6	0.42	25
15:48	25.0	6.48	650	5.8	-234.6	0.71	30

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Total vol. purged = 30 gal

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-4-97/ 10:44		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENCOM	Well Development Date and Time: 10-15-97	Logged by: B. Bruins	Checked by:
Well/Site I.D.: CLD-08-12 / S48	Weather: NR	Start Date: 10-15-97	Finish Date: 10-15-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.26	Start Time: 09:55	Finish Time: 11:14

Installed Depth From Top of Well Casing to Bottom of Well: 29'

Initial Depth to Water (ft): 3.16	Initial Depth to Well Bottom: 28.11

Water Level during Initial Pumping/Purging (ft): 3.16

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
09:55	24.0	5.52	143	>200	-146.2	—	0
10:06	23.8	5.13	80	>200	-106.7	0.55	6
10:21	24.1	5.08	78	30.3	-94.4	0.66	16
10:32	24.0	5.00	80	13.7	-98.1	0.55	22
10:45	24.0	4.97	80	9.9	-86.1	0.46	28
11:01	24.5	5.00	75	9.0	-37.9	0.44	35

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

11:10	25.0	4.77	75	9.1	-101.2	0.56	40

Total vol. purged = 42 gal

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC ORLANDO 003	Well Installation Date and Time: 11-24/97 1152		Project No. 02546105
Client: South DIV	Well Development Date and Time: 11-25/97 1355	Logged by: RJB	Checked by: WDD
Well/Site I.D.: OLD-08-13	Weather: NR	Start Date: 11-25/97	Finish Date: 11-25/97
Volume of Drilling Fluid Lost (gal.) NA	Volume of Water in Well and Filter Pack (gal.) NR	Start Time: 1350	Finish Time: 1532

Installed Depth From Top of Well Casing to Bottom of Well: 11 ft

Initial Depth to Water (ft): NR	Initial Depth to Well Bottom: NR

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
1355	25.0	6.15	200	18.28	0.5 gal	
1408	25.0	6.15	182	16.71	1.0 gal	
1440	25.0	6.46	182	18.07	1.5 gal	
1450	25.0	6.43	182	17.85	2.0 gal	
1516	25.0	6.40	182	8.89	2.5 gal	
1533	25.0	6.51	182	8.84	3.0 gal	

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Peristaltic Pump
3 gal Pumped
water clear

Well Developer's Signature RJB

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC ORLANDO OU3	Well Installation Date and Time: 11-24/97 1241		Project No. 02546.05
Client: South Div.	Well Development Date and Time: 12-1/97 0820	Logged by: RJB	Checked by: WDO
Well/Site I.D.: OLD-08-14	Weather: NR	Start Date:	Finish Date:
Volume of Drilling Fluid Lost (gal.) NA	Volume of Water in Well and Filter Pack (gal.) NR	Start Time: 12-1/97	Finish Time: 12-1/97

Installed Depth From Top of Well Casing to Bottom of Well: 11 ft

Initial Depth to Water (ft): NR	Initial Depth to Well Bottom: NR

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
0822	25.0	6.46	500	17.82	0.85 gal	NR
0838	25.0	6.65	465	10.46	0.85 gal	
0903	25.0	6.55	440	3.86	1.0 gal	
0927	25.0	6.52	410	2.54	2.0 gal	
0947	25.0	6.49	380	2.10	2.5 gal	
—	—	—	—	—	—	

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Peristaltic pump
2.5 gal pumped
water clear

Well Developer's Signature RJB

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC Orlando OU3	Well Installation Date and Time: 11-24/97 1348		Project No. 0254605
Client: South Div	Well Development Date and Time: 11-25/97 1035	Logged by: RJB	Checked by: WDO
Well/Site I.D.: OLD-08-15	Weather: NR	Start Date: 11-25/97	Finish Date: 11-25/97
Volume of Drilling Fluid Lost (gal.) NA	Volume of Water in Well and Filter Pack (gal.) NR	Start Time: 1035	Finish Time: 1142

Installed Depth From Top of Well Casing to Bottom of Well: 11'

Initial Depth to Water (ft): NR	Initial Depth to Well Bottom: NR

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
1039	25.0	5.85	170	16.59	1.0	NR
1101	25.0	5.75	225	5.50	2.0	
1113	25.0	5.63	210	4.95	~~3.0~~ 2.5	
1122	25.0	5.59	205	2.70	3.0	
1135	25.0	5.57	205	2.69	3.5	
1142	25.0	5.60	200	2.83	4.0	

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

4 gal. Pumped
Peristaltic Pump
water clear

Well Developer's Signature RJB

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC Orlando	Well Installation Date and Time: 02/04/98 12:08		Project No. 02546.05
Client: South Div	Well Development Date and Time: 02/09/98 15:47	Logged by: WDC	Checked by:
Well/Site I.D.: OLD-08-16	Weather:	Start Date: 2/09/98	Finish Date: 2/09/98
Volume of Drilling Fluid Lost (gal.) Zero	Volume of Water in Well and Filter Pack (gal.) 0.34	Start Time: 15:47	Finish Time: 16:07

Installed Depth From Top of Well Casing to Bottom of Well: 10.02

Initial Depth to Water (ft): 1.95	Initial Depth to Well Bottom: 9.56

Water Level during Initial Pumping/Purging (ft): N/A microwell

Depth to Water at Termination of Pumping/Purging (ft): NA * SEE NOTE	Depth to Well Bottom at Termination of Pumping/Purging (ft): NA * SEE NOTE

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
15:47	19.2	6.44	158	54.60		.12
15:45	18.7	6.47	155	15.60		.12
15:52	18.9	6.51	158	11.45		.14
16:07	19.1	6.51	155	9.67		.13

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Use Portable Pump
4 GAL Removed
* Dedicated Pumping Tube, No Post Development

Well Developer's Signature: Willis Dobson

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC Orlando	Well Installation Date and Time: 02/04/98 11:30		Project No. 02546.05
Client: SOUTHDIV	Well Development Date and Time: 02/04/98 16:20	Logged by: WDO	Checked by:
Well/Site I.D.: OID-08-17	Weather:	Start Date: 02/04/98	Finish Date: 02/04/98
Volume of Drilling Fluid Lost (gal.) ZERO	Volume of Water in Well and Filter Pack (gal.) .96	Start Time: 16:20	Finish Time: 16:30

Installed Depth From Top of Well Casing to Bottom of Well: 9.87

Initial Depth to Water (ft): 1.23	Initial Depth to Well Bottom: 9.25

Water Level during Initial Pumping/Purging (ft): N/A MICRO WELL

Depth to Water at Termination of Pumping/Purging (ft): * SEE NOTE	Depth to Well Bottom at Termination of Pumping/Purging (ft): * SEE NOTE

BEGINNING OF WELL DEVELOPMENT

Time	Temperature °C	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
16:20	18.5	6.78	370	42.9		Int
16:26	18.2	6.79	360	4.7		.16/min
16:30	18.2	6.81	360	2.81		.12/min

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Isco Portable Pump
1.2 GAL. Removed
* dedicated Tubing NO Post Development measurments Taken

Well Developer's Signature Walter D. Olson

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC Orlando	Well Installation Date and Time: 02/06/98 11:30		Project No. 02546.05
Client: South Div	Well Development Date and Time: 02/09/98 14:42	Logged by: WDO	Checked by:
Well/Site I.D.: OLD-08-18	Weather:	Start Date: 02/09/98	Finish Date: 02/09/98
Volume of Drilling Fluid Lost (gal.) zero	Volume of Water in Well and Filter Pack (gal.) .84	Start Time: 14:42	Finish Time: 15:20

Installed Depth From Top of Well Casing to Bottom of Well: 13.90

Initial Depth to Water (ft): 3.46	Initial Depth to Well Bottom: 13.90

Water Level during Initial Pumping/Purging (ft): NA microwell

Depth to Water at Termination of Pumping/Purging (ft): * SEE NOTE	Depth to Well Bottom at Termination of Pumping/Purging (ft): * SEE NOTE

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
14:42	20.4	5.40	138	16.56		.077
14:55	20.7	5.57	130	10.26		.091
15:06	20.8	5.61	125	10.75		.091
15:18	20.8	5.66	120	10.84		.083

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

ISCO Portable Pump
2.5 Gal. Removed
* Dedicated Tubing No Post Development Measurements Taken

Well Developer's Signature William D. Olson

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

APPENDIX B-3.2

WELL DEVELOPMENT LOGS
STUDY AREA 9

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-6-97 / 07:17		Project No. 2546.05
Client: SOUTHDIV NAVFACENGCOM	Well Development Date and Time: 10-13-97 / 12:45 - 2:24	Logged by: R. Burns	Checked by:
Well/Site I.D.: OU-07-05 / SA 9	Weather: not recorded	Start Date: 10-13-97	Finish Date: 10-13-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.07	Start Time: 12:45	Finish Time: 12:24

Installed Depth From Top of Well Casing to Bottom of Well: ~~7.45~~ (EM) 10'

Initial Depth to Water (ft): 2.64'

Initial Depth to Well Bottom: 9.45

Water Level during Initial Pumping/Purging (ft): not recorded

Depth to Water at Termination of Pumping/Purging (ft): not recorded

Depth to Well Bottom at Termination of Pumping/Purging (ft): not recorded

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Other EDX (mv)	Approximate Pumping Rate (gal/min.)	Total vol. pumped (gal)
12:45	29.0	6.54	350	>200	NR	0.4	0
12:56	27.5	6.44	308	>200	NR	0.4	5
13:06	27.0	6.44	310	76.3	NR	0.4	11
13:26	27.5	6.33	285	95.7	NR	0.4	22
13:42	27.5	6.27	283	32.1	NR	0.4	30
13:49	27.5	6.28	275	22.0	NR	0.4	35
14:05	27.5	6.26	260	18.7	NR	0.4	42

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

14:20	not recorded	NR	NR	20.5	NR	0.4	59
14:25	NR	NR	NR	17.5	NR	0.4	62
14:27	NR	NR	NR	16.1	NR	0.4	63
14:35	NR	NR	NR	16.0	NR	0.4	65
15:07	NR	NR	NR	24.0	NR	0.4	75
15:18	27.5	6.05	192	33.0	NR	0.4	83
15:45	NR	NR	NR	19.1	NR	0.4	86
15:50	NR	NR	NR	15.7	NR	0.4	90
16:30	NR	NR	NR	13.1	NR	0.4	115
16:44	26.0	5.93	179	12.7	NR	0.4	125
17:05	27.0	6.03	182	12.2	NR	0.4	131

Well Developer's Signature

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-6-97 / 09:52		Project No. 2516.05
Client: SOUTHDIVNAVFACENGCOM	Well Development Date and Time: 10-13-97	Logged by: R. Burns	Checked by:
Well/Site I.D.: SLD-09-06 / S49	Weather: not recorded	Start Date: 10-13-97	Finish Date: 10-13-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.074	Start Time: 10-13-97	Finish Time: 14:54

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 2.19	Initial Depth to Well Bottom: 9.38

Water Level during Initial Pumping/Purging (ft): not recorded

Depth to Water at Termination of Pumping/Purging (ft): not recorded	Depth to Well Bottom at Termination of Pumping/Purging (ft): not recorded

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
13:21	28.0	6.27	240	21.0	NR	0.8	~~0~~ 2.0
13:36	27.5	5.99	215	15.8	NR	0.8	~~2.0~~ 7.0
13:47	29.0	6.19	252	35.2	NR	0.8	~~7.0~~ 10.0
13:59	28.0	5.99	195	79.0	NR	0.4	~~10.0~~ 16.0
14:23	NR	NR	NR	11.5	NR	0.4	~~16.0~~ 29.0
14:25	NR	NR	NR	11.1	NR	0.4	~~29.0~~ 30.0

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

14:28	NR	NR	NR	10.3	NR	0.4	~~30.0~~ 32.0
14:32	NR	NR	NR	9.3	NR	0.4	~~32.0~~ 34.0
14:36	28.0	5.91	198	8.8	NR	0.4	~~34.0~~ 36.0
14:41	27.5	5.92	190	9.0	NR	0.4	~~36.0~~ 38.0
14:51	27.5	5.89	178	9.0	NR	0.4	45.0

NR = not recorded

Well Developer's Signature _____

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-6-97, 10:21		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-14-97	Logged by: R. Bu[illegible]	Checked by:
Well/Site I.D.: OLD-09-07 / S.4 7	Weather: NR	Start Date: 10-14-97	Finish Date: 10-14-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 6.6 75	Start Time: 14:32	Finish Time: 5:44

Installed Depth From Top of Well Casing to Bottom of Well: 12'

Initial Depth to Water (ft): 4.23'	Initial Depth to Well Bottom: 1.51'

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal.)
14:32	28.0	4.51	120	>200	-174.2	—	0
14:52	28.0	4.46	124	>200	-42.2	1.45	9
15:12	27.5	4.11	122	32.0	-5.5	1.40	17
15:21	27.5	3.62	122	11.6	-17.0	0.56	22
15:29	27.5	3.57	123	6.4	-37.0	0.50	25
15:40	27.5	3.64	123	5.0	-35.1	0.50	30

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-6-97 / 10:5[illegible]		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-14-97	Logged by: R. Burns	Checked by:
Well/Site I.D.: LD-09-08 / 5+9	Weather: Not recorded	Start Date: 10-14-97	Finish Date: 10-14-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 1.06	Start Time: 12:44	Finish Time: 16:22

Installed Depth From Top of Well Casing to Bottom of Well: 11'

Initial Depth to Water (ft): 3.24	Initial Depth to Well Bottom: 10.02

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
12:50	29.0	5.41	124	>200	-71.8	—	0
13:09	28.5	5.46	98	127.1	-33.9	0.57	11
13:28	29.0	5.36	122	79.4	-42.0	0.27	19
14:14	28.5	5.34	110	51.5	-74.9	0.27	29
14:47	28.0	5.31	120	36.1	-53.8	0.30	39
15:07	28.0	5.31	120	32.3	-65.2	0.50	49

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

15:59	28.0	5.27	118	14.0	-63.9	0.40	69
16:12	28.0	5.28	118	10.2	-49.7	0.38	74
16:20	27.5	5.36	105	9.0	-57.3	0.75	80

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-6-97 / 11.24		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-14-97	Logged by: R. Burns	Checked by:
Well/Site I.D.: OLD-MW-17 / 54-7	Weather: not recorded	Start Date: 10-14-97	Finish Date: 10-14-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.264	Start Time: 08:57	Finish Time: 14:25

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 2.12	Initial Depth to Well Bottom: 9.12

Water Level during Initial Pumping/Purging (ft): not recorded

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
08:57	27.0	5.74	195	>200	-13	0.4	0
09:15	27.5	5.76	190	>200	-137.3	0.4	10
09:38	28.0	5.68	188	135.6	-112.1	0.4	25
10:13	28.0	5.62	180	129.4	-80.3	1.6	50
10:41	NR	NR	NR	56.0	NR	NR	NR
10:47	28.0	5.62	172	52.0	-62.5	0.6	70

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

11:15	28.0	5.66	178	35.5	-73.7	0.53	85
12:30	29.0	5.64	170	21.1	-26.2	0.40	115
13:00	29.0	5.58	170	18.9	-43.0	0.50	130
13:44	29.0	5.56	178	14.5	-49.3	0.58	165
14:21	29.0	5.58	178	32.7	-52.8	0.41	180

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-7-97 / 08:42		Project No. 2546.05
Client: SOUTHDIV NAVFACENGCOM	Well Development Date and Time: 11-14-97	Logged by: R. Burns	Checked by:
Well/Site I.D.: OLD-09-10 / S-9	Weather: HOT NOT RECORDED	Start Date: 10-14-97	Finish Date: 10-14-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.067	Start Time: 08:35	Finish Time: 12:38

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 2.61

Initial Depth to Well Bottom: ~~9.60~~ 9.16 SM

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR

Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
08:46	26.0	5.88	210	>200	+64.6	0.15	0
09:10	27.0	5.75	205	>200	-101.1	0.15	2.5
09:24	27.0	5.72	178	131.8	-60.4	0.30	6.5
09:46	27.0	5.92	99	113.7	-30.2	0.16	10.0
10:07	28.0	5.97	162	45.1	+1.8	0.23	15.0
10:41	29.0	5.98	160	24.7	-9.3	0.21	22.0

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

11:12	28.0	5.88	155	17.5	-30.5	0.25	30.0
11:50	28.0	5.94	155	12.5	-16.9	0.25	35.0
12:23	28.0	5.89	150	10.3	+7.5	0.25	45.0
12:35	29.0	5.89	140	9.7	+2.4	0.23	48.0

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-7-97 / 0731		Project No. 2546.05
Client: SOUTHDIVNAVFACENGCOM	Well Development Date and Time: 10-14-97	Logged by: R. Ewin	Checked by:
Well/Site I.D.: MD-04-11 / SA-4	Weather: NR	Start Date: 10-14-97	Finish Date: 10-14-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.)	Start Time: 16:29	Finish Time: 17:26

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 3.14 | Initial Depth to Well Bottom: 9.14

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR | Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
16:29	29.8	6.17	211	>200	-98.5	—	0
16:49	29.0	5.99	241	31.7	-99.9	0.55	11
16:59	29.0	5.86	240	15.0	-104.9	0.70	18
17:16	28.5	5.98	242	9.9	-114.4	0.53	27
17:24	28.0	5.98	242	7.8	-57.3	NR	32

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Total vol. purged = 55 gal.

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-7-92 / 10:00		Project No. 2546.05
Client: SOUTHDIVNAVFACENGCOM	Well Development Date and Time: 10-14-92	Logged by: R. Bowen	Checked by:
Well/Site I.D.: SLD-07-12/549	Weather: NR	Start Date: 10-14-92	Finish Date: 10-14-92
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.058	Start Time: 15:51	Finish Time: 17:06

Installed Depth From Top of Well Casing to Bottom of Well: 10'

Initial Depth to Water (ft): 3.43'

Initial Depth to Well Bottom: 7.13'

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR

Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Other (mV) Redox	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
15:51	28.5	3.06	204	>200	+27.2	—	0
16:07	28.0	3.21	192	17.0	+72.5	0.43	7
16:35	28.5	3.48	178	128.4	-14.9	0.21	13
16:47	28.0	3.24	190	5.6	-27.9	0.11	15
16:54	28.0	3.36	170	3.5	-18.7	0.23	20
17:03	28.0	3.39	181	7.4	-28.5	0.30	23

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Well Developer's Signature _____

NR = not recorded

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: OU 3 RI	Well Installation Date and Time: 10-7-97 / 11:42		Project No. 2546.05
Client: SOUTHDIV NAVFAC ENGCOM	Well Development Date and Time: 10-13-97	Logged by: E. Burns	Checked by:
Well/Site I.D.: OLD-04-13 / S4 4	Weather: not recorded	Start Date: 10-13-97	Finish Date: 10-13-97
Volume of Drilling Fluid Lost (gal.) N/A	Volume of Water in Well and Filter Pack (gal.) 0.26	Start Time: 15:05	Finish Time: 16:10

Installed Depth From Top of Well Casing to Bottom of Well: 29'

Initial Depth to Water (ft): 3.45	Initial Depth to Well Bottom: 28.40'

Water Level during Initial Pumping/Purging (ft): not recorded

Depth to Water at Termination of Pumping/Purging (ft): not recorded	Depth to Well Bottom at Termination of Pumping/Purging (ft): not recorded

BEGINNING OF WELL DEVELOPMENT

Time	Temperature (°C)	pH	Conductivity (µmhos)	Turbidity (NTUs)	Redox Other (mV)	Approximate Pumping Rate (gal/min.)	Total vol. purged (gal)
15:05	27.0	5.59	120	>200	NR	0.4	0
15:23	26.0	5.35	90	23	NR	0.4	7
15:45	26.0	5.16	75	8.5	NR	0.4	15
15:50	26.0	5.00	70	3.7	NR	0.4	20
16:06	26.5	5.02	72	2.2	NR	0.4	27

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

NR = not recorded

Well Developer's Signature _____

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC ORLANDO	Well Installation Date and Time: 11-25/97 0810		Project No. 02546.05
Client: South Div.	Well Development Date and Time: 12-1/97 1400	Logged by: RJB	Checked by: WDO
Well/Site I.D.: OLD-09-14	Weather: NR	Start Date: 12-1/97	Finish Date: 12-1/97
Volume of Drilling Fluid Lost (gal.) NA	Volume of Water in Well and Filter Pack (gal.) NR	Start Time: 1350	Finish Time: 1547

Installed Depth From Top of Well Casing to Bottom of Well: ~~NR~~ 11'

Initial Depth to Water (ft): NR	Initial Depth to Well Bottom: NR

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
1431	22.7	6.21	310	18.34	4gal	NR
1446	22.6	6.16	285	18.26	5gal	
1458	22.7	6.13	240	19.14	6 gal	
1509	22.6	6.11	230	18.20	7gal	
1520	22.6	6.06	210	11.70	9gal	
1547	22.5	6.07	200	7.11	10gal	

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Peristaltic pump
10 gal. Pumped
water clear

Well Developer's Signature RJB

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC ORLANDO 063	Well Installation Date and Time: 11-25/97/0845		Project No. 02546.05
Client: South Div	Well Development Date and Time: 12-2/97 0945	Logged by: RJB	Checked by: WDO
Well/Site I.D.: OLD-09-15	Weather: NR	Start Date: 12-2/97	Finish Date: 12-2/97
Volume of Drilling Fluid Lost (gal.) NA	Volume of Water in Well and Filter Pack (gal.) NR	Start Time: 0945	Finish Time: 1137

Installed Depth From Top of Well Casing to Bottom of Well: ~~NR~~ 11'

Initial Depth to Water (ft): NR	Initial Depth to Well Bottom: NR

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
1041	21.6	5.73	135	49.2	7 gal	NR
1055	21.8	5.69	120	18.50	8 gal	
1105	21.5	5.66	120	18.70	9 gal	
1117	21.8	5.56	115	18.70	10 gal	
1128	22.0	5.48	100	18.80	11 gal	
1137	22.0	5.46	110	19.10	12 gal	

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

12 gal Pumped
Peristaltic Pump
water fairly clear

Well Developer's Signature RJB

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC ORLANDO 003	Well Installation Date and Time: 11-25/97 0918		Project No. 02546.05
Client: South Div	Well Development Date and Time: 12-2/97 1320	Logged by: RJB	Checked by: WDO
Well/Site I.D.: OLD-09-16	Weather: NR	Start Date: 12-2/97	Finish Date: 12-2/97
Volume of Drilling Fluid Lost (gal.) NA	Volume of Water in Well and Filter Pack (gal.) NR	Start Time: 1320	Finish Time: 1554

Installed Depth From Top of Well Casing to Bottom of Well: 11'

Initial Depth to Water (ft): NR	Initial Depth to Well Bottom: NR

Water Level during Initial Pumping/Purging (ft): NR

Depth to Water at Termination of Pumping/Purging (ft): NR	Depth to Well Bottom at Termination of Pumping/Purging (ft): NR

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
1402	22.1	6.00	210	139.0	4	NR
1430	22.1	5.91	185	50.8	5	
1441	22.1	5.89	165	34.8	6	
1503	22.1	5.82	160	18.7	7	
1535	22.1	5.81	160	18.67	8	
1554	22.1	5.81	160	18.65	9	

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Peristaltic Pump
9 gal Pumped
water fairly clear

Well Developer's Signature RJB

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC Orlando	Well Installation Date and Time: 02/04/98 10:40		Project No. 02546.05
Client: South DIV	Well Development Date and Time: 02/09/98 12:23	Logged by: WDO	Checked by:
Well/Site I.D.: OID-09-17	Weather:	Start Date: 02/09/98	Finish Date: 02/09/98
Volume of Drilling Fluid Lost (gal.) ZERO	Volume of Water in Well and Filter Pack (gal.) 0.84	Start Time: 12:23	Finish Time: 13:43

Installed Depth From Top of Well Casing to Bottom of Well: 9.93

Initial Depth to Water (ft): 2.66	Initial Depth to Well Bottom: 9.58

Water Level during Initial Pumping/Purging (ft): N/A MICROWELL

Depth to Water at Termination of Pumping/Purging (ft): * SEE NOTE	Depth to Well Bottom at Termination of Pumping/Purging (ft): * SEE NOTE

BEGINNING OF WELL DEVELOPMENT

Time	Temperature	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
12:23	20.7	5.91	190	43.1		INT
12:48	20.0	6.32	162	14.26		.2 min
13:17	20.1	6.47	162	18.95		.08/min
13:33	20.2	6.47	160	14.84		.05/min
13:43	20.2	6.47	161	12.46		.1/min
13:52	N/A	N/A	N/A	10.97		.2/min

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

14:01 NTU = 10.62 (.25/min)
14:04 NTU = 9.45 (.25/min
ISCO Portable Pump
10 Gal Removed
* Dedicated Tubing, No Post Development measurements Take

Well Developer's Signature Wesley D. Olson

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

8519-03 940321WEM

WELL DEVELOPMENT RECORD

Project: NTC Orlando	Well Installation Date and Time: 02/05/98 11:25		Project No. 02546.05
Client: South Div	Well Development Date and Time: 02/06/98 12:00	Logged by: WO	Checked by:
Well/Site I.D.: old-09-18	Weather:	Start Date: 02/06/98	Finish Date: 02/06/98
Volume of Drilling Fluid Lost (gal.) Six	Volume of Water in Well and Filter Pack (gal.) ONE	Start Time: 12:00	Finish Time: 14:29

Installed Depth From Top of Well Casing to Bottom of Well: 29.64

Initial Depth to Water (ft): 2.35	Initial Depth to Well Bottom: 29.15

Water Level during Initial Pumping/Purging (ft): N/A microwell

Depth to Water at Termination of Pumping/Purging (ft):	Depth to Well Bottom at Termination of Pumping/Purging (ft):

BEGINNING OF WELL DEVELOPMENT

Time	Temperature °C	pH	Conductivity	Turbidity	Other	Approximate Pumping Rate (gal/min.)
12:00	21.6	4.74	171	>200		.4/min
12:10	23.3	4.41	100	>200		.4/min
13:06	23.6	5.12	70	22.3		.2/min
14:16	23.7	5.56	75	8.29		.16/min
14:19	23.3	5.55	72	7.89		.16/min
14:29	23.4	5.67	70	7.36		.10/min

END OF WELL DEVELOPMENT

Notes: (Include Physical character of removed water, type and size of pump, volume of water removed.)

Water Quality - Below 10.0 NTU
ISCO Portable Pump
22 Gal. Removed
*dedicated tubing, No Post Development measurements Taken

Well Developer's Signature William D. Olson

FIGURE 4-3

EXAMPLE WELL DEVELOPMENT RECORD

PROJECT OPERATIONS PLAN

NAVAL TRAINING CENTER ORLANDO, FLORIDA

8519-03 940321WEM

APPENDIX B-4.1

GROUNDWATER SAMPLING LOGS
STUDY AREA 8

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OU3
Project Number: 02586.05
Date: 10-22/97
Sample Location ID: OLD-08-01
Time: Start: 0956 End: 1127
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 12.45 ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) ___ ft. — Protective Casing/Well Difference ___ ft. — Protective Casing ___ ft.

Depth to Water 2.46 ft. — Well Material: X PVC / ___ SS — Well Locked?: X Yes / ___ No — Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch — Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 9.99 ft. X X .16 Gal/ft. (2 in.) / ___ .65 Gal/ft. (4 in.) / ___ 1.5 Gal/ft. (6 in.) / ___ Gal/ft. (___ in.) = 1.64 Gal/Vol; 5.50 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ✓ / No ___; Concrete Collar Intact — Yes ✓ / No ___; Other ___ — Yes ✓ / No ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data @ ___ Gal.		@ 1/4 Gal.	@ 2.5 Gal.	@ 4.25 Gal.	@ 5.5 Gal.
Temperature, Deg. C		23.5	25.0	25.0	25.5
pH, units		6.52	6.47	6.51	6.48
Specific Conductivity		720	690	700	700
~~Turbidity, @ 25 Deg. C~~ NTU		2.5	1.27	0.91	0.72
Oxidation - Reduction, +/- mv		-121.3	-138.8	-118.3	-111.3
Dissolved Oxygen, ppm					

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			
SVOA		4°C			
Pest/PCB		4°C			
Inorganics		HNO_3			
Explosives		4°C			
TPH		H_2SO_4			
TOC		H_2SO_4			
Nitrate		H_2SO_4			

Notes: -08 G00102
TAL metals / SVOC / Pest + PCB
Herb / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLando
Point of Interest: 003
Project Number: 02546.05
Date: 10-22/97
Sample Location ID: OLD-08-02
Time: Start: 0925 End: 1245
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 12.50 Ft. — X Measured / Historical — X Top of Well / Top of Protective Casing

Well Riser Stick-up (from ground) — Ft. — Protective Casing/Well Difference — Ft. — Protective Casing — Ft.

Depth to Water 2.34 Ft. — Well Material: X PVC / SS — Well Locked?: X Yes / No — Well Dia. X 2 inch / 4 inch / 6 inch 1/2 11 — Water Level Equip. Used: X Elect. Cond. Probe / Float Activated / Press. Transducer

Height of Water Column 10.16 Ft. X — X .16 Gal/Ft. (2 in.) / .65 Gal/Ft. (4 in.) / 1.5 Gal/Ft. (6 in.) / Gal/Ft. (in.) = 1.67 Gal/Vol; 6.0 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	X	
Concrete Collar Intact	X	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- Methanol (100%)
- 25% Methanol/75% ASTM Type II water
- Deionized Water
- Liquinox Solution
- Hexane
- HNO_3/D.I. Water Solution
- Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected: In-line / X In Container

Sample Observations: Turbid / X Clear / Cloudy / Colored / Odor

Purge Data	@ 1/4 Gal.	@ 2.0 Gal.	@ 3.0 Gal.	@ 4.5 Gal.	@ 6.0 Gal.
Temperature, Deg. C	25.5	28.0	28.0	28.0	28.0
pH, units	6.72	6.88	6.98	6.71	6.68
Specific Conductivity	700	700	720	760	700
~~(umhos/cm @ 25 Deg. C)~~ NTU	17.91	2.2	1.65	0.97	1.17
Oxidation - Reduction, +/- mv	-175.4	-161.8	-146.9	-178.6	-188.6
Dissolved Oxygen, ppm					

Sample Collection Requirements
(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 08G00202
TAL metals / SVOC / Pest PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-08-03
Time: Start: 1006 End: 1139

Point of Interest: 003
Date: 10-22-97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 13.05 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) — Ft.

Protective Casing/Well Difference — Ft.

Protective Casing — Ft.

Depth to Water 2.28 Ft.

Well Material: X PVC / ___ SS

Well Locked?: X Yes / ___ No

Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 10.77 Ft. X X .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.) = 1.77 Gal/Vol; 6 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ✓ / No ___
Concrete Collar Intact — Yes ✓ / No ___
Other ___ — Yes ___ / No ___

Equipment Documentation

Purging/Sampling Equipment Used :

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used :

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / ___ Colored / X Clear / ___ Odor / ___ Cloudy

Purge Data	@ ___ Gal.	@ 1/4 Gal.	@ 2 Gal.	@ 4 Gal.	@ 6 Gal.
Temperature, Deg. C		24.5	25.0	27.6	28.5
pH, units		6.06	6.08	6.10	6.14
Specific Conductivity		290	300	300	310
~~Turbidity @ 25 Deg. C~~ NTU		1.43	0.85	0.31	0.46
Oxidation - Reduction, +/- mv		-166.6	-159.3	-156.3	-133.8
Dissolved Oxygen, ppm					

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			
SVOA		4°C			
Pest/PCB		4°C			
Inorganics		HNO_3			
Explosives		4°C			
TPH		H_2SO_4			
TOC		H_2SO_4			
Nitrate		H_2SO_4			

Notes: 08G00302
TAL metals / SVOC / Pest. & PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-08-04
Time: Start: 1011 End: 1249

Point of Interest: 003
Date: 10-22/97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 12.83 Ft. — X Measured; ___ Historical

X Top of Well; ___ Top of Protective Casing; ___ ___

Well Riser Stick-up (from ground) ___ Ft.

Protective Casing/Well Difference ___ Ft.

Protective Casing ___ Ft.

Depth to Water 2.24 Ft.

Well Material: X PVC; ___ SS; ___

Well Locked?: X Yes; ___ No

Well Dia. X 2 inch; ___ 4 inch; ___ 6 inch; ___ ___

Water Level Equip. Used: X Elect. Cond. Probe; ___ Float Activated; ___ Press. Transducer; ___ ___

Height of Water Column 10.59 Ft. X [X .16 Gal/Ft. (2 in.); ___ .65 Gal/Ft. (4 in.); ___ 1.5 Gal/Ft. (6 in.); ___ ___ Gal/Ft. (___ in.)] = [1.74 Gal/Vol; 6 Total Gal Purged]

Well Integrity: Yes / No
Prot. Casing Secure: ___ / ___
Concrete Collar Intact: ___ / ___
Other ___ ___ / ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	___	In-line Filter	
___	___	Press/Vac Filter	
___	___		

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None
- ___ ___

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line; X In Container

Sample Observations: ___ Turbid; X Clear; ___ Cloudy; ___ Colored; ___ Odor

Purge Data	@ 1/4 Gal.	@ 2 Gal.	@ 3 Gal.	@ 4.5 Gal.	@ 6 Gal.
Temperature, Deg. C	24.5	25.5	26.0	27.0	26.5
pH, units	6.10	6.25	6.26	6.23	6.18
Specific Conductivity	260	238	252	260	235
(~~umhos/cm @ 25 Deg. C~~) mS/cm	14.81	3.66	1.97	1.23	0.98
Oxidation - Reduction, +/- mv	-133.6	-123.5	-110.8	-127.7	-125.4
Dissolved Oxygen, ppm					

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	___	___	___ / ___ / ___ / ___
SVOA	___	4OC	___	___	___ / ___ / ___ / ___
Pest/PCB	___	4OC	___	___	___ / ___ / ___ / ___
Inorganics	___	HNO_3	___	___	___ / ___ / ___ / ___
Explosives	___	4°C	___	___	___ / ___ / ___ / ___
TPH	___	H_2SO_4	___	___	___ / ___ / ___ / ___
TOC	___	H_2SO_4	___	___	___ / ___ / ___ / ___
Nitrate	___	H_2SO_4	___	___	___ / ___ / ___ / ___

Notes: 08G00402
TAL metals / SVOC / Pest & PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLA-08-05
Time: Start: 1250 End: 1349

Point of Interest: 003
Date: 10-23-97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.37 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) — Ft.

Protective Casing/Well Difference — Ft.

Protective Casing — Ft.

Depth to Water 1.26 Ft.

Well Material: X PVC, X SS

Well Locked?: X Yes / ___ No

Well Dia.: ___ 2 inch, ___ 4 inch, ___ 6 inch, X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 8.11 Ft. X ___ 16 Gal/Ft. (2 in.) / ___ 65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.01 Gal/Ft. (___ in.) = 0.08 Gal/Vol; 2.0 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ✓ / No ___; Concrete Collar Intact — Yes ✓ / No ___; Other ___ — Yes ✓ / No ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	___	In-line Filter	
___	___	Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line, X In Container

Sample Observations: ___ Turbid, ___ Colored, X Clear, ___ Odor, ___ Cloudy

Purge Data	@ ___ Gal.	@ ___ Gal.	@ 1/4 Gal.	@ 1.25 Gal.	@ 2 Gal.
Temperature, Deg. C			28	27	27
pH, units			5.86	5.81	5.83
Specific Conductivity (~~umhos/cm @ 25 Deg. C~~ mS/cm)			270	270	270
Oxidation - Reduction, +/- mv			8.1	4.1	3.7
Dissolved Oxygen, ppm			-105.9	-113.1	-109.2

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			
SVOA		4°C			
Pest/PCB		4°C			
Inorganics		HNO_3			
Explosives		4°C			
TPH		H_2SO_4			
TOC		H_2SO_4			
Nitrate		H_2SO_4			

Notes: OBG-00501
TAL metals/SVOC/Pest+PCB
Herb./TOC/TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-08-06
Time: Start: 1005 End: 1142

Point of Interest: OUB
Date: 10-23/97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.56 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) ___ Ft.

Protective Casing/Well Difference ___ Ft.

Protective Casing ___ Ft.

Depth to Water 2.28 Ft.

Well Material: X PVC, X SS

Well Locked?: X Yes / ___ No

Well Dia.: ___ 2 inch / ___ 4 inch / ___ 6 inch / X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 7.28 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.0 Gal/Ft. (___ in.) = 0.07 Gal/Vol; 2.0 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: ✓
Concrete Collar Intact: ✓
Other: ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ ___ Gal.	@ ___ Gal.	@ 1/4 Gal.	@ 1.5 Gal.	@ 2 Gal.
Temperature, Deg. C			25.5	27.0	28.0
pH, units			5.80	5.77	5.78
Specific Conductivity (umhos/cm. @ 25 Deg. C.)			240	245	245
Oxidation - Reduction, +/- mv			18.98	7.8	6.9
Dissolved Oxygen, ppm			-87.1	-84.9	-67.9

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 08G00601
TAL Metals / SVOC / Pest + PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-08-07
Time: Start: 1015 End: 1138

Point of Interest: 003
Date: 10-23-92
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.38 Ft. — X Measured / Historical

X Top of Well / Top of Protective Casing

Well Riser Stick-up (from ground) ___ Ft.

Protective Casing/Well Difference ___ Ft.

Protective Casing ___ Ft.

Depth to Water 2.52 Ft.

Well Material: X PVC, X SS

Well Locked?: X Yes / No

Well Dia. ___ 2 inch / ___ 4 inch / X 6 inch 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / Float Activated / Press. Transducer

Height of Water Column 0.86 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.01 Gal/Ft. (___ in.) = 0.07 Gal/Vol; 4 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure
Concrete Collar Intact
Other

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ ___ Gal.	@ ___ Gal.	@ 1/4 Gal.	@ 1.5 Gal.	@ 4 Gal.
Temperature, Deg. C			26.5	27.0	28.0
pH, units			6.46	6.50	6.48
Specific Conductivity			332	310	316
~~(umhos/cm @ 25 Deg. C)~~ NTU			17.93	5.61	3.70
Oxidation - Reduction, +/- mv			-46.7	-52.6	-44.9
Dissolved Oxygen, ppm					

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: -08G-00701
TAL metals / SVOC / Pest & PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-08-08
Time: Start: 1248 End: 1340/1410

Point of Interest: 003
Date: 10.22.97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.44 Ft. — X Measured / Historical — X Top of Well / Top of Protective Casing

Well Riser Stick-up (from ground) — Ft.

Protective Casing/Well Difference — Ft.

Protective Casing — Ft.

Depth to Water 2.47 Ft.

Well Material: X PVC, X SS

Well Locked?: X Yes / No

Well Dia.: 2 inch / 4 inch / 6 inch / X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / Float Activated / Press. Transducer

Height of Water Column 6.97 Ft. X (.16 Gal/Ft. (2 in.) / .65 Gal/Ft. (4 in.) / 1.5 Gal/Ft. (6 in.) / 0.0 Gal/Ft. (__ in.)) = 0.07 Gal/Vol; 2 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: Yes
Concrete Collar Intact: Yes
Other

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- Methanol (100%)
- 25% Methanol/75% ASTM Type II water
- Deionized Water
- Liquinox Solution
- Hexane
- HNO_3/D.I. Water Solution
- Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: In-line / X In Container

Sample Observations: Turbid / X Clear / Cloudy / Colored / Odor

Purge Data	@ Gal.	@ Gal.	@ 1/4 Gal.	@ 1 Gal.	@ 2 Gal.
Temperature, Deg. C			27	29	29
pH, units			6.67	6.64	6.60
Specific Conductivity (umhos/cm @ 25 Deg. C) NTU			800	850	825
Oxidation - Reduction, +/- mv			8.0	7.6	3.9
Dissolved Oxygen, ppm			-202.7	-222.0	-201.5

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 08G00801 & 08G00801D
TAL metals/SVOC/Pest & PCB
Herb./TOC/TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OU3
Project Number: 02546.05
Date: 10-22-97
Sample Location ID: OLD-08-09
Time: Start: 1317 End: 1513
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.53 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) — Ft.

Protective Casing/Well Difference — Ft.

Protective Casing — Ft.

Depth to Water 2.25 Ft.

Well Material: X PVC / X SS

Well Locked?: X Yes / ___ No

Well Dia.: ___ 2 inch / ___ 4 inch / ___ 6 inch / X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 7.28 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.16 Gal/Ft. (___ in.) = 0.075 Gal/Vol; 2.25 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ✓ / No ___; Concrete Collar Intact — Yes ✓ / No ___; Other ___ — Yes ✓ / No ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / ___ Colored / ___ Clear / ___ Odor / X Cloudy

Purge Data	@ 1/4 Gal.	@ 1 Gal.	@ 1.5 Gal.	@ 1.75 Gal.	@ 2.25 Gal.
Temperature, Deg. C	28	28	29	28	28
pH, units	6.19	6.18	6.19	6.19	6.16
Specific Conductivity	390	400	400	393	385
~~(umhos/cm. @ 25 Deg. C)~~ NTU	18.95	15.65	18.49	12.0	18.20
Oxidation - Reduction, +/- mv	-131.9	-136.9	-97.2	-107.9	-79.7
Dissolved Oxygen, ppm	—	—	—	—	—

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 08G00901
TAC metals / SVOC / Pest PCB
Herb / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-08-10
Time: Start: 0996 End: 1209

Point of Interest: 003
Date: 10-23-97
Signature of Sampler: RSB

Water Level/Well Data

Well Depth 9.42 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) ~ Ft. — Protective Casing/Well Difference ~ Ft. — Protective Casing ~ Ft.

Depth to Water 1.78 Ft.

Well Material: X PVC, X SS

Well Locked?: X Yes, ___ No

Well Dia. ___ 2 inch, ___ 4 inch, ___ 6 inch, X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe, ___ Float Activated, ___ Press. Transducer

Height of Water Column 7.64 Ft. X ___ .16 Gal/Ft. (2 in.), ___ .65 Gal/Ft. (4 in.), ___ 1.5 Gal/Ft. (6 in.), 0.10 Gal/Ft. (___ in.) = 0.08 Gal/Vol; 5 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure
Concrete Collar Intact
Other

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line, X In Container

Sample Observations: ___ Turbid, X Clear, ___ Cloudy, ___ Colored, ___ Odor

Purge Data	@ ___ Gal.	@ 1/4 Gal.	@ 2 Gal.	@ 4 Gal.	@ 5 Gal.
Temperature, Deg. C		23.5	24.0	25.0	25.0
pH, units		5.35	5.30	5.25	5.28
Specific Conductivity (umhos/cm @ 25 Deg. C.) NTU		90	100	100	100
Oxidation - Reduction, +/- mv		17.71	17.92	11.88	8.63
Dissolved Oxygen, ppm		-27.4	-45.8	-11.7	-8.88

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 08G01001
TAL metals/SVOC/Pest+PCB
Herb./TOC/TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OU3
Project Number: 02546, 03
Date: 10·22·97
Sample Location ID: OLD-08-11
Time: Start: ~~1320~~ 0915 End: ~~1432~~ 1429
Signature of Sampler: RJR

Water Level/Well Data

Well Depth 9.65 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing — Well Riser Stick-up (from ground) ___ Ft. — Protective Casing/Well Difference ___ Ft. — Protective Casing ___ Ft.

Depth to Water 1.65 Ft. — Well Material: X PVC, X SS — Well Locked?: X Yes, ___ No — Well Dia. ___ 2 inch, ___ 4 inch, ___ 6 inch, X 1/2" — Water Level Equip. Used: X Elect. Cond. Probe, ___ Float Activated, ___ Press. Transducer

Height of Water Column 8 Ft. X ___ .16 Gal/Ft. (2 in.), ___ .65 Gal/Ft. (4 in.), ___ 1.5 Gal/Ft. (6 in.), 0.10 Gal/Ft. (___ in.) = 0.08 Gal/Vol; 1 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: Yes
Concrete Collar Intact: Yes
Other: ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected: ___ In-line, X In Container

Sample Observations: ___ Turbid, X Clear, ___ Cloudy, ___ Colored, ___ Odor

Purge Data	@ ___ Gal.	@ ___ Gal.	@ 1/4 Gal.	@ 3/4 Gal.	@ 1 Gal.
Temperature, Deg. C			27	27	27
pH, units			6.65	6.61	6.62
Specific Conductivity ~~(umhos/cm. @ 25 Deg. C)~~ mV			600	600	600
Oxidation - Reduction, +/- mv			17.5	5.53	1.88
Dissolved Oxygen, ppm			-159.5	-173.8	-189.1

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: -08 G01101
TAL metals / SVOC / Pest & PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-08-12
Time: Start: 0946 End: 1128

Point of Interest: 003
Date: 10-23/97
Signature of Sampler: RJR

Water Level/Well Data

Well Depth 28.11 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) ___ Ft. — Protective Casing/Well Difference ___ Ft. — Protective Casing ___ Ft.

Depth to Water 3.35 Ft. — Well Material: X PVC, X SS — Well Locked?: X Yes / ___ No — Well Dia. ___ 2 inch / ___ 4 inch / ___ 6 inch / X 1/2" — Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 24.76 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.10 Gal/Ft. (___ in.) = 0.25 Gal/Vol; 2.5 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure		
Concrete Collar Intact		
Other ___		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line / X In Container

Sample Observations: ___ Turbid / ___ Colored / ___ Clear / ___ Odor / X Cloudy

Purge Data @ ___ Gal.	@ 1/4 Gal.	@ 1.5 Gal.	@ 2.0 Gal.	@ 2.5 Gal.
Temperature, Deg. C	24.0	25.5	27.0	27.0
pH, units	5.65	5.32	5.33	5.18
Specific Conductivity (~~umhos/cm @ 25 Deg. C~~) mS	122	70	95	65
Oxidation - Reduction, +/- mv	19.99	18.46	18.20	15.62
Dissolved Oxygen, ppm	-41.4	-28.5	-26.1	-16.1

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nerate		H_2SO_4			/ / /

Notes: 08G0120\
TAL metals / SVOC / Pest & PCB
Herb. / TOC / TSS

APPENDIX B-4.2

GROUNDWATER SAMPLING LOGS
STUDY AREA 9

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-09-01
Time: Start: 1156 End: 1220

Point of Interest: OU3
Date: 10-20-97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 12.60 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM Ft.

Protective Casing/Well Difference ~ Ft.

Protective Casing ~ Ft.

Depth to Water 3.12 Ft.

Well Material: X PVC / ___ SS

Well Locked?: X Yes / ___ No

Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 9.48 Ft. X [X .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.)] = [1.55 Gal/Vol / 8 Total Gal Purged]

Well Integrity: Prot. Casing Secure — Yes ✓ / No ___
Concrete Collar Intact — Yes ✓ / No ___
Other ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
___	X	Peristaltic Pump	
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	___	In-line Filter	
___	___	Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 1/4 Gal.	@ 4.5 Gal.	@ 5.5 Gal.	@ 6.0 Gal.	@ 8.0 Gal.
Temperature, Deg. C	28.0	29.0	29.0	28.0	28.0
pH, units	6.32	6.46	6.17	6.03	5.93
Specific Conductivity (umhos/cm @ 25 Deg. C.)	110	145	160	158	155
Oxidation - Reduction, +/- mv	34 NTU	41.16	41.57	3.43	3.06
Dissolved Oxygen, ppm	-83.6	-83.6	-72.7	-55.6	-101.7
	~	~	~	~	~

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	___	___	___ / ___ / ___ / ___
SVOA	___	4OC	___	___	___ / ___ / ___ / ___
Pest/PCB	___	4OC	___	___	___ / ___ / ___ / ___
Inorganics	___	HNO_3	___	___	___ / ___ / ___ / ___
Explosives	___	4°C	___	___	___ / ___ / ___ / ___
TPH	___	H_2SO_4	___	___	___ / ___ / ___ / ___
TOC	___	H_2SO_4	___	___	___ / ___ / ___ / ___
Nitrate	___	H_2SO_4	___	___	___ / ___ / ___ / ___

Notes: 09G00102
TAL metals
PEST/PCB
SVOC
HERB

TOC/TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-09-02
Time: Start: 1141 End: 1544

Point of Interest: 003
Date: 10-20/97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 13.86 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up ___ Ft. (from ground)

Protective ___ Ft. Casing/Well Difference

Protective ___ Ft. Casing

Depth to Water 5.72 Ft.

Well Material: X PVC / ___ SS

Well Locked?: X Yes / ___ No

Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 8.14 Ft. X X .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (___ in.) = 1.33 Gal/Vol; 3.99 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ___ No ___; Concrete Collar Intact — Yes ___ No ___; Other ___ — Yes ___ No ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm Field Data Collected ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 1/4 Gal.	@ 2.5 Gal.	@ 4.0 Gal.	@ 4.5 Gal.	@ 5.0 Gal.
Temperature, Deg. C	27.0	28.0	29.0	28.0	28.6
pH, units	5.66	5.49	5.34	5.35	5.27
Specific Conductivity	110	75	70	70	70
~~(umhos/cm. @ 25 Deg. C.)~~ NTU	8.7	18.15	7.42	7.31	7.00
Oxidation - Reduction, +/- mv	-52.2	-93.0	-91.2	-85.4	-85.8
Dissolved Oxygen, ppm	—	—	—	—	—

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes:

TAL Metals — 09G00202
Pest/PCB — 09G00202
SVOC
Herb.
TOC/TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OU3
Project Number: 02546.05
Date: 10-20/97
Sample Location ID: OLD-09-03
Time: Start: 1128 End: 1345
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 13.70 Ft. — X Measured ___ Historical

X Top of Well ___ Top of Protective Casing ___ ___

Well Riser Stick-up (from ground) ___ Ft.

Protective Casing/Well Difference ___ Ft.

Protective Casing ___ Ft.

Depth to Water 6.32 Ft.

Well Material: X PVC ___ SS ___

Well Locked?: X Yes ___ No

Well Dia. X 2 inch ___ 4 inch ___ 6 inch ___

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___

Height of Water Column 7.38 Ft. X X .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) ___ Gal/Ft. (__ in.) = 1.21 Gal/Vol; 4 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: ___ / ___
Concrete Collar Intact: ___ / ___
Other ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
___	___	Peristaltic Pump	
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	___	In-line Filter	
___	___	Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
___ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line X In Container

Sample Observations: ___ Turbid X Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ ___ Gal.	@ 0.32 Gal.	@ 2 Gal.	@ 3.5 Gal.	@ 4 Gal.
Temperature, Deg. C		26.0	26.0	29.0	27.0
pH, units		5.24	5.64	5.70	5.66
Specific Conductivity (~~umhos/cm @ 25 Deg. C~~) NTU		90.0	102.0	100.0	102.0
		2.3	7.82	3.94	4.30
Oxidation - Reduction, +/- mv		191.5	-75.6	-87.5	-93.3
Dissolved Oxygen, ppm					

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA	___	HCL	___	___	___/___/___/___
SVOA	___	4OC	___	___	___/___/___/___
Pest/PCB	___	4OC	___	___	___/___/___/___
Inorganics	___	HNO_3	___	___	___/___/___/___
Explosives	___	4°C	___	___	___/___/___/___
TPH	___	H_2SO_4	___	___	___/___/___/___
TOC	___	H_2SO_4	___	___	___/___/___/___
Nitrate	___	H_2SO_4	___	___	___/___/___/___

Notes: TAL metals
Pest/PCB
SVOC
Herb.
TOC/TSS

09G00302
MS/MSD

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.09
Sample Location ID: OLD-09-04
Time: Start: 0910 End: _____

Point of Interest: 003
Date: 10-21-97
Signature of Sampler: RJR

Water Level/Well Data

Well Depth 13.80 Ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) ___ Ft.

Protective Casing/Well Difference ___ Ft.

Protective Casing ___ Ft.

Depth to Water 5.48 Ft.

Well Material: X PVC / ___ SS

Well Locked?: X Yes / ___ No

Well Dia. X 2 inch / ___ 4 inch / ___ 6 inch

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 8.32 Ft. X [X .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / ___ Gal/Ft. (__ in.)] = [1.36 Gal/Vol / ___ Total Gal Purged]

Well Integrity:	Yes	No
Prot. Casing Secure		
Concrete Collar Intact		
Other ___		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ 1.4 Gal.	@ 3.8 Gal.	@ 4.0 Gal.	@ 8.5 Gal.	@ 8.9 Gal.
Temperature, Deg. C	25.5	28.0	28.0	28.0	29.0
pH, units	6.19	6.59	6.28	6.39	6.33
Specific Conductivity (~~umhos/cm. @ 25 Deg. C~~) mS	272	278	270	278	290
Oxidation - Reduction, +/- mv	12.12	12.4	18.88	18.51	18.60
Dissolved Oxygen, ppm	-162.4	-70.7	-129.8	-121.0	-115.1
	—	—	—	—	—

Sample Collection Requirements

(✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 09G00402
TAL metals
PEST/PCB
SVOC
Herb.
TOC/TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-09-05
Time: Start: 1307 End: 1507

Point of Interest: 003
Date: 10-21-97
Signature of Sampler: RSB

Water Level/Well Data

Well Depth 9.45 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) — Ft.

Protective Casing/Well Difference ~ Ft.

Protective Casing ~ Ft.

Depth to Water 2.77 Ft.

Well Material: X PVC, X SS

Well Locked?: X Yes / ___ No

Well Dia.: ___ 2 inch, ___ 4 inch, ___ 6 inch, X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe, ___ Float Activated, ___ Press. Transducer

Height of Water Column 6.68 Ft. X ___ .16 Gal/Ft. (2 in.), ___ .65 Gal/Ft. (4 in.), ___ 1.5 Gal/Ft. (6 in.), X .01 Gal/Ft. (__ in.) = 0.07 Gal/Vol

___ Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes ✓ / No ___; Concrete Collar Intact — Yes ✓ / No ___; Other ___ — Yes ___ / No ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm

Field Data Collected: ___ In-line, X In Container

Sample Observations: ___ Turbid, ___ Colored, X Clear, ___ Odor, ___ Cloudy

Purge Data	@ ___ Gal.	@ ~~1/4~~ Gal.	@ 1/4 Gal.	@ 1 Gal.	@ 1.5 Gal.
Temperature, Deg. C			30.0	27.0	27.0
pH, units			6.78	6.38	6.35
Specific Conductivity			330	300	305
~~(umhos/cm. @ 25 Deg. C)~~ NTU			8.33	6.45	7.0
Oxidation - Reduction, +/- mv			-88.6	-91.7	-105.0
Dissolved Oxygen, ppm					

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 09G0050
TAL metals / SVOC / Pest + PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: 003
Project Number: 02546.03
Date: 10-17/97
Sample Location ID: OLD-09-06
Time: Start: 1355 End:
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.38 ft. — X Measured / ___ Historical — X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) FM ft.

Protective Casing/Well Difference FM ft.

Protective Casing FM ft.

Depth to Water 2.22 ft.

Well Material: X PVC / X SS

Well Locked?: X Yes / ___ No

Well Dia. ___ 2 inch / ___ 4 inch / ___ 6 inch / X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 7.16 ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.01 Gal/Ft. (1/2 in.) = 0.07 Gal/Vol; 0.65 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC NR ppm Well Mouth NR ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ .4 Gal.	@ .5 Gal.	@ .55 Gal.	@ .60 Gal.	@ .65 Gal.
Temperature, Deg. C	32.0	31.5	30.0	30.0	30.0
pH, units	7.05	6.86	6.78	6.86	6.87
Specific Conductivity ~~(umhos/cm. @ 25 Deg. C)~~	530	362	345	338	335
NTU	18.8	17.30	16.04	15.10	13.94
Oxidation - Reduction, +/- mv	-32.7	-56.3	-84.4	-83.7	-54.6
Dissolved Oxygen, ppm					

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes:

TAL Metals
Pest/PCB
SVOCS
Herb.
TOC
TSS

09G00601

0.03 NTU's f.

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OU3
Project Number: 02546.05
Date: 10-21/97
Sample Location ID: OLD-09-07
Time: Start: 1328 End: 1543
Signature of Sampler: RJR

Water Level/Well Data

Well Depth 11.51 Ft. X Measured ___ Historical

X Top of Well ___ Top of Protective Casing ___ ___

Well Riser Stick-up (from ground) ~ Ft.

Protective Casing/Well Difference ~ Ft.

Protective Casing ~ Ft.

Depth to Water 4.38 Ft.

Well Material: X PVC X SS ___

Well Locked?: X Yes ___ No

Well Dia. ___ 2 inch ___ 4 inch ___ 6 inch X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe ___ Float Activated ___ Press. Transducer ___ ___

Height of Water Column 7.13 Ft. X ___ .16 Gal/Ft. (2 in.) ___ .65 Gal/Ft. (4 in.) ___ 1.5 Gal/Ft. (6 in.) 0.0 Gal/Ft. (___ in.) = 0.07 Gal/Vol × 6 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: Yes
Concrete Collar Intact: Yes
Other ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None
- ___ ___

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm

Field Data Collected: ___ In-line X In Container

Sample Observations: ___ Turbid X Clear ___ Cloudy ___ Colored ___ Odor

Purge Data	@ ___ Gal.	@ 1/4 Gal.	@ 2.5 Gal.	@ 4 Gal.	@ 6 Gal.
Temperature, Deg. C		29.0	28.0	28.0	28.0
pH, units		4.64	4.04	4.01	3.98
Specific Conductivity		90	100	120	120
(~~unfiltered @ 25 Deg. C~~) NTU		7200	31.5	18.13	17.93
Oxidation - Reduction, +/- mv		-30.1	33.7	58.2	72.1
Dissolved Oxygen, ppm		—	—	—	—

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4OC			/ / /
Pest/PCB		4OC			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: -09G00701
TAL metals / SVOC / Pest + PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-09-08
Time: Start: 0926 End: 1045

Point of Interest: OU3
Date: 10/24/97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 10.02 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) ___ Ft.

Protective Casing/Well Difference ___ Ft.

Protective Casing ___ Ft.

Depth to Water 3.43 Ft.

Well Material: X PVC, X SS

Well Locked?: X Yes / ___ No

Well Dia. ___ 2 inch / ___ 4 inch / X 6 inch 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 6.59 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.06 Gal/Ft. (___ in.) = 0.07 Gal/Vol × 3/4 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: Yes
Concrete Collar Intact: Yes
Other: ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ ___ Gal.	@ ___ Gal.	@ 1/4 Gal.	@ 1/2 Gal.	@ 3/4 Gal.
Temperature, Deg. C			25.0	26.0	27.0
pH, units			5.84	6.04	5.99
Specific Conductivity (~~umhos/cm. @ 25 Deg. C~~) NTU			135	115	130
Oxidation - Reduction, +/- mv			14.2	7.29	4.87
Dissolved Oxygen, ppm			-45.1	-13.9	-27.3

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 09G00801
TAL metals / SVOC / Pest & PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-09-09
Time: Start: 0919 End: 1018

Point of Interest: OU3
Date: 10-24-97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.12 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing / ___ ___

Well Riser Stick-up (from ground) X Ft.

Protective Casing/Well Difference X Ft.

Protective Casing X Ft.

Depth to Water 3.18 Ft.

Well Material: X PVC / X SS / ___

Well Locked?: X Yes / ___ No

Well Dia. ___ 2 inch / ___ 4 inch / ___ 6 inch / X 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer / ___ ___

Height of Water Column 5.94 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.16 1 Gal/Ft. (___ in.) = 0.06 Gal/Vol; 1 Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: ✓ / ___
Concrete Collar Intact: ✓ / ___
Other ___ ___ / ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
___ Methanol (100%)
___ 25% Methanol/75% ASTM Type II water
___ Deionized Water
___ Liquinox Solution
___ Hexane
___ HNO_3/D.I. Water Solution
___ Potable Water
X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ ___ Gal.	@ ___ Gal.	@ 1/4 Gal.	@ 1/2 Gal.	@ 1 Gal.
Temperature, Deg. C			24.9	25.0	26.0
pH, units			6.09	6.44	6.21
Specific Conductivity (umhos/cm @ 25 Deg. C)			185	170	172
Oxidation - Reduction, +/- mv			17.67	3.44	3.08
Dissolved Oxygen, ppm			-22.1	28.2	3.6

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			
SVOA		4OC			
Pest/PCB		4OC			
Inorganics		HNO_3			
Explosives		4°C			
TPH		H_2SO_4			
TOC		H_2SO_4			
Nitrate		H_2SO_4			

Notes: -09G-00901
TAL metals / SVOC / Pest & PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02566.05
Sample Location ID: OLD-09-10
Time: Start: 1415 End: 1538

Point of Interest: OU3
Date: 10-21-97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.16 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up ___ Ft. (from ground)

Protective ___ Ft. Casing/Well Difference

Protective ___ Ft. Casing

Depth to Water 2.88 Ft.

Well Material: ✓ PVC / X SS

Well Locked?: X Yes / ___ No

Well Dia. ___ 2 inch / ___ 4 inch / ___ 6 inch / X 1/2 "

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 6.28 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.01 Gal/Ft. (___ in.) = 0.064 Gal/Vol; 1.75 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	✓	
Concrete Collar Intact	✓	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used:

(✓ All That Apply at Location)
- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ ___ Gal.	@ ___ Gal.	@ 1/2 Gal.	@ 1.50 Gal.	@ 1.75 Gal.
Temperature, Deg. C			27.0	26.0	27.0
pH, units			6.21	6.28	6.30
Specific Conductivity ~~umhos/cm @ 25 Deg. C~~ Field			18.3	220	220
			18.4	5.83	5.16
Oxidation - Reduction, +/- mv			-2.9	-1.6	-2.3
Dissolved Oxygen, ppm					

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: OLD-09-10
09G01001
TAL Metals/SVOC/Pest & PCB
Nerb/TOC/TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Point of Interest: OU3
Project Number: 02546.05
Date: 10-21-97
Sample Location ID: OLD-09-11
Time: Start: 0946 End: 1106
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 9.14 Ft. — X Measured ___ Historical — X Top of Well ___ Top of Protective Casing ___ ___ — Well Riser Stick-up (from ground) ___ Ft. — Protective Casing/Well Difference ___ Ft. — Protective Casing ___ Ft.

Depth to Water 3.31 Ft. — Well Material: X PVC, X SS — Well Locked?: X Yes, ___ No — Well Dia. ___ 2 inch, ___ 4 inch, ___ 6 inch, X 1/2" — Water Level Equip. Used: X Elect. Cond. Probe, ___ Float Activated, ___ Press. Transducer

Height of Water Column 5.63 Ft. X ___ .16 Gal/Ft. (2 in.), ___ .65 Gal/Ft. (4 in.), ___ 1.5 Gal/Ft. (6 in.), 0.01 Gal/Ft. (___ in.) = 0.06 Gal/Vol; 2.5 Total Gal Purged

Well Integrity:	Yes	No
Prot. Casing Secure	+	
Concrete Collar Intact	+	
Other		

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC 0 ppm Well Mouth 0 ppm Field Data Collected ___ In-line, X In Container

Sample Observations: ___ Turbid, X Clear, ___ Cloudy, ___ Colored, ___ Odor

Purge Data	@ 1/4 Gal.	@ 1/2 Gal.	@ 1.0 Gal.	@ 2.0 Gal.	@ 2.5 Gal.
Temperature, Deg. C	27.0	27.0	27.0	28.0	28.0
pH, units	6.32	6.82	6.99	6.58	6.58
Specific Conductivity	210	225	230	220	220
~~Turbidity, @ 25 Deg. C~~ NTU	7200	11.6	10.8	10.03	6.72
Oxidation - Reduction, +/- mv	-99.3	-67.4	-46.4	-66.5	-70.1
Dissolved Oxygen, ppm	—	—	—	—	—

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 09G01101
TAL metals
Pest/PCB
SVOC
Herb
TOC/TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-09-12
Time: Start: 1321 End: 1529

Point of Interest: OU 3
Date: 10-21/97
Signature of Sampler: RJR

Water Level/Well Data

Well Depth 9.13 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing / ___ ___

Well Riser Stick-up (from ground) — Ft.

Protective Casing/Well Difference — Ft.

Protective Casing — Ft.

Depth to Water 3.66 Ft.

Well Material: X PVC / X SS / ___

Well Locked?: X Yes / ___ No

Well Dia. ___ 2 inch / ___ 4 inch / X 6 inch 1/2"

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer / ___

Height of Water Column 5.47 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / 0.04 Gal/Ft. (__ in.) = 0.06 Gal/Vol / ___ Total Gal Purged

Well Integrity: Yes / No
Prot. Casing Secure: ___ / ___
Concrete Collar Intact: ___ / ___
Other ___: ___ / ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
___	___	Submersible Pump	
___	___	Bailer	
___	___	PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
___	___	Airlift	
___	___	Hand Pump	
___	___	In-line Filter	
___	___	Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None
- ___ ___

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / X Clear / ___ Cloudy / ___ Colored / ___ Odor

Purge Data	@ ___ Gal.	@ 1/4 Gal.	@ 1/2 Gal.	@ 1 Gal.	@ 2 Gal.
Temperature, Deg. C		30.0	28.0	28.0	29.0
pH, units		3.43	3.39	3.47	3.39
Specific Conductivity		210	190	180	190
~~(umhos/cm @ 25 Deg. C)~~ NTU		16.9	17.8	9.35	4.86
Oxidation - Reduction, +/- mv			53.3	55.5	74.2
Dissolved Oxygen, ppm					

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 09G01201
TAL metals / SVOC / Pest + PCB
Herb. / TOC / TSS

GROUNDWATER SAMPLE FIELD DATA

Project: NTC ORLANDO
Project Number: 02546.05
Sample Location ID: OLD-09-13
Time: Start: 0916 End: 1053

Point of Interest: 003
Date: 10/21/97
Signature of Sampler: RJB

Water Level/Well Data

Well Depth 28.41 Ft. — X Measured / ___ Historical

X Top of Well / ___ Top of Protective Casing

Well Riser Stick-up (from ground) — Ft.

Protective Casing/Well Difference — Ft.

Protective Casing — Ft.

Depth to Water 3.48 Ft.

Well Material: X PVC / X SS

Well Locked?: X Yes / ___ No

Well Dia. ___ 2 inch / ___ 4 inch / ___ 6 inch / X 1/2 in

Water Level Equip. Used: X Elect. Cond. Probe / ___ Float Activated / ___ Press. Transducer

Height of Water Column 24.93 Ft. X ___ .16 Gal/Ft. (2 in.) / ___ .65 Gal/Ft. (4 in.) / ___ 1.5 Gal/Ft. (6 in.) / X 0.0 Gal/Ft. (___ in.) = 0.26 Gal/Vol; 2.9 Total Gal Purged

Well Integrity: Prot. Casing Secure — Yes X / No ___; Concrete Collar Intact — Yes X / No ___; Other — Yes ___ / No ___

Equipment Documentation

Purging/Sampling Equipment Used:

(✓ If Used For) Purging	Sampling		Equipment ID
X	X	Peristaltic Pump	
		Submersible Pump	
		Bailer	
		PVC/Silicon Tubing	
X	X	Teflon/Silicon Tubing	
		Airlift	
		Hand Pump	
		In-line Filter	
		Press/Vac Filter	

Decontamination Fluids Used: (✓ All That Apply at Location)

- ___ Methanol (100%)
- ___ 25% Methanol/75% ASTM Type II water
- ___ Deionized Water
- ___ Liquinox Solution
- ___ Hexane
- ___ HNO_3/D.I. Water Solution
- ___ Potable Water
- X None

Field Analysis Data

Ambient Air VOC Ø ppm Well Mouth Ø ppm

Field Data Collected: ___ In-line / X In Container

Sample Observations: ___ Turbid / ___ Colored / X Clear / ___ Odor / ___ Cloudy

Purge Data	@ 1/4 Gal.	@ 1.25 Gal.	@ 1.50 Gal.	@ 2.5 Gal.	@ 2.9 Gal.
Temperature, Deg. C	26.0	27.0	27.5	27.0	27.0
pH, units	4.94	5.36	5.13	4.99	4.99
Specific Conductivity (~~umhos/cm @ 25 Deg. C~~) mS	80	83	83	80	80
Turbidity, NTU	17.42	10.8	9.60	3.30	2.30
Oxidation - Reduction, +/- mv	-10.6	-21.7	-27.8	-16.6	-5.6
Dissolved Oxygen, ppm	—	—	—	—	—

Sample Collection Requirements (✓ If Required at this Location)

Analytical Parameter	✓ If Field Filtered	Preservation Method	Volume Required	✓ If Sample Collected	Sample Bottle IDs
VOA		HCL			/ / /
SVOA		4°C			/ / /
Pest/PCB		4°C			/ / /
Inorganics		HNO_3			/ / /
Explosives		4°C			/ / /
TPH		H_2SO_4			/ / /
TOC		H_2SO_4			/ / /
Nitrate		H_2SO_4			/ / /

Notes: 09G 01301
TAL metals / SVOC / Pest / PCB
Herb / TOC / TSS

APPENDIX B-5.1

HYDRAULIC CONDUCTIVITY TESTING
STUDY AREA 8

AQUIFER TEST COMPLETION CHECKLIST

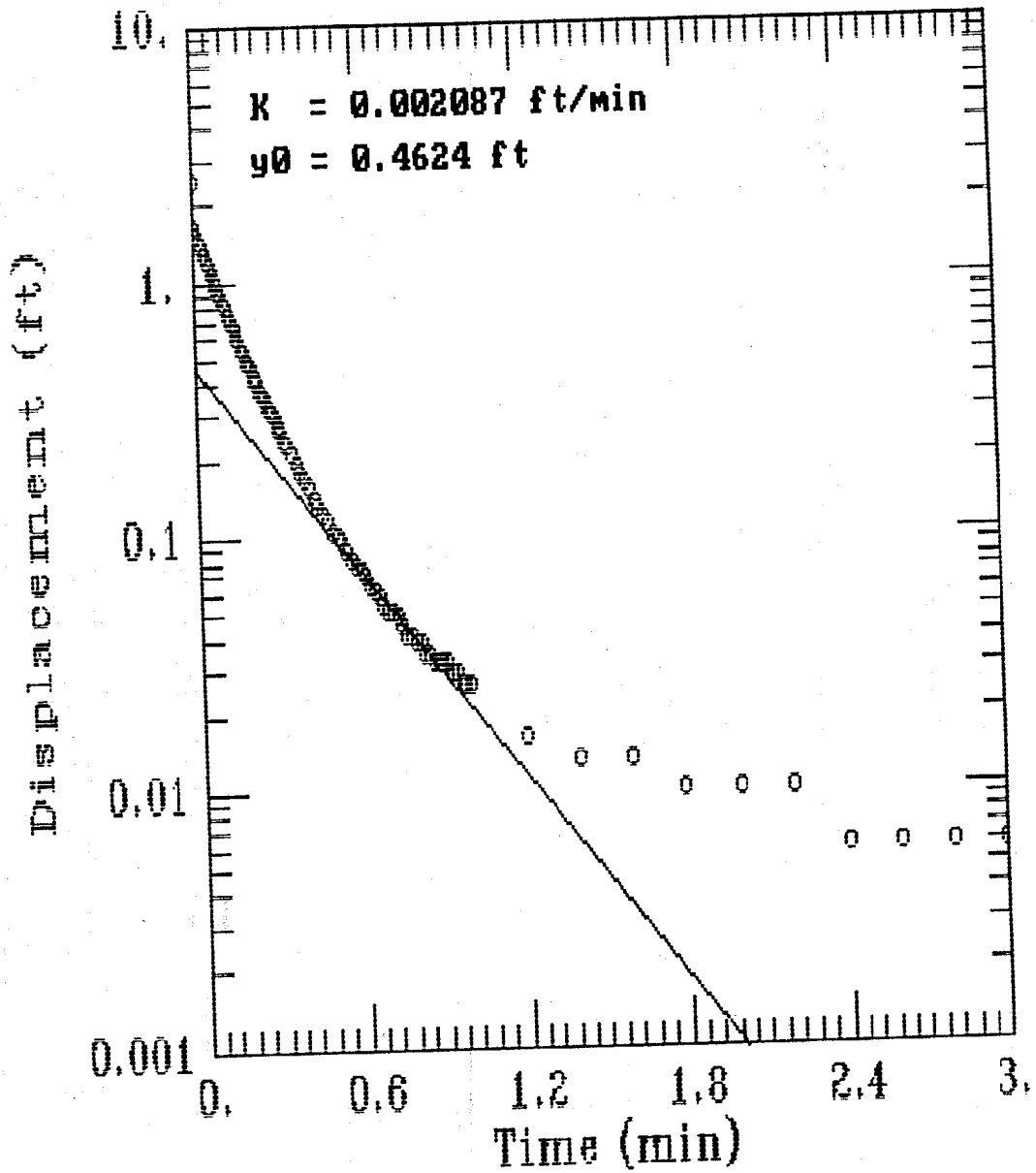
AQUIFER TEST NO. _____

SETUP	DATE	BY WHOM
MONITORING WELL ID	OLD-08-02	
DATE OF TEST	4-14/98	
TYPE OF TEST	Slug out	
HERMIT TYPE/SERIAL#	2000C /	
TEST #	T2	T3
DATA COLLECTION RATE	Log	Log
TRANSDUCER		
SERIAL #	5083	5083
PSIG		
SCALE FACTOR		
OFFSET		
INPUT CHANNEL		
TEST DATA		
INPUT MODE (TOC/SUR)	TOC	TOC
STATIC WATER LEVEL (FT./TOC)	2.14	2.14
WELL DEPTH (FT./TOC)	12.20	12.20
XD DEPTH (FT.TOC)	11.5	11.5
INITIAL XD REFERENCE	9.222	~~9.203~~ 9.190 recd XD
SLUG DEPTH (FT./TOC)	5.14	5.14
TIME OF SLUG PLACEMENT	1252	1306
TIME OF WL EQUILIBRATION	1258	1310
NEW XD REFERENCE	9.206	9.190
START TIME OF TEST	1259	1311
END TIME OF TEST	1304	1316
NOTES:	0.003 fwd	0.006 fwd

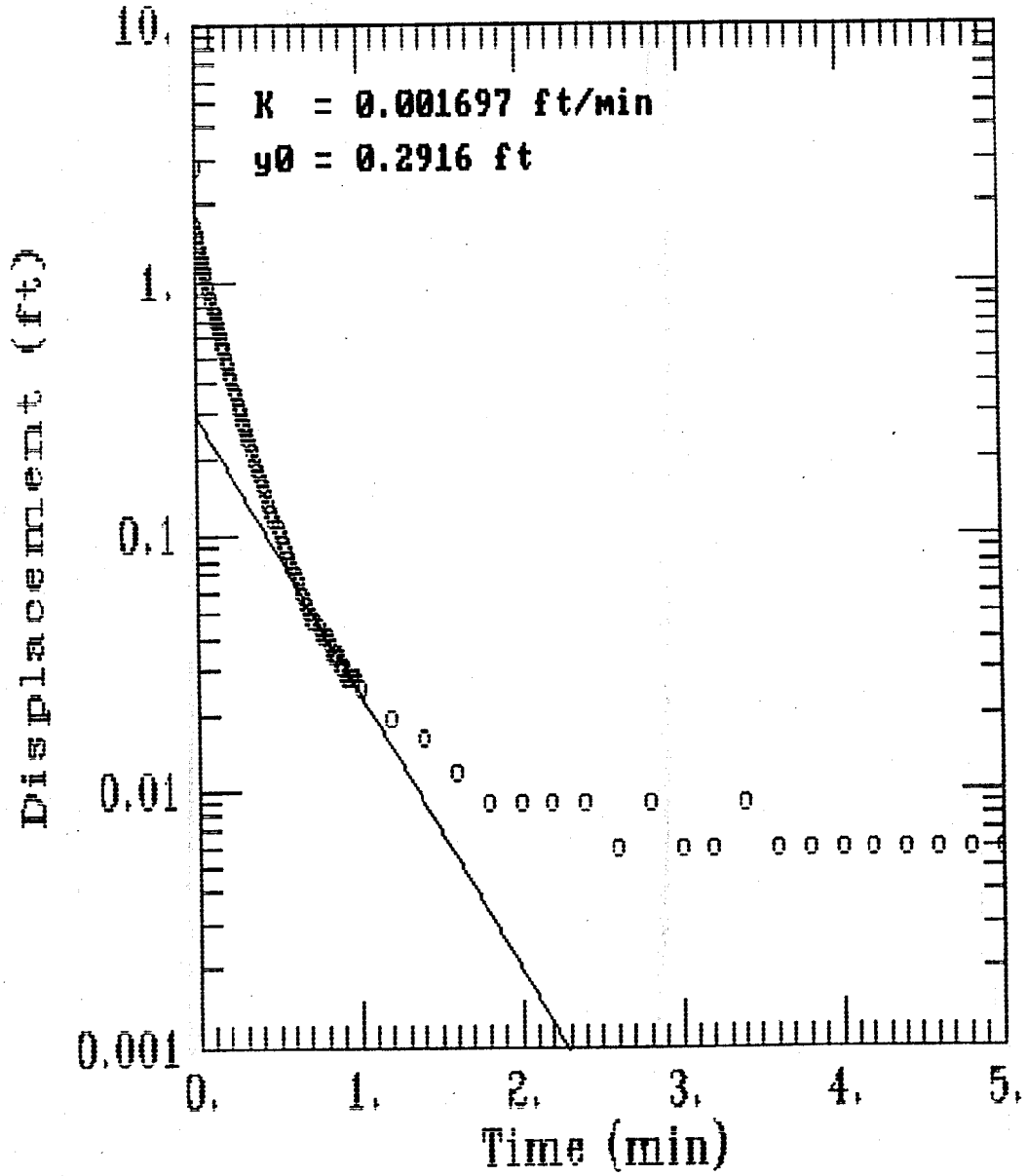
2.500 (2.491)
0.012
-0.009

2.955 (2.796)
0.165
-0.159

OLD-08-02 #1


K = 0.002087 ft/min
y0 = 0.4624 ft
10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
0.6
1.2
1.8
2.4
3.
Time (min)

OLD-08-02 #2


K = 0.001697 ft/min
y0 = 0.2916 ft
10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
1.
2.
3.
4.
5.
Time (min)

AQUIFER TEST COMPLETION CHECKLIST

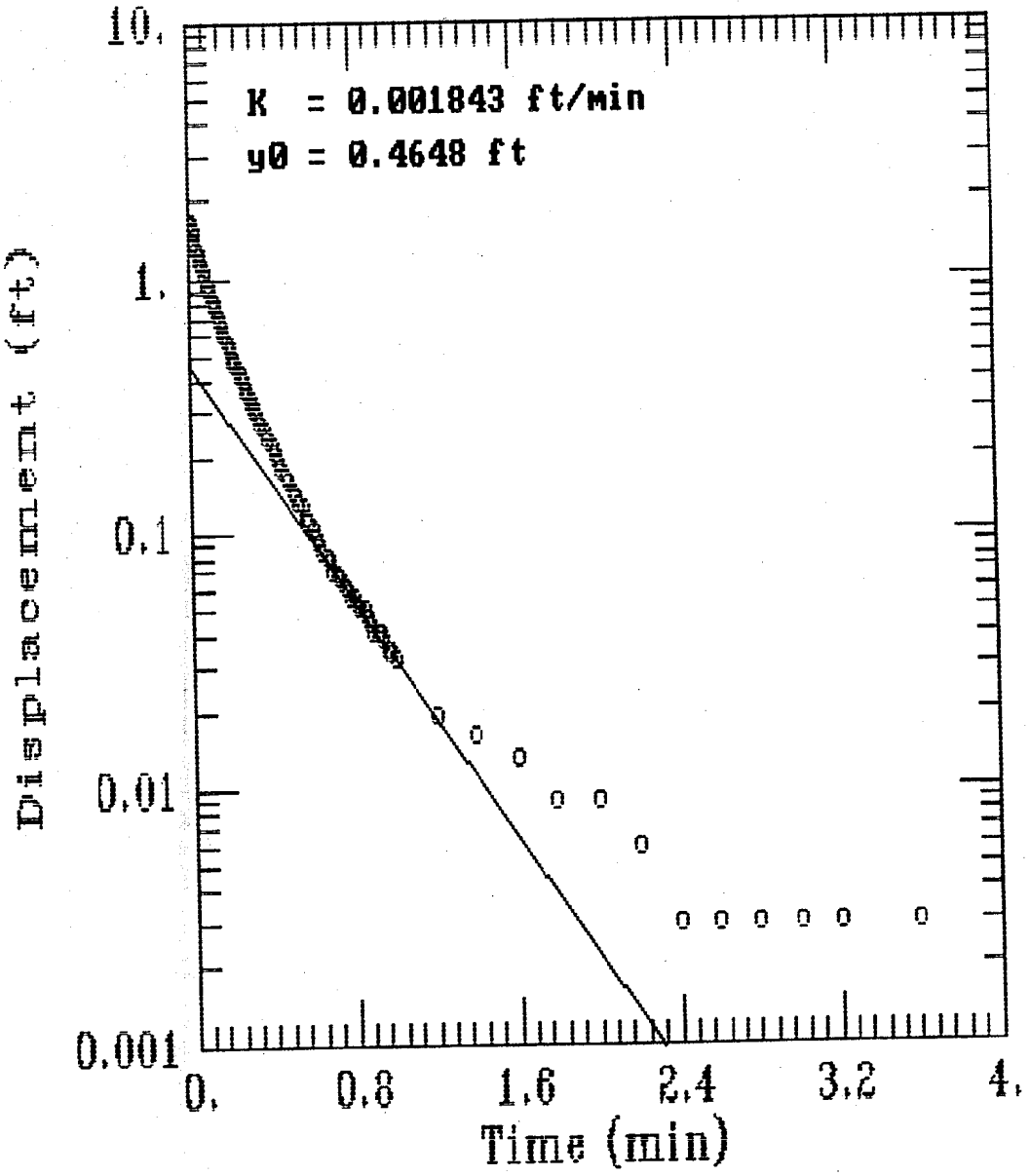
AQUIFER TEST NO. _____

SETUP	DATE	BY WHOM
MONITORING WELL ID	OLD-08-03	
DATE OF TEST	11-14-98	
TYPE OF TEST	Slug out	
HERMIT TYPE/SERIAL#	2000cl	
TEST #	T4	T5
DATA COLLECTION RATE	Log	
TRANSDUCER		
SERIAL #	5083	
PSIG		
SCALE FACTOR		
OFFSET		
INPUT CHANNEL		
TEST DATA		
INPUT MODE (TOC/SUR)	TOC	TOC
STATIC WATER LEVEL (FT./TOC)	1.99	1.99
WELL DEPTH (FT./TOC)	12.80	12.80
XD DEPTH (FT.TOC)	11.5	11.5
INITIAL XD REFERENCE	9.413	9.369
SLUG DEPTH (FT./TOC)	5	5
TIME OF SLUG PLACEMENT	1336	1350
TIME OF WL EQUILIBRATION	1342	1353
NEW XD REFERENCE	9.350	9.324
START TIME OF TEST	1343	1354
END TIME OF TEST	1348	1359
NOTES:	-0.15 fnal	-0.22 final

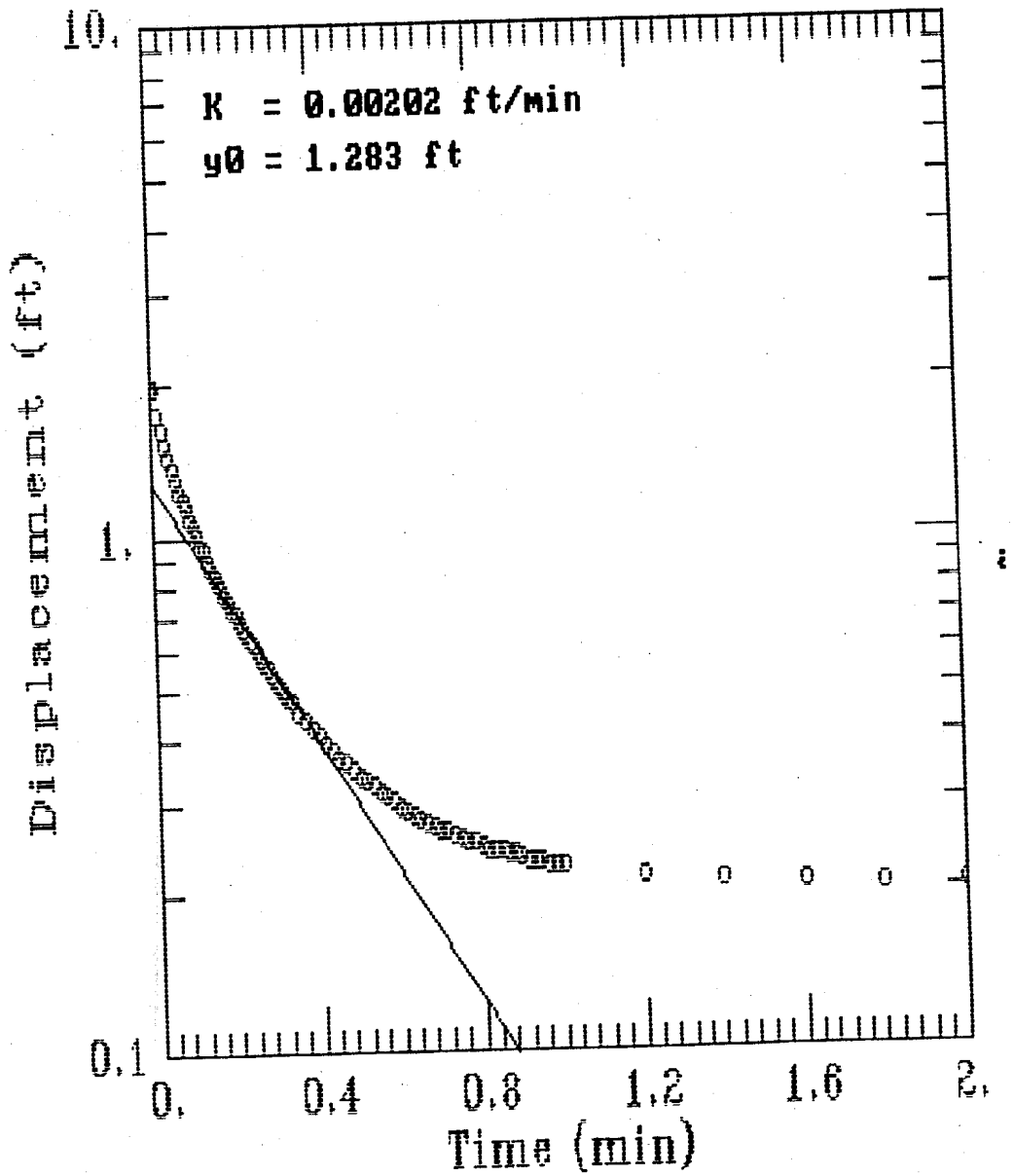
1.609
-0.044
1.653

1.749 1.969
-0.22

OLD-08-03 #1


K = 0.001843 ft/min
y0 = 0.4648 ft
10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
0.8
1.6
2.4
3.2
4.
Time (min)

OLD-08-03 #2


K = 0.00202 ft/min
y0 = 1.283 ft
10.
1.
0.1
0.
0.4
0.8
1.2
1.6
2.
Time (min)
Displacement (ft)

APPENDIX B-5.2

HYDRAULIC CONDUCTIVITY TESTING
STUDY AREA 9

AQUIFER TEST COMPLETION CHECKLIST

AQUIFER TEST NO. _____

SETUP	DATE	BY WHOM
MONITORING WELL ID	OLD-09-02	OLD-09-02
DATE OF TEST	4-13-98	4-13-98
TYPE OF TEST	Slug out	Slug out
HERMIT TYPE/SERIAL#	2000C/	2000C/
TEST #	T Ø	T 1
DATA COLLECTION RATE	Log	Log
TRANSDUCER		
SERIAL #	5083	5083
PSIG	10	10
SCALE FACTOR	10.0361	10.0361
OFFSET	-0.1317	-0.1317
~~INPUT CHANNEL~~ Lin	0.0422	0.0422
TEST DATA		
INPUT MODE (TOC/SUR)	TOC	TOC
STATIC WATER LEVEL (FT./TOC)	4.87	4.87
WELL DEPTH (FT./TOC)	13.60	13.60
XD DEPTH (FT.TOC)	12	12
INITIAL XD REFERENCE	7.899	8.320
SLUG DEPTH (FT./TOC)	7.9	7.9
TIME OF SLUG PLACEMENT	0930	1032
TIME OF WL EQUILIBRATION	1005	1055
NEW XD REFERENCE	7.282	7.018
START TIME OF TEST	1005	1057
END TIME OF TEST	1035	1117
NOTES:		

2.050
0.238

3.790 1.985
-1.985
1.805

AQUIFER TEST COMPLETION CHECKLIST

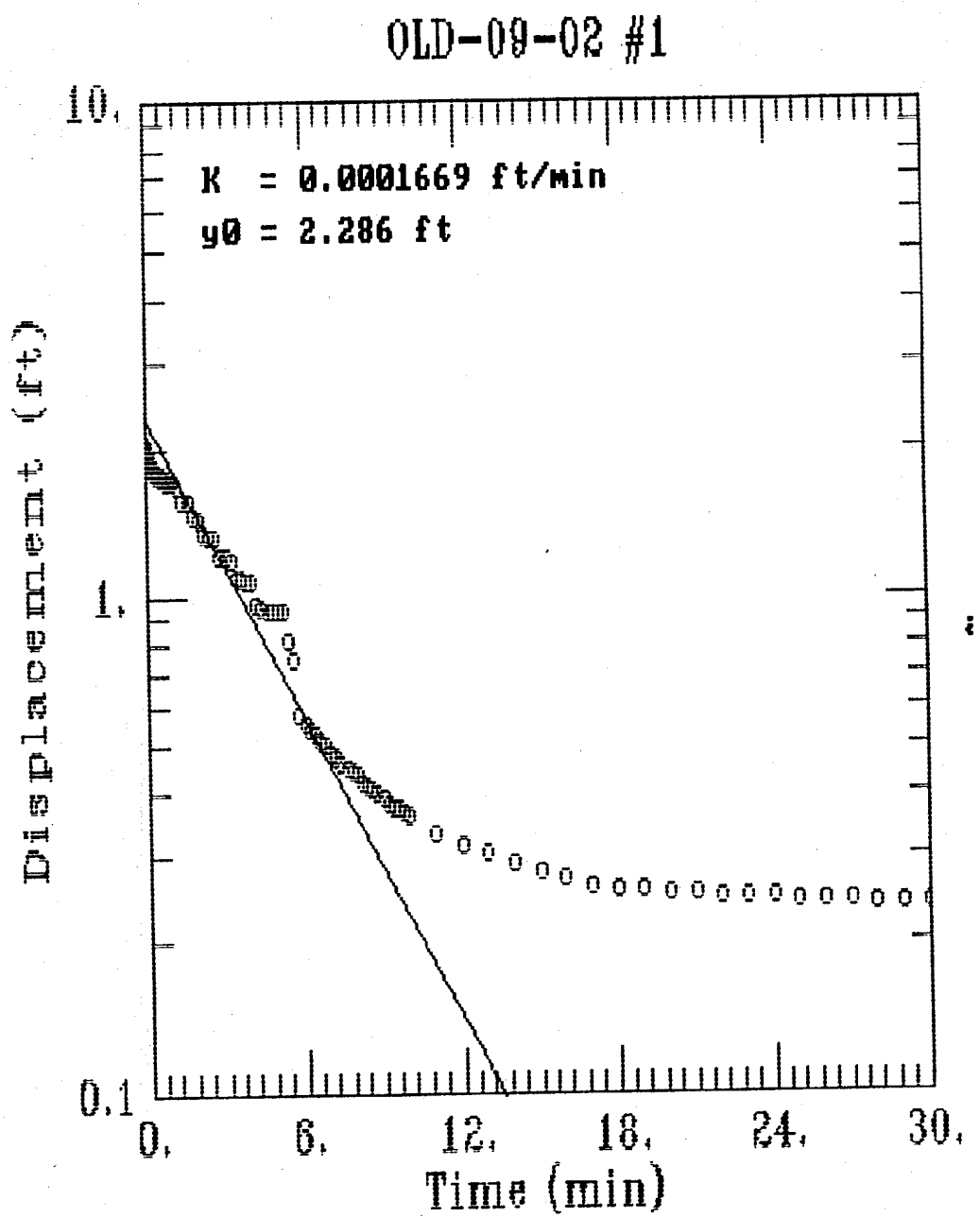
AQUIFER TEST NO. _____

SETUP	DATE	BY WHOM
MONITORING WELL ID	OLD-09-02	
DATE OF TEST	4-17/98	
TYPE OF TEST	Slug out	
HERMIT TYPE/SERIAL#	2000C/	
TEST #	TØ	T1
DATA COLLECTION RATE	Log (1 min)	Log
TRANSDUCER		
SERIAL #	5083	
PSIG		
SCALE FACTOR		
OFFSET		
~~INPUT CHANNEL~~ LIN		
TEST DATA		
INPUT MODE (TOC/SUR)	TOC	TOC
STATIC WATER LEVEL (FT./TOC)	5.03	5.03
WELL DEPTH (FT./TOC)	13.65	13.65
XD DEPTH (FT.TOC)	13	13
INITIAL XD REFERENCE	7.798	7.574
SLUG DEPTH (FT./TOC)	~~7~~ 8	8
TIME OF SLUG PLACEMENT	0838	1005
TIME OF WL EQUILIBRATION	0930	1104
NEW XD REFERENCE	7.791	~~8~~ 7.918
START TIME OF TEST	0931	1105
END TIME OF TEST	1001	1155
NOTES:		

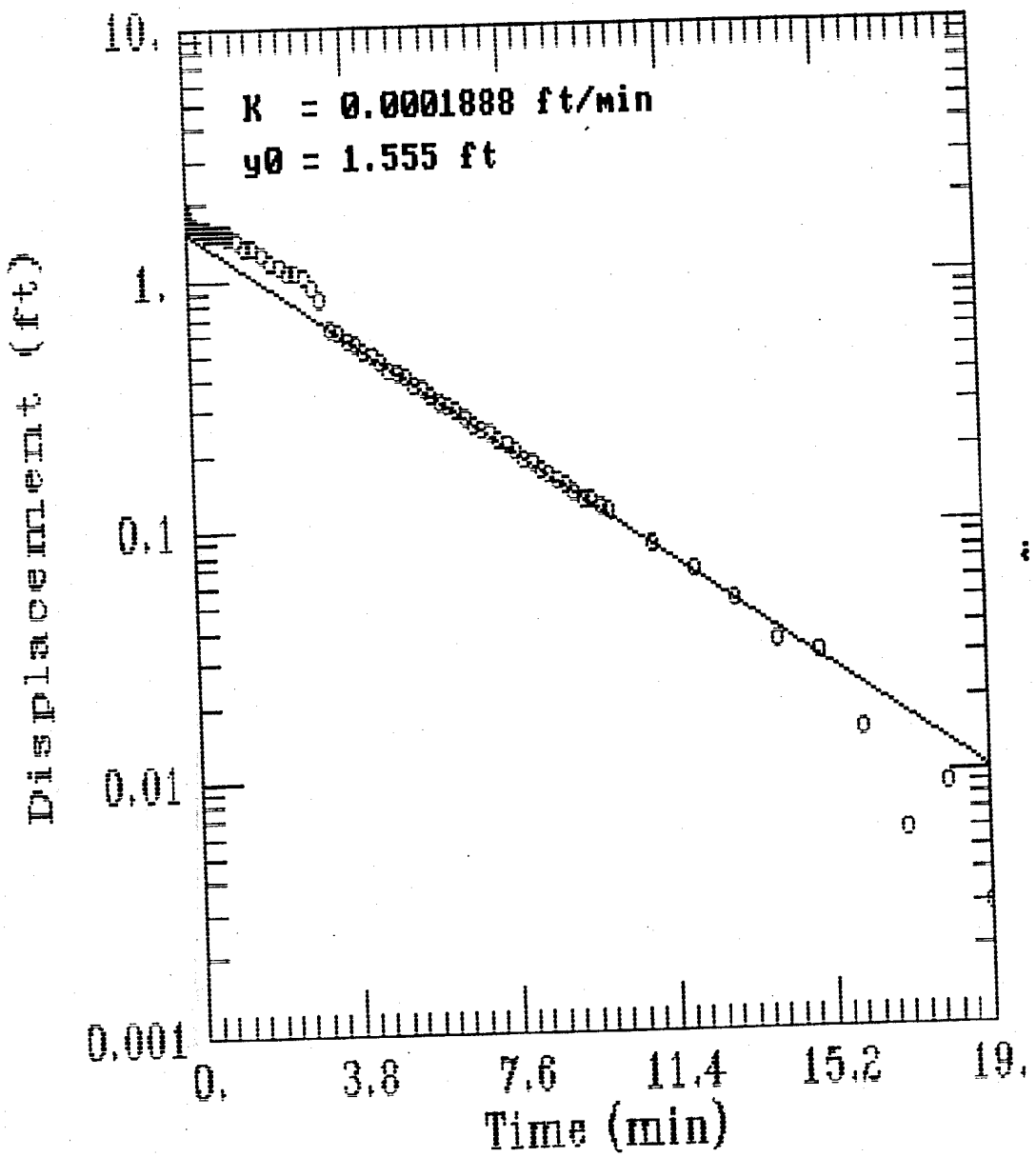
3.622 2.473

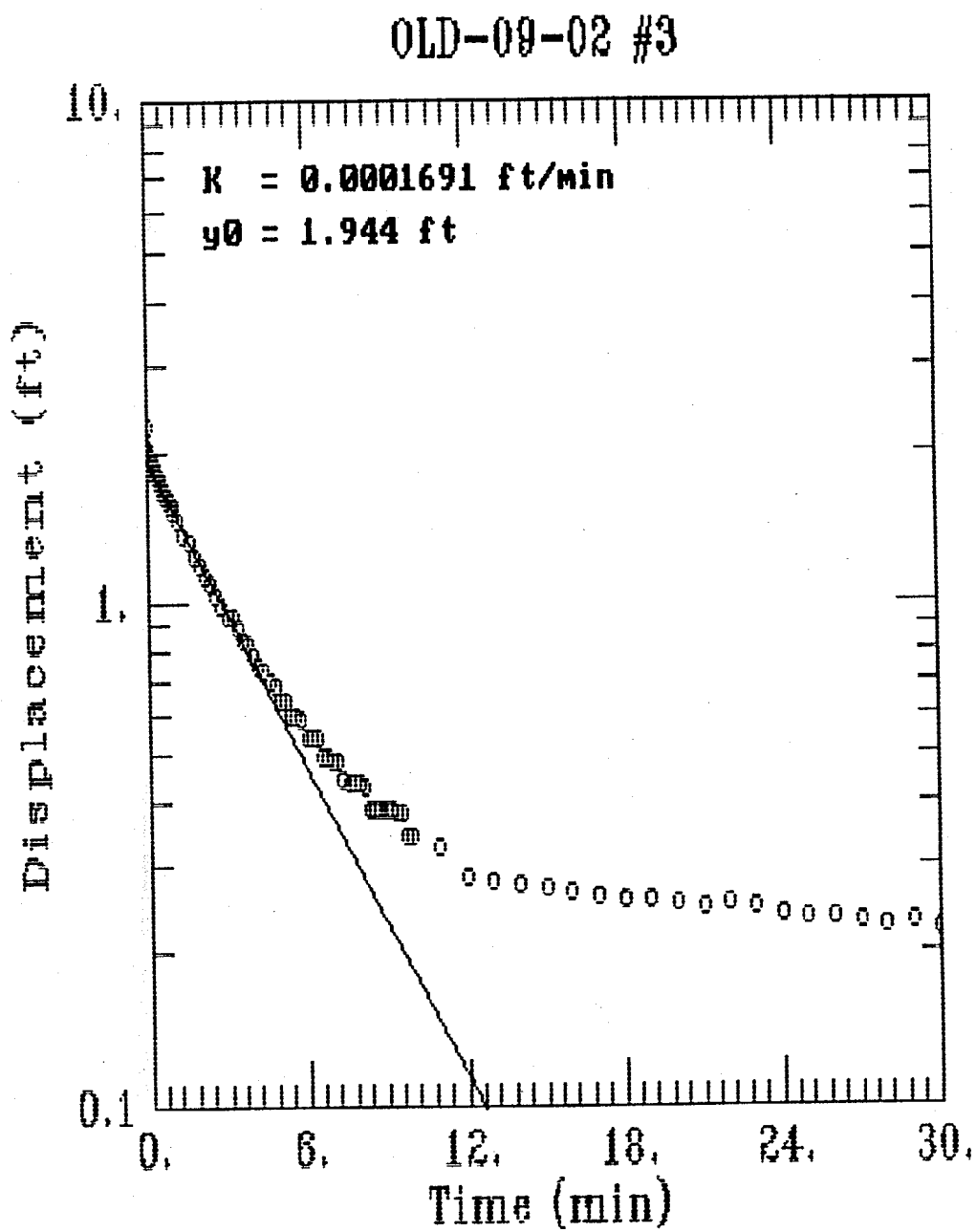
1.587

.22

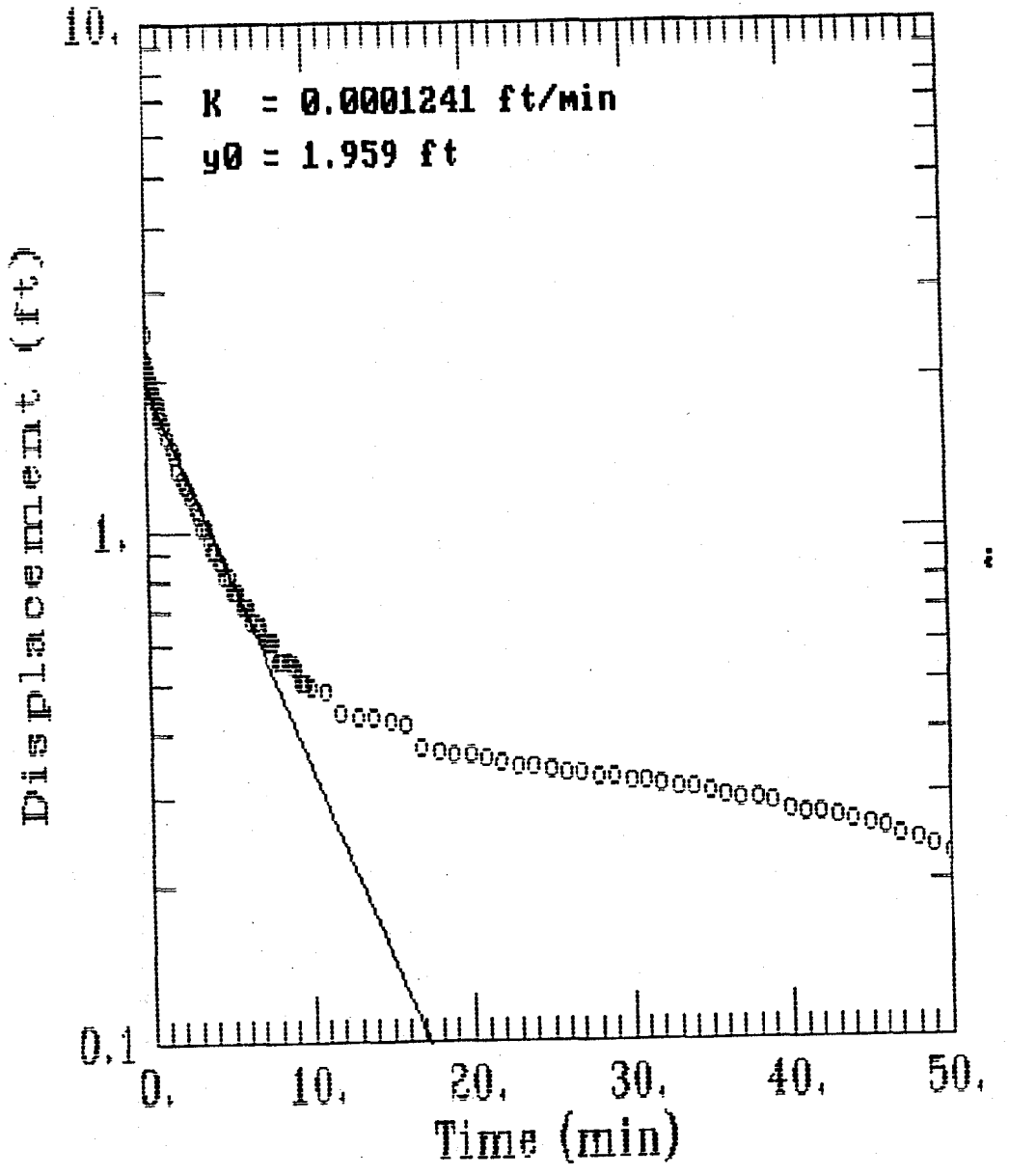

OLD-09-02 #1
K = 0.0001669 ft/min
y0 = 2.286 ft
10.
1.
0.1
0.
6.
12.
18.
24.
30.
Time (min)
Displacement (ft)

OLD-09-02 #2


K = 0.0001888 ft/min
y0 = 1.555 ft
10.
1.
0.1
0.01
0.001
Displacement (ft)
0.
3.8
7.6
11.4
15.2
19.
Time (min)


OLD-09-02 #3
K = 0.0001691 ft/min
y0 = 1.944 ft
10.
1.
0.1
0.
6.
12.
18.
24.
30.
Time (min)
Displacement (ft)

OLD-09-02 #4


K = 0.0001241 ft/min
y0 = 1.959 ft
10.
1.
0.1
0.
10.
20.
30.
40.
50.
Time (min)
Displacement (ft)

AQUIFER TEST COMPLETION CHECKLIST

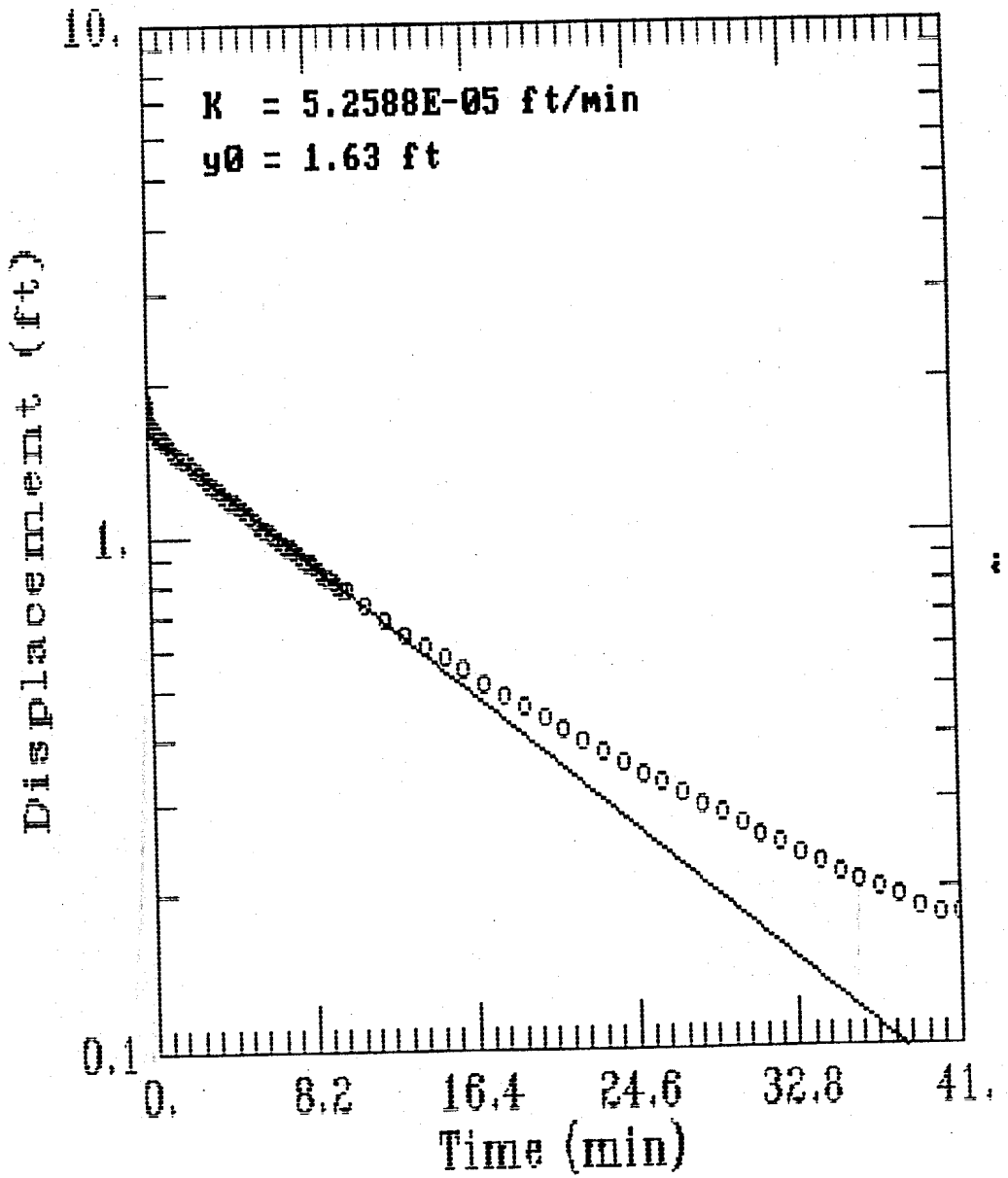
AQUIFER TEST NO. _____

SETUP	DATE	BY WHOM
MONITORING WELL ID	OLD-09-04 (11)	
DATE OF TEST	4-14-98	
TYPE OF TEST	slug	
HERMIT TYPE/SERIAL#	2006C	
TEST #	T Ø	T 1
DATA COLLECTION RATE	Log	Log
TRANSDUCER		
SERIAL #	5083	5083
PSIG	10	10
SCALE FACTOR		
OFFSET		
INPUT CHANNEL		
TEST DATA		
INPUT MODE (TOC/SUR)	toc	toc
STATIC WATER LEVEL (FT./TOC)	4.95	4.95
WELL DEPTH (FT./TOC)	13.56	13.56
XD DEPTH (FT.TOC)	13	13
INITIAL XD REFERENCE	7.212	7.059
SLUG DEPTH (FT./TOC)	7.9	7.9
TIME OF SLUG PLACEMENT	0910	1054
TIME OF WL EQUILIBRATION	1010	1120
NEW XD REFERENCE	7.228	7.374
START TIME OF TEST	1011	1121
END TIME OF TEST	1052	1221
NOTES:	ref. slug(fter) final 0.178	2.126 init 0.238 final

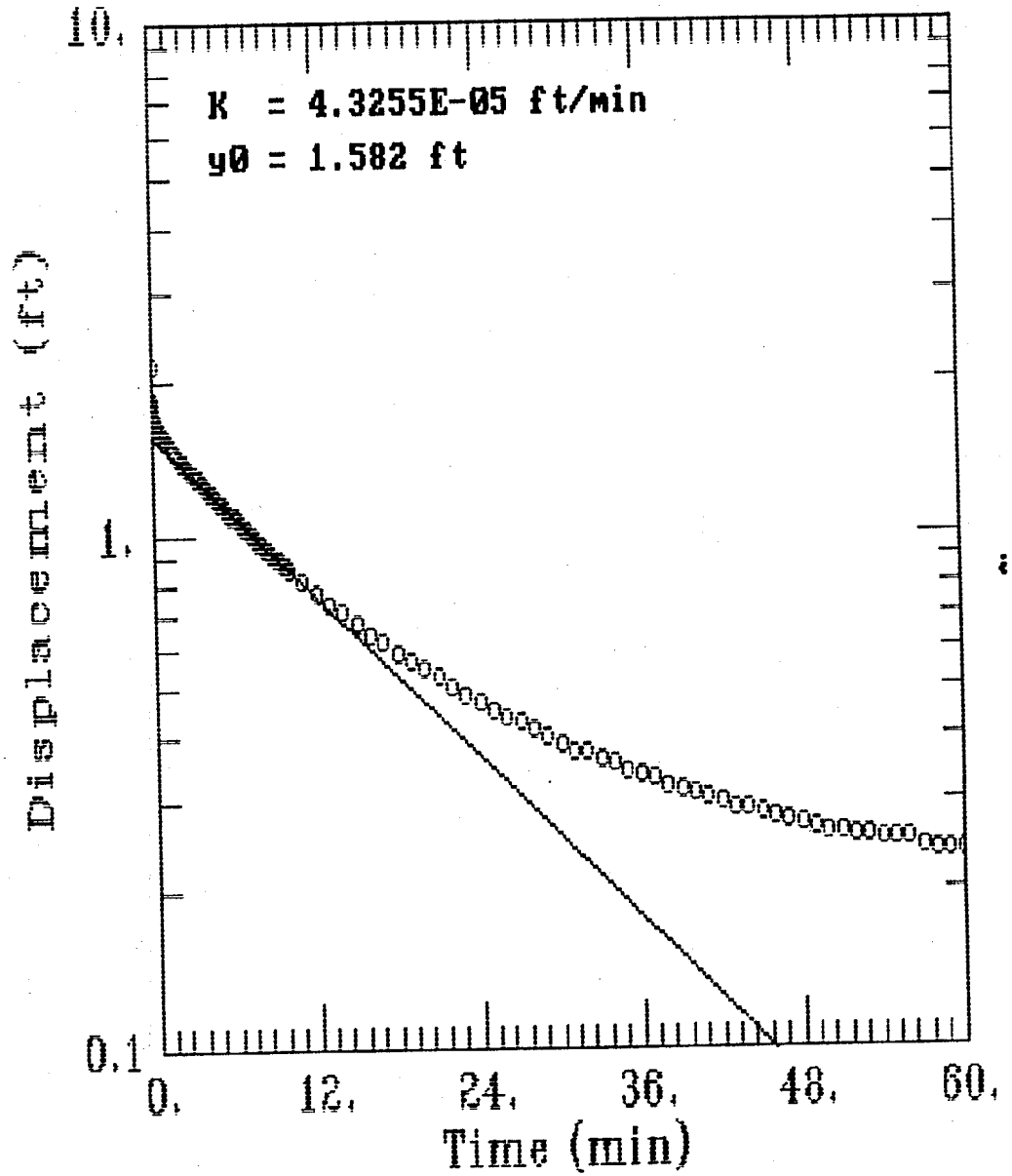
~~2.391~~
3.020
1.377

2.126

OLD-09-04 #1


K = 5.2588E-05 ft/min
y0 = 1.63 ft
10.
1.
0.1
Displacement (ft)
0.
8.2
16.4
24.6
32.8
41.
Time (min)

OLD-09-04 #2


K = 4.3255E-05 ft/min
y0 = 1.582 ft
10.
1.
0.1
0.
12.
24.
36.
48.
60.
Time (min)
Displacement (ft)

APPENDIX C

ANALYTICAL RESULTS

APPENDIX C-1

PRECISION, ACCURACY, REPRESENTATIVENESS, COMPLETENESS, AND COMPARABILITY REPORTS

PARCC CRITERIA EVALUATION REPORT

NTC Orlando, Orlando, Florida
Operable Unit 3

March 1998

Prepared for:

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1536 Kingsley Avenue, Suite 127
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Prepared by:

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Concord, New Hampshire 03301

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PARCC CRITERIA SUMMARY TABLE 75

1.0 Introduction

Environmental Data Services, Inc. (EDS) performed data validation and evaluation of chemical analytical data from environmental samples which consisted of water and soil samples. These samples were collected at the Naval Training Center (NTC) - Operable Unit 3 in Orlando, Florida. The purpose of the data validation was to assess the reliability of the analytical data.

The data validation was performed in accordance with the Naval Facilities Engineering Service Center (NFESC) document Navy Installation Restoration Laboratory Quality Assurance Guide, February 1996. Other guidance documents used are the USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, February 1994, and the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, February 1994. This report summarizes the results of the data quality assessment according to the precision, accuracy, representativeness, completeness and comparability (PARCC) parameters relative to the project specific Data Quality Objectives (DQOs).

The data consisted of NFESC Level C data packages for the organic and inorganic analyses. CompuChem Environmental, Inc. analyzed all of the samples in their North Carolina laboratory.

The data validation was performed to assess data quality. Data quality is dependent on field sampling procedures, analytical methods and instrumentation, and sample matrices. Field sampling procedures and laboratory analysis contain potential sources of uncertainty, error, or bias which can affect the overall quality of the data. Sampling errors can occur from inadequate equipment decontamination, improper sample collection techniques, improper filtering, improper preservation, and homogenization or non-homogenization of samples. Data quality can also be affected by analytical factors such appropriate analytical method, proper equipment maintenance, quality instrumentation and software.

Quality control samples are used to determine the effects of sampling procedures and evaluate laboratory contaminants, laboratory performance, and matrix effects. Quality control samples include trip blanks, equipment rinsate blanks, field source blanks, method blanks, laboratory control samples, surrogate spikes, matrix spike/matrix spike duplicate samples, laboratory duplicates and field duplicates.

Before conducting the PARCC evaluation, the data were validated according to the functional guidelines for organic and inorganic data (USEPA 1994). Samples not meeting functional guideline acceptance criteria were qualified with a data quality flag, as specified below. The qualifiers used for this project are as follows:

Organic Data Qualifiers

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ - The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Inorganic Data Qualifiers

U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J - The associated value is an estimated quantity.

R - The data are unusable. (Note: Analyte may or may not be present.)

UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

Following review and qualification of the data according to the functional guidelines, the data are then evaluated using PARCC criteria. PARCC criteria provide an evaluation of overall data useability. The following section defines the PARCC criteria in general terms, followed by a specific evaluation for each analysis: volatile organic compounds, semivolatile organic compounds, pesticides/PCBs, metals, and chlorinated herbicides.

Precision

Definition: Precision - Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation around the mean.

Precision is defined by the Contract Laboratory Program (CLP) as the relative percent difference of matrix spike recoveries for two matrix spikes of the same sample (matrix spike and matrix spike duplicates recoveries, MS/MSD). Precision was assessed by comparing the results for field sample duplicates and laboratory sample duplicates to provide information on homogeneity of field sampling techniques, improper handling of samples, and on laboratory sample preparation and analysis.

The relative percent difference (RPD) was calculated for the MS and MSD samples, ABB sample and associated field duplicate, and ABB sample and associated laboratory duplicate sample. Precision was quantitatively measured as the difference of the two sample results divided by the mean and multiplied by 100 in order to be reported as a percentage. The RPD was calculated by the reviewer for each of the duplicate samples and compared to the Data Quality Objectives (DQOs) for this project. Poor precision can be caused by sample heterogeneity, improper sample collection or handling, inconsistent sample preparation, and improper instrument use. An RPD above the numerical QC limit indicates imprecision which indicates that the actual concentrations may be higher or lower that the reported result.

Accuracy

Definition: Accuracy - Accuracy is the degree of conformity of a measurement (or an average of measurements of the same parameter), X, with an accepted reference or true value, T, usually expressed as the difference of the two values, X-T, or the difference as a percentage of the reference or true value 100(X-T)/T, and sometimes expressed as a ratio, X/T. Accuracy is a measurement of the bias in a system.

Accuracy is defined by the CLP as a percent recovery for a spiked sample for analyses. MS/MSD samples, surrogate recovery samples, and LCS samples are used to evaluate the data for accuracy. Recoveries outside of acceptable QC limits may be due to matrix interference, instrumentation, analyst error, or poor recovery of some of the target compounds.

Accuracy was quantitatively measured as the concentration of the spiked analyte minus the concentration of the spiked compound in the original sample, divided by the true concentration of the spiked analyte and multiplied by 100 in order to be reported as a percentage.

Accuracy was evaluated based on the results of the matrix spike/matrix spike duplicate, laboratory control sample, and surrogate spike. The reviewer calculated the percent recovery value (%R) for

each spiking compound and compared the results with the DQOs for this project. Spike recoveries outside the acceptable QC limits indicate a source of bias, where the reported results may be either higher or lower than reported.

Representativeness

Definition: Representativeness - Representativeness is the degree to which data accurately and precisely represent the true value of a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition intended to be characterized.

Representativeness is evaluated using the QC blank sample results. QC blank samples are equipment rinsate blanks, field source blanks, trip blanks, laboratory method blanks for organic analyses and laboratory preparation blanks for inorganic analyses. The presence of target compounds in these QC blanks provide an estimate of bias to the samples due to either cross contamination in the field or laboratory.

Field QC results were used to evaluate representativeness. Positive detection of compounds in the field QC samples identify compounds that could have been introduced to the associated field samples during sample collection, transportation to the laboratory, or during analysis. Contamination should not be found in field QC samples.

Qualifications were made to the data based on field blank contamination when the sample results were below ten (10) times the maximum amount detected in the blank for compounds that are common laboratory contaminants and five (5) times the maximum amount detected in the blank for compounds that are not common contaminants. Samples that were qualified as estimated due to blank contamination were flagged by the data reviewer with a "U." Compounds that were qualified due to blank contamination that were reported below the method detection limit were raised to the detection limit and the laboratory qualifier was replaced by the reviewer with a "U."

Qualifications were made to the data based on blank contamination in the following order:

- laboratory method blank contamination;

Followed by the highest concentration of contaminant found in any of the following:

- field blank contamination;
- trip blank contamination;
- equipment blank contamination;

Representativeness was also evaluated based on laboratory QC results. Laboratory method blanks were analyzed for the organic methods and preparation blanks were analyzed for inorganic compounds. Positive detection of compounds in the laboratory QC samples identify compounds that could have been introduced to the associated field samples during sample extraction or

preparation or during analysis. Contamination should not be found in laboratory QC samples. The detection of target compounds in the laboratory QC samples provides an estimate of bias to the associated samples due to cross contamination in the laboratory.

Qualifications were made to the data based on laboratory blank contamination when the sample results were below ten (10) times the maximum amount detected in the blank for compounds that are common laboratory contaminants and five (5) times the maximum amount detected in the blank for compounds that are not common contaminants. Samples that were qualified as estimated due to laboratory blank contamination were flagged by the data reviewer with a "U." Compounds that were qualified due to blank contamination that were reported below the method detection limit were raised to the detection limit and the laboratory qualifier was replaced by the reviewer with a "U."

Comparability

Definition: Comparability - Comparability is the confidence with which one data set can be compared to another. Comparability may be assessed by comparing sampling methodology, analytical methodology, and measurement units of reported data.

The comparability parameter assessment relies almost exclusively on the results of the data validation process. Each data reviewer assessed the comparability parameter by determining whether or not the data was acquired by using standard operating procedures for sampling, standard analytical methods for analysis and by reporting analytical results in standard units.

Comparability also may be assessed by review of the analytical method practical quantitation limits. The DQOs for this project specify that the any compound detected between the detection limit and practical quantitation limit will be reported and qualified as estimated (J).

Completeness

Definition: Completeness - Completeness is a measure of the amount of valid data expressed as a percentage obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

Completeness is evaluated to determine if an acceptable level of data was obtained so that a project can be completed with valid-usable data. Valid usable values are data that are not rejected (R qualifier) by comparison of the analytical procedures with Level C Data Validation Guidelines as specified by NFESC. Completeness is quantitatively measured as the total number of analytes in each sample, equipment rinsate, field and trip blanks and duplicate samples, minus the total number of rejected analytes divided by the total number of analytes. The completeness criterion should be defined to be consistent with the project DQOs.

2.0 Semivolatile Organic Compounds

A total of eight (8) Semivolatile Organic Compound SDGs were analyzed for this project. The SDGs are 0001W, 0025W, 0026S, 0026W, 0027S, 0028S, 0029S, and 0031W.

This section discusses the QC supporting documentation as defined by the PARCC criteria and evaluated based on the project specific DQOs.

2.1 Precision

MS/MSD Samples

The relative percent difference (RPD) between MS/MSD samples and field duplicate samples is used to assess precision.

One MS/MSD sample was analyzed for each SDG except SDG 0026W. The functional guidelines establish RPD QC criteria limits for MS/MSD samples as follows:

MS/MSD CRITERIA

	Water RPD	Soil/Sediment RPD
Phenol	42	35
2-Chlorophenol	40	50
1,4-Dichlorobenzene	28	27
N-Nitroso-di-n-propylamine	38	38
1,2,4-Trichlorobenzene	28	23
4-Chloro-3-methylphenol	42	33
Acenaphthene	31	19
4-Nitrophenol	50	50
2-4-Dinitrotoluene	38	47
Pentachlorophenol	50	47
Pyrene	31	36

MS/MSD RPD results for each SDG were acceptable with the exception of the following.

SDG 0028S

MS/MSD sample 09S02800 exhibited high RPD values for 1,2,4-trichlorobenzene and 1,4-dichlorobenzene of 31 and 35, respectively. Since 1,2,4-trichlorobenzene also exhibited a high %R value, this compound was qualified "UJ" in sample 09S02800.

SDG 0029S

MS/MSD sample 08S02900 exhibited high RPD values for pentachlorophenol and 4-nitrophenol of 56 and 147, respectively. Since these compounds also exhibited high %R values, pentachlorophenol and 4-nitrophenol have been qualified "UJ" in sample 08S02900.

Field Duplicate Samples

SDG 0026W did not have field duplicate samples analyzed. Field duplicate results in SDGs 0025W and 0026S were non-detect. The following tables summarize field duplicate sample results for the remaining SDGs. No qualifications were made based on field duplicate results.

SDG 0001W

Analyte	09G00202 ug/L	09G00202D ug/L	RPD
Phenol	10U	2	NC
2-Methylphenol	10U	1	NC
4-Methylphenol	10U	3	NC
2,4-Dimethylphenol	10U	2	NC

SDG 0027S

Analyte	08S00900 ug/kg	08S00900D ug/kg	RPD
Fluoranthene	78	820U	NC
Pyrene	310	820U	NC
Butylbenzylphthalate	440	820U	NC
Benzo(a)anthracene	78	820U	NC
Chrysene	85	820U	NC
Benzo(b)fluoranthene	160	820U	NC
Benzo(k)fluoranthene	170	820U	NC

SDG 0028S

Analyte	08S03800 ug/kg	08S03800D ug/kg	RPD
Phenanthrene	48	43	11
Fluoranthene	540	610	12
Pyrene	580	500	15
Benzo(a)anthracene	350	360	3
Chrysene	420	380	10
Benzo(b)fluoranthene	580	520	11
Benzo(k)fluoranthene	220	210	5
Benzo(a)pyrene	430	370	15
Indeno(1,2,3-cd)pyrene	270	240	12
Dibenzo(a,h)anthracene	70	59	17

Analyte	08S03800 ug/kg	08S03800D ug/kg	RPD
Benzo(g,h,i)perylene	300	260	14

SDG 0029S

Analyte	08S02800 ug/kg	08S02800D ug/kg	RPD
Fluoranthene	170	200	16
Pyrene	140	150	7
Benzo(a)anthracene	97	120	21
Chrysene	120	130	8
Bis(2-ethylhexyl)phthalate	400U	52	NC
Benzo(b)fluoranthene	180	250	33
Benzo(k)fluoranthene	54	250	129
Benzo(a)pyrene	110	120	9
Indeno(1,2,3-cd)pyrene	61	130	72
Dibenzo(a,h)anthracene	400U	49	NC
Benzo(g,h,i)perylene	47	86	59

SDG 0031W

Analyte	09G01401 ug/L	09G01401D ug/L	RPD
Naphthalene	160	10U	NC
2-Methylnaphthalane	1.0	10U	NC

2.2 Accuracy

The percent recovery results of MS/MSD samples and surrogate spikes are used to assess accuracy. Additionally, initial and continuing calibration results can be used to evaluate accuracy. Relative response factors (RRFs), percent relative standard deviation (%RSD) and percent difference (%D) are the three parameters used to evaluate instrument calibration.

MS/MSD Samples

The functional guidelines establish % Recovery QC criteria limits for MS/MSD samples as follows:

MS/MSD CRITERIA

	Water %R	Soil/Sediment %R
Phenol	12-110	26-90
2-Chlorophenol	27-123	25-102
1,4-Dichlorobenzene	36-97	28-104
N-Nitroso-di-n-propylamine	41-116	41-126

	Water %R	Soil/Sediment %R
1,2,4-Trichlorobenzene	39-98	38-107
4-Chloro-3-methylphenol	23-97	26-103
Acenaphthene	46-118	31-137
4-Nitrophenol	10-80	11-114
2-4-Dinitrotoluene	24-96	28-89
Pentachlorophenol	9-103	17-109
Pyrene	26-127	35-142

One MS/MSD sample was analyzed for each SDG except 0026W. The percent recovery (%R) values for all of the MS/MSD samples were acceptable with the following exceptions.

SDG 0001W

MS/MSD sample 09G00302 exhibited low MS/MSD %R values for n-nitroso-di-n-propylamine of 40%/37%, a low MSD %R value for 1,2,4-trichlorobenzene of 38%, and a low MSD %R value for acenaphthene of 40%. Since these values only slightly exceeded QC criteria and the LCS %R values were acceptable, no qualifications were required.

SDG 0025W

MS/MSD sample 09G00901 exhibited low MS/MSD %R values for 1,4-dichlorobenzene and 1,2,4-trichlorobenzene of 33%/33% and 36%/37%, respectively, a low MS %R value for n-nitroso-di-n-propylamine of 40%, and a low MSD %R value for acenaphthene of 45%. 1,4-Dichlorobenzene has been qualified "UJ" in sample 09G00901. Since the LCS %R values were acceptable for all other compounds, no further qualifications were required.

SDG 0026S

Sample 09S00600 exhibited a low MSD %R value for 1,2,4-trichlorobenzene of 34%. Since the LCS sample exhibited similar results, this compound has been qualified "UJ" in sample 09S00600.

SDG 0028S

MS/MSD sample 09S02800 exhibited low MS %R values for n-nitroso-di-n-propylamine, 1,2,4-trichlorobenzene, and pentachlorophenol of 33%, 30%, and 15%, respectively. n-Nitroso-di-n-propylamine, 1,2,4-trichlorobenzene, and pentachlorophenol have been qualified "UJ" in sample 09S02800 since all results are non-detect.

SDG 0029S

MS/MSD sample 08S02900 exhibited a low MS %R value for pentachlorophenol of 9% and low MSD %R values for pentachlorophenol and 4-nitrophenol of 16% and 7%, respectively. Pentachlorophenol and 4-nitrophenol have been qualified "UJ" in sample 08S02900 since both results are non-detect.

Surrogate Spikes

Six surrogate compounds are used for spiking the semivolatile organic samples. Surrogate spike recoveries for semivolatile organic analyses were compared to the QC acceptance criteria as specified in the functional guidelines. These criteria are summarized as follows:

Surrogate Recovery Limits

	Water %R	Soil %R
NBZ (Nitrobenzene-d5)	35-114	23-120
FBP (2-Fluorobiphenyl)	43-116	30-115
TPH (Terphenyl-d14)	33-141	18-137
PHL (Phenol-d5)	10-110	24-113
2FP (2-Fluorophenol)	21-110	25-121
TBP (2,4,6-Tribromophenol)	10-123	19-122

Surrogate recovery values for all SDGs were acceptable with the exception of the following.

SDG 0001W

Samples 08G00102, 08G00202, and 09G00701RE exhibited low %R values for surrogate S2-2-fluorobiphenyl of 37%, 32%, and 33%, respectively, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Samples 09G01001, 09G00202, 09G00202D, and 09G00302 exhibited low %R values for surrogate S3-terphenyl-d14 of 29%, 18%, 21%, and 26%, respectively, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Samples 09G00102 exhibited low %R values for surrogates S1-nitrobenzene-d5, S2-2-fluorobiphenyl, S3-terphenyl-d14, and advisory surrogate S7-2-chlorophenol-d4 of 29%, 27%, 13%, and 27%, respectively. All base/neutral compounds have been qualified "UJ" since all results are non-detect.

Sample 09G00102RE exhibited a low %R value for surrogate S2-2-fluorobiphenyl of 40%, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Samples 09G00402 and 09G01101 exhibited low %R values for surrogates S2-2-fluorobiphenyl and S3-terphenyl-d14 of 42%/30% and 35%/14%, respectively. All base/neutral compounds have been qualified "UJ" since all results are non-detect.

Sample 09G00701 exhibited low %R values for surrogates S1-nitrobenzene-d5, S2-2-fluorobiphenyl, S3-terphenyl-d14, and advisory surrogate S7-2-chlorophenol-d4 of 31%, 29%, 22%, and 29%, respectively. All base/neutral compounds have been qualified "UJ" since all results are non-detect.

SDG 0025W

Samples 08G00801, 08G00801D, and 08G01201 exhibited low %R values for surrogate S2-2-fluorobiphenyl of 40%, 30%, and 29%, respectively, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Samples 09G00901 and 09G00801RE exhibited a low %R value for surrogate S3-terphenyl-d14 of 32% and 27%, respectively, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Sample 08G00601RE exhibited a high %R value for advisory surrogate S7-2-chlorophenol-d4 of 119%, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Sample 08G00701 exhibited low %R values for surrogates S2-2-fluorobiphenyl and S7-2-chlorophenol-d4 of 30% and 32%, respectively, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Samples 08G00302, 08G00402, and 09G00801 exhibited low %R values for surrogates S2-2-fluorobiphenyl and S3-terphenyl-d14 of 42%/20%, 35%/27%, and 33%/16%, respectively. All base/neutral compounds have been qualified "UJ" since all results are non-detect.

Samples 08G00501 and 08G01001 exhibited low %R values for surrogates S1-nitrobenzene-d5, S2-2-fluorobiphenyl, and S3-terphenyl-d14 of 34%/27%/25% and 34%/25%/27%, respectively. All base/neutral compounds have been qualified "UJ" since all results are non-detect.

Samples 08G00601 and 08G00501D exhibited low %R values for surrogates S1-nitrobenzene-d5, S2-2-fluorobiphenyl, S3-terphenyl-d14, and advisory surrogate S7-2-chlorophenol-d4 of 31%/25%/14%/32% and 31%/24%/9%/31%, respectively. All base/neutral compounds have

been qualified "UJ" since all results are non-detect.

Sample 08G00901 exhibited low %R values at or below 10% for 7 out of 8 surrogates and sample 08G01101 exhibited low %R values below 10% for 7 out of 8 surrogates. All results for these two samples have been rejected "R."

All original analysis results should be used for reporting purposes (due to less qualifications) for all samples except 08G00901 and 08G01101 since the original results for these two samples have been rejected due to surrogate problems. The reanalysis for these two samples should be used for reporting purposes.

SDG 0026S

Sample 09S00500 exhibited low %R values for surrogate compounds S2-2-fluorobiphenyl, S5-2-fluorophenol, and S8-1,2-dichlorobenzene-d4 (advisory) of 28%, 24%, and 19%, respectively. All base neutral compounds have been qualified "J" for positive results and "UJ" for non-detects.

Sample 09S02200 exhibited a low %R value for S8-1,2-dichlorobenzene-d4 (advisory) of 18%, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

SDG 0028S

Sample 08S04900 exhibited a low %R value for surrogate compound S5-2-fluorophenol of 24%, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

SDG 0029S

Samples 09S02400 and 09S02600 exhibited low %R values (all $>10\%$) for all eight surrogate compounds. All results for these two samples have been qualified "J" for positive results and "UJ" for non-detects.

Sample 09S02500 exhibited low %R values (S6-2,4,6-tribromophenol $<10\%$) for all eight surrogate compounds. All results for this sample have been qualified "J" for positive results, "UJ" for non-detect base/neutral results, and "R" for non-detect acid results.

Sample 09S02400RE exhibited low %R values for surrogate compounds S2-2-fluorobiphenyl and S5-2-fluorophenol of 26% and 22%, respectively, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Samples 09S02500RE and 09S02600RE exhibited acceptable %R values, however, all

reanalyzed sample results have already been qualified "J/UJ" due to holding time problems. Therefore, results from original samples 09S02400 and 09S02600 should be used for reporting purposes and results from reanalyzed sample 09S02500RE should be used for reporting purposes since the original sample 09S02500 has rejected acid compounds.

SDG 0031W

Sample 08G01301 exhibited a low %R value for surrogate S2-2-fluorobiphenyl of 40%, however, the guidelines allow for one surrogate per fraction to exceed QC limits and no qualifications were required.

Initial and Continuing Calibration

Initial and continuing calibration results can be used to evaluate accuracy within an SDG. Relative response factors (RRFs), percent relative standard deviation (%RSD) and percent difference (%D) are the three parameters used to evaluate instrument calibration. The RRF is a measure of relative response of an analyte compared to its internal standard. The %RSD is an expression of the linearity of instrument response and the %D is a comparison of the continuing calibration instrument response with its initial calibration response. The RRF is the most critical of the three parameters.

All SDGs were qualified due to initial and/or continuing calibration problems and are summarized below.

SDG 0001W

The initial calibration analyzed on 10/11/97 exhibited acceptable %RSD and mean RRF values. No qualifications were required.

The initial calibration analyzed on 10/25/97 exhibited acceptable %RSD and mean RRF values. No qualifications were required.

The continuing calibration analyzed on 11/6/97 exhibited high %D values for several compounds, however, the associated samples 09G00701RE and 09G00102RE have already been qualified for holding times and no further qualifications were required.

The continuing calibration analyzed on 11/7/97 exhibited high %D values for several compounds, however, the associated sample 09G01101RE has already been qualified for holding times and no further qualifications were required.

The continuing calibration analyzed on 11/1/97 (0904) exhibited high %D values for 2,2'-oxybis(1-chloropropane), 1,2,4-trichlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, and pentachlorophenol of 31.5%, 28.8%, 40.5%, 30.2%, and

25.4%, respectively. All of the above compounds have been qualified "UJ" in associated samples 09G00102, 09G00202, 09G00202D, 09G00302, 09G00402, 09G00501, 09G00701, 09G01001, 09G01101, 09G01201, and 09G01301 since all results are non-detect.

The continuing calibration analyzed on 11/1/97 (2105) exhibited high %D values for 2,2'-oxybis(1-chloropropane), 1,2,4-trichlorobenzene, hexachlorobutadiene, 3-nitroaniline, 2,4-dinitrophenol, 4-nitroaniline, pentachlorophenol, and 3,3-'dichlorobenzidine of 33.6%, 26.9%, 40.5%, 40.4%, 37.7%, 28.8%, 32.8%, and 32.7%, respectively. All of the above compounds have been qualified "UJ" in associated samples 08G00102, 08G00202, 09G00601, 09G01201DL, U3R00001, and U3Y00001 since all results are non-detect.

SDG 0025W

The initial calibration analyzed on 10/11/97 exhibited acceptable %RSD and mean RRF values. No qualifications were required.

The initial calibration analyzed on 10/25/97 exhibited acceptable %RSD and mean RRF values. No qualifications were required.

The continuing calibration analyzed on 11/1/97 exhibited high %D values for 2,2'-oxybis(1-chloropropane), 1,2,4-trichlorobenzene, hexachlorobutadiene, 3-nitroaniline, 2,4-dinitrophenol, 4-nitroaniline, pentachlorophenol, and 3,3'-dichlorobenzidine of 33.6%, 26.9%, 40.5%, 40.4%, 37.7%, 28.8%, 32.8%, and 32.7%, respectively. All of the above compounds have been qualified "UJ" in associated samples 08G00302, 08G00801, and 09G00901 since all results are non-detect.

The continuing calibration analyzed on 11/2/97 exhibited high %D values for 2,2'-oxybis(1-chloropropane), hexachlorobutadiene, 3-nitroaniline, 2,4-dinitrophenol, 4-chlorophenyl-phenylether, 4-nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol, and 3,3'-dichlorobenzidine of 34.5%, 40.0%, 50.5%, 33.5%, 27.6%, 34.4%, 25.1%, 36.5%, and 45.3%, respectively. All of the above compounds have been qualified "UJ" in associated samples 08G00402, 08G00501, 08G00501D, 08G00601, 08G00801D, 08G00901, 08G01001, 08G01101, 08G01201, and 09G00801 since all results are non-detect.

The continuing calibration analyzed on 11/3/97 exhibited high %D values for hexachlorobutadiene, hexachlorocyclopentadiene, 2,4-dinitrophenol, pentachlorophenol, di-n-butylphthalate, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene of 25.1%, 50.6%, 41.5%, 38.1%, 33.1%, 31.7%, and 28.8%, respectively. All of the above compounds have been qualified "UJ" in associated sample 08G00701 since all results are non-detect.

The continuing calibration analyzed on 11/5/97 exhibited high %D values for several compounds, however, the associated samples 08G01101RE, 08G00501DRE, and 09G00801RE have already been qualified due to holding time exceedences and no further

qualifications were required.

The continuing calibration analyzed on 11/6/97 exhibited high %D values for several compounds, however, the associated samples 08G01001RE, 08G00501RE, 08G00601RE, and 08G00901RE have already been qualified due to holding time exceedences and no further qualifications were required.

The continuing calibration analyzed on 11/7/97 exhibited high %D values for several compounds, however, the associated sample 08G00402RE has already been qualified due to holding time exceedences and no further qualifications were required.

SDG 0026S

The initial calibration analyzed on 11/28/97 exhibited high %RSD values for 2,4-dinitrophenol and 3,3'-dichlorobenzidine of 41.0% and 36.6%, respectively, however, all associated results are non-detect and no qualifications were required.

The continuing calibration analyzed on 11/30/97 exhibited high %D values for hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitrophenol, 4,6-dinitro-2-methylphenol, carbazole, and di-n-butylphthalate of 49.5%, 54.7%, 46.2%, 40.0%, 27.3%, and 34.0%, respectively. The above compounds have been qualified "UJ" in associated samples 09S00500D, 09S00700, 09S00800, 09S00900, 09S01000, 09S01100, 09S01400, and 09S01500 since all results are non-detect.

The continuing calibration analyzed on 12/1/97 (0853) exhibited high %D values for hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitrophenol, and 4,6-dinitro-2-methylphenol of 37.4%, 54.7%, 45.5%, and 36.0%, respectively. The above compounds have been qualified "UJ" in associated samples 09S00500, 09S00600, 09S01200, 09S01300, 09S01600, 09S01700, 09S01800, and 09S01800D since all results are non-detect.

The continuing calibration analyzed on 12/1/97 (2150) exhibited high %D values for hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitrophenol, 4,6-dinitro-2-methylphenol, and di-n-butylphthalate of 45.0%, 51.2%, 46.9%, 27.2%, and 36.0%, respectively. The above compounds have been qualified "UJ" in associated samples 09S01900, 09S02000, 09S02100, and 09S02200 since all results are non-detect.

SDG 0026W

The initial calibration analyzed on 12/2/97 exhibited acceptable %RSD and mean RRF values. No qualifications were required.

The continuing calibration analyzed on 12/2/97 exhibited acceptable %D and RRF values. No qualifications were required.

The continuing calibration analyzed on 12/3/97 exhibited high %D values for n-nitrosodiphenylamine, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, and di-n-octylphthalate of 25.2%, 37.7%, 32.0%, 46.8%, and 36.1%, respectively. All of the above compounds have been qualified "UJ" in associated sample U3R00401 since all results are non-detect.

The continuing calibration analyzed on 12/4/97 exhibited high %D values for 2,2'-oxybis(1-chloropropane), hexachlorobutadiene, and di-n-octylphthalate of 61.2%, 45.6% and 26.9%, respectively, however, the associated samples U3R00101RE and U3R00301RE have already been qualified due to holding time exceedences and no further qualifications were required.

The continuing calibration analyzed on 12/6/97 exhibited high %D values for hexachlorocyclopentadiene, 2,4-dinitrophenol, and 3,3'-dichlorobenzidine of 42.4%, 41.5%, and 50.2%, respectively, however, the associated sample U3R00201RE has already been qualified due to holding time exceedences and no further qualifications were required.

SDG 0027S

The initial calibration analyzed on 11/26/97 exhibited a high %RSD value for 2,4-dinitrophenol of 43.5%, however, all associated results are non-detect and no qualifications were required.

The initial calibration analyzed on 12/2/97 exhibited high %RSD values for 2,4-dinitrophenol, pentachlorophenol, and carbazole of 30.8%, 31.0%, and 32.6%, respectively, however, all associated results are non-detect and no qualifications were required.

The initial calibration analyzed on 12/4/97 exhibited high %RSD values for 2,4-dinitrophenol and pentachlorophenol of 31.0% and 30.4%, respectively, however, all associated results are non-detect and no qualifications were required.

The continuing calibration analyzed on 12/1/97 exhibited high %D values for 4-chloroaniline, 3-nitroaniline, 4-nitroaniline, n-nitrosodiphenylamine, and dibenzo(a,h)anthracene of 33.2%, 37.1%, 55.0%, 26.0%, and 27.1%, respectively. The above compounds have been qualified "UJ" in associated samples 08S01000 and 08S00900D since all results are non-detect.

The continuing calibration analyzed on 12/2/97 exhibited a high %D value for carbazole of 27.2%. Carbazole has been qualified "UJ" in associated samples 08S01100, 08S01200, 08S01300, 08S01400, 08S01500, 08S01600, 08S01700, 08S01800, 08S01900, 08S02000, 08S02100, 08S02200, 08S02300, 08S02500, and 08S03100 since all results are non-detect.

The continuing calibration analyzed on 12/3/97 exhibited high %D values for hexachlorobutadiene, 3-nitroaniline, and carbazole of 25.2%, 41.4%, and 55.6%,

respectively. The above compounds have been qualified "UJ" in associated sample 08S00900 since all results are non-detect.

The continuing calibration analyzed on 12/4/97 exhibited acceptable %D and RRF values. No qualifications were required.

SDG 0028S

The initial calibration analyzed on 11/26/97 exhibited high %RSD values for 4-chloroaniline, 3-nitroaniline, and carbazole of 40.8%, 54.6%, and 35.1%, respectively, however, all associated results are non-detect and no qualifications were required.

The initial calibration analyzed on 11/28/97 exhibited high %RSD values for 2,4-dinitrophenol and 3,3'-dichlorobenzidine of 41.0% and 36.6%, respectively, however, all associated results are non-detect and no qualifications were required.

The initial calibration analyzed on 12/4/97 exhibited high %RSD values for 2,4-dinitrophenol and pentachlorophenol of 31.0% and 30.4%, respectively, however, all associated results are non-detect and no qualifications were required.

The continuing calibration analyzed on 12/1/97 (1242) exhibited high %D values for phenol, 4-chloroaniline, 3-nitroaniline, 2,4-dinitrophenol, and pentachlorophenol of 31.1%, 68.1%, 200.9%, 32.0%, and 35.9%, respectively. The above compounds have been qualified "UJ" in associated samples 08S05000 and 08S05100 since all results are non-detect.

The continuing calibration analyzed on 12/1/97 (2150) exhibited high %D values for hexachlorocyclopentadiene, 2,4-dinitrophenol, 4-nitrophenol, 4,6-dinitro-2-methylphenol, and di-n-butylphthalate of 45.0%, 51.2%, 46.9%, 27.2%, and 36.0%, respectively. The above compounds have been qualified "UJ" in associated samples 08S03400, 08S03500, 08S03600, 08S03700, 08S03800, 08S04000, 08S04100, and 09S02800 since all results are non-detect.

The continuing calibration analyzed on 12/2/97 exhibited high %D values for 3-nitroaniline, 4-nitrophenol, pentachlorophenol, di-n-butylphthalate, and 3,3'-dichlorobenzidine of 38.9%, 33.6%, 29.3%, 30.4%, and 36.7%, respectively. The above compounds have been qualified "UJ" in associated samples 08S03800D, 08S03900, 08S04200, 08S04300, 08S04400, 08S04500, 08S04600, and 08S04700 since all results are non-detect.

The continuing calibration analyzed on 12/4/97 exhibited acceptable %D and RRF values. No qualifications were required.

SDG 0029S

The initial calibration analyzed on 11/26/97 exhibited high %RSD values for 4-chloroaniline,

3-nitroaniline, and carbazole of 40.8%, 54.6%, and 35.1%, respectively, however, all associated results are non-detect and no qualifications were required.

The initial calibration analyzed on 12/2/97 exhibited acceptable %RSD and mean RRF values. No qualifications were required.

The initial calibration analyzed on 12/4/97 exhibited high %RSD values for 2,4-dinitrophenol and pentachlorophenol of 31.0% and 30.4%, respectively, however, all associated results are non-detect and no qualifications were required.

The initial calibration analyzed on 12/5/97 exhibited high %RSD values for 2,4-dinitrophenol and pentachlorophenol of 39.7% and 30.2%, respectively, however, all associated results are non-detect and no qualifications were required.

The initial calibration analyzed on 12/11/97 exhibited high %RSD values for 2,4-dinitrophenol and 3,3'-dichlorobenzidine of 30.3% and 30.5%, respectively, however, all associated results are non-detect and no qualifications were required.

The continuing calibration analyzed on 12/2/97 (1112) exhibited high %D values for bis(2-chloroethyl)ether, 1,2,4-trichlorobenzene, 4-chloroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitroaniline, pentachlorophenol, and carbazole of 27.7%, 29.0%, 46.2%, 70.8%, 29.7%, 31.3%, 38.1%, and 37.8%, respectively. The above compounds have been qualified "UJ" in associated samples 08S05100D, 08S05200, and 09S02300 since all results are non-detect.

The continuing calibration analyzed on 12/2/97 (1604) exhibited acceptable %D and RRF values. No qualifications were required.

The continuing calibration analyzed on 12/4/97 exhibited acceptable %D and RRF values. No qualifications were required.

The continuing calibration analyzed on 12/5/97 exhibited acceptable %D and RRF values. No qualifications were required.

The continuing calibration analyzed on 12/11/97 exhibited a high %D value for carbazole of 25.9%, however, this compound has already been qualified in all associated samples due to holding times and no further qualifications were required.

SDG 0031W

The initial calibration analyzed on 12/18/97 exhibited a high %RSD value for carbazole of 33.4%, however, all associated results are non-detect and no qualifications were required.

The continuing calibration analyzed on 12/22/97 (0052) exhibited a high %D value for 4-

chloroaniline of 35.2%. 4-Chloroaniline has been qualified "UJ" in associated samples 08G01301, 08G01501, 09G01401, 09G01401D, 09G01501, and 09G01601 since all results are non-detect.

2.3 Representativeness

Method blanks, equipment rinsate blanks, and field source blanks are used to evaluate representativeness. A summary of the contaminants found in these blanks can be found below. Several compounds were detected in the various blanks. The laboratory method blank was applied first to the samples, followed by the highest concentration of the equipment rinsate blank and field source blank.

Qualifications were made to the data based on blank contamination when the sample results were below ten (10) times the maximum amount detected in the blank for compounds that are common laboratory contaminants and five (5) times the maximum amount detected in the blank for compounds that are not common contaminants. Samples that were qualified as undetected due to blank contamination were flagged by the data reviewer with a "U." Compounds that were qualified due to blank contamination that were reported below the method detection limit were raised to the detection limit and the laboratory qualifier was replaced by the reviewer with a "U." If a sample result exceeded 5X or 10X the amount in the blank, the result was not amended.

The following summarizes the method blanks, equipment rinsate blanks, and field source blanks.

Method Blanks

Method blanks were analyzed with each SDG for semivolatile organic compounds to identify contaminants that may have been introduced through analytical instrumentation or sample preparation. All method blanks were free of contamination with the exception of the following.

SDG 0026W

Method blank SBLKMZ (11/17/97) exhibited phenol and 2-chlorophenol contamination at 8 ug/L and 1 ug/L, respectively, however, all associated results are non-detect and no qualifications were required.

Method blank SBLKOD (11/20/97) exhibited bis(2-ethylhexyl)phthalate contamination at 1 ug/L, however, all associated results are non-detect and no qualifications were required.

Method blank SBLKQZ (12/3/97) was free of contamination. No qualifications were required.

SDG 0028S

Method blank SBLKNF (11/17/97) was free of contamination. No qualifications were required.

Method blank SBLKNE (11/17/97) exhibited bis(2-ethylhexyl)phthalate contamination at 320 ug/kg. Bis(2-ethylhexyl)phthalate has been qualified "U" in associated samples 08S03400, 08S03500, 08S03600, 08S03800D, 08S04000, 08S04100, 08S04300, and 08S04600.

SDG 0029S

Method blanks SBLKNF (11/17/97) and SBLKOK (11/20/97) were free of contamination. No qualifications were required.

Method blank SBLKRO (12/05/97) exhibited bis(2-ethylhexyl)phthalate and diethylphthalate contamination at 40 ug/kg and 150 ug/kg, respectively, however, both compounds are non-detect in all associated samples and no qualifications were required.

SDG 0031W

Method blank SBLKSA (12/8/97) exhibited bis(2-ethylhexyl)phthalate contamination at 6 ug/L. Bis(2-ethylhexyl)phthalate has been qualified "U" in associated samples 08G01501, 09G01401, 09G01401D, and 09G01501.

Equipment/Rinsate Blanks

Equipment rinsate blanks are used to evaluate contaminants that may have been introduced through the sampling equipment or laboratory handling of samples. All equipment/rinsate blanks were free of contamination.

Field Source Blanks

Field source blanks are used to evaluate contaminants that may have been introduced through site conditions. Field source blanks are typically prepared in the field (on-site) as opposed to a trip blank which is typically prepared at the laboratory and shipped with the cooler. All field source blanks were free of contamination.

2.4 Comparability

The laboratory used standard analytical methods for all of the analyses. The method detection limits were below the contract required quantitation limits, therefore, the comparability was considered acceptable.

2.5 Completeness

There were 141 rejections of data for semivolatiles analyses. The percent of valid data is 98.3%.

3.0 Pesticide/PCB Compounds

A total of eight (8) Pesticide/PCB SDGs were analyzed for this project. The SDGs are 0001W, 0025W, 0026S, 0026W, 0027S, 0028S, 0029S, and 0031W.

This section discusses the QC supporting documentation as defined by the PARCC criteria and evaluated based on the project specific DQOs.

3.1 Precision

The relative percent difference (RPD) between MS/MSD samples and field duplicate samples is used to assess precision.

MS/MSD Samples

One MS/MSD sample was analyzed for each SDG except 0026W. The functional guidelines establish RPD QC criteria limits for MS/MSD samples as follows:

	MS/MSD Criteria	
	Water	Soil
	RPD	RPD
gamma-BHC (Lindane)	15	50
Heptachlor	20	31
Aldrin	22	43
Dieldrin	18	38
Endrin	21	45
4,4'-DDT	27	50

MS/MSD RPD results for each SDG were acceptable with the exception of the following.

SDG 0001W

MS/MSD sample 09G00302 exhibited high RPD values for aldrin, gamma-BHC, heptachlor, dieldrin, endrin, and 4,4'-DDT of 63, 33, 34, 24, 28, and 33, respectively, however, since the LCS %R values for these compounds were acceptable, no qualifications were required.

SDG 0025W

MS/MSD sample 09G00901 exhibited a high RPD value for gamma-BHC of 16, however, since the LCS %R values for these compounds were acceptable, no qualifications were required.

SDG 0026S

MS/MSD sample 09S00600 exhibited high RPD values for heptachlor, dieldrin, and 4,4'-DDT of 37, 42, and 81, respectively, however, all %R values were acceptable and the LCS sample was acceptable, therefore, no qualifications were required.

SDG 0027S

MS/MSD sample 08S01000 exhibited a high RPD value for 4,4'-DDT of 125. All positive results for this sample are already qualified due to surrogate recovery problems and no further qualifications were required.

SDG 0028S

MS/MSD sample 09S02800 exhibited a high RPD value for 4,4'-DDT of 87. 4,4-DDT has been qualified "J" and gamma-BHC has been qualified "UJ" in sample 09S02800.

SDG 0029S

MS/MSD sample 08S02900 exhibited a low MS %R value for endrin of 27% and a high RPD value for endrin of 83. Endrin has been qualified "UJ" in sample 08S02900.

SDG 0031W

MS/MSD sample 08G01501 exhibited high RPD values for aldrin and heptachlor of 30 and 60, respectively, however, all results for this sample have already been qualified due to surrogate problems and no further qualifications were required.

Field Duplicate Samples

Field duplicate samples were analyzed for each SDG except 0026W. Field duplicate sample results for SDGs 0001W, 0025W, and 0031W were non-detect. Field duplicate sample results for the remaining SDGs are summarized in the following. No qualifications were made based on field duplicate results.

SDG 0026S

Analyte	09S00500 ug/kg	09S00500D ug/kg	RPD
gamma-BHC	230U	32	NC
4,4'-DDE	710	1000	34
4,4'-DDD	15000	20000	29
4,4'-DDT	3600	12000	108
alpha-Chlordane	3900	5300	30
gamma-Chlordane	4200	6000	35

Analyte	09S01800 ug/kg	09S01800D ug/kg	RPD
gamma-BHC	1.8U	0.10	NC
Dieldrin	0.57	0.54	5
4,4'-DDE	0.79	3.5U	NC
Endrin	0.61	0.081	153
4,4'-DDD	0.51	1.2	81
4,4'-DDT	5.4	3.5U	NC
alpha-Chlordane	1.8U	0.13	NC

SDG 0027S

Analyte	08S00900 ug/kg	08S00900D ug/kg	RPD
delta-BHC	2.1	1.6	27
Heptachlor Epoxide	0.60	1.1	59
Dieldrin	1.5	12	156
4,4'-DDE	7.4	9.4	24
Endrin	0.74	1.0	30
4,4'-DDD	1.4	13	161
Endosulfan Sulfate	11	8.1	30
4,4'-DDT	12	13	8
Endrin Ketone	3.4	3.5	3
Endrin Aldehyde	1.5	5.9	120
Aldrin	4.1U	0.56	NC
gamma-Chlordane	0.32	9.7	187
alpha-Chlordane	4.1U	6.8	NC

SDG 0028S

Analyte	08S03800 ug/kg	08S03800D ug/kg	RPD
4,4'-DDE	0.53	4.2U	NC
Endosulfan Sulfate	0.87	0.77	12
4,4'-DDT	4.2	2.5	51
alpha-Chlordane	1.0	0.79	23
gamma-Chlordane	2.1U	0.68	NC

SDG 0029S

Analyte	08S02800 ug/kg	08S02800D ug/kg	RPD
Delta-BHC	0.42	0.39	7
Heptachlor Epoxide	0.14	0.12	15
4,4'-DDE	7.1	6.0	17
Endosulfan Sulfate	1.5	1.5	0
4,4'-DDT	8.1	8.2	1
alpha-Chlordane	4.1	4.1	0
gamma-Chlordane	3.2	3.1	3

Analyte	08S05100 ug/kg	08S05100D ug/kg	RPD
Dieldrin	4.2U	0.69	NC
4,4'-DDT	0.42	0.31	30
alpha-Chlordane	11	10	10
gamma-Chlordane	11	11	0

3.2 Accuracy

The percent recovery results of MS/MSD samples and surrogate spikes are used to assess accuracy. Additionally, initial and continuing calibration results can be used to evaluate accuracy. Relative response factors (RRFs), percent relative standard deviation (%RSD) and percent difference (%D) are the three parameters used to evaluate instrument calibration.

MS/MSD Samples

The functional guidelines establish % Recovery QC criteria limits for MS/MSD samples as follows:

MS/MSD Criteria

	Water %R	Soil/Sediment %R
gamma-BHC (Lindane)	56-123	46-127
Heptachlor	40-131	35-130
Aldrin	40-120	34-132
Dieldrin	52-126	31-134
Endrin	56-121	42-139
4,4'-DDT	38-127	23-134

MS/MSD %R results for each SDG were acceptable with the exception of the following.

SDG 0001W

MS/MSD sample 09G00302 exhibited low MS/MSD %R values for aldrin of 25%/13% and a low MSD %R value for gamma-BHC of 41%. Since the LCS %R values for these compounds were acceptable, no qualifications were required.

SDG 0025W

MS/MSD sample 09G00901 exhibited a low MSD %R value for dieldrin of 47%, however, since the LCS %R values for these compounds were acceptable, no qualifications were required.

SDG 0026S

MS/MSD sample 09S00600 exhibited high RPD values for heptachlor, dieldrin, and 4,4'-DDT of 37, 42, and 81, respectively, however, all %R values were acceptable and the LCS sample was acceptable, therefore, no qualifications were required.

SDG 0027S

MS/MSD sample 08S01000 exhibited a high MS %R value for 4,4'-DDT of 435%. All positive results for this sample are already qualified due to surrogate recovery problems and no further qualifications were required.

SDG 0028S

MS/MSD sample 09S02800 exhibited a low MS %R value for 4,4'-DDT of 11% and a low MSD %R value for gamma-BHC. 4,4-DDT has been qualified "J" and gamma-BHC has been qualified "UJ" in sample 09S02800.

SDG 0029S

MS/MSD sample 08S02900 exhibited a low MS %R value for endrin of 27%. Endrin has been qualified "UJ" in sample 08S02900.

SDG 0031W

MS/MSD sample 08G01501 exhibited low MS %R values for aldrin and heptachlor of 20% and 28%, respectively, and a low MSD %R value for aldrin of 27%, however, all results for this sample have already been qualified due to surrogate problems and no further qualifications were required.

Surrogate Spikes

Two surrogate compounds, TCX and DCB, are used for spiking the pesticide/PCB samples. Surrogate spike recoveries for pesticide/PCB analyses were compared to the QC acceptance criteria specified for each SDG. All surrogate recovery results were within QC advisory limits for TCX and DCB with the exception of the following.

SDG 0001W

Sample 08G00102 exhibited a high %R value for TCX1 of 154% and sample 08G00202 exhibited a high %R value for DCB1 of 153%. All positive results for these samples have been qualified "J."

SDG 0025W

Sample 08G00801D exhibited a low %R value for TCX1 of 25%. All results for this sample have been qualified "UJ" since all results are non-detect.

SDG 0026S

Sample 09S01000 exhibited a high %R value for surrogate compound DCB1 of 151%. All positive results for this sample have been qualified "J."

Due to the level of dilution performed, the surrogate recoveries for several samples could not be calculated accurately and were reported with a "D" flag for "diluted out." No action was taken on this basis.

SDG 0027S

Sample 08S01000 exhibited low %R values for surrogate compounds TCX1, TCX2, DCB1, and DCB2 of 17%, 18%, 17%, and 18%, respectively. All results for this sample have been qualified "J" for positive results and "UJ" for non-detects.

Samples 08S03100 and 08S03100DL were analyzed at a dilution and the surrogate %R values were reported with a "D" flag for "diluted out." No action was taken on this basis.

SDG 0028S

Sample 08S04000 exhibited a high %R value for surrogate compound DCB1 of 153%. All positive results for this sample have been qualified "J."

SDG 0031W

Sample 08G01301 exhibited a high %R value for surrogate compound TCX1 of 190%. All positive results for this sample have been qualified "J."

Sample 08G01501 exhibited a low %R value for surrogate compound TCX2 of 5%. All positive results for this sample have been qualified "J" and all non-detect results have been rejected "R."

Initial and Continuing Calibration

Initial and continuing calibration results can be used to evaluate accuracy within an SDG. Relative response factors (RRFs), percent relative standard deviation (%RSD) and percent difference (%D) are the three parameters used to evaluate instrument calibration. The RRF is a measure of relative

response of an analyte compared to its internal standard. The %RSD is an expression of the linearity of instrument response and the %D is a comparison of the continuing calibration instrument response with its initial calibration response. The RRF is the most critical of the three parameters.

The initial and continuing calibrations analyzed were acceptable except the following.

SDG 0026S

The initial calibration analyzed on 11/12/97 exhibited acceptable %RSD values of less than 20%. No qualifications were required.

The initial calibration analyzed on 11/19/97 exhibited high %RSD values for dieldrin of 20.7% on the primary column and methoxychlor of 20.4% on the secondary column. Dieldrin has been qualified "J" in associated samples 09S01200, 09S01300, 09S01400DL, 09S01500, 09S01600, 09S01700, 09S01800, and 09S01800D. Methoxychlor is non-detect or already qualified in all associated samples and no qualifications were required.

SDG 0029S

The initial calibration analyzed on 11/12/97 exhibited acceptable %RSD values of less than 20%. No qualifications were required.

The initial calibration analyzed on 12/5/97 exhibited a high %RSD for methoxychlor of 20.1% on the secondary column, however, all associated results are non-detect and no qualifications were required.

3.3 Representativeness

Method blanks, equipment rinsate blanks, and field source blanks were used to evaluate representativeness for the pesticide/PCB analyses. A summary of the contaminants found in these blanks can be found below. The blanks were used to assess the sample data.

The following summarizes the method blanks, equipment rinsate blanks, and field source blanks.

Method Blanks

Method blanks were analyzed with each SDG for pesticide/PCB compounds to identify contaminants that may have been introduced through analytical instrumentation or sample preparation. Method blanks were non-detect or are summarized below.

SDG 0001W

Method blank PBLKHX (10/23/97) was free of contamination. No qualifications were required.

Method blank PBLKHZ (10/24/97) exhibited delta-BHC, heptachlor, and endrin ketone contamination at 0.012 ug/L, 0.012 ug/L, and 0.0068 ug/L, respectively, however, all associated results are non-detect and no qualifications were required.

Method blank PBLKJE (10/29/97) exhibited delta-BHC and aldrin contamination at 0.011 ug/L and 0.0047 ug/L, respectively. Delta-BHC has been qualified "U" in associated samples U3R00001 and U3Y00001. All other associated results are non-detect and no further qualifications were required.

Method blank PBLKLE (11/7/97) exhibited delta-BHC, heptachlor, 4,4'-DDT, methoxychlor, and alpha-chlordane contamination at 0.027 ug/L, 0.00098 ug/L, 0.0062 ug/L, 0.0078 ug/L, and 0.0034 ug/L, respectively. Delta-BHC has been qualified "U" in associated sample 09G00202. Methoxychlor has been qualified "U" in associated sample 09G00202. All other associated results are non-detect and no further qualifications were required.

SDG 0025W

Method blank PBLKHZ (10/24/97) exhibited delta-BHC, heptachlor, and endrin ketone contamination at 0.012 ug/L, 0.012 ug/L, and 0.0068 ug/L, respectively, however, all associated results are non-detect and no qualifications were required.

Method blank PBLKIU (10/28/97) was free of contamination. No qualifications were required.

SDG 0026S

Method blank PBLKMO (11/14/97) was free of contamination. No qualifications were required.

Method blank PBLKML (11/14/97) exhibited delta-BHC, endosulfan sulfate, and methoxychlor contamination at 0.075 ug/kg, 0.20 ug/kg, and 1.8 ug/kg, respectively. Delta-BHC has been qualified "U" in associated samples 09S00700, 09S01000, and 09S01100. Endosulfan sulfate has been qualified "U" in associated sample 09S00600. Methoxychlor has been qualified "U" in associated samples 09S00600, 09S01000, 09S01200, 09S01400DL, and 09S01700.

SDG 0026W

Method blank PBLKNA (11/17/97) was free of contamination. No qualifications were required.

Method blank PBLKOE (11/20/97) exhibited methoxychlor contamination at 0.076 ug/L, however, all associated results are non-detect and no qualifications were required.

SDG 0027S

Method blank PBLKMQ (11/14/97) exhibited delta-BHC, heptachlor, 4,4'-DDE, methoxychlor, endrin ketone, alpha-chlordane, and gamma-chlordane contamination at 0.21 ug/kg, 0.17 ug/kg, 0.22 ug/kg, 1.3 ug/kg, 0.45 ug/kg, 1.2 ug/kg, and 0.52 ug/kg, respectively. Delta-BHC has been qualified "U" in associated samples 08S01100, 08S01200, 08S01300, 08S01400, 08S01900, 08S02000, and 08S02500.

Heptachlor has been qualified "U" in associated sample 08S01600.

4,4'-DDE has been qualified "U" in associated samples 08S01300, 08S01400, 08S01600DL, 08S01900, and 08S02000.

Endrin ketone has been qualified "U" in associated sample 08S01100.

Alpha-Chlordane has been qualified "U" in associated samples 08S01300 and 08S01400.

Methoxychlor and gamma-chlordane are non-detect in all associated samples and no further qualifications were required.

Method blank PBLKQM (11/14/97) exhibited dieldrin, 4,4'-DDT, and alpha-chlordane contamination at 0.16 ug/kg, 0.18 ug/kg, and 0.25 ug/kg, respectively. Dieldrin has been qualified "U" in associated samples 08S01000 and 08S02300.

Alpha-Chlordane has been qualified "U" in associated samples 08S01800 and 08S02100.

4,4-DDT is non-detect or greater than 5X the blank concentration in all associated samples and no further qualifications were required.

Method blank PBLKNM (11/19/97) exhibited delta-BHC and methoxychlor contamination at 0.30 ug/kg and 1.0 ug/kg, respectively, however, all associated results are non-detect and no qualifications were required.

SDG 0028S

Method blank PBLKLN (11/18/97) exhibited methoxychlor contamination at 6.1 ug/kg. Methoxychlor has been qualified "U" in associated samples 08S04300 and 08S04600DL. All other associated results are non-detect and no further qualifications were required.

Method blank PBLKNL (11/18/97) exhibited 4,4'-DDT and methoxychlor contamination at 0.35 ug/kg and 3.9 ug/kg, respectively. Methoxychlor has been qualified "U" in associated sample 09S02800. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Method blank PBLKNM (11/19/97) exhibited delta-BHC and methoxychlor contamination at 0.30 ug/kg and 1.0 ug/kg, respectively. Delta-BHC has been qualified "U" in associated samples 08S04900 and 08S05100. All other associated results are non-detect and no further qualifications were required.

SDG 0029S

Method blank PBLKNM (11/19/97) exhibited delta-BHC and methoxychlor contamination at 0.30 ug/kg and 1.0 ug/kg, respectively. Delta-BHC has been qualified "U" in associated samples 08S05100D, 08S05200, 09S02400, 09S02400DL, 09S02600, and 09S02700. Methoxychlor has been qualified "U" in associated samples 08S05200, 09S02300, 09S02300DL, 09S02400, and 09S02500. All other associated results are non-detect and no further qualifications were required.

Method blank PBLKMO (11/20/97) exhibited methoxychlor contamination at 2.1 ug/kg. Methoxychlor has been qualified "U" in associated samples 08S02400 and 08S03000. All other associated results are non-detect and no further qualifications were required.

Equipment/Rinsate Blanks

Equipment rinsate blanks are used to evaluate contaminants that may have been introduced through the sampling equipment or laboratory handling of samples. Equipment/rinsate blanks were non-detect or are summarized below.

SDG 0001W

Rinsate blank U3R00001 exhibited 4,4'-DDD and endrin ketone contamination at 0.0024 ug/L and 0.0059 ug/L, respectively. 4,4'-DDD has been qualified "U" in associated sample 09G01201DL. Endrin ketone has been qualified "U" in associated sample 09G00202. All other associated results are non-detect and no further qualifications were required.

SDG 0025W

Rinsate blank U3R00001 exhibited 4,4'-DDD and endrin ketone contamination at 0.0024 ug/L and 0.0059 ug/L, respectively, however, all associated results are non-detect and no qualifications were required.

SDG 0026S

Rinsate blank U3R00001 (in SDG 0001W) exhibited 4,4'-DDD and endrin ketone contamination at 0.0024 ug/L and 0.0059 ug/L, respectively. 4,4'-DDD has been qualified "U" in associated samples 09S01200, 09S01600, and 09S01800. Endrin ketone has been qualified "U" in associated sample 09S00900. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Rinsate blank U3R00101 (in SDG 0026W) exhibited methoxychlor contamination at 0.020 ug/L. Sample 09S02200 has been qualified "U." All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

SDG 0026W

Rinsate blank U3R00101 exhibited methoxychlor contamination at 0.020 ug/L. This is a field QC sample and the results were applied to the associated samples in other data packages.

Rinsate blank U3R00201 was free of contamination. No qualifications were required.

Rinsate blank U3R00301 was free of contamination. No qualifications were required.

Rinsate blank U3R00401 was free of contamination. No qualifications were required.

SDG 0027S

Rinsate blank U3R00001 (in SDG 0001W) exhibited 4,4'-DDD and endrin ketone contamination at 0.0024 ug/L and 0.0059 ug/L, respectively. 4,4'-DDD has been qualified "U" in associated samples 08S01900 and 08S02000. All other associated results are non-detect, greater than 5X the blank concentration or already qualified and no further qualifications were required.

Rinsate blank U3R00201 (in SDG 0026W) was free of contamination. No qualifications were required.

SDG 0028S

Rinsate blank U3R00001 (in SDG 0001W) exhibited 4,4'-DDD and endrin ketone contamination at 0.0024 ug/L and 0.0059 ug/L, respectively. Endrin ketone has been qualified "U" in associated samples 08S03800D, 08S04000, and 08S04800. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Rinsate blank U3R00301 (in SDG 0026W) was free of contamination. No qualifications were required.

SDG 0029S

Rinsate blank U3R00001 (in SDG 0001W) exhibited 4,4'-DDD and endrin ketone contamination at 0.0024 ug/L and 0.0059 ug/L, respectively. Endrin ketone has been qualified "U" in associated samples 08S02900 and 08S03000. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Rinsate blank U3R00401 (in SDG 0026W) was free of contamination. No qualifications were required.

SDG 0031W

Rinsate blank U3R00001 (in SDG 0001W) exhibited 4,4'-DDD and endrin ketone contamination at 0.0024 ug/L and 0.0059 ug/L, respectively, however, all associated results are non-detect and no qualifications were required.

Field Source Blanks

Field source blanks are used to evaluate contaminants that may have been introduced through site conditions. Field source blanks are typically prepared in the field (on-site) as opposed to a trip blank which is typically prepared at the laboratory and shipped with the cooler. Field source blanks were non-detect or are summarized below.

SDG 0001W

Source blank U3Y00001 exhibited heptachlor contamination at 0.0092 ug/L. Heptachlor has been qualified "U" in associated samples 09G00402 and 09G00601. All other associated results are non-detect and no further qualifications were required.

SDG 0025W

Source blank U3Y00001 exhibited heptachlor contamination at 0.0092 ug/L, however, all associated results are non-detect and no qualifications were required.

SDG 0026S

Source blank U3Y00001 (in SDG 0001W) exhibited heptachlor contamination at 0.0092 ug/L. Heptachlor has been qualified "U" in associated samples 09S00900, 09S01300, and 09S01700. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

SDG 0027S

Source blank U3Y00001 (in SDG 0001W) exhibited heptachlor contamination at 0.0092 ug/L. Heptachlor has been qualified "U" in associated samples 08S00900D, 08S01100, 08S01500, and 08S02100. All other associated results are non-detect, greater than 5X the blank concentration or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0028S

Source blank U3Y00001 (in SDG 0001W) exhibited heptachlor contamination at 0.0092 ug/L, however, all associated results are non-detect and no qualifications were required.

SDG 0029S

Source blank U3Y00001 (in SDG 0001W) exhibited heptachlor contamination at 0.0092 ug/L. Heptachlor has been qualified "U" in associated sample 08S02900. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

SDG 0031W

Source blank U3Y00001 (in SDG 0001W) exhibited heptachlor contamination at 0.0092 ug/L, however, all associated results are non-detect and no qualifications were required.

3.4 Comparability

The laboratory used standard analytical methods for all of the analyses. The method detection limits were below the contract required quantitation limits, therefore, the comparability was considered acceptable.

3.5 Completeness

There were 27 rejections of data for the pesticides/PCBs analyses. The percent of valid data is 99.3%.

4.0 Metals

A total of eight (8) Metals SDGs were analyzed for this project. The SDGs are 0001W, 0025W, 0026S, 0026W, 0027S, 0028S, 0029S, and 0031W.

This section discusses the QC supporting documentation as defined by the PARCC criteria and evaluated based on the project specific DQOs.

4.1 Precision

Metals analysis is different from organic analyses in that no matrix spike duplicate sample is evaluated. A laboratory duplicate sample is analyzed instead. For duplicate analyte concentrations greater than 5X the CRDL, the relative percent difference (RPD) between the two reported results must be less than 20% for aqueous samples (35% for soil samples).

For duplicate analyte concentrations less than 5X the CRDL, the difference between the two reported results must be less than the CRDL value for aqueous samples, or less than 2X the CRDL value for soil samples. RPDs for samples with values less than the CRDL are not calculated.

The relative percent difference (RPD) between field duplicate samples is also used to assess precision.

Matrix Duplicates

The following summarizes matrix duplicate qualification.

SDG 0001W

Matrix duplicate sample 09F00601D exhibited a high RPD value for zinc of 78.6, however, all zinc results have already been qualified due to blank contamination, ICP serial dilution, or matrix spike problems and no further qualifications were required.

SDG 0026S

Matrix duplicate sample 09S00600D exhibited high RPD values for aluminum, barium, calcium, chromium, iron, lead, magnesium, manganese, and zinc of 72.9, 65.9, 59.7, 21.4, 37.9, 40.6, 69.2, 96.6, and 66.6, respectively. All positive results of the above compounds have been qualified "J" in all samples.

SDG 0027S

Matrix duplicate sample 08S01000D exhibited high RPD values for arsenic, iron, manganese, mercury, and silver of 14.5, 137.5, 41.4, 18.9, and 42.8, respectively. All positive results of the above compounds have been qualified "J" in all samples.

SDG 0028S

Matrix duplicate sample 09S02800D exhibited high RPD values for chromium and zinc of 2.9 and 38.6, respectively. All positive results of the above compounds have been qualified "J" in all samples.

SDG 0029S

Matrix duplicate sample 08S02900D exhibited high RPD values for calcium, mercury, and silver of 37.6, 16.8, and 45.3, respectively. All positive results for the above compounds have been qualified "J" in all samples.

SDG 0031W

Matrix duplicate sample 08G01501D exhibited a high RPD value for zinc of 55.5, however, all zinc results have already been qualified "U" due to blank contamination and no further qualifications were required.

Field Duplicates

Field duplicate sample RPD results are summarized below. No qualifications were made based on field duplicate results.

SDG 0001W

Analyte	09G00202 ug/L	09G00202D ug/L	RPD
Aluminum	731	781	7
Barium	1.8	2.4	29
Calcium	5830	6350	9
Chromium	1.3	1.1	17
Silver	1.1	0.80U	NC
Vanadium	0.73	0.73	0

SDG 0025W

Analyte	08G00501 ug/L	08G00501D ug/L	RPD
Arsenic	57.7	57.3	1
Barium	11.8	11.3	4

Analyte	08G00501 ug/L	08G00501D ug/L	RPD
Calcium	33200	33100	0
Chromium	1.8	2.3	24
Copper	1.2	0.96	22
Manganese	160	162	1
Potassium	11200	11200	0

Analyte	08G00801 ug/L	08G00801D ug/L	RPD
Arsenic	122	120	2
Barium	26.6	26.1	2
Calcium	131000	134000	2
Copper	1.5	1.4	7
Manganese	6.3	6.4	2
Potassium	8670	8900	3

SDG 0026S

Analyte	09S00500 mg/kg	09S00500D mg/kg	RPD
Aluminum	877	964	9
Arsenic	4.8	4.4	9
Barium	6.2	6.8	9
Chromium	2.0	3.4	52
Copper	8.7	10.9	22
Iron	242	282	15
Lead	18.7	24.6	27
Manganese	9.6	10.6	10
Mercury	0.09	0.09	0
Zinc	89.1	40.1U	NC

Analyte	09S01800 mg/kg	09S01800D mg/kg	RPD
Aluminum	33.4	48.5	37
Beryllium	0.02U	0.46	NC
Iron	25.6U	61.5	NC
Lead	0.91	1.5	49
Mercury	0.05	0.05	0
Silver	0.16U	0.32	NC

SDG 0027S

Analyte	08S00900 mg/kg	08S00900D mg/kg	RPD
Aluminum	5800	6060	4
Antimony	4.2	4.6	9
Arsenic	30.5	30.7	1
Barium	54.3	53.7	1
Cadmium	0.87	0.87	0
Calcium	38100	38000	0

Analyte	08S00900 mg/kg	08S00900D mg/kg	RPD
Chromium	11.4	11.0	4
Cobalt	0.76	0.36	71
Copper	25.5	24.6	4
Iron	6440	4740	30
Lead	337	353	5
Manganese	146	130	12
Mercury	0.47	0.48	2
Nickel	8.1	8.1	0
Selenium	4.2	3.2	27
Silver	4.0	3.8	5
Vanadium	6.7	6.4	5
Zinc	764	808	6

SDG 0028S

Analyte	08S03800 mg/kg	08S03800D mg/kg	RPD
Aluminum	710	596	17
Barium	6.1	6.0	2
Calcium	42700	38800	10
Chromium	4.3	4.6	7
Copper	4.3U	6.5	NC
Iron	372	340	9
Lead	18.6	18.0	3
Manganese	25.8	24.7	4
Vanadium	2.0	1.8	11

SDG 0029S

Analyte	08S02800 mg/kg	08S02800D mg/kg	RPD
Aluminum	1100	974	12
Antimony	4.8	4.8	0
Arsenic	13.4	12.8	5
Barium	11.7	10.7	9
Cadmium	0.77	0.96	22
Calcium	25200	23400	7
Chromium	7.0	8.7	22
Copper	9.1	9.5	4
Iron	1520	4760	103
Lead	344	379	10
Manganese	31.3	37.2	17
Nickel	2.1	2.3	9
Silver	0.52	0.64	21
Vanadium	2.6	2.4	8
Zinc	710	833	16

Analyte	08S05100 mg/kg	08S05100D mg/kg	RPD
Aluminum	475	476	0
Arsenic	3.4	2.4	34
Barium	6.2	5.1	19
Calcium	172000	114000	41
Chromium	6.8	5.7	18
Copper	6.4	6.8	6
Iron	440	418	5
Lead	6.2	10.8	54
Manganese	49.0	43.7	11
Vanadium	3.6	3.4	6

SDG 0031W

Analyte	09G01401 ug/L	09G01401D ug/L	RPD
Aluminum	315	294	7
Barium	47.2	38.0	22
Calcium	105000	80800	26
Cobalt	1.7	2.1	21
Copper	4.5	5.6	22
Iron	430	451	5
Magnesium	9780	7410	28
Manganese	159	145	9
Nickel	9.9	9.4	5
Vanadium	1.6	1.6	0

4.2 Accuracy

Matrix Spike Analysis

The matrix spike recovery QC limits are 75-125%. It should be noted that spike recovery limits do not apply when the sample concentration exceeds the spike concentration by a factor of four or more. Matrix spike analytical results exhibited acceptable % recoveries with the exception of the following.

SDG 0001W

Matrix spike sample 09F00601S exhibited a low %R value for zinc of 73.7%. All zinc results have been qualified "J" for positive results and "UJ" for non-detects.

SDG 0026S

Matrix spike sample 09S00600S exhibited low %R values for manganese and mercury of 16.2% and 67.2%, respectively. All manganese results have been qualified "J" for positive

results and "R" for non-detects. All mercury results have been qualified "J" for positive results and "UJ" for non-detects.

SDG 0028S

Matrix spike sample 09S02800S exhibited a low %R value for mercury of 46.0%. All mercury results have been qualified "J" for positive results and "UJ" for non-detects.

SDG 0029S

Matrix spike sample 08S02900S exhibited a high %R value for lead of 161.0%. All positive lead results have been qualified "J."

Initial and Continuing Calibration Results

All ICV and CCV %R values were within the QC limits for each SDG. The %R values do not suggest any systematic analytical problem with either accuracy or precision.

5.3 Representativeness

Preparation blanks, equipment rinsate blanks, and field source blanks were analyzed for metals to evaluate representativeness. Blank results are summarized below.

The preparation blanks are used first to evaluate data quality, followed by the highest value of the equipment rinsate blanks or the field source blanks.

Sample results were qualified due to blanks that had target analytes where the absolute value of the reported results was greater than or equal to the corresponding IDL value; sample results were less than 5X the absolute value of the blank result. Samples that were qualified as undetected due to blank contamination were flagged by the data reviewer with a "U."

Preparation and Calibration Blanks

Preparation blanks were analyzed for each SDG to identify target analytes that may have been introduced through the analytical instrumentation or sample preparation. Preparation and/or calibration blank contamination that resulted in qualification is summarized below.

SDG 0001W

Water preparation blank PBW (11/6/97) exhibited contamination for several compounds, however, all sample results were non-detect, greater than 5X the blank concentration, or already qualified due to blank contamination with the exception of barium, manganese,

potassium, and zinc. Barium has been qualified "U" in associated samples U3R00001 and U3Y00001. Manganese has been qualified "U" in associated samples 09G00202, 09G00202D, 09G00302, U3R00001, and U3Y00001. Potassium has been qualified "U" in associated sample 09G01301. Zinc has been qualified "U" in associated samples 08G00202, 09F00701, 09G00102, 09G00202, 09G00501, 09G01101, and 09G01301.

Initial and continuing calibration blanks exhibited contamination for several compounds, however, all sample results were non-detect or greater than 5X the blank concentration with the exception of beryllium and copper. Beryllium has been qualified "U" in associated samples 09F00601, 09F00701, 09G00202, 09G00701, and 09G01301. Copper has been qualified "U" in associated samples 08F00901, 08G00102, 08G00202, 09F00701, 09G00102, 09G00202, 09G00202D, 09G00302, 09G00501, 09G00601, 09G00701, 09G01001, 09G01101, 09G01301, U3R00001, and U3Y00001.

SDG 0025W

Water preparation blank PBW (11/10/97) exhibited contamination for several compounds, however, all sample results were non-detect, greater than 5X the blank concentration, or already qualified due to blank contamination with the exception of barium, iron, and mercury. Barium has been qualified "U" in associated samples 08G00402, 08G00901, 08G01101, and 09G00901.

Iron has been qualified "U" in associated samples 08G00402, 08G00501, 08G00501D, 08G00801, 08G00801D, and 08G01101. Mercury has been qualified "U" in all samples.

Initial and continuing calibration blanks exhibited contamination for several compounds, however, all sample results were non-detect or greater than 5X the blank concentration with the exception of aluminum and beryllium. Aluminum has been qualified "U" in associated samples 08G00501D and 08G01101. Beryllium has been qualified "U" in all samples.

SDG 0026S

Soil preparation blank PBS (11/19/97) exhibited contamination for several compounds, however, all sample results were non-detect, greater than 5X the blank concentration, or already qualified due to blank contamination with the exception of chromium and sodium. Chromium has been qualified "U" in associated samples 09S00800, 09S01000, 09S01200, 09S01300, 09S01500, 09S01600, 09S01800, 09S01800D, 09S01900, 09S02000, and 09S02100. Sodium has been qualified "U" in all samples.

Initial and continuing calibration blanks exhibited contamination for several compounds, however, all sample results were non-detect or greater than 5X the blank concentration with the exception of beryllium, cadmium, magnesium, and potassium. Beryllium has been qualified "U" in associated samples except 09S00600, 09S00900, 09S01800, 09S01800D, and

09S01900. Cadmium has been qualified "U" in associated samples 09S01700 and 09S01800D. Magnesium has been qualified "U" in associated sample 09S01000. Potassium has been qualified "U" in associated samples 09S01200, 09S01300, 09S01400, 09S01600, 09S01700, 09S01800, 09S01800D, 09S01900, and 09S02000.

SDG 0026W

Water preparation blank PBW (11/25/97) exhibited contamination for several compounds, however, all sample results were non-detect, greater than 5X the blank concentration, or already qualified due to blank contamination and no qualifications were required.

Initial and continuing calibration blanks exhibited contamination for several compounds, however, all sample results were non-detect or greater than 5X the blank concentration with the exception of aluminum, barium, and beryllium. Aluminum has been qualified "U" in all samples. Barium has been qualified "U" in associated samples U3R00201, U3R00301, and U3R00401. Beryllium has been qualified "U" in all samples.

SDG 0027S

Soil preparation blank PBS (11/19/97) exhibited contamination for several compounds, however, all sample results were non-detect, greater than 5X the blank concentration, or already qualified due to blank contamination with the exception of sodium. Sodium has been qualified "U" in all samples.

Initial and continuing calibration blanks exhibited contamination for several compounds, however, all sample results were non-detect or greater than 5X the blank concentration with the exception of beryllium, cadmium, and potassium. Beryllium has been qualified "U" in all samples except 08S01700 and 08S02500. Cadmium has been qualified "U" in associated sample 08S01400. Potassium has been qualified "U" in associated samples 08S01300, 08S01900, 08S02000, and 08S03100

SDG 0028S

Soil preparation blank PBS (11/19/97) exhibited contamination for several compounds, however, all sample results were non-detect, greater than 5X the blank concentration, or already qualified due to blank contamination with the exception of chromium, lead, mercury, and sodium. Chromium has been qualified "U" in associated sample 08S04200. Lead has been qualified "U" in associated sample 08S04000. Mercury has been qualified "U" in associated samples 08S03500, 08S03600, 08S03700, 08S03800, 08S03800D, 08S04000, 08S04200, 08S04600, 08S04800, 08S05000, 08S05100, and 09S02800. Sodium has been qualified "U" in all samples except 08S04700.

Initial and continuing calibration blanks exhibited contamination for several compounds,

however, all sample results were non-detect or greater than 5X the blank concentration with the exception of beryllium and cadmium. Beryllium has been qualified "U" in all samples except 09S02800. Cadmium has been qualified "U" in associated sample 08S05000.

SDG 0029S

Soil preparation blank PBS (11/25/97) exhibited contamination for several compounds, however, all sample results were non-detect, greater than 5X the blank concentration, or already qualified due to blank contamination with the exception of sodium. Sodium has been qualified "U" in all samples.

Initial and continuing calibration blanks exhibited contamination for several compounds, however, all sample results were non-detect or greater than 5X the blank concentration with the exception of beryllium, cadmium, cobalt, and vanadium. Beryllium has been qualified "U" in all samples except 09S02700. Cadmium has been qualified "U" in associated samples 08S02400, 08S03300, 09S02300, and 09S02500. Cobalt has been qualified "U" in associated samples 08S02800, 08S02800D, 09S02300, 09S02400, 09S02600, and 09S02700. Vanadium has been qualified "U" in associated samples 08S03000 and 09S02300.

SDG 0031W

Water preparation blank PBW (12/12/97) exhibited contamination for several compounds, however, all sample results were non-detect, greater than 5X the blank concentration, or already qualified due to blank contamination with the exception of antimony, chromium, mercury, and potassium. Antimony has been qualified "U" in all samples. Chromium has been qualified "U" in all samples. Mercury has been qualified "U" in all samples. Potassium has been qualified "U" in associated sample 09F01501

Initial and continuing calibration blanks exhibited contamination for several compounds, however, all sample results were non-detect or greater than 5X the blank concentration with the exception of beryllium. Beryllium has been qualified "U" in associated samples 08G01301, 08G01501, and 09G01501.

Equipment/Rinsate Blanks

Target analytes found in the equipment rinsate blanks through inadequate decontamination procedures or sampling equipment are applied to associated samples. Equipment/rinsate blank contamination is summarized below.

SDG 0001W

Rinsate blank U3R00001 exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 31.9 ug/L, 858 ug/L, 35.5 ug/L, 1410 ug/L, 921 ug/L, 57300 ug/L,

and 40.0 ug/L, respectively. Calcium has been qualified "U" in associated samples 09F00701, 09G00701, and 09G01301. Iron has been qualified "U" in associated samples 08G00202, 09G00202, 09G00202D, and 09G00302. Magnesium has been qualified "U" in all samples. Potassium has been qualified "U" in associated samples 09F00402, 09F00601, 09F00701, 09G00102, 09G00202, 09G00202D, 09G00302, 09G00402, 09G00501, 09G00601, 09G00701, 09G01001, 09G01101, and 09G01201. Zinc has been qualified "U" in all samples. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0025W

Rinsate blank U3R00001 exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 31.9 ug/L, 858 ug/L, 35.5 ug/L, 1410 ug/L, 921 ug/L, 57300 ug/L, and 40.0 ug/L, respectively. Calcium has been qualified "U" in associated samples 08F01201 and 08G01201. Magnesium has been qualified "U" in all samples. Potassium has been qualified "U" in associated samples 08F01201, 08G00801, 08G01001, 08G01201, and 09G00901. Zinc has been qualified "U" in all samples. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0026S

Rinsate blank U3R00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 31.9 ug/L, 858 ug/L, 35.5 ug/L, 1410 ug/L, 921 ug/L, 57300 ug/L, and 40.0 ug/L, respectively. Iron has been qualified "U" in associated samples 09S01000, 09S01200, 09S01600 and 09S01800. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no further qualifications were required.

Rinsate blank U3R00101 (in SDG 0026W) exhibited barium, calcium, cobalt, copper, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc contamination at 4.2 ug/L, 6630 ug/L, 1.5 ug/L, 7.6 ug/L, 14200 ug/L, 5.9 ug/L, 5.8 ug/L, 2450 ug/L, 42100 ug/L, 1.7 ug/L, and 84.9 ug/L, respectively. Barium has been qualified "U" in associated samples 09S00800, 09S01000, 09S01200, 09S01300, 09S01400, 09S01500, 09S01600, 09S01800, 09S01800D, 09S01900, 09S02000, and 09S02100.

Calcium has been qualified "U" in all samples except 09S00600 and 09S00700.

Cobalt has been qualified "U" in associated samples 09S00600, 09S00700, and 09S01800D.

Copper has been qualified "U" in all samples except 09S00500, 09S00500D, 09S00700, 09S00900, and 09S01100.

Magnesium has been qualified "U" in all samples.

Manganese has been qualified "U" in associated samples 09S00800, 09S01000, 09S01200, 09S01300, 09S01500, 09S01600, 09S01700, 09S01800, 09S01800D, 09S01900, 09S02000, and 09S02100.

Nickel has been qualified "U" in associated samples 09S00500, 09S00500D, 09S00600, 09S00800, 09S00900, 09S01100, 09S01700, 09S01800D, and 09S02200.

Potassium has been qualified "U" in all samples except those results already qualified "U" due to method blank contamination.

Vanadium has been qualified "U" in associated samples 09S00500, 09S00500D, 09S00800, 09S00900, 09S01000, 09S01100, 09S01300, 09S01400, 09S01500, 09S01600, 09S01700, 09S01800, 09S01800D, 09S01900, 09S02000, 09S02100, and 09S02200.

Zinc has been qualified "U" in associated samples 09S00500D, 09S00600, 09S00800, 09S00900, 09S01000, 09S01100, 09S01200, 09S01300, 09S01400, 09S01500, 09S01600, 09S01700, 09S01800, 09S01800D, 09S01900, 09S02000, 09S02100, and 09S02200.

All other associated results are non-detect, greater than 5X the blank concentration or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0026W

Rinsate blank U3R00101 exhibited barium, calcium, cobalt, copper, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc contamination at 4.2 ug/L, 6630 ug/L, 1.5 ug/L, 7.6 ug/L, 14200 ug/L, 5.9 ug/L, 5.8 ug/L, 2450 ug/L, 42100 ug/L, 1.7 ug/L, and 84.9 ug/L, respectively. This is a field QC sample and the results were applied to the associated samples in other data packages.

Rinsate blank U3R00201 exhibited calcium, copper, magnesium, manganese, potassium, sodium, and zinc contamination at 8190 ug/L, 5.4 ug/L, 15600 ug/L, 7.4 ug/L, 2230 ug/L, 38400 ug/L, and 92.9 ug/L, respectively. This is a field QC sample and the results were applied to the associated samples in other data packages.

Rinsate blank U3R00301 exhibited calcium, copper, magnesium, manganese, nickel, potassium, sodium, and zinc contamination at 8700 ug/L, 6.3 ug/L, 16900 ug/L, 8.1 ug/L, 1.5 ug/L, 1930 ug/L, 34100 ug/L, and 100 ug/L, respectively. This is a field QC sample and the results were applied to the associated samples in other data packages.

Rinsate blank U3R00401 exhibited calcium, copper, magnesium, manganese, mercury,

nickel, potassium, sodium, and zinc contamination at 11400 ug/L, 3.1 ug/L, 17500 ug/L, 10.5 ug/L, 0.20 ug/L, 1.7 ug/L, 1690 ug/L, 29800 ug/L, and 103 ug/L, respectively. This is a field QC sample and the results were applied to the associated samples in other data packages.

SDG 0027S

Rinsate blank U3R00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 31.9 ug/L, 858 ug/L, 35.5 ug/L, 1410 ug/L, 921 ug/L, 57300 ug/L, and 40.0 ug/L, respectively. Iron has been qualified "U" in associated samples 08S01300 and 08S02000. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no further qualifications were required.

Rinsate blank U3R00201 (in SDG 0026W) exhibited calcium, copper, magnesium, manganese, potassium, sodium, and zinc contamination at 8190 ug/L, 5.4 ug/L, 15600 ug/L, 7.4 ug/L, 2230 ug/L, 38400 ug/L, and 92.9 ug/L, respectively. Calcium has been qualified "U" in associated samples 08S01000, 08S01200, 08S01300, 08S01400, 08S01900, 08S02000, 08S02100, 08S02700, and 08S03100.

Copper has been qualified "U" in associated samples 08S01100, 08S01300, 08S01400, 08S01900, and 08S02000.

Magnesium has been qualified "U" in all samples.

Manganese has been qualified "U" in associated samples 08S01300, 08S01900, and 08S02000.

Potassium has been qualified "U" in all samples.

Zinc has been qualified "U" in associated samples 08S01000, 08S01100, 08S01300, 08S01400, 08S01600, 08S01700, 08S01800, 08S01900, 08S02000, 08S02200, 08S02300, and 08S02700.

All other associated results are non-detect, greater than 5X the blank concentration or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0028S

Rinsate blank U3R00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 31.9 ug/L, 858 ug/L, 35.5 ug/L, 1410 ug/L, 921 ug/L, 57300 ug/L, and 40.0 ug/L, respectively, however, all associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no qualifications were required.

Rinsate blank U3R00301 (in SDG 0026W) exhibited calcium, copper, magnesium, manganese, nickel, potassium, sodium, and zinc contamination at 8700 ug/L, 6.3 ug/L, 16900 ug/L, 8.1 ug/L, 1.5 ug/L, 1930 ug/L, 34100 ug/L, and 100 ug/L, respectively. Calcium has been qualified "U" in associated samples 08S04300, 08S04400, 08S04500, and 08S04900.

Copper has been qualified "U" in associated samples 08S03700, 08S03800, 08S04000, 08S04200, 08S04600, and 09S02800.

Magnesium has been qualified "U" in all samples.

Manganese has been qualified "U" in associated samples 08S04200 and 08S04300.

Nickel has been qualified "U" in associated samples 08S03600, 08S03700, 08S03800, 08S03800D, 08S05100, and 09S02800.

Potassium has been qualified "U" in all samples.

Zinc has been qualified "U" in associated samples 08S03600, 08S03800, 08S03800D, 08S03900, 08S04000, 08S04100, 08S04200, 08S04300, 08S04600, 08S04700, 08S04900, 08S05000, 08S05100, and 09S02800.

All other associated results are non-detect, greater than 5X the blank concentration or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0029S

Rinsate blank U3R00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 31.9 ug/L, 858 ug/L, 35.5 ug/L, 1410 ug/L, 921 ug/L, 57300 ug/L, and 40.0 ug/L, respectively, however, all associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no qualifications were required.

Rinsate blank U3R00401 (in SDG 0026W) exhibited calcium, copper, magnesium, manganese, mercury, nickel, potassium, sodium, and zinc contamination at 11400 ug/L, 3.1 ug/L, 17500 ug/L, 10.5 ug/L, 0.20 ug/L, 1.7 ug/L, 1690 ug/L, 29800 ug/L, and 103 ug/L, respectively.

Calcium has been qualified "U" in associated samples 08S02400, 08S03000, 08S03300, 09S02300, 09S02400, and 09S02500.

Copper has been qualified "U" in associated samples 08S03000 and 09S02700.

Magnesium has been qualified "U" in all samples.

Manganese has been qualified "U" in associated samples 08S02400, 08S03000, 08S03300, 09S02300, 09S02400, and 09S02500.

Mercury has been qualified "U" in all samples except 09S02500.

Nickel has been qualified "U" in associated samples 08S02400, 08S03000, 08S03200, 08S03300, 08S05100D, 08S05200, 09S02300, 09S02400, 09S02500, 09S02600, and 09S02700.

Potassium has been qualified "U" in all samples.

Zinc has been qualified "U" in associated samples 08S02400, 08S03000, 08S03200, 08S03300, 08S05100D, 08S05200, 09S02300, 09S02400, 09S02500, 09S02600, and 09S02700.

All other associated results are non-detect, greater than 5X the blank concentration or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0031W

Rinsate blank U3R00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 31.9 ug/L, 858 ug/L, 35.5 ug/L, 1410 ug/L, 921 ug/L, 57300 ug/L, and 40.0 ug/L, respectively. Iron has been qualified "U" in associated sample 09F01601. Magnesium has been qualified "U" in all samples except 09G01401 and 09G01401D. Potassium has been qualified "U" in all samples. Zinc has been qualified "U" in all samples. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no further qualifications were required.

Field Source Blanks

Target analytes found in field source blanks through background or on-site contamination are applied to associated samples. Field source blank contamination is summarized below.

SDG 0001W

Source blank U3Y00001 exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 32.9 ug/L, 343 ug/L, 20.3 ug/L, 256 ug/L, 900 ug/L, 60300 ug/L, and 30.7 ug/L, respectively. Aluminum has been qualified "U" in associated samples 08G00102, 08G00202, 09F00601. Sodium has been qualified "U" in all samples. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified

"U" due to blank contamination and no further qualifications were required.

SDG 0025W

Source blank U3Y00001 exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 32.9 ug/L, 343 ug/L, 20.3 ug/L, 256 ug/L, 900 ug/L, 60300 ug/L, and 30.7 ug/L, respectively. Aluminum has been qualified "U" in associated samples 08G00302, 08G00402, 08G00501, 08G00601, 08G00701, 08G00801, and 08G00801D. Sodium has been qualified "U" in all samples. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0026S

Source blank U3Y00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 32.9 ug/L, 343 ug/L, 20.3 ug/L, 256 ug/L, 900 ug/L, 60300 ug/L, and 30.7 ug/L, respectively. Aluminum has been qualified "U" in associated sample 09S01200. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0027S

Source blank U3Y00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 32.9 ug/L, 343 ug/L, 20.3 ug/L, 256 ug/L, 900 ug/L, 60300 ug/L, and 30.7 ug/L, respectively, however, all associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no qualifications were required.

SDG 0028S

Source blank U3Y00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 32.9 ug/L, 343 ug/L, 20.3 ug/L, 256 ug/L, 900 ug/L, 60300 ug/L, and 30.7 ug/L, respectively. Sodium has been qualified "U" in associated sample 08S04700. All other associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no further qualifications were required.

SDG 0029S

Source blank U3Y00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 32.9 ug/L, 343 ug/L, 20.3 ug/L, 256 ug/L, 900 ug/L, 60300 ug/L, and 30.7 ug/L, respectively. All associated results are non-detect, greater

than 5X the blank concentration, or already qualified "U" due to blank contamination and no qualifications were required.

SDG 0031W

Source blank U3Y00001 (in SDG 0001W) exhibited aluminum, calcium, iron, magnesium, potassium, sodium, and zinc contamination at 32.9 ug/L, 343 ug/L, 20.3 ug/L, 256 ug/L, 900 ug/L, 60300 ug/L, and 30.7 ug/L, respectively. All associated results are non-detect, greater than 5X the blank concentration, or already qualified "U" due to blank contamination and no qualifications were required.

4.4 Comparability

The laboratory used standard analytical methods for all of the analyses. The method detection limits were below the contract required quantitation limits, therefore, the comparability was considered acceptable.

4.5 Completeness

There were no rejections of data in the metals analyses. The percent of valid data is 100%.

5.0 Chlorinated Herbicides

A total of eight (8) Chlorinated Herbicide SDGs were analyzed for this project. The SDGs are 0001W, 0025W, 0026S, 0026W, 0027S, 0028S, 0029S, and 0031W.

This section discusses the QC supporting documentation as defined by the PARCC criteria and evaluated based on the project specific DQOs.

5.1 Precision

MS/MSD Samples

The relative percent difference (RPD) between MS/MSD samples and field duplicate samples is used to assess precision.

One MS/MSD sample was analyzed for each SDG except 0026W. The functional guidelines establish RPD QC criteria limits for MS/MSD samples as follows:

MS/MSD CRITERIA

	Water RPD	Soil/Sediment RPD
2,4-D	40	40
Silvex	40	40
2,4,5-T	40	40

MS/MSD RPD results for each SDG were acceptable with the exception of the following.

SDG 0026S

MS/MSD sample 09S00600 exhibited high RPD values for 2,4-D and 2,4,5-T of 92 and 72, respectively. All 2,4-D results are already qualified "J" due to compound quantitation problems. All 2,4,5-T results are already qualified "U" due to blank contamination.

SDG 0027S

MS/MSD sample 08S01000 exhibited a high RPD value for 2,4-D of 41, however, the LCS sample results were acceptable and no qualifications were made based on MS/MSD results alone.

Field Duplicate Samples

SDG 0026W did not have field duplicate samples analyzed. Field duplicate sample results are summarized in the following section. No qualifications were made based on field duplicate results.

SDG 0001W

Analyte	09G00202 ug/L	09G00202D ug/L	RPD
2,4-DB	0.44	0.33	29
Dichloroprop	2.0U	3.1	NC
MCPP	840	540U	NC
MCPA	870	670	26

SDG 0025W

Analyte	08G00501 ug/L	08G00501D ug/L	RPD
2,4-DB	1.4	5.0U	NC
Dinoseb	0.098	1.5U	NC

Analyte	08G00801 ug/L	08G00801D ug/L	RPD
2,4-DB	0.16	0.11	37
2,4-D	0.12	0.11	9
Dichloroprop	0.69	0.66	4
MCPP	110U	710	NC

SDG 0026S

Analyte	09S00500 ug/kg	09S00500D ug/kg	RPD
2,4-DB	5.3	33	145
2,4-D	9.4	0.31	187
Dinoseb	33	40	19

Analyte	09S01800 ug/kg	09S01800D ug/kg	RPD
2,4-DB	8.0	10	22
2,4-D	3.5	6.8	64

SDG 0027S

Analyte	08S00900 ug/kg	08S00900D ug/kg	RPD
2,4-DB	100	63	45
2,4-D	17	37	74
Dinoseb	12U	22	NC
Dichloroprop	19U	88	NC
MCPA	21000	26000	21

SDG 0028S

Analyte	08S03800 ug/kg	08S03800D ug/kg	RPD
2,4-D	14	7.6U	NC

SDG 0029S

Analyte	08S02800 ug/kg	08S02800D ug/kg	RPD
2,4-DB	11	4.5	84
2,4-D	34	44	26

Analyte	08S05100 ug/kg	08S05100D ug/kg	RPD
2,4-DB	4.9	5.1	4
2,4-D	6.4U	2.1	NC

SDG 0031W

Analyte	09G01401 ug/L	09G01401D ug/L	RPD
2,4-DB	0.21	5.0U	NC
2,4-D	0.26	1.5U	NC
MCPA	890	840	6

5.2 Accuracy

The percent recovery results of MS/MSD samples and surrogate spikes are used to assess accuracy. Additionally, initial and continuing calibration results can be used to evaluate accuracy. Relative response factors (RRFs), percent relative standard deviation (%RSD) and percent difference (%D) are the three parameters used to evaluate instrument calibration.

MS/MSD Samples

The functional guidelines establish % Recovery QC criteria limits for MS/MSD samples as follows:

MS/MSD CRITERIA

	Water %R	Soil/Sediment %R
2,4-D	30-150	30-150
Silvex	30-150	30-150
2,4,5-T	30-150	30-150

The percent recovery (%R) values for all of the MS/MSD samples were acceptable with the following exceptions.

SDG 0026S

MS/MSD sample 09S00600 exhibited low MS %R values for 2,4-D and 2,4,5-T of 16% and 17%, respectively. All 2,4-D results are already qualified "J" due to compound quantitation problems. All 2,4,5-T results are already qualified "U" due to blank contamination and have been further qualified "UJ" due to the low MS %R value.

SDG 0027S

MS/MSD sample 08S01000 exhibited a low MS %R value for 2,4-D of 29%, however, the LCS sample results were acceptable and no qualifications were made based on MS/MSD results alone.

SDG 0029S

MS/MSD sample 08S02900 exhibited a low MSD %R value for 2,4-D of 27%, however, this compound has already been qualified "J" in sample 08S02900 due to surrogate problems and no further qualifications were required.

Surrogate Spikes

One surrogate compound is used for spiking the chlorinated herbicide samples. Surrogate spike recoveries were compared to the QC acceptance criteria as specified in the functional guidelines. These criteria are summarized as follows:

Surrogate Recovery Limits

	Water %R	Soil %R
DCAA	30-150	30-150

Surrogate recovery values were acceptable for SDGs 0026W and 0031W and were outside of QC limits for all other SDGs.

SDG 0001W

Sample 08G00102 exhibited a high %R value for surrogate compound DCAA of 225%. All positive results for this sample have been qualified "J."

Sample 08G00202 exhibited a high %R value for surrogate compound DCAA of 187%. All positive results for this sample have been qualified "J."

Sample 09G00202 exhibited a high %R value for surrogate compound DCAA of 220%. All positive results for this sample have been qualified "J."

Sample 09G00501 exhibited a high %R value for surrogate compound DCAA of 229%. All positive results for this sample have been qualified "J."

Sample 09G01001 exhibited a high %R value for surrogate compound DCAA of 168%. All positive results for this sample have been qualified "J."

Sample 09G01101 exhibited a high %R value for surrogate compound DCAA of 234%. All positive results for this sample have been qualified "J."

Samples 09G01201 and 09G01201DL were analyzed at dilutions and exhibited low %R values for surrogate DCAA of 0%, 0%, 0%, and 2% on all columns due to the dilution. No action was taken on this basis.

Sample U3R00001RE exhibited a high %R value for surrogate DCAA of 626%, however, this sample has already been qualified due to holding times and no further qualifications were required.

Sample 09G00402DL was analyzed at a dilution and exhibited a low %R value for surrogate DCAA of 6D% on one of the columns due to the dilution. No action was taken on this basis.

Sample 08G00202 exhibited a high %R value for surrogate compound DCAA of 187% during the MCPP/MCPA analysis, however, both results for this sample are non-detect and no qualifications were required.

Sample 09G00402 exhibited a high %R value for surrogate compound DCAA of 168% during the MCPP/MCPA analysis. Both results for this sample have been qualified "J."

Sample 09G00402DL was analyzed at a dilution and exhibited a low %R value for surrogate DCAA of 6D% during the MCPP/MCPA analysis on one of the columns due to the dilution. No action was taken on this basis.

SDG 0025W

Sample 08G00302 exhibited a high %R value for surrogate compound DCAA of 451%. All positive results for this sample, except MCPP and MCPA, have been qualified "J."

Sample 08G00801 exhibited a high %R value for surrogate compound DCAA of 207%. All positive results for this sample, except MCPP and MCPA, have been qualified "J."

Sample 08G00801D exhibited a high %R value for surrogate compound DCAA of 173%. All positive results for this sample, except MCPP and MCPA, have been qualified "J."

Sample 08G00901 exhibited a high %R value for surrogate compound DCAA of 186%. All positive results for this sample, except MCPP and MCPA, have been qualified "J."

Samples 08G00302 and 08G00901 exhibited high %R values for surrogate compound DCAA of 373% and 159%, respectively, during the MCPP/MCPA analysis. Positive results for these samples have been qualified "J."

Sample 08G00601 exhibited a low %R value for surrogate compound DCAA of 12% during the MCPP/MCPA analysis. Both results for this sample have been qualified "UJ."

SDG 0026S

Sample 09S01900 exhibited low %R values for surrogate compound DCAA on the primary and secondary columns of 16% and 10%, respectively. All results for this sample have been qualified "J" for positive results and "UJ" for non-detects.

SDG 0027S

Samples 08S01500, 08S02200, 08S02600, and 08S03100 exhibited high %R values for surrogate compound DCAA of 197D, 193%, 312%, and 171%, respectively, on the secondary column. Since sample 08S01500 was analyzed at a 5X dilution which caused the high %R value, no action was required for this sample. For the remaining above samples, all positive results have been qualified "J."

SDG 0028S

Samples 08S04100, 08S04500, 08S04700, and 08S04800 exhibited high %R values for surrogate compound DCAA of 175%, 155%, 153%, and 334%, respectively, however, all results for these samples have already been qualified due to blank contamination, holding times, or compound quantitation problems and no further qualifications were required.

Sample 08S03400 exhibited a low %R value for surrogate compound DCAA on the primary column of 22%. All results for this sample have been qualified "J" for positive results and "UJ" for non-detects.

SDG 0029S

Samples 08S02800D, 08S02900, 08S03200, 09S02400, and 09S02500 exhibited high %R values for surrogate compound DCAA of 191%, 420%, 248%, 2715%, and 171%, respectively. All positive results for these samples have been qualified "J."

Sample 09S02500DL was analyzed at a dilution and the surrogate compounds were "diluted out" during analysis. No action has been taken on this basis.

Initial and Continuing Calibration

Initial and continuing calibration results can be used to evaluate accuracy within an SDG. Relative response factors (RRFs), percent relative standard deviation (%RSD) and percent difference (%D) are the three parameters used to evaluate instrument calibration. The RRF is a measure of relative response of an analyte compared to its internal standard. The %RSD is an expression of the linearity of instrument response and the %D is a comparison of the continuing calibration instrument response with its initial calibration response. The RRF is the most critical of the three parameters.

All SDGs were qualified due to initial and/or continuing calibration deficiencies and are summarized below.

SDG 0001W

The initial calibration analyzed on 11/13/97 exhibited acceptable %RSD values. No qualifications were required.

The initial calibration analyzed on 11/17/97 exhibited a high %RSD value for MCPP of 23.1%. All associated positive MCPP results have been qualified "J."

The initial calibration analyzed on 11/19/97 exhibited a high %RSD value for MCPP of 21.1%. All associated positive MCPP results have been qualified "J."

The initial calibration analyzed on 11/25/97 exhibited acceptable %RSD values. No qualifications were required.

All continuing calibration %D criteria were met. No qualifications were required.

SDG 0025W

The initial calibration analyzed on 11/13/97 exhibited acceptable %RSD values. No qualifications were required.

The initial calibration analyzed on 11/17/97 exhibited a high %RSD value for MCPP of 23.1%. All associated positive MCPP results have been qualified "J."

The initial calibration analyzed on 11/19/97 exhibited a high %RSD value for MCPP of 21.1%. All associated positive MCPP results have been qualified "J."

The initial calibration analyzed on 11/25/97 exhibited acceptable %RSD values. No qualifications were required.

All continuing calibration %D criteria were met. No qualifications were required.

SDG 0026W

The initial calibration analyzed on 12/3/97 exhibited acceptable %RSD values. No qualifications were required.

The initial calibration analyzed on 12/15/97 exhibited high %RSD values for MCPP and MCPA of 21.9% and 21.3%, respectively, on the primary column and 21.7% and 22.0%, respectively, on the secondary column, however, both compounds are non-detect in associated sample U3R00401 and no qualifications were required.

The continuing calibrations analyzed on 12/8/97, 12/9/97, 12/11/97, and 12/17/97 exhibited acceptable %D values. No qualifications were required.

SDG 0028S

The initial calibration analyzed on 12/3/97 exhibited acceptable %RSD values. No qualifications were required.

The initial calibration analyzed on 12/15/97 exhibited high %RSD values for MCPP and MCPA on the primary and secondary columns of 21.9%/21.7% and 21.3%/22.0%, respectively, however, all associated results are non-detect and no qualifications were required.

The continuing calibrations analyzed on 12/8/97, 12/10/97, 12/11/97, 12/12/97, 12/13/97, 12/16/97, and 12/17/97 exhibited acceptable %D values. No qualifications were required.

The continuing calibration analyzed on 12/19/97 exhibited high %D values for 2,4-DB on the primary and secondary columns of 27.7% and 29.9%, respectively, however, all associated results are already qualified due to holding time exceedences and no further qualifications were required.

SDG 0029S

The initial calibration analyzed on 12/3/97 exhibited acceptable %RSD values. No qualifications were required.

The initial calibration analyzed on 12/15/97 exhibited high %RSD values for MCPP and MCPA on the primary and secondary columns of 21.9%/21.7% and 21.3%/22.0%, respectively, however, a continuing calibration was analyzed on 12/16/97 at 18:09 which is between the initial calibration and the sample analyses, therefore, the data was not affected and no qualifications were required.

The continuing calibrations analyzed on 12/8/97, 12/10/97, 12/11/97, 12/16/97, and 12/17/97 exhibited acceptable %D values. No qualifications were required.

SDG 0031W

The initial calibration analyzed on 12/31/97 exhibited high %RSD values for MCPA and MCPP of 23.8% and 22.4%, respectively, on the primary column. All associated positive MCPA and MCPP results have been qualified "J."

The continuing calibrations analyzed on 12/31/97 and 1/2/98 exhibited acceptable %D values. No qualifications were required.

5.3 Representativeness

Method blanks, equipment rinsate blanks, and field source blanks are used to evaluate representativeness. A summary of the contaminants found in these blanks can be found below. Several compounds were detected in the various blanks. The laboratory method blank was applied first to the samples, followed by the highest concentration of the equipment rinsate blank and field source blank.

Qualifications were made to the data based on blank contamination when the sample results were below ten (10) times the maximum amount detected in the blank for compounds that are common laboratory contaminants and five (5) times the maximum amount detected in the blank for compounds that are not common contaminants. Samples that were qualified as undetected due to blank contamination were flagged by the data reviewer with a "U." Compounds that were qualified due to blank contamination that were reported below the method detection limit were raised to the detection limit and the laboratory qualifier was replaced by the reviewer with a "U." If a sample result exceeded 5X or 10X the amount in the blank, the result was not amended.

The following summarizes the method blanks, equipment rinsate blanks, and field source blanks.

Method Blanks

Method blanks were analyzed with each SDG to identify contaminants that may have been introduced through analytical instrumentation or sample preparation. The following summarizes method blank contamination for each SDG.

SDG 0001W

Method blank HBLKHW (10/22/97) exhibited 2,4,5-T, dicamba, and dalapon contamination at 0.00064 ug/L, 0.0068 ug/L, and 0.081 ug/L, respectively, however, all associated results are non-detect or greater than 5X the blank concentration and no qualifications were required.

Method blank HBLKHY (10/24/97) exhibited 2,4,5-T, dicamba, and dalapon contamination at 0.081 ug/L, 0.15 ug/L, and 0.045 ug/L, respectively. 2,4,5-T has been qualified "U" in associated samples 08G00102, 08G00202, 09G00402, 09G00501, 09G00701, 09G01001, and 09G01101. Dicamba has been qualified "U" in associated samples 08G00102, 08G00202, 09G00402, 09G00501, 09G00701, 09G01001, 09G01101, 09G01201, 09G01201DL, and 09G01301. Dalapon has been qualified "U" in associated samples 08G00102, 09G00402, 09G01001, and 09G01201. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Method blank HBLKNB (11/17/97) exhibited 2,4-DB, 2,4-D, dicamba, and dalapon contamination at 0.14 ug/L, 0.0046 ug/L, 0.038 ug/L, and 0.14 ug/L, respectively. 2,4-DB and dalapon have been qualified "U" in associated sample 09G00601RE. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

SDG 0025W

Method blank HBLKHY (10/24/97) exhibited 2,4,5-T, dicamba, and dalapon contamination at 0.081 ug/L, 0.15 ug/L, and 0.045 ug/L, respectively. 2,4,5-T has been qualified "U" in associated samples 08G00302, 08G00402, 08G00801, and 08G00901. Dicamba has been qualified "U" in associated samples 08G00402, 08G00801, 08G00801D, and 08G00901. Dalapon has been qualified "U" in associated samples 08G00402, 08G00801, and 08G00901. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Method blank HBLKIV (10/29/97) exhibited 2,4-DB, 2,4, 5-T, and dalapon contamination at 0.058 ug/L, 0.00030 ug/L, and 0.072 ug/L, respectively. 2,4-DB has been qualified "U" in associated samples 08G00501D, 08G00701, 08G01001, 08G01101, 08G01201, 09G00801, and 09G00901.

2,4,5-T has been qualified "U" in associated sample 08G00501. Dalapon has been qualified "U" in associated samples 08G00501, 08G00501D, 08G00601, 08G00701, 08G01001, 08G01101, 08G01201, 09G00801, and 09G00901. All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

SDG 0026S

Method blank HBLKMM (11/13/97) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, and dalapon contamination at 0.67 ug/kg, 0.044 ug/kg, 0.042 ug/kg, 1.0 ug/kg, 11 ug/kg, and 3.4 ug/kg, respectively. Silvex has been qualified "U" in all associated samples except 09S01300.

2,4,5-T has been qualified "U" in associated samples 09S00500D, 09S00700, 09S00800, 09S01200, 09S01400, 09S01500, 09S01500DL, 09S01800, and 09S01800D.

Dinoseb has been qualified "U" in associated samples 09S01800D and 09S02100.

Dicamba has been qualified "U" in all associated samples except 09S01100DL and 09S01500DL.

Dichloroprop has been qualified "U" in all associated samples except 09S01400DL and those samples already non-detect.

Dalapon has been qualified "U" in all associated samples.

Method blank HBLKMP (11/13/97) exhibited 2,4-DB, 2,4-D, silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, and dalapon contamination at 2.1 ug/kg, 2.7 ug/kg, 0.33 ug/kg, 0.24 ug/kg, 0.51 ug/kg, 0.82 ug/kg, 18 ug/kg, and 6.2 ug/kg, respectively. 2,4-DB has been qualified in associated samples 09S01900, 09S02100, and 09S02200.

2,4,-D has been qualified "U" in associated sample 09S02100.

Silvex has been qualified "U" in associated samples 09S01900, 09S02100, and 09S02200.

2,4,5-T has been qualified "U" in associated samples 09S01900, 09S02000, 09S02100, and 09S02200.

Dinoseb has been qualified "U" in associated samples 09S01900, 09S02000, 09S02100, and 09S02200.

Dicamba has been qualified in associated samples 09S01900, 09S02100, and 09S02200.

Dichloroprop has been qualified "U" in associated samples 09S01900, 09S02000, 09S02100, and 09S02200.

Dalapon has been qualified "U" in associated samples 09S01900, 09S02000, 09S02100, and 09S02200.

All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

SDG 0026W

Method blank HBLKNB (11/17/97) exhibited 2,4-DB, 2,4-D, 2,4,5-T, dicamba, MCPA, and dalapon contamination at 0.16 ug/L, 0.059 ug/L, 0.0042 ug/L, 0.018 ug/L, 0.49 ug/L, and 0.27 ug/L, respectively. 2,4-DB, 2,4-D, 2,4,5-T, and dalapon have been qualified "U" in associated samples U3R00101, U3R00201, and U3R00301. Dicamba and MCPA are greater than 5X the blank concentration and no further qualifications were required.

Method blank HBLKOF (11/20/97) exhibited silvex, dinoseb, dicamba, and dalapon contamination at 0.0036 ug/L, 0.0031 ug/L, 0.10 ug/L, and 0.14 ug/L, respectively. Dicamba and dalapon have been qualified "U" in associated sample U3R00401. Silvex and dinoseb are non-detect and no further qualifications were required.

SDG 0027S

Method blank HBLKMU (11/17/97) exhibited 2,4-DB, 2,4-D, silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, and dalapon contamination at 4.8 ug/kg, 2.5 ug/kg, 0.038 ug/kg, 0.15 ug/kg, 0.058 ug/kg, 1.0 ug/kg, 4.6 ug/kg, and 2.2 ug/kg, respectively. 2,4-DB has been qualified "U" in associated samples 08S01000, 08S01100, 08S01300, 08S01400, 08S01500, 08S01600, 08S01700, 08S01800, 08S01900, 08S02000, 08S02100, 08S02200, and 08S02500.

2,4-D has been qualified "U" in associated samples 08S01000, 08S01300, 08S01500, 08S01600, 08S01800, 08S01900, 08S02000, 08S02100, 08S02200, 08S02500, and 08S03100.

Silvex has been qualified "U" in associated samples 08S02200, 08S02300, and 08S02500.

2,4,5-T has been qualified "U" in associated samples 08S01000, 08S01300, 08S01400, 08S01500, 08S01600, 08S02100, 08S02200, 08S02500, and 08S03100.

Dinoseb has been qualified "U" in associated samples 08S02000, 08S02100, and 08S02500.

Dicamba has been qualified "U" in associated samples 08S00900, 08S01000, 08S01100, 08S01200, 08S01300, 08S01400, 08S01500, 08S01600, 08S01700, 08S01800, 08S01900, 08S02000, 08S02200, 08S02300, 08S02500, and 08S03100.

Dichloroprop has been qualified "U" in associated samples 08S00900, 08S01000, 08S01100, 08S01300, 08S01400, 08S01500, 08S01600, 08S01700, 08S01900, 08S02000, 08S02200, 08S02300, 08S02500, and 08S03100.

Dalapon has been qualified "U" in associated samples 08S01100, 08S01200, 08S01500, 08S01600, 08S01700, 08S01800, 08S01900, 08S02000, 08S02100, 08S02200, 08S02300, and 08S02500.

Method blank HBLKNJ (11/18/97) exhibited 2,4-DB, 2,4-D, silvex, 2,4,5-T, dinoseb, dicamba, and dalapon contamination at 0.53 ug/kg, 0.12 ug/kg, 0.022 ug/kg, 0.010 ug/kg, 0.11 ug/kg, 1.5 ug/kg, and 0.72 ug/kg, respectively.

Dinoseb has been qualified "U" in associated sample 08S02700. Dicamba has been qualified "U" in associated samples 08S02600 and 08S02700.

Dalapon has been qualified "U" in associated samples 08S02600 and 08S02700.

All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

SDG 0028S

Method blank HBLKNI (11/18/97) exhibited 2,4-DB, 2,4-D, silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, and dalapon contamination at 7.9 ug/kg, 1.9 ug/kg, 1.7 ug/kg, 0.13 ug/kg, 0.078 ug/kg, 1.0 ug/kg, 1.6 ug/kg, and 4.7 ug/kg, respectively. 2,4-DB has been qualified "U" in associated samples 08S03400, 08S03600, 08S03800, 08S03800D, 08S04100, 08S04300, 08S04400, 08S04500, and 08S04600.

2,4-D has been qualified "U" in associated samples 08S03500, 08S03800D, 08S04100, 08S04300, 08S04500, and 09S02800.

Silvex has been qualified "U" in associated samples 08S03400, 08S03500, 08S03600, 08S03800, 08S03800D, 08S03900, 08S04100, 08S04300, 08S04500, and 09S02800.

2,4,5-T has been qualified "U" in associated samples 08S03600, 08S03900, 08S04100, 08S04300, 08S04500, and 09S02800.

Dinoseb has been qualified "U" in associated sample 08S03800D.

Dicamba has been qualified "U" in associated samples 08S03400, 08S03500, 08S03600, 08S03800D, 08S03900, 08S04100, 08S04300, 08S04400, 08S04600, and 09S02800.

Dichloroprop has been qualified "U" in associated samples 08S03600, 08S03800D, 08S03900, 08S04100, 08S04300, 08S04400, and 08S04500.

Dalapon has been qualified "U" in associated samples 08S03400, 08S03500, 08S03600, 08S03800, 08S03800D, 08S04100, 08S04300, 08S04400, 08S04500, 08S04600, and 09S02800.

Method blank HBLKNJ (11/18/97) exhibited 2,4-DB, 2,4-D, silvex, 2,4,5-T, dinoseb, dicamba, and dalapon contamination at 0.53 ug/kg, 0.12 ug/kg, 0.022 ug/kg, 0.010 ug/kg, 0.11 ug/kg, 1.5 ug/kg, and 0.72 ug/kg, respectively. 2,4-D has been qualified "U" in associated sample 08S05100.

Silvex has been qualified "U" in associated sample 08S05100.

Dinoseb has been qualified "U" in associated samples 08S04900 and 08S05100.

Dicamba has been qualified "U" in associated samples 08S04800, 08S04900, and 08S05100.

Dalapon has been qualified "U" in associated samples 08S04900 and 08S05100.

All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Method blank HBLKUN (12/12/97) exhibited 2,4-DB, 2,4-D, silvex, dinoseb, dichloroprop, and dalapon contamination at 4.9 ug/kg, 0.50 ug/kg, 0.080 ug/kg, 0.64 ug/kg, 1.0 ug/kg, and 6.4 ug/kg, respectively. All of the above compounds except dichloroprop have been qualified "U" in associated sample 08S05000.

Method blank HBLKUJ (12/18/97) exhibited silvex, dinoseb, dicamba, dichloroprop, and dalapon contamination at 1.8 ug/kg, 0.40 ug/kg, 1.4 ug/kg, 6.5 ug/kg, and 1.8 ug/kg, respectively. Silvex has been qualified "U" in associated samples 08S03700 and 08S04200.

Dinoseb has been qualified "U" in associated samples 08S04000 and 08S04200.

Dicamba has been qualified "U" in associated samples 08S03700 and 08S04200.

Dichloroprop has been qualified "U" in associated samples 08S03700, 08S04000, and 08S04100.

Dalapon has been qualified "U" in associated sample 08S04000.

All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

SDG 0029S

Method blank HBLKNJ (11/18/97) exhibited 2,4-DB, 2,4-D, silvex, 2,4,5-T, dinoseb, dicamba, and dalapon contamination at 0.53 ug/kg, 0.12 ug/kg, 0.022 ug/kg, 0.010 ug/kg, 0.11 ug/kg, 1.5 ug/kg, and 0.72 ug/kg, respectively. Silvex has been qualified "U" in associated sample 08S05100D.

Dinoseb has been qualified "U" in associated samples 08S05100D and 08S05200.

Dicamba has been qualified "U" in associated samples 08S05100D, 08S05200, 09S02300, 09S02400, 09S02500, 09S02600, and 09S02700.

Dalapon has been qualified "U" in associated samples 08S05100D, 09S02400, 09S02600, and 09S02700.

All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Method blank HBLKOL (11/20/97) exhibited dicamba and dalapon contamination at 1.3 ug/kg and 15 ug/kg, respectively. Dicamba has been qualified "U" in associated samples 08S02400, 08S02800, 08S02800D, 08S02900, 08S03000, 08S03200, and 08S03300. Dalapon has been qualified "U" in associated samples 08S02400, 08S02800, 08S02800D, 08S02900, 08S03000, 08S03200, and 08S03300.

SDG 0031W

Method blank HBLKSC (12/8/97) exhibited 2,4-D, silvex, 2,4,5-T, dinoseb, dicamba, and dalapon contamination at 0.012 ug/L, 0.042 ug/L, 0.028 ug/L, 0.0061 ug/L, 0.030 ug/L, and 0.086 ug/L, respectively.

2,4-D has been qualified "U" in associated sample 09G01401D.

Silvex has been qualified "U" in associated samples 08G01301, 08G01501, 09G01501, and 09G01601.

2,4,5-T has been qualified "U" in associated samples 08G01501DL, 09G01401, and 09G01601.

Dinoseb has been qualified "U" in associated sample 08G01501.

Dicamba has been qualified "U" in associated samples 08G01501, 08G01501DL, 09G01401, 09G01401D, 09G01501, and 09G01601.

Dalapon has been qualified "U" in associated samples 08G01301, 09G01401, 09G01401D, 09G01501, and 09G01601.

All other associated results are non-detect or greater than 5X the blank concentration and no further qualifications were required.

Equipment/Rinsate Blanks

Equipment rinsate blanks are used to evaluate contaminants that may have been introduced through the sampling equipment or laboratory handling of samples. Equipment/rinsate blanks results are summarized in the following section.

SDG 0001W

Rinsate blank U3R00001RE exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, and MCPP contamination at 0.084 ug/L, 0.047 ug/L, 0.019 ug/L, 1.2 ug/L, 0.60 ug/L, 4.1 ug/L, and 120 ug/L, respectively.

Silvex has been qualified "U" in all samples.

2,4,5-T has been qualified "U" in associated samples 09G00102, 09G00202, 09G00202D, 09G00302, and 09G00601RE.

Dinoseb has been qualified "U" in associated samples 08G00102, 08G00202, 09G00102, 09G00102DL, 09G00202, 09G00202D, 09G00302, 09G00501, 09G00601RE, 09G00701, 09G01001, 09G01101, 09G01201, and 09G01301.

Dicamba has been qualified "U" in associated samples 09G00102, 09G00202D, 09G00302, and 09G00601RE.

Dichloroprop has been qualified "U" in associated samples 08G00102, 08G00202, 09G00102, 09G00202, 09G00402, 09G00501, 09G00601RE, 09G00701, 09G01001, 09G01101, and 09G01201.

Dalapon has been qualified "U" in associated samples 08G00202, 09G00102, 09G00102DL, 09G00202, 09G00202D, 09G00302, 09G00501, 09G00701, 09G01101, and 09G01301.

MCPP has been qualified "U" in associated samples 09G00102, 09G00202D, 09G00302, 09G00402DL, 09G00501DL, 09G00701DL, 09G01101DL, and 09G01201DL.

All other associated results are non-detect, greater than 5X the blank concentration, or already qualified due to method blank contamination and no further qualifications were required.

SDG 0025W

Rinsate blank U3R00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, and MCPP contamination at 0.084 ug/L, 0.047 ug/L, 0.019 ug/L, 1.2 ug/L, 0.060 ug/L, 4.1 ug/L, and 120 ug/L, respectively.

Silvex has been qualified "U" in associated samples 08G00302, 08G00402, 08G00501D, 08G00701, 08G00801, 08G00801D, 08G00901, 08G01001, 08G01101, and 09G00801.

2,4,5-T has been qualified "U" in associated samples 08G00501D, 08G00601, 08G01001, 08G01101, 08G01201, 09G00801, and 09G00901.

Dinoseb has been qualified "U" in associated samples 08G00302, 08G00402, 08G00501D, 08G00701, 08G00801, 08G00801D, 08G00901, 08G01001, 08G01101, 08G01201, and 09G00801.

Dicamba has been qualified "U" in associated samples 08G00501, 08G00601, 08G00701, and 09G00801.

Dalapon has been qualified "U" in associated samples 08G00302 and 08G00801D.

MCPP has been qualified "U" in all samples except 08G00801D, 08G00801DDL, 08G01001, and 08G01101.

All other associated results are non-detect, greater than 5X the blank concentration, or already qualified due to method blank contamination and no further qualifications were required.

SDG 0026S

Rinsate blank U3R00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, and MCPP contamination at 0.084 ug/L, 0.047 ug/L, 0.019 ug/L, 1.2 ug/L, 0.060 ug/L, 4.1 ug/L, and 120 ug/L, respectively.

Silvex has been qualified "U" in associated samples 09S01300, 09S01900, and 09S02000.

2,4,5-T has been qualified "U" in associated samples 09S00500, 09S00600, 09S00900, 09S01000, 09S01100, and 09S01400DL.

Dicamba has been qualified "U" in associated sample 09S02000.

All other associated results have been qualified based on higher results from other field or method blanks.

Rinsate blank U3R00101 (in SDG 0026W) exhibited silvex, dinoseb, dicamba, dichloroprop, MCPP, and MCPA contamination at 0.034 ug/L, 0.048 ug/L, 0.91 ug/L, 0.028 ug/L, 250 ug/L, and 170 ug/L, respectively. Dinoseb has been qualified "U" in associated samples 09S00600, 09S00700, 09S00800, 09S01000, 09S01100DL, 09S01200, 09S01300, 09S01400, 09S01400DL, 09S01500DL, 09S01600, 09S01700, and 09S01800.

MCPP has been qualified "U" in associated samples 09S00500, 09S00600, 09S00700, 09S00800, 09S00900, 09S01000, 09S01100, 09S01200, 09S01500DL, 09S01600, 09S01700, 09S01800D, 09S02000, 09S02100, and 09S02200.

MCPA has been qualified "U" in associated samples 09S00500, 09S00500D, 09S00800, 09S00900, 09S01000, 09S01100, 09S01200, 09S01300, 09S01400, 09S01400DL, 09S01500, 09S01500DL, 09S01600, 09S01700, 09S01800, 09S01800D, 09S01900, 09S02000, 09S02100, and 09S02200.

All other associated results have been qualified based on higher results from other field or method blanks.

SDG 0026W

Rinsate blank U3R00101 exhibited silvex, dinoseb, dicamba, dichloroprop, MCPP, and MCPA contamination at 0.034 ug/L, 0.048 ug/L, 0.91 ug/L, 0.028 ug/L, 250 ug/L, and 170 ug/L, respectively. This is a field QC sample and the results were applied to the associated samples in other data packages.

Rinsate blank U3R00201 exhibited silvex, dinoseb, dicamba, dichloroprop, MCPP, and MCPA contamination at 0.018 ug/L, 0.033 ug/L, 0.23 ug/L, 0.059 ug/L, 120 ug/L, and 520 ug/L, respectively. This is a field QC sample and the results were applied to the associated samples in other data packages.

Rinsate blank U3R00301 exhibited silvex, dinoseb, dicamba, dichloroprop, MCPP, and MCPA contamination at 0.031 ug/L, 0.011 ug/L, 0.20 ug/L, 0.17 ug/L, 520 ug/L, and 260 ug/L, respectively. This is a field QC sample and the results were applied to the associated samples in other data packages.

Rinsate blank U3R00401 was free of contamination. This is a field QC sample and the results were applied to the associated samples in other data packages.

SDG 0027S

Rinsate blank U3R00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, and MCPP contamination at 0.084 ug/L, 0.047 ug/L, 0.019 ug/L, 1.2 ug/L, 0.060 ug/L, 4.1 ug/L, and 120 ug/L, respectively.

Silvex has been qualified "U" in all samples unless already qualified "U" due to method blank contamination.

2,4,5-T has been qualified "U" in all samples except 08S00900D unless already qualified "U" due to method blank contamination.

Dicamba has been qualified "U" in associated sample 08S00900D. Dalapon has been qualified "U" in associated samples 08S00900, 08S00900D, 08S01000, 08S01300, 08S01400, and 08S03100.

MCPP has been qualified "U" in associated samples 08S01200, 08S01400, 08S01600, 08S01700, 08S01900, 08S02300, 08S02700, and 08S03100.

All other associated results have been qualified based on higher results from other field or method blanks.

Rinsate blank U3R00201 (in SDG 0026W) exhibited silvex, dinoseb, dicamba, dichloroprop, MCPP, and MCPA contamination at 0.018 ug/L, 0.033 ug/L, 0.23 ug/L, 0.059 ug/L, 120 ug/L, and 520 ug/L, respectively. Dinoseb has been qualified "U" in associated samples 08S00900, 08S01000, 08S01100, 08S01200, 08S01300, 08S01400, 08S01500, 08S01600, 08S01700, 08S01800, 08S01900, 08S02200, 08S02300, and 08S02600.

MCPP has been qualified "U" in all samples except those already non-detect for MCPP.

All other associated results have been qualified based on higher results from other field or method blanks.

SDG 0028S

Rinsate blank U3R00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, and MCPP contamination at 0.084 ug/L, 0.047 ug/L, 0.019 ug/L, 1.2 ug/L, 0.060 ug/L, 4.1 ug/L, and 120 ug/L, respectively.

Silvex has been qualified "U" in associated sample 08S04900.

2,4,5-T has been qualified "U" in associated samples 08S03400, 08S03500, 08S03700, 08S03800, 08S03800D, 08S04200, 08S04600, 08S04800, 08S04900, 08S05000, and 08S05100.

Dinoseb has been qualified "U" in associated samples 08S03400, 08S03500, 08S03600, 08S03800, 08S03900, 08S04100, 08S04300, 08S04500, 08S04600, 08S04800, and 09S02800.

Dicamba has been qualified "U" in associated samples 08S04700 and 08S05000.

Dalapon has been qualified "U" in associated samples 08S03700, 08S04200, 08S04700, and 08S04800.

All other associated results have been qualified based on higher results from other field or method blanks.

Rinsate blank U3R00301 (in SDG 0026W) exhibited silvex, dinoseb, dicamba, dichloroprop, MCPP, and MCPA contamination at 0.031 ug/L, 0.011 ug/L, 0.20 ug/L, 0.17 ug/L, 520 ug/L, and 260 ug/L, respectively.

Dichloroprop has been qualified "U" in associated samples 08S03400, 08S04800, and 08S04900.

MCPP has been qualified "U" in associated samples 08S03400, 08S03600, 08S03800, 08S03800D, 08S04100, 08S04300, 08S04400, and 08S04700.

MCPA has been qualified "U" in associated samples 08S03600, 08S03700, 08S03800, 08S04200, 08S04400, 08S04500, 08S04700, 08S04800, and 08S04900.

All other associated results have been qualified based on higher results from other field or method blanks.

SDG 0029S

Rinsate blank U3R00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, and MCPP contamination at 0.084 ug/L, 0.047 ug/L, 0.019 ug/L, 1.2 ug/L, 0.060 ug/L, 4.1 ug/L, and 120 ug/L, respectively.

Silvex has been qualified "U" in associated samples 08S02400, 08S02800, 08S02800D, 08S02900, 08S03000, 08S03200, 08S05200, 09S02300, 09S02400, 09S02500, 09S02500DL, 09S02600, and 09S02700.

2,4,5-T has been qualified "U" in associated samples 08S02400, 08S02800D, 08S02900, 08S03000, 08S03200, 08S03300, 08S05100D, 08S05200, 09S02300, 09S02400, 09S02500, 09S02500DL, 09S02600, and 09S02700.

Dinoseb has been qualified "U" in associated samples 08S02400, 08S02800, 08S02800D, 08S02900, 08S03300, 09S02600, and 09S02700.

Dalapon has been qualified "U" in associated samples 08S05200, 09S02300, 09S02500, and 09S02500DL.

MCPP has been qualified "U" in associated samples 08S02400, 08S02800D, 08S02900, 08S03200, 08S05100D, 08S05200, 09S02300, 09S02400, 09S02500DL, and 09S02600.

All other associated results have been qualified based on higher results from other field or method blanks.

Rinsate blank U3R00401 (in SDG 0026W) was free of contamination. No qualifications were required.

SDG 0031W

Rinsate blank U3R00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, and MCPP contamination at 0.084 ug/L, 0.047 ug/L, 0.019 ug/L, 1.2 ug/L, 0.060 ug/L, 4.1 ug/L, and 120 ug/L, respectively.

Dinoseb has been qualified "U" in associated samples 08G01301 and 09G01401.

Dalapon has been qualified "U" in associated samples 08G01501 and 08G01501DL.

MCPP has been qualified "U" in associated samples 08G01501, 09G01401, 09G01401D, and 09G01601.

All other associated results are non-detect, greater than 5X the blank concentration, or already qualified due to method blank contamination and no further qualifications were required.

Field Source Blanks

Field source blanks are used to evaluate contaminants that may have been introduced through site conditions. Field source blanks are typically prepared in the field (on-site) as opposed to a trip blank which is typically prepared at the laboratory and shipped with the cooler. Field source blanks results are summarized in the following section.

SDG 0001W

Source blank U3Y00001 exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, MCPP, and MCPA contamination at 0.027 ug/L, 0.00024 ug/L, 0.013 ug/L, 1.1 ug/L, 0.069 ug/L, 1.1 ug/L, 110 ug/L, and 120 ug/L, respectively.

MCPA has been qualified "U" in associated samples 08G00102, 08G00202, 09G00302, 09G00402DL, 09G00501DL, 09G00701, 09G00701DL, 09G01101, 09G01101DL, and 09G01201DL.

All other associated results are non-detect, greater than 5X the blank concentration, or already qualified due to method or field blank contamination and no further qualifications were required.

SDG 0025W

Source blank U3Y00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, MCPP, and MCPA contamination at 0.027 ug/L, 0.00024 ug/L, 0.013 ug/L, 1.1 ug/L, 0.069 ug/L, 1.1 ug/L, 110 ug/L, and 120 ug/L, respectively.

Dichloroprop has been qualified "U" in associated samples 08G00302, 08G00501, 08G00501D, 08G00601, 08G00701, 08G00901, 08G01001, and 08G01101.

MCPA has been qualified "U" in all samples except 08G00302.

All other associated results are non-detect, greater than 5X the blank concentration, or already qualified due to method or field blank contamination and no further qualifications were required.

SDG 0026S

Source blank U3Y00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, MCPP, and MCPA contamination at 0.027 ug/L, 0.00024 ug/L, 0.013 ug/L, 1.1 ug/L, 0.069 ug/L, 1.1 ug/L, 110 ug/L, and 120 ug/L, respectively. All associated results are non-detect or have been qualified based on higher results from other field or method blanks and no further qualifications were required.

SDG 0027S

Source blank U3Y00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, MCPP, and MCPA contamination at 0.027 ug/L, 0.00024 ug/L, 0.013 ug/L, 1.1 ug/L, 0.069 ug/L, 1.1 ug/L, 110 ug/L, and 120 ug/L, respectively. Dichloroprop has been qualified "U" in associated sample 08S02600. All other associated results have been qualified based on higher results from other field or method blanks.

SDG 0028S

Source blank U3Y00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, MCPP, and MCPA contamination at 0.027 ug/L, 0.00024 ug/L, 0.013 ug/L, 1.1 ug/L, 0.069 ug/L, 1.1 ug/L, 110 ug/L, and 120 ug/L, respectively, however, all associated results have been qualified based on higher results from other field or method blanks and no qualifications were required.

SDG 0029S

Source blank U3Y00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, MCPP, and MCPA contamination at 0.027 ug/L, 0.00024 ug/L, 0.013 ug/L, 1.1 ug/L, 0.069 ug/L, 1.1 ug/L, 110 ug/L, and 120 ug/L, respectively. Dichloroprop has been qualified "U" in associated samples 08S02400, 08S02800D, 08S02900, 08S03000, 08S03300, 08S05100D, 08S05200, 09S02400, 09S02600, and 09S02700.

MCPA has been qualified "U" in associated samples 08S02400, 08S02900, 08S03300, 08S05200, 09S02300, 09S02400, 09S02500, 09S02500DL, 09S02600, and 09S02700.

All other associated results have been qualified based on higher results from other field or method blanks and no further qualifications were required.

SDG 0031W

Source blank U3Y00001RE (in SDG 0001W) exhibited silvex, 2,4,5-T, dinoseb, dicamba, dichloroprop, dalapon, MCPP, and MCPA contamination at 0.027 ug/L, 0.00024 ug/L, 0.013 ug/L, 1.1 ug/L, 0.069 ug/L, 1.1 ug/L, 110 ug/L, and 120 ug/L, respectively.

Dichloroprop has been qualified "U" in associated samples 08G01501, 09G01401, and 09G01401D.

MCPA has been qualified "U" in associated sample 09G01501.

All other associated results are non-detect, greater than 5X the blank concentration, or already qualified due to method or field blank contamination and no further qualifications were required.

5.4 Comparability

The laboratory used standard analytical methods for all of the analyses. The method detection limits were below the contract required quantitation limits, therefore, the comparability was considered acceptable.

5.5 Completeness

There were no rejections of data in the herbicide analyses. The percent of valid data is 100%.

PARCC Criteria Summary Table

SDG Number	Precision	Accuracy	Representativeness	Completeness	Comparability
0001W	Acceptable	Acceptable w/qualification	Acceptable w/qualification	Acceptable	Acceptable
0025W	Acceptable	Acceptable w/qualification	Acceptable w/qualification	Acceptable	Acceptable
0026S	Acceptable w/qualification	Acceptable w/qualification	Acceptable w/qualification	Acceptable	Acceptable
0026W	Acceptable	Acceptable w/qualification	Acceptable w/qualification	Acceptable	Acceptable
0027S	Acceptable w/qualification	Acceptable w/qualification	Acceptable w/qualification	Acceptable	Acceptable
0028S	Acceptable w/qualification	Acceptable w/qualification	Acceptable w/qualification	Acceptable	Acceptable
0029S	Acceptable w/qualification	Acceptable w/qualification	Acceptable w/qualification	Acceptable	Acceptable
0031W	Acceptable	Acceptable w/qualification	Acceptable w/qualification	Acceptable	Acceptable

APPENDIX C-2

POSITIVE DETECTION TABLES

Appendix C, Table C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID / Sampling Date	Background Screening[1]	SCG for Residential Soil[2]	RBC[3] for Residential Soil	08B01001 13-Feb-98	08S00900 12-Nov-97	08S00900D 12-Nov-97	08S01000 12-Nov-97	08S01100 12-Nov-97	08S01200 12-Nov-97	08S01300 12-Nov-97	08S01400 12-Nov-97	08S01500 12-Nov-97
Semivolatile Organics, ug/kg												
Acenaphthylene		670,000	2,300,000 n					67 J				
Anthracene		20,000,000	23,000,000 n									
Benzo(a)anthracene		1,400	870 c		78 J		140 J	120 J				31 J
Benzo(a)pyrene		100	87 c					150 J				41 J
Benzo(b)fluoranthene		1,400	870 c		170 J			340 J				75 J
Benzo(g,h,i)perylene		14,000	2300000 n					80 J				
Benzo(k)fluoranthene		14,000	8,700 c		170 J			330 J				74 J
bis(2-Ethylhexyl)phthalate		48,000	46,000 c					270 J				
Butylbenzylphthalate		15,000,000	16000000 n		440 J							
Carbazole		42,000	32000 c									
Chrysene		140,000	87,000 c		85 J		110 J	230 J				54 J
Di-n-butylphthalate		7,300,000	7,800,000 n									
Dibenz(a,h)anthracene		100	87 c									
Fluoranthene		2,900,000	3,100,000 n		78 J			260 J				50 J
Indeno(1,2,3-cd)pyrene		1400	870 c					120 J				
Phenanthrene		1,700,000	2,300,000 n					80 J				
Pyrene		2,200,000	2,300,000 n		310 J			350 J				61 J
Pesticides/PCBs, ug/kg												
4,4'-DDD		4500	2,700 c	4.1 J	1.4 J	13 J		6.4 J	9.7 J	0.88 J	0.92 J	36 J
4,4'-DDE		3000	1,900 c	2.5 J	7.4 J	9.4	19 J	6.4 J	22			
4,4'-DDT		3100	1,900 c	2 J	12 J	13 J	3.6 J	6.5 J		1 J	0.35 J	160
Aldrin		60	38 c			0.56 J						
alpha-BHC		200	100 c									
alpha-Chlordane		800	1,800 c	5.1		6.8	1.7 J		19			78
Aroclor-1260		900	320 c						420 J			
beta-BHC		600	350 c									
delta-BHC		23000	350 c		2.1 J	1.6 J						5.9 J
Dieldrin		70	40 c	1.3 J	1.5 J	12 J	0.7 J	1.4 J	9 J		6.5 J	
Endosulfan I		390000	470,000 n						0.73 J			
Endosulfan II		390000	470,000 n				0.97 J					
Endosulfan sulfate		ND	470,000 n		11	8.1 J			2 J			2.3 J
Endrin		23000	23,000 n		0.74 J	1 J			6.7			
Endrin aldehyde		23000	23,000 n		1.5 J	5.9 J	1 J	1.4 J	7.1	0.55 J	0.46 J	
Endrin ketone		ND	23,000 n		3.4 J	3.5 J						
gamma-BHC (Lindane)		800	490 c									
gamma-Chlordane		800	1,600 c	5.8	0.32 J	9.7	1.3 J	5	11 J	0.48 J		140
Heptachlor		200	140 c									
Heptachlor epoxide		100	70 c		0.6 J	1.1 J			1.5 J			11
Methoxychlor		380000	390,000 n									
Herbicides, ug/kg												

Appendix C, Table C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID / Sampling Date	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	08B01001 13-Feb-98	08S00900 12-Nov-97	08S00900D 12-Nov-97	08S01000 12-Nov-97	08S01100 12-Nov-97	08S01200 12-Nov-97	08S01300 12-Nov-97	08S01400 12-Nov-97	08S01500 12-Nov-97
2,4,5-TP (Silvex)		610000	630,000 n	0.46 J								
2,4,5-T		760,000	780,000 n			10 J						
2,4-D		110000	780,000 n		17 J	37 J		13 J	36 J		16 J	
2,4-DB		610,000	630,000 n		100 J	63 J			63 J			
Dalapon		1900000	2,300,000 n									
Dichloroprop		3800	630000 n	20 J		88 J			41 J			
Dinoseb		43000	78,000 n	9.7 J		22 J						
MCPA		38000	39000 n									
MCPP		77,000	78,000 n	2300 J	35000 J		22000 J			26000 J		
Inorganics, mg/kg												
Aluminum	2088	75000	78,000 n		5800	6060	1110	1940	1600	64.7	127	931
Antimony	ND	26	31 n		4.2 J	4.6 J			7.8 J			
Arsenic	1.0	0.8	0.43 c		**30.5** J	**30.7** J	**7.8** J	**3.5** J	**6.2** J			**10.4** J
Barium	8.7	5,200	5,500 n		54.3 J	53.7 J	10.4 J	28.4 J	36.9 J	3.8 J	2.3 J	135
Beryllium	0.09	0.2	160 n									
Cadmium	0.98	37	39 n		0.87 J	0.87 J	0.36 J	0.07 J	1.5			1.1 J
Calcium	25295	ND	1000000		38100	38000		13000				12400
Chromium	4.6	290	390 n		11.4	11	27.4	5.4	208	1.6 J	9.2	5.6
Cobalt	ND	4700	4,700 n		0.76 J	0.36 J		0.17 J				
Copper	4.1	ND	3,100 n		25.5 J	24.6 J	11.1 J		49.3 J			24.8 J
Iron	712	ND	23,000 n		6440 J	4740 J	517 J	478 J	1230 J		108 J	2570 J
Lead	14.5	500	400		337	353	43.6	37.3	156	24.3	21.6	66.7
Manganese	6.1	370	1,600 n		146 J	130 J	12.7 J	18.5 J	16.9 J		8.4 J	52.4 J
Mercury	0.07	23	23 n		0.47 J	0.48 J	0.16 J	0.1 J	0.58 J	0.06 J	0.08 J	0.77 J
Nickel	4.4	1500	1,600 n		8.1 J	8.1 J	1.4 J	0.88 J	2.1 J		0.41 J	1.1 J
Selenium	0.95	390	390 n		4.2	3.2						1.6
Silver	1.8	390	390 n		4 J	3.8 J	62.7 J	3.8 J	122 J	0.65 J	9.6 J	16.8 J
Vanadium	3.1	490	550 n		6.7 J	6.4 J	1.7 J	2.4 J	2 J	0.15 J	0.19 J	2.2 J
Zinc	17.2	23000	23,000 n		764 J	808 J			137 J			260 J
General Chemistry, mg/kg												
Iron Oxide	ND	ND	ND	275 J	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	ND	ND	ND	10900	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C, C - 2.1

Summary of Detections in Soil Analytical Results

Study Area 8

Remedial Investigation, Operable Unit 3

Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil		08S01502	08S01600	08S01700	08S01800	08S01900	08S02000	08S02100	08S02200	08S02300
Sampling Date					13-Feb-98	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97
Semivolatile Organics, ug/kg													
Acenaphthylene		670,000	2,300,000	n	NA	63 J							
Anthracene		20,000,000	23,000,000	n	NA								
Benzo(a)anthracene		1,400	870	c	NA	120 J							
Benzo(a)pyrene		100	87	c	NA	**170** J						45 J	
Benzo(b)fluoranthene		1,400	870	c	NA	330 J							
Benzo(g,h,i)perylene		14,000	2300000	n	NA	120 J						17 J	
Benzo(k)fluoranthene		14,000	8,700	c	NA	330 J					990		44 J
bis(2-Ethylhexyl)phthalate		48,000	46,000	c	NA	42 J							
Butylbenzylphthalate		15,000,000	16000000	n	NA								
Carbazole		42,000	32000	c	NA								
Chrysene		140,000	87,000	c	NA	250 J							47 J
Di-n-butylphthalate		7,300,000	7,800,000	n	NA		58 J						
Dibenz(a,h)anthracene		100	87	c	NA							25 J	
Fluoranthene		2,900,000	3,100,000	n	NA	160 J							
Indeno(1,2,3-cd)pyrene		1400	870	c	NA	150 J							
Phenanthrene		1,700,000	2,300,000	n	NA	64 J						42 J	
Pyrene		2,200,000	2,300,000	n	NA	280 J							
Pesticides/PCBs, ug/kg													
4,4'-DDD		4500	2,700	c	NA	40 J	5 J				57	110	35
4,4'-DDE		3000	1,900	c	NA	22 J	17	2.1 J			18 J	23 J	5.3 J
4,4'-DDT		3100	1,900	c	NA	1200 D	7 J	1.2 J					
Aldrin		60	38	c	NA								
alpha-BHC		200	100	c	NA				0.12 J	0.12 J		2 J	96 J
alpha-Chlordane		800	1,800	c	NA	14 J	7.3						
Aroclor-1260		900	320	c	NA							0.79 J	
beta-BHC		600	350	c	NA		0.24 J	0.1 J		0.53 J	0.5 J		1.2 J
delta-BHC		23000	350	c	NA		3.8 J	1.7 J	6.2 J	5.1 J	5.3 J	1.9 J	
Dieldrin		70	40	c	NA							0.41 J	
Endosulfan I		390000	470,000	n	NA			0.43 J			1.6 J	0.24 J	
Endosulfan II		390000	470,000	n	NA								
Endosulfan sulfate		ND	470,000	n	NA								
Endrin		23000	23,000	n	NA	1.8 J							
Endrin aldehyde		23000	23,000	n	NA		0.27 J	0.91 J	0.51 J	0.72 J	1 J	0.27 J	
Endrin ketone		ND	23,000	n	NA								
gamma-BHC (Lindane)		800	490	c	NA								
gamma-Chlordane		800	1,600	c	NA			0.31 J			0.63 J	0.93 J	93 J
Heptachlor		200	140	c	NA								
Heptachlor epoxide		100	70	c	NA								
Methoxychlor		380000	390,000	n	NA								
Herbicides, ug/kg													

Appendix C, Table C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil		08S01502	08S01600	08S01700	08S01800	08S01900	08S02000	08S02100	08S02200	08S02300
Sampling Date					13-Feb-98	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97
2,4 5-TP (Silvex)		610000	630,000	n	NA								
2,4,5-T		760,000	780,000	n	NA								
2,4-D		110000	780,000	n	NA		14 J						14 J
2,4-DB		610,000	630,000	n	NA								
Dalapon		1900000	2,300,000	n	NA								
Dichloroprop		3800	630000	n	NA								
Dinoseb		43000	78,000	n	NA								
MCPA		38000	39000	n	NA								
MCPP		77,000	78,000	n	NA			24000 J		26000 J			
Inorganics, mg/kg													
Aluminum	2088	75000	78,000	n	NA	2240	3190	2190	122	33.1 J	694	1100	2280
Antimony	ND	26	31	n	NA								
Arsenic	1.0	0.8	0.43	c	NA	**6.2** J	**6.6** J	**6.3** J			**19.6** J	**10.1** J	**53** J
Barium	8.7	5,200	5,500	n	NA	25.5 J	48.8 J	19.3 J	3.5 J	1.2 J	32.6 J	15.8 J	36.3 J
Beryllium	0.09	0.2	160	n	NA		0.45						
Cadmium	0.98	37	39	n	NA		0.31 J	0.55 J			5	0.35 J	2.8
Calcium	25295	ND	1000000		NA	63200	41700	19900				28500	47000
Chromium	4.6	290	390	n	NA	10.7	27	14.6	3.8	1.8 J	88.3	9.8	16.4
Cobalt	ND	4700	4,700	n	NA		0.36 J	0.29 J			0.31 J		0.3 J
Copper	4.1	ND	3,100	n	NA	6.8 J	16.6 J	7.9 J			34.2 J	11 J	14.9 J
Iron	712	ND	23,000	n	NA	526 J	962 J	982 J	87.2 J		1690 J	601 J	1140 J
Lead	14.5	500	400		NA	25.2	400	53.7	8.8	8.9	81.6	26.3	289
Manganese	8.1	370	1,600	n	NA	33.4 J	127 J	37.9 J			24.8 J	27 J	75.3 J
Mercury	0.07	23	23	n	NA	0.18 J	0.16 J	0.13 J	0.19 J	0.05 J	0.21 J	0.53 J	0.11 J
Nickel	4.4	1500	1,600	n	NA	1.2 J	2.5 J	1.6 J			3.9 J	1.2 J	1.8 J
Selenium	0.95	390	390	n	NA								
Silver	1.8	390	390	n	NA	4.2 J	44 J	16.3 J	1.4 J	0.37 J	5.1 J	6.9 J	2.4 J
Vanadium	3.1	490	550	n	NA	4.5 J	4.8 J	3.1 J	0.26 J	0.19 J	2 J	2.6 J	4.6 J
Zinc	17.2	23000	23,000	n	NA						106 J		
General Chemistry, mg/kg													
Iron Oxide	ND	ND	ND		155 J	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	ND	ND	ND		151000	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C, C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID / Sampling Date	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	08S02400 17-Nov-97	08S02500 12-Nov-97	08S02600 14-Nov-97	08S02700 14-Nov-97	08S02800 17-Nov-97	08S02800D 17-Nov-97	08S02802 13-Feb-98	08S02802D 13-Feb-98	08S02900 17-Nov-97	08S03000 17-Nov-97
Semivolatile Organics, ug/kg													
Acenaphthylene		670,000	2,300,000 n							NA	NA		
Anthracene		20,000,000	23,000,000 n							NA	NA		
Benzo(a)anthracene		1,400	870 c			39 J	110 J	97 J	120 J	NA	NA		
Benzo(a)pyrene		100	87 c			40 J	**140 J**	**110 J**	**120 J**	NA	NA		
Benzo(b)fluoranthene		1,400	870 c			92 J	230 J	180 J	250 J	NA	NA		
Benzo(g,h,i)perylene		14,000	2300000 n				73 J	47 J	86 J	NA	NA		
Benzo(k)fluoranthene		14,000	8,700 c			92 J	230 J	54 J	250 J	NA	NA		
bis(2-Ethylhexyl)phthalate		48,000	46,000 c		91 J	37 J			52 J	NA	NA	77 J	1700
Butylbenzylphthalate		15,000,000	16000000 n							NA	NA		
Carbazole		42,000	32000 c							NA	NA		
Chrysene		140,000	87,000 c			50 J	140 J	120 J	130 J	NA	NA		
Di-n-butylphthalate		7,300,000	7,800,000 n		210 J	52 J				NA	NA		
Dibenz(a,h)anthracene		100	87 c						49 J	NA	NA		
Fluoranthene		2,900,000	3,100,000 n			58 J	69 J	170 J	200 J	NA	NA		
Indeno(1,2,3-cd)pyrene		1400	870 c				87 J	61 J	130 J	NA	NA		
Phenanthrene		1,700,000	2,300,000 n							NA	NA		
Pyrene		2,200,000	2,300,000 n			73 J	120 J	140 J	150 J	NA	NA		
Pesticides/PCBs, ug/kg													
4,4'-DDD		4500	2,700 c	14		3.3 J	2.4 J			NA	NA		7.1
4,4'-DDE		3000	1,900 c	14 J	17 J	7.6	10	7.1	6 J	NA	NA		9.5 J
4,4'-DDT		3100	1,900 c		4.2 J	8.4 J	10 J	8.1 J	8.2 J	NA	NA	4.1 J	1.3 J
Aldrin		60	38 c	0.29 J	0.62 J					NA	NA	0.35 J	
alpha-BHC		200	100 c							NA	NA		
alpha-Chlordane		800	1,800 c	2.1 J		2	2 J	4.1	4.1	NA	NA	26	1 J
Aroclor-1260		900	320 c							NA	NA		
beta-BHC		600	350 c							NA	NA		
delta-BHC		23000	350 c					0.42 J	0.39 J	NA	NA		
Dieldrin		70	40 c		10 J					NA	NA		
Endosulfan I		390000	470,000 n							NA	NA		
Endosulfan II		390000	470,000 n	2.4 J						NA	NA		
Endosulfan sulfate		ND	470,000 n					1.5 J	1.5 J	NA	NA		
Endrin		23000	23,000 n	3.1 J						NA	NA		1 J
Endrin aldehyde		23000	23,000 n	1.3 J		0.45 J	0.59 J			NA	NA	0.71 J	
Endrin ketone		ND	23,000 n							NA	NA		
gamma-BHC (Lindane)		800	490 c							NA	NA		
gamma-Chlordane		800	1,600 c	5.9	37 J			3.2 J	3.1 J	NA	NA	29	1.4 J
Heptachlor		200	140 c							NA	NA		
Heptachlor epoxide		100	70 c		1.1 J			0.14 J	0.12 J	NA	NA	0.22 J	
Methoxychlor		380000	390,000 n							NA	NA		
Herbicides, ug/kg													

Appendix C, Table C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID / Sampling Date	Background Screening[1]	SCG for Residential Soil[2]	RBC[3] for Residential Soil	08S02400 17-Nov-97	08S02500 12-Nov-97	08S02600 14-Nov-97	08S02700 14-Nov-97	08S02800 17-Nov-97	08S02800D 17-Nov-97	08S02802 13-Feb-98	08S02802D 13-Feb-98	08S02900 17-Nov-97	08S03000 17-Nov-97
2,4 5-TP (Silvex)		610000	630,000 n							NA	NA		
2,4,5-T		760,000	780,000 n							NA	NA		
2,4-D		110000	780,000 n	2.2 J		4.3 J	13 J	34	44 J	NA	NA	24 J	1.6 J
2,4-DB		610,000	630,000 n	14 J		8.7 J	3.9 J	11 J	4.5 J	NA	NA	30 J	13 J
Dalapon		1900000	2,300,000 n							NA	NA		
Dichloroprop		3800	630000 n							NA	NA		
Dinoseb		43000	78,000 n							NA	NA		3.2 J
MCPA		38000	39000 n							NA	NA		
MCPP		77,000	78,000 n							NA	NA		
Inorganics, mg/kg													
Aluminum	2088	75000	78,000 n	1290	2920	179	680	1100	974	NA	NA	1980	159
Antimony	ND	26	31 n	1.8 J	1.8 J			4.8 J	4.8 J	NA	NA	2.4 J	
Arsenic	1.0	0.8	0.43 c		**9.9** J		**3.5** J	**13.4**	**12.8**	NA	NA	**41.2**	**7.2**
Barium	8.7	5,200	5,500 n	7.5 J	67.1	57.6	12 J	11.7 J	10.7 J	NA	NA	31.5 J	2 J
Beryllium	0.09	0.2	160 n		0.49 J					NA	NA		
Cadmium	0.98	37	39 n		7.1	0.42 J	0.48 J	0.77 J	0.96 J	NA	NA	5.9	
Calcium	25295	ND	1000000		27500	9950		25200 J	23400 J	NA	NA	103000 J	
Chromium	4.6	290	390 n	36.9	130	7.9	15	7	8.7	NA	NA	31.7	1.5 J
Cobalt	ND	4700	4,700 n		0.55 J					NA	NA	2.6 J	
Copper	4.1	ND	3,100 n	8.3	70.5 J	9.8 J	7.3 J	9.1	9.5	NA	NA	26.5	
Iron	712	ND	23,000 n	352	2120 J	287 J	330 J	1520	4760	NA	NA	2690	81.9
Lead	14.5	500	400	10 J	**541**	37.1	23.2	344 J	379 J	NA	NA	408 J	9.7 J
Manganese	8.1	370	1,600 n		122 J	15.6 J	27.7 J	31.3	37.2	NA	NA	106	
Mercury	0.07	23	23 n		0.3 J	0.09 J	0.12 J			NA	NA		
Nickel	4.4	1500	1,600 n		9.3	0.6 J	0.94 J	2.1 J	2.3 J	NA	NA	3.8 J	
Selenium	0.95	390	390 n							NA	NA		
Silver	1.8	390	390 n	108 J	3.1 J	0.45 J	28.9 J	0.52 J	0.64 J	NA	NA	2.1 J	0.22 J
Vanadium	3.1	490	550 n	1.4 J	3.9 J	0.82 J	1 J	2.6 J	2.4 J	NA	NA	8.5 J	
Zinc	17.2	23000	23,000 n		178 J	125 J		710	633	NA	NA	486	
General Chemistry, mg/kg													
Iron Oxide	ND	ND	ND	NA	NA	NA	NA	NA	NA	153 J	239 J	NA	NA
Total Organic Carbon	ND	ND	ND	NA	NA	NA	NA	NA	NA	5260	7160	NA	NA

Appendix C, C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil		08S03100	08S03200	08S03300	08S03400	08S03500	08S03600	08S03700	08S03800	08S03800D	08S03900
Sampling Date					12-Nov-97	17-Nov-97	17-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97
Semivolatile Organics, ug/kg														
Acenaphthylene		670,000	2,300,000	n										
Anthracene		20,000,000	23,000,000	n										
Benzo(a)anthracene		1,400	870	c						42 J		350 J	360 J	
Benzo(a)pyrene		100	87	c								**430**	**370 J**	
Benzo(b)fluoranthene		1,400	870	c					55 J	43 J		580	520	
Benzo(g,h,i)perylene		14,000	2300000	n								300 J	260 J	
Benzo(k)fluoranthene		14,000	8,700	c								230 J	210 J	
bis(2-Ethylhexyl)phthalate		48,000	46,000	c			35 J							
Butylbenzylphthalate		15,000,000	16000000	n										
Carbazole		42,000	32000	c										
Chrysene		140,000	87,000	c						41 J		420	390 J	
Di-n-butylphthalate		7,300,000	7,800,000	n										
Dibenz(a,h)anthracene		100	87	c								70 J	59 J	
Fluoranthene		2,900,000	3,100,000	n					61 J	86 J		540	610	
Indeno(1,2,3-cd)pyrene		1400	870	c								270 J	240 J	
Phenanthrene		1,700,000	2,300,000	n						40 J		48 J	43 J	
Pyrene		2,200,000	2,300,000	n					58 J	61 J		580	500	
Pesticides/PCBs, ug/kg														
4,4'-DDD		4500	2,700	c	780 DJ		6.8							
4,4'-DDE		3000	1,900	c	460 J	0.53 J	79 D	170	28 J	90 D	2 J	0.53 J		19 JD
4,4'-DDT		3100	1,900	c	450	2.8 J	7.6 J	33	6.9 J	22 J		4.2	2.5 J	44
Aldrin		60	38	c	49 J									
alpha-BHC		200	100	c										
alpha-Chlordane		800	1,800	c	**3700** D		5.7 J	69	90 D	4.7	0.35 J	1 J	0.79 J	31 JD
Aroclor-1260		900	320	c							320			
beta-BHC		600	350	c	12 J									
delta-BHC		23000	350	c	77 J		0.22 J							
Dieldrin		70	40	c			1.2 J	26 J						
Endosulfan I		390000	470,000	n										
Endosulfan II		390000	470,000	n							2.1 J	0.87 J	0.77 J	
Endosulfan sulfate		ND	470,000	n	25 J									
Endrin		23000	23,000	n	130 J				0.28 J		0.88 J			
Endrin aldehyde		23000	23,000	n				1.2 J	0.96 J					
Endrin ketone		ND	23,000	n										
gamma-BHC (Lindane)		800	490	c										
gamma-Chlordane		800	1,600	c	**2900** D		7.3	68	95 D	4.8	0.37 J		0.68 J	9.5 JD
Heptachlor		200	140	c	**680** D									
Heptachlor epoxide		100	70	c	**130** J			1.6 J	3.8					7.9
Methoxychlor		380000	390,000	n										
Herbicides, ug/kg														

Appendix C, Table C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	08S03100	08S03200	08S03300	08S03400	08S03500	08S03600	08S03700	08S03800	08S03800D	08S03900
Sampling Date				12-Nov-97	17-Nov-97	17-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97
2,4 5-TP (Silvex)		610000	630,000 n			3.2 J							
2,4,5-T		760,000	780,000 n		9.2 J	4.5 J	53 J			2.1 J	14 J		
2,4-D		110000	780,000 n	72 J	4.7 J								
2,4-DB		610,000	630,000 n										
Dalapon		1900000	2,300,000 n										
Dichloroprop		3800	630000 n							3.6 J			
Dinoseb		43000	78,000 n	240 J	3.4 J								
MCPA		38000	39000 n		31000 J								
MCPP		77,000	78,000 n										
Inorganics, mg/kg													
Aluminum	2088	75000	78,000 n	105	187	919	3770	1570	211	471	710	596	2200
Antimony	ND	26	31 n			0.79 J							
Arsenic	1.0	0.8	0.43 c	**39.2** J	**2.5**	**8.1**	**90**	**55.9**	**5.6**				**18.1**
Barium	8.7	5,200	5,500 n	2.3 J	4.2 J	5.4 J	44.9 J	19.4 J	4.3 J	4.7 J	6.1 J	6 J	14.5 J
Beryllium	0.09	0.2	160 n										
Cadmium	0.98	37	39 n	1.5			5.2	3.5	0.37 J				0.19 J
Calcium	25295	ND	1000000		14900 J		168000	61200	17500	78600	42700	38800	47100
Chromium	4.6	290	390 n	2.6	3.6	3.4	65.7 J	29.1 J	3.5 J	3.8	4.3 J	4.6 J	11.8 J
Cobalt	ND	4700	4,700 n				1.3 J	0.3 J					0.42 J
Copper	4.1	ND	3,100 n	12.6 J	7.1	3.6 J	77.5	23.4	11	3.4 J		6.5	7.4
Iron	712	ND	23,000 n	240 J	174	455	4690	2230	347		372	340	688
Lead	14.5	500	400	8.9	12.4 J	23.4 J	190	121	43.2		18.6	18	8.9
Manganese	8.1	370	1,600 n	9.4 J	10.8		414	66.7	9.5	22.4	25.8	24.7	26.9
Mercury	0.07	23	23 n	0.07 J			1.1 J						0.35 J
Nickel	4.4	1500	1,600 n	1.6 J			9 J	3.1 J					2.3 J
Selenium	0.95	390	390 n				3.4						1.3
Silver	1.8	390	390 n	0.4 J	0.18 J	0.58 J	4.3 J	4.1	0.4 J				0.26 J
Vanadium	3.1	490	550 n	0.25 J	1.2 J	1.3 J	18.1 J	5.9 J	0.69 J	2.7 J	2 J	1.8 J	7.4 J
Zinc	17.2	23000	23,000 n	370 J			1040 J	460 J		383 J			
General Chemistry, mg/kg													
Iron Oxide	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C, [illegible]C - 2.1
Summary of Detections in [illegible] Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID / Sampling Date	Background Screening[1]	SCG for Residential Soil[2]	RBC[3] for Residential Soil	08S04000 14-Nov-97	08S04100 14-Nov-97	08S04200 14-Nov-97	08S04300 14-Nov-97	08S04400 14-Nov-97	08S04500 14-Nov-97	08S04600 14-Nov-97	08S04700 14-Nov-97	08S04800 14-Nov-97	08S04802 13-Feb-98
Semivolatile Organics, ug/kg													
Acenaphthylene		670,000	2,300,000 n										NA
Anthracene		20,000,000	23,000,000 n										NA
Benzo(a)anthracene		1,400	870 c				330 J					63 J	NA
Benzo(a)pyrene		100	87 c				**310 J**					73 J	NA
Benzo(b)fluoranthene		1,400	870 c				440	69 J				180 J	NA
Benzo(g,h,i)perylene		14,000	2300000 n				200 J					40 J	NA
Benzo(k)fluoranthene		14,000	8,700 c				170 J					190 J	NA
bis(2-Ethylhexyl)phthalate		48,000	46,000 c									150 J	NA
Butylbenzylphthalate		15,000,000	16000000 n										NA
Carbazole		42,000	32000 c										NA
Chrysene		140,000	87,000 c				330 J	59 J				100 J	NA
Di-n-butylphthalate		7,300,000	7,800,000 n										NA
Dibenz(a,h)anthracene		100	87 c				50 J						NA
Fluoranthene		2,900,000	3,100,000 n				570	100 J				120 J	NA
Indeno(1,2,3-cd)pyrene		1400	870 c				200 J					58 J	NA
Phenanthrene		1,700,000	2,300,000 n										NA
Pyrene		2,200,000	2,300,000 n				450	70 J				140 J	NA
Pesticides/PCBs, ug/kg													
4,4'-DDD		4500	2,700 c				4.8 J	33 J		150 J			NA
4,4'-DDE		3000	1,900 c	0.64 J			1600 D			170 D			NA
4,4'-DDT		3100	1,900 c	2 J	1.8 J		2200 D	30	2 J	49	6.2 J	28	NA
Aldrin		60	38 c		0.27 J							0.51 J	NA
alpha-BHC		200	100 c										NA
alpha-Chlordane		800	1,800 c	3 J	17	0.45 J	1.6 J	280 D	1.6 J	0.39 J	2.2 J	50 D	NA
Aroclor-1260		900	320 c			66 J							NA
beta-BHC		600	350 c										NA
delta-BHC		23000	350 c					2.4 J	0.37 J				NA
Dieldrin		70	40 c	0.83 J	23			**91 D**					NA
Endosulfan I		390000	470,000 n				1.2 J			0.5 J			NA
Endosulfan II		390000	470,000 n										NA
Endosulfan sulfate		ND	470,000 n					2.5 J					NA
Endrin		23000	23,000 n							5.2 J			NA
Endrin aldehyde		23000	23,000 n				1.6 J					0.68 J	NA
Endrin ketone		ND	23,000 n										NA
gamma-BHC (Lindane)		800	490 c										NA
gamma-Chlordane		800	1,600 c	1.2 J	16			180 D	3.6	0.16 J		51 D	NA
Heptachlor		200	140 c										NA
Heptachlor epoxide		100	70 c				0.68 J	11				1.4 J	NA
Methoxychlor		380000	390,000 n										NA
Herbicides, ug/kg													

Appendix C, Table C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	08S04000	08S04100	08S04200	08S04300	08S04400	08S04500	08S04600	08S04700	08S04800	08S04802
Sampling Date				14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	13-Feb-98
2,4 5-TP (Silvex)		610000	630,000 n								15 J		NA
2,4,5-T		760,000	780,000 n								20 J		NA
2,4-D		110000	780,000 n	2.6 J		15 J		14 J			13 J	3 J	NA
2,4-DB		610,000	630,000 n			7.1 J					35 J	28 J	NA
Dalapon		1900000	2,300,000 n										NA
Dichloroprop		3800	630000 n								48 J		NA
Dinoseb		43000	78,000 n					36 J			11 J		NA
MCPA		38000	39000 n										NA
MCPP		77,000	78,000 n										NA
Inorganics, mg/kg													
Aluminum	2088	75000	78,000 n	216	837	207	2370	2900	608	1860	2080	1800	NA
Antimony	ND	26	31 n										NA
Arsenic	1.0	0.8	0.43 c	**1.4** J	**25**		**3.6**	**11.7**	**11.6**	**14.6**	**8.2** J	**65.6**	NA
Barium	8.7	5,200	5,500 n	5.3 J	10.7 J	2.2 J	10.4 J	18.1 J	8.6 J	12.3 J	24.7 J	19.5 J	NA
Beryllium	0.09	0.2	160 n										NA
Cadmium	0.98	37	39 n				2.5	3	1.6			1.9	NA
Calcium	25295	ND	1000000	334000	48600	27300				30900	38000	35400	NA
Chromium	4.6	290	390 n	11.7 J	9.4 J		37.9 J	63.3 J	21.5 J	11 J	7 J	20.3 J	NA
Cobalt	ND	4700	4,700 n	0.51 J	0.29 J			0.53 J		0.4 J		0.6 J	NA
Copper	4.1	ND	3,100 n		11.3		15.2	27.8	18.5		16.8 J	43.7	NA
Iron	712	ND	23,000 n	967	2050	142	359	1390	1140	909	1170	3090	NA
Lead	14.5	500	400		40.1	2.7	9.9	20.6	40.7	15.9	163	72.8	NA
Manganese	8.1	370	1,600 n	24	45.4			51.2	24.6	89.8	33.2	131	NA
Mercury	0.07	23	23 n		1.7 J		0.72 J	0.47 J	0.64 J		0.51 J		NA
Nickel	4.4	1500	1,600 n	2.2 J	2.2 J		3.9 J	5.4 J	2 J	2.1 J	4.3 J	4.4 J	NA
Selenium	0.95	390	390 n				1.3				4.5	1.4	NA
Silver	1.8	390	390 n		0.59 J		0.24 J	1.1 J	2.2 J	0.62 J		2.5 J	NA
Vanadium	3.1	490	550 n	18.6	3.5 J	0.76 J	3.6 J	4.9 J	2.4 J	5.2 J	4.8 J	4.4 J	NA
Zinc	17.2	23000	23,000 n					162 J	325 J			296 J	NA
General Chemistry, mg/kg													
Iron Oxide	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	396 J
Total Organic Carbon	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	12500

Appendix C, Table C - 2.1
Summary of Detections, Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening[1]	SCG for Residential Soil[2]	RBC[3] for Residential Soil	08S04900	08S05000	08S05002	08S05100	08S05100D	08S05200	08S05301	08S05401	08S05501	08S05601
Sampling Date				14-Nov-97	14-Nov-97	13-Feb-98	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
Semivolatile Organics, ug/kg													
Acenaphthylene		670,000	2,300,000 n			NA							
Anthracene		20,000,000	23,000,000 n			NA							
Benzo(a)anthracene		1,400	870 c	37 J		NA			76 J	320 J		48 J	
Benzo(a)pyrene		100	87 c	36 J		NA			61 J	270 J	50 J		
Benzo(b)fluoranthene		1,400	870 c	88 J		NA			120 J	320 J	82 J	72 J	
Benzo(g,h,i)perylene		14,000	2300000 n			NA			42 J	120 J			
Benzo(k)fluoranthene		14,000	8,700 c	89 J		NA			110 J	280 J	110 J	93 J	
bis(2-Ethylhexyl)phthalate		48,000	46,000 c	38 J		NA				69 J	170 J	51 J	140 J
Butylbenzylphthalate		15,000,000	16000000 n			NA							
Carbazole		42,000	32000 c			NA							
Chrysene		140,000	87,000 c	45 J		NA			56 J	310 J	43 J		
Di-n-butylphthalate		7,300,000	7,800,000 n			NA							
Dibenz(a,h)anthracene		100	87 c			NA				85 J			
Fluoranthene		2,900,000	3,100,000 n	59 J		NA			81 J	700	51 J	110 J	88 J
Indeno(1,2,3-cd)pyrene		1400	870 c			NA			38 J	160 J			
Phenanthrene		1,700,000	2,300,000 n			NA				130 J			
Pyrene		2,200,000	2,300,000 n	71 J		NA			83 J	460	51 J	67 J	
Pesticides/PCBs, ug/kg													
4,4'-DDD		4500	2,700 c	36 J		NA						6.8 J	
4,4'-DDE		3000	1,900 c	96 D		NA				0.34 J	160 D	28	32
4,4'-DDT		3100	1,900 c	27 J	1.5 J	NA	0.42 J	0.31 J	1.2 J	1.5 J	11 J	18	3 J
Aldrin		60	38 c			NA							0.28 J
alpha-BHC		200	100 c			NA							
alpha-Chlordane		800	1,800 c	12	100 D	NA	11	10	1 J	1.3 J	7.7 J	2.6	17 J
Aroclor-1260		900	320 c			NA							
beta-BHC		600	350 c			NA							
delta-BHC		23000	350 c			NA							
Dieldrin		70	40 c			NA		0.69 J		0.33 J		2.6 J	2 J
Endosulfan I		390000	470,000 n	0.58 J		NA							
Endosulfan II		390000	470,000 n			NA							5.9 J
Endosulfan sulfate		ND	470,000 n			NA			1 J				1.7 J
Endrin		23000	23,000 n			NA							
Endrin aldehyde		23000	23,000 n	1.4 J		NA					1.4 J	0.54 J	
Endrin ketone		ND	23,000 n	3.7 J		NA					1.2 J		
gamma-BHC (Lindane)		800	490 c			NA						0.22 J	
gamma-Chlordane		800	1,600 c	13	100 D	NA	11	11		0.82 J	6	2.1 J	0.8 J
Heptachlor		200	140 c			NA				0.23 J			
Heptachlor epoxide		100	70 c		0.54 J	NA					9.7	0.24 J	0.24 J
Methoxychlor		380000	390,000 n			NA				1.4 J			7.6 J
Herbicides, ug/kg													

Appendix C, Table C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening[1]	SCG for Residential Soil[2]	RBC[3] for Residential Soil	08S04900	08S05000	08S05002	08S05100	08S05100D	08S05200	08S05301	08S05401	08S05501	08S05601
Sampling Date				14-Nov-97	14-Nov-97	13-Feb-98	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
2,4 5-TP (Silvex)		610000	630,000 n			NA				0.46 J		1.3 J	0.61 J
2,4,5-T		760,000	780,000 n			NA						4.6 J	
2,4-D		110000	780,000 n			NA		2.1 J	1.2 J				
2,4-DB		610,000	630,000 n	6 J		NA	4.9 J	5.1 J		140 J	110 J	120 J	
Dalapon		1900000	2,300,000 n			NA							8.4 J
Dichloroprop		3800	630000 n			NA				15 J	61 J	140 J	
Dinoseb		43000	78,000 n			NA							
MCPA		38000	39000 n			NA					16000 J		6000 J
MCPP		77,000	78,000 n	99000 J		NA					4600 J		
Inorganics, mg/kg													
Aluminum	2088	75000	78,000 n	770	836	NA	475	476	374	576	1230		3250
Antimony	ND	26	31 n			NA						1.2 J	
Arsenic	1 0	0.8	0.43 c	14.6	4	NA	3.4	2.4	1.8 J	5.3	14.6	2.5 J	8.6
Barium	8.7	5,200	5,500 n	9.3 J	8.7 J	NA	6.2 J	5.1 J	4.7 J	7.1 J	14.7 J		15.5 J
Beryllium	0 09	0.2	160 n			NA						0.14 J	
Cadmium	0.98	37	39 n	1.2 J		NA					2.1		
Calcium	25295	ND	1000000		50400	NA	172000	114000 J	37400 J			7230 J	
Chromium	4.6	290	390 n	13.5 J	14.7 J	NA	6.8 J	5.7	5.5	3.6	38.8		3.8 J
Cobalt	ND	4700	4,700 n			NA							
Copper	4.1	ND	3,100 n	11	16.9	NA	6.4	6.8	5.3 J	7	24.5	23.5	8 J
Iron	712	ND	23,000 n	658	606	NA	440	418	294	428 J	694 J	510 J	1000 J
Lead	14.5	500	400	21.5	12.4	NA	6.2	10.8 J	10.3 J	17.8	18	83	144
Manganese	8.1	370	1,600 n	48.4	41.6	NA	49	43.7	44.5				
Mercury	0 07	23	23 n	0.36 J		NA					0.14	0.08 J	0.11 J
Nickel	4.4	1500	1,600 n	1.8 J	1.9 J	NA				0.62 J	3.3 J	0.94 J	1.5 J
Selenium	0.95	390	390 n			NA							
Silver	1.8	390	390 n	7.8	0.39 J	NA			0.51 J		2.3 J		0.47 J
Vanadium	3.1	490	550 n	1.2 J	2.7 J	NA	3.6 J	3.4 J	2.1 J	1.3 J	1.2 J	2 J	3.9 J
Zinc	17.2	23000	23,000 n			NA							81.3 J
General Chemistry, mg/kg													
Iron Oxide	ND	ND	ND	NA	NA	54.4 J	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	ND	ND	ND	NA	NA	16000 >	NA	NA	NA	NA	NA	NA	NA

Appendix C, C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID / Sampling Date	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	08S05701 10-Feb-98	08S05702 13-Feb-98	08S05801 10-Feb-98	08S05901 10-Feb-98	08S06001 10-Feb-98	08S06101 10-Feb-98	08S06201 10-Feb-98	08S06301 10-Feb-98	08S06301D 10-Feb-98
Semivolatile Organics, ug/kg												
Acenaphthylene		670,000	2,300,000 n	140 J	NA							
Anthracene		20,000,000	23,000,000 n	540	NA							
Benzo(a)anthracene		1,400	870 c	1300	NA							
Benzo(a)pyrene		100	87 c	**1100**	NA							
Benzo(b)fluoranthene		1,400	870 c	**3700** J	NA		81 J					
Benzo(g,h,i)perylene		14,000	2300000 n	260 J	NA							
Benzo(k)fluoranthene		14,000	8,700 c	3700 J	NA		110 J					
bis(2-Ethylhexyl)phthalate		48,000	46,000 c	54 J	NA	230 J	120 J	46 J	83 J	47 J	50 J	130 J
Butylbenzylphthalate		15,000,000	16000000 n		NA							
Carbazole		42,000	32000 c	260 J	NA							
Chrysene		140,000	87,000 c	1900	NA							
Di-n-butylphthalate		7,300,000	7,800,000 n		NA							
Dibenz(a,h)anthracene		100	87 c	**280** J	NA							
Fluoranthene		2,900,000	3,100,000 n	2600	NA							
Indeno(1,2,3-cd)pyrene		1400	870 c	460 J	NA							
Phenanthrene		1,700,000	2,300,000 n		NA							
Pyrene		2,200,000	2,300,000 n	2600	NA							
Pesticides/PCBs, ug/kg												
4,4'-DDD		4500	2,700 c		NA	1.6 J	3.8 J					
4,4'-DDE		3000	1,900 c	1.1 J	NA	9.5 J	7.4 J	2 J				
4,4'-DDT		3100	1,900 c	4.2 J	NA	4.2 J	3.8 J				0.22 J	0.44 J
Aldrin		60	38 c		NA							
alpha-BHC		200	100 c		NA	1.3 J						
alpha-Chlordane		800	1,800 c	0.19 J	NA	37 J	5.4 J		0.41 J		6.1	6.4
Aroclor-1260		900	320 c		NA							
beta-BHC		600	350 c		NA							
delta-BHC		23000	350 c		NA							
Dieldrin		70	40 c	0.29 J	NA	1.7 J	2.5 J				20 J	24 J
Endosulfan I		390000	470,000 n		NA							
Endosulfan II		390000	470,000 n	4.2 J	NA	1.2 J						
Endosulfan sulfate		ND	470,000 n		NA	2.7 J						
Endrin		23000	23,000 n	6.3 J	NA							
Endrin aldehyde		23000	23,000 n		NA				0.47 J		0.73 J	0.86 J
Endrin ketone		ND	23,000 n		NA	2.6 J	0.66 J				0.36 J	0.51 J
gamma-BHC (Lindane)		800	490 c	3.2 J	NA	18 J	0.3 J					
gamma-Chlordane		800	1,600 c		NA	1.4 J	0.64 J		0.11 J		2.8	3.2
Heptachlor		200	140 c		NA							
Heptachlor epoxide		100	70 c		NA	1.4 J					0.23 J	0.27 J
Methoxychlor		380000	390,000 n	87 J	NA							
Herbicides, ug/kg												

Appendix C, Table C - 2.1
Summary of Detections in Soil Analytical Results
Study Area 8

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	08S05701	08S05702	08S05801	08S05901	08S06001	08S06101	08S06201	08S06301	08S06301D
Sampling Date				10-Feb-98	13-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
2,4 5-TP (Silvex)		610000	630,000 n	0.33 J	NA		1.7 J	16 J	0.25 J		0.2 J	0.9 J
2,4,5-T		760,000	780,000 n	1.9 J	NA		2.8 J	4.8 J		2.1 J		1.9 J
2,4-D		110000	780,000 n	23 J	NA		13 J			13 J		16 J
2,4-DB		610,000	630,000 n	120 J	NA		310 J	1.9 J	100 J	100 J	87 J	2.8 J
Dalapon		1900000	2,300,000 n		NA		50 J					
Dichloroprop		3800	630000 n	15 J	NA		4 J	62 J	43 J	28 J	14 J	68 J
Dinoseb		43000	78,000 n		NA							
MCPA		38000	39000 n		NA		32000 J		9400 J	11000 J		
MCPP		77,000	78,000 n	6800 J	NA		38000 J	10000 J	7900 J	3700 J	3200 J	16000 J
Inorganics, mg/kg												
Aluminum	2088	75000	78,000 n	218	NA	9130	1780	90.6	781	65.6	304	361
Antimony	ND	26	31 n		NA	16.3 J	5.8 J					
Arsenic	1.0	0.8	0.43 c		NA	**2.9** J	**6.7**		**3.4**		**3.3**	**4.3**
Barium	8.7	5,200	5,500 n	4.9 J	NA	23.2 J	31.1 J	3.5 J	2.4 J	1.4 J	11.7 J	16.5 J
Beryllium	0.09	0.2	160 n		NA	2 J						
Cadmium	0.98	37	39 n		NA	2.5 J		0.08 J			0.61 J	0.66 J
Calcium	25295	ND	1000000		NA							
Chromium	4.6	290	390 n	0.95 J	NA	6.5 J	6.8	2.3 J	4.2	1.7 J	17.7	14.5
Cobalt	ND	4700	4,700 n		NA							
Copper	4.1	ND	3,100 n	2.8 J	NA	17.4 J	11 J	2.6 J	3.2 J	1.5 J	13.3	14.7
Iron	712	ND	23,000 n	306 J	NA	1260 J	1780 J	75.1 J	188 J	93 J	305 J	352 J
Lead	14.5	500	400	15.9	NA	**902**	268	19.9	7.1	2.8	15	22.8
Manganese	8.1	370	1,600 n		NA							
Mercury	0.07	23	23 n		NA						0.17	0.34
Nickel	4.4	1500	1,600 n	0.46 J	NA	6.2 J	4.3 J	2.1 J	0.41 J		1.2 J	1.4 J
Selenium	0.95	390	390 n		NA							
Silver	1.8	390	390 n		NA		5.9	1.1 J	1.6 J		1.3 J	2 J
Vanadium	3.1	490	550 n	1.1 J	NA	8.1 J	3 J	0.72 J	0.48 J		0.76 J	0.66 J
Zinc	17.2	23000	23,000 n		NA	45.4 J	79.3 J					
General Chemistry, mg/kg												
Iron Oxide	ND	ND	ND	NA	205 J	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	ND	ND	ND	NA	16000 >	NA	NA	NA	NA	NA	NA	NA

Appendix C, C - 2.2
Summary of Detections in Groundwater Analytical Results
Study Area 8

Remedial Investigations, Operable Unit 3
Naval Training Center, Orlando, Florida

				WELL ID	OLD-08-01	OLD-08-02	OLD-08-03	OLD-08-04	OLD-08-05		OLD-08-06	OLD-08-07
Identifier	Background[1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	08G00102	08G00202	08G00302	08G00402	08G00501	08G00501D	08G00601	08G00701
Sampling Date					22-Oct-97	22-Oct-97	22-Oct-97	22-Oct-97	23-Oct-97	23-Oct-97	23-Oct-97	23-Oct-97
Semivolatile Organics, ug/L												
Naphthalene		6.8 o	ND	1,500 n	25							
Pesticides/PCBs, ug/L												
4,4'-DDT		0.1 c	ND	0.2 c	0.01 J							
delta-BHC		0.05 st	ND	0.037 c								
Dieldrin		0.1 c	ND	0.0042 c								
Endosulfan sulfate		0.3 st	ND	220 n		0.01 J						
Endrin		2 p	2	11 n	0.01 J							
Endrin aldehyde		0.1 st	ND	11 n								
Herbicides, ug/L												
2,4-D		70 p	70	61 n	0.1 J	0.01 J		0.02 J			0.22 J	
2,4-DB		ND	ND	290 n	0.05 J	0.09 J	0.6 J	0.18 J	1.4 J		0.57 J	
Dalapon		200 p	200	1100 n								
Dichloroprop		ND	ND	290 n								
Dinoseb		7 p	7	6.1 n					0.1 J		0.28 J	
MCPA		1000 st	ND	18 n			640 J					
MCPP		ND	ND	37 n	**790** J							
Inorganics, ug/L												
Aluminum	4,067	200 s	ND	37,000 n								
Antimony	4.1	6 p	6	15 n	3.7 J							
Arsenic	5	50 p	50	0.045 c	**133**	**295**	**79.9**	**70.4**	**57.7**	**57.3**	**53**	**56.4**
Barium	31.4	2,000 p	2,000	2,600 n	19 J	25.1 J	14.7 J		11.8 J	11.3 J	12.3 J	8 J
Calcium	36,830	ND	ND	1,000,000	101000	104000	37500	28900	33200	33100	28100	45300
Chromium	7.8	100 p	100	180 n	2.6 J	1.4 J	1.7 J	1.5 J	1.8 J	2.3 J	3.4 J	1.1 J
Cobalt	ND	ND	ND	2,200 n								
Copper	5.4	1,000 s	1,300	1,500 n			1.5 J	1.3 J	1.2 J	0.96 J	6.7 J	3.3 J
Iron	1,227	300 s	ND	11,000 n	1460		231				198	529
Lead	4	15 p	15	15							6.6	
Manganese	17	50 s	ND	730 n	12.6 J	6.7 J	15.3	16.4	160	162	24.2	11 J
Nickel	ND	100 p	100	730 n	1.7 J	1.4 J	1.6 J	3 J				
Potassium	5,400	ND	ND	297,016	16000	10800	9130	9940	11200	11200	11700	11000
Sodium	18,222	160,000 p	ND	396,022								
Vanadium	20.6	49 st	ND	260 n	0.86 J						2 J	1.8 J
General Chemistry, mg/L												
Total Organic Carbon	ND	ND	ND	ND	27.4	28.6	30.6	27	31.2	NA	33.7	22.9
Total Suspended Solids	ND	ND	ND	ND	5					NA		

Appendix C, Table C - 2.2
Summary of Detections in Groundwater Analytical Results
Study Area 8

Remedial Investigations, Operable Unit 3
Naval Training Center, Orlando, Florida

				WELL ID	OLD-08-08		OLD-08-09		OLD-08-10	OLD-08-11	OLD-08-12	
Identifier	Background[1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	08G00801	08G00801D	08G00901	08F00901	08G01001	08G01101	08G01201	08F01201
Sampling Date					22-Oct-97	22-Oct-97	22-Oct-97	22-Oct-97	23-Oct-97	23-Oct-97	23-Oct-97	23-Oct-97
Semivolatile Organics, ug/L												
Naphthalene		6.8 o	ND	1,500 n				NA				NA
Pesticides/PCBs, ug/L												
4,4'-DDT		0.1 c	ND	0.2 c				NA				NA
delta-BHC		0.05 st	ND	0.037 c				NA				NA
Dieldrin		0.1 c	ND	0.0042 c				NA		0.02 J		NA
Endosulfan sulfate		0.3 st	ND	220 n				NA				NA
Endrin		2 p	2	11 n				NA				NA
Endrin aldehyde		0.1 st	ND	11 n				NA				NA
Herbicides, ug/L												
2,4-D		70 p	70	61 n	0.12 J	0.11 J	0.08 J	NA		0.05 J	0.08 J	NA
2,4-DB		ND	ND	290 n	0.16 J	0.11 J	0.06 J	NA				NA
Dalapon		200 p	200	1100 n				NA				NA
Dichloroprop		ND	ND	290 n	0.69 J	0.66 J		NA				NA
Dinoseb		7 p	7	6.1 n				NA				NA
MCPA		1000 st	ND	18 n				NA				NA
MCPP		ND	ND	37 n		**710 J**		NA	**900 J**	**660 J**		
Inorganics, ug/L												
Aluminum	4,067	200 s	ND	37,000 n			372	252	614		1450	412
Antimony	4.1	6 p	6	15 n								
Arsenic	5	50 p	50	0.045 c	**122**	**120**	**117**	**96.4**	**209**	**223**		
Barium	31.4	2,000 p	2,000	2,600 n	26.6 J	26.1 J		4.9 J	15 J		38.5 J	18.2 J
Calcium	36,830	ND	ND	1,000,000	131000	134000	45600	43300	7230	89800		
Chromium	7.8	100 p	100	180 n				1.3 J			0.83 J	
Cobalt	ND	ND	ND	2,200 n								
Copper	5.4	1,000 s	1,300	1,500 n	1.5 J	1.4 J	1.2 J		6.5 J	0.9 J	1.5 J	0.95 J
Iron	1,227	300 s	ND	11,000 n			455	410	825		5800	4080
Lead	4	15 p	15	15								
Manganese	17	50 s	ND	730 n	6.3 J	6.4 J	18.5	18.9	54.4	5.3 J	71.8	51
Nickel	ND	100 p	100	730 n				1.7 J				
Potassium	5,400	ND	ND	297,016	8670	8900	4980 J	4720 J		11600		
Sodium	18,222	160,000 p	ND	396,022								
Vanadium	20.6	49 st	ND	260 n			2.3 J	2.3 J	2.8 J		4.2 J	2.6 J
General Chemistry, mg/L												
Total Organic Carbon	ND	ND	ND	ND	20.7	NA	31.5	NA	21.1	20.9	8.47	NA
Total Suspended Solids	ND	ND	ND	ND		NA		NA			8	NA

Appendix C, C - 2.2
Summary of Detections in Groundwater Analytical Results
Study Area 8

Remedial Investigations, Operable Unit 3
Naval Training Center, Orlando, Florida

Identifier	Background Screening[1]	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	WELL ID	OLD-08-13		OLD-08-14	OLD-08-15	OLD-08-16	OLD-08-17	OLD-08-18
Sampling Date						08G01301 5-Dec-97	08F01301 5-Dec-97	08G01401 8-Dec-97	08G01501 5-Dec-97	08G01601 18-Feb-98	08G01701 18-Feb-98	08G01801 19-Feb-98
Semivolatile Organics, ug/L												
Naphthalene		6.8 o	ND	1,500 n			NA			NA	NA	NA
Pesticides/PCBs, ug/L												
4,4'-DDT		0.1 c	ND	0.2 c			NA			NA	NA	NA
delta-BHC		0.05 st	ND	0.037 c		0.01 J	NA		0.01 J	NA	NA	NA
Dieldrin		0.1 c	ND	0.0042 c			NA			NA	NA	NA
Endosulfan sulfate		0.3 st	ND	220 n			NA			NA	NA	NA
Endrin		2 p	2	11 n			NA			NA	NA	NA
Endrin aldehyde		0.1 st	ND	11 n			NA	0.01 J		NA	NA	NA
Herbicides, ug/L												
2,4-D		70 p	70	61 n		0.16 J	NA		0.16 J	NA	NA	NA
2,4-DB		ND	ND	290 n		0.31 J	NA		0.29 J	NA	NA	NA
Dalapon		200 p	200	1100 n			NA	1.4 J		NA	NA	NA
Dichloroprop		ND	ND	290 n		0.4 J	NA	0.14 J		NA	NA	NA
Dinoseb		7 p	7	6.1 n			NA			NA	NA	NA
MCPA		1000 st	ND	18 n		660 J	NA		**1200 DJ**	NA	NA	NA
MCPP		ND	ND	37 n			NA	**200 J**		NA	NA	NA
Inorganics, ug/L												
Aluminum	4,067	200 s	ND	37,000 n		1870	529	1380 J	1420	454	88.3 J	87.3 J
Antimony	4.1	6 p	6	15 n								2.9 J
Arsenic	5	50 p	50	0.045 c		**88.2**	**71.1**	7.1 J		3.9 J	**98.8**	
Barium	31.4	2,000 p	2,000	2,600 n		42.1 J	25.6 J	39.2 J	21.6 J	27.7 J	20 J	12.1 J
Calcium	36,830	ND	ND	1,000,000		12900	11400	34200	18100			
Chromium	7.8	100 p	100	180 n								
Cobalt	ND	ND	ND	2,200 n		1.9 J	1.5 J	2.3 J	1.2 J	1.9 J		
Copper	5.4	1,000 s	1,300	1,500 n		5.5 J	4.5 J	9.5 J	8.3 J			
Iron	1,227	300 s	ND	11,000 n		447	293	1730 J	498	580		550
Lead	4	15 p	15	15		3.2		3.1	2.3 J			
Manganese	17	50 s	ND	730 n		148	94.1	172	72.9	164		
Nickel	ND	100 p	100	730 n		9.6 J	7.3 J	5.8 J	5.9 J	11.4 J	4.4 J	3 J
Potassium	5,400	ND	ND	297,016							10900	
Sodium	18,222	160,000 p	ND	396,022					28900			
Vanadium	20.6	49 st	ND	260 n		2 J	1.2 J	2.5 J	3 J	3.5 J	4.4 J	2.4 J
General Chemistry, mg/L												
Total Organic Carbon	ND	ND	ND	ND		22.1	NA	46.8	27.2	25.2	19.9	23.5
Total Suspended Solids	ND	ND	ND	ND		22	NA	20	13			

Appendix C, C - 2.3
Summary of Detections in Soil Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	09S00500	09S00500D	09S00502	09S00600	09S00700	09S00702	09S00800	09S00802	09S00900	09S01000	09S01100
Sampling Date				11-Nov-97	11-Nov-97	17-Mar-98	11-Nov-97	11-Nov-97	17-Mar-98	11-Nov-97	13-Feb-98	11-Nov-97	11-Nov-97	11-Nov-97
Semivolatile Organics, ug/kg														
2-Methylnaphthalene		960,000	3,100,000 n			NA		77 J	NA		NA			
Benzo(b)fluoranthene		1,400	870 c			NA			NA		NA			
Benzo(k)fluoranthene		14,000	8,700 c			NA			NA		NA			
bis(2-Ethylhexyl)phthalate		48,000	46,000 c			NA			NA	170 J	NA			
Di-n-octylphthalate		1,500,000	1,600,000 n			NA			NA		NA			
Fluoranthene		2,900,000	3,100,000 n			NA			NA		NA			
Pyrene		2,200,000	2,300,000 n			NA		78 J	NA		NA			46 J
Pesticides/PCBs, ug/kg														
4,4'-DDD		4500	2,700 c	**15000** D	**20000** D	NA	21	**4600** D	NA	43	NA	140 D	19 J	4400 D
4,4'-DDE		3000	1,900 c	710	1000	NA	14	570	NA	18	NA	22 J	14 J	300 J
4,4'-DDT		3100	1,900 c	**3600**	**12000** D	NA	8.4 J	35 J	NA	12	NA	9.5 J	11 J	1200 J
alpha-BHC		200	100 c			NA			NA		NA	0.52 J		
alpha-Chlordane		800	1800 c	**3900** D	**5300** D	NA	15	**2400** D	NA	33	NA	23	14 J	1200 D
beta-BHC		600	350 c			NA			NA		NA	0.18 J	0.51 J	
delta-BHC		23000	350 c			NA			NA		NA	5.4		
Dieldrin		70	40 c			NA			NA		NA			
Endosulfan II		390000	470,000 n			NA			NA		NA			
Endosulfan sulfate		ND	470,000 n			NA			NA		NA			
Endrin		23000	23,000 n			NA			NA	8.5 J	NA			
Endrin aldehyde		23000	23,000 n			NA			NA		NA			
Endrin ketone		ND	23,000 n			NA			NA		NA			
gamma-BHC (Lindane)		800	490 c		32 J	NA			NA	0.53 J	NA			
gamma-Chlordane		800	1,600 c	**4200** D	**6000** D	NA	16 J	**2600** D	NA	29	NA	18 J	14 J	1300 D
Heptachlor		200	140 c			NA			NA		NA			
Heptachlor epoxide		100	70 c			NA			NA	0.24 J	NA	0.23 J		
Methoxychlor		380000	390,000 n			NA			NA		NA			
Herbicides, ug/kg														
2,4 5-TP (Silvex)		610000	630,000 n			NA			NA		NA			
2,4,5-T		760,000	780,000 n			NA			NA		NA			
2,4-D		110000	780,000 n	9.4 J	0.31 J	NA	0.75 J	1.9 J	NA		NA	4.2 J	14	10
2,4-DB		610,000	630,000 n	5.3 J	33 J	NA	15 J	14 J	NA	6.1 J	NA	4.6 J	10 J	
Dalapon		1,900,000	2,300,000 n			NA			NA		NA			
Dicamba		1700000	2,300,000 n			NA			NA		NA			
Dichloroprop		3800	ND			NA			NA		NA			
Dinoseb		43000	78,000 n	33 J	40	NA			NA		NA	11		9 J
MCPA		38000	39,000 n			NA			NA		NA			
MCPP		77,000	78,000 n			NA			NA		NA			
Inorganics, mg/kg														
Aluminum	2088	75000	78,000 n	877 J	964 J	NA	2250 J	2540 J	NA	390 J	NA	438 J	58.7 J	422 J
Antimony	ND	26	31 n			NA			NA		NA			
Arsenic	1.0	0.8	0.43 c	**4.8**	**4.4**	NA		**20.2**	NA	**3.2**	NA	**14.4**		

Appendix C, Table C - 2.3
Summary of Detections in Soil Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	09S00500	09S00500D	09S00502	09S00600	09S00700	09S00702	09S00800	09S00802	09S00900	09S01000	09S01100
Barium	8.7	5,200	5,500 n	6.2 J	6.8 J	NA	47.1 J	40.8 J	NA		NA	5.9 J		6.1 J
Beryllium	0.09	0.2	160 n			NA	0.46 J		NA		NA			
Cadmium	0.98	37	39 n			NA			NA		NA			
Calcium	25295	ND	1000000			NA	18700 J	37200 J	NA		NA			
Chromium	4.6	290	390 n	2 J	3.4 J	NA	2.5 J	15.9 J	NA		NA	1.6 J		1.6 J
Copper	4.1	ND	3,100 n	8.7	10.9	NA		29.7	NA		NA	16.5		17.6
Iron	712	ND	23,000 n	242 J	282 J	NA	444 J	1630 J	NA	311 J	NA	330 J		209 J
Lead	14.5	500	400	18.7 J	24.6 J	NA	23.9 J	47.6 J	NA	2.2 J	NA	8.2 J	0.84 J	9.8 J
Manganese	8.1	370	1,600 n	9.6 J	10.6 J	NA	137 J	45.1 J	NA		NA	7.7 J		9 J
Mercury	0.07	23	23 n	0.09 J	0.09 J	NA	0.05 J	0.18 J	NA	0.05 J	NA	0.07 J		0.09 J
Nickel	4.4	1500	1,600 n			NA		7 J	NA		NA			
Selenium	0.95	390	390 n			NA		1.7	NA		NA			
Silver	1.8	390	390 n			NA		1.2 J	NA		NA			
Vanadium	3.1	490	550 n			NA	4.2 J	5 J	NA		NA			
Zinc	17.2	23000	23,000 n	89.1 J		NA		187 J	NA		NA			
General Chemistry, mg/kg														
Iron Oxide	ND	ND	ND	NA	NA	33.8 J	NA	NA	42.5 J	NA	50.3 J	NA	NA	NA
Total Organic Carbon	ND	ND	ND	NA	NA	16000 >	NA	NA	3980	NA	1570	NA	NA	NA

Appendix C, C - 2.3
Summary of Detections in Soil Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	09S01200	09S01300	09S01400	09S01500	09S01600	09S01700	09S01800	09S01800D	09S01900	09S02000	09S02100
Sampling Date				11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97
Semivolatile Organics, ug/kg														
2-Methylnaphthalene		960,000	3,100,000 n											
Benzo(b)fluoranthene		1,400	870 c											
Benzo(k)fluoranthene		14,000	8,700 c											
bis(2-Ethylhexyl)phthalate		48,000	46,000 c		74 J	220 J	180 J						3 J	
Di-n-octylphthalate		1,500,000	1,600,000 n										1 J	
Fluoranthene		2,900,000	3,100,000 n											
Pyrene		2,200,000	2,300,000 n				36 J							
Pesticides/PCBs, ug/kg														
4,4'-DDD		4500	2,700 c		19 J	41	3.6 J		25 J		1.2 J			2 J
4,4'-DDE		3000	1,900 c	1.7 J	9.3 J	7.5 J	2.1 J	0.22 J	8.5 J	0.79 J				
4,4'-DDT		3100	1,900 c		4.8 J	8 J			11 J	5.4 J		0.43 J		5.1
alpha-BHC		200	100 c											
alpha-Chlordane		800	1800 c	0.68 J	20	60 D	2.1	0.47 J	13		0.13 J		1.2 J	27 D
beta-BHC		600	350 c						0.21 J					
delta-BHC		23000	350 c											
Dieldrin		70	40 c	0.47 J	3.1 J		0.99 J	0.18 J	9.1 J	0.57 J	0.54 J	0.28 J	3.5 J	
Endosulfan II		390000	470,000 n		2.2 J			0.1 J	7 J					
Endosulfan sulfate		ND	470,000 n											
Endrin		23000	23,000 n							0.61 J	0.08 J			0.56 J
Endrin aldehyde		23000	23,000 n		0.11 J									0.33 J
Endrin ketone		ND	23,000 n											
gamma-BHC (Lindane)		800	490 c								0.1 J			
gamma-Chlordane		800	1,600 c	0.09 J	18 J	63 D	0.62 J	0.24 J	9.4					16
Heptachlor		200	140 c											
Heptachlor epoxide		100	70 c		0.08 J		0.05 J		0.1 J					2
Methoxychlor		380000	390,000 n											
Herbicides, ug/kg														
2,4,5-TP (Silvex)		610000	630,000 n											
2,4,5-T		760,000	780,000 n											
2,4-D		110000	780,000 n	7 J	23 J	1.5 J	11 J	0.08 J	14	3.5 J	6.8 J		24 J	
2,4-DB		610,000	630,000 n	2.4 J	11 J	11 J	18 J	8.1 J		8 J	10 J		13 J	
Dalapon		1,900,000	2,300,000 n											
Dicamba		1700000	2,300,000 n											
Dichloroprop		3800	ND											
Dinoseb		43000	78,000 n				8.7 J							
MCPA		38000	39,000 n											
MCPP		77,000	78,000 n			77000 DJ	62000 J							
Inorganics, mg/kg														
Aluminum	2088	75000	78,000 n		109 J	342 J	250 J	45.3 J	214 J	33.4 J	48.5 J	69.9 J	89.3 J	113 J
Antimony	ND	26	31 n											
Arsenic	1.0	0.8	0.43 c											

Appendix C, Table C - 2.3
Summary of Detections in Soil Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	09S01200	09S01300	09S01400	09S01500	09S01600	09S01700	09S01800	09S01800D	09S01900	09S02000	09S02100
Barium	8.7	5,200	5,500 n						4.7 J					
Beryllium	0.09	0.2	160 n								0.46 J			
Cadmium	0.98	37	39 n											
Calcium	25295	ND	1000000											
Chromium	4.6	290	390 n			1.5 J			21.1 J					
Copper	4.1	ND	3,100 n											
Iron	712	ND	23,000 n		82.2 J	226 J	132 J		197 J		61.5 J	44.1 J	47 J	37.3 J
Lead	14.5	500	400	0.62 J	5.1 J	15.5 J	5.9 J	0.79 J	6.8 J	0.91 J	1.5 J	0.9 J	3 J	0.91 J
Manganese	8.1	370	1,600 n			12.1 J								
Mercury	0.07	23	23 n		0.06 J	0.1 J	0.06 J		0.13 J	0.05 J	0.05 J		0.06 J	
Nickel	4.4	1500	1,600 n											
Selenium	0.95	390	390 n											
Silver	1.8	390	390 n						60.1		0.32 J			
Vanadium	3.1	490	550 n											
Zinc	17.2	23000	23,000 n											
General Chemistry, mg/kg														
Iron Oxide	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C, C - 2.3
Summary of Detections in Soil Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil	09S02200	09S02300	09S02400	09S02500	09S02600	09S02700	09S02800	09S02901	09S02901D	09S03001	09S03101
Sampling Date				11-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
Semivolatile Organics, ug/kg														
2-Methylnaphthalene		960,000	3,100,000 n								NA	NA	NA	NA
Benzo(b)fluoranthene		1,400	870 c						58 J		NA	NA	NA	NA
Benzo(k)fluoranthene		14,000	8,700 c						60 J		NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate		48,000	46,000 c	81 J							NA	NA	NA	NA
Di-n-octylphthalate		1,500,000	1,600,000 n								NA	NA	NA	NA
Fluoranthene		2,900,000	3,100,000 n						30 J		NA	NA	NA	NA
Pyrene		2,200,000	2,300,000 n						40 J		NA	NA	NA	NA
Pesticides/PCBs, ug/kg														
4,4'-DDD		4500	2,700 c						4.6 J		9.7 J		22 J	120 J
4,4'-DDE		3000	1,900 c	20	55	39	24 J	6.4	140 D	110 DJ	13	6.2	32	170 D
4,4'-DDT		3100	1,900 c	24	38	16 J	37 J	7.3	76 D	110 DJ	4.7	0.87 J	18	38
alpha-BHC		200	100 c											
alpha-Chlordane		800	1800 c	14	33 D	44 D	530 D	1.6 J	5.5	24	20	5	33	520 D
beta-BHC		600	350 c											
delta-BHC		23000	350 c											
Dieldrin		70	40 c		3.2 J	2.1 J					1.1 J		11 J	17 J
Endosulfan II		390000	470,000 n	1.1 J										
Endosulfan sulfate		ND	470,000 n						0.28 J				1.2 J	
Endrin		23000	23,000 n			0.74 J	8.7 J	0.24 J	0.75 J	0.51 J	2 J		2.9 J	11 J
Endrin aldehyde		23000	23,000 n		0.32 J	0.28 J	1.3 J			0.38 J				
Endrin ketone		ND	23,000 n								0.2 J		1.4 J	
gamma-BHC (Lindane)		800	490 c				0.46 J							
gamma-Chlordane		600	1,600 c				500 D	1.9 J	6.2	25	18	3.8	17 J	360 D
Heptachlor		200	140 c										2.3 J	1.1 J
Heptachlor epoxide		100	70 c	1.7 J	5.4	3.9	27			0.34 J				3 J
Methoxychlor		380000	390,000 n										2.2 J	
Herbicides, ug/kg														
2,4,5-TP (Silvex)		610000	630,000 n								NA	NA	1.7 J	NA
2,4,5-T		760,000	780,000 n								NA	NA	3.8 J	NA
2,4-D		110000	780,000 n	21	2.8 J	16 J	5.9 J	3.8 J	17 J		NA	NA	15 J	NA
2,4-DB		610,000	630,000 n		10 J		28 J	5.8 J	12 J		NA	NA	86 J	NA
Dalapon		1,900,000	2,300,000 n								NA	NA	62 J	NA
Dicamba		1700000	2,300,000 n								NA	NA	85 J	NA
Dichloroprop		3800	ND		22		27 J				NA	NA	66 J	NA
Dinoseb		43000	78,000 n		4.8 J	6.4 J	320 J				NA	NA		NA
MCPA		38000	39,000 n								NA	NA	67000 J	NA
MCPP		77,000	78,000 n								NA	NA	13000 J	NA
Inorganics, mg/kg														
Aluminum	2088	75000	78,000 n	234 J	140	869	1800	2520	3160	2560	122	146	7170	6720
Antimony	ND	26	31 n										4.4 J	
Arsenic	1.0	0.8	0.43 c											6

Appendix C, Table C - 2.3
Summary of Detections in Soil Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening[1]	SCG for Residential Soil[2]	RBC[3] for Residential Soil	09S02200	09S02300	09S02400	09S02500	09S02600	09S02700	09S02800	09S02901	09S02901D	09S03001	09S03101
Barium	8.7	5,200	5,500 n	8.7 J	7.4 J	35.2 J	20.7 J	37.4 J	65.3	35.3 J	2.7 J	3.1 J	19.1 J	25.3 J
Beryllium	0.09	0.2	160 n						0.58 J	0.59 J				
Cadmium	0.98	37	39 n	0.12 J		0.74 J								
Calcium	25295	ND	1000000					2E+05 J	91100 J	24100				
Chromium	4.6	290	390 n	1.6 J	2.2 J	11.3	3.5	5.6	3.8	2.2 J	0.36 J	0.45 J	7.9	8.7
Copper	4.1	ND	3,100 n		3.8 J	10	3.2 J	4.4 J			1 J	1.2 J	6.8 J	11 J
Iron	712	ND	23,000 n	285 J	204	838	183	486	975	485	92.4 J	138 J	803 J	751 J
Lead	14.5	500	400	45.2 J	43.7 J	25 J	15.8 J	18.2 J	9.9 J	17	2.7	3.5	50.1	44.7
Manganese	8.1	370	1,600 n	11.2 J				103	111	97.8				
Mercury	0.07	23	23 n	0.13 J			0.23 J							
Nickel	4.4	1500	1,600 n									0.27 J	2.3 J	2.5 J
Selenium	0.95	390	390 n											
Silver	1.8	390	390 n	0.69 J		0.57 J	2.5 J							
Vanadium	3.1	490	550 n			1.9 J	0.99 J	6.6 J	6.9 J	2.4 J	0.38 J	0.41 J	4.1 J	4.2 J
Zinc	17.2	23000	23,000 n											
General Chemistry, mg/kg														
Iron Oxide	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Appendix C, [illegible] C - 2.3
Summary of Detections [illegible] Soil Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil		09S03201	09S03202	09S03301	09S03302	09S03401	09S03501	09S03601
Sampling Date					10-Feb-98	13-Feb-98	10-Feb-98	13-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
Semivolatile Organics, ug/kg											
2-Methylnaphthalene		960,000	3,100,000	n	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene		1,400	870	c	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene		14,000	8,700	c	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate		48,000	46,000	c	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate		1,500,000	1,600,000	n	NA	NA	NA	NA	NA	NA	NA
Fluoranthene		2,900,000	3,100,000	n	NA	NA	NA	NA	NA	NA	NA
Pyrene		2,200,000	2,300,000	n	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs, ug/kg											
4,4'-DDD		4500	2,700	c	19 J	NA		NA	340 J		
4,4'-DDE		3000	1,900	c	18	NA	17 J	NA	360 J	0.99 J	12
4,4'-DDT		3100	1,900	c	9.1 J	NA	3.2 J	NA	160 J	0.88 J	10
alpha-BHC		200	100	c		NA		NA			
alpha-Chlordane		800	1800	c	110 D	NA	130 DJ	NA	**2200** D	0.83 J	0.43 J
beta-BHC		600	350	c		NA		NA			
delta-BHC		23000	350	c		NA		NA			
Dieldrin		70	40	c		NA	2.1 J	NA	14 J		0.15 J
Endosulfan II		390000	470,000	n		NA		NA			
Endosulfan sulfate		ND	470,000	n		NA		NA			
Endrin		23000	23,000	n	4.5 J	NA		NA	54 J		
Endrin aldehyde		23000	23,000	n		NA		NA			
Endrin ketone		ND	23,000	n		NA		NA			
gamma-BHC (Lindane)		800	490	c		NA		NA			
gamma-Chlordane		800	1,600	c	91 D	NA	120 D	NA	**2200** D		0.17 J
Heptachlor		200	140	c	0.12 J	NA		NA			
Heptachlor epoxide		100	70	c		NA		NA	29 J		0.48 J
Methoxychlor		380000	390,000	n		NA		NA		1.9 J	
Herbicides, ug/kg											
2,4 5-TP (Silvex)		610000	630,000	n	NA	NA	NA	NA	NA	NA	NA
2,4,5-T		760,000	780,000	n	NA	NA	NA	NA	NA	NA	NA
2,4-D		110000	780,000	n	NA	NA	NA	NA	NA	NA	NA
2,4-DB		610,000	630,000	n	NA	NA	NA	NA	NA	NA	NA
Dalapon		1,900,000	2,300,000	n	NA	NA	NA	NA	NA	NA	NA
Dicamba		1700000	2,300,000	n	NA	NA	NA	NA	NA	NA	NA
Dichloroprop		3800	ND		NA	NA	NA	NA	NA	NA	NA
Dinoseb		43000	78,000	n	NA	NA	NA	NA	NA	NA	NA
MCPA		38000	39,000	n	NA	NA	NA	NA	NA	NA	NA
MCPP		77,000	78,000	n	NA	NA	NA	NA	NA	NA	NA
Inorganics, mg/kg											
Aluminum	2088	75000	78,000	n	1170	NA	14300	NA	2540	194	301
Antimony	ND	26	31	n		NA		NA			
Arsenic	1.0	0.8	0.43	c	2.9 J	NA	5.9 J	NA			

Appendix C, Table C - 2.3
Summary of Detections in Soil Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Sample ID	Background Screening [1]	SCG for Residential Soil [2]	RBC [3] for Residential Soil		09S03201		09S03202		09S03301		09S03302		09S03401		09S03501		09S03601	
Barium	8.7	5,200	5,500	n	4.6	J	NA		23.2	J	NA		16	J	2.8	J	4.7	J
Beryllium	0.09	0.2	160	n			NA		0.66	J	NA							
Cadmium	0.98	37	39	n			NA				NA							
Calcium	25295	ND	1000000				NA				NA						1E+05	
Chromium	4.6	290	390	n	2	J	NA		16		NA		4		0.58	J	3.6	
Copper	4.1	ND	3,100	n	1.8	J	NA		9.7	J	NA		54				13.1	
Iron	712	ND	23,000	n	70.7	J	NA		790	J	NA		581	J	121	J	284	J
Lead	14.5	500	400		3.1		NA		16		NA		19.9		5.3		3	
Manganese	8.1	370	1,600	n			NA				NA							
Mercury	0.07	23	23	n			NA		0.27	J	NA		0.06	J				
Nickel	4.4	1500	1,600	n	0.44	J	NA		4.5	J	NA		1.1	J			0.83	J
Selenium	0.95	390	390	n			NA		5.5	J	NA							
Silver	1.8	390	390	n			NA				NA							
Vanadium	3.1	490	550	n	1.6	J	NA		10.1	J	NA		2.1	J	0.56	J	2.9	J
Zinc	17.2	23000	23,000	n			NA				NA		63.4	J				
General Chemistry, mg/kg																		
Iron Oxide	ND	ND	ND		NA		43.8	J	NA		460	J	NA		NA		NA	
Total Organic Carbon	ND	ND	ND		NA		12600		NA		12700		NA		NA		NA	

Appendix C, C - 2.4
Summary of Detections in Groundwater Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Identifier	Background Screening[1]	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	OLD-09-01	OLD-09-02		OLD-09-03	OLD-09-04		OLD-09-05	OLD-09-06	
WELL ID					09G00102	09G00202	09G00202D	09G00302	09G00402	09F00402	09G00501	09G00601	09F00601
Sampling Date					20-Oct-97	20-Oct-97	20-Oct-97	20-Oct-97	21-Oct-97	21-Oct-97	21-Oct-97	17-Oct-97	17-Oct-97
Semivolatile Organics, ug/L													
2,4,6-Trichlorophenol		10 c	ND	6.1 c						NA			NA
2,4-Dichlorophenol		4 o	ND	110 n					2 J	NA			NA
2,4-Dimethylphenol		400 o	ND	730 n			2 J			NA			NA
2-Methylnaphthalene		ND	ND	1,500 n					14 J	NA			NA
2-Methylphenol		350 st	ND	1,800 n			1 J			NA			NA
4-Methylphenol		35 st	ND	180 n			3 J			NA			NA
Naphthalene		6.6 o	ND	1,500 n				1 J	6 J	NA			NA
Phenol		10 t	ND	22,000 n			2 J			NA			NA
Pesticides/PCBs, ug/L										NA			NA
4,4'-DDD		0.1 c	ND	0.28 c					0.09 J	NA	0.03 J		NA
4,4'-DDE		0.1 c	ND	0.2 c	0.1 J					NA	0.01 J		NA
4,4'-DDT		0.1 c	ND	0.2 c				0.004 J		NA		0.01 J	NA
Aldrin		0.05 c	ND	0.004 c					0.05 J	NA			NA
alpha-BHC		0.05 c	ND	0.011 c						NA			NA
alpha-Chlordane		2 p	2	0.19 c						NA	0.11 J		NA
delta-BHC		0.05 st	ND	0.037 c						NA	0.02 J		NA
Dieldrin		0.1 c	ND	0.0042 c						NA		0.01 J	NA
Endosulfan I		0.35 st	ND	220 n					0.09 J	NA			NA
Endosulfan II		0.35 st	ND	220 n						NA		0.01 J	NA
Endrin		2 p	2	11 n						NA	0.02 J	0.02 J	NA
Endrin aldehyde		0.1 st	ND	11 n						NA			NA
gamma-BHC (Lindane)		0.2 p	ND	0.052 c					0.01 J	NA	0.01 J		NA
gamma-Chlordane		2 p	2	0.19 c					0.67	NA	0.17	0.03 J	NA
Heptachlor epoxide		0.2 p	0.2	0.0012 c					0.1 J	NA			NA
Methoxychlor		40 p	40	180 n						NA		0.01 J	NA
Herbicides, ug/L													
2,4-D		70 p	70	61 n	0.002 J			0.004 J	0.1 J	NA	0.11 J	0.9 J	NA
2,4-DB		ND	ND	290 n	0.42 J	0.44 J	0.33 J	0.17 J	1.8 J	NA	0.83 J		NA
Dalapon		200 p	200	1100 n						NA			NA
Dichloroprop		ND	ND	290 n			3.1 J			NA			NA
Dinoseb		7 p	7	6.1 n					0.1 J	NA			NA
MCPA		1000 st	ND	18 n	640	870 J	670 J		**3100** J	NA	**2900** J		NA
MCPP		ND	ND	37 n		**840** J			**1900** J	NA	**830** J		NA
Inorganics, ug/L													
Aluminum	4,067	200 s	ND	37,000 n	318	731	781	471	448	373	224	538	
Antimony	4.1	6 p	6	15 n						3.5 J			5.1 J
Arsenic	5	50 p	50	0.045 c	13.2				**264**	**232**	**61.3**	**53**	**51.5**
Barium	31.4	2,000 p	2,000	2,600 n	24.5 J	1.8 J	2.4 J	4 J	8.6 J	8.6 J	7.6 J	9.5 J	13.7 J
Calcium	36,830	ND	ND	1,000,000	24600	5830	6350	10600	43800	46000	53400	55000	53400
Chromium	7.8	100 p	100	180 n	0.81 J	1.3 J	1.1 J	0.88 J	1.6 J	1.7 J	1.4 J	1 J	0.85 J

Appendix C, Table C - 2.4
Summary of Detections in Groundwater Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

				WELL ID	OLD-09-01	OLD-09-02		OLD-09-03	OLD-09-04		OLD-09-05	OLD-09-06	
Identifier	Background[1] Screening	FDEPG	Primary FEDMCL	RBC[2] for Tap Water	09G00102	09G00202	09G00202D	09G00302	09G00402	09F00402	09G00501	09G00601	09F00601
Sampling Date					20-Oct-97	20-Oct-97	20-Oct-97	20-Oct-97	21-Oct-97	21-Oct-97	21-Oct-97	17-Oct-97	17-Oct-97
Cobalt	ND	ND	ND	2,200 n						0.75 J			1.5 J
Copper	5.4	1,000 s	1,300	1,500 n					56	42.7			6.3 J
Iron	1,227	300 s	ND	11,000 n	391				1290	1380	188	638	740
Lead	4	15 p	15	15					6.1	4.2			
Magnesium	4,560	ND	ND	118,807									
Manganese	17	50 s	ND	730 n	6.7 J				53.7	62.7	11.3 J	32.9	39
Mercury	0.12	2 p	2	11 n					0.11 J	0.12 J			
Nickel	ND	100 p	100	730 n	2.5 J				2.2 J	2 J			2.7 J
Silver	ND	100 s	ND	180 n		1.1 J							0.95 J
Sodium	18,222	160,000 p	ND	396,022									
Vanadium	20.6	49 st	ND	260 n		0.73 J	0.73 J		0.99 J	1.5 J	3.4 J	0.86 J	1.7 J
General Chemistry, mg/L													
Total Organic Carbon	ND	ND	ND	ND	37.2	34.5	NA	47.5	54.6	NA	33.1	24.3	NA
Total Suspended Solids	ND	ND	ND	ND			NA			NA		20	NA

Appendix C, C - 2.4
Summary of Detections in Groundwater Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

			OLD-09-07		OLD-09-08	OLD-09-09	OLD-09-10	OLD-09-11	OLD-09-12	OLD-09-13	OLD-09-14	
Identifier	Background Screening	FDEPG	09G00701	09F00701	09G00801	09G00901	09G01001	09G01101	09G01201	09G01301	09G01401	09G01401D
Sampling Date			21-Oct-97	21-Oct-97	24-Oct-97	24-Oct-97	21-Oct-97	21-Oct-97	21-Oct-97	21-Oct-97	4-Dec-97	4-Dec-97
Semivolatile Organics, ug/L												
2,4,6-Trichlorophenol		10 c		NA					2 J			
2,4-Dichlorophenol		4 o		NA					**200**			
2,4-Dimethylphenol		400 o		NA							1 J	
2-Methylnaphthalene		ND		NA								
2-Methylphenol		350 st		NA								
4-Methylphenol		35 st		NA					8 J	2 J	160 D	
Naphthalene		6.8 o		NA								
Phenol		10 t		NA								
Pesticides/PCBs, ug/L												
4,4'-DDD		0.1 c		NA				0.01 J				
4,4'-DDE		0.1 c		NA				0.01 J				
4,4'-DDT		0.1 c		NA								
Aldrin		0.05 c		NA				0.001 J	**1** J			
alpha-BHC		0.05 c		NA					0.03 J			
alpha-Chlordane		2 p		NA					**0.3**			
delta-BHC		0.05 st		NA								
Dieldrin		0.1 c		NA					0.05 J			
Endosulfan I		0.35 st		NA								
Endosulfan II		0.35 st		NA								
Endrin		2 p		NA				0.08 J				
Endrin aldehyde		0.1 st		NA				0.03 J	**0.69**			
gamma-BHC (Lindane)		0.2 p		NA					0.01 J			
gamma-Chlordane		2 p		NA				0.04 J				
Heptachlor epoxide		0.2 p		NA								
Methoxychlor		40 p		NA								
Herbicides, ug/L												
2,4-D		70 p	0.005 J	NA	0.21 J	0.24 J		1.4 J	**110** J	0.001 J	0.26 J	
2,4-DB		ND	0.18 J	NA			0.14 J	1 J		0.38 J	0.21 J	
Dalapon		200 p		NA								
Dichloroprop		ND		NA	0.59 J	0.37 J						
Dinoseb		7 p		NA		0.1 J						
MCPA		1000 st		NA					750 J		890 J	840 J
MCPP		ND	**1100** J	NA				**1200** J	**1500** J			
Inorganics, ug/L												
Aluminum	4,067	200 s	2040	1600	290	243	212	539	1030	353	315	294
Antimony	4.1	6 p				3.5 J						
Arsenic	5	50 p						**93.9**	**138**			
Barium	31.4	2,000 p	13.8 J	11.5 J	12.5 J		5.4 J	6.8 J	10.3 J	19.7 J	47.2 J	38 J
Calcium	36,630	ND			17900	31100	33700	36900	11700		105000	80800
Chromium	7.8	100 p	3.7 J	2.6 J			0.91 J	1 J	3.3 J	1.3 J		

Appendix C, Table C - 2.4
Summary of Detections in Groundwater Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

			OLD-09-07		OLD-09-08	OLD-09-09	OLD-09-10	OLD-09-11	OLD-09-12	OLD-09-13	OLD-09-14	
Identifier	Background[1] Screening	FDEPG	09G00701	09F00701	09G00801	09G00901	09G01001	09G01101	09G01201	09G01301	09G01401	09G01401D
Sampling Date			21-Oct-97	21-Oct-97	24-Oct-97	24-Oct-97	21-Oct-97	21-Oct-97	21-Oct-97	21-Oct-97	4-Dec-97	4-Dec-97
Cobalt	ND	ND	1.1 J			1 J				0.88 J	1.7 J	2.1 J
Copper	5.4	1,000 s			0.76 J	2.6 J			6.1 J		4.5 J	5.6 J
Iron	1,227	300 s	1870	1640	1000	200	1030	570	540	2400	430	451
Lead	4	15 p							1.9 J			
Magnesium	4,560	ND									9780	7410
Manganese	17	50 s	48.9	38.4	53.6	3 J	16.7	11.6 J	24.9	82.9	159	145
Mercury	0.12	2 p										
Nickel	ND	100 p	5.4 J	4.9 J					3.4 J	3.5 J	9.9 J	9.4 J
Silver	ND	100 s										
Sodium	18,222	160,000 p										
Vanadium	20.6	49 st	1.3 J	0.8 J	0.91 J	1.8 J			0.79 J	1.3 J	1.6 J	1.6 J
General Chemistry, mg/L												
Total Organic Carbon	ND	ND	41.1	NA	47.8	62.3	28	36	38.5	10.1	21.2	NA
Total Suspended Solids	ND	ND		NA				28			7	NA

Appendix C, C - 2.4
Summary of Detections in Groundwater Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

				OLD-09-15		OLD-09-16		OLD-09-17	OLD-09-18	
Identifier	Background Screening[1]	FDEPG		09G01501	09F01501	09G01601	09F01601	09G01701	09G01801	09G01801D
Sampling Date				5-Dec-97	5-Dec-97	5-Dec-97	5-Dec-97	12-Feb-98	12-Feb-98	12-Feb-98
Semivolatile Organics, ug/L										
2,4,6-Trichlorophenol		10	c		NA		NA	NA	NA	NA
2,4-Dichlorophenol		4	o		NA		NA	NA	NA	NA
2,4-Dimethylphenol		400	o		NA		NA	NA	NA	NA
2-Methylnaphthalene		ND			NA		NA	NA	NA	NA
2-Methylphenol		350	st		NA		NA	NA	NA	NA
4-Methylphenol		35	st		NA		NA	NA	NA	NA
Naphthalene		6.8	o	5 J	NA		NA	NA	NA	NA
Phenol		10	t		NA		NA	NA	NA	NA
Pesticides/PCBs, ug/L					NA					
4,4'-DDD		0.1	c		NA		NA	NA	NA	NA
4,4'-DDE		0.1	c		NA		NA	NA	NA	NA
4,4'-DDT		0.1	c		NA		NA	NA	NA	NA
Aldrin		0.05	c		NA		NA	NA	NA	NA
alpha-BHC		0.05	c		NA		NA	NA	NA	NA
alpha-Chlordane		2	p		NA		NA	NA	NA	NA
delta-BHC		0.05	st		NA		NA	NA	NA	NA
Dieldrin		0.1	c		NA		NA	NA	NA	NA
Endosulfan I		0.35	st		NA		NA	NA	NA	NA
Endosulfan II		0.35	st	0.01 J	NA		NA	NA	NA	NA
Endrin		2	p		NA		NA	NA	NA	NA
Endrin aldehyde		0.1	st		NA		NA	NA	NA	NA
gamma-BHC (Lindane)		0.2	p		NA		NA	NA	NA	NA
gamma-Chlordane		2	p		NA		NA	NA	NA	NA
Heptachlor epoxide		0.2	p		NA		NA	NA	NA	NA
Methoxychlor		40	p		NA		NA	NA	NA	NA
Herbicides, ug/L										
2,4-D		70	p	0.07 J	NA		NA	0.32 J		
2,4-DB		ND		0.18 J	NA	0.31 J	NA	0.55 J		
Dalapon		200	p		NA		NA	0.69 J	0.3 J	
Dichloroprop		ND		0.42 J	NA	0.36 J	NA	0.29 J	0.24 J	0.12 J
Dinoseb		7	p		NA	0.12 J	NA			
MCPA		1000	st		NA	920 J	NA	680 J	630 J	460 J
MCPP		ND			NA	0.36 J	NA			
Inorganics, ug/L										
Aluminum	4,067	200	s	3260	872	1840	405	349	567	667
Antimony	4.1	6	p							
Arsenic	5	50	p			2.2 J	2.4 J	4.3 J		
Barium	31.4	2,000	p	18.3 J	13.3 J	17.8 J	10.5 J		20.8 J	23.4 J
Calcium	36,830	ND		9800	8060	15000	13100			
Chromium	7.8	100	p						1.5 J	1.9 J

Appendix C, Table C - 2.4
Summary of Detections in Groundwater Analytical Results
Study Area 9

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

			OLD-09-15		OLD-09-16		OLD-09-17	OLD-09-18	
Identifier	Background Screening[1]	FDEPG	09G01501	09F01501	09G01601	09F01601	09G01701	09G01801	09G01801D
Sampling Date			5-Dec-97	5-Dec-97	5-Dec-97	5-Dec-97	12-Feb-98	12-Feb-98	12-Feb-98
Cobalt	ND	ND	0.8 J	0.63 J	0.55 J	0.75 J			
Copper	5.4	1,000 s	7.2 J	4.4 J	5.1 J	4 J			
Iron	1,227	300 s	374	284	249		53.6 J	4680	5490
Lead	4	15 p	2.8 J						
Magnesium	4,560	ND							
Manganese	17	50 s	55.7	46.4	70.8	44.5			
Mercury	0.12	2 p							
Nickel	ND	100 p	7.5 J	5.6 J	5.1 J	3 J	1.4 J		
Silver	ND	100 s							
Sodium	18,222	160,000 p		7890					
Vanadium	20.6	49 st	1.9 J	0.93 J	5.1 J	3.1 J	4.3 J	1.6 J	1.6 J
General Chemistry, mg/L									
Total Organic Carbon	ND	ND	25.3	NA	22	NA	NA	7.05	5.94
Total Suspended Solids	ND	ND	58	NA	4	NA	NA		

APPENDIX C-3

ARSENIC SPECIATION DATA

Appendix C, Table C-3.1
Summary of Soil and Groundwater Analytical Results
Arsenic Speciation (total, arsenite, and arsenate species)

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando

Identifier	Total As	As (III)	As (V)	Ratio As(III) to As (IV)	Ratio As (III) to Total As
08B01001	7.54	6.36	1.18	5.39	0.84
08S01502	2.91	2.23	0.68	3.28	0.77
08S02802	8.03	6.64	1.39	4.78	0.83
08S02802D	8.27	7.05	1.22	5.78	0.85
08S04802	12.5	9.84	2.66	3.70	0.79
08S05002	1.54	1.23	0.31	3.97	0.80
08S05702	0.5	0.43	0.06	7.17	0.86
09S00502	1.68	1.32	0.36	3.67	0.79
09S00702	1.21	0.85	0.36	2.36	0.70
09S00802	0.55	0.48	0.07	6.86	0.87
09S03202	1.65	1.14	0.51	2.24	0.69
09S03302	1.26	0.92	0.34	2.71	0.73
AVERAGE				**4.32**	**0.79**
08G00205	65.9	51	14.9	3.42	0.77
08G00702	48.6	36.5	12.1	3.02	0.75
08G00802	45.9	24.3	21.6	1.13	0.53
08G01302	24.2	20.7	3.52	5.88	0.86
08G01601	1.53	1.48	0.05	29.60	0.97
08G01701	85.8	64.9	20.9	3.11	0.76
08G01801	4.43	3.86	0.57	6.77	0.87
09G00402[1]	13.6	10.4	3.19	3.26	0.76
09G00602	35.7	27.1	8.56	3.17	0.76
09G01701	2.21	1.83	0.38	4.82	0.83
09G01801	0.2 U	0.2 U	0.2 U	NC	NC
09G01801D	0.2 U	0.2 U	0.2 U	NC	NC
AVERAGE				**6.42**	**0.79**

NOTES:
All concentrations shown are in milligrams per kilogram.
[1] 09G00402 from well OLD-09-11
As = Arsenic
U = parameter was undetected below the value shown

Appendix C, Table C-3.2
Summary of Groundwater pH and Redox Potential Measurements

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando

Identifier	pH (units)	Eh (millivolts)	
OLD-09-18	4.69	-163.2	
OLD-09-06	5.88	-153.5	
OLD-09-17	6.63	168.6	
OLD-09-11	6.03	-173.9	(Sampled instead of OLD-09-04)
OLD-08-17	6.35	-84.9	
OLD-08-02	6.25	-189.8	
OLD-08-16	5.93	-20.1	
OLD-08-07	5.98	51	
OLD-08-18	4.86	-193.8	
OLD-08-13	4.99	-40.6	
OLD-08-08	6.26	-180.2	
OLD-09-06	6.87	-54.6	
OLD-09-01	5.92	-101.7	
OLD-09-02	5.27	-85.8	
OLD-09-03	5.66	-93.5	
OLD-09-04	6.33	-115.1	
OLD-09-11	6.58	-70.1	
OLD-09-13	4.99	-5.6	
OLD-09-05	6.35	-105	
OLD-09-07	3.98	72.1	
OLD-09-10	6.3	-2.3	
OLD-09-12	3.39	74.2	
OLD-09-08	5.99	-27.3	
OLD-09-09	6.21	3.6	
OLD-08-01	6.48	-111.3	
OLD-08-02	6.68	-188.6	
OLD-08-03	6.14	-133.8	
OLD-08-04	6.18	-125.4	
OLD-08-08	6.6	-201.5	
OLD-08-09	6.16	-79.7	
OLD-08-06	5.78	-67.9	
OLD-08-07	6.48	-44.9	
OLD-08-10	5.28	-8.88	
OLD-08-12	5.18	-16.1	
OLD-08-05	5.83	-108.2	
OLD-08-11	6.62	-189.1	
NOTES:			
Eh = reduction oxidation potential			

Appendix C, Table C-3.3
Summary of Soil pH and Redox Potential Measurements

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando

Identifier	Date	pH (units)	Eh (millivolts)
09S00802	02/13/98	7.06	177.9
09S03202	02/13/98	6.83	189.6
09S03302	02/13/98	6.7	208
09S00502	03/17/98	6.02	-167.4
09S00702	03/17/98	5.98	62.4
08S05702	02/13/98	5.47	194.2
08S01502	02/13/98	6.48	301.1
08S02802	02/13/98	7.49	164.5
08S04802	02/13/98	7.69	175.2
08B01001	02/13/98	7.44	147.7
08S05002	02/13/98	8.08	173.5

NOTES:
Eh = reduction oxidation potential

Appendix C, Table C-3.4
Summary of Soil Analytical Results for As(total), As(III), As(IV), Fe, FeO_2, and TOC

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Identifier	Date	Arsenic, Total	Arsenic (III)	Arsenic (V)	Iron	Iron Oxide	Total Organic Carbon
08B01001	13-Feb-98	7.54	6.36	1.18		275 J	10900
08S00900	12-Nov-97	30.5 J			6440 J		
08S00900D	12-Nov-97	30.7 J			4740 J		
08S01000	12-Nov-97	7.8 J			517 J		
08S01100	12-Nov-97	3.5 J			478 J		
08S01200	12-Nov-97	6.2 J			1230 J		
08S01300	12-Nov-97	1.3 U			34.3 U		
08S01400	12-Nov-97	1.3 U			108 J		
08S01500	12-Nov-97	10.4 J			2570 J		
08S01502	13-Feb-98	2.91	2.23	0.68		155 J	151000
08S01600	12-Nov-97	6.2 J			526 J		
08S01700	12-Nov-97	6.6 J			962 J		
08S01800	12-Nov-97	6.3 J			982 J		
08S01900	12-Nov-97	1.3 U			87.2 J		
08S02000	12-Nov-97	1.2 U			29.9 U		
08S02100	12-Nov-97	19.6 J			1690 J		
08S02200	12-Nov-97	10.1 J			601 J		
08S02300	12-Nov-97	53 J			1140 J		
08S02400	17-Nov-97	1.3 U			352		
08S02500	12-Nov-97	9.9 J			2120 J		
08S02600	14-Nov-97	1.3 U			287 J		
08S02700	14-Nov-97	3.5 J			330 J		
08S02800	17-Nov-97	13.4			1520		
08S02800D	17-Nov-97	12.8			4760		
08S02802	13-Feb-98	8.03	6.64	1.39		153 J	5260
08S02802D	13-Feb-98	8.27	7.05	1.22		239 J	7160
08S02900	17-Nov-97	41.2			2690		
08S03000	17-Nov-97	7.2			81.9		
08S03100	12-Nov-97	39.2 J			240 J		
08S03200	17-Nov-97	2.5			174		
08S03300	17-Nov-97	8.1			455		
08S03400	14-Nov-97	90			4690		
08S03500	14-Nov-97	55.9			2230		
08S03600	14-Nov-97	5.6			347		
08S03700	14-Nov-97	1.4 U			276 U		
08S03800	14-Nov-97	1.4 U			372		
08S03800D	14-Nov-97	1.4 U			340		
08S03900	14-Nov-97	16.1			688		
08S04000	14-Nov-97	1.4 J			967		
08S04100	14-Nov-97	25			2050		
08S04200	14-Nov-97	1.2 U			142		
08S04300	14-Nov-97	3.6			359		
08S04400	14-Nov-97	11.7			1390		
08S04500	14-Nov-97	11.6			1140		
08S04600	14-Nov-97	14.6			909		
08S04700	14-Nov-97	8.2 J			1170		
08S04800	14-Nov-97	65.6			3090		
08S04802	13-Feb-98	12.5	9.84	2.66		396 J	12500
08S04900	14-Nov-97	14.6			658		
08S05000	14-Nov-97	4			606		
08S05002	13-Feb-98	1.54	1.23	0.31		54.4 J	16000 >
08S05100	14-Nov-97	3.4			440		
08S05100D	14-Nov-97	2.4			418		
08S05200	14-Nov-97	1.8 J			294		
08S05301	10-Feb-98	5.3			428 J		
08S05401	10-Feb-98	14.6			694 J		
08S05501	10-Feb-98	2.5 J			510 J		
08S05601	10-Feb-98	8.6			1000 J		

Appendix C, Table C-3.4
Summary of Soil Analytical Results for As(total), As(III), As(IV), Fe, FeO_2, and TOC

Remedial Investigation, Operable Unit 3
Naval Training Center, Orlando, Florida

Identifier	Date	Arsenic, Total	Arsenic (III)	Arsenic (V)	Iron	Iron Oxide	Total Organic Carbon
08S05701	10-Feb-98	0.86 U			306 J		
08S05702	13-Feb-98	0.5	0.43	0.06		205 J	16000 >
08S05801	10-Feb-98	2.9 J			1260 J		
08S05901	10-Feb-98	6.7			1780 J		
08S06001	10-Feb-98	0.81 U			75.1 J		
08S06101	10-Feb-98	3.4			188 J		
08S06201	10-Feb-98	0.65 U			93 J		
08S06301	10-Feb-98	3.3			305 J		
08S06301D	10-Feb-98	4.3			352 J		
09S00500	11-Nov-97	4.8			242 J		
09S00500D	11-Nov-97	4.4			282 J		
09S00502	17-Mar-98	1.68	1.32	0.36		33.8 J	16000 >
09S00600	11-Nov-97	1.2 U			444 J		
09S00700	11-Nov-97	20.2			1630 J		
09S00702	17-Mar-98	1.21	0.85	0.36		42.5 J	3980
09S00800	11-Nov-97	3.2			311 J		
09S00802	13-Feb-98	0.55	0.48	0.07		50.3 J	1570
09S00900	11-Nov-97	14.4			330 J		
09S01000	11-Nov-97	1.2 U			33.5 U		
09S01100	11-Nov-97	1.6 U			209 J		
09S01200	11-Nov-97	1.2 U			19.1 U		
09S01300	11-Nov-97	1.2 U			82.2 J		
09S01400	11-Nov-97	1.5 U			226 J		
09S01500	11-Nov-97	1.3 U			132 J		
09S01600	11-Nov-97	1.2 U			33.6 U		
09S01700	11-Nov-97	1.3 U			197 J		
09S01800	11-Nov-97	1.2 U			25.6 U		
09S01800D	11-Nov-97	1.2 U			61.5 J		
09S01900	11-Nov-97	1.2 U			44.1 J		
09S02000	11-Nov-97	1.2 U			47 J		
09S02100	11-Nov-97	1.2 U			37.3 J		
09S02200	11-Nov-97	1.2 U			285 J		
09S02300	14-Nov-97	1.3 U			204		
09S02400	14-Nov-97	1.4 U			838		
09S02500	14-Nov-97	1.5 U			183		
09S02600	14-Nov-97	1.3 U			486		
09S02700	14-Nov-97	1.4 U			975		
09S02800	14-Nov-97	1.3 U			485		
09S02901	10-Feb-98	0.74 U			92.4 J		
09S02901D	10-Feb-98	0.69 U			138 J		
09S03001	10-Feb-98	1.3 U			803 J		
09S03101	10-Feb-98	6			751 J		
09S03201	10-Feb-98	2.9 J			70.7 J		
09S03202	13-Feb-98	1.65	1.14	0.51		43.8 J	12600
09S03301	10-Feb-98	5.9 J			790 J		
09S03302	13-Feb-98	1.26	0.92	0.34		460 J	12700
09S03401	10-Feb-98	0.86 U			581 J		
09S03501	10-Feb-98	0.69 U			121 J		
09S03601	10-Feb-98	0.65 U			284 J		

NOTES:
All concentrations shown in milligrams per kilogram.
Blank cells indicate that analysis was not performed on that sample.
U = parameter was undetected below the value shown
J = concentration is an estimated value

APPENDIX C-4

ANALYTICAL STATISTICAL EVALUATION

Appendix C-4
Statistical Evaluation of OU 3 Analytical Data Using Non-Parametric Statistics

C.4.1 Introduction

The statistical evaluation approach for OU 3 analytical data is similar to the approach for the NTC Orlando OU 1 RI/FS report (ABB-ES, 1995), which primarily uses nonparametric statistical methods, including (1) the Mann-Whitney U Test, and (2) the outside value test. A brief discussion of this procedure, also found in Appendix I-5 of the OU 1 RI/FS report, is presented below as applied to the OU 3 analytical data set.

Nonparametric statistics (also known as distribution-free tests) have been used in a number of Navy CLEAN RI/FS evaluations because they require less restrictive assumptions about the underlying distributions such as the assumption of normality and equal variance. These assumptions are usually difficult to meet especially in small environmental sample sets. The details of the background data set used in this evaluation has been published elsewhere (Background Sampling Report, ABB-ES, 1995). The background data set excludes two surface soil locations (Location 009 and 016) because they have been found to have elevated polyaromatic hydrocarbon compound concentrations. OU 3 analytical values rejected through data validation were excluded from the procedure, but all other nonrejected values, including below detection limit results, were included. Field duplicate sample results were arbitrarily included as separate and distinct entities.

C.4.2. Statistical Evaluation Approach

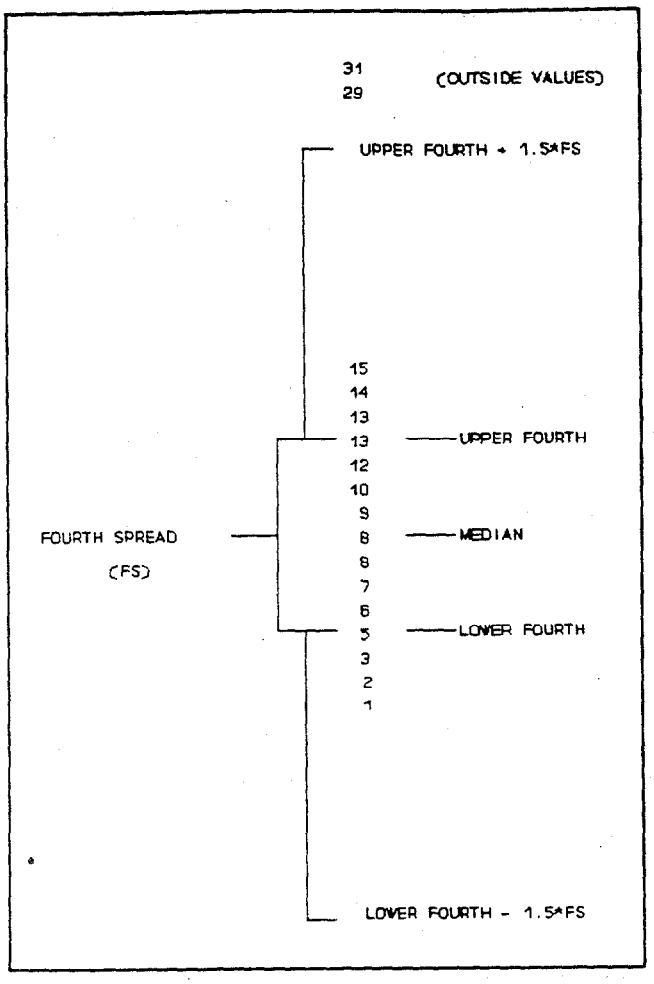
C.4.2.1 The Mann-Whitney U Test Procedure

The Mann-Whitney U test procedure was performed in order to gain a better understanding of underlying value distributions and systematic differences (such as varying detection limits) between the OU 3 data set and the established NTC Orlando main base background data set (Background Sampling Report, ABB-ES, 1995). The U test, a non-parametric analog of the better known parametric Student's t test, determines if two samples are likely to have been drawn from a single population (at some confidence level). This procedure was used to determine whether an analyte/compound detected in the site samples is significantly above background so as to be considered potentially affected by site activities; otherwise, the detected analyte/compound could be considered not significantly different from expected background values.

For each media (soil or groundwater), results from each analytical parameter for OU 3 samples and background samples were analyzed. The first determination was whether or not the two were likely derived from the same population. If this assumption was not rejected (with a 95% confidence level), then no further analysis was done for that analyte, that is, there was no reason to believe there was any difference between the background and the field samples. If, on the other hand, this assumption was dismissed (they were not derived from the same population; they are different populations) then a determination of which sample group had a larger central value was made. This determination was based on the relative values of the median of each group. If more than fifty percent of both the background and field samples are below detection limits (BDL), then the test

is essentially comparing detection limit populations. Cases of different detection limit populations are noted in the results below. Any analyte whose background median was larger than the field sample's median was dismissed as not being of further concern. Any analyte whose field sample median was larger than the background's median was considered to be potentially affected by site activities.

C.4.2.2 The Outside Value Identification Test



The outside value test was done for each sampled media (surface soils and groundwater) to determine if they represented consistent populations. This examination was performed by identifying points in need of closer scrutiny through the use of a non-parametric outside value identification method based on the definition of a "fourth spread" described in **Understanding Robust and Exploratory Data Analysis**, D. C. Hoaglin, F. Mosteller, and J.W. Tukey, John Wiley and Sons, Inc. 1983. This method is based on the definition of a "fourth spread" which is the numerical difference between the lower fourth and upper fourth. (For all practical purposes, the lower fourth and upper fourth correspond to the twenty-fifth and seventy-fifth percentiles which are the values that are greater than or equal to twenty-five percent of the values and greater than or equal to seventy-five percent of the values, respectively.) By using the distance between fourths as an indicator to the "natural spread" of the values, extreme values at either end of the distribution have no effect on the measurement of the spread of the population around its central value. Any value that lies more than 1.5 times the fourth spread above the upper fourth value or 1.5 times the fourth spread below the lower fourth is considered an "outside value" deserving further consideration (See Fig 1). These values are not true statistical outliers, but are distributed far enough from the sample's central value to be questioned. The resulting outside values were then evaluated to determine if there were any known factors that could explain anomalous results. A sample with several outside values in the OU 3 data set could assist in identifying areas of "hot spots" or contaminated zones.

C.4.3 Guide to the Interpretion of Statistical Results

In the pages that follow, descriptive statistics for OU 3 soil and groundwater are presented first. The descriptive statistics include the minimum and maximum

reported detection levels, the minimum and maximum levels reported, the above detection level average values, the median of all values above and below detection levels, and the number of detections versus total number of samples.

Results of the Mann-Whitney U test and non-parametric outside values test for each media are reported in three major sections: the header information, the summary information, and the detail (by analyte) information.

The header consist of a 'points used' listing which gives the sample location identifier and group affiliations for every sample used in the analysis. In the example below, the OU 3 groundwater samples are identified with a '3g' and background groundwater samples with a 'bkg',

```
Points used:
ou  location
3g  08G00102
3g  08G00202
...
bkg ORG00101
bkg ORG00201
...
```

The summary information begins with a listing of each analyte found to contain groups from different parent populations and an interpretation of which group tends to have higher values. 'Different Detection Limits' indicates a comparison dominated by comparisons of detection levels instead of analytical values.

```
Parameters with different populations:
ARSENIC                    Group 3g Higher
CADMIUM                    Different Detection Limits
...
```

This section continues with a 'by location outside values count' listing which summarizes the number of lower and upper outside values each sample location contains. Locations with a relatively large number of low or high outside values may indicate an area in need of closer scrutiny (possibly representing an area of elevated concentrations, high analytical detection limits, etc).

location	low values BDL/total	high values BDL/total
08G00102	24/29	21/27
08G00202	25/29	24/27
08G00302	26/28	23/26

Next come the individual analyte detail listings. The example discussed below is the output of a comparison of two groups of data (OU 3 and background group) for the parameter arsenic, a contaminant of concern for OU 3.

```
-------------------------------------------------------------
 ARSENIC in UG/L
-----------------------------

bkg      .....***      **   .*
3g              .....**  ...  **...........*************************
 group1:  3g
 min, median, max, bdl/tot :          2.2000 U          13.2000          295.0000      19 /   49
 group2:  bkg
 min, median, max, bdl/tot :          1.5000 U           1.8500           3.7000 B     6 /   12
>>> Different populations at alpha > 0.95
  Group 3g Higher
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -0.3750
```

```
lq     =          1.5000 U
median =          1.8500
uq     =          2.7500
hicut  =          4.6250
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U          5.9000 09G00302
 U          5.9000 09G00202D
...
          264.0000 09G00402
          295.0000 08G00202
```

Below is an explanation for each section. First is the header, which tells the reader which parameter is being compared.

```
-----------------------------------------------------------------
 ARSENIC in UG/L
-----------------------------
```

Next are two rows of .'s and *'s -- these are a graphical representation of the ranking of values, increasing values to the right. (.'s represent below detection limit [BDL] values while *'s represent above detection limit [ADL] values.) In the arsenic example below, most arsenic detections in group OU 3 groundwater (group 3g) are much higher than detections shown for group bkg. This display is limited to a 70 character bar (to fit on the page), so each character can represent more than one value (actually, each character exactly represents (total number in both groups)/70, rounded up to the next larger integer). Hits take precedence over a BDL (ie., if the character contains both ADL and BDL values, then it is a *).

```
bkg      .....***       **   .*
3g               .....**  ...  **...........*************************
```

Next comes a brief descriptive statistics report for each group. Included in this report are the minimum, median, and maximum values in each group (including any appropriate value qualifiers), and a listing of the number of BDL values and total number of values included for the group in the analysis.

```
 group1:  3g
 min, median, max, bdl/tot :        2.2000 U        13.2000        295.0000     19 /   49
 group2:  bkg
 min, median, max, bdl/tot :        1.5000 U         1.8500         3.7000 B     6 /   12
```

Next comes a description of the results of a Mann-Whitney U test comparison for the two groups. This test determines if the two groups are likely to have been chosen from the same parent population.

```
>>> Different populations at alpha > 0.95
  Group 3g Higher
```

Possible outcomes (and their meaning) may include:

All analyses were BDLs — (No comparison of analytical values is possible since all values were below detection limits)

>>> Different populations at alpha= nnn <<< (the groups are small and from different parent populations with more than 95%

confidence)

Different populations at alpha= nnn (the groups are small but not from different parent populations with more than 95% confidence)

>>> Different populations at alpha > 0.95 (the groups are large and from different parent populations with more than 95% confidence)

no evidence of different populations at alpha=.95 (the groups are large but not from different parent populations with more than 95% confidence)

And a determination of which group tends to have higher values. If many of the values are BDL, then this determination might be that the comparison reflects groups with different detection limits and not necessarily different actual analytical values.

Next, a fourth spread nonparametric outside value check is done to identify points with suspect values which should be further examined. These are not necessarily "bad" points, but their values are sufficiently extreme to warrant closer scrutiny before using them in further data analyses. The median, lower quartile (lq), upper quartile (uq), the lower cut off value (locut), and the upper cut off value (hicut) are then listed for the background group. (For descriptions of these values, see **Understanding Robust and Exploratory Data Analysis**, D. C. Hoaglin, F. Mosteller, and J.W. Tukey, John Wiley and Sons, Inc. 1983.) Following these listings is a list of non-background values that fall outside of the interval between the lower cut off value and the upper cut off value. If no values fall outside, then '<<NONE FOUND>>' will be listed. The summary of outside values by analytical parameter is then presented, one group for low outside values and another group for high outside values.

```
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -0.3750
lq     =           1.5000 U
median =           1.8500
uq     =           2.7500
hicut  =           4.6250
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            5.9000 09G00302
 U            5.9000 09G00202D
...
            264.0000 09G00402
            295.0000 08G00202
```

Next come the detail reports on each individual location and the summary of outside values by analyte. The location detail report begins with a listing of the location identifier and the total number of low and hi outside values. The comes a details listing of all analytical values (including parameter name, value and value qualifiers) which are low outside values. Following these is a report detailing the same information for high outside values. The example below is for well identifier OLD-08-02.

```
08G00302          low:  26/28  hi:  23/26
 L 2,4-D                                        1.5000 U
 L 2,4-DB                                       0.6000 J
---
 L gamma-Chlordane                              0.0480 U

 H 1,2-Dichlorobenzene                         10.0000 UJ
 H 1,3-Dichlorobenzene                         10.0000 UJ
---
 H Arsenic                                     79.9000
---
```

Statistical evaluation results are presented by media, groundwater in Section ?.?.4 and surface soils in Section ?.?.5. Descriptive statistics for each OU 3 media are summarized first. While the statistical procedures were done on all analytes and compounds analyzed in OU 3 soil and groundwater data, only the analytes and compounds that were detected at least once in any one sample is included in the summaries that follow since they could be considered statistically insignificant. The following table summarizes the analytes and compounds detected at least once in either soil or groundwater sample.

Analyte/Compound Detected	Soil	Groundwater
2,4 5-TP (Silvex)	x	x
2,4,5-T	x	x
2,4,6-Trichlorophenol		x
2,4-D	x	x
2,4-DB	x	x
2,4-Dichlorophenol		x
2,4-Dimethylphenol		x
2-Methylnaphthalene	x	x
2-Methylphenol		x
4,4'-DDD	x	x
4,4'-DDE	x	x
4,4'-DDT	x	x
4-Methylphenol		x
Acenaphthylene	x	
Aldrin	x	x
alpha-BHC	x	x
alpha-Chlordane	x	x
Aluminum	x	x
Anthracene	x	
Antimony	x	x
Aroclor-1260	x	
Arsenic	x	x
Barium	x	x
Benzo(a)anthracene	x	
Benzo(a)pyrene	x	
Benzo(b)fluoranthene	x	
Benzo(g,h,i)perylene	x	
Benzo(k)fluoranthene	x	
Beryllium	x	
beta-BHC	x	
bis(2-Ethylhexyl)phthalate	x	
Butylbenzylphthalate	x	
Cadmium	x	
Calcium	x	x

Carbazole	x	
Chromium	x	x
Chrysene	x	
Cobalt	x	x
Copper	x	x
Dalapon	x	x
delta-BHC	x	x
Di-n-butylphthalate	x	
Di-n-octylphthalate	x	
Dibenz(a,h)anthracene	x	
Dicamba	x	x
Dichloroprop	x	x
Dieldrin	x	x
Dinoseb	x	x
Endosulfan I	x	x
Endosulfan II	x	x
Endosulfan sulfate	x	x
Endrin	x	x
Endrin aldehyde	x	x
Endrin ketone	x	x
Fluoranthene	x	
gamma-BHC (Lindane)	x	x
gamma-Chlordane	x	x
Heptachlor	x	x
Heptachlor epoxide	x	x
Indeno(1,2,3-cd)pyrene	x	
Iron	x	x
Lead	x	x
Magnesium		x
Manganese	x	x
MCPA	x	x
MCPP	x	x
Mercury	x	x
Methoxychlor	x	x
Naphthalene		x
Nickel	x	x
Phenanthrene	x	
Phenol		x
Potassium		x
Pyrene	x	
Selenium	x	
Silver	x	x
Sodium		x
Vanadium	x	x
Zinc	x	x

C.4.4 Statistical Evaluation - OU3 groundwater

Summary of descriptive statistics

Chem.name is chemical name
Min.dl is minimum reported detection level
Max.dl is maximum reported detection level
Min.lv is minimum level reported
Max.lv is maximum level reported
ADL.Avg is above detection level average value
Median is median of all values above and below detection level
Num.Det/Tot.Sample is number of detects / total number sampled

Chem.name	Min.dl	Max.dl	Min.lv	Max.lv	ADL.Avg	Median		Num.Det/Tot.Sample
1,2,4-Trichlorobenzene	10.000	11.000	N/A	N/A	N/A	10.000	UJ	0/35
1,2-Dichlorobenzene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
1,3-Dichlorobenzene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
1,4-Dichlorobenzene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
2,2'-oxybis(1-Chloropropa	10.000	11.000	N/A	N/A	N/A	10.000	UJ	0/35
2,4 5-TP (Silvex)	0.050	5.000	N/A	N/A	N/A	0.500	U	0/38
2,4,5-T	0.500	5.000	N/A	N/A	N/A	0.500	U	0/38
2,4,5-Trichlorophenol	25.000	27.000	N/A	N/A	N/A	25.000	U	0/35
2,4,6-Trichlorophenol	10.000	11.000	2.000	2.000	2.000	10.000	U	1/35
2,4-D	1.500	2.000	0.001	110.000	4.589	0.230	J	25/38
2,4-DB	2.000	50.000	0.046	1.800	0.430	0.560	J	25/38
2,4-Dichlorophenol	10.000	11.000	2.000	200.000	101.000	10.000	U	2/35
2,4-Dimethylphenol	10.000	11.000	2.000	2.000	2.000	10.000	U	1/35
2,4-Dinitrophenol	25.000	27.000	N/A	N/A	N/A	25.000	U	0/35
2,4-Dinitrotoluene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
2,6-Dinitrotoluene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
2-Chloronaphthalene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
2-Chlorophenol	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
2-Methylnaphthalene	10.000	11.000	1.000	14.000	7.500	10.000	U	2/35
2-Methylphenol	10.000	11.000	1.000	1.000	1.000	10.000	U	1/35
2-Nitroaniline	25.000	27.000	N/A	N/A	N/A	25.000	U	0/35
2-Nitrophenol	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
3,3'-Dichlorobenzidine	10.000	11.000	N/A	N/A	N/A	10.000	UJ	0/35
3-Nitroaniline	25.000	27.000	N/A	N/A	N/A	25.000	U	0/35
4,4'-DDD	0.093	0.110	0.029	0.088	0.059	0.096	U	2/34
4,4'-DDE	0.093	0.110	0.005	0.100	0.038	0.096	U	3/34
4,4'-DDT	0.093	0.110	0.004	0.009	0.006	0.095	U	4/34
4,6-Dinitro-2-methylpheno	25.000	27.000	N/A	N/A	N/A	25.000	U	0/35
4-Bromophenyl-phenylether	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
4-Chloro-3-methylphenol	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
4-Chloroaniline	10.000	11.000	N/A	N/A	N/A	10.000	UJ	0/35
4-Chlorophenyl-phenylethe	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
4-Methylphenol	10.000	11.000	3.000	3.000	3.000	10.000	U	1/35
4-Nitroaniline	25.000	27.000	N/A	N/A	N/A	25.000	UJ	0/35
4-Nitrophenol	25.000	27.000	N/A	N/A	N/A	25.000	U	0/35
Acenaphthene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Acenaphthylene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Aldrin	0.047	0.054	0.051	0.051	0.051	0.048	U	1/34
Aluminum	33.000	155.000	87.300	3260.000	748.341	372.000		37/49
Anthracene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Antimony	2.000	5.000	2.900	5.100	3.740	2.900	U	5/49
Aroclor-1016	0.930	1.100	N/A	N/A	N/A	0.955	U	0/34
Aroclor-1221	1.900	2.200	N/A	N/A	N/A	1.900	U	0/34
Aroclor-1232	0.930	1.100	N/A	N/A	N/A	0.955	U	0/34
Aroclor-1242	0.930	1.100	N/A	N/A	N/A	0.955	U	0/34
Aroclor-1248	0.930	1.100	N/A	N/A	N/A	0.955	U	0/34
Aroclor-1254	0.930	1.100	N/A	N/A	N/A	0.955	U	0/34
Aroclor-1260	0.930	1.100	N/A	N/A	N/A	0.955	U	0/34
Arsenic	2.200	5.900	2.200	295.000	95.833	13.200		30/49
Barium	1.500	9.600	1.800	47.200	17.495	13.300	J	44/49
Benzo(a)anthracene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Benzo(a)pyrene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Benzo(b)fluoranthene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Benzo(g,h,i)perylene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Benzo(k)fluoranthene	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Beryllium	0.100	0.430	N/A	N/A	N/A	0.120	U	0/49
Butylbenzylphthalate	10.000	11.000	N/A	N/A	N/A	10.000	U	0/35
Cadmium	0.300	0.500	N/A	N/A	N/A	0.300	U	0/49
Calcium	771.000	63200.000	5830.000	134000.000	42175.526	29300.000	U	38/49

Carbazole	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Chromium	0.800	6.300	0.810	3.700	1.659	1.500 J	27/49
Chrysene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Cobalt	0.700	0.800	0.550	2.300	1.285	0.700 U	16/49
Copper	0.700	4.400	0.760	56.000	6.964	3.000 U	29/49
Dalapon	6.000	60.000	0.300	1.400	0.797	6.000 U	3/38
Di-n-butylphthalate	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Di-n-octylphthalate	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Dibenz(a,h)anthracene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Dibenzofuran	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Dicamba	0.500	5.000	N/A	N/A	N/A	0.500 U	0/38
Dichloroprop	2.000	20.000	0.120	3.100	0.615	2.000 U	12/38
Dieldrin	0.093	0.110	0.012	0.019	0.016	0.095 U	2/34
Diethylphthalate	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Dimethylphthalate	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Dinoseb	1.500	15.000	0.098	0.280	0.139	1.500 U	5/38
Endosulfan I	0.047	0.054	0.046	0.094	0.070	0.048 U	2/34
Endosulfan II	0.093	0.110	0.008	0.009	0.008	0.095 U	2/34
Endosulfan sulfate	0.093	0.110	0.012	0.012	0.012	0.095 U	1/34
Endrin	0.093	0.110	0.010	0.022	0.017	0.095 U	3/34
Endrin aldehyde	0.093	0.110	0.007	0.078	0.042	0.095 U	2/34
Endrin ketone	0.093	0.110	N/A	N/A	N/A	0.096 U	0/34
Fluoranthene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Fluorene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Heptachlor	0.047	0.054	N/A	N/A	N/A	0.048 U	0/34
Heptachlor epoxide	0.047	0.054	0.044	0.100	0.072	0.048 U	2/34
Hexachlorobenzene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Hexachlorobutadiene	10.000	11.000	N/A	N/A	N/A	10.000 UJ	0/35
Hexachlorocyclopentadiene	10.000	11.000	N/A	N/A	N/A	10.000 UJ	0/35
Hexachloroethane	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Indeno(1,2,3-cd)pyrene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Iron	36.400	162.000	53.600	5800.000	1188.503	447.000	37/49
Isophorone	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Lead	1.600	3.600	1.900	6.600	3.775	1.900 U	8/49
MCPA	53.000	500.000	460.000	3100.000	1056.667	390.000 U	15/38
MCPP	60.000	540.000	0.360	1900.000	885.863	270.000 UJ	12/38
Magnesium	660.000	6650.000	7410.000	9780.000	8595.000	2150.000 U	2/49
Manganese	0.520	104.000	3.000	172.000	56.085	38.400	41/49
Mercury	0.100	0.190	0.110	0.120	0.115	0.110 U	2/49
Methoxychlor	0.052	0.540	0.008	0.008	0.008	0.480 U	1/34
N-Nitroso-di-n-propylamin	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
N-Nitrosodiphenylamine (1	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Naphthalene	10.000	11.000	1.000	160.000	29.571	10.000 U	7/35
Nickel	1.200	1.300	1.400	11.400	4.641	1.600 J	27/49
Nitrobenzene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Pentachlorophenol	25.000	27.000	N/A	N/A	N/A	25.000 UJ	0/35
Phenanthrene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Phenol	10.000	11.000	2.000	2.000	2.000	10.000 U	1/35
Potassium	178.000	4570.000	4720.000	16000.000	10052.857	2530.000 U	14/49
Pyrene	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
Selenium	3.600	4.400	N/A	N/A	N/A	4.400 U	0/49
Silver	0.700	0.800	0.950	1.100	1.025	0.800 U	2/49
Sodium	1960.000	78300.000	7890.000	28900.000	18395.000	6680.000 U	2/49
Thallium	3.700	5.000	N/A	N/A	N/A	5.000 U	0/49
Total Organic Carbon	N/A	N/A	5.940	62.300	29.041	27.300	36/36
Total Suspended Solids	4.000	4.000	4.000	58.000	18.500	4.000 U	10/36
Toxaphene	4.700	5.400	N/A	N/A	N/A	4.800 U	0/34
Vanadium	0.700	0.700	0.730	5.100	2.065	1.500 J	37/49
Zinc	1.000	151.000	N/A	N/A	N/A	16.800 U	0/49
alpha-BHC	0.047	0.054	0.004	1.000	0.502	0.048 U	2/34
alpha-Chlordane	0.047	0.054	0.028	0.110	0.069	0.048 U	2/34
beta-BHC	0.047	0.054	N/A	N/A	N/A	0.048 U	0/34
bis(2-Chloroethoxy)methan	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
bis(2-Chloroethyl)ether	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
bis(2-Ethylhexyl)phthalat	10.000	11.000	N/A	N/A	N/A	10.000 U	0/35
delta-BHC	0.047	0.054	0.005	0.300	0.083	0.048 U	4/35
gamma-BHC (Lindane)	0.047	0.054	0.008	0.690	0.186	0.048 U	4/34
gamma-Chlordane	0.047	0.054	0.013	0.670	0.221	0.048 U	4/34

LOCATIONS AND SAMPLE DATES USED:

location	sampdate
08F00901	19971022

08F01201	19971023
08F01301	19971205
08G00102	19971022
08G00202	19971022
08G00302	19971022
08G00402	19971022
08G00501	19971023
08G00501D	19971023
08G00601	19971023
08G00701	19971023
08G00801	19971022
08G00801D	19971022
08G00901	19971022
08G01001	19971023
08G01101	19971023
08G01201	19971023
08G01301	19971205
08G01401	19971208
08G01501	19971205
08G01601	19980218
08G01701	19980218
08G01801	19980219
09F00402	19971021
09F00601	19971017
09F00701	19971021
09F01501	19971205
09F01601	19971205
09G00102	19971020
09G00202	19971020
09G00202D	19971020
09G00302	19971020
09G00402	19971021
09G00501	19971021
09G00601	19971017
09G00701	19971021
09G00801	19971024
09G00901	19971024
09G01001	19971021
09G01101	19971021
09G01201	19971021
09G01301	19971021
09G01401	19971204
09G01401D	19971204
09G01501	19971205
09G01601	19971205
09G01701	19980212
09G01801	19980212
09G01801D	19980212

NTC ORLANDO background groundwater descriptive statistics

Chem.name is chemical name
Min.dl is minimum reported detection level
Max.dl is maximum reported detection level
Min.lv is minimum level reported
Max.lv is maximum level reported
ADL.Avg is above detection level average value
Median is median of all values above and below detection level
Num.Det/Tot.Sample is number of detects / total number sampled

Chem.name	Min.dl	Max.dl	Min.lv	Max.lv	ADL.Avg	Median	Num.Det/Tot.Sample
1,1,1-Trichloroethane	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,1,2,2-Tetrachloroethane	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,1,2-Trichloroethane	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,1-Dichloroethane	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,1-Dichloroethene	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,2,4-Trichlorobenzene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
1,2-Dibromo-3-chloropropa	1.000	1.000	N/A	N/A	N/A	1.000 UR	0/9
1,2-Dibromoethane	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,2-Dichlorobenzene	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,2-Dichloroethane	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,2-Dichloropropane	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,3-Dichlorobenzene	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
1,4-Dichlorobenzene	1.000	1.000	N/A	N/A	N/A	1.000 U	0/12
2,2'-oxybis(1-Chloropropa	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2,4,5-T	0.500	0.500	N/A	N/A	N/A	0.500 U	0/12
2,4,5-Trichlorophenol	25.000	25.000	N/A	N/A	N/A	25.000 U	0/12
2,4,6-Trichlorophenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2,4-D	2.500	2.500	N/A	N/A	N/A	2.500 U	0/12
2,4-DB	2.500	2.500	N/A	N/A	N/A	2.500 U	0/12
2,4-DP (Dichloroprop)	2.500	2.500	N/A	N/A	N/A	2.500 U	0/12
2,4-Dichlorophenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2,4-Dimethylphenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2,4-Dinitrophenol	25.000	25.000	N/A	N/A	N/A	25.000 U	0/12
2,4-Dinitrotoluene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2,6-Dinitrotoluene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2-Butanone	5.000	5.000	N/A	N/A	N/A	5.000 UR	0/6
2-Chloronaphthalene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2-Chlorophenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2-Hexanone	5.000	5.000	N/A	N/A	N/A	5.000 UR	0/9
2-Methylnaphthalene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2-Methylphenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
2-Nitroaniline	25.000	25.000	N/A	N/A	N/A	25.000 U	0/12
2-Nitrophenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
3,3'-Dichlorobenzidine	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
3-Nitroaniline	25.000	25.000	N/A	N/A	N/A	25.000 U	0/12
4,4'-DDD	0.100	0.100	N/A	N/A	N/A	0.100 UJ	0/12
4,4'-DDE	0.100	0.100	N/A	N/A	N/A	0.100 UJ	0/12
4,4'-DDT	0.100	0.100	N/A	N/A	N/A	0.100 UJ	0/12
4,6-Dinitro-2-methylpheno	25.000	25.000	N/A	N/A	N/A	25.000 U	0/12
4-Bromophenyl-phenylether	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
4-Chloro-3-methylphenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
4-Chloroaniline	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
4-Chlorophenyl-phenylethe	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
4-Methyl-2-pentanone	5.000	5.000	N/A	N/A	N/A	5.000 U	0/12
4-Methylphenol	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
4-Nitroaniline	25.000	25.000	N/A	N/A	N/A	25.000 U	0/12
4-Nitrophenol	25.000	25.000	N/A	N/A	N/A	25.000 U	0/12
Acenaphthene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
Acenaphthylene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
Acetone	5.000	5.000	N/A	N/A	N/A	5.000 UR	0/6
Actinium-228	23.300	38.900	N/A	N/A	N/A	34.700 U	0/12
Aldrin	0.050	0.050	N/A	N/A	N/A	0.050 UJ	0/12
Aluminum	14.600	14.600	22.700	7260.000	2033.427	829.000	11/12
Anthracene	10.000	10.000	N/A	N/A	N/A	10.000 U	0/12
Antimony	1.200	1.400	1.900	2.200	2.050	1.200 U	2/12
Aroclor-1016	0.500	0.500	N/A	N/A	N/A	0.500 UJ	0/12
Aroclor-1221	0.500	0.500	N/A	N/A	N/A	0.500 UJ	0/12
Aroclor-1232	0.500	0.500	N/A	N/A	N/A	0.500 UJ	0/12
Aroclor-1242	0.500	0.500	N/A	N/A	N/A	0.500 UJ	0/12
Aroclor-1248	0.500	0.500	N/A	N/A	N/A	0.500 UJ	0/12
Aroclor-1254	0.500	0.500	N/A	N/A	N/A	0.500 UJ	0/12

Aroclor-1260	0.500	0.500	N/A	N/A	N/A	0.500	UJ	0/12
Arsenic	1.500	3.100	1.700	3.700	2.483	1.850	B	6/12
Barium	N/A	N/A	2.000	71.000	15.708	8.800	B	12/12
Benzene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Benzo(a)anthracene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Benzo(a)pyrene	0.100	0.100	N/A	N/A	N/A	0.100	U	0/12
Benzo(b)fluoranthene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Benzo(g,h,i)perylene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Benzo(k)fluoranthene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Beryllium	0.200	0.200	N/A	N/A	N/A	0.200	U	0/12
Bismuth-212	71.600	229.000	232.000	232.000	232.000	188.500	U	1/12
Bismuth-214	17.200	26.700	N/A	N/A	N/A	23.000	U	0/12
Bromochloromethane	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Bromodichloromethane	1.000	1.000	1.000	1.000	1.000	1.000	U	1/12
Bromoform	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Bromomethane	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Butylbenzylphthalate	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Cadmium	2.100	2.100	2.800	2.800	2.800	2.100	U	1/12
Calcium	N/A	N/A	2660.000	42500.000	18415.000	15550.000	J	12/12
Carbazole	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Carbon disulfide	1.000	5.000	N/A	N/A	N/A	1.000	U	0/12
Carbon tetrachloride	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Cesium-137	3.300	8.400	0.835	0.835	0.835	5.700	U	1/13
Cesium-137, Uncertainty	N/A	N/A	1.650	1.650	1.650	1.650		1/1
Chlorobenzene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Chloroethane	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Chloroform	1.000	1.000	0.500	4.000	1.200	1.000	U	7/12
Chloromethane	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Chromium	1.900	1.900	2.400	6.000	3.917	2.150	B	6/12
Chrysene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Cobalt	2.600	2.600	N/A	N/A	N/A	2.600	U	0/12
Copper	1.500	1.800	1.800	3.600	2.700	1.500	U	2/12
Dalapon	5.000	5.000	N/A	N/A	N/A	5.000	U	0/12
Di-n-butylphthalate	10.000	10.000	2.000	2.000	2.000	10.000	U	1/12
Di-n-octylphthalate	10.000	10.000	2.000	3.000	2.250	10.000	U	4/12
Dibenz(a,h)anthracene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Dibenzofuran	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Dibromochloromethane	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Dicamba	0.500	0.500	N/A	N/A	N/A	0.500	U	0/12
Dieldrin	0.100	0.100	N/A	N/A	N/A	0.100	UJ	0/12
Diethylphthalate	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Dimethylphthalate	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Dinoseb	0.500	0.500	N/A	N/A	N/A	0.500	U	0/12
Endosulfan I	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
Endosulfan II	0.100	0.100	N/A	N/A	N/A	0.100	UJ	0/12
Endosulfan sulfate	0.100	0.100	N/A	N/A	N/A	0.100	UJ	0/12
Endrin	0.100	0.100	N/A	N/A	N/A	0.100	UJ	0/12
Endrin aldehyde	0.100	0.100	N/A	N/A	N/A	0.100	UJ	0/12
Endrin ketone	0.100	0.100	N/A	N/A	N/A	0.100	UJ	0/12
Ethylbenzene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Fluoranthene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Fluorene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Gross Alpha	1.000	1.000	2.200	16.200	6.340	4.200	J	10/13
Gross Alpha, Counting Err	N/A	N/A	2.700	2.700	2.700	2.700		1/1
Gross Beta	3.000	3.000	3.000	6.600	5.067	3.000	U	6/13
Gross Beta, Counting Erro	N/A	N/A	2.600	2.600	2.600	2.600		1/1
Heptachlor	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
Heptachlor epoxide	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
Hexachlorobenzene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Hexachlorobutadiene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Hexachlorocyclopentadiene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Hexachloroethane	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Indeno(1,2,3-cd)pyrene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Iron	N/A	N/A	16.000	1540.000	613.558	285.500		12/12
Isophorone	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Lead	1.300	1.300	1.700	2.300	2.000	1.300	UJ	2/12
Lead-212	14.300	19.000	N/A	N/A	N/A	16.600	U	0/12
Lead-214	15.200	23.700	N/A	N/A	N/A	21.450	U	0/12
MCPA	250.000	250.000	N/A	N/A	N/A	250.000	U	0/12
MCPP	250.000	250.000	N/A	N/A	N/A	250.000	U	0/12
Magnesium	N/A	N/A	713.000	4930.000	2280.000	1725.000	J	12/12
Manganese	N/A	N/A	2.400	14.100	8.483	10.150	B	12/12
Mercury	0.020	0.020	0.030	0.120	0.061	0.040	J	7/12

Methoxychlor	0.500	0.500	N/A	N/A	N/A	0.500	UJ	0/12
Methylene chloride	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
N-Nitroso-di-n-propylamin	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
N-Nitrosodiphenylamine (1	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Naphthalene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Nickel	9.100	9.100	N/A	N/A	N/A	9.100	UJ	0/12
Nitrobenzene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Pentachlorophenol	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Phenanthrene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Phenol	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Potassium	339.000	339.000	419.000	5460.000	2699.857	584.500	B	7/12
Potassium-40	83.000	213.000	-20.200	-20.200	-20.200	192.000	UJ	1/13
Potassium-40, Uncertainty	N/A	N/A	29.800	29.800	29.800	29.800		1/1
Pyrene	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
Radium-226	N/A	N/A	2.760	2.760	2.760	2.760		1/1
Radium-226, Uncertainty	N/A	N/A	0.190	0.190	0.190	0.190		1/1
Radium-228	N/A	N/A	0.000	0.000	0.000	0.000		1/1
Radium-228, Uncertainty	N/A	N/A	0.780	0.780	0.780	0.780		1/1
Selenium	2.000	2.000	4.300	5.400	4.850	2.000	U	2/12
Silver	2.200	2.200	N/A	N/A	N/A	2.200	U	0/12
Silvex (2,4,5-TP)	0.500	0.500	N/A	N/A	N/A	0.500	U	0/12
Sodium	N/A	N/A	814.000	19800.000	9111.167	6970.000	J	12/12
Styrene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Tetrachloroethene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Thallium	1.300	1.300	1.900	1.900	1.900	1.300	U	1/12
Thallium-208	6.500	11.800	N/A	N/A	N/A	9.550	U	0/12
Thorium-227	N/A	N/A	0.013	0.013	0.013	0.013		1/1
Thorium-227, Uncertainty	N/A	N/A	0.007	0.007	0.007	0.007		1/1
Thorium-228	564.000	1070.000	0.724	0.724	0.724	814.000	U	1/13
Thorium-228, Uncertainty	N/A	N/A	0.095	0.095	0.095	0.095		1/1
Thorium-230	N/A	N/A	1.460	1.460	1.460	1.460		1/1
Thorium-230, Uncertainty	N/A	N/A	0.172	0.172	0.172	0.172		1/1
Thorium-232	N/A	N/A	0.017	0.017	0.017	0.017		1/1
Thorium-232, Uncertainty	N/A	N/A	0.009	0.009	0.009	0.009		1/1
Thorium-234	313.000	670.000	N/A	N/A	N/A	551.500	U	0/12
Toluene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Total Dissolved Solids	N/A	N/A	192.000	192.000	192.000	192.000		1/1
Total Suspended Solids	1.000	1.000	3.000	21.000	9.333	2.000		6/12
Toxaphene	5.000	5.000	N/A	N/A	N/A	5.000	UJ	0/12
Trichloroethene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Uranium-234	N/A	N/A	0.000	0.000	0.000	0.000		1/1
Uranium-234, Uncertainty	N/A	N/A	0.006	0.006	0.006	0.006		1/1
Uranium-235	30.500	51.900	N/A	N/A	N/A	42.550	U	0/12
Uranium-238	N/A	N/A	0.027	0.027	0.027	0.027		1/1
Uranium-238, Uncertainty	N/A	N/A	0.016	0.016	0.016	0.016		1/1
Vanadium	2.500	2.500	2.900	19.200	10.318	9.950	B	11/12
Vinyl chloride	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Xylene (total)	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
Zinc	1.100	5.000	2.000	2.000	2.000	2.100	U	1/12
alpha-BHC	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
alpha-Chlordane	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
beta-BHC	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
bis(2-Chloroethoxy)methan	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
bis(2-Chloroethyl)ether	10.000	10.000	N/A	N/A	N/A	10.000	U	0/12
bis(2-Ethylhexyl)phthalat	1.000	2.000	N/A	N/A	N/A	1.000	U	0/12
cis-1,2-Dichloroethene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
cis-1,3-Dichloropropene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
delta-BHC	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
gamma-BHC (Lindane)	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
gamma-Chlordane	0.050	0.050	N/A	N/A	N/A	0.050	UJ	0/12
trans-1,2-Dichloroethene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12
trans-1,3-Dichloropropene	1.000	1.000	N/A	N/A	N/A	1.000	U	0/12

LOCATIONS AND SAMPLE DATES USED:

location	sampdate
ORG00101	19941110
ORG00101	19941111
ORG00103	19951016
ORG00201	19941110
ORG00201D	19941110
ORG00301	19941110
ORG00401	19941110

ORG00501	19941110
ORG00601	19941109
ORG00601	19941110
ORG00701	19941109
ORG00701	19941110
ORG00701D	19941109
ORG00701D	19941110
ORG00801	19941109
ORG00801	19941110
ORG00901	19941110
ORG01001	19941110

Points used:

ou	location
3g	08F00901
3g	08F01201
3g	08F01301
3g	08G00102
3g	08G00202
3g	08G00302
3g	08G00402
3g	08G00501
3g	08G00501D
3g	08G00601
3g	08G00701
3g	08G00801
3g	08G00801D
3g	08G00901
3g	08G01001
3g	08G01101
3g	08G01201
3g	08G01301
3g	08G01401
3g	08G01501
3g	08G01601
3g	08G01701
3g	08G01801
3g	09F00402
3g	09F00601
3g	09F00701
3g	09F01501
3g	09F01601
3g	09G00102
3g	09G00202
3g	09G00202D
3g	09G00302
3g	09G00402
3g	09G00501
3g	09G00601
3g	09G00701
3g	09G00801
3g	09G00901
3g	09G01001
3g	09G01101
3g	09G01201
3g	09G01301
3g	09G01401
3g	09G01401D
3g	09G01501
3g	09G01601
3g	09G01701
3g	09G01801
3g	09G01801D
bkg	ORG00101
bkg	ORG00103
bkg	ORG00201
bkg	ORG00201D
bkg	ORG00301
bkg	ORG00401
bkg	ORG00501
bkg	ORG00601
bkg	ORG00701
bkg	ORG00701D
bkg	ORG00801
bkg	ORG00901
bkg	ORG01001

Parameters with different populations: groundwater

2,4-D	Different Detection Limits
4,4'-DDD	Different Detection Limits
4,4'-DDE	Different Detection Limits
4,4'-DDT	Different Detection Limits
ALDRIN	Different Detection Limits
ANTIMONY	Different Detection Limits
ARSENIC	Group 3g Higher
CADMIUM	Different Detection Limits
CHROMIUM	Different Detection Limits
COBALT	Different Detection Limits
COPPER	Different Detection Limits
DALAPON	Different Detection Limits
DIELDRIN	Different Detection Limits
DINOSEB	Different Detection Limits
ENDOSULFAN I	Different Detection Limits
ENDOSULFAN II	Different Detection Limits
ENDOSULFAN SULFATE	Different Detection Limits
ENDRIN	Different Detection Limits
ENDRIN ALDEHYDE	Different Detection Limits
HEPTACHLOR EPOXIDE	Different Detection Limits
LEAD	Different Detection Limits
MANGANESE	Group 3g Higher
MERCURY	Different Detection Limits
METHOXYCHLOR	Different Detection Limits
NICKEL	Different Detection Limits
SELENIUM	Different Detection Limits
SILVER	Different Detection Limits
THALLIUM	Different Detection Limits,
TOTAL SUSPENDED SOLIDS	Different Detection Limits
VANADIUM	Group bkg Higher
ZINC	Different Detection Limits
ALPHA-BHC	Different Detection Limits
ALPHA-CHLORDANE	Different Detection Limits
DELTA-BHC	Different Detection Limits
GAMMA-BHC (LINDANE)	Different Detection Limits
GAMMA-CHLORDANE	Different Detection Limits

location	low values BDL/total	high values BDL/total
08F00901	4/5	6/7
08F01201	4/5	8/10
08F01301	3/5	6/9
08G00102	24/29	21/27
08G00202	25/29	24/27
08G00302	26/28	23/26
08G00402	27/30	21/23
08G00501	7/10	22/25
08G00501D	28/29	23/26
08G00601	27/30	77/82
08G00701	28/28	24/27
08G00801	28/30	22/25
08G00801D	27/29	22/26
08G00901	26/29	24/25
08G01001	27/27	24/28
08G01101	25/28	24/28
08G01201	27/28	25/28
08G01301	23/27	22/30
08G01401	25/30	21/27
08G01501	13/18	20/24
08G01601	3/4	5/7
08G01701	4/5	6/8
08G01801	3/4	5/6
09F00402	3/5	3/8
09F00601	2/5	4/8
09F00701	4/5	7/8
09F01501	3/5	6/8
09F01601	3/5	5/7
09G00102	4/7	35/37
09G00202	6/8	34/36
09G00202D	6/11	36/37
09G00302	5/9	25/25

09G00402	19/27	19/30
09G00501	19/26	21/26
09G00601	7/14	33/36
09G00701	25/29	23/25
09G00801	4/6	46/47
09G00901	25/28	24/26
09G01001	29/30	23/23
09G01101	21/29	22/25
09G01201	19/25	23/34
09G01301	5/10	44/45
09G01401	4/8	23/31
09G01401D	26/27	24/31
09G01501	24/30	23/27
09G01601	25/30	21/24
09G01701	4/8	7/8
09G01801	7/8	8/10
09G01801D	7/7	9/11

OU 3 groundwater statistics

Points used:

ou	location
3g	08F00901
3g	08F01201
3g	08F01301
3g	08G00102
3g	08G00202
3g	08G00302
3g	08G00402
3g	08G00501
3g	08G00501D
3g	08G00601
3g	08G00701
3g	08G00801
3g	08G00801D
3g	08G00901
3g	08G01001
3g	08G01101
3g	08G01201
3g	08G01301
3g	08G01401
3g	08G01501
3g	08G01601
3g	08G01701
3g	08G01801
3g	09F00402
3g	09F00601
3g	09F00701
3g	09F01501
3g	09F01601
3g	09G00102
3g	09G00202
3g	09G00202D
3g	09G00302
3g	09G00402
3g	09G00501
3g	09G00601
3g	09G00701
3g	09G00801
3g	09G00901
3g	09G01001
3g	09G01101
3g	09G01201
3g	09G01301
3g	09G01401
3g	09G01401D
3g	09G01501
3g	09G01601
3g	09G01701
3g	09G01801
3g	09G01801D
bkg	ORG00101
bkg	ORG00103
bkg	ORG00201
bkg	ORG00201D
bkg	ORG00301
bkg	ORG00401
bkg	ORG00501
bkg	ORG00601
bkg	ORG00701
bkg	ORG00701D
bkg	ORG00801
bkg	ORG00901
bkg	ORG01001

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-------------------------------------------------------------
 2,4,6-TRICHLOROPHENOL in UG/L
-----------------------------

3g       *........................ . . . . . . .....     .
bkg                                . . .. . . .     .....
 group1:  3g
 min, median, max, bdl/tot :          2.0000 J          10.0000 U          11.0000 U    34 /   35
 group2:  bkg
 min, median, max, bdl/tot :         10.0000 U          10.0000 U          10.0000 U    12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values in test group relative to group bkg:
 J            2.0000 09G01201

 Upper outside values in test group relative to group bkg:
 U           11.0000 08G00601


-------------------------------------------------------------
 2,4-D in UG/L
-----------------------------

3g       ************************.............            *
bkg                                            .............
 group1:  3g
 min, median, max, bdl/tot :          0.0012 J           0.2300          110.0000 J    13 /   38
 group2:  bkg
 min, median, max, bdl/tot :          2.5000 U           2.5000 U           2.5000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =           2.5000
lq     =           2.5000 U
median =           2.5000 U
uq     =           2.5000 U
hicut  =           2.5000
 Lower outside values in test group relative to group bkg:
 J            0.0012 09G01301
 J            0.0018 09G00102
 J            0.0035 09G00302
 J            0.0047 09G00701
 J            0.0051 08G00202
 J            0.0230 08G00402
 J            0.0480 08G01101
 J            0.0680 09G01501
 J            0.0760 08G00901
 J            0.0820 08G01201
 J            0.0950 08G00102
 J            0.0990 09G00402
 J            0.1100 09G00501
 J            0.1100 08G00801D
 J            0.1200 08G00801
 J            0.1600 08G01501
 J            0.1600 08G01301
 J            0.2100 09G00801
 J            0.2200 08G00601
 J            0.2400 09G00901
 J            0.2600 09G01401
 J            0.3200 09G01701
 J            0.9000 09G00601
 J            1.4000 09G01101
 U            1.5000 08G00302
 U            1.5000 08G01001
 U            1.5000 09G00202
 U            1.5000 09G01001
```

```
U            1.5000 09G01801D
U            1.5000 08G00701
U            1.5000 08G00501
U            1.5000 08G00501D
U            1.5000 09G01401D
U            1.5000 09G01601
U            1.5000 09G01801
U            1.6000 09G00202D
U            2.0000 08G01401

Upper outside values in test group relative to group bkg:
J          110.0000 09G01201


-------------------------------------------------------------
2,4-DB in UG/L
-----------------------------

3g       ************************.            .............
bkg                                 .............
 group1:  3g
 min, median, max, bdl/tot :          0.0460 J          0.5600          50.0000 U    13 /   38
 group2:  bkg
 min, median, max, bdl/tot :          2.5000 U          2.5000 U         2.5000 U    12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =           2.5000
lq     =           2.5000 U
median =           2.5000 U
uq     =           2.5000 U
hicut  =           2.5000
 Lower outside values in test group relative to group bkg:
 J            0.0460 08G00102
 J            0.0610 08G00901
 J            0.0900 08G00202
 J            0.1100 08G00801D
 J            0.1400 09G01001
 J            0.1600 08G00801
 J            0.1700 09G00302
 J            0.1800 09G00701
 J            0.1800 09G01501
 J            0.1800 08G00402
 J            0.2100 09G01401
 J            0.2900 08G01501
 J            0.3100 09G01601
 J            0.3100 08G01301
 J            0.3300 09G00202D
 J            0.3800 09G01301
 J            0.4200 09G00102
 J            0.4400 09G00202
 J            0.5500 09G01701
 J            0.5700 08G00601
 J            0.6000 08G00302
 J            0.8300 09G00501
 J            1.0000 09G01101
 J            1.4000 08G00501
 J            1.8000 09G00402
 U            2.0000 08G01401

 Upper outside values in test group relative to group bkg:
 UJ           5.0000 09G00601
 U            5.0000 09G01801D
 U            5.0000 08G01201
 U            5.0000 08G00501D
 U            5.0000 08G01101
 U            5.0000 08G01001
 U            5.0000 08G00701
 U            5.0000 09G01801
 U            5.0000 09G00801
 U            5.0000 09G00901
 U            5.0000 09G01401D
 U           50.0000 09G01201
```

```
-------------------------------------------------------------
 2,4-DICHLOROPHENOL in UG/L
-----------------------------

3g      *.......................  . . . .. ..     .*
bkg                                ... . . .  .  .....
 group1:  3g
 min, median, max, bdl/tot :          2.0000 J          10.0000 U         200.0000      33 /   35
 group2:  bkg
 min, median, max, bdl/tot :         10.0000 U          10.0000 U         10.0000 U     12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values in test group relative to group bkg:
 J            2.0000 09G00402

 Upper outside values in test group relative to group bkg:
 U           11.0000 08G00601
           200.0000 09G01201


-------------------------------------------------------------
 2,4-DIMETHYLPHENOL in UG/L
-----------------------------

3g      *................. ...... . . . . . .....     .
bkg                        .     . . . . . .    .....
 group1:  3g
 min, median, max, bdl/tot :          2.0000 J          10.0000 U          11.0000 U    34 /   35
 group2:  bkg
 min, median, max, bdl/tot :         10.0000 U          10.0000 U         10.0000 U     12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values in test group relative to group bkg:
 J            2.0000 09G00202D

 Upper outside values in test group relative to group bkg:
 U           11.0000 08G00601


-------------------------------------------------------------
 2-METHYLNAPHTHALENE in UG/L
-----------------------------

3g      *....................... . . . . . . ...     .*
bkg                               . . . . . . .  .....
 group1:  3g
 min, median, max, bdl/tot :          1.0000 J          10.0000 U          14.0000 J    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :         10.0000 U          10.0000 U         10.0000 U     12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values in test group relative to group bkg:
 J            1.0000 09G01401
```

```
 Upper outside values in test group relative to group bkg:
 UJ          11.0000 08G00601
 J           14.0000 09G00402


-------------------------------------------------------------
 2-METHYLPHENOL in UG/L
-----------------------------

3g       *................ ...... . . . . . .....     .
bkg                        .      . . . . . .     .....
 group1:  3g
 min, median, max, bdl/tot :          1.0000 J          10.0000 U          11.0000 U    34 /   35
 group2:  bkg
 min, median, max, bdl/tot :         10.0000 U          10.0000 U          10.0000 U    12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values in test group relative to group bkg:
 J            1.0000 09G00202D

 Upper outside values in test group relative to group bkg:
 U           11.0000 08G00601


-------------------------------------------------------------
 4,4'-DDD in UG/L
-----------------------------

3g       **........................    ..    . .. .  .
bkg                                 ....  .... .  . ..
 group1:  3g
 min, median, max, bdl/tot :          0.0290 J           0.0960 U           0.1100 U    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.1000 UJ          0.1000 U           0.1000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.1000
lq     =          0.1000 U
median =          0.1000 U
uq     =          0.1000 U
hicut  =          0.1000
 Lower outside values in test group relative to group bkg:
 J            0.0290 09G00501
 J            0.0880 09G00402
 U            0.0930 09G01501
 U            0.0930 09G01201
 U            0.0930 09G01001
 U            0.0930 09G01601
 U            0.0940 09G01401D
 U            0.0940 09G01101
 UJ           0.0950 08G00801D
 U            0.0950 08G00601
 U            0.0950 08G00901
 U            0.0950 08G01001
 U            0.0950 08G00501D
 U            0.0950 08G01201
 U            0.0950 08G00402
 U            0.0950 09G00901
 U            0.0950 08G00102
 U            0.0960 08G00202
 U            0.0960 08G00302
 U            0.0960 08G00701
 U            0.0960 08G00801
 U            0.0970 09G00701
 U            0.0970 08G01401
```

```
U            0.0980 08G01101
U            0.0980 08G01301
UR           0.0990 08G01501

Upper outside values in test group relative to group bkg:
U            0.1100 09G01301


-------------------------------------------------------------
4,4'-DDE in UG/L
-----------------------------

3g      **.......................     ..   . ...   *.
bkg                                 .....  ... .   ...
 group1:  3g
 min, median, max, bdl/tot :          0.0051 J          0.0960 U          0.1100 U    32 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.1000 UJ         0.1000 U          0.1000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.1000
lq     =          0.1000 U
median =          0.1000 U
uq     =          0.1000 U
hicut  =          0.1000
 Lower outside values in test group relative to group bkg:
 J           0.0051 09G01101
 J           0.0081 09G00501
 U           0.0930 09G01601
 U           0.0930 09G01001
 U           0.0930 09G00402
 U           0.0930 09G01201
 U           0.0930 09G01501
 U           0.0940 09G01401D
 UJ          0.0950 08G00801D
 U           0.0950 08G00402
 U           0.0950 08G00901
 U           0.0950 08G01001
 U           0.0950 08G00601
 U           0.0950 08G01201
 U           0.0950 08G00501D
 U           0.0950 09G00901
 U           0.0950 08G00102
 U           0.0960 08G00202
 U           0.0960 08G00302
 U           0.0960 08G00701
 U           0.0960 08G00801
 U           0.0970 08G01401
 U           0.0970 09G00701
 U           0.0980 08G01301
 U           0.0980 08G01101
 UR          0.0990 08G01501

 Upper outside values in test group relative to group bkg:
 U           0.1100 09G01301


-------------------------------------------------------------
4,4'-DDT in UG/L
-----------------------------

3g      ****........................  . .     ...  .  .
bkg                                 .. . .....   .. ..
 group1:  3g
 min, median, max, bdl/tot :          0.0039 J          0.0950 U          0.1100 U    31 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.1000 UJ         0.1000 U          0.1000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
```

```
lowcut =          0.1000
lq     =          0.1000 U
median =          0.1000 U
uq     =          0.1000 U
hicut  =          0.1000
 Lower outside values in test group relative to group bkg:
 J            0.0039 09G00302
 J            0.0056 08G00102
 J            0.0067 09G00601
 J            0.0092 09G01101
 U            0.0930 09G01501
 U            0.0930 09G01201
 U            0.0930 09G01001
 U            0.0930 09G00402
 U            0.0930 09G01601
 U            0.0940 09G01401D
 U            0.0940 09G00501
 UJ           0.0950 08G00801D
 U            0.0950 08G00901
 U            0.0950 08G00601
 U            0.0950 08G01201
 U            0.0950 08G00402
 U            0.0950 08G01001
 U            0.0950 08G00501D
 U            0.0950 09G00901
 U            0.0960 08G00202
 U            0.0960 08G00302
 U            0.0960 08G00801
 U            0.0960 08G00701
 U            0.0970 09G00701
 U            0.0970 08G01401
 U            0.0980 08G01301
 U            0.0980 08G01101
 UR           0.0990 08G01501

 Upper outside values in test group relative to group bkg:
 U            0.1100 09G01301


-------------------------------------------------------------
 4-METHYLPHENOL in UG/L
-----------------------------

3g       *................. ...... . . . . . .....     .
bkg                          .      . . . . . .     .....
 group1:  3g
 min, median, max, bdl/tot :          3.0000 J          10.0000 U          11.0000 U    34 /   35
 group2:  bkg
 min, median, max, bdl/tot :         10.0000 U          10.0000 U          10.0000 U    12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =         10.0000
lq     =         10.0000 U
median =         10.0000 U
uq     =         10.0000 U
hicut  =         10.0000
 Lower outside values in test group relative to group bkg:
 J            3.0000 09G00202D

 Upper outside values in test group relative to group bkg:
 U           11.0000 08G00601


-------------------------------------------------------------
 ALDRIN in UG/L
-----------------------------

3g       ........................    .     . .  .*.....
bkg                                 .... ..... . ..
 group1:  3g
 min, median, max, bdl/tot :          0.0470 U          0.0480 U          0.0540 U    34 /   35
 group2:  bkg
```

```
 min, median, max, bdl/tot :          0.0500 UJ          0.0500 U          0.0500 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.0500
lq     =          0.0500 U
median =          0.0500 U
uq     =          0.0500 U
hicut  =          0.0500
 Lower outside values in test group relative to group bkg:
 U            0.0470 09G01601
 U            0.0470 09G00501
 U            0.0470 09G01001
 U            0.0470 09G01101
 U            0.0470 09G01501
 U            0.0470 09G01201
 U            0.0470 09G01401D
 UJ           0.0480 08G00801D
 U            0.0480 08G00202
 U            0.0480 08G00302
 U            0.0480 08G00901
 U            0.0480 08G01001
 U            0.0480 08G00701
 U            0.0480 08G01201
 U            0.0480 08G00601
 U            0.0480 08G00501D
 U            0.0480 08G00402
 U            0.0480 08G00801
 U            0.0480 09G00901
 U            0.0480 08G01401
 U            0.0480 09G00701
 U            0.0480 08G00102
 U            0.0490 08G01101
 U            0.0490 08G01301

 Upper outside values in test group relative to group bkg:
 UJ           0.0510 09G00601
 J            0.0510 09G00402
 UJ           0.0520 09G00202
 UJ           0.0520 09G00102
 U            0.0520 09G00801
 U            0.0530 09G00202D
 U            0.0540 09G01301


-------------------------------------------------------------
 ALUMINUM in UG/L
-----------------------------

bkg      .*          **                  *         *   *        ** ***
3g        ......**..  ....************** ********* *** ********  *
 group1:  3g
 min, median, max, bdl/tot :          33.0000 U         372.0000          3260.0000      12 /   49
 group2:  bkg
 min, median, max, bdl/tot :          14.6000 U         829.0000          7260.0000       1 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =       -4651.2500
lq     =         116.5000
median =         829.0000
uq     =        3295.0000
hicut  =        8062.7500
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
<< NONE FOUND>>


-------------------------------------------------------------
 ANTIMONY in UG/L
-----------------------------
```

```
bkg      ..........*   *
3g                 ... ...................................*..**.*...*
 group1:  3g
 min, median, max, bdl/tot :          2.0000 U          2.9000 U          5.1000 J    44 /   49
 group2:  bkg
 min, median, max, bdl/tot :          1.2000 U          1.2000 U          2.2000 B    10 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          1.0500
lq     =          1.2000 U
median =          1.2000 U
uq     =          1.3000 U
hicut  =          1.4500
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            2.0000 08G01401
 U            2.0000 09G01401
 U            2.0000 09G01601
 U            2.5000 09G01801D
 U            2.5000 08G01701
 U            2.5000 08G01601
 U            2.5000 09G01801
 U            2.5000 09G01701
 U            2.8000 09G01501
 U            2.9000 09G00202
 U            2.9000 09G00202D
 U            2.9000 09G00302
 U            2.9000 09G00102
 U            2.9000 09G00601
 U            2.9000 08G01101
 U            2.9000 09F00701
 U            2.9000 08G00901
 U            2.9000 08G01001
 U            2.9000 09G00801
 U            2.9000 08G01201
 U            2.9000 09G01301
 U            2.9000 08G00801D
 U            2.9000 08G00801
 U            2.9000 08G00701
 U            2.9000 08G00601
 U            2.9000 09G00701
 U            2.9000 09G01001
 U            2.9000 08G00501D
 U            2.9000 08G00501
 U            2.9000 08G00402
 U            2.9000 08G00302
 U            2.9000 08G00202
 U            2.9000 08F00901
 U            2.9000 08F01201
 U            2.9000 09G01201
 U            2.9000 09G00402
 U            2.9000 09G00501
 U            2.9000 09G01101
 J            2.9000 08G01801
 U            3.3000 09G01401D
 U            3.5000 08G01301
 J            3.5000 09G00901
 J            3.5000 09F00402
 U            3.7000 09F01501
 J            3.7000 08G00102
 U            4.0000 08G01501
 U            4.7000 08F01301
 U            5.0000 09F01601
 J            5.1000 09F00601


-------------------------------------------------------------
 ARSENIC in UG/L
```

```
----------------------------

bkg      .....***       **   .*
3g                .....**  ...  **...........**************************
 group1:  3g
 min, median, max, bdl/tot :          2.2000 U          13.2000          295.0000      19 /   49
 group2:  bkg
 min, median, max, bdl/tot :          1.5000 U           1.8500           3.7000 B      6 /   12
>>> Different populations at alpha > 0.95
  Group 3g Higher
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -0.3750
lq     =           1.5000 U
median =           1.8500
uq     =           2.7500
hicut  =           4.6250
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            5.9000 09G00302
 U            5.9000 09G00202D
 U            5.9000 08F01201
 U            5.9000 09G00701
 U            5.9000 09G00901
 U            5.9000 09G01001
 U            5.9000 08G01201
 U            5.9000 09F00701
 U            5.9000 09G01301
 U            5.9000 09G00202
 U            5.9000 09G00801
 J            7.1000 08G01401
             13.2000 09G00102
             51.5000 09F00601
             53.0000 08G00601
             53.0000 09G00601
             56.4000 08G00701
             57.3000 08G00501D
             57.7000 08G00501
             61.3000 09G00501
             70.4000 08G00402
             71.1000 08F01301
             79.9000 08G00302
             88.2000 08G01301
             93.9000 09G01101
             96.4000 08F00901
             98.8000 08G01701
            117.0000 08G00901
            120.0000 08G00801D
            122.0000 08G00801
            133.0000 08G00102
            138.0000 09G01201
            209.0000 08G01001
            223.0000 08G01101
            232.0000 09F00402
            264.0000 09G00402
            295.0000 08G00202


-------------------------------------------------------------
 BARIUM in UG/L
----------------------------

3g       .* **.  .* *.***  ** *. *********** *** ************** *****
bkg        *   **  *     **  *  *           *   *              *     *
 group1:  3g
 min, median, max, bdl/tot :          1.5000 U          13.3000 J          47.2000 J     5 /   49
 group2:  bkg
 min, median, max, bdl/tot :          2.0000 B           8.8000           71.0000 B     0 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =         -12.1250
```

```
lq     =          4.9000
median =          8.8000
uq     =         16.2500
hicut  =         33.2750
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 J          38.0000 09G01401D
 J          38.5000 08G01201
 J          39.2000 08G01401
 J          42.1000 08G01301
 J          47.2000 09G01401


-------------------------------------------------------------
 CADMIUM in UG/L
-----------------------------

3g       ..............................................
bkg                                                        ............*
 group1:  3g
 min, median, max, bdl/tot :          0.3000 U          0.3000 U          0.5000 U    49 /   49
 group2:  bkg
 min, median, max, bdl/tot :          2.1000 U          2.1000 U          2.8000 B    11 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          2.1000
lq     =          2.1000 U
median =          2.1000 U
uq     =          2.1000 U
hicut  =          2.1000
 Lower outside values in test group relative to group bkg:
 U          0.3000 09G01101
 U          0.3000 08F00901
 U          0.3000 09G01201
 U          0.3000 08G00102
 U          0.3000 09G01301
 U          0.3000 08G00302
 U          0.3000 09G00701
 U          0.3000 09G00801
 U          0.3000 08G00501D
 U          0.3000 09G00901
 U          0.3000 08G00701
 U          0.3000 09G01001
 U          0.3000 08G00801D
 U          0.3000 08F01201
 U          0.3000 08G01001
 U          0.3000 08G00202
 U          0.3000 08G01201
 U          0.3000 08G00402
 U          0.3000 09F00601
 U          0.3000 08G00501
 U          0.3000 09G00102
 U          0.3000 09G00202
 U          0.3000 09G00202D
 U          0.3000 09G00302
 U          0.3000 09G00402
 U          0.3000 09G00501
 U          0.3000 09G00601
 U          0.3000 09F00701
 U          0.3000 09G01801
 U          0.3000 08G00801
 U          0.3000 08G01101
 U          0.3000 09F00402
 U          0.3000 08G01801
 U          0.3000 08G00901
 U          0.3000 09G01701
 U          0.3000 09G01801D
 U          0.3000 08G00601
 U          0.3000 08G01601
 U          0.3000 08G01701
```

```
U            0.5000 08G01501
U            0.5000 09F01501
U            0.5000 09F01601
U            0.5000 09G01401
U            0.5000 09G01401D
U            0.5000 09G01501
U            0.5000 09G01601
U            0.5000 08G01401
U            0.5000 08G01301
U            0.5000 08F01301

 Upper outside values in test group relative to group bkg:
<< NONE FOUND>>

-----------------------------------------------------------------
 CALCIUM in UG/L
-----------------------------

3g        .......   *** .* ****** * ***  * *.***.** ** ********.*******
bkg              ***   *  *      * *   ** *        *  *
 group1:  3g
 min, median, max, bdl/tot :          771.0000 U       29300.0000 U      134000.0000       11 /   49
 group2:  bkg
 min, median, max, bdl/tot :         2660.0000 J       15550.0000        42500.0000 J      0 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =       -27375.0000
lq     =         5970.0000
median =        15550.0000
uq     =        28200.0000
hicut  =        61545.0000
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U         63200.0000 08G01701
           80800.0000 09G01401D
           89800.0000 08G01101
          101000.0000 08G00102
          104000.0000 08G00202
          105000.0000 09G01401
          131000.0000 08G00801
          134000.0000 08G00801D


-----------------------------------------------------------------
 CHROMIUM in UG/L
-----------------------------

3g        .......****.***************.*    .  . *..*  .** ..**..*..   .
bkg                                   ... .. .    **   *        ***
 group1:  3g
 min, median, max, bdl/tot :           0.8000 U          1.5000 J          6.3000 U    22 /   49
 group2:  bkg
 min, median, max, bdl/tot :           1.9000 U          2.1500 U          6.0000 B    6 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -0.7250
lq     =           1.9000 U
median =           2.1500 U
uq     =           3.6500
hicut  =           6.2750
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            6.3000 09G01501


-----------------------------------------------------------------
 COBALT in UG/L
-----------------------------
```

```
3g      **.........................**.....************
bkg                                                          ............
 group1:  3g
 min, median, max, bdl/tot :          0.5500 J          0.7000 U          2.3000 J    33 /   49
 group2:  bkg
 min, median, max, bdl/tot :          2.6000 U          2.6000 U          2.6000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          2.6000
lq     =          2.6000 U
median =          2.6000 U
uq     =          2.6000 U
hicut  =          2.6000
 Lower outside values in test group relative to group bkg:
 J            0.5500 09G01601
 J            0.6300 09F01501
 U            0.7000 08F01201
 U            0.7000 08G00102
 U            0.7000 08G00202
 U            0.7000 08G00302
 U            0.7000 08G00402
 U            0.7000 08G00501
 U            0.7000 08G00501D
 U            0.7000 08G00701
 U            0.7000 08G00801
 U            0.7000 08G00801D
 U            0.7000 08G00901
 U            0.7000 08G01001
 U            0.7000 08G01101
 U            0.7000 08G01201
 U            0.7000 08G00601
 U            0.7000 09G01101
 U            0.7000 09G00501
 U            0.7000 09G00601
 U            0.7000 09G00102
 U            0.7000 09G00202
 U            0.7000 09G00302
 U            0.7000 09G00402
 U            0.7000 09G01201
 U            0.7000 09G00202D
 U            0.7000 09G00801
 U            0.7000 09F00701
 U            0.7000 09G01001
 U            0.7000 08F00901
 J            0.7500 09F00402
 J            0.7500 09F01601
 U            0.8000 08G01801
 U            0.8000 09G01701
 U            0.8000 09G01801
 U            0.8000 08G01701
 U            0.8000 09G01801D
 J            0.8000 09G01501
 J            0.8800 09G01301
 J            1.0000 09G00901
 J            1.1000 09G00701
 J            1.2000 08G01501
 J            1.5000 09F00601
 J            1.5000 08F01301
 J            1.7000 09G01401
 J            1.9000 08G01601
 J            1.9000 08G01301
 J            2.1000 09G01401D
 J            2.3000 08G01401

 Upper outside values in test group relative to group bkg:
<< NONE FOUND>>

-------------------------------------------------------------
 COPPER in UG/L
-----------------------------
```

```
3g        ...****.****          ***  .....*....*... ..*..***************
bkg                    .........   .*              *
 group1:  3g
 min, median, max, bdl/tot :          0.7000 U          3.0000 U          56.0000      20 /   49
 group2:  bkg
 min, median, max, bdl/tot :          1.5000 U          1.5000 U          3.6000 B     10 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          1.2750
lq     =          1.5000 U
median =          1.5000 U
uq     =          1.6500 U
hicut  =          1.8750
 Lower outside values in test group relative to group bkg:
 U            0.7000 09G01801D
 U            0.7000 09G01801
 U            0.7000 08G01601
 J            0.7600 09G00801
 J            0.9000 08G01101
 J            0.9500 08F01201
 J            0.9600 08G00501D
 U            1.2000 08G01701
 J            1.2000 08G00501
 J            1.2000 08G00901

 Upper outside values in test group relative to group bkg:
 U            2.5000 08G00202
 U            2.6000 09G00601
 U            2.6000 09G00202
 U            2.6000 09F00701
 U            2.6000 09G01301
 J            2.6000 09G00901
 U            2.7000 09G01701
 U            2.8000 08G01801
 U            3.0000 09G00302
 U            3.0000 09G00102
 J            3.3000 08G00701
 U            3.5000 09G00701
 U            3.5000 09G00202D
 U            3.6000 08G00102
 U            3.8000 09G00501
 U            4.0000 09G01001
 J            4.0000 09F01601
 U            4.2000 09G01101
 U            4.4000 08F00901
 J            4.4000 09F01501
 J            4.5000 08F01301
 J            4.5000 09G01401
 J            5.1000 09G01601
 J            5.5000 08G01301
 J            5.6000 09G01401D
 J            6.1000 09G01201
 J            6.3000 09F00601
 J            6.5000 08G01001
 J            6.7000 08G00601
 J            7.2000 09G01501
 J            8.3000 08G01501
 J            9.5000 08G01401
             42.7000 09F00402
             56.0000 09G00402


-------------------------------------------------------------
 DALAPON in UG/L
-----------------------------

3g        ***            ...................................
bkg          .............
 group1:  3g
 min, median, max, bdl/tot :          0.3000 J          6.0000 U          60.0000 U    35 /   38
```

```
 group2:  bkg
 min, median, max, bdl/tot :          5.0000 U          5.0000 U          5.0000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          5.0000
lq     =          5.0000 U
median =          5.0000 U
uq     =          5.0000 U
hicut  =          5.0000
 Lower outside values in test group relative to group bkg:
 J            0.3000 09G01801
 J            0.6900 09G01701
 J            1.4000 08G01401

 Upper outside values in test group relative to group bkg:
 UJ           6.0000 09G00601
 U            6.0000 08G00501D
 U            6.0000 09G00801
 U            6.0000 08G00302
 U            6.0000 09G00901
 U            6.0000 08G00801
 U            6.0000 09G01401
 U            6.0000 08G00102
 U            6.0000 09G01401D
 U            6.0000 09G00302
 U            6.0000 09G01501
 U            6.0000 08G01001
 U            6.0000 09G01601
 U            6.0000 08G01101
 U            6.0000 08G01501
 U            6.0000 08G00402
 U            6.0000 08G01301
 U            6.0000 09G01301
 U            6.0000 08G00501
 U            6.0000 08G00202
 U            6.0000 08G00901
 U            6.0000 09G01101
 U            6.0000 09G01801D
 U            6.0000 09G01001
 U            6.0000 09G00701
 U            6.0000 09G00501
 U            6.0000 09G00402
 U            6.0000 08G00701
 U            6.0000 08G00801D
 U            6.0000 08G01201
 U            6.0000 08G00601
 U            8.5000 09G00202
 U            8.9000 09G00202D
 U           11.0000 09G00102
 U           60.0000 09G01201


-------------------------------------------------------------------
 DI-N-BUTYLPHTHALATE in UG/L
-----------------------------

bkg      *                        . . . .   .  . .....
3g        ........................ . . . ... .. .     .
 group1:  3g
 min, median, max, bdl/tot :         10.0000 UJ        10.0000 U          11.0000 UJ   35 /   35
 group2:  bkg
 min, median, max, bdl/tot :          2.0000 J         10.0000 U          10.0000 U    11 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =         10.0000
lq     =         10.0000 U
median =         10.0000 U
uq     =         10.0000 U
hicut  =         10.0000
 Lower outside values in test group relative to group bkg:
```

```
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 UJ          11.0000 08G00601


-------------------------------------------------------------
 DI-N-OCTYLPHTHALATE in UG/L
-----------------------------

bkg      ****                        . . .       .. .. .
3g          ......................... . . .......  .  . .
 group1:  3g
 min, median, max, bdl/tot :          10.0000 UJ         10.0000 U          11.0000 UJ   35 /   35
 group2:  bkg
 min, median, max, bdl/tot :           2.0000 J          10.0000 U          10.0000 U     8 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -8.7500
lq     =           2.5000
median =          10.0000 U
uq     =          10.0000 U
hicut  =          21.2500
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
<< NONE FOUND>>


-------------------------------------------------------------
 DIELDRIN in UG/L
-----------------------------

3g       **........................... .  .    .. . .  .
bkg                                  . .. .....  . . ..
 group1:  3g
 min, median, max, bdl/tot :           0.0120 J           0.0950 U           0.1100 U    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :           0.1000 UJ          0.1000 U           0.1000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =           0.1000
lq     =           0.1000 U
median =           0.1000 U
uq     =           0.1000 U
hicut  =           0.1000
 Lower outside values in test group relative to group bkg:
 J            0.0120 09G00601
 J            0.0190 08G01101
 U            0.0930 09G01501
 U            0.0930 09G01001
 U            0.0930 09G01201
 U            0.0930 09G01601
 U            0.0930 09G00402
 U            0.0940 09G00501
 U            0.0940 09G01401D
 U            0.0940 09G01101
 UJ           0.0950 08G00801D
 U            0.0950 08G01001
 U            0.0950 08G00402
 U            0.0950 08G01201
 U            0.0950 08G00601
 U            0.0950 08G00501D
 U            0.0950 08G00901
 U            0.0950 09G00901
 U            0.0950 08G00102
 U            0.0960 08G00202
 U            0.0960 08G00302
 U            0.0960 08G00701
 U            0.0960 08G00801
 U            0.0970 08G01401
```

```
 U            0.0970 09G00701
 U            0.0980 08G01301
 UR           0.0990 08G01501

 Upper outside values in test group relative to group bkg:
 U            0.1100 09G01301


-------------------------------------------------------------
 DINOSEB in UG/L
-----------------------------

3g       *****            ...............................
bkg            ............
 group1:  3g
 min, median, max, bdl/tot :          0.0980 J          1.5000 U        15.0000 U    33 /   38
 group2:  bkg
 min, median, max, bdl/tot :          0.5000 U          0.5000 U         0.5000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.5000
lq     =          0.5000 U
median =          0.5000 U
uq     =          0.5000 U
hicut  =          0.5000
 Lower outside values in test group relative to group bkg:
 J            0.0980 08G00501
 J            0.0980 09G00402
 J            0.0990 09G00901
 J            0.1200 09G01601
 J            0.2800 08G00601

 Upper outside values in test group relative to group bkg:
 UJ           1.5000 09G00601
 U            1.5000 08G00102
 U            1.5000 08G00202
 U            1.5000 08G00302
 U            1.5000 09G01301
 U            1.5000 08G00801
 U            1.5000 08G00901
 U            1.5000 08G00801D
 U            1.5000 08G00402
 U            1.5000 09G01101
 U            1.5000 08G01501
 U            1.5000 08G00501D
 U            1.5000 09G01401
 U            1.5000 09G01401D
 U            1.5000 09G01501
 U            1.5000 09G00801
 U            1.5000 08G01301
 U            1.5000 08G01401
 U            1.5000 09G01801
 U            1.5000 09G01801D
 U            1.5000 09G01701
 U            1.5000 09G01001
 U            1.5000 09G00701
 U            1.5000 09G00501
 U            1.5000 09G00202D
 U            1.5000 09G00302
 U            1.5000 09G00202
 U            1.5000 09G00102
 U            1.5000 08G01001
 U            1.5000 08G01101
 U            1.5000 08G01201
 U            1.5000 08G00701
 U           15.0000 09G01201


-------------------------------------------------------------
 ENDOSULFAN I in UG/L
-----------------------------
```

```
3g       *.......................     .     . . ......*
bkg                                 ..... ..... . .
 group1:  3g
 min, median, max, bdl/tot :          0.0460 J          0.0480 U          0.0940 J    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.0500 UJ         0.0500 U          0.0500 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.0500
lq     =          0.0500 U
median =          0.0500 U
uq     =          0.0500 U
hicut  =          0.0500
 Lower outside values in test group relative to group bkg:
 J            0.0460 09G01201
 U            0.0470 09G01601
 U            0.0470 09G01001
 U            0.0470 09G01101
 U            0.0470 09G01501
 U            0.0470 09G01401D
 U            0.0470 09G00501
 UJ           0.0480 08G00801D
 U            0.0480 08G00701
 U            0.0480 08G00302
 U            0.0480 08G00901
 U            0.0480 08G01001
 U            0.0480 08G00601
 U            0.0480 08G01201
 U            0.0480 08G00202
 U            0.0480 08G00501D
 U            0.0480 08G00402
 U            0.0480 08G00801
 U            0.0480 09G00901
 U            0.0480 08G01401
 U            0.0480 09G00701
 U            0.0480 08G00102
 U            0.0490 08G01101
 U            0.0490 08G01301

 Upper outside values in test group relative to group bkg:
 UJ           0.0510 09G00601
 UJ           0.0520 09G00202
 UJ           0.0520 09G00102
 U            0.0520 09G00801
 U            0.0530 09G00202D
 U            0.0540 09G01301
 J            0.0940 09G00402

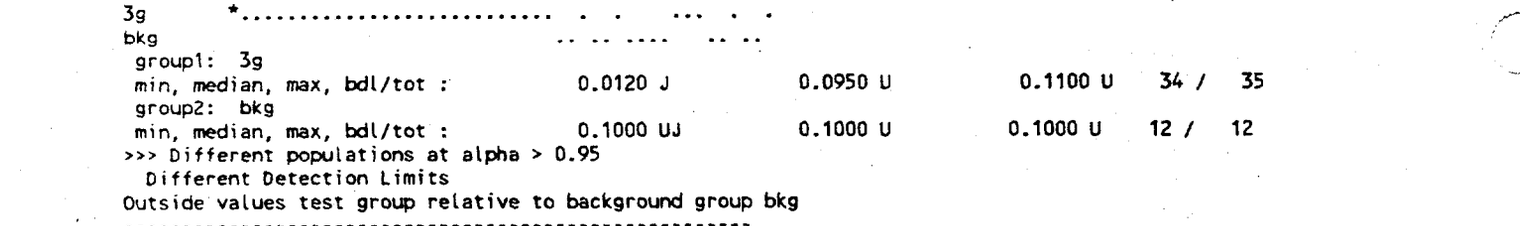

-------------------------------------------------------------
 ENDOSULFAN II in UG/L
-----------------------------

3g       **.........................  . .    ...  . .
bkg                                 .. .. ....   .. ..
 group1:  3g
 min, median, max, bdl/tot :          0.0075 J          0.0950 U          0.1100 U    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.1000 UJ         0.1000 U          0.1000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.1000
lq     =          0.1000 U
median =          0.1000 U
uq     =          0.1000 U
hicut  =          0.1000
 Lower outside values in test group relative to group bkg:
 J            0.0075 09G01501
```

```
 J            0.0093 09G00601
 U            0.0930 09G00402
 U            0.0930 09G01201
 U            0.0930 09G01001
 U            0.0930 09G01601
 U            0.0940 09G01401D
 U            0.0940 09G01101
 U            0.0940 09G00501
 UJ           0.0950 08G00801D
 U            0.0950 08G00601
 U            0.0950 08G00901
 U            0.0950 08G01001
 U            0.0950 08G00501D
 U            0.0950 08G01201
 U            0.0950 08G00402
 U            0.0950 09G00901
 U            0.0950 08G00102
 U            0.0960 08G00202
 U            0.0960 08G00302
 U            0.0960 08G00701
 U            0.0960 08G00801
 U            0.0970 09G00701
 U            0.0970 08G01401
 U            0.0980 08G01101
 U            0.0980 08G01301
 UR           0.0990 08G01501

 Upper outside values in test group relative to group bkg:
 U            0.1100 09G01301


-----------------------------------------------------------------
 ENDOSULFAN SULFATE in UG/L
-----------------------------
```




```
 group1:  3g
 min, median, max, bdl/tot :          0.0120 J          0.0950 U          0.1100 U    34 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.1000 UJ         0.1000 U          0.1000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.1000
lq     =          0.1000 U
median =          0.1000 U
uq     =          0.1000 U
hicut  =          0.1000
 Lower outside values in test group relative to group bkg:
 J            0.0120 08G00202
 U            0.0930 09G01201
 U            0.0930 09G00402
 U            0.0930 09G01001
 U            0.0930 09G01501
 U            0.0930 09G01601
 U            0.0940 09G01401D
 U            0.0940 09G01101
 U            0.0940 09G00501
 UJ           0.0950 08G00801D
 U            0.0950 08G00601
 U            0.0950 08G00901
 U            0.0950 08G01001
 U            0.0950 08G00501D
 U            0.0950 08G01201
 U            0.0950 08G00402
 U            0.0950 09G00901
 U            0.0950 08G00102
 U            0.0960 08G00302
 U            0.0960 08G00701
 U            0.0960 08G00801
 U            0.0970 09G00701
```

```
 U            0.0970 08G01401
 U            0.0980 08G01101
 U            0.0980 08G01301
 UR           0.0990 08G01501

 Upper outside values in test group relative to group bkg:
 U            0.1100 09G01301


-------------------------------------------------------------
 ENDRIN in UG/L
-----------------------------

3g       ***........................ .  .     .. . .  .
bkg                                 . .. .....  . . ..
 group1:  3g
 min, median, max, bdl/tot :          0.0100 J          0.0950 U          0.1100 U    32 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.1000 UJ         0.1000 U          0.1000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.1000
lq     =          0.1000 U
median =          0.1000 U
uq     =          0.1000 U
hicut  =          0.1000
 Lower outside values in test group relative to group bkg:
 J            0.0100 08G00102
 J            0.0190 09G00601
 J            0.0220 09G00501
 U            0.0930 09G01501
 U            0.0930 09G01201
 U            0.0930 09G01001
 U            0.0930 09G01601
 U            0.0930 09G00402
 U            0.0940 09G01401D
 U            0.0940 09G01101
 UJ           0.0950 08G00801D
 U            0.0950 08G00601
 U            0.0950 08G00501D
 U            0.0950 08G01201
 U            0.0950 08G00402
 U            0.0950 08G00901
 U            0.0950 08G01001
 U            0.0950 09G00901
 U            0.0960 08G00202
 U            0.0960 08G00302
 U            0.0960 08G00701
 U            0.0960 08G00801
 U            0.0970 08G01401
 U            0.0970 09G00701
 U            0.0980 08G01301
 U            0.0980 08G01101
 UR           0.0990 08G01501

 Upper outside values in test group relative to group bkg:
 U            0.1100 09G01301


-------------------------------------------------------------
 ENDRIN ALDEHYDE in UG/L
-----------------------------

3g       **.........................   . .    .. . .  .
bkg                                 ... . ....  . . ..
 group1:  3g
 min, median, max, bdl/tot :          0.0066 J          0.0950 U          0.1100 U    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.1000 UJ         0.1000 U          0.1000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
```

```
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.1000
lq     =          0.1000 U
median =          0.1000 U
uq     =          0.1000 U
hicut  =          0.1000
 Lower outside values in test group relative to group bkg:
 J            0.0066 08G01401
 J            0.0780 09G01101
 U            0.0930 09G01501
 U            0.0930 09G01201
 U            0.0930 09G00402
 U            0.0930 09G01001
 U            0.0930 09G01601
 U            0.0940 09G00501
 U            0.0940 09G01401D
 UJ           0.0950 08G00801D
 U            0.0950 08G00901
 U            0.0950 08G01001
 U            0.0950 08G00402
 U            0.0950 08G01201
 U            0.0950 08G00601
 U            0.0950 08G00501D
 U            0.0950 09G00901
 U            0.0950 08G00102
 U            0.0960 08G00701
 U            0.0960 08G00202
 U            0.0960 08G00302
 U            0.0960 08G00801
 U            0.0970 09G00701
 U            0.0980 08G01301
 U            0.0980 08G01101
 UR           0.0990 08G01501

 Upper outside values in test group relative to group bkg:
 U            0.1100 09G01301


-------------------------------------------------------------
 HEPTACHLOR EPOXIDE in UG/L
-----------------------------

3g       *.......................     .     . . ......*
bkg                                 ..... ..... . .
 group1:  3g
 min, median, max, bdl/tot :          0.0440 J          0.0480 U          0.1000 J    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.0500 UJ         0.0500 U          0.0500 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.0500
lq     =          0.0500 U
median =          0.0500 U
uq     =          0.0500 U
hicut  =          0.0500
 Lower outside values in test group relative to group bkg:
 J            0.0440 09G01101
 U            0.0470 09G01601
 U            0.0470 09G01001
 U            0.0470 09G01201
 U            0.0470 09G01501
 U            0.0470 09G01401D
 U            0.0470 09G00501
 UJ           0.0480 08G00801D
 U            0.0480 08G00701
 U            0.0480 08G00302
 U            0.0480 08G00901
 U            0.0480 08G01001
 U            0.0480 08G00601
 U            0.0480 08G01201
```

```
 U            0.0480 08G00501D
 U            0.0480 08G00202
 U            0.0480 08G00402
 U            0.0480 08G00801
 U            0.0480 09G00901
 U            0.0480 08G01401
 U            0.0480 09G00701
 U            0.0480 08G00102
 U            0.0490 08G01101
 U            0.0490 08G01301

 Upper outside values in test group relative to group bkg:
 UJ           0.0510 09G00601
 UJ           0.0520 09G00202
 UJ           0.0520 09G00102
 U            0.0520 09G00801
 U            0.0530 09G00202D
 U            0.0540 09G01301
 J            0.1000 09G00402


-----------------------------------------------------------------
 IRON in UG/L
-----------------------------
bkg      **  *            *   * * *                   ***   **
3g         .. *..........* *** * ** ******************   ***  ********
 group1:  3g
 min, median, max, bdl/tot :          36.4000 U         447.0000          5800.0000      12 /   49
 group2:  bkg
 min, median, max, bdl/tot :          16.0000 B         285.5000          1540.0000       0 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-------------------------------------------------------
lowcut =       -1327.7500
lq     =         119.9000
median =         285.5000
uq     =        1085.0000
hicut  =        2532.6500
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
          4080.0000 08F01201
          4680.0000 09G01801
          5490.0000 09G01801D
          5800.0000 08G01201


-----------------------------------------------------------------
 LEAD in UG/L
-----------------------------

bkg      ..........    *                                  *
3g                 .... ..............................*...... ****..***
 group1:  3g
 min, median, max, bdl/tot :           1.6000 U           1.9000 U           6.6000      41 /   49
 group2:  bkg
 min, median, max, bdl/tot :           1.3000 UJ          1.3000 U           2.3000 J    10 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-------------------------------------------------------
lowcut =           1.3000
lq     =           1.3000 U
median =           1.3000 U
uq     =           1.3000 U
hicut  =           1.3000
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            1.6000 09G01701
 U            1.6000 09G01801D
 U            1.6000 08G01701
```

```
U            1.6000 09G01801
U            1.9000 08G01101
U            1.9000 08G01201
U            1.9000 08G00801
U            1.9000 08G00901
U            1.9000 08G01001
U            1.9000 09G00102
U            1.9000 09F00701
U            1.9000 09G00302
U            1.9000 08G00701
U            1.9000 09F00601
U            1.9000 09G00501
U            1.9000 08G00501D
U            1.9000 09G01301
U            1.9000 09G00801
U            1.9000 09G01001
U            1.9000 08F00901
U            1.9000 09G00701
U            1.9000 09G00901
U            1.9000 08G00501
U            1.9000 08G00402
U            1.9000 08G00302
U            1.9000 08G00202
U            1.9000 08G00102
U            1.9000 08G00801D
U            1.9000 08F01201
U            1.9000 09G00601
U            1.9000 09G00202
U            1.9000 09G00202D
U            1.9000 09G01101
J            1.9000 09G01201
U            2.2000 09G01601
U            2.2000 09G01401D
U            2.2000 09G01401
U            2.2000 09F01601
U            2.2000 09F01501
U            2.2000 08F01301
J            2.3000 08G01501
J            2.8000 09G01501
             3.1000 08G01401
             3.2000 08G01301
U            3.3000 08G01601
U            3.6000 08G01801
             4.2000 09F00402
             6.1000 09G00402
             6.6000 08G00601


-----------------------------------------------------------------
 MCPA in UG/L
-------------------------------

3g       ...................            ...*..**************
bkg                          .............
 group1:  3g
 min, median, max, bdl/tot :          53.0000 UJ        390.0000 U        3100.0000 J    23 /   38
 group2:  bkg
 min, median, max, bdl/tot :         250.0000 U         250.0000 U         250.0000 U    12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          250.0000
lq     =          250.0000 U
median =          250.0000 U
uq     =          250.0000 U
hicut  =          250.0000
 Lower outside values in test group relative to group bkg:
 UJ          53.0000 09G00601
 U           60.0000 08G01401
 U           60.0000 09G01301
 U           60.0000 09G01001
 U           72.0000 08G00801D
 U           78.0000 08G00701
```

```
U          82.0000 08G00801
UJ        110.0000 08G00601
U         110.0000 08G01201
U         140.0000 08G01101
U         140.0000 08G00102
U         150.0000 09G00701
U         160.0000 08G00501
U         160.0000 08G01001
U         190.0000 08G00501D
U         190.0000 09G01101
U         200.0000 08G00402
U         220.0000 08G00901

Upper outside values in test group relative to group bkg:
U         380.0000 09G00901
U         400.0000 09G00801
U         420.0000 09G01501
J         460.0000 09G01801D
U         480.0000 09G00302
U         500.0000 08G00202
J         630.0000 09G01801
J         640.0000 08G00302
          640.0000 09G00102
J         660.0000 08G01301
J         670.0000 09G00202D
J         680.0000 09G01701
J         750.0000 09G01201
J         840.0000 09G01401D
J         870.0000 09G00202
J         890.0000 09G01401
J         920.0000 09G01601
DJ       1200.0000 08G01501
J        2900.0000 09G00501
J        3100.0000 09G00402


-----------------------------------------------------------------
 MCPP in UG/L
-----------------------------

3g       *................*.            .........**********
bkg                            ............
 group1:  3g
 min, median, max, bdl/tot :          0.3600 J        270.0000 U       1900.0000 J    26 /   38
 group2:  bkg
 min, median, max, bdl/tot :        250.0000 U        250.0000 U        250.0000 U    12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =         250.0000
lq     =         250.0000 U
median =         250.0000 U
uq     =         250.0000 U
hicut  =         250.0000
 Lower outside values in test group relative to group bkg:
 J           0.3600 09G01601
 U          60.0000 09G01001
 U          60.0000 09G01301
 U          60.0000 08G00202
 U          60.0000 08G01501
 U          60.0000 09G00901
 U          60.0000 08G01301
 U          60.0000 09G01701
 U          60.0000 09G01501
 U          60.0000 09G01801D
 U          60.0000 09G01801
 U          60.0000 08G01201
 UJ         63.0000 09G00601
 U         110.0000 08G00801
 U         120.0000 09G01401
 U         170.0000 09G01401D
 U         200.0000 08G00402
 J         200.0000 08G01401
```

```
U          240.0000 08G00501D

Upper outside values in test group relative to group bkg:
UJ         300.0000 08G00601
U          350.0000 08G00901
U          350.0000 09G00302
U          350.0000 08G00701
U          400.0000 08G00302
U          440.0000 08G00501
U          520.0000 09G00102
U          520.0000 09G00801
U          540.0000 09G00202D
J          660.0000 08G01101
J          710.0000 08G00801D
J          790.0000 08G00102
J          830.0000 09G00501
J          840.0000 09G00202
J          900.0000 08G01001
J         1100.0000 09G00701
J         1200.0000 09G01101
J         1500.0000 09G01201
J         1900.0000 09G00402


-------------------------------------------------------------
 MAGNESIUM in UG/L
-----------------------------

3g       ...   ............  . ... ...........  ..... .... . .......**
bkg        ***            ** *   *          **     *    * *
 group1:  3g
 min, median, max, bdl/tot :        660.0000 U       2150.0000 U       9780.0000      47 /   49
 group2:  bkg
 min, median, max, bdl/tot :        713.0000 J       1725.0000         4930.0000 J     0 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =       -1963.7500
lq     =        1152.5000
median =        1725.0000
uq     =        3230.0000
hicut  =        6346.2500
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U         6490.0000 08G00202
 U         6650.0000 08G01401
           7410.0000 09G01401D
           9780.0000 09G01401


-------------------------------------------------------------
 MANGANESE in UG/L
-----------------------------

3g       ...  * .*  **** . ** *  *  *****.******************.*.*******
bkg        ** *  **    * *  * ** **
 group1:  3g
 min, median, max, bdl/tot :          0.5200 U         38.4000          172.0000       8 /   49
 group2:  bkg
 min, median, max, bdl/tot :          2.4000 B         10.1500          14.1000 B      0 /   12
>>> Different populations at alpha > 0.95
  Group 3g Higher
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -7.6500
lq     =           4.2000
median =          10.1500
uq     =          12.1000
hicut  =          23.9500
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
```

```
            24.2000 08G00601
            24.9000 09G01201
            32.9000 09G00601
            38.4000 09F00701
            39.0000 09F00601
            44.5000 09F01601
            46.4000 09F01501
            48.9000 09G00701
            51.0000 08F01201
            53.6000 09G00801
            53.7000 09G00402
            54.4000 08G01001
            55.7000 09G01501
            62.7000 09F00402
            70.8000 09G01601
            71.8000 08G01201
            72.9000 08G01501
            82.9000 09G01301
 U          85.8000 09G01801
            94.1000 08F01301
 U         104.0000 09G01801D
           145.0000 09G01401D
           148.0000 08G01301
           159.0000 09G01401
           160.0000 08G00501
           162.0000 08G00501D
           164.0000 08G01601
           172.0000 08G01401


-------------------------------------------------------------
 MERCURY in UG/L
-----------------------------

bkg       .....******                          *
3g                  ........................*.* ......................
 group1:  3g
 min, median, max, bdl/tot :          0.1000 U          0.1100 U          0.1900 U    47 /   49
 group2:  bkg
 min, median, max, bdl/tot :          0.0200 UJ         0.0400            0.1200 J    5 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -0.0400
lq     =           0.0200 U
median =           0.0400
uq     =           0.0600
hicut  =           0.1200
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            0.1300 08G01101
 U            0.1300 08F01201
 U            0.1300 08G00801
 U            0.1300 08G00801D
 U            0.1300 09G00901
 U            0.1400 09G01401
 U            0.1400 09G01401D
 U            0.1400 08G01001
 U            0.1400 08G00302
 U            0.1400 08G00901
 U            0.1400 09F01501
 U            0.1500 08G01201
 U            0.1500 08G01301
 U            0.1500 08F01301
 U            0.1500 09G00801
 U            0.1500 09G01601
 U            0.1600 08G00501D
 U            0.1600 08G00501
 U            0.1600 08G00701
 U            0.1800 09G01501
 U            0.1900 08G00601
```

```
-------------------------------------------------------------
 METHOXYCHLOR in UG/L
-----------------------------

3g       *..............................        . .   ....
bkg                                     ........ . ...
 group1:  3g
 min, median, max, bdl/tot :          0.0078 J          0.4800 U          0.5400 U    34 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.5000 UJ         0.5000 U          0.5000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.5000
lq     =          0.5000 U
median =          0.5000 U
uq     =          0.5000 U
hicut  =          0.5000
 Lower outside values in test group relative to group bkg:
 J            0.0078 09G00601
 UJ           0.0520 09G00202
 U            0.4700 09G00402
 U            0.4700 09G01001
 U            0.4700 09G01101
 U            0.4700 09G00501
 U            0.4700 09G01201
 U            0.4700 09G01401D
 U            0.4700 09G01601
 U            0.4700 09G01501
 UJ           0.4800 08G00801D
 U            0.4800 08G01001
 U            0.4800 08G00801
 U            0.4800 08G01201
 U            0.4800 08G00701
 U            0.4800 08G00601
 U            0.4800 08G00501D
 U            0.4800 08G00402
 U            0.4800 08G00302
 U            0.4800 08G00202
 U            0.4800 08G00901
 U            0.4800 09G00701
 U            0.4800 09G00901
 U            0.4800 08G00102
 U            0.4800 08G01401
 U            0.4900 08G01101
 U            0.4900 08G01301

 Upper outside values in test group relative to group bkg:
 UJ           0.5200 09G00102
 U            0.5200 09G00801
 U            0.5300 09G00202D
 U            0.5400 09G01301


-------------------------------------------------------------
 NAPHTHALENE in UG/L
-----------------------------

3g       *****......................  . . . .    .   .**
bkg                                   .. . . . .... ...
 group1:  3g
 min, median, max, bdl/tot :          1.0000 J         10.0000 U        160.0000 D    28 /   35
 group2:  bkg
 min, median, max, bdl/tot :         10.0000 U         10.0000 U         10.0000 U    12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =         10.0000
lq     =         10.0000 U
median =         10.0000 U
```

```
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values in test group relative to group bkg:
 J            1.0000 09G00302
 J            2.0000 09G01301
 J            5.0000 09G01501
 J            6.0000 09G00402
 J            8.0000 09G01201

 Upper outside values in test group relative to group bkg:
 UJ          11.0000 08G00601
             25.0000 08G00102
 D          160.0000 09G01401


-------------------------------------------------------------
 NICKEL in UG/L
-----------------------------

3g       ......................**********************            ****
bkg                                                        .............
 group1:  3g
 min, median, max, bdl/tot :          1.2000 U          1.6000 J          11.4000 J    22 /   49
 group2:  bkg
 min, median, max, bdl/tot :          9.1000 UJ         9.1000 U          9.1000 U     12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =           9.1000
lq     =           9.1000 U
median =           9.1000 U
uq     =           9.1000 U
hicut  =           9.1000
 Lower outside values in test group relative to group bkg:
 U            1.2000 09G01801D
 U            1.2000 09G01801
 U            1.3000 08F01201
 U            1.3000 09G01101
 U            1.3000 08G01201
 U            1.3000 09G00901
 U            1.3000 08G01101
 U            1.3000 09G00601
 U            1.3000 08G00501D
 U            1.3000 08G00501
 U            1.3000 08G00701
 U            1.3000 09G01001
 U            1.3000 08G00801D
 U            1.3000 08G00901
 U            1.3000 08G00601
 U            1.3000 08G00801
 U            1.3000 09G00801
 U            1.3000 08G01001
 U            1.3000 09G00501
 U            1.3000 09G00202
 U            1.3000 09G00202D
 U            1.3000 09G00302
 J            1.4000 09G01701
 J            1.4000 08G00202
 J            1.6000 08G00302
 J            1.7000 08G00102
 J            1.7000 08F00901
 J            2.0000 09F00402
 J            2.2000 09G00402
 J            2.5000 09G00102
 J            2.7000 09F00601
 J            3.0000 08G00402
 J            3.0000 09F01601
 J            3.0000 08G01801
 J            3.4000 09G01201
 J            3.5000 09G01301
 J            4.4000 08G01701
 J            4.9000 09F00701
```

```
J            5.1000 09G01601
J            5.4000 09G00701
J            5.6000 09F01501
J            5.8000 08G01401
J            5.9000 08G01501
J            7.3000 08F01301
J            7.5000 09G01501

Upper outside values in test group relative to group bkg:
J            9.4000 09G01401D
J            9.6000 08G01301
J            9.9000 09G01401
J           11.4000 08G01601


-------------------------------------------------------------
PHENOL in UG/L
-----------------------------

3g      *................. ...... . . . . . .....     .
bkg                        .      . . . . . .     .....
 group1:  3g
 min, median, max, bdl/tot :          2.0000 J          10.0000 U          11.0000 U    34 /   35
 group2:  bkg
 min, median, max, bdl/tot :         10.0000 U          10.0000 U          10.0000 U    12 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          10.0000
lq     =          10.0000 U
median =          10.0000 U
uq     =          10.0000 U
hicut  =          10.0000
 Lower outside values in test group relative to group bkg:
 J            2.0000 09G00202D

 Upper outside values in test group relative to group bkg:
 U           11.0000 08G00601


-------------------------------------------------------------
POTASSIUM in UG/L
-----------------------------

3g       -------      .. ... ... .....................*  * ************
bkg             .....*  *   *   *                     ** *
 group1:  3g
 min, median, max, bdl/tot :        178.0000 U        2530.0000 U       16000.0000      35 /   49
 group2:  bkg
 min, median, max, bdl/tot :        339.0000 U         584.5000         5460.0000       5 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =       -3907.5000
lq     =         339.0000 U
median =         584.5000
uq     =        3170.0000
hicut  =        7416.5000
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
           8670.0000 08G00801
           8900.0000 08G00801D
           9130.0000 08G00302
           9940.0000 08G00402
          10800.0000 08G00202
          10900.0000 08G01701
          11000.0000 08G00701
          11200.0000 08G00501D
          11200.0000 08G00501
          11600.0000 08G01101
          11700.0000 08G00601
          16000.0000 08G00102
```

```
-------------------------------------------------------------
 SELENIUM in UG/L
-----------------------------

bkg      ..........                 *                              *
3g                 ................ ...............................
 group1:  3g
 min, median, max, bdl/tot :          3.6000 U          4.4000 U          4.4000 U    49 /   49
 group2:  bkg
 min, median, max, bdl/tot :          2.0000 U          2.0000 U          5.4000      10 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          2.0000
lq     =          2.0000 U
median =          2.0000 U
uq     =          2.0000 U
hicut  =          2.0000
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            3.6000 09G01701
 U            3.6000 08G01801
 U            3.6000 08G01701
 U            3.6000 08G01601
 U            3.6000 09G01801D
 U            3.6000 09G01801
 U            4.0000 09F01601
 U            4.0000 09F01501
 U            4.0000 09G01501
 U            4.0000 09G01401
 U            4.0000 08G01501
 U            4.0000 09G01401D
 U            4.0000 08G01301
 U            4.0000 08F01301
 U            4.0000 09G01601
 U            4.1000 08G01401
 U            4.4000 09G00202
 U            4.4000 09G00801
 U            4.4000 09G00102
 U            4.4000 09G00601
 U            4.4000 09F00701
 U            4.4000 09G01201
 U            4.4000 09F00601
 U            4.4000 09G00501
 U            4.4000 09F00402
 U            4.4000 09G00302
 U            4.4000 08G01201
 U            4.4000 09G00701
 U            4.4000 09G01301
 U            4.4000 09G00402
 U            4.4000 09G00202D
 U            4.4000 08F00901
 U            4.4000 08G01101
 U            4.4000 08G01001
 U            4.4000 08G00901
 U            4.4000 08G00801D
 U            4.4000 08G00801
 U            4.4000 08G00501D
 U            4.4000 08G00701
 U            4.4000 08G00601
 U            4.4000 08G00302
 U            4.4000 08G00501
 U            4.4000 08G00402
 U            4.4000 08F01201
 U            4.4000 08G00202
 U            4.4000 08G00102
 U            4.4000 09G00901
 U            4.4000 09G01001
 U            4.4000 09G01101
```

```
-------------------------------------------------------------
 SILVER in UG/L
-----------------------------

3g      ..............................................**
bkg                                                     .............
 group1:  3g
 min, median, max, bdl/tot :          0.7000 U          0.8000 U          1.1000 J    47 /   49
 group2:  bkg
 min, median, max, bdl/tot :          2.2000 U          2.2000 U          2.2000 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          2.2000
lq     =          2.2000 U
median =          2.2000 U
uq     =          2.2000 U
hicut  =          2.2000
 Lower outside values in test group relative to group bkg:
 U            0.7000 09G01801D
 U            0.7000 09G01601
 U            0.7000 09G01501
 U            0.7000 09G01401D
 U            0.7000 09G01401
 U            0.7000 09F01601
 U            0.7000 09F01501
 U            0.7000 08G01801
 U            0.7000 08G01701
 U            0.7000 08G01601
 U            0.7000 08G01501
 U            0.7000 08G01401
 U            0.7000 08G01301
 U            0.7000 08F01301
 U            0.7000 09G01701
 U            0.7000 09G01801
 U            0.8000 08G01201
 U            0.8000 09F00402
 U            0.8000 09F00701
 U            0.8000 09G00102
 U            0.8000 08G00901
 U            0.8000 09G00701
 U            0.8000 09G00801
 U            0.8000 08G01001
 U            0.8000 09G00501
 U            0.8000 09G00601
 U            0.8000 09G00202D
 U            0.8000 08G01101
 U            0.8000 09G00901
 U            0.8000 09G01001
 U            0.8000 08F00901
 U            0.8000 09G01201
 U            0.8000 09G01301
 U            0.8000 08G00801D
 U            0.8000 08G00801
 U            0.8000 08G00701
 U            0.8000 08G00601
 U            0.8000 08G00501D
 U            0.8000 08G00501
 U            0.8000 08G00402
 U            0.8000 08G00302
 U            0.8000 08G00202
 U            0.8000 08G00102
 U            0.8000 08F01201
 U            0.8000 09G00402
 U            0.8000 09G00302
 U            0.8000 09G01101
 J            0.9500 09F00601
 J            1.1000 09G00202

 Upper outside values in test group relative to group bkg:
<< NONE FOUND>>
```

```
-------------------------------------------------------------
 SODIUM in UG/L
-----------------------------

bkg      **  *      *        *          **    *             ****
3g          .. ...... ........ ..........  .... .*...........    ...*..
 group1:  3g
 min, median, max, bdl/tot :        1960.0000 U        6680.0000 U       78300.0000 U    47 /   49
 group2:  bkg
 min, median, max, bdl/tot :         814.0000 J        6970.0000        19800.0000 J     0 /   12
no evidence of different populations at alpha=.95
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =      -18950.0000
lq     =        3010.0000
median =        6970.0000
uq     =       17650.0000
hicut  =       39610.0000
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U        58700.0000 09G01401D
 U        78300.0000 09G01401


-------------------------------------------------------------
 THALLIUM in UG/L
-----------------------------

bkg      ...........*
3g                   ..............................................
 group1:  3g
 min, median, max, bdl/tot :           3.7000 U           5.0000 U           5.0000 U    49 /   49
 group2:  bkg
 min, median, max, bdl/tot :           1.3000 UJ          1.3000 U           1.9000 B    11 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =           1.3000
lq     =           1.3000 U
median =           1.3000 U
uq     =           1.3000 U
hicut  =           1.3000
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            3.7000 08G01401
 U            3.7000 09G01601
 U            3.7000 09G01501
 U            3.7000 09G01401D
 U            3.7000 09G01401
 U            3.7000 09F01601
 U            3.7000 09F01501
 U            3.7000 08G01501
 U            3.7000 08G01301
 U            3.7000 08F01301
 U            4.2000 09G01801
 U            4.2000 09G01801D
 U            4.2000 08G01801
 U            4.2000 08G01701
 U            4.2000 08G01601
 U            4.2000 09G01701
 U            5.0000 09G00801
 U            5.0000 09G00901
 U            5.0000 09G00601
 U            5.0000 09G00701
 U            5.0000 09G01301
 U            5.0000 09G00302
 U            5.0000 09G00402
 U            5.0000 08G01001
 U            5.0000 09G00202
```

```
U            5.0000 09G00501
U            5.0000 09G01201
U            5.0000 09G00202D
U            5.0000 09G00102
U            5.0000 09F00701
U            5.0000 09F00601
U            5.0000 09F00402
U            5.0000 08G01201
U            5.0000 08G01101
U            5.0000 08F01201
U            5.0000 08F00901
U            5.0000 08G00901
U            5.0000 08G00501D
U            5.0000 08G00801
U            5.0000 08G00701
U            5.0000 08G00601
U            5.0000 08G00801D
U            5.0000 08G00501
U            5.0000 08G00402
U            5.0000 08G00302
U            5.0000 08G00202
U            5.0000 08G00102
U            5.0000 09G01001
U            5.0000 09G01101

-------------------------------------------------------------
 TOTAL SUSPENDED SOLIDS in MG/L
-----------------------------

bkg      ......*                          * *   * *  *
3g              ........................... * *** * ** ***
 group1:  3g
 min, median, max, bdl/tot :          4.0000 U          4.0000 U        58.0000      26 /   36
 group2:  bkg
 min, median, max, bdl/tot :          1.0000 U          2.0000 U        21.0000       6 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -8.0000
lq     =           1.0000 U
median =           2.0000 U
uq     =           7.0000
hicut  =          16.0000
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
             20.0000 08G01401
             20.0000 09G00601
             22.0000 08G01301
             28.0000 09G01101
             58.0000 09G01501


-------------------------------------------------------------
 VANADIUM in UG/L
-----------------------------

3g       ............************************** *** ** ******
bkg                                              *  *      *********
 group1:  3g
 min, median, max, bdl/tot :          0.7000 U          1.5000 J         5.1000 J     12 /   49
 group2:  bkg
 min, median, max, bdl/tot :          2.5000 U          9.9500          19.2000 B      1 /   12
>>> Different populations at alpha > 0.95
  Group bkg Higher
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -9.0250
lq     =           4.5500
median =           9.9500
uq     =          13.6000
```

```
hicut  =          27.1750
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
<< NONE FOUND>>

-------------------------------------------------------------
 ZINC in UG/L
-----------------------------

3g        ....     .    . ........................................
bkg          ..... *.... ..
 group1:  3g
 min, median, max, bdl/tot :          1.0000 U          16.8000 U          151.0000 U    49 /   49
 group2:  bkg
 min, median, max, bdl/tot :          1.1000 U           2.1000 U           5.0000 U    11 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          -1.4500
lq     =           1.5500 U
median =           2.1000 U
uq     =           3.5500 U
hicut  =           6.5500
 Lower outside values in test group relative to group bkg:
<< NONE FOUND>>
 Upper outside values in test group relative to group bkg:
 U            6.6000 08G01201
 U            6.8000 08G00801D
 UJ           7.2000 09G00202
 U            7.2000 09G00801
 UJ           8.3000 09F00701
 U            9.2000 08G01001
 U            9.5000 08F01201
 U            9.8000 08G00701
 UJ          10.2000 09G01101
 UJ          10.5000 08G00202
 U           10.5000 08G00801
 UJ          10.8000 09G00102
 UJ          12.6000 09G01301
 U           14.5000 08G00501
 U           14.6000 09G00901
 UJ          15.7000 09G01001
 U           16.8000 09G01601
 U           16.8000 08F01301
 U           16.8000 09G01401
 U           16.8000 08G01301
 U           16.9000 09G01401D
 U           19.2000 08G00302
 UJ          20.0000 09G00701
 U           21.9000 08G00901
 U           23.8000 09F01601
 UJ          24.0000 09G00601
 UJ          30.0000 09G00202D
 U           30.8000 09G01501
 UJ          33.2000 08G00102
 UJ          35.3000 09F00601
 U           39.6000 09F01501
 UJ          39.9000 08F00901
 U           41.3000 08G01501
 U           52.5000 08G01101
 UJ          54.9000 09G01201
 UJ          55.9000 09F00402
 UJ          59.6000 09G00402
 U           62.3000 08G00601
 U           65.6000 08G00402
 UJ          67.6000 09G00302
 U          151.0000 08G01401


-------------------------------------------------------------
 ALPHA-BHC in UG/L
```

```
-----------------------------

3g        *.......................          . .  ......*
bkg                                  ......... . ..
 group1:  3g
 min, median, max, bdl/tot :          0.0042 J          0.0480 U          1.0000 J    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.0500 UJ         0.0500 U          0.0500 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.0500
lq     =          0.0500 U
median =          0.0500 U
uq     =          0.0500 U
hicut  =          0.0500
 Lower outside values in test group relative to group bkg:
 J            0.0042 09G01101
 U            0.0470 09G01601
 U            0.0470 09G00501
 U            0.0470 09G01001
 U            0.0470 09G01501
 U            0.0470 09G01401D
 U            0.0470 09G00402
 UJ           0.0480 08G00801D
 U            0.0480 08G00701
 U            0.0480 08G00302
 U            0.0480 08G00901
 U            0.0480 08G01001
 U            0.0480 08G00601
 U            0.0480 08G01201
 U            0.0480 08G00202
 U            0.0480 08G00501D
 U            0.0480 08G00402
 U            0.0480 08G00801
 U            0.0480 09G00901
 U            0.0480 08G01401
 U            0.0480 09G00701
 U            0.0480 08G00102
 U            0.0490 08G01101
 U            0.0490 08G01301

 Upper outside values in test group relative to group bkg:
 UJ           0.0510 09G00601
 UJ           0.0520 09G00202
 UJ           0.0520 09G00102
 U            0.0520 09G00801
 U            0.0530 09G00202D
 U            0.0540 09G01301
 J            1.0000 09G01201


-------------------------------------------------------------
 ALPHA-CHLORDANE in UG/L
-----------------------------

3g        *.......................     .     . . ......*
bkg                                  ..... ..... . .
 group1:  3g
 min, median, max, bdl/tot :          0.0280 J          0.0480 U          0.1100 J    33 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.0500 UJ         0.0500 U          0.0500 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.0500
lq     =          0.0500 U
median =          0.0500 U
uq     =          0.0500 U
hicut  =          0.0500
 Lower outside values in test group relative to group bkg:
```

```
 J            0.0280 09G01201
 U            0.0470 09G01601
 U            0.0470 09G01001
 U            0.0470 09G01101
 U            0.0470 09G01501
 U            0.0470 09G01401D
 U            0.0470 09G00402
 UJ           0.0480 08G00801D
 U            0.0480 08G00701
 U            0.0480 08G00302
 U            0.0480 08G00901
 U            0.0480 08G01001
 U            0.0480 08G00601
 U            0.0480 08G01201
 U            0.0480 08G00202
 U            0.0480 08G00501D
 U            0.0480 08G00402
 U            0.0480 08G00801
 U            0.0480 09G00901
 U            0.0480 08G01401
 U            0.0480 09G00701
 U            0.0480 08G00102
 U            0.0490 08G01101
 U            0.0490 08G01301

 Upper outside values in test group relative to group bkg:
 UJ           0.0510 09G00601
 UJ           0.0520 09G00202
 UJ           0.0520 09G00102
 U            0.0520 09G00801
 U            0.0530 09G00202D
 U            0.0540 09G01301
 J            0.1100 09G00501


-----------------------------------------------------------------
 DELTA-BHC in UG/L
-----------------------------

3g       ***.......................        ...    ......*
bkg                                 ........   ....
 group1:  3g
 min, median, max, bdl/tot :          0.0051 J          0.0480 U          0.3000      31 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.0500 UJ         0.0500 U          0.0500 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.0500
lq     =          0.0500 U
median =          0.0500 U
uq     =          0.0500 U
hicut  =          0.0500
 Lower outside values in test group relative to group bkg:
 J            0.0051 08G01301
 J            0.0077 08G01501
 J            0.0210 09G00501
 U            0.0470 09G00402
 U            0.0470 09G01001
 U            0.0470 09G01101
 U            0.0470 09G01501
 U            0.0470 09G01401D
 U            0.0470 09G01601
 UJ           0.0480 08G00801D
 U            0.0480 08G00701
 U            0.0480 08G01001
 U            0.0480 08G00801
 U            0.0480 08G01201
 U            0.0480 08G00901
 U            0.0480 08G00601
 U            0.0480 08G00501D
 U            0.0480 08G00402
```

```
U            0.0480 08G00302
U            0.0480 08G00202
U            0.0480 09G00901
U            0.0480 09G00701
U            0.0480 08G01401
U            0.0480 08G00102
U            0.0490 08G01101

Upper outside values in test group relative to group bkg:
UJ           0.0510 09G00601
UJ           0.0520 09G00202
UJ           0.0520 09G00102
U            0.0520 09G00801
U            0.0530 09G00202D
U            0.0540 09G01301
             0.3000 09G01201


-------------------------------------------------------------
 GAMMA-BHC (LINDANE) in UG/L
-----------------------------

3g       ***.......................          . .  ......*
bkg                                  ......... . ..
 group1:  3g
 min, median, max, bdl/tot :          0.0076 J          0.0480 U          0.6900      31 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.0500 UJ         0.0500 U          0.0500 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.0500
lq     =          0.0500 U
median =          0.0500 U
uq     =          0.0500 U
hicut  =          0.0500
 Lower outside values in test group relative to group bkg:
 J           0.0076 09G00501
 J           0.0110 09G00402
 J           0.0340 09G01101
 U           0.0470 09G01601
 U           0.0470 09G01401D
 U           0.0470 09G01501
 U           0.0470 09G01001
 UJ          0.0480 08G00801D
 U           0.0480 08G00402
 U           0.0480 08G00701
 U           0.0480 08G00601
 U           0.0480 08G01001
 U           0.0480 08G00501D
 U           0.0480 08G01201
 U           0.0480 08G00302
 U           0.0480 08G00901
 U           0.0480 08G00202
 U           0.0480 08G00801
 U           0.0480 09G00901
 U           0.0480 08G01401
 U           0.0480 09G00701
 U           0.0480 08G00102
 U           0.0490 08G01101
 U           0.0490 08G01301

 Upper outside values in test group relative to group bkg:
 UJ          0.0510 09G00601
 UJ          0.0520 09G00202
 UJ          0.0520 09G00102
 U           0.0520 09G00801
 U           0.0530 09G00202D
 U           0.0540 09G01301
             0.6900 09G01201
```

```
-------------------------------------------------------------
 GAMMA-CHLORDANE in UG/L
-----------------------------

3g       **.......................    .     . .  .....**
bkg                                 .... ..... . ..
 group1:  3g
 min, median, max, bdl/tot :          0.0130 J          0.0480 U          0.6700      31 /   35
 group2:  bkg
 min, median, max, bdl/tot :          0.0500 UJ         0.0500 U          0.0500 U    12 /   12
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bkg
-----------------------------------------------------
lowcut =          0.0500
lq     =          0.0500 U
median =          0.0500 U
uq     =          0.0500 U
hicut  =          0.0500
 Lower outside values in test group relative to group bkg:
 J            0.0130 09G01201
 J            0.0300 09G00601
 U            0.0470 09G01601
 U            0.0470 09G01001
 U            0.0470 09G01501
 U            0.0470 09G01101
 U            0.0470 09G01401D
 UJ           0.0480 08G00801D
 U            0.0480 08G00302
 U            0.0480 08G00402
 U            0.0480 08G00901
 U            0.0480 08G01001
 U            0.0480 08G00701
 U            0.0480 08G01201
 U            0.0480 08G00202
 U            0.0480 08G00601
 U            0.0480 08G00501D
 U            0.0480 08G00801
 U            0.0480 09G00901
 U            0.0480 08G01401
 U            0.0480 09G00701
 U            0.0480 08G00102
 U            0.0490 08G01101
 U            0.0490 08G01301

 Upper outside values in test group relative to group bkg:
 UJ           0.0520 09G00202
 UJ           0.0520 09G00102
 U            0.0520 09G00801
 U            0.0530 09G00202D
 U            0.0540 09G01301
              0.1700 09G00501
              0.6700 09G00402
```

Outside values - location details:

08F00901 low: 4/5 hi: 6/7

L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Nickel	1.7000 J
L	Silver	0.8000 U
H	Antimony	2.9000 U
H	Arsenic	96.4000
H	Copper	4.4000 U
H	Lead	1.9000 U
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	39.9000 UJ

08F01201 low: 4/5 hi: 8/10

L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Copper	0.9500 J
L	Nickel	1.3000 U
L	Silver	0.8000 U
H	Antimony	2.9000 U
H	Arsenic	5.9000 U
H	Beryllium	0.2900 U
H	Iron	4080.0000
H	Lead	1.9000 U
H	Manganese	51.0000
H	Mercury	0.1300 U
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	9.5000 U

08F01301 low: 3/5 hi: 6/9

L	Beryllium	0.1000 U
L	Cadmium	0.5000 U
L	Cobalt	1.5000 J
L	Nickel	7.3000 J
L	Silver	0.7000 U
H	Antimony	4.7000 U
H	Arsenic	71.1000
H	Copper	4.5000 J
H	Lead	2.2000 U
H	Manganese	94.1000
H	Mercury	0.1500 U
H	Selenium	4.0000 U
H	Thallium	3.7000 U
H	Zinc	16.8000 U

08G00102 low: 24/29 hi: 21/27

L	2,4-D	0.0950 J
L	2,4-DB	0.0460 J
L	4,4'-DDD	0.0950 U
L	4,4'-DDE	0.0950 U
L	4,4'-DDT	0.0056 J
L	Aldrin	0.0480 U
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0950 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0950 U
L	Endosulfan sulfate	0.0950 U
L	Endrin	0.0100 J
L	Endrin aldehyde	0.0950 U
L	Endrin ketone	0.0950 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPA	140.0000 U

L	Methoxychlor	0.4800 U
L	Nickel	1.7000 J
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	3.7000 J
H	Aroclor-1016	0.9500 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9500 U
H	Aroclor-1242	0.9500 U
H	Aroclor-1248	0.9500 U
H	Aroclor-1254	0.9500 U
H	Aroclor-1260	0.9500 U
H	Arsenic	133.0000
H	Benzo(a)pyrene	10.0000 U
H	Calcium	101000.0000
H	Copper	3.6000 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	MCPP	790.0000 J
H	Naphthalene	25.0000
H	Pentachlorophenol	25.0000 UJ
H	Potassium	16000.0000
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	33.2000 UJ
H	bis(2-Ethylhexyl)phthalate	10.0000 U

08G00202 low: 25/29 hi: 24/27

L	2,4-D	0.0051 J
L	2,4-DB	0.0900 J
L	4,4'-DDD	0.0960 U
L	4,4'-DDE	0.0960 U
L	4,4'-DDT	0.0960 U
L	Aldrin	0.0480 U
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0960 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0960 U
L	Endosulfan sulfate	0.0120 J
L	Endrin	0.0960 U
L	Endrin aldehyde	0.0960 U
L	Endrin ketone	0.0960 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPP	60.0000 U
L	Methoxychlor	0.4800 U
L	Nickel	1.4000 J
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U

H	Antimony	2.9000 U
H	Aroclor-1016	0.9600 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9600 U
H	Aroclor-1242	0.9600 U
H	Aroclor-1248	0.9600 U
H	Aroclor-1254	0.9600 U
H	Aroclor-1260	0.9600 U
H	Arsenic	295.0000
H	Benzo(a)pyrene	10.0000 U
H	Calcium	104000.0000
H	Copper	2.5000 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	MCPA	500.0000 U
H	Magnesium	6490.0000 U
H	Pentachlorophenol	25.0000 UJ
H	Potassium	10800.0000
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	10.5000 UJ
H	bis(2-Ethylhexyl)phthalate	10.0000 U

08G00302 low: 26/28 hi: 23/26

L	2,4-D	1.5000 U
L	2,4-DB	0.6000 J
L	4,4'-DDD	0.0960 U
L	4,4'-DDE	0.0960 U
L	4,4'-DDT	0.0960 U
L	Aldrin	0.0480 U
L	Beryllium	0.1200 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0960 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0960 U
L	Endosulfan sulfate	0.0960 U
L	Endrin	0.0960 U
L	Endrin aldehyde	0.0960 U
L	Endrin ketone	0.0960 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	Methoxychlor	0.4800 U
L	Nickel	1.6000 J
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	0.9600 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9600 U
H	Aroclor-1242	0.9600 U
H	Aroclor-1248	0.9600 U
H	Aroclor-1254	0.9600 U
H	Aroclor-1260	0.9600 U
H	Arsenic	79.9000
H	Benzo(a)pyrene	10.0000 UJ
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	MCPA	640.0000 J

H	MCPP	400.0000 U
H	Mercury	0.1400 U
H	Pentachlorophenol	25.0000 UJ
H	Potassium	9130.0000
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	19.2000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ

08G00402 low: 27/30 hi: 21/23

L	2,4-D	0.0230 J
L	2,4-DB	0.1800 J
L	4,4'-DDD	0.0950 U
L	4,4'-DDE	0.0950 U
L	4,4'-DDT	0.0950 U
L	Aldrin	0.0480 U
L	Beryllium	0.1900 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0950 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0950 U
L	Endosulfan sulfate	0.0950 U
L	Endrin	0.0950 U
L	Endrin aldehyde	0.0950 U
L	Endrin ketone	0.0950 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPA	200.0000 U
L	MCPP	200.0000 U
L	Methoxychlor	0.4800 U
L	Nickel	3.0000 J
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	0.9500 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9500 U
H	Aroclor-1242	0.9500 U
H	Aroclor-1248	0.9500 U
H	Aroclor-1254	0.9500 U
H	Aroclor-1260	0.9500 U
H	Arsenic	70.4000
H	Benzo(a)pyrene	10.0000 UJ
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	Pentachlorophenol	25.0000 UJ
H	Potassium	9940.0000
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	65.6000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ

08G00501 low: 7/10 hi: 22/25

L	2,4-D	1.5000 U
L	2,4-DB	1.4000 J
L	Beryllium	0.1500 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Copper	1.2000 J
L	Dinoseb	0.0980 J

L	MCPA	160.0000 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	1.0000 U
H	Aroclor-1221	2.0000 U
H	Aroclor-1232	1.0000 U
H	Aroclor-1242	1.0000 U
H	Aroclor-1248	1.0000 U
H	Aroclor-1254	1.0000 U
H	Aroclor-1260	1.0000 U
H	Arsenic	57.7000
H	Benzo(a)pyrene	10.0000 UJ
H	Dalapon	6.0000 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	MCPP	440.0000 U
H	Manganese	160.0000
H	Mercury	0.1600 U
H	Pentachlorophenol	25.0000 UJ
H	Potassium	11200.0000
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	14.5000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ

08G00501D low: 28/29 hi: 23/26

L	2,4-D	1.5000 U
L	4,4'-DDD	0.0950 U
L	4,4'-DDE	0.0950 U
L	4,4'-DDT	0.0950 U
L	Aldrin	0.0480 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Copper	0.9600 J
L	Dieldrin	0.0950 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0950 U
L	Endosulfan sulfate	0.0950 U
L	Endrin	0.0950 U
L	Endrin aldehyde	0.0950 U
L	Endrin ketone	0.0950 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPA	190.0000 U
L	MCPP	240.0000 U
L	Methoxychlor	0.4800 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	2,4-DB	5.0000 U
H	Antimony	2.9000 U
H	Aroclor-1016	0.9500 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9500 U
H	Aroclor-1242	0.9500 U
H	Aroclor-1248	0.9500 U
H	Aroclor-1254	0.9500 U
H	Aroclor-1260	0.9500 U

H	Arsenic	57.3000
H	Benzo(a)pyrene	10.0000 UJ
H	Beryllium	0.2400 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	Manganese	162.0000
H	Mercury	0.1600 U
H	Pentachlorophenol	25.0000 UJ
H	Potassium	11200.0000
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ

08G00601 low: 27/30 hi: 77/82

L	2,4-D	0.2200 J
L	2,4-DB	0.5700 J
L	4,4'-DDD	0.0950 U
L	4,4'-DDE	0.0950 U
L	4,4'-DDT	0.0950 U
L	Aldrin	0.0480 U
L	Beryllium	0.1300 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0950 U
L	Dinoseb	0.2800 J
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0950 U
L	Endosulfan sulfate	0.0950 U
L	Endrin	0.0950 U
L	Endrin aldehyde	0.0950 U
L	Endrin ketone	0.0950 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPA	110.0000 UJ
L	Methoxychlor	0.4800 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U

H	1,2,4-Trichlorobenzene	11.0000 UJ
H	1,2-Dichlorobenzene	11.0000 UJ
H	1,3-Dichlorobenzene	11.0000 UJ
H	1,4-Dichlorobenzene	11.0000 UJ
H	2,2'-oxybis(1-Chloropropane)	11.0000 UJ
H	2,4,5-Trichlorophenol	27.0000 U
H	2,4,6-Trichlorophenol	11.0000 U
H	2,4-Dichlorophenol	11.0000 U
H	2,4-Dimethylphenol	11.0000 U
H	2,4-Dinitrophenol	27.0000 UJ
H	2,4-Dinitrotoluene	11.0000 UJ
H	2,6-Dinitrotoluene	11.0000 UJ
H	2-Chloronaphthalene	11.0000 UJ
H	2-Chlorophenol	11.0000 U
H	2-Methylnaphthalene	11.0000 UJ
H	2-Methylphenol	11.0000 U
H	2-Nitroaniline	27.0000 UJ
H	2-Nitrophenol	11.0000 U
H	3,3'-Dichlorobenzidine	11.0000 UJ
H	3-Nitroaniline	27.0000 UJ
H	4,6-Dinitro-2-methylphenol	27.0000 UJ
H	4-Bromophenyl-phenylether	11.0000 UJ
H	4-Chloro-3-methylphenol	11.0000 U
H	4-Chloroaniline	11.0000 UJ
H	4-Chlorophenyl-phenylether	11.0000 UJ
H	4-Methylphenol	11.0000 U

H	4-Nitroaniline	27.0000 UJ
H	4-Nitrophenol	27.0000 U
H	Acenaphthene	11.0000 UJ
H	Acenaphthylene	11.0000 UJ
H	Anthracene	11.0000 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	0.9500 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9500 U
H	Aroclor-1242	0.9500 U
H	Aroclor-1248	0.9500 U
H	Aroclor-1254	0.9500 U
H	Aroclor-1260	0.9500 U
H	Arsenic	53.0000
H	Benzo(a)anthracene	11.0000 UJ
H	Benzo(a)pyrene	11.0000 UJ
H	Benzo(b)fluoranthene	11.0000 UJ
H	Benzo(g,h,i)perylene	11.0000 UJ
H	Benzo(k)fluoranthene	11.0000 UJ
H	Butylbenzylphthalate	11.0000 UJ
H	Carbazole	11.0000 UJ
H	Chrysene	11.0000 UJ
H	Copper	6.7000 J
H	Dalapon	6.0000 U
H	Di-n-butylphthalate	11.0000 UJ
H	Dibenz(a,h)anthracene	11.0000 UJ
H	Dibenzofuran	11.0000 UJ
H	Diethylphthalate	11.0000 UJ
H	Dimethylphthalate	11.0000 UJ
H	Fluoranthene	11.0000 UJ
H	Fluorene	11.0000 UJ
H	Hexachlorobenzene	11.0000 UJ
H	Hexachlorobutadiene	11.0000 UJ
H	Hexachlorocyclopentadiene	11.0000 UJ
H	Hexachloroethane	11.0000 UJ
H	Indeno(1,2,3-cd)pyrene	11.0000 UJ
H	Isophorone	11.0000 UJ
H	Lead	6.6000
H	MCPP	300.0000 UJ
H	Manganese	24.2000
H	Mercury	0.1900 U
H	N-Nitroso-di-n-propylamine	11.0000 UJ
H	N-Nitrosodiphenylamine (1)	11.0000 UJ
H	Naphthalene	11.0000 UJ
H	Nitrobenzene	11.0000 UJ
H	Pentachlorophenol	27.0000 UJ
H	Phenanthrene	11.0000 UJ
H	Phenol	11.0000 U
H	Potassium	11700.0000
H	Pyrene	11.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	62.3000 U
H	bis(2-Chloroethoxy)methane	11.0000 UJ
H	bis(2-Chloroethyl)ether	11.0000 UJ
H	bis(2-Ethylhexyl)phthalate	11.0000 UJ

08G00701 low: 28/28 hi: 24/27

L	2,4-D	1.5000 U
L	4,4'-DDD	0.0960 U
L	4,4'-DDE	0.0960 U
L	4,4'-DDT	0.0960 U
L	Aldrin	0.0480 U
L	Beryllium	0.1900 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0960 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0960 U
L	Endosulfan sulfate	0.0960 U
L	Endrin	0.0960 U
L	Endrin aldehyde	0.0960 U
L	Endrin ketone	0.0960 U

L Heptachlor	0.0480 U
L Heptachlor epoxide	0.0480 U
L MCPA	78.0000 U
L Methoxychlor	0.4800 U
L Nickel	1.3000 U
L Silver	0.8000 U
L Toxaphene	4.8000 U
L alpha-BHC	0.0480 U
L alpha-Chlordane	0.0480 U
L beta-BHC	0.0480 U
L delta-BHC	0.0480 U
L gamma-BHC (Lindane)	0.0480 U
L gamma-Chlordane	0.0480 U
H 1,2-Dichlorobenzene	10.0000 U
H 1,3-Dichlorobenzene	10.0000 U
H 1,4-Dichlorobenzene	10.0000 U
H 2,4-DB	5.0000 U
H Antimony	2.9000 U
H Aroclor-1016	0.9600 U
H Aroclor-1221	1.9000 U
H Aroclor-1232	0.9600 U
H Aroclor-1242	0.9600 U
H Aroclor-1248	0.9600 U
H Aroclor-1254	0.9600 U
H Aroclor-1260	0.9600 U
H Arsenic	56.4000
H Benzo(a)pyrene	10.0000 U
H Copper	3.3000 J
H Dalapon	6.0000 U
H Dinoseb	1.5000 U
H Hexachlorobenzene	10.0000 U
H Lead	1.9000 U
H MCPP	350.0000 U
H Mercury	0.1600 U
H Pentachlorophenol	25.0000 UJ
H Potassium	11000.0000
H Selenium	4.4000 U
H Thallium	5.0000 U
H Zinc	9.8000 U
H bis(2-Ethylhexyl)phthalate	10.0000 U

08G00801 low: 28/30 hi: 22/25

L 2,4-D	0.1200 J
L 2,4-DB	0.1600 J
L 4,4'-DDD	0.0960 U
L 4,4'-DDE	0.0960 U
L 4,4'-DDT	0.0960 U
L Aldrin	0.0480 U
L Beryllium	0.1200 U
L Cadmium	0.3000 U
L Cobalt	0.7000 U
L Dieldrin	0.0960 U
L Endosulfan I	0.0480 U
L Endosulfan II	0.0960 U
L Endosulfan sulfate	0.0960 U
L Endrin	0.0960 U
L Endrin aldehyde	0.0960 U
L Endrin ketone	0.0960 U
L Heptachlor	0.0480 U
L Heptachlor epoxide	0.0480 U
L MCPA	82.0000 U
L MCPP	110.0000 U
L Methoxychlor	0.4800 U
L Nickel	1.3000 U
L Silver	0.8000 U
L Toxaphene	4.8000 U
L alpha-BHC	0.0480 U
L alpha-Chlordane	0.0480 U
L beta-BHC	0.0480 U
L delta-BHC	0.0480 U
L gamma-BHC (Lindane)	0.0480 U
L gamma-Chlordane	0.0480 U

H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	2.9000 U
H	Aroclor-1016	0.9600 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9600 U
H	Aroclor-1242	0.9600 U
H	Aroclor-1248	0.9600 U
H	Aroclor-1254	0.9600 U
H	Aroclor-1260	0.9600 U
H	Arsenic	122.0000
H	Benzo(a)pyrene	10.0000 U
H	Calcium	131000.0000
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	Mercury	0.1300 U
H	Pentachlorophenol	25.0000 UJ
H	Potassium	8670.0000
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	10.5000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U

08G00801D low: 27/29 hi: 22/26

L	2,4-D	0.1100 J
L	2,4-DB	0.1100 J
L	4,4'-DDD	0.0950 UJ
L	4,4'-DDE	0.0950 UJ
L	4,4'-DDT	0.0950 UJ
L	Aldrin	0.0480 UJ
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0950 UJ
L	Endosulfan I	0.0480 UJ
L	Endosulfan II	0.0950 UJ
L	Endosulfan sulfate	0.0950 UJ
L	Endrin	0.0950 UJ
L	Endrin aldehyde	0.0950 UJ
L	Endrin ketone	0.0950 UJ
L	Heptachlor	0.0480 UJ
L	Heptachlor epoxide	0.0480 UJ
L	MCPA	72.0000 U
L	Methoxychlor	0.4800 UJ
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.8000 UJ
L	alpha-BHC	0.0480 UJ
L	alpha-Chlordane	0.0480 UJ
L	beta-BHC	0.0480 UJ
L	delta-BHC	0.0480 UJ
L	gamma-BHC (Lindane)	0.0480 UJ
L	gamma-Chlordane	0.0480 UJ
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	2.9000 U
H	Aroclor-1016	0.9500 UJ
H	Aroclor-1221	1.9000 UJ
H	Aroclor-1232	0.9500 UJ
H	Aroclor-1242	0.9500 UJ
H	Aroclor-1248	0.9500 UJ
H	Aroclor-1254	0.9500 UJ
H	Aroclor-1260	0.9500 UJ
H	Arsenic	120.0000
H	Benzo(a)pyrene	10.0000 U
H	Calcium	134000.0000
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U

H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	MCPP	710.0000 J
H	Mercury	0.1300 U
H	Pentachlorophenol	25.0000 UJ
H	Potassium	8900.0000
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	6.8000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U

08G00901 low: 26/29 hi: 24/25

L	2,4-D	0.0760 J
L	2,4-DB	0.0610 J
L	4,4'-DDD	0.0950 U
L	4,4'-DDE	0.0950 U
L	4,4'-DDT	0.0950 U
L	Aldrin	0.0480 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Copper	1.2000 J
L	Dieldrin	0.0950 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0950 U
L	Endosulfan sulfate	0.0950 U
L	Endrin	0.0950 U
L	Endrin aldehyde	0.0950 U
L	Endrin ketone	0.0950 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPA	220.0000 U
L	Methoxychlor	0.4800 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	0.9500 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9500 U
H	Aroclor-1242	0.9500 U
H	Aroclor-1248	0.9500 U
H	Aroclor-1254	0.9500 U
H	Aroclor-1260	0.9500 U
H	Arsenic	117.0000
H	Benzo(a)pyrene	10.0000 UJ
H	Dalapon	6.0000 U
H	Dicamba	0.5200 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	MCPP	350.0000 U
H	Mercury	0.1400 U
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	21.9000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ

08G01001 low: 27/27 hi: 24/28

L	2,4-D	1.5000 U
L	4,4'-DDD	0.0950 U
L	4,4'-DDE	0.0950 U
L	4,4'-DDT	0.0950 U

L	Aldrin	0.0480 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0950 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0950 U
L	Endosulfan sulfate	0.0950 U
L	Endrin	0.0950 U
L	Endrin aldehyde	0.0950 U
L	Endrin ketone	0.0950 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPA	160.0000 U
L	Methoxychlor	0.4800 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	2,4-DB	5.0000 U
H	Antimony	2.9000 U
H	Aroclor-1016	0.9500 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9500 U
H	Aroclor-1242	0.9500 U
H	Aroclor-1248	0.9500 U
H	Aroclor-1254	0.9500 U
H	Aroclor-1260	0.9500 U
H	Arsenic	209.0000
H	Benzo(a)pyrene	10.0000 UJ
H	Beryllium	0.2300 U
H	Copper	6.5000 J
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	MCPP	900.0000 J
H	Manganese	54.4000
H	Mercury	0.1400 U
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	9.2000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ

08G01101 low: 25/28 hi: 24/28

L	2,4-D	0.0480 J
L	4,4'-DDD	0.0980 U
L	4,4'-DDE	0.0980 U
L	4,4'-DDT	0.0980 U
L	Aldrin	0.0490 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Copper	0.9000 J
L	Dieldrin	0.0190 J
L	Endosulfan I	0.0490 U
L	Endosulfan II	0.0980 U
L	Endosulfan sulfate	0.0980 U
L	Endrin	0.0980 U
L	Endrin aldehyde	0.0980 U
L	Endrin ketone	0.0980 U
L	Heptachlor	0.0490 U
L	Heptachlor epoxide	0.0490 U
L	MCPA	140.0000 U
L	Methoxychlor	0.4900 U

L Nickel	1.3000 U
L Silver	0.8000 U
L Toxaphene	4.9000 U
L alpha-BHC	0.0490 U
L alpha-Chlordane	0.0490 U
L beta-BHC	0.0490 U
L delta-BHC	0.0490 U
L gamma-BHC (Lindane)	0.0490 U
L gamma-Chlordane	0.0490 U
H 1,2-Dichlorobenzene	10.0000 UJ
H 1,3-Dichlorobenzene	10.0000 UJ
H 1,4-Dichlorobenzene	10.0000 UJ
H 2,4-DB	5.0000 U
H Antimony	2.9000 U
H Aroclor-1016	0.9800 U
H Aroclor-1221	2.0000 U
H Aroclor-1232	0.9800 U
H Aroclor-1242	0.9800 U
H Aroclor-1248	0.9800 U
H Aroclor-1254	0.9800 U
H Aroclor-1260	0.9800 U
H Arsenic	223.0000
H Benzo(a)pyrene	10.0000 UJ
H Beryllium	0.2200 U
H Calcium	89800.0000
H Dalapon	6.0000 U
H Dinoseb	1.5000 U
H Hexachlorobenzene	10.0000 UJ
H Lead	1.9000 U
H MCPP	660.0000 J
H Mercury	0.1300 U
H Pentachlorophenol	25.0000 UJ
H Potassium	11600.0000
H Selenium	4.4000 U
H Thallium	5.0000 U
H Zinc	52.5000 U
H bis(2-Ethylhexyl)phthalate	10.0000 UJ

08G01201 low: 27/28 hi: 25/28

L 2,4-D	0.0820 J
L 4,4'-DDD	0.0950 U
L 4,4'-DDE	0.0950 U
L 4,4'-DDT	0.0950 U
L Aldrin	0.0480 U
L Cadmium	0.3000 U
L Cobalt	0.7000 U
L Dieldrin	0.0950 U
L Endosulfan I	0.0480 U
L Endosulfan II	0.0950 U
L Endosulfan sulfate	0.0950 U
L Endrin	0.0950 U
L Endrin aldehyde	0.0950 U
L Endrin ketone	0.0950 U
L Heptachlor	0.0480 U
L Heptachlor epoxide	0.0480 U
L MCPA	110.0000 U
L MCPP	60.0000 U
L Methoxychlor	0.4800 U
L Nickel	1.3000 U
L Silver	0.8000 U
L Toxaphene	4.8000 U
L alpha-BHC	0.0480 U
L alpha-Chlordane	0.0480 U
L beta-BHC	0.0480 U
L delta-BHC	0.0480 U
L gamma-BHC (Lindane)	0.0480 U
L gamma-Chlordane	0.0480 U
H 1,2-Dichlorobenzene	10.0000 U
H 1,3-Dichlorobenzene	10.0000 U
H 1,4-Dichlorobenzene	10.0000 U
H 2,4-DB	5.0000 U

H	Antimony	2.9000 U
H	Aroclor-1016	0.9500 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9500 U
H	Aroclor-1242	0.9500 U
H	Aroclor-1248	0.9500 U
H	Aroclor-1254	0.9500 U
H	Aroclor-1260	0.9500 U
H	Arsenic	5.9000 U
H	Barium	38.5000 J
H	Benzo(a)pyrene	10.0000 U
H	Beryllium	0.2600 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Iron	5800.0000
H	Lead	1.9000 U
H	Manganese	71.8000
H	Mercury	0.1500 U
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	6.6000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U

08G01301 low: 23/27 hi: 22/30

L	2,4-D	0.1600 J
L	2,4-DB	0.3100 J
L	4,4'-DDD	0.0980 U
L	4,4'-DDE	0.0980 U
L	4,4'-DDT	0.0980 U
L	Aldrin	0.0490 U
L	Cadmium	0.5000 U
L	Cobalt	1.9000 J
L	Dieldrin	0.0980 U
L	Endosulfan I	0.0490 U
L	Endosulfan II	0.0980 U
L	Endosulfan sulfate	0.0980 U
L	Endrin	0.0980 U
L	Endrin aldehyde	0.0980 U
L	Endrin ketone	0.0980 U
L	Heptachlor	0.0490 U
L	Heptachlor epoxide	0.0490 U
L	MCPP	60.0000 U
L	Methoxychlor	0.4900 U
L	Silver	0.7000 U
L	Toxaphene	4.9000 U
L	alpha-BHC	0.0490 U
L	alpha-Chlordane	0.0490 U
L	beta-BHC	0.0490 U
L	delta-BHC	0.0051 J
L	gamma-BHC (Lindane)	0.0490 U
L	gamma-Chlordane	0.0490 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	3.5000 U
H	Aroclor-1016	0.9800 U
H	Aroclor-1221	2.0000 U
H	Aroclor-1232	0.9800 U
H	Aroclor-1242	0.9800 U
H	Aroclor-1248	0.9800 U
H	Aroclor-1254	0.9800 U
H	Aroclor-1260	0.9800 U
H	Arsenic	88.2000
H	Barium	42.1000 J
H	Benzo(a)pyrene	10.0000 U
H	Beryllium	0.2300 U
H	Copper	5.5000 J
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U

H	Lead	3.2000
H	MCPA	660.0000 J
H	Manganese	148.0000
H	Mercury	0.1500 U
H	Nickel	9.6000 J
H	Pentachlorophenol	25.0000 U
H	Selenium	4.0000 U
H	Thallium	3.7000 U
H	Total Suspended Solids	22.0000
H	Zinc	16.8000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U

08G01401 low: 25/30 hi: 21/27

L	2,4-D	2.0000 U
L	2,4-DB	2.0000 U
L	4,4'-DDD	0.0970 U
L	4,4'-DDE	0.0970 U
L	4,4'-DDT	0.0970 U
L	Aldrin	0.0480 U
L	Cadmium	0.5000 U
L	Cobalt	2.3000 J
L	Dalapon	1.4000 J
L	Dieldrin	0.0970 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0970 U
L	Endosulfan sulfate	0.0970 U
L	Endrin	0.0970 U
L	Endrin aldehyde	0.0066 J
L	Endrin ketone	0.0970 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPA	60.0000 U
L	MCPP	200.0000 J
L	Methoxychlor	0.4800 U
L	Nickel	5.8000 J
L	Silver	0.7000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	2.0000 U
H	Aroclor-1016	0.9700 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9700 U
H	Aroclor-1242	0.9700 U
H	Aroclor-1248	0.9700 U
H	Aroclor-1254	0.9700 U
H	Aroclor-1260	0.9700 U
H	Arsenic	7.1000 J
H	Barium	39.2000 J
H	Benzo(a)pyrene	10.0000 U
H	Beryllium	0.3300 U
H	Copper	9.5000 J
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	3.1000
H	Magnesium	6650.0000 U
H	Manganese	172.0000
H	Pentachlorophenol	25.0000 U
H	Selenium	4.1000 U
H	Thallium	3.7000 U
H	Total Suspended Solids	20.0000
H	Zinc	151.0000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U

08G01501 low: 13/18 hi: 20/24

L 2,4-D	0.1600	J
L 2,4-DB	0.2900	J
L 4,4'-DDD	0.0990	UR
L 4,4'-DDE	0.0990	UR
L 4,4'-DDT	0.0990	UR
L Beryllium	0.1300	U
L Cadmium	0.5000	U
L Cobalt	1.2000	J
L Dieldrin	0.0990	UR
L Endosulfan II	0.0990	UR
L Endosulfan sulfate	0.0990	UR
L Endrin	0.0990	UR
L Endrin aldehyde	0.0990	UR
L Endrin ketone	0.0990	UR
L MCPP	60.0000	U
L Nickel	5.9000	J
L Silver	0.7000	U
L delta-BHC	0.0077	J
H 1,2-Dichlorobenzene	10.0000	U
H 1,3-Dichlorobenzene	10.0000	U
H 1,4-Dichlorobenzene	10.0000	U
H Antimony	4.0000	U
H Aroclor-1016	0.9900	UR
H Aroclor-1221	2.0000	UR
H Aroclor-1232	0.9900	UR
H Aroclor-1242	0.9900	UR
H Aroclor-1248	0.9900	UR
H Aroclor-1254	0.9900	UR
H Aroclor-1260	0.9900	UR
H Benzo(a)pyrene	10.0000	U
H Copper	8.3000	J
H Dalapon	6.0000	U
H Dinoseb	1.5000	U
H Hexachlorobenzene	10.0000	U
H Lead	2.3000	J
H MCPA	1200.0000	DJ
H Manganese	72.9000	
H Pentachlorophenol	25.0000	U
H Selenium	4.0000	U
H Thallium	3.7000	U
H Zinc	41.3000	U
H bis(2-Ethylhexyl)phthalate	10.0000	U

08G01601 low: 3/4 hi: 5/7

L Cadmium	0.3000	U
L Cobalt	1.9000	J
L Copper	0.7000	U
L Silver	0.7000	U
H Antimony	2.5000	U
H Beryllium	0.4300	U
H Lead	3.3000	U
H Manganese	164.0000	
H Nickel	11.4000	J
H Selenium	3.6000	U
H Thallium	4.2000	U

08G01701 low: 4/5 hi: 6/8

L Cadmium	0.3000	U
L Cobalt	0.8000	U
L Copper	1.2000	U
L Nickel	4.4000	J
L Silver	0.7000	U
H Antimony	2.5000	U
H Arsenic	98.8000	
H Beryllium	0.3900	U
H Calcium	63200.0000	U
H Lead	1.6000	U
H Potassium	10900.0000	
H Selenium	3.6000	U
H Thallium	4.2000	U

08G01801	low: 3/4 hi: 5/6	
L Cadmium		0.3000 U
L Cobalt		0.8000 U
L Nickel		3.0000 J
L Silver		0.7000 U
H Antimony		2.9000 J
H Beryllium		0.4000 U
H Copper		2.8000 U
H Lead		3.6000 U
H Selenium		3.6000 U
H Thallium		4.2000 U
09F00402	low: 3/5 hi: 3/8	
L Beryllium		0.1000 U
L Cadmium		0.3000 U
L Cobalt		0.7500 J
L Nickel		2.0000 J
L Silver		0.8000 U
H Antimony		3.5000 J
H Arsenic		232.0000
H Copper		42.7000
H Lead		4.2000
H Manganese		62.7000
H Selenium		4.4000 U
H Thallium		5.0000 U
H Zinc		55.9000 UJ
09F00601	low: 2/5 hi: 4/8	
L Beryllium		0.1200 U
L Cadmium		0.3000 U
L Cobalt		1.5000 J
L Nickel		2.7000 J
L Silver		0.9500 J
H Antimony		5.1000 J
H Arsenic		51.5000
H Copper		6.3000 J
H Lead		1.9000 U
H Manganese		39.0000
H Selenium		4.4000 U
H Thallium		5.0000 U
H Zinc		35.3000 UJ
09F00701	low: 4/5 hi: 7/8	
L Beryllium		0.1000 U
L Cadmium		0.3000 U
L Cobalt		0.7000 U
L Nickel		4.9000 J
L Silver		0.8000 U
H Antimony		2.9000 U
H Arsenic		5.9000 U
H Copper		2.6000 U
H Lead		1.9000 U
H Manganese		38.4000
H Selenium		4.4000 U
H Thallium		5.0000 U
H Zinc		8.3000 UJ
09F01501	low: 3/5 hi: 6/8	
L Beryllium		0.1000 U
L Cadmium		0.5000 U
L Cobalt		0.6300 J
L Nickel		5.6000 J
L Silver		0.7000 U
H Antimony		3.7000 U
H Copper		4.4000 J
H Lead		2.2000 U
H Manganese		46.4000
H Mercury		0.1400 U

H Selenium		4.0000 U
H Thallium		3.7000 U
H Zinc		39.6000 U
09F01601	low: 3/5 hi: 5/7	
L Beryllium		0.1000 U
L Cadmium		0.5000 U
L Cobalt		0.7500 J
L Nickel		3.0000 J
L Silver		0.7000 U
H Antimony		5.0000 U
H Copper		4.0000 J
H Lead		2.2000 U
H Manganese		44.5000
H Selenium		4.0000 U
H Thallium		3.7000 U
H Zinc		23.8000 U
09G00102	low: 4/7 hi: 35/37	
L 2,4-D		0.0018 J
L 2,4-DB		0.4200 J
L Beryllium		0.1000 U
L Cadmium		0.3000 U
L Cobalt		0.7000 U
L Nickel		2.5000 J
L Silver		0.8000 U
H 1,2-Dichlorobenzene		10.0000 UJ
H 1,3-Dichlorobenzene		10.0000 UJ
H 1,4-Dichlorobenzene		10.0000 UJ
H Aldrin		0.0520 UJ
H Antimony		2.9000 U
H Aroclor-1016		1.0000 UJ
H Aroclor-1221		2.1000 UJ
H Aroclor-1232		1.0000 UJ
H Aroclor-1242		1.0000 UJ
H Aroclor-1248		1.0000 UJ
H Aroclor-1254		1.0000 UJ
H Aroclor-1260		1.0000 UJ
H Arsenic		13.2000
H Benzo(a)pyrene		10.0000 UJ
H Copper		3.0000 U
H Dalapon		11.0000 U
H Dinoseb		1.5000 U
H Endosulfan I		0.0520 UJ
H Heptachlor		0.0520 UJ
H Heptachlor epoxide		0.0520 UJ
H Hexachlorobenzene		10.0000 UJ
H Lead		1.9000 U
H MCPA		640.0000
H MCPP		520.0000 U
H Methoxychlor		0.5200 UJ
H Pentachlorophenol		25.0000 UJ
H Selenium		4.4000 U
H Thallium		5.0000 U
H Toxaphene		5.2000 UJ
H Zinc		10.8000 UJ
H alpha-BHC		0.0520 UJ
H alpha-Chlordane		0.0520 UJ
H beta-BHC		0.0520 UJ
H bis(2-Ethylhexyl)phthalate		10.0000 UJ
H delta-BHC		0.0520 UJ
H gamma-BHC (Lindane)		0.0520 UJ
H gamma-Chlordane		0.0520 UJ
09G00202	low: 6/8 hi: 34/36	
L 2,4-D		1.5000 U
L 2,4-DB		0.4400 J
L Beryllium		0.1100 U
L Cadmium		0.3000 U
L Cobalt		0.7000 U
L Methoxychlor		0.0520 UJ

L	Nickel	1.3000 U
L	Silver	1.1000 J
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Aldrin	0.0520 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	1.0000 UJ
H	Aroclor-1221	2.1000 UJ
H	Aroclor-1232	1.0000 UJ
H	Aroclor-1242	1.0000 UJ
H	Aroclor-1248	1.0000 UJ
H	Aroclor-1254	1.0000 UJ
H	Aroclor-1260	1.0000 UJ
H	Arsenic	5.9000 U
H	Benzo(a)pyrene	10.0000 U
H	Copper	2.6000 U
H	Dalapon	8.5000 U
H	Dinoseb	1.5000 U
H	Endosulfan I	0.0520 UJ
H	Heptachlor	0.0520 UJ
H	Heptachlor epoxide	0.0520 UJ
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	MCPA	870.0000 J
H	MCPP	840.0000 J
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Toxaphene	5.2000 UJ
H	Zinc	7.2000 UJ
H	alpha-BHC	0.0520 UJ
H	alpha-Chlordane	0.0520 UJ
H	beta-BHC	0.0520 UJ
H	bis(2-Ethylhexyl)phthalate	10.0000 U
H	delta-BHC	0.0520 UJ
H	gamma-BHC (Lindane)	0.0520 UJ
H	gamma-Chlordane	0.0520 UJ

09G00202D low: 6/11 hi: 36/37

L	2,4-D	1.6000 U
L	2,4-DB	0.3300 J
L	2,4-Dimethylphenol	2.0000 J
L	2-Methylphenol	1.0000 J
L	4-Methylphenol	3.0000 J
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Nickel	1.3000 U
L	Phenol	2.0000 J
L	Silver	0.8000 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Aldrin	0.0530 U
H	Antimony	2.9000 U
H	Aroclor-1016	1.0000 U
H	Aroclor-1221	2.1000 U
H	Aroclor-1232	1.0000 U
H	Aroclor-1242	1.0000 U
H	Aroclor-1248	1.0000 U
H	Aroclor-1254	1.0000 U
H	Aroclor-1260	1.0000 U
H	Arsenic	5.9000 U
H	Benzo(a)pyrene	10.0000 U
H	Copper	3.5000 U
H	Dalapon	8.9000 U
H	Dinoseb	1.5000 U
H	Endosulfan I	0.0530 U
H	Heptachlor	0.0530 U
H	Heptachlor epoxide	0.0530 U

H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	MCPA	670.0000 J
H	MCPP	540.0000 U
H	Methoxychlor	0.5300 U
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Toxaphene	5.3000 U
H	Zinc	30.0000 UJ
H	alpha-BHC	0.0530 U
H	alpha-Chlordane	0.0530 U
H	beta-BHC	0.0530 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U
H	delta-BHC	0.0530 U
H	gamma-BHC (Lindane)	0.0530 U
H	gamma-Chlordane	0.0530 U

09G00302 low: 5/9 hi: 25/25

L	2,4-D	0.0035 J
L	2,4-DB	0.1700 J
L	4,4'-DDT	0.0039 J
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Naphthalene	1.0000 J
L	Nickel	1.3000 U
L	Silver	0.8000 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	2.9000 U
H	Aroclor-1016	1.0000 UJ
H	Aroclor-1221	2.0000 UJ
H	Aroclor-1232	1.0000 UJ
H	Aroclor-1242	1.0000 UJ
H	Aroclor-1248	1.0000 UJ
H	Aroclor-1254	1.0000 UJ
H	Aroclor-1260	1.0000 UJ
H	Arsenic	5.9000 U
H	Benzo(a)pyrene	10.0000 U
H	Copper	3.0000 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	MCPA	480.0000 U
H	MCPP	350.0000 U
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	67.6000 UJ
H	bis(2-Ethylhexyl)phthalate	10.0000 U

09G00402 low: 19/27 hi: 19/30

L	2,4-D	0.0990 J
L	2,4-DB	1.8000 J
L	2,4-Dichlorophenol	2.0000 J
L	4,4'-DDD	0.0880 J
L	4,4'-DDE	0.0930 U
L	4,4'-DDT	0.0930 U
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0930 U
L	Dinoseb	0.0980 J
L	Endosulfan II	0.0930 U
L	Endosulfan sulfate	0.0930 U
L	Endrin	0.0930 U
L	Endrin aldehyde	0.0930 U
L	Endrin ketone	0.0930 U
L	Heptachlor	0.0470 U

L	Methoxychlor	0.4700 U
L	Naphthalene	6.0000 J
L	Nickel	2.2000 J
L	Silver	0.8000 U
L	Toxaphene	4.7000 U
L	alpha-BHC	0.0470 U
L	alpha-Chlordane	0.0470 U
L	beta-BHC	0.0470 U
L	delta-BHC	0.0470 U
L	gamma-BHC (Lindane)	0.0110 J
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	2-Methylnaphthalene	14.0000 J
H	Aldrin	0.0510 J
H	Antimony	2.9000 U
H	Aroclor-1016	0.9300 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9300 U
H	Aroclor-1242	0.9300 U
H	Aroclor-1248	0.9300 U
H	Aroclor-1254	0.9300 U
H	Aroclor-1260	0.9300 U
H	Arsenic	264.0000
H	Benzo(a)pyrene	10.0000 UJ
H	Copper	56.0000
H	Dalapon	6.0000 U
H	Endosulfan I	0.0940 J
H	Heptachlor epoxide	0.1000 J
H	Hexachlorobenzene	10.0000 UJ
H	Lead	6.1000
H	MCPA	3100.0000 J
H	MCPP	1900.0000 J
H	Manganese	53.7000
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	59.6000 UJ
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ
H	gamma-Chlordane	0.6700

09G00501 low: 19/26 hi: 21/26

L	2,4-D	0.1100 J
L	2,4-DB	0.8300 J
L	4,4'-DDD	0.0290 J
L	4,4'-DDE	0.0081 J
L	4,4'-DDT	0.0940 U
L	Aldrin	0.0470 U
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0940 U
L	Endosulfan I	0.0470 U
L	Endosulfan II	0.0940 U
L	Endosulfan sulfate	0.0940 U
L	Endrin	0.0220 J
L	Endrin aldehyde	0.0940 U
L	Endrin ketone	0.0940 U
L	Heptachlor	0.0470 U
L	Heptachlor epoxide	0.0470 U
L	Methoxychlor	0.4700 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.7000 U
L	alpha-BHC	0.0470 U
L	beta-BHC	0.0470 U
L	delta-BHC	0.0210 J
L	gamma-BHC (Lindane)	0.0076 J
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U

H	Antimony	2.9000 U
H	Aroclor-1016	0.9400 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9400 U
H	Aroclor-1242	0.9400 U
H	Aroclor-1248	0.9400 U
H	Aroclor-1254	0.9400 U
H	Aroclor-1260	0.9400 U
H	Arsenic	61.3000
H	Benzo(a)pyrene	10.0000 U
H	Copper	3.8000 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	MCPA	2900.0000 J
H	MCPP	830.0000 J
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	alpha-Chlordane	0.1100 J
H	bis(2-Ethylhexyl)phthalate	10.0000 U
H	gamma-Chlordane	0.1700

09G00601 low: 7/14 hi: 33/36

L	2,4-D	0.9000 J
L	4,4'-DDT	0.0067 J
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0120 J
L	Endosulfan II	0.0093 J
L	Endrin	0.0190 J
L	MCPA	53.0000 UJ
L	MCPP	63.0000 UJ
L	Methoxychlor	0.0078 J
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	gamma-Chlordane	0.0300 J
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	2,4-DB	5.0000 UJ
H	Aldrin	0.0510 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	1.0000 UJ
H	Aroclor-1221	2.0000 UJ
H	Aroclor-1232	1.0000 UJ
H	Aroclor-1242	1.0000 UJ
H	Aroclor-1248	1.0000 UJ
H	Aroclor-1254	1.0000 UJ
H	Aroclor-1260	1.0000 UJ
H	Arsenic	53.0000
H	Benzo(a)pyrene	10.0000 U
H	Copper	2.6000 U
H	Dalapon	6.0000 UJ
H	Dinoseb	1.5000 UJ
H	Endosulfan I	0.0510 UJ
H	Heptachlor	0.0510 UJ
H	Heptachlor epoxide	0.0510 UJ
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	Manganese	32.9000
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Total Suspended Solids	20.0000
H	Toxaphene	5.1000 UJ
H	Zinc	24.0000 UJ
H	alpha-BHC	0.0510 UJ
H	alpha-Chlordane	0.0510 UJ
H	beta-BHC	0.0510 UJ

H	bis(2-Ethylhexyl)phthalate	10.0000 U
H	delta-BHC	0.0510 UJ
H	gamma-BHC (Lindane)	0.0510 UJ

09G00701 low: 25/29 hi: 23/25

L	2,4-D	0.0047 J
L	2,4-DB	0.1800 J
L	4,4'-DDD	0.0970 U
L	4,4'-DDE	0.0970 U
L	4,4'-DDT	0.0970 U
L	Aldrin	0.0480 U
L	Beryllium	0.1100 U
L	Cadmium	0.3000 U
L	Cobalt	1.1000 J
L	Dieldrin	0.0970 U
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0970 U
L	Endosulfan sulfate	0.0970 U
L	Endrin	0.0970 U
L	Endrin aldehyde	0.0970 U
L	Endrin ketone	0.0970 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPA	150.0000 U
L	Methoxychlor	0.4800 U
L	Nickel	5.4000 J
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	0.9700 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9700 U
H	Aroclor-1242	0.9700 U
H	Aroclor-1248	0.9700 U
H	Aroclor-1254	0.9700 U
H	Aroclor-1260	0.9700 U
H	Arsenic	5.9000 U
H	Benzo(a)pyrene	10.0000 UJ
H	Copper	3.5000 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	MCPP	1100.0000 J
H	Manganese	48.9000
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	20.0000 UJ
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ

09G00801 low: 4/6 hi: 46/47

L	2,4-D	0.2100 J
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Copper	0.7600 J
L	Nickel	1.3000 U
L	Silver	0.8000 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	2,4,5-Trichlorophenol	26.0000 U

H	2,4-DB	5.0000 U
H	2,4-Dinitrophenol	26.0000 UJ
H	2-Nitroaniline	26.0000 UJ
H	3-Nitroaniline	26.0000 UJ
H	4,6-Dinitro-2-methylphenol	26.0000 UJ
H	4-Nitroaniline	26.0000 UJ
H	4-Nitrophenol	26.0000 U
H	Aldrin	0.0520 U
H	Antimony	2.9000 U
H	Aroclor-1016	1.0000 U
H	Aroclor-1221	2.1000 U
H	Aroclor-1232	1.0000 U
H	Aroclor-1242	1.0000 U
H	Aroclor-1248	1.0000 U
H	Aroclor-1254	1.0000 U
H	Aroclor-1260	1.0000 U
H	Arsenic	5.9000 U
H	Benzo(a)pyrene	10.0000 UJ
H	Beryllium	0.2300 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Endosulfan I	0.0520 U
H	Heptachlor	0.0520 U
H	Heptachlor epoxide	0.0520 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	MCPA	400.0000 U
H	MCPP	520.0000 U
H	Manganese	53.6000
H	Mercury	0.1500 U
H	Methoxychlor	0.5200 U
H	Pentachlorophenol	26.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Toxaphene	5.2000 U
H	Zinc	7.2000 U
H	alpha-BHC	0.0520 U
H	alpha-Chlordane	0.0520 U
H	beta-BHC	0.0520 U
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ
H	delta-BHC	0.0520 U
H	gamma-BHC (Lindane)	0.0520 U
H	gamma-Chlordane	0.0520 U

09G00901 low: 25/28 hi: 24/26

L	2,4-D	0.2400 J
L	4,4'-DDD	0.0950 U
L	4,4'-DDE	0.0950 U
L	4,4'-DDT	0.0950 U
L	Aldrin	0.0480 U
L	Cadmium	0.3000 U
L	Cobalt	1.0000 J
L	Dieldrin	0.0950 U
L	Dinoseb	0.0990 J
L	Endosulfan I	0.0480 U
L	Endosulfan II	0.0950 U
L	Endosulfan sulfate	0.0950 U
L	Endrin	0.0950 U
L	Endrin aldehyde	0.0950 U
L	Endrin ketone	0.0950 U
L	Heptachlor	0.0480 U
L	Heptachlor epoxide	0.0480 U
L	MCPP	60.0000 U
L	Methoxychlor	0.4800 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.8000 U
L	alpha-BHC	0.0480 U
L	alpha-Chlordane	0.0480 U
L	beta-BHC	0.0480 U
L	delta-BHC	0.0480 U
L	gamma-BHC (Lindane)	0.0480 U
L	gamma-Chlordane	0.0480 U

H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 UJ
H	2,4-DB	5.0000 U
H	Antimony	3.5000 J
H	Aroclor-1016	0.9500 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9500 U
H	Aroclor-1242	0.9500 U
H	Aroclor-1248	0.9500 U
H	Aroclor-1254	0.9500 U
H	Aroclor-1260	0.9500 U
H	Arsenic	5.9000 U
H	Benzo(a)pyrene	10.0000 U
H	Beryllium	0.2100 U
H	Copper	2.6000 J
H	Dalapon	6.0000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	MCPA	380.0000 U
H	Mercury	0.1300 U
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	14.6000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U

09G01001 low: 29/30 hi: 23/23

L	2,4-D	1.5000 U
L	2,4-DB	0.1400 J
L	4,4'-DDD	0.0930 U
L	4,4'-DDE	0.0930 U
L	4,4'-DDT	0.0930 U
L	Aldrin	0.0470 U
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0930 U
L	Endosulfan I	0.0470 U
L	Endosulfan II	0.0930 U
L	Endosulfan sulfate	0.0930 U
L	Endrin	0.0930 U
L	Endrin aldehyde	0.0930 U
L	Endrin ketone	0.0930 U
L	Heptachlor	0.0470 U
L	Heptachlor epoxide	0.0470 U
L	MCPA	60.0000 U
L	MCPP	60.0000 U
L	Methoxychlor	0.4700 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.7000 U
L	alpha-BHC	0.0470 U
L	alpha-Chlordane	0.0470 U
L	beta-BHC	0.0470 U
L	delta-BHC	0.0470 U
L	gamma-BHC (Lindane)	0.0470 U
L	gamma-Chlordane	0.0470 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	2.9000 U
H	Aroclor-1016	0.9300 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9300 U
H	Aroclor-1242	0.9300 U
H	Aroclor-1248	0.9300 U
H	Aroclor-1254	0.9300 U
H	Aroclor-1260	0.9300 U
H	Arsenic	5.9000 U
H	Benzo(a)pyrene	10.0000 U
H	Copper	4.0000 U

H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	15.7000 UJ
H	bis(2-Ethylhexyl)phthalate	10.0000 U

09G01101 low: 21/29 hi: 22/25

L	2,4-D	1.4000 J
L	2,4-DB	1.0000 J
L	4,4'-DDD	0.0940 U
L	4,4'-DDE	0.0051 J
L	4,4'-DDT	0.0092 J
L	Aldrin	0.0470 U
L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0940 U
L	Endosulfan I	0.0470 U
L	Endosulfan II	0.0940 U
L	Endosulfan sulfate	0.0940 U
L	Endrin	0.0940 U
L	Endrin aldehyde	0.0780 J
L	Endrin ketone	0.0940 U
L	Heptachlor	0.0470 U
L	Heptachlor epoxide	0.0440 J
L	MCPA	190.0000 U
L	Methoxychlor	0.4700 U
L	Nickel	1.3000 U
L	Silver	0.8000 U
L	Toxaphene	4.7000 U
L	alpha-BHC	0.0042 J
L	alpha-Chlordane	0.0470 U
L	beta-BHC	0.0470 U
L	delta-BHC	0.0470 U
L	gamma-BHC (Lindane)	0.0340 J
L	gamma-Chlordane	0.0470 U
H	1,2-Dichlorobenzene	10.0000 UJ
H	1,3-Dichlorobenzene	10.0000 UJ
H	1,4-Dichlorobenzene	10.0000 UJ
H	Antimony	2.9000 U
H	Aroclor-1016	0.9400 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9400 U
H	Aroclor-1242	0.9400 U
H	Aroclor-1248	0.9400 U
H	Aroclor-1254	0.9400 U
H	Aroclor-1260	0.9400 U
H	Arsenic	93.9000
H	Benzo(a)pyrene	10.0000 UJ
H	Copper	4.2000 U
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 UJ
H	Lead	1.9000 U
H	MCPP	1200.0000 J
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Total Suspended Solids	28.0000
H	Zinc	10.2000 UJ
H	bis(2-Ethylhexyl)phthalate	10.0000 UJ

09G01201 low: 19/25 hi: 23/34

L	2,4,6-Trichlorophenol	2.0000 J
L	4,4'-DDD	0.0930 U
L	4,4'-DDE	0.0930 U
L	4,4'-DDT	0.0930 U
L	Aldrin	0.0470 U

L	Beryllium	0.1000 U
L	Cadmium	0.3000 U
L	Cobalt	0.7000 U
L	Dieldrin	0.0930 U
L	Endosulfan I	0.0460 J
L	Endosulfan II	0.0930 U
L	Endosulfan sulfate	0.0930 U
L	Endrin	0.0930 U
L	Endrin aldehyde	0.0930 U
L	Endrin ketone	0.0930 U
L	Heptachlor	0.0470 U
L	Heptachlor epoxide	0.0470 U
L	Methoxychlor	0.4700 U
L	Naphthalene	8.0000 J
L	Nickel	3.4000 J
L	Silver	0.8000 U
L	Toxaphene	4.7000 U
L	alpha-Chlordane	0.0280 J
L	beta-BHC	0.0470 U
L	gamma-Chlordane	0.0130 J
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	2,4,5-T	5.0000 U
H	2,4-D	110.0000 J
H	2,4-DB	50.0000 U
H	2,4-Dichlorophenol	200.0000
H	Antimony	2.9000 U
H	Aroclor-1016	0.9300 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9300 U
H	Aroclor-1242	0.9300 U
H	Aroclor-1248	0.9300 U
H	Aroclor-1254	0.9300 U
H	Aroclor-1260	0.9300 U
H	Arsenic	138.0000
H	Benzo(a)pyrene	10.0000 U
H	Copper	6.1000 J
H	Dalapon	60.0000 U
H	Dicamba	5.0000 U
H	Dinoseb	15.0000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 J
H	MCPA	750.0000 J
H	MCPP	1500.0000 J
H	Manganese	24.9000
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Zinc	54.9000 UJ
H	alpha-BHC	1.0000 J
H	bis(2-Ethylhexyl)phthalate	10.0000 U
H	delta-BHC	0.3000
H	gamma-BHC (Lindane)	0.6900

09G01301 low: 5/10 hi: 44/45

L	2,4-D	0.0012 J
L	2,4-DB	0.3800 J
L	Beryllium	0.1300 U
L	Cadmium	0.3000 U
L	Cobalt	0.8800 J
L	MCPA	60.0000 U
L	MCPP	60.0000 U
L	Naphthalene	2.0000 J
L	Nickel	3.5000 J
L	Silver	0.8000 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	4,4'-DDD	0.1100 U
H	4,4'-DDE	0.1100 U

H	4,4'-DDT	0.1100 U
H	Aldrin	0.0540 U
H	Antimony	2.9000 U
H	Aroclor-1016	1.1000 U
H	Aroclor-1221	2.2000 U
H	Aroclor-1232	1.1000 U
H	Aroclor-1242	1.1000 U
H	Aroclor-1248	1.1000 U
H	Aroclor-1254	1.1000 U
H	Aroclor-1260	1.1000 U
H	Arsenic	5.9000 U
H	Benzo(a)pyrene	10.0000 U
H	Copper	2.6000 U
H	Dalapon	6.0000 U
H	Dieldrin	0.1100 U
H	Dinoseb	1.5000 U
H	Endosulfan I	0.0540 U
H	Endosulfan II	0.1100 U
H	Endosulfan sulfate	0.1100 U
H	Endrin	0.1100 U
H	Endrin aldehyde	0.1100 U
H	Endrin ketone	0.1100 U
H	Heptachlor	0.0540 U
H	Heptachlor epoxide	0.0540 U
H	Hexachlorobenzene	10.0000 U
H	Lead	1.9000 U
H	Manganese	82.9000
H	Methoxychlor	0.5400 U
H	Pentachlorophenol	25.0000 UJ
H	Selenium	4.4000 U
H	Thallium	5.0000 U
H	Toxaphene	5.4000 U
H	Zinc	12.6000 UJ
H	alpha-BHC	0.0540 U
H	alpha-Chlordane	0.0540 U
H	beta-BHC	0.0540 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U
H	delta-BHC	0.0540 U
H	gamma-BHC (Lindane)	0.0540 U
H	gamma-Chlordane	0.0540 U

09G01401 low: 4/8 hi: 23/31

L	2,4-D	0.2600 J
L	2,4-DB	0.2100 J
L	2-Methylnaphthalene	1.0000 J
L	Beryllium	0.1000 U
L	Cadmium	0.5000 U
L	Cobalt	1.7000 J
L	MCPP	120.0000 U
L	Silver	0.7000 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	2.0000 U
H	Aroclor-1016	1.0000 U
H	Aroclor-1221	2.0000 U
H	Aroclor-1232	1.0000 U
H	Aroclor-1242	1.0000 U
H	Aroclor-1248	1.0000 U
H	Aroclor-1254	1.0000 U
H	Aroclor-1260	1.0000 U
H	Barium	47.2000 J
H	Benzo(a)pyrene	10.0000 U
H	Calcium	105000.0000
H	Copper	4.5000 J
H	Dalapon	6.0000 U
H	Dinoseb	1.5000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	2.2000 U
H	MCPA	890.0000 J
H	Magnesium	9780.0000
H	Manganese	159.0000

H Mercury	0.1400	U
H Naphthalene	160.0000	D
H Nickel	9.9000	J
H Pentachlorophenol	25.0000	U
H Selenium	4.0000	U
H Sodium	78300.0000	U
H Thallium	3.7000	U
H Zinc	16.8000	U
H bis(2-Ethylhexyl)phthalate	10.0000	U

09G01401D low: 26/27 hi: 24/31

L 2,4-D	1.5000	U
L 4,4'-DDD	0.0940	U
L 4,4'-DDE	0.0940	U
L 4,4'-DDT	0.0940	U
L Aldrin	0.0470	U
L Beryllium	0.1000	U
L Cadmium	0.5000	U
L Cobalt	2.1000	J
L Dieldrin	0.0940	U
L Endosulfan I	0.0470	U
L Endosulfan II	0.0940	U
L Endosulfan sulfate	0.0940	U
L Endrin	0.0940	U
L Endrin aldehyde	0.0940	U
L Endrin ketone	0.0940	U
L Heptachlor	0.0470	U
L Heptachlor epoxide	0.0470	U
L MCPP	170.0000	U
L Methoxychlor	0.4700	U
L Silver	0.7000	U
L Toxaphene	4.7000	U
L alpha-BHC	0.0470	U
L alpha-Chlordane	0.0470	U
L beta-BHC	0.0470	U
L delta-BHC	0.0470	U
L gamma-BHC (Lindane)	0.0470	U
L gamma-Chlordane	0.0470	U
H 1,2-Dichlorobenzene	10.0000	U
H 1,3-Dichlorobenzene	10.0000	U
H 1,4-Dichlorobenzene	10.0000	U
H 2,4-DB	5.0000	U
H Antimony	3.3000	U
H Aroclor-1016	0.9400	U
H Aroclor-1221	1.9000	U
H Aroclor-1232	0.9400	U
H Aroclor-1242	0.9400	U
H Aroclor-1248	0.9400	U
H Aroclor-1254	0.9400	U
H Aroclor-1260	0.9400	U
H Barium	38.0000	J
H Benzo(a)pyrene	10.0000	U
H Calcium	80800.0000	
H Copper	5.6000	J
H Dalapon	6.0000	U
H Dinoseb	1.5000	U
H Hexachlorobenzene	10.0000	U
H Lead	2.2000	U
H MCPA	840.0000	J
H Magnesium	7410.0000	
H Manganese	145.0000	
H Mercury	0.1400	U
H Nickel	9.4000	J
H Pentachlorophenol	25.0000	U
H Selenium	4.0000	U
H Sodium	58700.0000	U
H Thallium	3.7000	U
H Zinc	16.9000	U
H bis(2-Ethylhexyl)phthalate	11.0000	U

09G01501 low: 24/30 hi: 23/27

L 2,4-D	0.0680	J

L 2,4-DB	0.1800 J
L 4,4'-DDD	0.0930 U
L 4,4'-DDE	0.0930 U
L 4,4'-DDT	0.0930 U
L Aldrin	0.0470 U
L Beryllium	0.1400 U
L Cadmium	0.5000 U
L Cobalt	0.8000 J
L Dieldrin	0.0930 U
L Endosulfan I	0.0470 U
L Endosulfan II	0.0075 J
L Endosulfan sulfate	0.0930 U
L Endrin	0.0930 U
L Endrin aldehyde	0.0930 U
L Endrin ketone	0.0930 U
L Heptachlor	0.0470 U
L Heptachlor epoxide	0.0470 U
L MCPP	60.0000 U
L Methoxychlor	0.4700 U
L Naphthalene	5.0000 J
L Nickel	7.5000 J
L Silver	0.7000 U
L Toxaphene	4.7000 U
L alpha-BHC	0.0470 U
L alpha-Chlordane	0.0470 U
L beta-BHC	0.0470 U
L delta-BHC	0.0470 U
L gamma-BHC (Lindane)	0.0470 U
L gamma-Chlordane	0.0470 U
H 1,2-Dichlorobenzene	10.0000 U
H 1,3-Dichlorobenzene	10.0000 U
H 1,4-Dichlorobenzene	10.0000 U
H Antimony	2.8000 U
H Aroclor-1016	0.9300 U
H Aroclor-1221	1.9000 U
H Aroclor-1232	0.9300 U
H Aroclor-1242	0.9300 U
H Aroclor-1248	0.9300 U
H Aroclor-1254	0.9300 U
H Aroclor-1260	0.9300 U
H Benzo(a)pyrene	10.0000 U
H Chromium	6.3000 U
H Copper	7.2000 J
H Dalapon	6.0000 U
H Dinoseb	1.5000 U
H Hexachlorobenzene	10.0000 U
H Lead	2.8000 J
H MCPA	420.0000 U
H Manganese	55.7000
H Mercury	0.1800 U
H Pentachlorophenol	25.0000 U
H Selenium	4.0000 U
H Thallium	3.7000 U
H Total Suspended Solids	58.0000
H Zinc	30.8000 U
H bis(2-Ethylhexyl)phthalate	10.0000 U

09G01601 low: 25/30 hi: 21/24

L 2,4-D	1.5000 U
L 2,4-DB	0.3100 J
L 4,4'-DDD	0.0930 U
L 4,4'-DDE	0.0930 U
L 4,4'-DDT	0.0930 U
L Aldrin	0.0470 U
L Beryllium	0.1000 U
L Cadmium	0.5000 U
L Cobalt	0.5500 J
L Dieldrin	0.0930 U
L Dinoseb	0.1200 J
L Endosulfan I	0.0470 U
L Endosulfan II	0.0930 U
L Endosulfan sulfate	0.0930 U

L	Endrin	0.0930 U
L	Endrin aldehyde	0.0930 U
L	Endrin ketone	0.0930 U
L	Heptachlor	0.0470 U
L	Heptachlor epoxide	0.0470 U
L	MCPP	0.3600 J
L	Methoxychlor	0.4700 U
L	Nickel	5.1000 J
L	Silver	0.7000 U
L	Toxaphene	4.7000 U
L	alpha-BHC	0.0470 U
L	alpha-Chlordane	0.0470 U
L	beta-BHC	0.0470 U
L	delta-BHC	0.0470 U
L	gamma-BHC (Lindane)	0.0470 U
L	gamma-Chlordane	0.0470 U
H	1,2-Dichlorobenzene	10.0000 U
H	1,3-Dichlorobenzene	10.0000 U
H	1,4-Dichlorobenzene	10.0000 U
H	Antimony	2.0000 U
H	Aroclor-1016	0.9300 U
H	Aroclor-1221	1.9000 U
H	Aroclor-1232	0.9300 U
H	Aroclor-1242	0.9300 U
H	Aroclor-1248	0.9300 U
H	Aroclor-1254	0.9300 U
H	Aroclor-1260	0.9300 U
H	Benzo(a)pyrene	10.0000 U
H	Copper	5.1000 J
H	Dalapon	6.0000 U
H	Hexachlorobenzene	10.0000 U
H	Lead	2.2000 U
H	MCPA	920.0000 J
H	Manganese	70.8000
H	Mercury	0.1500 U
H	Pentachlorophenol	25.0000 U
H	Selenium	4.0000 U
H	Thallium	3.7000 U
H	Zinc	16.8000 U
H	bis(2-Ethylhexyl)phthalate	10.0000 U

09G01701 low: 4/8 hi: 7/8

L	2,4-D	0.3200 J
L	2,4-DB	0.5500 J
L	Cadmium	0.3000 U
L	Cobalt	0.8000 U
L	Dalapon	0.6900 J
L	MCPP	60.0000 U
L	Nickel	1.4000 J
L	Silver	0.7000 U
H	Antimony	2.5000 U
H	Beryllium	0.3000 U
H	Copper	2.7000 U
H	Dinoseb	1.5000 U
H	Lead	1.6000 U
H	MCPA	680.0000 J
H	Selenium	3.6000 U
H	Thallium	4.2000 U

09G01801 low: 7/8 hi: 8/10

L	2,4-D	1.5000 U
L	Cadmium	0.3000 U
L	Cobalt	0.8000 U
L	Copper	0.7000 U
L	Dalapon	0.3000 J
L	MCPP	60.0000 U
L	Nickel	1.2000 U
L	Silver	0.7000 U
H	2,4-DB	5.0000 U
H	Antimony	2.5000 U

H Beryllium	0.3500 U
H Dinoseb	1.5000 U
H Iron	4680.0000
H Lead	1.6000 U
H MCPA	630.0000 J
H Manganese	85.8000 U
H Selenium	3.6000 U
H Thallium	4.2000 U

09G01801D low: 7/7 hi: 9/11

L 2,4-D	1.5000 U
L Cadmium	0.3000 U
L Cobalt	0.8000 U
L Copper	0.7000 U
L MCPP	60.0000 U
L Nickel	1.2000 U
L Silver	0.7000 U
H 2,4-DB	5.0000 U
H Antimony	2.5000 U
H Beryllium	0.3200 U
H Dalapon	6.0000 U
H Dinoseb	1.5000 U
H Iron	5490.0000
H Lead	1.6000 U
H MCPA	460.0000 J
H Manganese	104.0000 U
H Selenium	3.6000 U
H Thallium	4.2000 U

Outside values - parameters counts

parameter	low values BDL/total	high values: BDL/total
1,2,4-Trichlorobenzene	0/0	1/1
1,2-Dichlorobenzene	0/0	35/35
1,3-Dichlorobenzene	0/0	35/35
1,4-Dichlorobenzene	0/0	35/35
2,2'-oxybis(1-Chloropropane)	0/0	1/1
2,4,5-T	0/0	1/1
2,4,5-Trichlorophenol	0/0	2/2
2,4,6-Trichlorophenol	0/1	1/1
2,4-D	13/37	0/1
2,4-DB	1/26	12/12
2,4-Dichlorophenol	0/1	1/2
2,4-Dimethylphenol	0/1	1/1
2,4-Dinitrophenol	0/0	2/2
2,4-Dinitrotoluene	0/0	1/1
2,6-Dinitrotoluene	0/0	1/1
2-Chloronaphthalene	0/0	1/1
2-Chlorophenol	0/0	1/1
2-Methylnaphthalene	0/1	1/2
2-Methylphenol	0/1	1/1
2-Nitroaniline	0/0	2/2
2-Nitrophenol	0/0	1/1
3,3'-Dichlorobenzidine	0/0	1/1
3-Nitroaniline	0/0	2/2
4,4'-DDD	24/26	1/1
4,4'-DDE	24/26	1/1
4,4'-DDT	24/28	1/1
4,6-Dinitro-2-methylphenol	0/0	2/2
4-Bromophenyl-phenylether	0/0	1/1
4-Chloro-3-methylphenol	0/0	1/1
4-Chloroaniline	0/0	1/1
4-Chlorophenyl-phenylether	0/0	1/1
4-Methylphenol	0/1	1/1
4-Nitroaniline	0/0	2/2
4-Nitrophenol	0/0	2/2
Acenaphthene	0/0	1/1
Acenaphthylene	0/0	1/1
Aldrin	24/24	6/7
Anthracene	0/0	1/1
Antimony	0/0	44/49

Aroclor-1016	0/0	35/35
Aroclor-1221	0/0	35/35
Aroclor-1232	0/0	35/35
Aroclor-1242	0/0	35/35
Aroclor-1248	0/0	35/35
Aroclor-1254	0/0	35/35
Aroclor-1260	0/0	35/35
Arsenic	0/0	11/37
Barium	0/0	0/5
Benzo(a)anthracene	0/0	1/1
Benzo(a)pyrene	0/0	35/35
Benzo(b)fluoranthene	0/0	1/1
Benzo(g,h,i)perylene	0/0	1/1
Benzo(k)fluoranthene	0/0	1/1
Beryllium	33/33	15/15
Butylbenzylphthalate	0/0	1/1
Cadmium	49/49	0/0
Calcium	0/0	1/8
Carbazole	0/0	1/1
Chromium	0/0	1/1
Chrysene	0/0	1/1
Cobalt	33/49	0/0
Copper	4/10	16/34
Dalapon	0/3	35/35
Di-n-butylphthalate	0/0	1/1
Dibenz(a,h)anthracene	0/0	1/1
Dibenzofuran	0/0	1/1
Dicamba	0/0	2/2
Dieldrin	25/27	1/1
Diethylphthalate	0/0	1/1
Dimethylphthalate	0/0	1/1
Dinoseb	0/5	33/33
Endosulfan I	23/24	6/7
Endosulfan II	25/27	1/1
Endosulfan sulfate	25/26	1/1
Endrin	24/27	1/1
Endrin aldehyde	24/26	1/1
Endrin ketone	26/26	1/1
Fluoranthene	0/0	1/1
Fluorene	0/0	1/1
Heptachlor	25/25	6/6
Heptachlor epoxide	23/24	6/7
Hexachlorobenzene	0/0	35/35
Hexachlorobutadiene	0/0	1/1
Hexachlorocyclopentadiene	0/0	1/1
Hexachloroethane	0/0	1/1
Indeno(1,2,3-cd)pyrene	0/0	1/1
Iron	0/0	0/4
Isophorone	0/0	1/1
Lead	0/0	41/49
MCPA	18/18	5/20
MCPP	17/19	9/19
Magnesium	0/0	2/4
Manganese	0/0	2/28
Mercury	0/0	21/21
Methoxychlor	26/27	4/4
N-Nitroso-di-n-propylamine	0/0	1/1
N-Nitrosodiphenylamine (1)	0/0	1/1
Naphthalene	0/5	1/3
Nickel	22/45	0/4
Nitrobenzene	0/0	1/1
Pentachlorophenol	0/0	35/35
Phenanthrene	0/0	1/1
Phenol	0/1	1/1
Potassium	0/0	0/12
Pyrene	0/0	1/1
Selenium	0/0	49/49
Silver	47/49	0/0
Sodium	0/0	2/2
Thallium	0/0	49/49
Total Suspended Solids	0/0	0/5
Toxaphene	25/25	6/6
Zinc	0/0	41/41

alpha-BHC	23/24	6/7
alpha-Chlordane	23/24	6/7
beta-BHC	25/25	6/6
bis(2-Chloroethoxy)methane	0/0	1/1
bis(2-Chloroethyl)ether	0/0	1/1
bis(2-Ethylhexyl)phthalate	0/0	35/35
delta-BHC	22/25	6/7
gamma-BHC (Lindane)	21/24	6/7
gamma-Chlordane	22/24	5/7

C.4.5 OU 3 soil statistics

Soil descriptive statistics

Chem.name is chemical name
Min.dl is minimum reported detection level
Max.dl is maximum reported detection level
Min.lv is minimum level reported
Max.lv is maximum level reported
ADL.Avg is above detection level average value
Median is median of all values above and below detection level
Num.Det/Tot.Sample is number of detects / total number sampled

Chem.name	Min.dl	Max.dl	Min.lv	Max.lv	ADL.Avg	Median		Num.Det/Tot.Sample
1,2,4-Trichlorobenzene	10.000	1500.000	N/A	N/A	N/A	400.000	UJ	0/87
1,2-Dichlorobenzene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
1,3-Dichlorobenzene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
1,4-Dichlorobenzene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2,2'-oxybis(1-Chloropropa	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2,4 5-TP (Silvex)	2.100	13.000	0.200	16.000	3.242	2.400	U	12/87
2,4,5-T	2.600	16.000	1.900	20.000	5.510	3.000	U	10/87
2,4,5-Trichlorophenol	25.000	3800.000	N/A	N/A	N/A	1000.000	U	0/87
2,4,6-Trichlorophenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2,4-D	1.800	33.000	0.076	53.000	12.863	7.000	J	53/87
2,4-DB	26.000	160.000	1.900	310.000	39.102	29.000	U	48/87
2,4-Dichlorophenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2,4-Dimethylphenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2,4-Dinitrophenol	25.000	3800.000	N/A	N/A	N/A	1000.000	UJ	0/87
2,4-Dinitrotoluene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2,6-Dinitrotoluene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2-Chloronaphthalene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2-Chlorophenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2-Methylnaphthalene	10.000	1500.000	77.000	77.000	77.000	400.000	U	1/87
2-Methylphenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
2-Nitroaniline	25.000	3800.000	N/A	N/A	N/A	1000.000	U	0/87
2-Nitrophenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
3,3'-Dichlorobenzidine	10.000	1500.000	N/A	N/A	N/A	400.000	UJ	0/87
3-Nitroaniline	25.000	3800.000	N/A	N/A	N/A	1000.000	UJ	0/87
4,4'-DDD	3.400	20.000	0.880	20000.000	1095.121	4.200	U	42/96
4,4'-DDE	3.400	22.000	0.220	1600.000	97.788	9.350		72/96
4,4'-DDT	3.300	4.400	0.220	12000.000	267.436	5.800	J	82/96
4,6-Dinitro-2-methylpheno	25.000	3800.000	N/A	N/A	N/A	1000.000	UJ	0/87
4-Bromophenyl-phenylether	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
4-Chloro-3-methylphenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
4-Chloroaniline	10.000	1500.000	N/A	N/A	N/A	400.000	UJ	0/87
4-Chlorophenyl-phenylethe	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
4-Methylphenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
4-Nitroaniline	25.000	3800.000	N/A	N/A	N/A	1000.000	U	0/87
4-Nitrophenol	25.000	3800.000	N/A	N/A	N/A	1000.000	UJ	0/87
Acenaphthene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Acenaphthylene	10.000	1500.000	63.000	140.000	90.000	390.000	U	3/87
Aldrin	1.700	230.000	0.270	49.000	7.371	2.000	U	7/96
Aluminum	31.400	879.000	33.100	14300.000	1465.571	770.000		93/95
Anthracene	10.000	1500.000	540.000	540.000	540.000	400.000	U	1/87
Antimony	0.500	2.700	0.790	16.300	4.668	0.690	U	13/95
Aroclor-1016	33.000	4400.000	N/A	N/A	N/A	40.000	U	0/96
Aroclor-1221	67.000	9000.000	N/A	N/A	N/A	82.000	U	0/96
Aroclor-1232	33.000	4400.000	N/A	N/A	N/A	40.000	U	0/96
Aroclor-1242	33.000	4400.000	N/A	N/A	N/A	40.000	U	0/96
Aroclor-1248	33.000	4400.000	N/A	N/A	N/A	40.000	U	0/96
Aroclor-1254	33.000	4400.000	N/A	N/A	N/A	40.000	U	0/96
Aroclor-1260	33.000	4400.000	66.000	420.000	268.667	40.000	U	3/96
Arsenic	0.650	1.600	1.400	90.000	14.138	3.200		55/95
Barium	0.900	8.600	1.200	135.000	18.617	8.600	J	82/95
Benzo(a)anthracene	10.000	1500.000	31.000	1300.000	199.000	370.000	U	19/87
Benzo(a)pyrene	10.000	1500.000	36.000	1100.000	216.938	380.000	U	16/87
Benzo(b)fluoranthene	10.000	1500.000	43.000	3700.000	338.333	370.000	U	24/87
Benzo(g,h,i)perylene	10.000	1500.000	40.000	300.000	135.667	380.000	U	12/87
Benzo(k)fluoranthene	10.000	1500.000	17.000	3700.000	328.524	370.000	U	21/87
Beryllium	0.020	0.470	0.140	2.000	0.648	0.100	U	9/95
Butylbenzylphthalate	10.000	1500.000	440.000	440.000	440.000	400.000	U	1/87
Cadmium	0.060	0.280	0.070	7.100	1.682	0.090	U	34/95
Calcium	103.000	19000.000	7230.000	334000.000	58948.205	6860.000	U	39/95

Carbazole	10.000	1500.000	260.000	260.000	260.000	400.000	UJ	1/87
Chromium	0.320	2.300	0.360	208.000	15.557	5.400		82/95
Chrysene	10.000	1500.000	41.000	1900.000	243.150	380.000	UJ	20/87
Cobalt	0.140	0.650	0.170	2.600	0.591	0.180	U	17/95
Copper	0.660	5.600	1.000	77.500	15.415	7.100		67/95
Dalapon	3.300	160.000	8.400	62.000	40.133	30.000	U	3/87
Di-n-butylphthalate	10.000	1500.000	47.000	210.000	91.750	400.000	UJ	4/87
Di-n-octylphthalate	340.000	1500.000	1.000	1.000	1.000	400.000	U	1/87
Dibenz(a,h)anthracene	10.000	1500.000	49.000	280.000	98.833	390.000	U	6/87
Dibenzofuran	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Dicamba	2.600	16.000	85.000	85.000	85.000	3.200	UJ	1/87
Dichloroprop	3.200	56.000	4.000	140.000	44.824	10.000	U	17/87
Dieldrin	3.400	440.000	0.150	91.000	7.376	3.950	U	45/96
Diethylphthalate	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Dimethylphthalate	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Dinoseb	2.800	33.000	3.200	320.000	47.613	6.100	U	16/87
Endosulfan I	1.700	230.000	0.410	1.200	0.684	2.050	U	5/96
Endosulfan II	3.300	440.000	0.098	7.000	2.278	4.000	U	12/96
Endosulfan sulfate	3.300	440.000	0.280	25.000	4.032	3.800	U	16/96
Endrin	3.300	440.000	0.081	130.000	10.084	3.950	UJ	25/96
Endrin aldehyde	3.300	440.000	0.110	7.100	1.127	3.700	U	33/96
Endrin ketone	3.300	440.000	0.200	3.700	1.753	3.900	U	10/96
Fluoranthene	10.000	1500.000	25.000	2600.000	286.500	370.000	U	24/87
Fluorene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Heptachlor	1.700	230.000	0.120	680.000	136.750	2.050	U	5/96
Heptachlor epoxide	1.700	230.000	0.052	130.000	7.175	2.000	U	36/96
Hexachlorobenzene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Hexachlorobutadiene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Hexachlorocyclopentadiene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Hexachloroethane	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Indeno(1,2,3-cd)pyrene	10.000	1500.000	38.000	460.000	164.500	380.000	U	12/87
Iron	19.100	276.000	37.300	6440.000	860.618	372.000		88/95
Iron Oxide	N/A	N/A	33.800	460.000	175.650	154.000	J	12/12
Isophorone	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Lead	1.300	23.600	0.620	902.000	70.682	18.600		93/95
MCPA	220.000	32000.000	6000.000	67000.000	24628.571	4800.000	U	7/87
MCPP	310.000	57000.000	2300.000	99000.000	26472.222	6900.000	U	18/87
Magnesium	10.100	3080.000	N/A	N/A	N/A	176.000	U	0/95
Manganese	0.490	22.600	7.700	414.000	55.702	13.300	U	51/95
Mercury	0.040	0.230	0.050	1.700	0.262	0.090	J	51/95
Methoxychlor	17.000	2300.000	1.400	87.000	20.020	20.500	U	5/96
N-Nitroso-di-n-propylamin	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
N-Nitrosodiphenylamine (1	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Naphthalene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Nickel	0.250	1.500	0.270	9.300	2.710	0.940	J	52/95
Nitrobenzene	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Pentachlorophenol	25.000	3800.000	N/A	N/A	N/A	1000.000	UJ	0/87
Phenanthrene	10.000	1500.000	40.000	130.000	67.500	390.000	U	6/87
Phenol	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
Potassium	10.300	417.000	N/A	N/A	N/A	40.400	U	0/95
Pyrene	10.000	1500.000	36.000	2600.000	266.038	370.000	U	26/87
Selenium	0.730	2.900	1.300	5.500	2.810	1.000	U	10/95
Silver	0.150	0.700	0.180	122.000	10.456	0.400	J	53/95
Sodium	98.700	1390.000	N/A	N/A	N/A	211.000	U	0/95
Thallium	0.850	4.400	N/A	N/A	N/A	1.200	U	0/95
Total Organic Carbon	N/A	N/A	1570.000	151000.000	22139.167	12550.000		12/12
Toxaphene	170.000	23000.000	N/A	N/A	N/A	210.000	U	0/96
Vanadium	0.130	1.500	0.150	18.600	3.304	1.800	J	74/95
Zinc	0.480	97.300	45.400	1040.000	347.326	27.500	U	23/95
alpha-BHC	1.700	230.000	0.280	1.300	0.700	2.000	U	3/96
alpha-Chlordane	1.800	10.000	0.120	5300.000	255.110	5.900		84/96
beta-BHC	1.700	230.000	0.180	12.000	2.738	2.100	U	5/96
bis(2-Chloroethoxy)methan	10.000	1500.000	N/A	N/A	N/A	400.000	U	0/87
bis(2-Chloroethyl)ether	10.000	1500.000	N/A	N/A	N/A	400.000	UJ	0/87
bis(2-Ethylhexyl)phthalat	340.000	1500.000	3.000	1700.000	181.467	370.000	U	30/87
delta-BHC	1.700	230.000	0.100	77.000	6.558	2.000	U	15/96
gamma-BHC (Lindane)	1.700	230.000	0.100	32.000	6.851	2.000	U	8/96
gamma-Chlordane	1.800	20.000	0.086	6000.000	298.138	3.400		72/96

LOCATIONS AND SAMPLE DATES USED:

location	sampdate
08B01001	19980213

08S00900	19971112
08S00900D	19971112
08S01000	19971112
08S01100	19971112
08S01200	19971112
08S01300	19971112
08S01400	19971112
08S01500	19971112
08S01502	19980213
08S01600	19971112
08S01700	19971112
08S01800	19971112
08S01900	19971112
08S02000	19971112
08S02100	19971112
08S02200	19971112
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08S02700	19971114
08S02800	19971117
08S02800D	19971117
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08S02802D	19980213
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08S03800	19971114
08S03800D	19971114
08S03900	19971114
08S04000	19971114
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08S05501	19980210
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08S05702	19980213
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08S06001	19980210
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08S06201	19980210
08S06301	19980210
08S06301D	19980210
09S00500	19971111
09S00500D	19971111
09S00502	19980317
09S00600	19971111
09S00700	19971111
09S00702	19980317
09S00800	19971111

09S00802	19980213
09S00900	19971111
09S01000	19971111
09S01100	19971111
09S01200	19971111
09S01300	19971111
09S01400	19971111
09S01500	19971111
09S01600	19971111
09S01700	19971111
09S01800	19971111
09S01800D	19971111
09S01900	19971111
09S02000	19971111
09S02100	19971111
09S02200	19971111
09S02300	19971114
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09S02500	19971114
09S02600	19971114
09S02700	19971114
09S02800	19971114
09S02901	19980210
09S02901D	19980210
09S03001	19980210
09S03101	19980210
09S03201	19980210
09S03202	19980213
09S03301	19980210
09S03302	19980213
09S03401	19980210
09S03501	19980210
09S03601	19980210

NTC ORLANDO background soil descriptive statistics

Chem.name is chemical name
Min.dl is minimum reported detection level
Max.dl is maximum reported detection level
Min.lv is minimum level reported
Max.lv is maximum level reported
ADL.Avg is above detection level average value
Median is median of all values above and below detection level
Num.Det/Tot.Sample is number of detects / total number sampled

Chem.name	Min.dl	Max.dl	Min.lv	Max.lv	ADL.Avg	Median		Num.Det/Tot.Sample
1,1,1-Trichloroethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
1,1,2,2-Tetrachloroethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
1,1,2-Trichloroethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
1,1-Dichloroethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
1,1-Dichloroethene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
1,2,4-Trichlorobenzene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
1,2-Dichlorobenzene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
1,2-Dichloroethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
1,2-Dichloroethene (total	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
1,2-Dichloropropane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
1,3-Dichlorobenzene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
1,4-Dichlorobenzene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2,2'-oxybis(1-Chloropropa	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2,4,5-T	10.000	22.000	N/A	N/A	N/A	11.000	U	0/15
2,4,5-Trichlorophenol	840.000	960.000	N/A	N/A	N/A	870.000	U	0/15
2,4,6-Trichlorophenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2,4-D	53.000	210.000	N/A	N/A	N/A	100.000	U	0/15
2,4-DB	51.000	110.000	N/A	N/A	N/A	57.000	U	0/15
2,4-DP (Dichloroprop)	51.000	110.000	N/A	N/A	N/A	57.000	U	0/15
2,4-Dichlorophenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2,4-Dimethylphenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2,4-Dinitrophenol	840.000	960.000	N/A	N/A	N/A	870.000	U	0/15
2,4-Dinitrotoluene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2,6-Dinitrotoluene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2-Butanone	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
2-Chloronaphthalene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2-Chlorophenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2-Hexanone	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
2-Methylnaphthalene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2-Methylphenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
2-Nitroaniline	840.000	960.000	N/A	N/A	N/A	870.000	U	0/15
2-Nitrophenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
3,3'-Dichlorobenzidine	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
3-Nitroaniline	840.000	960.000	N/A	N/A	N/A	870.000	U	0/15
4,4'-DDD	3.300	17.000	N/A	N/A	N/A	3.500	U	0/14
4,4'-DDE	3.300	7.500	3.900	130.000	39.225	3.500	U	4/14
4,4'-DDT	3.300	7.500	8.100	62.000	22.775	3.500	U	4/14
4,6-Dinitro-2-methylpheno	840.000	960.000	N/A	N/A	N/A	870.000	U	0/15
4-Bromophenyl-phenylether	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
4-Chloro-3-methylphenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
4-Chloroaniline	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
4-Chlorophenyl-phenylethe	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
4-Methyl-2-pentanone	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
4-Methylphenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
4-Nitroaniline	840.000	960.000	N/A	N/A	N/A	870.000	U	0/15
4-Nitrophenol	840.000	960.000	N/A	N/A	N/A	870.000	U	0/15
Acenaphthene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Acenaphthylene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Acetone	10.000	13.000	N/A	N/A	N/A	11.000	U	0/15
Aldrin	1.700	8.700	N/A	N/A	N/A	1.800	U	0/14
Aluminum	N/A	N/A	69.400	2310.000	1287.493	1460.000		15/15
Anthracene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Antimony	4.900	5.500	N/A	N/A	N/A	5.100	U	0/15
Aroclor-1016	33.000	170.000	N/A	N/A	N/A	35.000	U	0/14
Aroclor-1221	68.000	340.000	N/A	N/A	N/A	71.000	U	0/14
Aroclor-1232	33.000	170.000	N/A	N/A	N/A	35.000	U	0/14
Aroclor-1242	33.000	170.000	N/A	N/A	N/A	35.000	U	0/14
Aroclor-1248	33.000	170.000	N/A	N/A	N/A	35.000	U	0/14
Aroclor-1254	33.000	170.000	N/A	N/A	N/A	35.000	U	0/14
Aroclor-1260	33.000	170.000	99.000	99.000	99.000	35.000	U	1/14
Arsenic	0.320	0.380	0.380	1.300	0.678	0.520	B	12/15

Barium	0.410	0.410	1.100	10.000	4.093	3.400	B	14/15
Benzene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Benzo(a)anthracene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Benzo(a)pyrene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Benzo(b)fluoranthene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Benzo(g,h,i)perylene	340.000	380.000	91.000	110.000	100.500	350.000	U	2/15
Benzo(k)fluoranthene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Beryllium	0.040	0.050	0.040	0.050	0.045	0.040	U	2/15
Bromodichloromethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Bromoform	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Bromomethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Butylbenzylphthalate	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Cadmium	0.420	1.100	0.490	0.490	0.490	0.460	U	1/15
Calcium	N/A	N/A	39.600	124000.000	14772.373	737.000	B	15/15
Carbazole	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Carbon disulfide	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Carbon tetrachloride	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Chlorobenzene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Chloroethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Chloroform	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Chloromethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Chromium	N/A	N/A	0.620	5.600	2.421	2.400		15/15
Chrysene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Cobalt	0.530	0.600	N/A	N/A	N/A	0.550	U	0/15
Copper	0.310	3.100	1.100	2.600	1.780	1.100	U	5/15
Dalapon	100.000	220.000	N/A	N/A	N/A	110.000	U	0/15
Di-n-butylphthalate	340.000	1000.000	320.000	560.000	442.500	350.000	U	4/15
Di-n-octylphthalate	340.000	370.000	200.000	260.000	230.000	340.000	U	2/15
Dibenz(a,h)anthracene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Dibenzofuran	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Dibromochloromethane	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Dicamba	10.000	22.000	N/A	N/A	N/A	11.000	U	0/15
Dieldrin	3.300	7.500	95.000	95.000	95.000	3.500	U	1/14
Diethylphthalate	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Dimethylphthalate	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Dinoseb	10.000	22.000	N/A	N/A	N/A	11.000	U	0/15
Endosulfan I	1.700	8.700	N/A	N/A	N/A	1.800	U	0/14
Endosulfan II	3.300	17.000	N/A	N/A	N/A	3.500	U	0/14
Endosulfan sulfate	3.300	17.000	N/A	N/A	N/A	3.500	U	0/14
Endrin	3.300	17.000	N/A	N/A	N/A	3.500	U	0/14
Endrin aldehyde	3.300	17.000	N/A	N/A	N/A	3.500	U	0/14
Endrin ketone	3.300	17.000	N/A	N/A	N/A	3.500	U	0/14
Ethylbenzene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Fluoranthene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Fluorene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Heptachlor	1.700	8.700	N/A	N/A	N/A	1.800	U	0/14
Heptachlor epoxide	1.700	8.700	N/A	N/A	N/A	1.800	U	0/14
Hexachlorobenzene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Hexachlorobutadiene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Hexachlorocyclopentadiene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Hexachloroethane	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Indeno(1,2,3-cd)pyrene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Iron	N/A	N/A	25.600	575.000	337.307	357.000	J	15/15
Isophorone	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Lead	N/A	N/A	1.100	23.200	6.707	6.200		15/15
MCPA	5300.000	45000.000	N/A	N/A	N/A	10000.000	U	0/15
MCPP	5300.000	45000.000	N/A	N/A	N/A	10000.000	U	0/15
Magnesium	N/A	N/A	6.500	1330.000	173.780	45.100	B	15/15
Manganese	N/A	N/A	0.370	12.500	3.898	2.700	B	15/15
Mercury	0.010	0.050	0.010	0.080	0.030	0.020	B	7/15
Methoxychlor	17.000	87.000	N/A	N/A	N/A	18.000	U	0/14
Methylene chloride	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
N-Nitroso-di-n-propylamin	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
N-Nitrosodiphenylamine (1	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Naphthalene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Nickel	1.800	2.100	2.200	2.200	2.200	1.900	U	1/15
Nitrobenzene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Pentachlorophenol	840.000	960.000	N/A	N/A	N/A	870.000	U	0/15
Phenanthrene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Phenol	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Potassium	68.500	77.700	77.400	79.900	78.650	71.900	U	2/15
Pyrene	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
Selenium	0.400	0.440	0.440	0.570	0.497	0.420	U	4/15

Silver	0.450	0.500	0.490	1.300	0.895	0.470	U	2/15
Silvex (2,4,5-TP)	10.000	22.000	N/A	N/A	N/A	11.000	U	0/15
Sodium	6.100	16.000	45.700	45.700	45.700	6.400	U	1/15
Styrene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Tetrachloroethene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Thallium	0.260	0.300	1.000	1.000	1.000	0.280	UJ	1/15
Toluene	10.000	11.000	2.000	4.000	2.500	10.000	U	4/15
Toxaphene	170.000	870.000	N/A	N/A	N/A	180.000	U	0/14
Trichloroethene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Vanadium	0.510	0.510	0.530	5.700	1.646	1.300	B	14/15
Vinyl chloride	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Xylene (total)	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
Zinc	0.970	1.700	0.400	31.500	6.818	1.800	B	12/15
alpha-BHC	1.700	8.700	N/A	N/A	N/A	1.800	U	0/14
alpha-Chlordane	1.700	3.900	0.600	20.000	6.075	1.800	U	4/14
beta-BHC	1.700	8.700	N/A	N/A	N/A	1.800	U	0/14
bis(2-Chloroethoxy)methan	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
bis(2-Chloroethyl)ether	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
bis(2-Ethylhexyl)phthalat	340.000	380.000	N/A	N/A	N/A	350.000	U	0/15
cis-1,3-Dichloropropene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15
delta-BHC	1.700	8.700	N/A	N/A	N/A	1.800	U	0/14
gamma-BHC (Lindane)	1.700	8.700	N/A	N/A	N/A	1.800	U	0/14
gamma-Chlordane	1.700	3.900	0.840	13.000	4.285	1.800	U	4/14
trans-1,3-Dichloropropene	10.000	11.000	N/A	N/A	N/A	11.000	U	0/15

LOCATIONS AND SAMPLE DATES USED:

location	sampdate
ORS00101	19941025
ORS00201	19941025
ORS00301	19941025
ORS00401	19941026
ORS00501	19941026
ORS00601	19941027
ORS00701	19941027
ORS00801	19941027
ORS01001	19941028
ORS01101	19941029
ORS01201	19941029
ORS01201D	19941029
ORS01301	19941111
ORS01401	19941029
ORS01501	19941028

Points used:
3s 08B01001
3s 08S00900
3s 08S00900D
3s 08S01000
3s 08S01100
3s 08S01200
3s 08S01300
3s 08S01400
3s 08S01500
3s 08S01502
3s 08S01600
3s 08S01700
3s 08S01800
3s 08S01900
3s 08S02000
3s 08S02100
3s 08S02200
3s 08S02300
3s 08S02400
3s 08S02500
3s 08S02600
3s 08S02700
3s 08S02800
3s 08S02800D
3s 08S02802
3s 08S02802D
3s 08S02900
3s 08S03000
3s 08S03100
3s 08S03200
3s 08S03300
3s 08S03400
3s 08S03500
3s 08S03600
3s 08S03700
3s 08S03800
3s 08S03800D
3s 08S03900
3s 08S04000
3s 08S04100
3s 08S04200
3s 08S04300
3s 08S04400
3s 08S04500
3s 08S04600
3s 08S04700
3s 08S04800
3s 08S04802
3s 08S04900
3s 08S05000
3s 08S05002
3s 08S05100
3s 08S05100D
3s 08S05200
3s 08S05301
3s 08S05401
3s 08S05501
3s 08S05601
3s 08S05701
3s 08S05702
3s 08S05801
3s 08S05901
3s 08S06001
3s 08S06101
3s 08S06201
3s 08S06301
3s 08S06301D
3s 09S00500
3s 09S00500D
3s 09S00502
3s 09S00600

3s	09S00700
3s	09S00702
3s	09S00800
3s	09S00802
3s	09S00900
3s	09S01000
3s	09S01100
3s	09S01200
3s	09S01300
3s	09S01400
3s	09S01500
3s	09S01600
3s	09S01700
3s	09S01800
3s	09S01800D
3s	09S01900
3s	09S02000
3s	09S02100
3s	09S02200
3s	09S02300
3s	09S02400
3s	09S02500
3s	09S02600
3s	09S02700
3s	09S02800
3s	09S02901
3s	09S02901D
3s	09S03001
3s	09S03101
3s	09S03201
3s	09S03202
3s	09S03301
3s	09S03302
3s	09S03401
3s	09S03501
3s	09S03601
bks	ORS00101
bks	ORS00201
bks	ORS00301
bks	ORS00401
bks	ORS00501
bks	ORS00601
bks	ORS00701
bks	ORS00801
bks	ORS01001
bks	ORS01101
bks	ORS01201
bks	ORS01201D
bks	ORS01301
bks	ORS01401
bks	ORS01501

Parameters with different populations:

2,4,5-T	Different Detection Limits
2,4-D	Different Detection Limits
2,4-DB	Different Detection Limits
2-METHYLNAPHTHALENE	Different Detection Limits
4,4'-DDD	Different Detection Limits
4,4'-DDE	Group 3s Higher
ACENAPHTHYLENE	Different Detection Limits
ALDRIN	Different Detection Limits
ANTHRACENE	Different Detection Limits
ANTIMONY	Different Detection Limits
AROCLOR-1260	Different Detection Limits
ARSENIC	Group 3s Higher
BARIUM	Group 3s Higher
BENZO(A)ANTHRACENE	Different Detection Limits
BENZO(A)PYRENE	Different Detection Limits
BENZO(G,H,I)PERYLENE	Different Detection Limits
BERYLLIUM	Different Detection Limits
BUTYLBENZYLPHTHALATE	Different Detection Limits
CADMIUM	Different Detection Limits
CALCIUM	Different Detection Limits
CARBAZOLE	Different Detection Limits
CHROMIUM	Group 3s Higher
CHRYSENE	Different Detection Limits
COBALT	Different Detection Limits
COPPER	Group 3s Higher
DALAPON	Different Detection Limits
DI-N-BUTYLPHTHALATE	Different Detection Limits
DI-N-OCTYLPHTHALATE	Different Detection Limits
DIBENZ(A,H)ANTHRACENE	Different Detection Limits
DICAMBA	Different Detection Limits
DINOSEB	Different Detection Limits
ENDOSULFAN I	Different Detection Limits
ENDOSULFAN II	Different Detection Limits
ENDRIN KETONE	Different Detection Limits
FLUORANTHENE	Different Detection Limits
HEPTACHLOR	Different Detection Limits
INDENO(1,2,3-CD)PYRENE	Different Detection Limits
LEAD	Group 3s Higher
MCPA	Different Detection Limits
MAGNESIUM	Different Detection Limits
MANGANESE	Group 3s Higher
MERCURY	Group 3s Higher
METHOXYCHLOR	Different Detection Limits
NICKEL	Different Detection Limits
PHENANTHRENE	Different Detection Limits
POTASSIUM	Different Detection Limits
SELENIUM	Different Detection Limits
SODIUM	Different Detection Limits
THALLIUM	Different Detection Limits
ZINC	Different Detection Limits
ALPHA-BHC	Different Detection Limits
ALPHA-CHLORDANE	Group 3s Higher
BETA-BHC	Different Detection Limits
DELTA-BHC	Different Detection Limits
GAMMA-BHC (LINDANE)	Different Detection Limits
GAMMA-CHLORDANE	Group 3s Higher

location	low values BDL/total	high values BDL/total
08B01001	10/11	64/67
08S00900	0/13	79/99
08S00900D	0/5	84/106
08S01000	3/10	88/97
08S01100	2/16	68/78
08S01200	9/12	69/89
08S01300	6/9	4/6
08S01400	4/7	61/66
08S01500	2/11	83/102
08S01600	3/15	81/95
08S01700	1/6	89/106
08S01800	1/8	89/99

08S01900	6/8	5/8
08S02000	5/9	4/5
08S02100	2/7	87/103
08S02200	3/15	73/84
08S02300	1/5	92/107
08S02400	4/8	78/85
08S02500	0/5	28/47
08S02600	3/14	5/12
08S02700	3/15	83/91
08S02800	2/14	69/81
08S02800D	2/16	67/81
08S02900	0/5	78/94
08S03000	5/8	6/9
08S03100	3/5	20/37
08S03200	5/6	6/10
08S03300	4/8	90/98
08S03400	1/3	90/112
08S03500	1/7	89/106
08S03600	4/11	8/16
08S03700	5/9	91/96
08S03800	6/13	84/91
08S03800D	5/13	84/92
08S03900	1/4	79/94
08S04000	4/6	81/89
08S04100	2/4	8/23
08S04200	6/7	3/5
08S04300	3/12	79/94
08S04400	2/7	85/107
08S04500	3/4	91/103
08S04600	2/6	81/93
08S04700	2/2	97/109
08S04800	1/14	81/98
08S04900	3/13	80/95
08S05000	3/5	94/102
08S05100	5/5	94/102
08S05100D	5/6	81/89
08S05200	5/16	71/76
08S05301	5/18	58/62
08S05401	3/12	70/82
08S05501	3/15	84/93
08S05601	3/12	86/98
08S05701	5/13	77/90
08S05801	0/8	88/103
08S05901	2/9	90/102
08S06001	3/5	92/94
08S06101	4/9	5/8
08S06201	6/7	4/4
08S06301	3/8	68/78
08S06301D	3/8	68/79
09S00500	6/6	90/100
09S00500D	6/6	91/102
09S00600	5/5	8/18
09S00700	2/4	90/109
09S00800	6/9	24/30
09S00900	7/10	87/94
09S01000	7/8	3/7
09S01100	7/8	91/98
09S01200	7/10	3/3
09S01300	7/11	3/6
09S01400	7/8	91/97
09S01500	7/12	57/58
09S01600	7/11	3/3
09S01700	6/8	6/14
09S01800	7/9	3/3
09S01800D	4/10	3/4
09S01900	7/8	3/3
09S02000	69/72	3/3
09S02100	7/9	3/6
09S02200	4/8	5/13
09S02300	6/7	77/84
09S02400	4/7	79/89
09S02500	5/7	90/101
09S02600	5/6	10/16

09S02700	5/11	76/88
09S02800	5/8	8/16
09S02901	6/9	15/18
09S02901D	5/6	14/16
09S03001	4/9	25/41
09S03101	4/5	28/44
09S03201	5/7	25/31
09S03301	2/3	28/41
09S03401	5/6	26/38
09S03501	6/8	13/13
09S03601	5/10	6/8

```
-----------------------------------------------------------------
 2,4,5-T in UG/KG
-----------------------------
3s       **.............*...............*......***..*   . *
bks                                                  ..... ....
 group1:  3s
 min, median, max, bdl/tot :          1.9000 J          3.0000 U          20.0000 J    77 /   87
 group2:  bks
 min, median, max, bdl/tot :         10.0000 U         11.0000 U          22.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -3.2500
lq     =          11.0000 U
median =          11.0000 U
uq     =          20.5000 U
hicut  =          34.7500
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
<< NONE FOUND>>


-----------------------------------------------------------------
 2,4-D in UG/KG
-----------------------------
3s       **********....*.....**...***************.** *
bks                                                 ........
 group1:  3s
 min, median, max, bdl/tot :          0.0760 J          7.0000 J          53.0000 J    34 /   87
 group2:  bks
 min, median, max, bdl/tot :         53.0000 U        100.0000 U         210.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         -27.5000
lq     =          55.0000 U
median =         100.0000 U
uq     =         110.0000 U
hicut  =         192.5000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
<< NONE FOUND>>

-----------------------------------------------------------------
 2,4-DB in UG/KG
-----------------------------
3s       ***************.....**....*....**..    **** ** ****
bks                                         ....   ... ..
 group1:  3s
 min, median, max, bdl/tot :          1.9000 J         29.0000 U         310.0000 J    39 /   87
 group2:  bks
 min, median, max, bdl/tot :         51.0000 U         57.0000 U         110.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         -17.5000
lq     =          53.0000 U
median =          57.0000 U
uq     =         100.0000 U
hicut  =         170.5000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J          310.0000 08S05901
```

```
-------------------------------------------------------------
 2-METHYLNAPHTHALENE in UG/KG
-----------------------------

3s       *  ......  .. ....................................
bks       ....    .. ..   .      .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        400.0000 U        1500.0000 U    86 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          317.5000
lq     =          340.0000 U
median =          350.0000 U
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U            10.0000 09S02000
 J            77.0000 09S00700

 Upper outside values in test group relative to group bks:
 UJ          380.0000 09S02400
 U           380.0000 08S02300
 U           380.0000 08S01400
 U           380.0000 08S02400
 U           380.0000 09S01500
 U           380.0000 08S05301
 U           380.0000 09S02300
 U           380.0000 08S06301
 U           380.0000 08S06301D
 U           390.0000 08S02200
 U           390.0000 08S04000
 U           390.0000 09S02700
 U           390.0000 08S01600
 U           390.0000 08S05401
 U           400.0000 08S04600
 U           400.0000 08S02100
 U           400.0000 08S03900
 U           400.0000 08S05100D
 U           400.0000 08S02900
 U           400.0000 08S05200
 U           400.0000 08S02800D
 U           400.0000 08S01100
 U           400.0000 08S02800
 U           410.0000 08S01700
 U           410.0000 08S03800
 UJ          420.0000 09S02500
 U           420.0000 08S03800D
 U           420.0000 08S03700
 U           420.0000 08S01800
 U           420.0000 08S01000
 U           420.0000 08S05100
 U           430.0000 08S01500
 U           430.0000 08S03300
 U           430.0000 08S05000
 U           430.0000 08S04900
 UJ          440.0000 09S00500
 U           440.0000 08S04800
 U           440.0000 09S00500D
 U           440.0000 09S01400
 U           440.0000 08S06001
 U           440.0000 08S04300
 U           450.0000 08S02700
 U           450.0000 08S01200
 U           450.0000 08B01001
 U           460.0000 09S00900
 U           470.0000 08S05701
 U           470.0000 08S05501
```

```
 U          470.0000 08S04500
 U          470.0000 08S03500
 U          480.0000 09S01100
 U          510.0000 08S04400
 U          800.0000 08S00900
 U          820.0000 08S05601
 U          820.0000 08S00900D
 U         1000.0000 08S05901
 U         1100.0000 08S03400
 U         1400.0000 08S05801
 U         1500.0000 08S04700


-------------------------------------------------------------
 4,4'-DDD in UG/KG
-----------------------------

3s       **** ...... ...*......*.....*...*.****.****.************
bks          ....  .....  .                    ..    .
 group1:  3s
 min, median, max, bdl/tot :          0.8800 J          4.2000 U      20000.0000 D    54 /   96
 group2:  bks
 min, median, max, bdl/tot :          3.3000 U          3.5000 U          17.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          3.0250
lq     =          3.4000 U
median =          3.5000 U
uq     =          3.6500 U
hicut  =          4.0250
 Lower outside values in test group relative to group bks:
 J            0.8800 08S01300
 J            0.9200 08S01400
 J            1.2000 09S01800D
 J            1.4000 08S00900
 J            1.6000 08S05801
 J            2.4000 08S02700

 Upper outside values in test group relative to group bks:
 U            4.1000 08S03800
 J            4.1000 08B01001
 UJ           4.2000 08S01000
 U            4.2000 08S03700
 U            4.2000 08S05100
 U            4.2000 08S01800
 U            4.2000 08S03800D
 U            4.2000 09S02500
 U            4.4000 08S04800
 U            4.4000 08S06001
 J            4.6000 09S02700
 U            4.7000 08S05701
 U            4.7000 08S04500
 U            4.7000 08S03500
 J            4.8000 08S04300
 J            5.0000 08S01700
 J            6.4000 08S01100
 J            6.8000 08S05501
              6.8000 08S03300
              7.1000 08S03000
 U            8.2000 08S05601
 U            8.6000 08S05000
 J            9.7000 09S02901
 J            9.7000 08S01200
 U           10.0000 09S03301
 U           11.0000 08S03400
 J           13.0000 08S00900D
             14.0000 08S02400
 U           15.0000 08S04700
 U           18.0000 08S02500
 U           19.0000 08S02300
 J           19.0000 09S01000
```

```
J          19.0000 09S03201
J          19.0000 09S01300
U          20.0000 08S02100
           21.0000 09S00600
J          22.0000 09S03001
J          25.0000 09S01700
J          33.0000 08S04400
J          36.0000 08S04900
J          36.0000 08S01500
J          40.0000 08S01600
           41.0000 09S01400
           43.0000 09S00800
J         120.0000 09S03101
D         140.0000 09S00900
J         150.0000 08S04600
J         340.0000 09S03401
DJ        780.0000 08S03100
D        4400.0000 09S01100
D        4600.0000 09S00700
D       15000.0000 09S00500
D       20000.0000 09S005000


-----------------------------------------------------------------
 4,4'-DDE in UG/KG
-----------------------------
3s       ********. .............*********************************
bks              ....... .  *      . .    **              *
 group1:  3s
 min, median, max, bdl/tot :          0.2200 J          9.3500        1600.0000 D    24 /   96
 group2:  bks
 min, median, max, bdl/tot :          3.3000 U          3.5000 U        130.0000      11 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-------------------------------------------------------
lowcut =          -2.6000
lq     =           3.4000 U
median =           3.5000 U
uq     =           7.4000 U
hicut  =          13.4000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J          14.0000 09S01000
 J          14.0000 08S02400
            14.0000 09S00600
 U          15.0000 08S04700
 J          17.0000 09S03301
 J          17.0000 08S02500
            17.0000 08S01700
            18.0000 09S00800
            18.0000 09S03201
 JD         19.0000 08S03900
 J          19.0000 08S01000
            20.0000 09S02200
 U          22.0000 08S01500
 J          22.0000 08S01600
 J          22.0000 09S00900
            22.0000 08S01200
 J          24.0000 09S02500
 J          28.0000 08S03500
            28.0000 08S05501
            32.0000 09S03001
            32.0000 08S05601
            35.0000 08S02300
            39.0000 09S02400
            55.0000 09S02300
            57.0000 08S02100
 D          79.0000 08S03300
 D          90.0000 08S03600
 D          96.0000 08S04900
```

```
DJ          110.0000 09S02800
            110.0000 08S02200
D           140.0000 09S02700
D           160.0000 08S05401
D           170.0000 09S03101
D           170.0000 08S04600
            170.0000 08S03400
J           300.0000 09S01100
J           360.0000 09S03401
J           460.0000 08S03100
            570.0000 09S00700
            710.0000 09S00500
           1000.0000 09S00500D
D          1600.0000 08S04300

-----------------------------------------------------------------
 4,4'-DDT in UG/KG
-----------------------------
3s       ***********. .... .*..*********************************
bks                  .... ..  .         .. *   **          *
 group1:  3s
 min, median, max, bdl/tot :          0.2200 J          5.8000        12000.0000 D    14 /   96
 group2:  bks
 min, median, max, bdl/tot :          3.3000 U          3.5000 U          62.0000 NJ   11 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -3.2000
lq     =           3.4000 U
median =           3.5000 U
uq     =           7.8000 U
hicut  =          14.4000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J           16.0000 09S02400
 J           18.0000 08S02100
             18.0000 08S05501
             18.0000 09S03001
 J           22.0000 08S03600
 J           23.0000 08S02200
             24.0000 09S02200
 J           27.0000 08S04900
             28.0000 08S04800
             30.0000 08S04400
             33.0000 08S03400
 J           35.0000 09S00700
 J           37.0000 09S02500
             38.0000 09S02300
             38.0000 09S03101
             44.0000 08S03900
             49.0000 08S04600
 D           76.0000 09S02700
 DJ         110.0000 09S02800
 J          160.0000 09S03401
            160.0000 08S01500
            450.0000 08S03100
 J         1200.0000 09S01100
 D         1200.0000 08S01600
 D         2200.0000 08S04300
           3600.0000 09S00500
 D        12000.0000 09S00500D

-----------------------------------------------------------------
 ACENAPHTHYLENE in UG/KG
-----------------------------
3s       **   ........ ....................................
bks        ...     .... ..  .     .
 group1:  3s
```

```
 min, median, max, bdl/tot :          10.0000 U        390.0000 U        1500.0000 U    84 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          317.5000
lq     =          340.0000 U
median =          350.0000 U
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U            10.0000 09S02000
 J            63.0000 08S01600
 J            67.0000 08S01100
 J           140.0000 08S05701

 Upper outside values in test group relative to group bks:
 UJ          380.0000 09S02400
 U           380.0000 08S02300
 U           380.0000 08S06301
 U           380.0000 09S01500
 U           380.0000 09S02300
 U           380.0000 08S06301D
 U           380.0000 08S05301
 U           380.0000 08S01400
 U           380.0000 08S02400
 U           390.0000 08S05401
 U           390.0000 08S04000
 U           390.0000 09S02700
 U           390.0000 08S02200
 U           400.0000 08S02100
 U           400.0000 08S03900
 U           400.0000 08S05100D
 U           400.0000 08S04600
 U           400.0000 08S05200
 U           400.0000 08S02900
 U           400.0000 08S02800D
 U           400.0000 08S02800
 U           410.0000 08S03800
 U           410.0000 08S01700
 UJ          420.0000 09S02500
 U           420.0000 08S05100
 U           420.0000 08S01000
 U           420.0000 08S03700
 U           420.0000 08S01800
 U           420.0000 08S03800D
 U           430.0000 08S05000
 U           430.0000 08S03300
 U           430.0000 08S04900
 U           430.0000 08S01500
 UJ          440.0000 09S00500
 U           440.0000 09S01400
 U           440.0000 09S00500D
 U           440.0000 08S06001
 U           440.0000 08S04300
 U           440.0000 08S04800
 U           450.0000 08S02700
 U           450.0000 08B01001
 U           450.0000 08S01200
 U           460.0000 09S00900
 U           470.0000 08S04500
 U           470.0000 08S05501
 U           470.0000 08S03500
 U           480.0000 09S01100
 U           510.0000 08S04400
 U           580.0000 09S00700
 U           800.0000 08S00900
 U           820.0000 08S05601
 U           820.0000 08S00900D
 U          1000.0000 08S05901
 U          1100.0000 08S03400
```

```
U          1400.0000 08S05801
U          1500.0000 08S04700

-------------------------------------------------------------
 ALDRIN in UG/KG
-----------------------------

3s       ***........... ......................................*..
bks          ....   - ---- --                          . .    .
 group1:  3s
 min, median, max, bdl/tot :          0.2700 J          2.0000 U        230.0000 U    89 /   96
 group2:  bks
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          1.7250
lq     =          1.8000 U
median =          1.8000 U
uq     =          1.8500 U
hicut  =          1.9250
 Lower outside values in test group relative to group bks:
 J            0.2700 08S04100
 J            0.2900 08S02400
 J            0.3500 08S02900
 J            0.5100 08S04800
 J            0.5600 08S00900D
 J            0.6200 08S02500
 UJ           1.7000 08B01001
 U            1.7000 08S01200

 Upper outside values in test group relative to group bks:
 U            2.0000 09S03501
 U            2.0000 08S02200
 U            2.0000 08S01100
 U            2.0000 09S02901D
 U            2.0000 08S04600
 U            2.0000 08S04000
 U            2.0000 09S02901
 U            2.0000 08S05401
 U            2.0000 08S02800D
 U            2.0000 09S02300
 U            2.0000 09S02400
 U            2.0000 09S02700
 U            2.1000 08S03900
 U            2.1000 08S05100D
 U            2.1000 08S01700
 U            2.1000 08S03800
 U            2.1000 08S05200
 U            2.1000 08S02800
 UJ           2.2000 08S01000
 U            2.2000 09S02500
 U            2.2000 08S05100
 U            2.2000 09S01400
 U            2.2000 08S04900
 U            2.2000 08S03300
 U            2.2000 08S03700
 U            2.2000 08S06001
 U            2.2000 08S01800
 U            2.2000 08S04300
 U            2.2000 08S03800D
 U            2.3000 08S02700
 U            2.4000 08S04500
 U            2.4000 08S03500
 U            2.4000 09S00900
 U            2.4000 08S05501
 U            2.4000 08S05701
 U            2.5000 09S03201
 U            2.6000 08S04400
 U            3.8000 09S00800
 U            3.9000 09S03001
```

```
U            3.9000 09S03101
U            4.1000 08S00900
U            4.2000 08S05601
U            4.4000 08S05000
U            5.2000 08S05901
U            5.3000 09S03301
U            5.6000 08S03400
U            7.4000 08S05801
U            7.7000 08S04700
U            9.8000 08S02300
U           10.0000 08S02100
U           11.0000 08S01500
U           20.0000 08S01600
U           46.0000 09S03401
U           49.0000 09S01100
J           49.0000 08S03100
U           60.0000 09S00700
U          230.0000 09S00500
U          230.0000 09S005000

-------------------------------------------------------------
 ALUMINUM in MG/KG
-----------------------------

3s       ****************************** **** * ****************
bks          *   *              *  *    * * ** *  *   **
 group1:  3s
 min, median, max, bdl/tot :          31.4000 U        770.0000        14300.0000       2 /   95
 group2:  bks
 min, median, max, bdl/tot :          69.4000         1460.0000         2310.0000       0 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =        -180.0000
lq     =         924.0000
median =        1460.0000
uq     =        1660.0000
hicut  =        2764.0000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
           2900.0000 08S04400
           2920.0000 08S02500
           3160.0000 09S02700
           3190.0000 08S01700
           3250.0000 08S05601
           3770.0000 08S03400
           5800.0000 08S00900
           6060.0000 08S009000
           6720.0000 09S03101
           7170.0000 09S03001
           9130.0000 08S05801
          14300.0000 09S03301


-------------------------------------------------------------
 ANTHRACENE in UG/KG
-----------------------------

3s       .  ..........................................*....
bks      ... .  .. .....  .   .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        400.0000 U        1500.0000 U     86 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U     15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         317.5000
lq     =         340.0000 U
median =         350.0000 U
```

```
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U            10.0000 09S02000

 Upper outside values in test group relative to group bks:
 UJ          380.0000 09S02400
 U           380.0000 08S06301
 U           380.0000 09S01500
 U           380.0000 09S02300
 U           380.0000 08S05301
 U           380.0000 08S02400
 U           380.0000 08S02300
 U           380.0000 08S06301D
 U           380.0000 08S01400
 U           390.0000 08S04000
 U           390.0000 08S05401
 U           390.0000 09S02700
 U           390.0000 08S01600
 U           390.0000 08S02200
 U           400.0000 08S01100
 U           400.0000 08S02100
 U           400.0000 08S02800D
 U           400.0000 08S04600
 U           400.0000 08S05200
 U           400.0000 08S03900
 U           400.0000 08S05100D
 U           400.0000 08S02800
 U           400.0000 08S02900
 U           410.0000 08S01700
 U           410.0000 08S03800
 UJ          420.0000 09S02500
 U           420.0000 08S05100
 U           420.0000 08S03800D
 U           420.0000 08S03700
 U           420.0000 08S01800
 U           420.0000 08S01000
 U           430.0000 08S04900
 U           430.0000 08S03300
 U           430.0000 08S01500
 U           430.0000 08S05000
 UJ          440.0000 09S00500
 U           440.0000 09S00500D
 U           440.0000 08S04800
 U           440.0000 09S01400
 U           440.0000 08S04300
 U           440.0000 08S06001
 U           450.0000 08S01200
 U           450.0000 08S02700
 U           450.0000 08B01001
 U           460.0000 09S00900
 U           470.0000 08S03500
 U           470.0000 08S05501
 U           470.0000 08S04500
 U           480.0000 09S01100
 U           510.0000 08S04400
             540.0000 08S05701
 U           580.0000 09S00700
 U           800.0000 08S00900
 U           820.0000 08S05601
 U           820.0000 08S00900D
 U          1000.0000 08S05901
 U          1100.0000 08S03400
 U          1400.0000 08S05801
 U          1500.0000 08S04700


-------------------------------------------------------------
 ANTIMONY in MG/KG
-----------------------------

3s      ...................................*...*******      **
bks                                                  ........
```

```
 group1:  3s
 min, median, max, bdl/tot :          0.5000 U          0.6900 U          16.3000 J    82 /   95
 group2:  bks
 min, median, max, bdl/tot :          4.9000 U          5.1000 U           5.5000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          4.5000
lq     =          4.9500 U
median =          5.1000 U
uq     =          5.2500 U
hicut  =          5.7000
 Lower outside values in test group relative to group bks:
 U            0.5000 08S06101
 U            0.5200 09S03601
 U            0.5300 08S06201
 U            0.5400 08S05301
 U            0.5400 08S06301D
 U            0.5600 09S02901D
 U            0.5600 09S03501
 U            0.5700 09S01900
 U            0.5800 09S01600
 U            0.5900 09S02901
 U            0.5900 08S05401
 U            0.5900 09S01200
 U            0.5900 09S01000
 U            0.5900 09S02000
 U            0.5900 08S02000
 U            0.5900 09S02100
 U            0.6000 09S02200
 U            0.6000 08S04200
 U            0.6000 09S00600
 U            0.6000 09S01800
 U            0.6100 09S01800D
 U            0.6100 08S03100
 U            0.6100 09S01300
 U            0.6100 08S03600
 U            0.6200 09S01700
 U            0.6200 08S04100
 U            0.6200 08S06301
 U            0.6200 08S03200
 U            0.6200 08S02600
 U            0.6300 08S01300
 U            0.6300 09S00800
 U            0.6400 08S01900
 U            0.6400 09S02800
 U            0.6400 09S02600
 U            0.6500 08S03000
 U            0.6500 09S01500
 U            0.6500 08S01400
 U            0.6500 08S03900
 U            0.6600 08S02300
 U            0.6600 09S02300
 U            0.6700 08S01600
 U            0.6700 08S02200
 U            0.6700 09S02400
 U            0.6700 08S04000
 U            0.6800 08S05000
 U            0.6800 09S02700
 U            0.6800 08S05200
 U            0.6900 08S03800
 U            0.6900 08S01100
 U            0.7000 08S03800D
 U            0.7000 08S01800
 U            0.7000 08S02100
 U            0.7000 08S03700
 U            0.7000 08S04600
 U            0.7000 08S05100D
 U            0.7000 09S03401
 U            0.7000 08S05701
 U            0.7100 09S00500
 U            0.7100 08S01700
```

```
U            0.7300 08S04300
U            0.7300 09S03201
U            0.7300 08S04900
U            0.7300 08S01000
U            0.7300 09S02500
U            0.7400 08S01500
U            0.7400 08S02700
U            0.7400 08S05100
U            0.7500 08S04800
U            0.7500 09S01400
U            0.7700 09S00500D
J            0.7900 08S03300
U            0.8000 09S00900
U            0.8000 09S01100
U            0.8100 08S03500
U            0.8200 08S04500
U            0.8400 08S04400
U            0.9000 08S06001
U            0.9800 09S00700
U            1.1000 09S03101
J            1.2000 08S05501
U            1.5000 09S03301
J            1.8000 08S02400
J            1.8000 08S02500
U            1.9000 08S03400
J            2.4000 08S02900
U            2.5000 08S04700
U            2.7000 08S05601
J            4.2000 08S00900
J            4.4000 09S03001

Upper outside values in test group relative to group bks:
J            5.8000 08S05901
J            7.8000 08S01200
J           16.3000 08S05801


-------------------------------------------------------------
AROCLOR-1260 in UG/KG
-----------------------------

bks      ...  ... ...   .                          .  *  .
3s       .. ........ ..............................*.........**...
 group1:  3s
 min, median, max, bdl/tot :          33.0000 U          40.0000 U       4400.0000 U    93 /   96
 group2:  bks
 min, median, max, bdl/tot :          33.0000 U          35.0000 U        170.0000 U    14 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          30.2500
lq     =          34.0000 U
median =          35.0000 U
uq     =          36.5000 U
hicut  =          40.2500
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U           41.0000 08S03800
 U           41.0000 08S01700
 UJ          42.0000 08S01000
 U           42.0000 08S05100
 U           42.0000 08S01800
 U           42.0000 08S03800D
 U           42.0000 09S02500
 U           43.0000 08S04900
 U           43.0000 08S03300
 U           44.0000 08S04300
 U           44.0000 08S04800
 U           44.0000 08S02700
 U           44.0000 08S06001
 U           44.0000 09S01400
```

```
U          46.0000 09S00900
U          46.0000 08S05501
U          47.0000 08S04500
U          47.0000 08S03500
U          47.0000 08S05701
U          49.0000 09S03201
U          51.0000 08S04400
J          66.0000 08S04200
U          74.0000 09S00800
U          75.0000 09S03001
U          76.0000 09S03101
U          80.0000 08S00900
U          82.0000 08S00900D
U          82.0000 08S05601
U          86.0000 08S05000
U         100.0000 08S05901
U         100.0000 09S03301
U         110.0000 08S03400
U         140.0000 08S05801
U         150.0000 08S04700
U         180.0000 08S02500
U         190.0000 08S02300
U         200.0000 08S02100
U         220.0000 08S01500
          320.0000 08S03700
U         350.0000 08S03100
U         390.0000 08S01600
J         420.0000 08S01200
U         900.0000 09S03401
U         950.0000 09S01100
U        1200.0000 09S00700
U        4400.0000 09S00500
U        4400.0000 09S00500D

-----------------------------------------------------------------
 ARSENIC in MG/KG
-----------------------------

bks       .***** ** *            *
3s            ...... ................*.****************************
 group1:  3s
 min, median, max, bdl/tot :          0.6500 U          3.2000          90.0000      40 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.3200 U          0.5200 B         1.3000 B      3 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -0.1175
lq     =           0.3850
median =           0.5200 B
uq     =           0.7200
hicut  =           1.2225
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U            1.3000 08S02400
 U            1.3000 09S02600
 U            1.3000 08S01900
 U            1.3000 08S02600
 U            1.3000 08S01400
 U            1.3000 09S01500
 U            1.3000 09S02800
 U            1.3000 09S01700
 U            1.3000 09S02300
 U            1.3000 09S03001
 U            1.3000 08S01300
 U            1.4000 08S03800D
 U            1.4000 08S03800
 U            1.4000 08S03700
 U            1.4000 09S02400
 U            1.4000 09S02700
```

```
J          1.4000 08S04000
U          1.5000 09S01400
U          1.5000 09S02500
U          1.6000 09S01100
J          1.8000 08S05200
           2.4000 08S05100D
J          2.5000 08S05501
           2.5000 08S03200
J          2.9000 08S05801
J          2.9000 09S03201
           3.2000 09S00800
           3.3000 08S06301
           3.4000 08S05100
           3.4000 08S06101
J          3.5000 08S02700
J          3.5000 08S01100
           3.6000 08S04300
           4.0000 08S05000
           4.3000 08S06301D
           4.4000 09S00500D
           4.8000 09S00500
           5.3000 08S05301
           5.6000 08S03600
J          5.9000 09S03301
           6.0000 09S03101
J          6.2000 08S01600
J          6.2000 08S01200
J          6.3000 08S01800
J          6.6000 08S01700
           6.7000 08S05901
           7.2000 08S03000
J          7.8000 08S01000
           8.1000 08S03300
J          8.2000 08S04700
           8.6000 08S05601
J          9.9000 08S02500
J         10.1000 08S02200
J         10.4000 08S01500
          11.6000 08S04500
          11.7000 08S04400
          12.8000 08S02800D
          13.4000 08S02800
          14.4000 09S00900
          14.6000 08S04900
          14.6000 08S05401
          14.6000 08S04600
          16.1000 08S03900
J         19.6000 08S02100
          20.2000 09S00700
          25.0000 08S04100
J         30.5000 08S00900
J         30.7000 08S00900D
J         39.2000 08S03100
          41.2000 08S02900
J         53.0000 08S02300
          55.9000 08S03500
          65.6000 08S04800
          90.0000 08S03400


-------------------------------------------------------------
 BARIUM in MG/KG
-----------------------------

bks       .*   *   ** ** * **  **        **
3s        ...**.**** **.*.*****************************************
 group1:  3s
 min, median, max, bdl/tot :          0.9000 U          8.6000 J        135.0000      13 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.4100 U          3.4000 B         10.0000 B     1 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
```

```
-----------------------------------------------------
lowcut =          -0.1750
lq     =           2.6000
median =           3.4000 B
uq     =           4.4500
hicut  =           7.2250
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J            7.4000 09S02300
 J            7.5000 08S02400
 U            8.6000 08S05501
 J            8.6000 08S04500
 J            8.7000 09S02200
 J            8.7000 08S05000
 J            9.3000 08S04900
 J           10.4000 08S04300
 J           10.4000 08S01000
 J           10.7000 08S04100
 J           10.7000 08S02800D
 J           11.7000 08S02800
 J           11.7000 08S06301
 J           12.0000 08S02700
 J           12.3000 08S04600
 J           14.5000 08S03900
 J           14.7000 08S05401
 J           15.5000 08S05601
 J           15.8000 08S02200
 J           16.0000 09S03401
 J           16.5000 08S06301D
 J           18.1000 08S04400
 J           19.1000 09S03001
 J           19.3000 08S01800
 J           19.4000 08S03500
 J           19.5000 08S04800
 J           20.7000 09S02500
 J           23.2000 08S05801
 J           23.2000 09S03301
 J           24.7000 08S04700
 J           25.3000 09S03101
 J           25.5000 08S01600
 J           28.4000 08S01100
 J           31.1000 08S05901
 J           31.5000 08S02900
 J           32.6000 08S02100
 J           35.2000 09S02400
 J           35.3000 09S02800
 J           36.3000 08S02300
 J           36.9000 08S01200
 J           37.4000 09S02600
 J           40.8000 09S00700
 J           44.9000 08S03400
 J           47.1000 09S00600
 J           48.8000 08S01700
 J           53.7000 08S00900D
 J           54.3000 08S00900
             57.6000 08S02600
             65.3000 09S02700
             67.1000 08S02500
            135.0000 08S01500


-------------------------------------------------------------
 BENZO(A)ANTHRACENE in UG/KG
-----------------------------

3s        *********. . ...... *..*.......................*.
bks                . . ..   ...... .     .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        370.0000 U        1500.0000 U    68 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
```

Different Detection Limits
Outside values test group relative to background group bks

---

lowcut =	317.5000	
lq =	340.0000	U
median =	350.0000	U
uq =	355.0000	U
hicut =	377.5000	

Lower outside values in test group relative to group bks:

U	10.0000	09S02000
J	31.0000	08S01500
J	37.0000	08S04900
J	39.0000	08S02600
J	42.0000	08S03600
J	48.0000	08S05501
J	63.0000	08S04800
J	76.0000	08S05200
J	78.0000	08S00900
J	97.0000	08S02800
J	110.0000	08S02700
J	120.0000	08S02800D
J	120.0000	08S01600
J	120.0000	08S01100
J	140.0000	08S01000

Upper outside values in test group relative to group bks:

UJ	380.0000	09S02400
U	380.0000	08S01400
U	380.0000	09S01500
U	380.0000	08S06301
U	380.0000	08S06301D
U	380.0000	08S02400
U	380.0000	08S02300
U	380.0000	09S02300
U	390.0000	08S05401
U	390.0000	09S02700
U	390.0000	08S02200
U	390.0000	08S04000
U	400.0000	08S02900
U	400.0000	08S03900
U	400.0000	08S02100
U	400.0000	08S04600
U	400.0000	08S05100D
U	410.0000	08S01700
UJ	420.0000	09S02500
U	420.0000	08S01800
U	420.0000	08S03700
U	420.0000	08S05100
U	430.0000	08S03300
U	430.0000	08S05000
UJ	440.0000	09S00500
U	440.0000	09S00500D
U	440.0000	09S01400
U	440.0000	08S06001
U	450.0000	08S01200
U	450.0000	08B01001
U	460.0000	09S00900
U	470.0000	08S04500
U	470.0000	08S03500
U	480.0000	09S01100
U	510.0000	08S04400
U	580.0000	09S00700
U	820.0000	08S05601
U	820.0000	08S00900D
U	1000.0000	08S05901
U	1100.0000	08S03400
	1300.0000	08S05701
U	1400.0000	08S05801
U	1500.0000	08S04700

BENZO(A)PYRENE in UG/KG

```
-----------------------------

3s        *******. . .....  . .......*............*........*.
bks               .. ..    ....  .      .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        380.0000 U        1500.0000 U    71 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          317.5000
lq     =          340.0000 U
median =          350.0000 U
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U            10.0000 09S02000
 J            36.0000 08S04900
 J            40.0000 08S02600
 J            41.0000 08S01500
 J            50.0000 08S05401
 J            61.0000 08S05200
 J            73.0000 08S04800
 J           110.0000 08S02800
 J           120.0000 08S02800D
 J           140.0000 08S02700
 J           150.0000 08S01100
 J           170.0000 08S01600
 J           270.0000 08S05301
 J           310.0000 08S04300

 Upper outside values in test group relative to group bks:
 UJ          380.0000 09S02400
 U           380.0000 08S06301
 U           380.0000 09S01500
 U           380.0000 08S06301D
 U           380.0000 08S02400
 U           380.0000 08S01400
 U           380.0000 09S02300
 U           380.0000 08S02300
 U           390.0000 08S02200
 U           390.0000 08S04000
 U           390.0000 09S02700
 U           400.0000 08S02100
 U           400.0000 08S02900
 U           400.0000 08S05100D
 U           400.0000 08S03900
 U           400.0000 08S04600
 U           410.0000 08S01700
 UJ          420.0000 09S02500
 U           420.0000 08S03700
 U           420.0000 08S05100
 U           420.0000 08S01000
 U           420.0000 08S01800
 U           430.0000 08S03300
 U           430.0000 08S05000
             430.0000 08S03800
 UJ          440.0000 09S00500
 U           440.0000 09S01400
 U           440.0000 08S06001
 U           440.0000 09S00500D
 U           450.0000 08S01200
 U           450.0000 08B01001
 U           460.0000 09S00900
 U           470.0000 08S04500
 U           470.0000 08S05501
 U           470.0000 08S03500
 U           480.0000 09S01100
 U           510.0000 08S04400
 U           580.0000 09S00700
 U           800.0000 08S00900
```

```
U          820.0000 08S05601
U          820.0000 08S00900D
U         1000.0000 08S05901
U         1100.0000 08S03400
          1100.0000 08S05701
U         1400.0000 08S05801
U         1500.0000 08S04700


-------------------------------------------------------------
 BENZO(B)FLUORANTHENE in UG/KG
-----------------------------

3s       **********..  .*....  ......................*..**..*
bks                  ....    ... ...    .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        370.0000 U        3700.0000 J    63 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          317.5000
lq     =          340.0000 U
median =          350.0000 U
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U           10.0000 09S02000
 J           43.0000 08S03600
 J           45.0000 08S02200
 J           55.0000 08S03500
 J           58.0000 09S02700
 J           69.0000 08S04400
 J           72.0000 08S05501
 J           75.0000 08S01500
 J           81.0000 08S05901
 J           82.0000 08S05401
 J           88.0000 08S04900
 J           92.0000 08S02600
 J          120.0000 08S05200
 J          170.0000 08S00900
 J          180.0000 08S04800
 J          180.0000 08S02800
 J          230.0000 08S02700
 J          250.0000 08S02800D

 Upper outside values in test group relative to group bks:
 UJ         380.0000 09S02400
 U          380.0000 09S01500
 U          380.0000 08S02300
 U          380.0000 08S01400
 U          380.0000 08S06301D
 U          380.0000 09S02300
 U          380.0000 08S06301
 U          380.0000 08S02400
 U          390.0000 08S04000
 U          400.0000 08S02100
 U          400.0000 08S03900
 U          400.0000 08S04600
 U          400.0000 08S05100D
 U          400.0000 08S02900
 U          410.0000 08S01700
 UJ         420.0000 09S02500
 U          420.0000 08S03700
 U          420.0000 08S01800
 U          420.0000 08S01000
 U          420.0000 08S05100
 U          430.0000 08S03300
 U          430.0000 08S05000
 UJ         440.0000 09S00500
 U          440.0000 09S00500D
 U          440.0000 09S01400
```

```
U          440.0000 08S06001
           440.0000 08S04300
U          450.0000 08B01001
U          450.0000 08S01200
U          460.0000 09S00900
U          470.0000 08S04500
U          480.0000 09S01100
           520.0000 08S03800D
U          580.0000 09S00700
           580.0000 08S03800
U          820.0000 08S05601
U          820.0000 08S00900D
U         1100.0000 08S03400
U         1400.0000 08S05801
U         1500.0000 08S04700
J         3700.0000 08S05701

-------------------------------------------------------------
 BENZO(G,H,I)PERYLENE in UG/KG
-----------------------------

3s       ********.. .....  ...............................
bks         **  . ...    ....   .    .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        380.0000 U        1500.0000 U    75 /   87
 group2:  bks
 min, median, max, bdl/tot :          91.0000 J        350.0000 U         380.0000 U    13 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          317.5000
lq     =          340.0000 U
median =          350.0000 U
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U           10.0000 09S02000
 J           40.0000 08S04800
 J           42.0000 08S05200
 J           47.0000 08S02800
 J           73.0000 08S02700
 J           80.0000 08S01100
 J           86.0000 08S02800D
 J          120.0000 08S05301
 J          120.0000 08S01600
 J          200.0000 08S04300
 J          260.0000 08S05701
 J          260.0000 08S03800D
 J          300.0000 08S03800

 Upper outside values in test group relative to group bks:
 UJ         380.0000 09S02400
 U          380.0000 08S02300
 U          380.0000 08S06301
 U          380.0000 08S01400
 U          380.0000 08S06301D
 U          380.0000 08S02400
 U          380.0000 09S01500
 U          380.0000 09S02300
 U          390.0000 08S02200
 U          390.0000 08S04000
 U          390.0000 09S02700
 U          390.0000 08S05401
 U          400.0000 08S04600
 U          400.0000 08S02100
 U          400.0000 08S02900
 U          400.0000 08S05100D
 U          400.0000 08S03900
 U          410.0000 08S01700
 UJ         420.0000 09S02500
 U          420.0000 08S01000
```

```
U          420.0000 08S05100
U          420.0000 08S01800
U          420.0000 08S03700
U          430.0000 08S05000
U          430.0000 08S03300
U          430.0000 08S01500
U          430.0000 08S04900
UJ         440.0000 09S00500
U          440.0000 09S00500D
U          440.0000 09S01400
U          440.0000 08S06001
U          450.0000 08B01001
U          450.0000 08S01200
U          460.0000 09S00900
U          470.0000 08S04500
U          470.0000 08S05501
U          470.0000 08S03500
U          480.0000 09S01100
U          510.0000 08S04400
U          580.0000 09S00700
U          800.0000 08S00900
U          820.0000 08S00900D
U          820.0000 08S05601
U         1000.0000 08S05901
U         1100.0000 08S03400
U         1400.0000 08S05801
U         1500.0000 08S04700

-------------------------------------------------------------
 BENZO(K)FLUORANTHENE in UG/KG
-----------------------------

3s       ***********.. ......   -------------------------*
bks                 .....    ....   .   .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        370.0000 U        3700.0000 J    66 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         317.5000
lq     =         340.0000 U
median =         350.0000 U
uq     =         355.0000 U
hicut  =         377.5000
 Lower outside values in test group relative to group bks:
 U           10.0000 09S02000
 J           17.0000 08S02200
 J           54.0000 08S02800
 J           60.0000 09S02700
 J           74.0000 08S01500
 J           89.0000 08S04900
 J           92.0000 08S02600
 J           93.0000 08S05501
 J          110.0000 08S05401
 J          110.0000 08S05200
 J          110.0000 08S05901
 J          170.0000 08S00900
 J          170.0000 08S04300
 J          190.0000 08S04800
 J          210.0000 08S03800D
 J          230.0000 08S03800
 J          230.0000 08S02700
 J          250.0000 08S02800D
 J          280.0000 08S05301

 Upper outside values in test group relative to group bks:
 UJ         380.0000 09S02400
 U          380.0000 08S01400
 U          380.0000 09S02300
 U          380.0000 08S02300
```

```
U          380.0000 09S01500
U          380.0000 08S06301D
U          380.0000 08S06301
U          380.0000 08S02400
U          390.0000 08S04000
U          400.0000 08S02100
U          400.0000 08S04600
U          400.0000 08S03900
U          400.0000 08S05100D
U          400.0000 08S02900
U          410.0000 08S01700
UJ         420.0000 09S02500
U          420.0000 08S05100
U          420.0000 08S03700
U          420.0000 08S01800
U          420.0000 08S01000
U          430.0000 08S03300
U          430.0000 08S05000
UJ         440.0000 09S00500
U          440.0000 09S01400
U          440.0000 08S06001
U          440.0000 09S00500D
U          450.0000 08B01001
U          450.0000 08S01200
U          460.0000 09S00900
U          470.0000 08S03500
U          470.0000 08S04500
U          480.0000 09S01100
U          510.0000 08S04400
U          580.0000 09S00700
U          820.0000 08S05601
U          820.0000 08S00900D
U         1100.0000 08S03400
U         1400.0000 08S05801
U         1500.0000 08S04700
J         3700.0000 08S05701


-------------------------------------------------------------
 BERYLLIUM in MG/KG
-----------------------------

3s       ........ . ...  ........................*.......*****
bks              .... ...*.  *
 group1:  3s
 min, median, max, bdl/tot :          0.0200 U          0.1000 U          2.0000 J   86 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.0400 U          0.0400 U          0.0500 B   13 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
---------------------------------------------------
lowcut =          0.0400
lq     =          0.0400 U
median =          0.0400 U
uq     =          0.0400 U
hicut  =          0.0400
 Lower outside values in test group relative to group bks:
 U           0.0200 09S01900
 U           0.0200 09S01800
 U           0.0200 09S01600
 U           0.0200 09S01300
 U           0.0200 09S01000
 U           0.0300 08S01300
 U           0.0300 09S00900
 U           0.0300 09S01100
 U           0.0300 09S01200
 U           0.0300 09S01400
 U           0.0300 09S02100
 U           0.0300 09S01500
 U           0.0300 09S01700
 U           0.0300 08S01900
 U           0.0300 09S02000
```

Upper outside values in test group relative to group bks:

U	0.0500	08S03000
U	0.0500	08S01400
U	0.0500	08S03100
U	0.0500	08S02600
U	0.0500	08S02000
U	0.0500	08S03600
U	0.0600	08S05000
U	0.0600	08S03200
U	0.0600	08S03700
U	0.0600	08S05200
U	0.0600	08S05100D
U	0.0600	09S00500D
U	0.0600	08S05100
U	0.0700	08S02400
U	0.0700	08S06101
U	0.0800	08S03300
U	0.0800	08S06201
U	0.0800	08S04500
U	0.0800	08S05301
U	0.0800	08S06001
U	0.0900	08S02700
U	0.0900	08S03800D
U	0.0900	08S03800
U	0.1000	08S05701
U	0.1000	08S01500
U	0.1000	08S02100
U	0.1000	08S04100
U	0.1000	08S04000
U	0.1000	08S02800
U	0.1000	08S02800D
U	0.1100	09S02500
U	0.1100	08S06301D
U	0.1100	09S03601
U	0.1200	09S03501
U	0.1200	09S02400
U	0.1200	09S02901
U	0.1200	08S06301
U	0.1200	08S05401
U	0.1300	09S02901D
U	0.1300	08S04800
U	0.1300	08S02200
U	0.1300	08S01000
U	0.1300	08S01100
U	0.1400	08S03900
U	0.1400	08S01800
U	0.1400	08S01200
U	0.1400	08S04400
U	0.1400	08S04600
U	0.1400	09S03201
J	0.1400	08S05501
U	0.1600	08S03500
U	0.1700	09S00700
U	0.2100	08S04300
U	0.2400	08S02300
U	0.2400	08S05901
U	0.2500	09S03401
U	0.2600	08S01600
U	0.2700	08S04700
U	0.2900	08S02900
U	0.3000	08S00900
U	0.3400	08S03400
U	0.3500	08S00900D
U	0.3800	09S03001
U	0.4200	09S03101
U	0.4400	09S02600
	0.4500	08S01700
J	0.4600	09S01800D
J	0.4600	09S00600
U	0.4700	08S05601
J	0.4900	08S02500
J	0.5800	09S02700
J	0.5900	09S02800

```
 J            0.6600 09S03301
 J            2.0000 08S05801

-----------------------------------------------------------------
 BUTYLBENZYLPHTHALATE in UG/KG
-----------------------------
3s        .  ......................................*........
bks       ... .  .. ..... .   .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        400.0000 U        1500.0000 U    86 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          317.5000
lq     =          340.0000 U
median =          350.0000 U
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U           10.0000 09S02000

 Upper outside values in test group relative to group bks:
 UJ         380.0000 09S02400
 U          380.0000 08S06301
 U          380.0000 09S01500
 U          380.0000 09S02300
 U          380.0000 08S05301
 U          380.0000 08S02400
 U          380.0000 08S02300
 U          380.0000 08S06301D
 U          380.0000 08S01400
 U          390.0000 08S04000
 U          390.0000 08S05401
 U          390.0000 09S02700
 U          390.0000 08S01600
 U          390.0000 08S02200
 U          400.0000 08S01100
 U          400.0000 08S02100
 U          400.0000 08S02800D
 U          400.0000 08S04600
 U          400.0000 08S05200
 U          400.0000 08S03900
 U          400.0000 08S05100D
 U          400.0000 08S02800
 U          400.0000 08S02900
 U          410.0000 08S01700
 U          410.0000 08S03800
 UJ         420.0000 09S02500
 U          420.0000 08S05100
 U          420.0000 08S03800D
 U          420.0000 08S03700
 U          420.0000 08S01800
 U          420.0000 08S01000
 U          430.0000 08S04900
 U          430.0000 08S03300
 U          430.0000 08S01500
 U          430.0000 08S05000
 UJ         440.0000 09S00500
 U          440.0000 09S01400
 U          440.0000 08S04800
 U          440.0000 09S00500D
 U          440.0000 08S04300
 U          440.0000 08S06001
 J          440.0000 08S00900
 U          450.0000 08S01200
 U          450.0000 08S02700
 U          450.0000 08B01001
 U          460.0000 09S00900
```

```
U          470.0000 08S05501
U          470.0000 08S05701
U          470.0000 08S03500
U          470.0000 08S04500
U          480.0000 09S01100
U          510.0000 08S04400
U          580.0000 09S00700
U          820.0000 08S00900D
U          820.0000 08S05601
U         1000.0000 08S05901
U         1100.0000 08S03400
U         1400.0000 08S05801
U         1500.0000 08S04700

-------------------------------------------------------------
 CADMIUM in MG/KG
-----------------------------

3s       ..................*...*....*..*.****    ***************
bks                                       .......*. . .
 group1:  3s
 min, median, max, bdl/tot :          0.0600 U          0.0900 U          7.1000      61 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.4200 U          0.4600 U          1.1000 U    14 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          0.3600
lq     =          0.4350 U
median =          0.4600 U
uq     =          0.4850 U
hicut  =          0.5600
 Lower outside values in test group relative to group bks:
 U           0.0600 09S01300
 U           0.0600 08S04200
 U           0.0600 08S05301
 U           0.0600 09S00600
 U           0.0600 09S03601
 U           0.0600 08S06101
 U           0.0600 09S02100
 U           0.0600 09S01600
 U           0.0600 08S03200
 U           0.0600 08S06201
 U           0.0600 08S01300
 U           0.0600 09S01000
 U           0.0600 09S01200
 U           0.0600 08S04100
 U           0.0600 09S01800
 U           0.0600 08S02000
 U           0.0600 09S01900
 U           0.0600 09S02000
 U           0.0700 09S00800
 U           0.0700 09S01500
 U           0.0700 08S04600
 U           0.0700 09S02600
 U           0.0700 08S04000
 U           0.0700 08S01900
 U           0.0700 08S05200
 U           0.0700 08S03800
 U           0.0700 09S02901D
 U           0.0700 09S00500
 U           0.0700 09S02700
 U           0.0700 08S01600
 U           0.0700 08S03800D
 U           0.0700 08S05100D
 U           0.0700 09S02800
 U           0.0700 08S03000
 U           0.0700 09S03501
 U           0.0700 09S02901
 U           0.0700 08S03700
 J           0.0700 08S01100
```

```
U            0.0800 08S05701
U            0.0800 09S01400
U            0.0800 09S00500D
U            0.0800 09S01100
U            0.0800 08S05100
U            0.0800 09S00900
U            0.0800 09S03401
J            0.0800 08S06001
U            0.0900 09S03201
U            0.0900 09S01700
U            0.1000 09S00700
U            0.1000 08S01400
U            0.1000 08S02400
U            0.1100 08S05501
U            0.1100 09S02500
U            0.1200 09S03001
J            0.1200 09S02200
U            0.1300 09S03101
U            0.1400 08S05000
U            0.1500 08S05601
U            0.1700 08S05901
U            0.1900 09S03301
J            0.1900 08S03900
U            0.2000 08S03300
U            0.2100 09S01800D
U            0.2600 08S04700
U            0.2800 09S02300
J            0.3100 08S01700
J            0.3500 08S02200

Upper outside values in test group relative to group bks:
J            0.6100 08S06301
J            0.6600 08S06301D
J            0.7400 09S02400
J            0.7700 08S02800
J            0.8700 08S00900
J            0.8700 08S00900D
J            0.9600 08S02800D
J            1.1000 08S01500
J            1.2000 08S04900
             1.5000 08S01200
             1.5000 08S03100
             1.6000 08S04500
             1.9000 08S04800
             2.1000 08S05401
J            2.5000 08S05801
             2.5000 08S04300
             2.8000 08S02300
             3.0000 08S04400
             3.5000 08S03500
             5.0000 08S02100
             5.2000 08S03400
             5.9000 08S02900
             7.1000 08S02500


-------------------------------------------------------------
 CALCIUM in MG/KG
-----------------------------

bks      **   *** *  *         *   * *              *      *
3s       . ........... ..................**.************ *********
 group1:  3s
 min, median, max, bdl/tot :         103.0000 U        6860.0000 U      334000.0000       56 /   95
 group2:  bks
 min, median, max, bdl/tot :          39.6000 J         737.0000 B      124000.0000        0 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =       -6700.0000
lq     =         284.0000
median =         737.0000 B
```

```
uq     =        4940.0000
hicut  =       11924.0000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U        12000.0000 09S03101
          12400.0000 08S01500
          13000.0000 08S01100
 U        14600.0000 08S05301
 J        14900.0000 08S03200
 U        15300.0000 08S05801
          17500.0000 08S03600
 J        18700.0000 09S00600
 U        19000.0000 08S05901
          19900.0000 08S01800
 J        23400.0000 08S02800D
          24100.0000 09S02800
 J        25200.0000 08S02800
          27300.0000 08S04200
          27500.0000 08S02500
          28500.0000 08S02200
          30900.0000 08S04600
          35400.0000 08S04800
 J        37200.0000 09S00700
 J        37400.0000 08S05200
          38000.0000 08S00900D
          38000.0000 08S04700
          38100.0000 08S00900
          38800.0000 08S03800D
          41700.0000 08S01700
          42700.0000 08S03800
          47000.0000 08S02300
          47100.0000 08S03900
          48600.0000 08S04100
          50400.0000 08S05000
          61200.0000 08S03500
          63200.0000 08S01600
          78600.0000 08S03700
 J        91100.0000 09S02700
 J       103000.0000 08S02900
 J       114000.0000 08S05100D
         120000.0000 09S03601
 J       153000.0000 09S02600
         168000.0000 08S03400
         172000.0000 08S05100
         334000.0000 08S04000


-------------------------------------------------------------
 CARBAZOLE in UG/KG
-----------------------------

3s       *.  .......  .. ...................................
bks       ... .    ...  .   .    .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        400.0000 UJ       1500.0000 U    86 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U        380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         317.5000
lq     =         340.0000 U
median =         350.0000 U
uq     =         355.0000 U
hicut  =         377.5000
 Lower outside values in test group relative to group bks:
 U           10.0000 09S02000
 J          260.0000 08S05701

 Upper outside values in test group relative to group bks:
 UJ         380.0000 09S01500
```

```
UJ          380.0000 08S02300
UJ          380.0000 08S01400
UJ          380.0000 09S02400
UJ          380.0000 09S02300
U           380.0000 08S06301D
U           380.0000 08S02400
U           380.0000 08S05301
U           380.0000 08S06301
UJ          390.0000 08S02200
UJ          390.0000 08S01600
U           390.0000 08S05401
U           390.0000 08S04000
U           390.0000 09S02700
UJ          400.0000 08S02100
UJ          400.0000 08S01100
UJ          400.0000 08S05100D
UJ          400.0000 08S05200
U           400.0000 08S04600
U           400.0000 08S02900
U           400.0000 08S03900
U           400.0000 08S02800D
U           400.0000 08S02800
UJ          410.0000 08S01700
U           410.0000 08S03800
UJ          420.0000 08S01800
UJ          420.0000 09S02500
U           420.0000 08S05100
U           420.0000 08S03800D
U           420.0000 08S03700
U           420.0000 08S01000
UJ          430.0000 08S01500
U           430.0000 08S03300
U           430.0000 08S05000
U           430.0000 08S04900
UJ          440.0000 09S00500
UJ          440.0000 09S01400
UJ          440.0000 09S00500D
U           440.0000 08S06001
U           440.0000 08S04300
U           440.0000 08S04800
UJ          450.0000 08S01200
U           450.0000 08S02700
U           450.0000 08B01001
UJ          460.0000 09S00900
U           470.0000 08S04500
U           470.0000 08S05501
U           470.0000 08S03500
UJ          480.0000 09S01100
U           510.0000 08S04400
UJ          580.0000 09S00700
UJ          800.0000 08S00900
U           820.0000 08S05601
U           820.0000 08S00900D
U          1000.0000 08S05901
U          1100.0000 08S03400
U          1400.0000 08S05801
U          1500.0000 08S04700

-----------------------------------------------------------------
 CHROMIUM in MG/KG
-----------------------------
3s        *.*.*..* .********  * ********************************
bks            *  **     ** ** **   *     *
 group1:  3s
 min, median, max, bdl/tot :          0.3200 U          5.4000          208.0000      13 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.6200 B          2.4000            5.6000       0 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-----------------------------------------------------
```

```
lowcut =          0.1000
lq     =          1.7500
median =          2.4000
uq     =          2.8500
hicut  =          4.5000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J            4.6000 08S03800D
              5.4000 08S01100
              5.5000 08S05200
              5.6000 08S01500
              5.6000 09S02600
              5.7000 08S05100D
 J            6.5000 08S05801
 J            6.8000 08S05100
              6.8000 08S05901
 J            7.0000 08S04700
              7.0000 08S02800
              7.9000 09S03001
              7.9000 08S02600
              8.7000 08S02800D
              8.7000 09S03101
              9.2000 08S01400
 J            9.4000 08S04100
              9.8000 08S02200
             10.7000 08S01600
 J           11.0000 08S04600
             11.0000 08S00900D
             11.3000 09S02400
             11.4000 08S00900
 J           11.7000 08S04000
 J           11.8000 08S03900
 J           13.5000 08S04900
             14.5000 08S06301D
             14.6000 08S01800
 J           14.7000 08S05000
             15.0000 08S02700
 J           15.9000 09S00700
             16.0000 09S03301
             16.4000 08S02300
             17.7000 08S06301
 J           20.3000 08S04800
 J           21.1000 09S01700
 J           21.5000 08S04500
             27.0000 08S01700
             27.4000 08S01000
 J           29.1000 08S03500
             31.7000 08S02900
             36.9000 08S02400
 J           37.9000 08S04300
             38.8000 08S05401
 J           63.3000 08S04400
 J           65.7000 08S03400
             88.3000 08S02100
            130.0000 08S02500
            208.0000 08S01200


-------------------------------------------------------------
 CHRYSENE in UG/KG
-----------------------------

3s        *********...  ..... ..............*.....*.........*
bks                 ....   ..... . .   .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        380.0000 UJ       1900.0000      67 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U        380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
```

```
lowcut =        317.5000
lq     =        340.0000 U
median =        350.0000 U
uq     =        355.0000 U
hicut  =        377.5000
 Lower outside values in test group relative to group bks:
 U           10.0000 09S02000
 J           41.0000 08S03600
 J           43.0000 08S05401
 J           45.0000 08S04900
 J           50.0000 08S02600
 J           54.0000 08S01500
 J           56.0000 08S05200
 J           59.0000 08S04400
 J           85.0000 08S00900
 J          100.0000 08S04800
 J          110.0000 08S01000
 J          120.0000 08S02800
 J          130.0000 08S02800D
 J          140.0000 08S02700
 J          230.0000 08S01100
 J          250.0000 08S01600
 J          310.0000 08S05301

 Upper outside values in test group relative to group bks:
 UJ         380.0000 09S02400
 U          380.0000 08S01400
 U          380.0000 08S06301D
 U          380.0000 08S02300
 U          380.0000 08S06301
 U          380.0000 09S02300
 U          380.0000 09S01500
 U          380.0000 08S02400
 U          390.0000 09S02700
 U          390.0000 08S02200
 U          390.0000 08S04000
 J          390.0000 08S03800D
 U          400.0000 08S02100
 U          400.0000 08S02900
 U          400.0000 08S03900
 U          400.0000 08S04600
 U          400.0000 08S05100D
 U          410.0000 08S01700
 UJ         420.0000 09S02500
 U          420.0000 08S03700
 U          420.0000 08S05100
 U          420.0000 08S01800
            420.0000 08S03800
 U          430.0000 08S03300
 U          430.0000 08S05000
 UJ         440.0000 09S00500
 U          440.0000 08S06001
 U          440.0000 09S01400
 U          440.0000 09S00500D
 U          450.0000 08B01001
 U          450.0000 08S01200
 U          460.0000 09S00900
 U          470.0000 08S05501
 U          470.0000 08S04500
 U          470.0000 08S03500
 U          480.0000 09S01100
 U          580.0000 09S00700
 U          820.0000 08S05601
 U          820.0000 08S00900D
 U         1000.0000 08S05901
 U         1100.0000 08S03400
 U         1400.0000 08S05801
 U         1500.0000 08S04700
           1900.0000 08S05701

-----------------------------------------------------------------
 COBALT in MG/KG
```

```
-----------------------------
3s        ....................*............******.**.* .*  *  *.**
bks                                                  ...........
 group1:  3s
 min, median, max, bdl/tot :          0.1400 U          0.1800 U          2.6000 J    78 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.5300 U          0.5500 U          0.6000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          0.4900
lq     =          0.5350 U
median =          0.5500 U
uq     =          0.5650 U
hicut  =          0.6100
 Lower outside values in test group relative to group bks:
 U            0.1400 09S02000
 U            0.1400 09S01200
 U            0.1400 09S02100
 U            0.1400 08S02000
 U            0.1400 09S01600
 U            0.1400 09S01000
 U            0.1400 09S02200
 U            0.1400 09S01800
 U            0.1400 09S01900
 U            0.1500 08S03200
 U            0.1500 09S00800
 U            0.1500 08S03600
 U            0.1500 08S03100
 U            0.1500 09S01700
 U            0.1500 09S01300
 U            0.1500 08S02600
 U            0.1500 08S04200
 U            0.1500 08S01300
 U            0.1600 09S01500
 U            0.1600 08S03000
 U            0.1600 08S06101
 U            0.1600 08S02400
 U            0.1600 08S05200
 U            0.1600 09S02800
 U            0.1600 08S02200
 U            0.1600 08S01400
 U            0.1600 08S01900
 U            0.1600 08S01600
 U            0.1700 08S05100D
 U            0.1700 08S05000
 U            0.1700 08S06201
 U            0.1700 09S00500
 U            0.1700 08S05301
 U            0.1700 09S03601
 U            0.1700 08S06301D
 U            0.1700 08S03800D
 U            0.1700 08S03800
 U            0.1700 08S03700
 J            0.1700 08S01100
 U            0.1800 08S01500
 U            0.1800 09S02901D
 U            0.1800 09S03501
 U            0.1800 08S01000
 U            0.1800 09S01400
 U            0.1800 08S02700
 U            0.1800 08S06301
 U            0.1800 08S03300
 U            0.1800 09S02500
 U            0.1800 09S02300
 U            0.1800 08S05100
 U            0.1800 08S04900
 U            0.1800 08S04300
 U            0.1900 08S01200
 U            0.1900 09S00900
 U            0.1900 09S01100
```

```
 U            0.1900 09S02901
 U            0.1900 08S05401
 U            0.1900 09S00500D
 U            0.2000 08S04500
 U            0.2100 08S06001
 U            0.2100 08S05501
 U            0.2200 08S05701
 U            0.2200 09S03401
 U            0.2300 09S03201
 U            0.2300 09S00600
 J            0.2900 08S01800
 J            0.2900 08S04100
 U            0.3000 09S02400
 J            0.3000 08S03500
 J            0.3000 08S02300
 J            0.3100 08S02100
 U            0.3300 09S03001
 U            0.3600 09S03101
 J            0.3600 08S01700
 J            0.3600 08S00900D
 U            0.3700 08S02800D
 U            0.3700 08S02800
 U            0.3700 09S02600
 U            0.4000 08S05601
 J            0.4000 08S04600
 U            0.4200 09S02700
 J            0.4200 08S03900
 U            0.4400 08S05901

 Upper outside values in test group relative to group bks:
 U            0.6400 08S05801
 U            0.6500 09S00700
 J            0.7600 08S00900
 J            1.3000 08S03400
 J            2.6000 08S02900


-----------------------------------------------------------------
 COPPER in MG/KG
-----------------------------
bks       ..  . ...*  * ** * .
3s          .. ..*..**..*..*.*****.**.***************************
 group1:  3s
 min, median, max, bdl/tot :          0.6600 U          7.1000          77.5000      28 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.3100 U          1.1000 U         3.1000 U    10 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -0.6250
lq     =           0.7100 U
median =           1.1000 U
uq     =           1.6000
hicut  =           2.9350
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U            3.2000 09S02200
 J            3.2000 09S02500
 J            3.2000 08S06101
 U            3.3000 08S01400
 J            3.4000 08S03700
 U            3.6000 08S04000
 J            3.6000 08S03300
 J            3.8000 09S02300
 U            4.3000 08S03800
 U            4.3000 09S00600
 J            4.4000 09S02600
 U            5.1000 09S01400
 U            5.1000 08S01100
 J            5.3000 08S05200
```

```
U          5.6000 09S01700
U          5.6000 08S04600
           6.4000 08S05100
           6.5000 08S03800D
J          6.8000 08S01600
J          6.8000 09S03001
           6.8000 08S05100D
           7.0000 08S05301
           7.1000 08S03200
J          7.3000 08S02700
           7.4000 08S03900
J          7.9000 08S01800
J          8.0000 08S05601
           8.3000 08S02400
           8.7000 09S00500
           9.1000 08S02800
           9.5000 08S02800D
J          9.7000 09S03301
J          9.8000 08S02600
          10.0000 09S02400
          10.9000 09S00500D
J         11.0000 09S03101
J         11.0000 08S02200
J         11.0000 08S05901
          11.0000 08S04900
          11.0000 08S03600
J         11.1000 08S01000
          11.3000 08S04100
J         12.6000 08S03100
          13.1000 09S03601
          13.3000 08S06301
          14.7000 08S06301D
J         14.9000 08S02300
          15.2000 08S04300
          16.5000 09S00900
J         16.6000 08S01700
J         16.8000 08S04700
          16.9000 08S05000
J         17.4000 08S05801
          17.6000 09S01100
          18.5000 08S04500
          23.4000 08S03500
          23.5000 08S05501
          24.5000 08S05401
J         24.6000 08S00900D
J         24.8000 08S01500
J         25.5000 08S00900
          26.5000 08S02900
          27.8000 08S04400
          29.7000 09S00700
J         34.2000 08S02100
          43.7000 08S04800
J         49.3000 08S01200
          54.0000 09S03401
J         70.5000 08S02500
          77.5000 08S03400

-------------------------------------------------------------
 DALAPON in UG/KG
-----------------------------

3s       .*.....................................*.* .  ..
bks                                                .........
 group1:  3s
 min, median, max, bdl/tot :          3.3000 U        30.0000 U        160.0000 U    84 /   87
 group2:  bks
 min, median, max, bdl/tot :        100.0000 U       110.0000 U        220.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         -32.5000
```

```
lq     =          110.0000 U
median =          110.0000 U
uq     =          205.0000 U
hicut  =          347.5000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
<< NONE FOUND>>

-------------------------------------------------------------
 DI-N-BUTYLPHTHALATE in UG/KG
-----------------------------

3s        ***. ..... ......................................
bks         * . .*  ....    .  .                        ** .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 UJ        400.0000 UJ       1500.0000 UJ   83 /   87
 group2:  bks
 min, median, max, bdl/tot :         320.0000 J         350.0000 U        1000.0000 U    11 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
---------------------------------------------------
lowcut =          287.5000
lq     =          340.0000 U
median =          350.0000 U
uq     =          375.0000 U
hicut  =          427.5000
 Lower outside values in test group relative to group bks:
 UJ           10.0000 09S02000
 J            47.0000 08S02300
 J            52.0000 08S02600
 J            58.0000 08S01700
 J           210.0000 08S02500

 Upper outside values in test group relative to group bks:
 U           430.0000 08S04900
 U           430.0000 08S03300
 U           430.0000 08S01500
 U           430.0000 08S05000
 UJ          440.0000 08S04300
 UJ          440.0000 09S00500D
 UJ          440.0000 09S01400
 UJ          440.0000 09S00500
 U           440.0000 08S04800
 U           440.0000 08S06001
 U           450.0000 08B01001
 U           450.0000 08S02700
 U           450.0000 08S01200
 UJ          460.0000 09S00900
 UJ          470.0000 08S03500
 UJ          470.0000 08S04500
 U           470.0000 08S05701
 U           470.0000 08S05501
 UJ          480.0000 09S01100
 UJ          510.0000 08S04400
 UJ          580.0000 09S00700
 U           800.0000 08S00900
 U           820.0000 08S05601
 U           820.0000 08S00900D
 U          1000.0000 08S05901
 UJ         1100.0000 08S03400
 U          1400.0000 08S05801
 UJ         1500.0000 08S04700


-------------------------------------------------------------
 DI-N-OCTYLPHTHALATE in UG/KG
-----------------------------

3s        *  ... ..... ....................................
bks       **.  ..   ..... .
 group1:  3s
```

```
 min, median, max, bdl/tot :          1.0000 J        400.0000 U        1500.0000 U    86 /   87
 group2:  bks
 min, median, max, bdl/tot :        200.0000 J        340.0000 U         370.0000 U    13 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         325.0000
lq     =         340.0000 U
median =         340.0000 U
uq     =         350.0000 U
hicut  =         365.0000
 Lower outside values in test group relative to group bks:
 J            1.0000 09S02000

 Upper outside values in test group relative to group bks:
 UJ         370.0000 09S02600
 U          370.0000 08S01900
 U          370.0000 09S00600
 U          370.0000 08S02500
 U          370.0000 09S02800
 U          370.0000 08S04100
 U          370.0000 08S03000
 U          370.0000 08S06101
 U          370.0000 08S03600
 U          370.0000 09S00800
 UJ         380.0000 09S02400
 U          380.0000 09S01500
 U          380.0000 08S06301
 U          380.0000 08S01400
 U          380.0000 08S06301D
 U          380.0000 09S02300
 U          380.0000 08S02400
 U          380.0000 08S05301
 U          380.0000 08S02300
 U          390.0000 08S05401
 U          390.0000 08S01600
 U          390.0000 08S02200
 U          390.0000 08S04000
 U          390.0000 09S02700
 U          400.0000 08S02100
 U          400.0000 08S01100
 U          400.0000 08S03900
 U          400.0000 08S04600
 U          400.0000 08S05200
 U          400.0000 08S05100D
 U          400.0000 08S02800
 U          400.0000 08S02800D
 U          400.0000 08S02900
 U          410.0000 08S03800
 U          410.0000 08S01700
 UJ         420.0000 09S02500
 U          420.0000 08S05100
 U          420.0000 08S01000
 U          420.0000 08S03800D
 U          420.0000 08S03700
 U          420.0000 08S01800
 U          430.0000 08S03300
 U          430.0000 08S04900
 U          430.0000 08S01500
 U          430.0000 08S05000
 UJ         440.0000 09S00500
 U          440.0000 08S04800
 U          440.0000 08S04300
 U          440.0000 08S06001
 U          440.0000 09S00500D
 U          440.0000 09S01400
 U          450.0000 08S02700
 U          450.0000 08B01001
 U          450.0000 08S01200
 U          460.0000 09S00900
 U          470.0000 08S05701
 U          470.0000 08S03500
```

```
U          470.0000 08S04500
U          470.0000 08S05501
U          480.0000 09S01100
U          510.0000 08S04400
U          580.0000 09S00700
U          800.0000 08S00900
U          820.0000 08S05601
U          820.0000 08S00900D
U         1000.0000 08S05901
U         1100.0000 08S03400
U         1400.0000 08S05801
U         1500.0000 08S04700

-----------------------------------------------------------------
 DIBENZ(A,H)ANTHRACENE in UG/KG
-----------------------------
3s       ****. ........  ...................................
bks         .....    .....   .     .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U         390.0000 U        1500.0000 U    81 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U         350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-------------------------------------------------------
lowcut =         317.5000
lq     =         340.0000 U
median =         350.0000 U
uq     =         355.0000 U
hicut  =         377.5000
 Lower outside values in test group relative to group bks:
 U           10.0000 09S02000
 J           49.0000 08S02800D
 J           50.0000 08S04300
 J           59.0000 08S03800D
 J           70.0000 08S03800
 J           85.0000 08S05301
 J          280.0000 08S05701

 Upper outside values in test group relative to group bks:
 UJ         380.0000 09S02400
 U          380.0000 08S01400
 U          380.0000 08S02300
 U          380.0000 09S02300
 U          380.0000 09S01500
 U          380.0000 08S06301
 U          380.0000 08S06301D
 U          380.0000 08S02400
 U          390.0000 08S02200
 U          390.0000 08S05401
 U          390.0000 08S04000
 U          390.0000 08S01600
 U          390.0000 09S02700
 U          400.0000 08S05100D
 U          400.0000 08S02100
 U          400.0000 08S01100
 U          400.0000 08S04600
 U          400.0000 08S05200
 U          400.0000 08S02800
 U          400.0000 08S02900
 U          400.0000 08S03900
 U          410.0000 08S01700
 UJ         420.0000 09S02500
 UJ         420.0000 08S01000
 U          420.0000 08S03700
 U          420.0000 08S05100
 U          420.0000 08S01800
 U          430.0000 08S03300
 U          430.0000 08S05000
 U          430.0000 08S04900
```

```
U          430.0000 08S01500
UJ         440.0000 09S00500
U          440.0000 08S06001
U          440.0000 08S04800
U          440.0000 09S00500D
U          440.0000 09S01400
U          450.0000 08S02700
U          450.0000 08B01001
U          450.0000 08S01200
U          460.0000 09S00900
U          470.0000 08S03500
U          470.0000 08S04500
U          470.0000 08S05501
U          480.0000 09S01100
U          510.0000 08S04400
U          580.0000 09S00700
U          800.0000 08S00900
U          820.0000 08S05601
U          820.0000 08S00900D
U         1000.0000 08S05901
U         1100.0000 08S03400
U         1400.0000 08S05801
U         1500.0000 08S04700


-------------------------------------------------------------
 DICAMBA in UG/KG
-----------------------------

3s       ........................................   ..   *
bks                                              .....  ....
 group1:  3s
 min, median, max, bdl/tot :          2.6000 U          3.2000 UJ         85.0000 J    86 /   87
 group2:  bks
 min, median, max, bdl/tot :         10.0000 U         11.0000 U          22.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -3.2500
lq     =          11.0000 U
median =          11.0000 U
uq     =          20.5000 U
hicut  =          34.7500
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J           85.0000 09S03001


-------------------------------------------------------------
 DIELDRIN in UG/KG
-----------------------------

3s       **************.  .  .*......*...........***.*********...
bks                   .... ..   ..                ..         *
 group1:  3s
 min, median, max, bdl/tot :          0.1500 J          3.9500 U        440.0000 U    51 /   96
 group2:  bks
 min, median, max, bdl/tot :          3.3000 U          3.5000 U         95.0000      14 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =           3.0250
lq     =           3.4000 U
median =           3.5000 U
uq     =           3.6500 U
hicut  =           4.0250
 Lower outside values in test group relative to group bks:
 J            0.1500 09S03601
 J            0.1800 09S01600
 J            0.2800 09S01900
 J            0.2900 08S05701
```

J	0.3300	08S05301
J	0.4700	09S01200
J	0.5400	09S01800D
J	0.5700	09S01800
J	0.6900	08S05100D
J	0.7000	08S01000
J	0.8300	08S04000
J	0.9900	09S01500
J	1.1000	09S02901
J	1.2000	08S03300
J	1.3000	08B01001
J	1.4000	08S01100
J	1.5000	08S00900
J	1.7000	08S01800
J	1.7000	08S05801
J	1.9000	08S02200
J	2.0000	08S05601
J	2.1000	09S03301
J	2.1000	09S02400
J	2.5000	08S05901
J	2.6000	08S05501

Upper outside values in test group relative to group bks:

U	4.1000	08S03800
U	4.2000	08S05100
U	4.2000	08S03700
U	4.2000	09S02500
U	4.2000	08S03800D
U	4.3000	08S04900
U	4.4000	08S04800
U	4.4000	08S04300
U	4.4000	08S02700
U	4.4000	08S06001
U	4.4000	09S01400
U	4.6000	09S00900
U	4.7000	08S04500
U	4.7000	08S03500
U	4.9000	09S03201
J	5.1000	08S02000
J	5.3000	08S02100
J	6.2000	08S01900
J	6.5000	08S01400
U	7.4000	09S00800
U	8.6000	08S05000
J	9.0000	08S01200
J	9.1000	09S01700
J	10.0000	08S02500
J	11.0000	09S03001
J	12.0000	08S00900D
J	14.0000	09S03401
U	15.0000	08S04700
J	17.0000	09S03101
U	19.0000	08S02300
J	20.0000	08S06301
U	22.0000	08S01500
	23.0000	08S04100
J	24.0000	08S06301D
J	26.0000	08S03400
U	35.0000	08S03100
U	39.0000	08S01600
D	91.0000	08S04400
U	95.0000	09S01100
U	120.0000	09S00700
U	440.0000	09S00500
U	440.0000	09S00500D

DINOSEB in UG/KG

```
3s      ***.......................*......**    *..   .****
bks                                          ....   ....
```

```
 group1:  3s
 min, median, max, bdl/tot :          2.8000 U          6.1000 U        320.0000 J    71 /   87
 group2:  bks
 min, median, max, bdl/tot :         10.0000 U         11.0000 U         22.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -3.2500
lq     =          11.0000 U
median =          11.0000 U
uq     =          20.5000 U
hicut  =          34.7500
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J           36.0000 08S04400
             40.0000 09S00500D
 J          240.0000 08S03100
 J          320.0000 09S02500


-----------------------------------------------------------------
 ENDOSULFAN I in UG/KG
-----------------------------

3s       ***. ........ ........................................
bks        ...      .......                          ..     .
 group1:  3s
 min, median, max, bdl/tot :          0.4100 J          2.0500 U        230.0000 U    91 /   96
 group2:  bks
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          1.7250
lq     =          1.8000 U
median =          1.8000 U
uq     =          1.8500 U
hicut  =          1.9250
 Lower outside values in test group relative to group bks:
 J           0.4100 08S02200
 J           0.5000 08S04600
 J           0.5800 08S04900
 J           0.7300 08S01200
 J           1.2000 08S04300
 U           1.7000 08B01001

 Upper outside values in test group relative to group bks:
 U           2.0000 08S01100
 U           2.0000 08S04000
 U           2.0000 09S02400
 U           2.0000 09S02700
 U           2.0000 08S05401
 U           2.0000 09S02901
 U           2.0000 08S02400
 U           2.0000 08S02800D
 U           2.0000 09S02901D
 U           2.0000 09S02300
 U           2.0000 09S03501
 U           2.1000 08S03800
 U           2.1000 08S01700
 U           2.1000 08S05100D
 U           2.1000 08S03900
 U           2.1000 08S05200
 U           2.1000 08S02800
 U           2.1000 08S02900
 UJ          2.2000 08S01000
 U           2.2000 08S05100
 U           2.2000 09S01400
 U           2.2000 08S03700
 U           2.2000 08S03800D
```

```
U            2.2000 09S02500
U            2.2000 08S03300
U            2.2000 08S06001
U            2.2000 08S01800
U            2.3000 08S04800
U            2.3000 08S02700
U            2.4000 08S05701
U            2.4000 08S03500
U            2.4000 09S00900
U            2.4000 08S04500
U            2.4000 08S05501
U            2.5000 09S03201
U            2.6000 08S04400
U            3.8000 09S00800
U            3.9000 09S03001
U            3.9000 09S03101
U            4.1000 08S00900
U            4.2000 08S05601
U            4.2000 08S00900D
U            4.4000 08S05000
U            5.2000 08S05901
U            5.3000 09S03301
U            5.6000 08S03400
U            7.4000 08S05801
U            7.7000 08S04700
U            9.4000 08S02500
U            9.8000 08S02300
U           10.0000 08S02100
U           11.0000 08S01500
U           18.0000 08S03100
U           20.0000 08S01600
U           46.0000 09S03401
U           49.0000 09S01100
U           60.0000 09S00700
U          230.0000 09S00500
U          230.0000 09S00500D

-------------------------------------------------------------
 ENDOSULFAN II in UG/KG
-----------------------------

3s       *****... .. .......................*......*............
bks            .. .. . ... ..                        ..    .
 group1:  3s
 min, median, max, bdl/tot :          0.0980 J          4.0000 U        440.0000 U    84 /   96
 group2:  bks
 min, median, max, bdl/tot :          3.3000 U          3.5000 U         17.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          3.0250
lq     =          3.4000 U
median =          3.5000 U
uq     =          3.6500 U
hicut  =          4.0250
 Lower outside values in test group relative to group bks:
 J            0.0980 09S01600
 J            0.2400 08S02200
 J            0.4300 08S01800
 J            0.9700 08S01000
 J            1.1000 09S02200
 J            1.2000 08S05801
 J            1.6000 08S02100
 J            2.2000 09S01300
 J            2.4000 08S02400

 Upper outside values in test group relative to group bks:
 U            4.1000 08S01700
 U            4.1000 08S03800
 U            4.2000 08S05100
 U            4.2000 08S03800D
```

```
U            4.2000 09S02500
U            4.2000 08S03700
J            4.2000 08S05701
U            4.3000 08S04900
U            4.3000 08S03300
U            4.4000 08S04300
U            4.4000 08S02700
U            4.4000 08S04800
U            4.4000 09S01400
U            4.4000 08S06001
U            4.6000 08S05501
U            4.6000 09S00900
U            4.7000 08S03500
U            4.7000 08S04500
U            4.9000 09S03201
U            5.1000 08S04400
J            5.9000 08S05601
J            7.0000 09S01700
U            7.4000 09S00800
U            7.5000 09S03001
U            7.6000 09S03101
U            8.0000 08S00900
U            8.2000 08S00900D
U            8.6000 08S05000
U           10.0000 09S03301
U           10.0000 08S05901
U           11.0000 08S03400
U           15.0000 08S04700
U           18.0000 08S02500
U           19.0000 08S02300
U           22.0000 08S01500
U           35.0000 08S03100
U           39.0000 08S01600
U           90.0000 09S03401
U           95.0000 09S01100
U          120.0000 09S00700
U          440.0000 09S00500
U          440.0000 09S00500D

-------------------------------------------------------------
 ENDOSULFAN SULFATE in UG/KG
-----------------------------

3s       *******.... ..... ..............................*..*..*...
bks              . ....  . .. . .                      ..    .
 group1:  3s
 min, median, max, bdl/tot :          0.2800 J          3.8000 U        440.0000 U    80 /   96
 group2:  bks
 min, median, max, bdl/tot :          3.3000 U          3.5000 U         17.0000 U    15 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          3.0250
lq     =          3.4000 U
median =          3.5000 U
uq     =          3.6500 U
hicut  =          4.0250
 Lower outside values in test group relative to group bks:
 J           0.2800 09S02700
 J           0.7700 08S03800D
 J           0.8700 08S03800
 J           1.0000 08S05200
 J           1.2000 09S03001
 J           1.5000 08S02800
 J           1.5000 08S02800D
 J           1.7000 08S05601
 J           2.0000 08S01200
 J           2.1000 08S03700
 J           2.3000 08S01500
 J           2.5000 08S04400
 J           2.7000 08S05801
```

Upper outside values in test group relative to group bks:

U	4.1000	08S01700
UJ	4.2000	08S01000
U	4.2000	08S01800
U	4.2000	09S02500
U	4.2000	08S05100
U	4.3000	08S04900
U	4.3000	08S03300
U	4.4000	08S06001
U	4.4000	08S02700
U	4.4000	08S04800
U	4.4000	08S04300
U	4.4000	09S01400
U	4.6000	09S00900
U	4.6000	08S05501
U	4.7000	08S04500
U	4.7000	08S03500
U	4.7000	08S05701
U	4.9000	09S03201
U	7.4000	09S00800
U	7.6000	09S03101
J	8.1000	08S00900D
U	8.6000	08S05000
U	10.0000	09S03301
U	10.0000	08S05901
U	11.0000	08S03400
	11.0000	08S00900
U	15.0000	08S04700
U	18.0000	08S02500
U	19.0000	08S02300
U	20.0000	08S02100
J	25.0000	08S03100
U	39.0000	08S01600
U	90.0000	09S03401
U	95.0000	09S01100
U	120.0000	09S00700
U	440.0000	09S00500
U	440.0000	09S00500D

ENDRIN in UG/KG

```
3s        ********..... .......................*.** **.*...*.*.
bks               .. .......   ..                      .     .
```

group1: 3s
min, median, max, bdl/tot : 0.0810 J 3.9500 U 440.0000 U 71 / 96
group2: bks
min, median, max, bdl/tot : 3.3000 U 3.5000 U 17.0000 U 15 / 15

no evidence of different populations at alpha=.95

Outside values test group relative to background group bks

---

lowcut =	3.0250
lq =	3.4000 U
median =	3.5000 U
uq =	3.6500 U
hicut =	4.0250

Lower outside values in test group relative to group bks:

J	0.0810	09S01800D
J	0.2400	09S02600
J	0.2800	08S03500
J	0.5100	09S02800
J	0.5600	09S02100
J	0.6100	09S01800
J	0.7400	08S00900
J	0.7400	09S02400
J	0.7500	09S02700
J	0.8800	08S03700
J	1.0000	08S00900D
J	1.0000	08S03000
J	1.8000	08S01600
J	2.0000	09S02901

```
J            2.9000 09S03001

Upper outside values in test group relative to group bks:
U            4.1000 08S03800
U            4.1000 08S01700
UJ           4.2000 08S01000
U            4.2000 08S03800D
U            4.2000 08S05100
U            4.2000 08S01800
U            4.3000 08S04900
U            4.3000 08S03300
U            4.4000 08S06001
U            4.4000 08S04800
U            4.4000 08S02700
U            4.4000 09S01400
U            4.4000 08S04300
J            4.5000 09S03201
U            4.6000 08S05501
U            4.6000 09S00900
U            4.7000 08S04500
U            5.1000 08S04400
J            5.2000 08S04600
J            6.3000 08S05701
             6.7000 08S01200
U            8.2000 08S05601
J            8.5000 09S00800
U            8.6000 08S05000
J            8.7000 09S02500
U           10.0000 08S05901
U           10.0000 09S03301
U           11.0000 08S03400
J           11.0000 09S03101
U           14.0000 08S05801
U           15.0000 08S04700
U           18.0000 08S02500
U           19.0000 08S02300
U           20.0000 08S02100
U           22.0000 08S01500
J           54.0000 09S03401
U           95.0000 09S01100
U          120.0000 09S00700
J          130.0000 08S03100
U          440.0000 09S00500
U          440.0000 09S00500D


-------------------------------------------------------------
 ENDRIN ALDEHYDE in UG/KG
-----------------------------

3s       ****************. ........................**...........
bks                      . ....... . ..              ..    .
 group1:  3s
 min, median, max, bdl/tot :          0.1100 J          3.7000 U        440.0000 U    63 /   96
 group2:  bks
 min, median, max, bdl/tot :          3.3000 U          3.5000 U         17.0000 U    15 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          3.0250
lq     =          3.4000 U
median =          3.5000 U
uq     =          3.6500 U
hicut  =          4.0250
 Lower outside values in test group relative to group bks:
 J           0.1100 09S01300
 J           0.2700 08S01700
 J           0.2700 08S02200
 J           0.2800 09S02400
 J           0.3200 09S02300
 J           0.3300 09S02100
 J           0.3800 09S02800
 J           0.4500 08S02600
```

```
J            0.4600 08S01400
J            0.4700 08S06101
J            0.5100 08S01900
J            0.5400 08S05501
J            0.5500 08S01300
J            0.5900 08S02700
J            0.6800 08S04800
J            0.7100 08S02900
J            0.7200 08S02000
J            0.7300 08S06301
J            0.8600 08S06301D
J            0.9100 08S01800
J            0.9600 08S03500
J            1.0000 08S01000
J            1.0000 08S02100
J            1.2000 08S03400
J            1.3000 09S02500
J            1.3000 08S02400
J            1.4000 08S04900
J            1.4000 08S01100
J            1.4000 08S05401
J            1.5000 08S00900
J            1.6000 08S04300

Upper outside values in test group relative to group bks:
U            4.1000 08S03800
U            4.2000 08S05100
U            4.2000 08S03800D
U            4.2000 08S03700
U            4.3000 08S03300
U            4.4000 09S01400
U            4.4000 08S06001
U            4.6000 09S00900
U            4.7000 08S04500
U            4.7000 08S05701
U            4.9000 09S03201
U            5.1000 08S04400
J            5.9000 08S00900D
             7.1000 08S01200
U            7.4000 09S00800
U            7.5000 09S03001
U            7.6000 09S03101
U            8.2000 08S05601
U            8.6000 08S05000
U           10.0000 09S03301
U           10.0000 08S05901
U           14.0000 08S05801
U           15.0000 08S04700
U           18.0000 08S02500
U           19.0000 08S02300
U           22.0000 08S01500
U           35.0000 08S03100
U           39.0000 08S01600
U           90.0000 09S03401
U           95.0000 09S01100
U          120.0000 09S00700
U          440.0000 09S00500
U          440.0000 09S00500D


-------------------------------------------------------------
 ENDRIN KETONE in UG/KG
-----------------------------

3s       ****..... *.. ..*... ...*.............................
bks          ...  .  .. ..   .                        ..  .
 group1:  3s
 min, median, max, bdl/tot :          0.2000 J          3.9000 U        440.0000 U    86 /   96
 group2:  bks
 min, median, max, bdl/tot :          3.3000 U          3.5000 U         17.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
```

```
-----------------------------------------------------
lowcut =          3.0250
lq     =          3.4000 U
median =          3.5000 U
uq     =          3.6500 U
hicut  =          4.0250
 Lower outside values in test group relative to group bks:
 J            0.2000 09S02901
 J            0.3600 08S06301
 J            0.5100 08S06301D
 J            0.6600 08S05901
 J            1.2000 08S05401
 J            1.4000 09S03001
 J            2.6000 08S05801

 Upper outside values in test group relative to group bks:
 U            4.1000 08S01700
 U            4.1000 08S03800
 UJ           4.2000 08S01000
 U            4.2000 09S02500
 U            4.2000 08S03700
 U            4.2000 08S05100
 U            4.2000 08S03800D
 U            4.2000 08S01800
 U            4.3000 08S03300
 U            4.4000 08S06001
 U            4.4000 08S04300
 U            4.4000 09S01400
 U            4.4000 08S02700
 U            4.4000 08S04800
 U            4.6000 08S05501
 U            4.6000 09S00900
 U            4.7000 08S03500
 U            4.7000 08S05701
 U            4.7000 08S04500
 U            4.9000 09S03201
 U            5.1000 08S04400
 U            7.4000 09S00800
 U            7.6000 09S03101
 U            8.2000 08S05601
 U            8.6000 08S05000
 U           10.0000 09S03301
 U           11.0000 08S03400
 U           15.0000 08S04700
 U           18.0000 08S02500
 U           19.0000 08S02300
 U           20.0000 08S02100
 U           22.0000 08S01500
 U           35.0000 08S03100
 U           39.0000 08S01600
 U           90.0000 09S03401
 U           95.0000 09S01100
 U          120.0000 09S00700
 U          440.0000 09S00500
 U          440.0000 09S00500D


-------------------------------------------------------------
 FLUORANTHENE in UG/KG
-----------------------------

3s       **********... ...... .......................***..*
bks                .....   ......    .    .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        370.0000 U        2600.0000      63 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         317.5000
lq     =         340.0000 U
```

```
median =          350.0000 U
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U            10.0000 09S02000
 J            25.0000 08S02200
 J            30.0000 09S02700
 J            50.0000 08S01500
 J            51.0000 08S05401
 J            58.0000 08S02600
 J            59.0000 08S04900
 J            61.0000 08S03500
 J            69.0000 08S02700
 J            78.0000 08S00900
 J            81.0000 08S05200
 J            86.0000 08S03600
 J            88.0000 08S05601
 J           100.0000 08S04400
 J           110.0000 08S05501
 J           120.0000 08S04800
 J           160.0000 08S01600
 J           170.0000 08S02800
 J           200.0000 08S02800D
 J           260.0000 08S01100

 Upper outside values in test group relative to group bks:
 UJ          380.0000 09S02400
 U           380.0000 08S01400
 U           380.0000 08S02300
 U           380.0000 09S02300
 U           380.0000 08S02400
 U           380.0000 09S01500
 U           380.0000 08S06301D
 U           380.0000 08S06301
 U           390.0000 08S04000
 U           400.0000 08S03900
 U           400.0000 08S05100D
 U           400.0000 08S04600
 U           400.0000 08S02100
 U           400.0000 08S02900
 U           410.0000 08S01700
 UJ          420.0000 09S02500
 U           420.0000 08S05100
 U           420.0000 08S01000
 U           420.0000 08S03700
 U           420.0000 08S01800
 U           430.0000 08S03300
 U           430.0000 08S05000
 UJ          440.0000 09S00500
 U           440.0000 08S06001
 U           440.0000 09S01400
 U           440.0000 09S00500D
 U           450.0000 08B01001
 U           450.0000 08S01200
 U           460.0000 09S00900
 U           470.0000 08S04500
 U           480.0000 09S01100
             540.0000 08S03800
             570.0000 08S04300
 U           580.0000 09S00700
             610.0000 08S03800D
             700.0000 08S05301
 U           820.0000 08S00900D
 U          1000.0000 08S05901
 U          1100.0000 08S03400
 U          1400.0000 08S05801
 U          1500.0000 08S04700
            2600.0000 08S05701

-------------------------------------------------------------
 HEPTACHLOR in UG/KG
-----------------------------
```

```
3s       **. ...... .  ........................*..............*
bks        ...     ....  .                          ..    .
 group1:  3s
 min, median, max, bdl/tot :          0.1200 J          2.0500 U        680.0000 D    91 /   96
 group2:  bks
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
---------------------------------------------------
lowcut =          1.7250
lq     =          1.8000 U
median =          1.8000 U
uq     =          1.8500 U
hicut  =          1.9250
 Lower outside values in test group relative to group bks:
 J            0.1200 09S03201
 J            0.2300 08S05301
 J            1.1000 09S03101
 UJ           1.7000 08B01001
 U            1.7000 08S01200

 Upper outside values in test group relative to group bks:
 U            2.0000 08S02200
 U            2.0000 08S01100
 U            2.0000 08S04000
 U            2.0000 08S02800D
 U            2.0000 09S02700
 U            2.0000 08S02400
 U            2.0000 09S02901
 U            2.0000 08S04600
 U            2.0000 08S05401
 U            2.0000 09S02901D
 U            2.0000 09S02400
 U            2.0000 09S02300
 U            2.0000 09S03501
 U            2.1000 08S01700
 U            2.1000 08S05100D
 U            2.1000 08S05200
 U            2.1000 08S03900
 U            2.1000 08S02900
 U            2.1000 08S03800
 U            2.1000 08S02800
 UJ           2.2000 08S01000
 U            2.2000 08S05100
 U            2.2000 08S03800D
 U            2.2000 08S04900
 U            2.2000 08S03700
 U            2.2000 08S04300
 U            2.2000 09S02500
 U            2.2000 08S03300
 U            2.2000 09S01400
 U            2.2000 08S06001
 U            2.2000 08S01800
 U            2.3000 08S04800
 U            2.3000 08S02700
 J            2.3000 09S03001
 U            2.4000 08S05701
 U            2.4000 08S03500
 U            2.4000 08S05501
 U            2.4000 08S04500
 U            2.4000 09S00900
 U            2.6000 08S04400
 U            3.8000 09S00800
 U            4.1000 08S00900
 U            4.2000 08S05601
 U            4.2000 08S00900D
 U            4.4000 08S05000
 U            5.2000 08S05901
 U            5.3000 09S03301
 U            5.6000 08S03400
 U            7.4000 08S05801
```

```
U            7.7000 08S04700
U            9.4000 08S02500
U            9.8000 08S02300
U           10.0000 08S02100
U           14.0000 08S01500
U           20.0000 08S01600
U           46.0000 09S03401
U           49.0000 09S01100
U           60.0000 09S00700
U          230.0000 09S00500
U          230.0000 09S00500D
D          680.0000 08S03100
```

HEPTACHLOR EPOXIDE in UG/KG

```
3s        ************.*......... .........*........***.******.*.
bks                  .... ..  .....                  . .  .
 group1:  3s
 min, median, max, bdl/tot :          0.0520 J          2.0000 U        230.0000 U    60 /   96
 group2:  bks
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    15 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
```

```
lowcut =          1.7250
lq     =          1.8000 U
median =          1.8000 U
uq     =          1.8500 U
hicut  =          1.9250
 Lower outside values in test group relative to group bks:
 J            0.0520 09S01500
 J            0.0810 09S01300
 J            0.1000 09S01700
 J            0.1200 08S02800D
 J            0.1400 08S02800
 J            0.2200 08S02900
 J            0.2300 08S06301
 J            0.2300 09S00900
 J            0.2400 09S00800
 J            0.2400 08S05601
 J            0.2400 08S05501
 J            0.2700 08S06301D
 J            0.3400 09S02800
 J            0.4800 09S03601
 J            0.5400 08S05000
 J            0.6000 08S00900
 J            0.6800 08S04300
 J            1.1000 08S02500
 J            1.1000 08S00900D
 J            1.4000 08S05801
 J            1.4000 08S04800
 J            1.5000 08S01200
 J            1.6000 08S03400
 U            1.7000 08B01001
 J            1.7000 09S02200

 Upper outside values in test group relative to group bks:
 U            2.0000 08S04000
 U            2.0000 09S02901
 U            2.0000 08S02400
 U            2.0000 08S04600
 U            2.0000 08S01100
 U            2.0000 09S02700
 U            2.0000 09S02901D
 U            2.0000 09S03501
 U            2.0000 08S02200
              2.0000 09S02100
 U            2.1000 08S03800
 U            2.1000 08S05100D
 U            2.1000 08S05200
```

```
U            2.1000 08S01700
UJ           2.2000 08S01000
U            2.2000 08S05100
U            2.2000 08S06001
U            2.2000 08S04900
U            2.2000 08S03700
U            2.2000 08S03800D
U            2.2000 08S03300
U            2.2000 08S01800
U            2.2000 09S01400
U            2.3000 08S02700
U            2.4000 08S04500
U            2.4000 08S05701
U            2.5000 09S03201
J            3.0000 09S03101
             3.8000 08S03500
U            3.9000 09S03001
             3.9000 09S02400
U            5.2000 08S05901
U            5.3000 09S03301
             5.4000 09S02300
U            7.7000 08S04700
             7.9000 08S03900
             9.7000 08S05401
U            9.8000 08S02300
U           10.0000 08S02100
            11.0000 08S04400
            11.0000 08S01500
U           20.0000 08S01600
            27.0000 09S02500
J           29.0000 09S03401
U           49.0000 09S01100
U           60.0000 09S00700
J          130.0000 08S03100
U          230.0000 09S00500
U          230.0000 09S00500D


-------------------------------------------------------------
 INDENO(1,2,3-CD)PYRENE in UG/KG
-----------------------------

3s       ******.  ....... . .........................*......
bks            ... .   .....     . .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        380.0000 U        1500.0000 U    75 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         317.5000
lq     =         340.0000 U
median =         350.0000 U
uq     =         355.0000 U
hicut  =         377.5000
 Lower outside values in test group relative to group bks:
 U           10.0000 09S02000
 J           38.0000 08S05200
 J           58.0000 08S04800
 J           61.0000 08S02800
 J           87.0000 08S02700
 J          120.0000 08S01100
 J          130.0000 08S02800D
 J          150.0000 08S01600
 J          160.0000 08S05301
 J          200.0000 08S04300
 J          240.0000 08S03800D
 J          270.0000 08S03800

 Upper outside values in test group relative to group bks:
 UJ         380.0000 09S02400
```

```
U          380.0000 08S02300
U          380.0000 08S01400
U          380.0000 09S02300
U          380.0000 09S01500
U          380.0000 08S02400
U          380.0000 08S06301
U          380.0000 08S06301D
U          390.0000 08S05401
U          390.0000 08S04000
U          390.0000 09S02700
U          390.0000 08S02200
U          400.0000 08S03900
U          400.0000 08S04600
U          400.0000 08S05100D
U          400.0000 08S02900
U          400.0000 08S02100
U          410.0000 08S01700
UJ         420.0000 09S02500
U          420.0000 08S05100
U          420.0000 08S01800
U          420.0000 08S01000
U          420.0000 08S03700
U          430.0000 08S04900
U          430.0000 08S01500
U          430.0000 08S05000
U          430.0000 08S03300
UJ         440.0000 09S00500
U          440.0000 09S01400
U          440.0000 09S00500D
U          440.0000 08S06001
U          450.0000 08S01200
U          450.0000 08B01001
U          460.0000 09S00900
J          460.0000 08S05701
U          470.0000 08S04500
U          470.0000 08S05501
U          470.0000 08S03500
U          480.0000 09S01100
U          510.0000 08S04400
U          580.0000 09S00700
U          800.0000 08S00900
U          820.0000 08S00900D
U          820.0000 08S05601
U         1000.0000 08S05901
U         1100.0000 08S03400
U         1400.0000 08S05801
U         1500.0000 08S04700

-------------------------------------------------------------
 IRON in MG/KG
-----------------------------

3s       ...*************** ********* **************************
bks       *         ** *   *    *  * *  * ****
 group1:  3s
 min, median, max, bdl/tot :          19.1000 U         372.0000          6440.0000 J     7 /   95
 group2:  bks
 min, median, max, bdl/tot :          25.6000 J         357.0000 J         575.0000 J     0 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =        -131.2500
lq     =         235.5000
median =         357.0000 J
uq     =         480.0000
hicut  =         846.7500
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
           909.0000 08S04600
 J         962.0000 08S01700
           967.0000 08S04000
```

```
            975.0000 09S02700
 J          982.0000 08S01800
 J         1000.0000 08S05601
 J         1140.0000 08S02300
           1140.0000 08S04500
           1170.0000 08S04700
 J         1230.0000 08S01200
 J         1260.0000 08S05801
           1390.0000 08S04400
           1520.0000 08S02800
 J         1630.0000 09S00700
 J         1690.0000 08S02100
 J         1780.0000 08S05901
           2050.0000 08S04100
 J         2120.0000 08S02500
           2230.0000 08S03500
 J         2570.0000 08S01500
           2690.0000 08S02900
           3090.0000 08S04800
           4690.0000 08S03400
 J         4740.0000 08S00900D
           4760.0000 08S02800D
 J         6440.0000 08S00900


-----------------------------------------------------------------
 LEAD in MG/KG
-----------------------------
3s       *** .*****************************************************
bks        ** **  ** ****  *   **         *
 group1:  3s
 min, median, max, bdl/tot :          0.6200 J        18.6000          902.0000       2 /   95
 group2:  bks
 min, median, max, bdl/tot :          1.1000 J         6.2000           23.2000       0 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-------------------------------------------------------
lowcut =          -7.0000
lq     =           2.6000
median =           6.2000
uq     =           9.0000
hicut  =          18.6000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J           18.7000 09S00500
             19.9000 09S03401
             19.9000 08S06001
             20.6000 08S04400
             21.5000 08S04900
             21.6000 08S01400
             22.8000 08S06301D
             23.2000 08S02700
 J           23.4000 08S03300
 U           23.6000 08S03700
 J           23.9000 09S00600
             24.3000 08S01300
 J           24.6000 09S00500D
 J           25.0000 09S02400
             25.2000 08S01600
             26.3000 08S02200
             37.1000 08S02600
             37.3000 08S01100
             40.1000 08S04100
             40.7000 08S04500
             43.2000 08S03600
             43.6000 08S01000
 J           43.7000 09S02300
             44.7000 09S03101
 J           45.2000 09S02200
 J           47.6000 09S00700
```

```
            50.1000 09S03001
            53.7000 08S01800
            66.7000 08S01500
            72.8000 08S04800
            81.6000 08S02100
            83.0000 08S05501
           121.0000 08S03500
           144.0000 08S05601
           156.0000 08S01200
           163.0000 08S04700
           190.0000 08S03400
           268.0000 08S05901
           289.0000 08S02300
           337.0000 08S00900
 J         344.0000 08S02800
           353.0000 08S00900D
 J         379.0000 08S02800D
           400.0000 08S01700
 J         408.0000 08S02900
           541.0000 08S02500
           902.0000 08S05801


-------------------------------------------------------------
 MCPA in UG/KG
-----------------------------

3s       .......................  .*......*.. .*...* ...***
bks                              ...         ...     ....  .
 group1:  3s
 min, median, max, bdl/tot :         220.0000 U        4800.0000 U       67000.0000 J    80 /   87
 group2:  bks
 min, median, max, bdl/tot :        5300.0000 U       10000.0000 U       45000.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =      -16250.0000
lq     =        5500.0000 U
median =       10000.0000 U
uq     =       20000.0000 U
hicut  =       41750.0000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J        67000.0000 09S03001


-------------------------------------------------------------
 MCPP in UG/KG
-----------------------------

3s       ..............*.*.**  .*.*.. *....*..*... ..****.**
bks                          ...    ... .         .. .   .
 group1:  3s
 min, median, max, bdl/tot :         310.0000 U        6900.0000 U       99000.0000 J    69 /   87
 group2:  bks
 min, median, max, bdl/tot :        5300.0000 U       10000.0000 U       45000.0000 U    15 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =      -16250.0000
lq     =        5500.0000 U
median =       10000.0000 U
uq     =       20000.0000 U
hicut  =       41750.0000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U        44000.0000 08S04400
 U        57000.0000 09S02500
 J        62000.0000 09S01500
 DJ       77000.0000 09S01400
```

```
J        99000.0000 08S04900

-------------------------------------------------------------
 MAGNESIUM in MG/KG
-----------------------------

bks      **    * *  ***    * *   *          * *          *
3s       ........ ... ........................................
 group1:  3s
 min, median, max, bdl/tot :          10.1000 U        176.0000 U        3080.0000 U    95 /   95
 group2:  bks
 min, median, max, bdl/tot :           6.5000 B         45.1000 B        1330.0000       0 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -49.1750
lq     =           33.8500
median =           45.1000 B
uq     =           89.2000
hicut  =          172.2250
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U          176.0000 08S04400
 U          176.0000 08S04300
 U          179.0000 08S01000
 U          187.0000 08S03600
 U          221.0000 08S02800D
 U          223.0000 09S03401
 U          229.0000 08S05701
 U          232.0000 08S02800
 U          286.0000 08S05501
 U          287.0000 08S02200
 U          302.0000 08S05200
 U          312.0000 08S01200
 U          329.0000 09S03001
 U          351.0000 08S04600
 U          376.0000 08S03800
 U          417.0000 09S00700
 U          478.0000 08S03700
 U          481.0000 08S03800D
 U          485.0000 08S05000
 U          487.0000 08S01100
 U          496.0000 08S04100
 U          508.0000 08S03900
 U          514.0000 08S05601
 U          521.0000 08S01800
 U          529.0000 08S01500
 U          562.0000 09S03101
 U          637.0000 09S03301
 U          666.0000 08S04800
 U          705.0000 08S03500
 U          735.0000 09S03601
 U          804.0000 08S05100D
 U          919.0000 08S04700
 U         1010.0000 08S05901
 U         1110.0000 08S02900
 U         1190.0000 08S05801
 U         1200.0000 08S02300
 U         1240.0000 08S05100
 U         1540.0000 08S00900
 U         1540.0000 08S00900D
 U         1620.0000 08S01600
 U         1900.0000 09S00600
 U         2230.0000 08S03400
 U         2260.0000 08S02500
 U         2280.0000 08S01700
 U         2390.0000 09S02700
 U         2390.0000 08S04000
 U         2610.0000 09S02800
 U         3080.0000 09S02600
```

```
-------------------------------------------------------------
 MANGANESE in MG/KG
-----------------------------

bks       *   *  ** *  ****  *  *      *
3s        ........... .. .......* .*******..**********************
 group1:  3s
 min, median, max, bdl/tot :          0.4900 U          13.3000 U        414.0000      44 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.3700 B           2.7000 B         12.5000       0 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -3.8000
lq     =           1.6000
median =           2.7000 B
uq     =           5.2000
hicut  =          10.6000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
             10.8000 08S03200
 J           11.2000 09S02200
 J           12.1000 09S01400
 J           12.7000 08S01000
 U           12.9000 08S06301
 U           13.3000 08S05601
 U           13.5000 08S05701
 U           13.9000 09S03601
 U           14.5000 09S03401
 U           15.1000 08S05301
 J           15.6000 08S02600
 U           16.1000 08S06301D
 J           16.9000 08S01200
 J           18.5000 08S01100
 U           20.1000 08S05901
             22.4000 08S03700
 U           22.6000 09S03101
             24.0000 08S04000
             24.6000 08S04500
             24.7000 08S03800D
 J           24.8000 08S02100
             25.8000 08S03800
             26.9000 08S03900
 J           27.0000 08S02200
 J           27.7000 08S02700
             31.3000 08S02800
             33.2000 08S04700
 J           33.4000 08S01600
             37.2000 08S02800D
 J           37.9000 08S01800
             41.6000 08S05000
             43.7000 08S05100D
             44.5000 08S05200
 J           45.1000 09S00700
             45.4000 08S04100
             48.4000 08S04900
             49.0000 08S05100
             51.2000 08S04400
 J           52.4000 08S01500
             66.7000 08S03500
 J           75.3000 08S02300
             89.8000 08S04600
             97.8000 09S02800
            103.0000 09S02600
            106.0000 08S02900
            111.0000 09S02700
 J          122.0000 08S02500
 J          127.0000 08S01700
 J          130.0000 08S009000
            131.0000 08S04800
```

```
 J          137.0000 09S00600
 J          146.0000 08S00900
            414.0000 08S03400


-------------------------------------------------------------
 MERCURY in MG/KG
-----------------------------

bks       .***..*   .                 *
3s              . ....***.....***.**.**...**..*****.**************
 group1:  3s
 min, median, max, bdl/tot :          0.0400 UJ          0.0900 J          1.7000 J    44 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.0100 U           0.0200 B          0.0800       8 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -0.0100
lq     =           0.0200 U
median =           0.0200 B
uq     =           0.0400 U
hicut  =           0.0700
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 UJ           0.0800 08S05100
 UJ           0.0800 08S04000
 U            0.0800 08S03200
 U            0.0800 09S02600
 J            0.0800 08S01400
 J            0.0800 08S05501
 UJ           0.0900 08S03800
 UJ           0.0900 08S05000
 UJ           0.0900 08S03600
 U            0.0900 08S03000
 U            0.0900 08S03300
 U            0.0900 08S02800D
 J            0.0900 09S00500
 J            0.0900 08S02600
 J            0.0900 09S00500D
 J            0.0900 09S01100
 UJ           0.1000 08S03800D
 UJ           0.1000 08S04600
 U            0.1000 09S03101
 U            0.1000 09S02400
 J            0.1000 09S01400
 J            0.1000 08S01100
 U            0.1100 09S03001
 J            0.1100 08S02300
 J            0.1100 08S05601
 U            0.1200 08S02800
 J            0.1200 08S02700
 J            0.1300 09S01700
 J            0.1300 09S02200
 J            0.1300 08S01800
 U            0.1400 08S05901
 U            0.1400 08S02900
              0.1400 08S05401
 J            0.1600 08S01000
 J            0.1600 08S01700
              0.1700 08S06301
 J            0.1800 08S01600
 J            0.1800 09S00700
 J            0.1900 08S01900
 UJ           0.2000 08S04800
 U            0.2000 08S05801
 J            0.2100 08S02100
 UJ           0.2300 08S03500
 J            0.2300 09S02500
 J            0.2700 09S03301
 J            0.3000 08S02500
```

```
              0.3400 08S06301D
 J            0.3500 08S03900
 J            0.3600 08S04900
 J            0.4700 08S04400
 J            0.4700 08S00900
 J            0.4800 08S00900D
 J            0.5100 08S04700
 J            0.5300 08S02200
 J            0.5800 08S01200
 J            0.6400 08S04500
 J            0.7200 08S04300
 J            0.7700 08S01500
 J            1.1000 08S03400
 J            1.7000 08S04100

-------------------------------------------------------------
 METHOXYCHLOR in UG/KG
-----------------------------

3s       **. ........ ....................................*......
bks         ....   ...  ...                            ..    .
 group1:  3s
 min, median, max, bdl/tot :          1.4000 J          20.5000 U       2300.0000 U    91 /   96
 group2:  bks
 min, median, max, bdl/tot :         17.0000 U          18.0000 U          87.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          17.2500
lq     =          18.0000 U
median =          18.0000 U
uq     =          18.5000 U
hicut  =          19.2500
 Lower outside values in test group relative to group bks:
 J            1.4000 08S05301
 J            1.9000 09S03501
 J            2.2000 09S03001
 J            7.6000 08S05601
 U           17.0000 08B01001
 U           17.0000 08S01200

 Upper outside values in test group relative to group bks:
 U           20.0000 08S01100
 U           20.0000 08S02200
 U           20.0000 08S04000
 U           20.0000 09S02300
 U           20.0000 09S02901D
 U           20.0000 09S02400
 U           20.0000 08S02400
 U           20.0000 08S02800D
 U           20.0000 08S05401
 U           20.0000 09S02700
 U           20.0000 09S02901
 U           20.0000 08S04600
 U           21.0000 08S01700
 U           21.0000 08S02900
 U           21.0000 08S03900
 U           21.0000 08S05200
 U           21.0000 08S03800
 U           21.0000 08S02800
 U           21.0000 08S05100D
 UJ          22.0000 08S01000
 U           22.0000 08S03800D
 U           22.0000 09S02500
 U           22.0000 08S05100
 U           22.0000 08S04900
 U           22.0000 08S03700
 U           22.0000 08S04300
 U           22.0000 08S03300
 U           22.0000 09S01400
 U           22.0000 08S06001
```

```
U          22.0000 08S01800
U          23.0000 08S02700
U          23.0000 08S04800
U          24.0000 09S00900
U          24.0000 08S04500
U          24.0000 08S05501
U          24.0000 08S03500
U          25.0000 09S03201
U          26.0000 08S04400
U          38.0000 09S00800
U          39.0000 09S03101
U          41.0000 08S00900
U          42.0000 08S00900D
U          44.0000 08S05000
U          52.0000 08S05901
U          53.0000 09S03301
U          56.0000 08S03400
U          74.0000 08S05801
U          77.0000 08S04700
J          87.0000 08S05701
U          94.0000 08S02500
U          98.0000 08S02300
U         100.0000 08S02100
U         110.0000 08S01500
U         180.0000 08S03100
U         200.0000 08S01600
U         460.0000 09S03401
U         490.0000 09S01100
U         600.0000 09S00700
U        2300.0000 09S00500
U        2300.0000 09S00500D


-------------------------------------------------------------
 NICKEL in MG/KG
-----------------------------

3s       .....*....****..**..*********** *   *  ***************
bks                                       . .......   *
 group1:  3s
 min, median, max, bdl/tot :          0.2500 U          0.9400 J          9.3000      43 /   95
 group2:  bks
 min, median, max, bdl/tot :          1.8000 U          1.9000 U          2.2000 B    14 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits

Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          1.7500
lq     =          1.9000 U
median =          1.9000 U
uq     =          2.0000 U
hicut  =          2.1500
 Lower outside values in test group relative to group bks:
 U           0.2500 08S06201
 U           0.2600 09S01600
 U           0.2600 09S01900
 U           0.2600 09S01000
 U           0.2600 09S02100
 U           0.2600 09S02000
 U           0.2700 09S01200
 U           0.2700 08S02000
 U           0.2700 09S01300
 U           0.2700 09S01800
 U           0.2700 08S04200
 U           0.2700 09S03501
 J           0.2700 09S02901D
 U           0.2800 08S01300
 U           0.2900 09S01500
 U           0.2900 09S02901
 U           0.2900 08S01900
 U           0.3300 09S02800
 U           0.3400 09S01400
```

U	0.3600	08S03000
U	0.3700	09S00800
U	0.3900	09S01700
U	0.4000	09S00900
J	0.4100	08S06101
J	0.4100	08S01400
U	0.4200	09S00500
J	0.4400	09S03201
U	0.4500	09S02200
J	0.4600	08S05701
U	0.4800	09S02300
U	0.5200	09S00600
U	0.5300	09S02500
U	0.5300	09S01800D
U	0.5400	09S01100
U	0.5700	08S03600
J	0.6000	08S02600
J	0.6200	08S05301
U	0.6500	08S03800D
U	0.6600	09S00500D
U	0.6800	08S02400
U	0.7200	08S03300
U	0.8200	08S05200
J	0.8300	09S03601
U	0.8500	08S03200
U	0.8700	08S03700
J	0.8800	08S01100
U	0.9300	08S03800
J	0.9400	08S05501
J	0.9400	08S02700
U	1.0000	08S05100
J	1.1000	08S01500
J	1.1000	09S03401
U	1.2000	08S05100D
J	1.2000	08S01600
J	1.2000	08S02200
J	1.2000	08S06301
U	1.4000	09S02600
J	1.4000	08S06301D
J	1.4000	08S01000
U	1.5000	09S02400
U	1.5000	09S02700
J	1.5000	08S05601
J	1.6000	08S03100
J	1.6000	08S01800

Upper outside values in test group relative to group bks:

J	2.2000	08S04000
J	2.2000	08S04100
J	2.3000	09S03001
J	2.3000	08S03900
J	2.3000	08S02800D
J	2.5000	09S03101
J	2.5000	08S01700
J	3.1000	08S03500
J	3.3000	08S05401
J	3.8000	08S02900
J	3.9000	08S02100
J	3.9000	08S04300
J	4.3000	08S05901
J	4.3000	08S04700
J	4.4000	08S04800
J	4.5000	09S03301
J	5.4000	08S04400
J	6.2000	08S05801
J	7.0000	09S00700
J	8.1000	08S00900
J	8.1000	08S00900D
J	9.0000	08S03400
	9.3000	08S02500

PHENANTHRENE in UG/KG

```
3s        ****..........  ...................................
bks          ......   .....   .      .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        390.0000 U        1500.0000 U    81 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          317.5000
lq     =          340.0000 U
median =          350.0000 U
uq     =          355.0000 U
hicut  =          377.5000
 Lower outside values in test group relative to group bks:
 U            10.0000 09S02000
 J            40.0000 08S03600
 J            43.0000 08S03800D
 J            48.0000 08S03800
 J            64.0000 08S01600
 J            80.0000 08S01100
 J           130.0000 08S05301

 Upper outside values in test group relative to group bks:
 UJ          380.0000 09S02400
 U           380.0000 08S01400
 U           380.0000 09S01500
 U           380.0000 08S02300
 U           380.0000 09S02300
 U           380.0000 08S06301
 U           380.0000 08S06301D
 U           380.0000 08S02400
 U           390.0000 08S02200
 U           390.0000 08S05401
 U           390.0000 09S02700
 U           390.0000 08S04000
 U           400.0000 08S04600
 U           400.0000 08S05100D
 U           400.0000 08S02100
 U           400.0000 08S03900
 U           400.0000 08S05200
 U           400.0000 08S02800
 U           400.0000 08S02800D
 U           400.0000 08S02900
 U           410.0000 08S01700
 UJ          420.0000 09S02500
 U           420.0000 08S05100
 U           420.0000 08S03700
 U           420.0000 08S01800
 U           420.0000 08S01000
 U           430.0000 08S03300
 U           430.0000 08S01500
 U           430.0000 08S04900
 U           430.0000 08S05000
 UJ          440.0000 09S00500
 U           440.0000 08S06001
 U           440.0000 09S00500D
 U           440.0000 09S01400
 U           440.0000 08S04800
 U           440.0000 08S04300
 U           450.0000 08S01200
 U           450.0000 08B01001
 U           450.0000 08S02700
 U           460.0000 09S00900
 U           470.0000 08S03500
 U           470.0000 08S05701
 U           470.0000 08S05501
 U           470.0000 08S04500
 U           480.0000 09S01100
```

```
 U          510.0000 08S04400
 U          580.0000 09S00700
 U          800.0000 08S00900
 U          820.0000 08S05601
 U          820.0000 08S00900D
 U         1000.0000 08S05901
 U         1100.0000 08S03400
 U         1400.0000 08S05801
 U         1500.0000 08S04700

-----------------------------------------------------------------
 POTASSIUM in MG/KG
-----------------------------

3s       ...................................    .. ................
bks                                        .......*.*
 group1:  3s
 min, median, max, bdl/tot :          10.3000 U          40.4000 U          417.0000 U    95 /   95
 group2:  bks
 min, median, max, bdl/tot :          68.5000 U          71.9000 U           79.9000 B    13 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          62.4000
lq     =          69.9000 U
median =          71.9000 U
uq     =          74.9000 U
hicut  =          82.4000
 Lower outside values in test group relative to group bks:
 U           10.3000 08S01300
 U           10.8000 08S06001
 U           12.7000 09S01600
 U           13.4000 08S06101
 U           13.5000 09S02901
 U           13.9000 09S02901D
 U           14.2000 09S01900
 U           15.4000 08S02000
 U           16.3000 09S01800
 U           17.0000 08S03000
 U           17.1000 08S01900
 U           18.3000 08S03600
 U           18.4000 08S04200
 U           18.7000 08S05401
 U           18.8000 09S02100
 U           19.0000 09S00800
 U           20.2000 09S01000
 U           20.7000 08S06201
 U           21.4000 08S05301
 U           22.2000 08S03100
 U           22.9000 09S03201
 U           23.2000 09S01200
 U           23.3000 08S06301
 U           24.2000 08S03300
 U           24.7000 09S01400
 U           25.1000 09S03501
 U           26.0000 08S02800D
 U           27.6000 09S00900
 U           28.0000 09S03401
 U           28.5000 09S00500
 U           29.0000 08S06301D
 U           29.3000 09S02200
 U           30.0000 09S02400
 U           30.5000 09S01800D
 U           30.6000 08S01000
 U           30.9000 09S02300
 U           32.7000 08S05701
 U           33.5000 09S01700
 U           35.0000 08S02600
 U           35.7000 08S02400
 U           35.9000 09S02000
 U           36.9000 08S02700
```

```
U          37.5000 08S03200
U          37.7000 08S01400
U          39.3000 08S05200
U          39.9000 09S00500D
U          40.1000 09S01100
U          40.4000 08S04300
U          41.2000 08S04500
U          43.8000 09S01300
U          45.2000 08S02200
U          45.9000 08S02800
U          46.2000 09S02500
U          48.2000 08S04900
U          48.4000 09S01500
U          51.2000 08S04400
U          52.1000 09S03601
U          55.4000 08S02100
U          56.4000 08S01100
U          56.6000 08S03800
U          56.6000 09S03001
U          60.4000 08S04000

Upper outside values in test group relative to group bks:
U          82.5000 08S05100D
U          92.9000 08S04100
U          95.4000 09S03301
U          97.7000 08S03500
U         103.0000 08S03800D
U         115.0000 08S03900
U         122.0000 08S01500
U         133.0000 08S04600
U         142.0000 08S01600
U         144.0000 08S05801
U         161.0000 08S02900
U         175.0000 08S04800
U         195.0000 08S05501
U         202.0000 08S02300
U         251.0000 08S05901
U         273.0000 08S00900
U         284.0000 08S00900D
U         296.0000 08S02500
U         303.0000 08S01700
U         321.0000 08S03400
U         342.0000 09S02700
U         344.0000 09S00600
U         366.0000 08S04700
U         373.0000 09S02800
U         417.0000 09S02600


-------------------------------------------------------------
 PYRENE in UG/KG
-----------------------------

3s       ***********... .....  *.....................****..*
bks                  .....   ... . ..      .
 group1:  3s
 min, median, max, bdl/tot :          10.0000 U        370.0000 U        2600.0000      61 /   87
 group2:  bks
 min, median, max, bdl/tot :         340.0000 U        350.0000 U         380.0000 U    15 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         317.5000
lq     =         340.0000 U
median =         350.0000 U
uq     =         355.0000 U
hicut  =         377.5000
 Lower outside values in test group relative to group bks:
 U          10.0000 09S02000
 J          36.0000 09S01500
 J          40.0000 09S02700
 J          42.0000 08S02200
 J          46.0000 09S01100
```

```
J          51.0000 08S05401
J          58.0000 08S03500
J          61.0000 08S03600
J          61.0000 08S01500
J          67.0000 08S05501
J          70.0000 08S04400
J          71.0000 08S04900
J          73.0000 08S02600
J          78.0000 09S00700
J          83.0000 08S05200
J         120.0000 08S02700
J         140.0000 08S02800
J         140.0000 08S04800
J         150.0000 08S02800D
J         280.0000 08S01600
J         310.0000 08S00900

Upper outside values in test group relative to group bks:
UJ        380.0000 09S02400
U         380.0000 09S02300
U         380.0000 08S01400
U         380.0000 08S06301D
U         380.0000 08S02300
U         380.0000 08S06301
U         380.0000 08S02400
U         390.0000 08S04000
U         400.0000 08S02100
U         400.0000 08S03900
U         400.0000 08S04600
U         400.0000 08S05100D
U         400.0000 08S02900
U         410.0000 08S01700
UJ        420.0000 09S02500
U         420.0000 08S03700
U         420.0000 08S01800
U         420.0000 08S05100
U         420.0000 08S01000
U         430.0000 08S03300
U         430.0000 08S05000
UJ        440.0000 09S00500
U         440.0000 09S00500D
U         440.0000 08S06001
U         440.0000 09S01400
U         450.0000 08B01001
U         450.0000 08S01200
          450.0000 08S04300
U         460.0000 09S00900
          460.0000 08S05301
U         470.0000 08S04500
          500.0000 08S03800D
          580.0000 08S03800
U         820.0000 08S00900D
U         820.0000 08S05601
U        1000.0000 08S05901
U        1100.0000 08S03400
U        1400.0000 08S05801
U        1500.0000 08S04700
         2600.0000 08S05701


-------------------------------------------------------------
 SELENIUM in MG/KG
-----------------------------

bks      .....***
3s             ......................................**.*.***
 group1:  3s
 min, median, max, bdl/tot :          0.7300 U          1.0000 U          5.5000 J    85 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.4000 UJ         0.4200 U          0.5700 J    11 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
```

```
-----------------------------------------------------
lowcut =          0.3650
lq     =          0.4100 U
median =          0.4200 U
uq     =          0.4400 U
hicut  =          0.4850
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U            0.7300 08S06101
 U            0.7500 09S03601
 U            0.7600 08S06201
 U            0.7800 08S06301D
 U            0.7800 08S05301
 U            0.8000 09S02901D
 U            0.8100 09S03501
 U            0.8300 08S06301
 U            0.8500 08S05401
 U            0.8600 09S02901
 U            0.8700 09S01600
 U            0.8700 09S01900
 U            0.8900 09S01000
 U            0.9000 09S02000
 U            0.9000 08S02000
 U            0.9000 09S01200
 U            0.9000 09S02100
 U            0.9100 09S02200
 U            0.9100 09S01800
 U            0.9100 09S00600
 U            0.9200 08S04200
 U            0.9200 08S05501
 U            0.9200 09S01300
 U            0.9300 08S03100
 U            0.9300 09S01800D
 U            0.9300 08S03600
 U            0.9300 08S04100
 U            0.9400 08S03200
 U            0.9400 08S02600
 U            0.9400 09S01700
 U            0.9400 08S06001
 U            0.9500 08S01300
 U            0.9600 08S02500
 U            0.9600 09S00800
 U            0.9700 08S01900
 U            0.9700 09S02600
 U            0.9800 09S02800
 U            0.9800 08S01400
 U            0.9800 08S03000
 U            0.9900 09S01500
 U            0.9900 08S02400
 U            1.0000 08S04000
 U            1.0000 08S03800
 U            1.0000 08S05000
 U            1.0000 08S02300
 U            1.0000 08S02200
 U            1.0000 08S05200
 U            1.0000 09S02300
 U            1.0000 09S02400
 U            1.0000 08S01600
 U            1.0000 08S05701
 U            1.0000 09S03401
 U            1.0000 09S02700
 U            1.0000 08S01100
 U            1.1000 08S02800D
 U            1.1000 08S05100
 U            1.1000 08S02900
 U            1.1000 08S04900
 U            1.1000 08S03300
 U            1.1000 08S01700
 U            1.1000 08S02800
 U            1.1000 09S00500
 U            1.1000 08S02100
 U            1.1000 08S05100D
```

```
U            1.1000 08S01000
U            1.1000 08S03800D
U            1.1000 08S03700
U            1.1000 09S01400
U            1.1000 08S02700
U            1.1000 09S02500
U            1.1000 08S01800
U            1.1000 08S04600
U            1.1000 09S03201
U            1.2000 09S005000
U            1.2000 09S00900
U            1.2000 09S01100
U            1.2000 08S01200
U            1.2000 08S03500
U            1.2000 08S04500
U            1.3000 08S04400
             1.3000 08S04300
             1.3000 08S03900
             1.4000 08S04800
U            1.5000 09S03001
U            1.6000 09S03101
             1.6000 08S01500
             1.7000 09S00700
U            1.8000 08S05601
U            2.0000 08S05901
U            2.9000 08S05801
             3.2000 08S00900D
             3.4000 08S03400
             4.2000 08S00900
             4.5000 08S04700
J            5.5000 09S03301

-----------------------------------------------------------------
 SILVER in MG/KG
-----------------------------
3s        ...........*.......*****. *  *  ***********************
bks                                .......*.       *
 group1:  3s
 min, median, max, bdl/tot :          0.1500 U          0.4000 J        122.0000 J    42 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.4500 U          0.4700 U          1.3000 B    13 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          0.4150
lq     =          0.4600 U
median =          0.4700 U
uq     =          0.4900 U
hicut  =          0.5350
 Lower outside values in test group relative to group bks:
 U           0.1500 08S06201
 U           0.1500 08S05301
 U           0.1500 09S03601
 U           0.1600 09S02901D
 U           0.1600 09S01600
 U           0.1600 09S03501
 U           0.1600 09S02100
 U           0.1600 09S01200
 U           0.1600 09S01000
 U           0.1600 09S02000
 U           0.1600 09S01900
 U           0.1600 09S01800
 U           0.1700 09S00600
 U           0.1700 09S01300
 U           0.1700 09S02901
 U           0.1700 08S04200
 U           0.1700 09S00800
 U           0.1800 09S02300
 U           0.1800 09S02600
 U           0.1800 08S04000
 U           0.1800 09S02800
```

U	0.1800	08S05501
U	0.1800	09S01500
J	0.1800	08S03200
U	0.1900	09S03401
U	0.1900	08S03700
U	0.1900	09S02700
U	0.1900	08S03800
U	0.1900	08S03800D
U	0.1900	08S05100D
U	0.2000	08S05100
U	0.2000	08S05701
U	0.2000	09S00500
U	0.2100	09S00500D
U	0.2100	09S01400
U	0.2100	09S03201
U	0.2200	09S01100
U	0.2200	09S00900
J	0.2200	08S03000
J	0.2400	08S04300
J	0.2600	08S03900
U	0.2900	09S03001
U	0.3100	09S03101
J	0.3200	09S01800D
J	0.3700	08S02000
J	0.3900	08S05000
J	0.4000	08S03600
J	0.4000	08S03100

Upper outside values in test group relative to group bks:

U	0.5600	08S05801
J	0.5700	09S02400
J	0.5800	08S03300
J	0.5900	08S04100
J	0.6200	08S04600
J	0.6400	08S02800D
J	0.6500	08S01300
J	0.6900	09S02200
U	0.7000	08S04700
J	1.1000	08S06001
J	1.1000	08S04400
J	1.2000	09S00700
J	1.3000	08S06301
J	1.4000	08S01900
J	1.6000	08S06101
J	2.0000	08S06301D
J	2.1000	08S02900
J	2.2000	08S04500
J	2.3000	08S05401
J	2.4000	08S02300
J	2.5000	08S04800
J	2.5000	09S02500
J	3.1000	08S02500
J	3.8000	08S00900D
J	3.8000	08S01100
J	4.0000	08S00900
	4.1000	08S03500
J	4.2000	08S01600
J	4.3000	08S03400
J	5.1000	08S02100
	5.9000	08S05901
J	6.9000	08S02200
	7.8000	08S04900
J	9.6000	08S01400
J	16.3000	08S01800
J	16.8000	08S01500
J	28.9000	08S02700
J	44.0000	08S01700
	60.1000	09S01700
J	62.7000	08S01000
J	108.0000	08S02400
J	122.0000	08S01200

```
-------------------------------------------------------------
 SODIUM in MG/KG
-----------------------------

bks       .......*
3s                .............................................
 group1:  3s
 min, median, max, bdl/tot :          98.7000 U        211.0000 U        1390.0000 U    95 /   95
 group2:  bks
 min, median, max, bdl/tot :           6.1000 U          6.4000 U          45.7000 B    14 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
---------------------------------------------------
lowcut =           5.4250
lq     =           6.2500 U
median =           6.4000 U
uq     =           6.8000 U
hicut  =           7.6250
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U           98.7000 09S01900
 U           99.6000 08S05301
 U          122.0000 08S05200
 U          130.0000 08S06101
 U          131.0000 09S03501
 U          133.0000 08S04200
 U          134.0000 08S06201
 U          136.0000 08S06301
 U          144.0000 09S02300
 U          144.0000 09S02901D
 U          147.0000 09S01600
 U          147.0000 08S02400
 U          148.0000 08S05401
 U          154.0000 08S03000
 U          156.0000 08S03200
 U          157.0000 09S02400
 U          159.0000 08S03800D
 U          162.0000 08S06001
 U          163.0000 09S02500
 U          164.0000 08S03600
 U          164.0000 09S01800
 U          168.0000 09S02000
 U          169.0000 09S03401
 U          171.0000 08S03800
 U          172.0000 08S05501
 U          172.0000 09S02100
 U          173.0000 09S00600
 U          177.0000 08S02600
 U          178.0000 09S02700
 U          179.0000 08S03300
 U          182.0000 09S02901
 U          182.0000 08S02800D
 U          184.0000 09S00800
 U          184.0000 08S02000
 U          185.0000 09S01400
 U          187.0000 08S04400
 U          193.0000 09S01500
 U          193.0000 08S01900
 U          194.0000 08S04300
 U          197.0000 08S04100
 U          197.0000 08S01300
 U          197.0000 08S02700
 U          198.0000 09S03201
 U          201.0000 09S03601
 U          201.0000 09S01000
 U          202.0000 09S01300
 U          206.0000 09S01200
 U          211.0000 08S05100D
 U          213.0000 09S01800D
 U          214.0000 08S02800
 U          217.0000 08S02500
```

```
U          220.0000 08S03900
U          222.0000 08S05000
U          222.0000 08S04600
U          223.0000 08S02200
U          225.0000 08S01500
U          227.0000 09S02200
U          235.0000 09S02600
U          237.0000 08S03100
U          241.0000 08S02100
U          241.0000 08S01000
U          241.0000 09S00500
U          243.0000 08S04800
U          244.0000 08S01600
U          244.0000 08S01800
U          245.0000 08S02900
U          246.0000 09S01700
U          249.0000 08S01100
U          252.0000 09S00900
U          253.0000 08S03700
U          254.0000 08S04500
U          257.0000 08S01400
U          259.0000 08S04900
U          259.0000 09S02800
U          266.0000 08S02300
U          274.0000 08S05100
U          275.0000 09S00500D
U          278.0000 09S00700
U          282.0000 09S01100
U          307.0000 08S01700
U          317.0000 08S05601
U          346.0000 08S03500
U          346.0000 08S01200
U          352.0000 08S04000
U          379.0000 08S05701
U          399.0000 09S03101
U          417.0000 09S03301
U          457.0000 09S03001
U          458.0000 08S05901
U          535.0000 08S00900D
U          555.0000 08S00900
U          613.0000 08S06301D
U          739.0000 08S03400
U          780.0000 08S05801
U         1390.0000 08S04700


-------------------------------------------------------------
 THALLIUM in MG/KG
-----------------------------

bks      .......          *
3s              ..............................................
 group1:  3s
 min, median, max, bdl/tot :          0.8500 U          1.2000 U          4.4000 U    95 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.2600 UJ         0.2800 UJ         1.0000 J    14 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          0.2525
lq     =          0.2750 U
median =          0.2800 UJ
uq     =          0.2900 U
hicut  =          0.3125
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U            0.8500 08S06101
 U            0.8800 08S06201
 U            0.8800 09S03601
 U            0.9000 08S05301
 U            0.9100 08S06301D
```

U	0.9300	09S02901D
U	0.9400	09S03501
U	0.9600	08S06301
U	0.9900	09S01600
U	0.9900	09S01900
U	1.0000	09S02200
U	1.0000	08S04200
U	1.0000	09S02100
U	1.0000	08S05401
U	1.0000	09S01000
U	1.0000	09S02000
U	1.0000	09S01300
U	1.0000	08S02000
U	1.0000	09S01200
U	1.0000	09S00600
U	1.0000	09S02901
U	1.0000	09S01800
U	1.1000	09S00800
U	1.1000	08S01900
U	1.1000	09S01700
U	1.1000	08S03100
U	1.1000	09S02800
U	1.1000	08S01400
U	1.1000	08S03600
U	1.1000	08S02500
U	1.1000	09S01500
U	1.1000	09S01800D
U	1.1000	08S03900
U	1.1000	08S02300
U	1.1000	08S04100
U	1.1000	08S01300
U	1.1000	08S02600
U	1.1000	09S02400
U	1.1000	08S06001
U	1.1000	09S02300
U	1.1000	08S03200
U	1.1000	08S03000
U	1.1000	08S02400
U	1.1000	08S05501
U	1.1000	09S02600
U	1.2000	08S05100D
U	1.2000	08S05200
U	1.2000	08S03700
U	1.2000	08S02200
U	1.2000	09S00500
U	1.2000	08S05000
U	1.2000	09S02700
U	1.2000	08S02800
U	1.2000	08S02800D
U	1.2000	08S03800
U	1.2000	08S02900
U	1.2000	08S03800D
U	1.2000	08S04000
U	1.2000	08S01800
U	1.2000	08S01700
U	1.2000	08S02100
U	1.2000	08S01600
U	1.2000	08S01100
U	1.2000	08S04600
U	1.2000	09S03201
U	1.2000	08S05701
U	1.2000	09S03401
U	1.3000	09S02500
U	1.3000	08S05100
U	1.3000	08S04900
U	1.3000	08S01000
U	1.3000	08S01200
U	1.3000	08S03300
U	1.3000	08S01500
U	1.3000	08S02700
U	1.3000	09S01400
U	1.3000	08S04800
U	1.3000	09S00500D

```
U            1.3000 08S04300
U            1.4000 08S04500
U            1.4000 08S04400
U            1.4000 09S00900
U            1.4000 08S03500
U            1.4000 09S01100
U            1.7000 09S03001
U            1.7000 09S00700
U            1.9000 09S03101
U            2.1000 08S05601
U            2.3000 08S05901
U            2.4000 08S00900
U            2.5000 08S00900D
U            2.6000 09S03301
U            3.2000 08S03400
U            3.4000 08S05801
U            4.4000 08S04700

-------------------------------------------------------------
 VANADIUM in MG/KG
-----------------------------

3s       ..****..*.**.****. *******.****************************
bks                .* *   ***    * ****   *    *          *
 group1:  3s
 min, median, max, bdl/tot :          0.1300 U          1.8000 J          18.6000      21 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.5100 U          1.3000 B           5.7000 B     1 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -0.5000
lq     =           0.8500
median =           1.3000 B
uq     =           1.7500
hicut  =           3.1000
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 J            3.4000 08S05100D
 J            3.5000 08S04100
 J            3.6000 08S04300
 J            3.6000 08S05100
 J            3.9000 08S02500
 J            3.9000 08S05601
 J            4.1000 09S03001
 J            4.2000 09S00600
 J            4.2000 09S03101
 J            4.4000 08S04800
 J            4.5000 08S01600
 J            4.6000 08S02300
 J            4.8000 08S01700
 J            4.8000 08S04700
 J            4.9000 08S04400
 J            5.0000 09S00700
 J            5.2000 08S04600
 J            5.9000 08S03500
 J            6.4000 08S00900D
 J            6.6000 09S02600
 J            6.7000 08S00900
 J            6.9000 09S02700
 J            7.4000 08S03900
 J            8.1000 08S05801
 J            8.5000 08S02900
 J           10.1000 09S03301
 J           18.1000 08S03400
             18.6000 08S04000

-------------------------------------------------------------
 ZINC in MG/KG
-----------------------------
```

```
bks       * *.*.. *  ***      *      *    *
3s         ........... ........................*.**.*.*********
 group1:  3s
 min, median, max, bdl/tot :          0.4800 U          27.5000 U        1040.0000 J    72 /   95
 group2:  bks
 min, median, max, bdl/tot :          0.4000 B           1.8000 B          31.5000       3 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          -3.5375
lq     =           0.9850 U
median =           1.8000 B
uq     =           4.0000
hicut  =           8.5225
 Lower outside values in test group relative to group bks:
<< NONE FOUND>>
 Upper outside values in test group relative to group bks:
 U            8.8000 09S02800
 U            9.3000 09S03001
 U            9.7000 09S02600
 U           10.0000 08S04000
 U           10.6000 09S01100
 U           11.4000 08S06001
 U           11.5000 09S01700
 U           11.7000 09S02500
 U           13.5000 09S00600
 U           13.5000 09S02700
 U           13.9000 08S05501
 U           14.7000 09S00900
 U           14.7000 09S02300
 U           15.2000 08S04600
 U           17.0000 08S03200
 U           17.6000 08S05701
 U           21.3000 09S03101
 U           22.7000 09S03301
 U           23.7000 08S03800
 U           25.7000 08S04300
 U           26.0000 08S02400
 U           27.0000 09S02200
 U           27.5000 08S02200
 U           30.0000 09S02400
 U           31.3000 08S05301
 U           31.8000 08S01600
 U           32.1000 08S06301
 U           33.1000 08S01100
 U           34.1000 08S04900
 U           35.2000 08S05100
 U           35.8000 08S01000
 U           37.3000 08S03800D
 U           39.5000 08S05401
 U           40.0000 08S05200
 U           40.1000 09S00500D
 U           40.2000 08S06301D
 U           42.2000 08S05100D
 U           44.9000 08S04700
 J           45.4000 08S05801
 U           46.4000 08S03300
 U           51.9000 08S04100
 U           53.8000 08S01800
 U           58.7000 08S03600
 J           63.4000 09S03401
 J           79.3000 08S05901
 J           81.3000 08S05601
 U           81.6000 08S02700
 U           83.0000 08S02300
 U           87.0000 08S05000
 J           89.1000 09S00500
 U           92.5000 08S01700
 U           97.3000 08S03900
 J          106.0000 08S02100
 J          125.0000 08S02600
```

```
J          137.0000 08S01200
J          162.0000 08S04400
J          178.0000 08S02500
J          187.0000 09S00700
J          260.0000 08S01500
J          296.0000 08S04800
J          325.0000 08S04500
J          370.0000 08S03100
J          383.0000 08S03700
J          460.0000 08S03500
           486.0000 08S02900
           710.0000 08S02800
J          764.0000 08S00900
J          808.0000 08S00900D
           833.0000 08S02800D
J         1040.0000 08S03400


-------------------------------------------------------------
 ALPHA-BHC in UG/KG
-----------------------------

3s       ** ............. ......................................
bks        ....    ... ...                          ..    .
 group1:  3s
 min, median, max, bdl/tot :          0.2800 J          2.0000 U       230.0000 U    93 /   96
 group2:  bks
 min, median, max, bdl/tot :          1.7000 U          1.8000 U         8.7000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =           1.7250
lq     =           1.8000 U
median =           1.8000 U
uq     =           1.8500 U
hicut  =           1.9250
 Lower outside values in test group relative to group bks:
 J            0.2800 08S05601
 J            0.5200 09S00900
 J            1.3000 08S05801
 U            1.7000 08S01200
 U            1.7000 08B01001

 Upper outside values in test group relative to group bks:
 U            2.0000 08S02200
 U            2.0000 08S01100
 U            2.0000 08S04000
 U            2.0000 09S02400
 U            2.0000 09S03501
 U            2.0000 09S02300
 U            2.0000 08S05401
 U            2.0000 09S02901D
 U            2.0000 08S02400
 U            2.0000 08S02800D
 U            2.0000 09S02700
 U            2.0000 08S04600
 U            2.0000 09S02901
 U            2.1000 08S01700
 U            2.1000 08S05100D
 U            2.1000 08S05200
 U            2.1000 08S03900
 U            2.1000 08S02800
 U            2.1000 08S02900
 U            2.1000 08S03800
 UJ           2.2000 08S01000
 U            2.2000 08S03800D
 U            2.2000 08S05100
 U            2.2000 08S04900
 U            2.2000 09S02500
 U            2.2000 08S03300
 U            2.2000 08S04300
 U            2.2000 08S06001
```

```
 U            2.2000 08S03700
 U            2.2000 09S01400
 U            2.2000 08S01800
 U            2.3000 08S04800
 U            2.3000 08S02700
 U            2.4000 08S03500
 U            2.4000 08S05701
 U            2.4000 08S04500
 U            2.4000 08S05501
 U            2.5000 09S03201
 U            2.6000 08S04400
 U            3.8000 09S00800
 U            3.9000 09S03101
 U            3.9000 09S03001
 U            4.1000 08S00900
 U            4.2000 08S00900D
 U            4.4000 08S05000
 U            5.2000 08S05901
 U            5.3000 09S03301
 U            5.6000 08S03400
 U            7.7000 08S04700
 U            9.4000 08S02500
 U            9.8000 08S02300
 U           10.0000 08S02100
 U           11.0000 08S01500
 U           18.0000 08S03100
 U           20.0000 08S01600
 U           46.0000 09S03401
 U           49.0000 09S01100
 U           60.0000 09S00700
 U          230.0000 09S00500
 U          230.0000 09S00500D

-----------------------------------------------------------------
 ALPHA-CHLORDANE in UG/KG
-----------------------------
3s        ************ * .....***.**.******************************
bks            *    *.... ...   *  ..              *
 group1:  3s
 min, median, max, bdl/tot :          0.1200 J          5.9000        5300.0000 D    12 /   96
 group2:  bks
 min, median, max, bdl/tot :          0.6000 J          1.8000 U          20.0000      11 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          1.2500
lq     =          1.7000 U
median =          1.8000 U
uq     =          2.0000 U
hicut  =          2.4500
 Lower outside values in test group relative to group bks:
 J            0.1200 08S02000
 J            0.1200 08S01900
 J            0.1300 09S01800D
 J            0.1900 08S05701
 J            0.3500 08S03700
 J            0.3900 08S04600
 J            0.4100 08S06101
 J            0.4300 09S03601
 J            0.4500 08S04200
 J            0.4700 09S01600
 J            0.6800 09S01200
 J            0.7900 08S03800D
 J            0.8300 09S03501
 J            1.0000 08S03000
 J            1.0000 08S05200
 J            1.0000 08S03800
 J            1.2000 09S02000

 Upper outside values in test group relative to group bks:
```

	2.6000	08S05501
J	3.0000	08S04000
U	4.1000	08S00900
	4.1000	08S02800
	4.1000	08S02800D
	4.7000	08S03600
	5.0000	09S02901D
	5.1000	08B01001
J	5.4000	08S05901
	5.5000	09S02700
J	5.7000	08S03300
	6.1000	08S06301
	6.4000	08S06301D
	6.8000	08S00900D
	7.3000	08S01700
J	7.7000	08S05401
U	9.4000	08S02500
U	10.0000	08S02100
	10.0000	08S05100D
	11.0000	08S05100
	12.0000	08S04900
	13.0000	09S01700
J	14.0000	09S01000
J	14.0000	08S01600
	14.0000	09S02200
	15.0000	09S00600
J	17.0000	08S05601
	17.0000	08S04100
	19.0000	08S01200
	20.0000	09S01300
	20.0000	09S02901
	23.0000	09S00900
	24.0000	09S02800
	26.0000	08S02900
D	27.0000	09S02100
JD	31.0000	08S03900
D	33.0000	09S02300
	33.0000	09S03001
	33.0000	09S00800
J	37.0000	08S05801
D	44.0000	09S02400
D	50.0000	08S04800
D	60.0000	09S01400
	69.0000	08S03400
	78.0000	08S01500
D	90.0000	08S03500
J	96.0000	08S02300
D	100.0000	08S05000
D	110.0000	09S03201
DJ	130.0000	09S03301
D	280.0000	08S04400
D	520.0000	09S03101
D	530.0000	09S02500
D	1200.0000	09S01100
D	2200.0000	09S03401
D	2400.0000	09S00700
D	3700.0000	08S03100
D	3900.0000	09S00500
D	5300.0000	09S00500D

BETA-BHC in UG/KG

```
3s       **.. ...............................................*...
bks       .... .  .... ..                          . .    .
 group1:  3s
 min, median, max, bdl/tot :          0.1800 J          2.1000 U        230.0000 U    91 /   96
 group2:  bks
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
```

Outside values test group relative to background group bks

lowcut =	1.7250	
lq =	1.8000	U
median =	1.8000	U
uq =	1.8500	U
hicut =	1.9250	

Lower outside values in test group relative to group bks:

J	0.1800	09S00900
J	0.2100	09S01700
J	0.5100	09S01000
J	0.7900	08S02200
U	1.7000	08S01200
U	1.7000	08B01001

Upper outside values in test group relative to group bks:

U	2.0000	08S01100
U	2.0000	08S04000
U	2.0000	08S04600
U	2.0000	08S02400
U	2.0000	09S02700
U	2.0000	09S02901D
U	2.0000	09S02901
U	2.0000	08S02800D
U	2.0000	09S02400
U	2.0000	09S02300
U	2.0000	08S05401
U	2.0000	09S03501
U	2.1000	08S03800
U	2.1000	08S05100D
U	2.1000	08S03900
U	2.1000	08S01700
U	2.1000	08S02900
U	2.1000	08S02800
U	2.1000	08S05200
UJ	2.2000	08S01000
U	2.2000	08S03700
U	2.2000	08S04300
U	2.2000	08S03800D
U	2.2000	09S02500
U	2.2000	08S04900
U	2.2000	08S05100
U	2.2000	08S03300
U	2.2000	09S01400
U	2.2000	08S06001
U	2.2000	08S01800
U	2.3000	08S02700
U	2.3000	08S04800
U	2.4000	08S05701
U	2.4000	08S03500
U	2.4000	08S05501
U	2.4000	08S04500
U	2.5000	09S03201
U	2.6000	08S04400
U	3.8000	09S00800
U	3.9000	09S03001
U	3.9000	09S03101
U	4.1000	08S00900
U	4.2000	08S009000
U	4.2000	08S05601
U	4.4000	08S05000
U	5.2000	08S05901
U	5.3000	09S03301
U	5.6000	08S03400
U	7.4000	08S05801
U	7.7000	08S04700
U	9.4000	08S02500
U	9.8000	08S02300
U	10.0000	08S02100
U	11.0000	08S01500
J	12.0000	08S03100
U	20.0000	08S01600
U	46.0000	09S03401

```
U          49.0000 09S01100
U          60.0000 09S00700
U         230.0000 09S00500
U         230.0000 09S00500D

-------------------------------------------------------------
 BIS(2-ETHYLHEXYL)PHTHALATE in UG/KG
-----------------------------

3s       **************.  ......  ......................**
bks                        ....   .....  .  .
 group1:  3s
 min, median, max, bdl/tot :          3.0000 J        370.0000 U        1700.0000      57 /   87
 group2:  bks
 min, median, max, bdl/tot :        340.0000 U        350.0000 U         380.0000 U    15 /   15
no evidence of different populations at alpha=.95
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =         317.5000
lq     =         340.0000 U
median =         350.0000 U
uq     =         355.0000 U
hicut  =         377.5000
 Lower outside values in test group relative to group bks:
 J           3.0000 09S02000
 J          35.0000 08S03300
 J          37.0000 08S02600
 J          38.0000 08S04900
 J          42.0000 08S01600
 J          44.0000 08S02300
 J          46.0000 08S06001
 J          47.0000 08S06201
 J          50.0000 08S06301
 J          51.0000 08S05501
 J          52.0000 08S02800D
 J          54.0000 08S05701
 J          69.0000 08S05301
 J          74.0000 09S01300
 J          77.0000 08S02900
 J          81.0000 09S02200
 J          83.0000 08S06101
 J          91.0000 08S02500
 J         120.0000 08S05901
 J         130.0000 08S06301D
 J         140.0000 08S05601
 J         150.0000 08S04800
 J         170.0000 09S00800
 J         170.0000 08S05401
 J         180.0000 09S01500
 J         220.0000 09S01400
 J         230.0000 08S05801
 J         270.0000 08S01100

 Upper outside values in test group relative to group bks:
 UJ        380.0000 09S02400
 U         380.0000 08S01400
 U         380.0000 08S02400
 U         380.0000 09S02300
 U         390.0000 09S02700
 U         390.0000 08S02200
 U         400.0000 08S04600
 U         400.0000 08S05100D
 U         400.0000 08S05200
 U         400.0000 08S02800
 U         400.0000 08S03900
 U         410.0000 08S03800
 U         410.0000 08S01700
 UJ        420.0000 09S02500
 U         420.0000 08S05100
 U         420.0000 08S03700
 U         420.0000 08S01800
 U         420.0000 08S01000
```

```
U          420.0000 08S03800D
U          430.0000 08S05000
U          430.0000 08S01500
U          430.0000 08S04000
UJ         440.0000 09S00500
U          440.0000 08S04300
U          440.0000 09S00500D
U          450.0000 08S01200
U          450.0000 08B01001
U          450.0000 08S02700
U          460.0000 09S00900
U          470.0000 08S04500
U          470.0000 08S03500
U          480.0000 09S01100
U          510.0000 08S04400
U          580.0000 09S00700
U          800.0000 08S00900
U          820.0000 08S00900D
           990.0000 08S02100
U         1100.0000 08S03400
U         1500.0000 08S04700
          1700.0000 08S03000


-------------------------------------------------------------
 DELTA-BHC in UG/KG
-----------------------------

3s       *****. ........... ................*.......*....**....*.
bks           ....    .. ....                        . .    .
 group1:  3s
 min, median, max, bdl/tot :          0.1000 J          2.0000 U        230.0000 U    81 /   96
 group2:  bks
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          1.7250
lq     =          1.8000 U
median =          1.8000 U
uq     =          1.8500 U
hicut  =          1.9250
 Lower outside values in test group relative to group bks:
 J            0.1000 08S01800
 J            0.2200 08S03300
 J            0.2400 08S01700
 J            0.3700 08S04500
 J            0.3900 08S02800D
 J            0.4200 08S02800
 J            0.5000 08S02100
 J            0.5300 08S02000
 J            1.2000 08S02300
 J            1.6000 08S00900D
 U            1.7000 08B01001
 U            1.7000 08S01200

 Upper outside values in test group relative to group bks:
 U            2.0000 08S04000
 U            2.0000 08S01100
 U            2.0000 08S04600
 U            2.0000 08S02200
 U            2.0000 09S02700
 U            2.0000 09S03501
 U            2.0000 09S02300
 U            2.0000 09S02400
 U            2.0000 09S02901D
 U            2.0000 09S02901
 U            2.0000 08S05401
 U            2.0000 08S02400
 U            2.1000 08S05100D
 U            2.1000 08S05200
 U            2.1000 08S03800
```

```
U            2.1000 08S02900
U            2.1000 08S03900
J            2.1000 08S00900
UJ           2.2000 08S01000
U            2.2000 09S01400
U            2.2000 08S03700
U            2.2000 09S02500
U            2.2000 08S04300
U            2.2000 08S03800D
U            2.2000 08S05100
U            2.2000 08S04900
U            2.2000 08S06001
U            2.3000 08S02700
U            2.3000 08S04800
U            2.4000 08S03500
U            2.4000 08S05501
U            2.4000 08S05701
J            2.4000 08S04400
U            2.5000 09S03201
U            3.8000 09S00800
U            3.9000 09S03001
U            3.9000 09S03101
U            4.2000 08S05601
U            4.4000 08S05000
U            5.2000 08S05901
U            5.3000 09S03301
             5.4000 09S00900
U            5.6000 08S03400
J            5.9000 08S01500
U            7.4000 08S05801
U            7.7000 08S04700
U            9.4000 08S02500
U           20.0000 08S01600
U           46.0000 09S03401
U           49.0000 09S01100
U           60.0000 09S00700
J           77.0000 08S03100
U          230.0000 09S00500
U          230.0000 09S00500D

-----------------------------------------------------------------
 GAMMA-BHC (LINDANE) in UG/KG
-----------------------------
3s       *** .. ....................................*........**..
bks         .. ..  . . ....                         ..    .
 group1:  3s
 min, median, max, bdl/tot :          0.1000 J          2.0000 U        230.0000 U    88 /   96
 group2:  bks
 min, median, max, bdl/tot :          1.7000 U          1.8000 U          8.7000 U    15 /   15
>>> Different populations at alpha > 0.95
  Different Detection Limits
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          1.7250
lq     =          1.8000 U
median =          1.8000 U
uq     =          1.8500 U
hicut  =          1.9250
 Lower outside values in test group relative to group bks:
 J           0.1000 09S01800D
 J           0.2200 08S05501
 J           0.3000 08S05901
 J           0.4600 09S02500
 J           0.5300 09S00800
 UJ          1.7000 08B01001
 U           1.7000 08S01200

 Upper outside values in test group relative to group bks:
 U           2.0000 08S01100
 U           2.0000 08S02200
 U           2.0000 08S04000
```

```
U            2.0000 09S02700
U            2.0000 09S03501
U            2.0000 08S02800D
U            2.0000 08S04600
U            2.0000 09S02901D
U            2.0000 08S02400
U            2.0000 08S05401
U            2.0000 09S02901
U            2.0000 09S02300
U            2.0000 09S02400
U            2.1000 08S05100D
U            2.1000 08S05200
U            2.1000 08S03900
U            2.1000 08S02800
U            2.1000 08S02900
U            2.1000 08S01700
U            2.1000 08S03800
UJ           2.2000 08S01000
U            2.2000 08S03800D
U            2.2000 08S05100
U            2.2000 08S03700
U            2.2000 09S01400
U            2.2000 08S04900
U            2.2000 08S06001
U            2.2000 08S03300
U            2.2000 08S01800
U            2.2000 08S04300
U            2.3000 08S02700
U            2.3000 08S04800
U            2.4000 08S04500
U            2.4000 08S03500
U            2.4000 09S00900
U            2.5000 09S03201
U            2.6000 08S04400
J            3.2000 08S05701
U            3.9000 09S03001
U            3.9000 09S03101
U            4.1000 08S00900
U            4.2000 08S00900D
U            4.2000 08S05601
U            4.4000 08S05000
U            5.3000 09S03301
U            5.6000 08S03400
U            7.7000 08S04700
U            9.4000 08S02500
U            9.8000 08S02300
U           10.0000 08S02100
U           11.0000 08S01500
U           18.0000 08S03100
J           18.0000 08S05801
U           20.0000 08S01600
J           32.0000 09S00500D
U           46.0000 09S03401
U           49.0000 09S01100
U           60.0000 09S00700
U          230.0000 09S00500

-------------------------------------------------------------
 GAMMA-CHLORDANE in UG/KG
-----------------------------

3s       ***********  .........*..*..****************************
bks             * * ...  .. ..*        ..       *
 group1:  3s
 min, median, max, bdl/tot :          0.0860 J          3.4000         6000.0000 D    24 /   96
 group2:  bks
 min, median, max, bdl/tot :          0.8400 NJ         1.8000 U          13.0000      11 /   15
>>> Different populations at alpha > 0.95
  Group 3s Higher
Outside values test group relative to background group bks
-----------------------------------------------------
lowcut =          1.4000
```

```
lq     =          1.7000 U
median =          1.8000 U
uq     =          1.9000 U
hicut  =          2.2000
 Lower outside values in test group relative to group bks:
 J            0.0860 09S01200
 J            0.1100 08S06101
 J            0.1600 08S04600
 J            0.1700 09S03601
 J            0.2400 09S01600
 J            0.3100 08S01800
 J            0.3200 08S00900
 J            0.3700 08S03700
 J            0.4800 08S01300
 J            0.6200 09S01500
 J            0.6300 08S02100
 J            0.6400 08S05901
 J            0.6800 08S03800D
 J            0.8000 08S05601
 J            0.8200 08S05301
 J            0.9300 08S02200
 J            1.2000 08S04000
 J            1.3000 08S01000

 Upper outside values in test group relative to group bks:
 U            2.3000 08S02700
 U            2.4000 08S05701
              2.8000 08S06301
 J            3.1000 08S02800D
 J            3.2000 08S02800
              3.2000 08S06301D
              3.6000 08S04500
              3.8000 09S02901D
              4.8000 08S03600
              5.0000 08S01100
              5.8000 08B01001
              5.9000 08S02400
              6.0000 08S05401
              6.2000 09S02700
              7.3000 08S03300
 U            7.7000 08S04700
              9.4000 09S01700
 JD           9.5000 08S03900
              9.7000 08S00900D
 J           11.0000 08S01200
             11.0000 08S05100D
             11.0000 08S05100
             13.0000 08S04900
 J           14.0000 09S01000
 J           16.0000 09S00600
             16.0000 08S04100
             16.0000 09S02100
 J           17.0000 09S03001
 J           18.0000 09S00900
 J           18.0000 09S01300
             18.0000 09S02901
 U           20.0000 08S01600
             25.0000 09S02800
             29.0000 09S00800
             29.0000 08S02900
 J           37.0000 08S02500
 D           51.0000 08S04800
 D           63.0000 09S01400
             68.0000 08S03400
 D           91.0000 09S03201
 J           93.0000 08S02300
 D           95.0000 08S03500
 D          100.0000 08S05000
 D          120.0000 09S03301
            140.0000 08S01500
 D          180.0000 08S04400
 D          360.0000 09S03101
 D          500.0000 09S02500
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D          1300.0000 09S01100
D          2200.0000 09S03401
D          2600.0000 09S00700
D          2900.0000 08S03100
D          4200.0000 09S00500
D          6000.0000 09S00500D
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Outside values - location details:

08B01001 low: 10/11 hi: 64/67

L	Aldrin	1.7000 UJ
L	Dieldrin	1.3000 J
L	Endosulfan I	1.7000 U
L	Heptachlor	1.7000 UJ
L	Heptachlor epoxide	1.7000 U
L	Methoxychlor	17.0000 U
L	Toxaphene	170.0000 U
L	alpha-BHC	1.7000 U
L	beta-BHC	1.7000 U
L	delta-BHC	1.7000 U
L	gamma-BHC (Lindane)	1.7000 UJ
H	1,2,4-Trichlorobenzene	450.0000 U
H	1,2-Dichlorobenzene	450.0000 U
H	1,3-Dichlorobenzene	450.0000 U
H	1,4-Dichlorobenzene	450.0000 U
H	2,2'-oxybis(1-Chloropropane)	450.0000 UJ
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	450.0000 U
H	2,4-Dichlorophenol	450.0000 U
H	2,4-Dimethylphenol	450.0000 U
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	450.0000 UJ
H	2,6-Dinitrotoluene	450.0000 UJ
H	2-Chloronaphthalene	450.0000 U
H	2-Chlorophenol	450.0000 U
H	2-Methylnaphthalene	450.0000 U
H	2-Methylphenol	450.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	450.0000 U
H	3,3'-Dichlorobenzidine	450.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	4.1000 J
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	450.0000 U
H	4-Chloro-3-methylphenol	450.0000 U
H	4-Chloroaniline	450.0000 U
H	4-Chlorophenyl-phenylether	450.0000 U
H	4-Methylphenol	450.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 UJ
H	Acenaphthene	450.0000 U
H	Acenaphthylene	450.0000 U
H	Anthracene	450.0000 U
H	Benzo(a)anthracene	450.0000 U
H	Benzo(a)pyrene	450.0000 U
H	Benzo(b)fluoranthene	450.0000 U
H	Benzo(g,h,i)perylene	450.0000 U
H	Benzo(k)fluoranthene	450.0000 U
H	Butylbenzylphthalate	450.0000 U
H	Carbazole	450.0000 U
H	Chrysene	450.0000 U
H	Di-n-butylphthalate	450.0000 U
H	Di-n-octylphthalate	450.0000 U
H	Dibenz(a,h)anthracene	450.0000 U
H	Dibenzofuran	450.0000 U
H	Diethylphthalate	450.0000 U
H	Dimethylphthalate	450.0000 U
H	Fluoranthene	450.0000 U
H	Fluorene	450.0000 U
H	Hexachlorobenzene	450.0000 UJ
H	Hexachlorobutadiene	450.0000 UJ
H	Hexachlorocyclopentadiene	450.0000 UJ
H	Hexachloroethane	450.0000 U
H	Indeno(1,2,3-cd)pyrene	450.0000 U
H	Isophorone	450.0000 U
H	N-Nitroso-di-n-propylamine	450.0000 U
H	N-Nitrosodiphenylamine (1)	450.0000 U
H	Naphthalene	450.0000 U
H	Nitrobenzene	450.0000 U

H	Pentachlorophenol	1100.0000 UJ
H	Phenanthrene	450.0000 U
H	Phenol	450.0000 U
H	Pyrene	450.0000 U
H	alpha-Chlordane	5.1000
H	bis(2-Chloroethoxy)methane	450.0000 U
H	bis(2-Chloroethyl)ether	450.0000 U
H	bis(2-Ethylhexyl)phthalate	450.0000 U
H	gamma-Chlordane	5.8000

08S00900 low: 0/13 hi: 79/99

L	4,4'-DDD	1.4000 J
L	Antimony	4.2000 J
L	Benzo(a)anthracene	78.0000 J
L	Benzo(b)fluoranthene	170.0000 J
L	Benzo(k)fluoranthene	170.0000 J
L	Chrysene	85.0000 J
L	Dieldrin	1.5000 J
L	Endrin	0.7400 J
L	Endrin aldehyde	1.5000 J
L	Fluoranthene	78.0000 J
L	Heptachlor epoxide	0.6000 J
L	Pyrene	310.0000 J
L	gamma-Chlordane	0.3200 J

H	1,2,4-Trichlorobenzene	800.0000 U
H	1,2-Dichlorobenzene	800.0000 U
H	1,3-Dichlorobenzene	800.0000 U
H	1,4-Dichlorobenzene	800.0000 U
H	2,2'-oxybis(1-Chloropropane)	800.0000 U
H	2,4,5-Trichlorophenol	2000.0000 U
H	2,4,6-Trichlorophenol	800.0000 U
H	2,4-Dichlorophenol	800.0000 U
H	2,4-Dimethylphenol	800.0000 U
H	2,4-Dinitrophenol	2000.0000 U
H	2,4-Dinitrotoluene	800.0000 U
H	2,6-Dinitrotoluene	800.0000 U
H	2-Chloronaphthalene	800.0000 U
H	2-Chlorophenol	800.0000 U
H	2-Methylnaphthalene	800.0000 U
H	2-Methylphenol	800.0000 U
H	2-Nitroaniline	2000.0000 UJ
H	2-Nitrophenol	800.0000 U
H	3,3'-Dichlorobenzidine	800.0000 U
H	3-Nitroaniline	2000.0000 U
H	4,6-Dinitro-2-methylphenol	2000.0000 U
H	4-Bromophenyl-phenylether	800.0000 U
H	4-Chloro-3-methylphenol	800.0000 U
H	4-Chloroaniline	800.0000 U
H	4-Chlorophenyl-phenylether	800.0000 U
H	4-Methylphenol	800.0000 U
H	4-Nitroaniline	2000.0000 U
H	4-Nitrophenol	2000.0000 U
H	Acenaphthene	800.0000 U
H	Acenaphthylene	800.0000 U
H	Aldrin	4.1000 U
H	Aluminum	5800.0000
H	Anthracene	800.0000 U
H	Aroclor-1016	80.0000 U
H	Aroclor-1221	160.0000 U
H	Aroclor-1232	80.0000 U
H	Aroclor-1242	80.0000 U
H	Aroclor-1248	80.0000 U
H	Aroclor-1254	80.0000 U
H	Aroclor-1260	80.0000 U
H	Arsenic	30.5000 J
H	Barium	54.3000 J
H	Benzo(a)pyrene	800.0000 U
H	Benzo(g,h,i)perylene	800.0000 U
H	Beryllium	0.3000 U
H	Butylbenzylphthalate	440.0000 J
H	Cadmium	0.8700 J
H	Calcium	38100.0000

H	Carbazole	800.0000 UJ
H	Chromium	11.4000
H	Cobalt	0.7600 J
H	Copper	25.5000 J
H	Di-n-butylphthalate	800.0000 U
H	Di-n-octylphthalate	800.0000 U
H	Dibenz(a,h)anthracene	800.0000 U
H	Dibenzofuran	800.0000 U
H	Diethylphthalate	800.0000 U
H	Dimethylphthalate	800.0000 U
H	Endosulfan I	4.1000 U
H	Endosulfan II	8.0000 U
H	Endosulfan sulfate	11.0000
H	Fluorene	800.0000 U
H	Heptachlor	4.1000 U
H	Hexachlorobenzene	800.0000 U
H	Hexachlorobutadiene	800.0000 UJ
H	Hexachlorocyclopentadiene	800.0000 U
H	Hexachloroethane	800.0000 U
H	Indeno(1,2,3-cd)pyrene	800.0000 U
H	Iron	6440.0000 J
H	Isophorone	800.0000 U
H	Lead	337.0000
H	Magnesium	1540.0000 U
H	Manganese	146.0000 J
H	Mercury	0.4700 J
H	Methoxychlor	41.0000 U
H	N-Nitroso-di-n-propylamine	800.0000 U
H	N-Nitrosodiphenylamine (1)	800.0000 U
H	Naphthalene	800.0000 U
H	Nickel	8.1000 J
H	Nitrobenzene	800.0000 U
H	Pentachlorophenol	2000.0000 U
H	Phenanthrene	800.0000 U
H	Phenol	800.0000 U
H	Potassium	273.0000 U
H	Selenium	4.2000
H	Silver	4.0000 J
H	Sodium	555.0000 U
H	Thallium	2.4000 U
H	Toxaphene	410.0000 U
H	Vanadium	6.7000 J
H	Zinc	764.0000 J
H	alpha-BHC	4.1000 U
H	alpha-Chlordane	4.1000 U
H	beta-BHC	4.1000 U
H	bis(2-Chloroethoxy)methane	800.0000 U
H	bis(2-Chloroethyl)ether	800.0000 U
H	bis(2-Ethylhexyl)phthalate	800.0000 U
H	delta-BHC	2.1000 J
H	gamma-BHC (Lindane)	4.1000 U

08S00900D low: 0/5 hi: 84/106

L	Aldrin	0.5600 J
L	Cobalt	0.3600 J
L	Endrin	1.0000 J
L	Heptachlor epoxide	1.1000 J
L	delta-BHC	1.6000 J
H	1,2,4-Trichlorobenzene	820.0000 U
H	1,2-Dichlorobenzene	820.0000 U
H	1,3-Dichlorobenzene	820.0000 U
H	1,4-Dichlorobenzene	820.0000 U
H	2,2'-oxybis(1-Chloropropane)	820.0000 U
H	2,4,5-Trichlorophenol	2100.0000 U
H	2,4,6-Trichlorophenol	820.0000 U
H	2,4-Dichlorophenol	820.0000 U
H	2,4-Dimethylphenol	820.0000 U
H	2,4-Dinitrophenol	2100.0000 U
H	2,4-Dinitrotoluene	820.0000 U
H	2,6-Dinitrotoluene	820.0000 U
H	2-Chloronaphthalene	820.0000 U
H	2-Chlorophenol	820.0000 U

H	2-Methylnaphthalene	820.0000	U
H	2-Methylphenol	820.0000	U
H	2-Nitroaniline	2100.0000	U
H	2-Nitrophenol	820.0000	U
H	3,3'-Dichlorobenzidine	820.0000	U
H	3-Nitroaniline	2100.0000	UJ
H	4,4'-DDD	13.0000	J
H	4,6-Dinitro-2-methylphenol	2100.0000	U
H	4-Bromophenyl-phenylether	820.0000	U
H	4-Chloro-3-methylphenol	820.0000	U
H	4-Chloroaniline	820.0000	U
H	4-Chlorophenyl-phenylether	820.0000	U
H	4-Methylphenol	820.0000	U
H	4-Nitroaniline	2100.0000	UJ
H	4-Nitrophenol	2100.0000	U
H	Acenaphthene	820.0000	U
H	Acenaphthylene	820.0000	U
H	Aluminum	6060.0000	
H	Anthracene	820.0000	U
H	Aroclor-1016	82.0000	U
H	Aroclor-1221	170.0000	U
H	Aroclor-1232	82.0000	U
H	Aroclor-1242	82.0000	U
H	Aroclor-1248	82.0000	U
H	Aroclor-1254	82.0000	U
H	Aroclor-1260	82.0000	U
H	Arsenic	30.7000	J
H	Barium	53.7000	J
H	Benzo(a)anthracene	820.0000	U
H	Benzo(a)pyrene	820.0000	U
H	Benzo(b)fluoranthene	820.0000	U
H	Benzo(g,h,i)perylene	820.0000	U
H	Benzo(k)fluoranthene	820.0000	U
H	Beryllium	0.3500	U
H	Butylbenzylphthalate	820.0000	U
H	Cadmium	0.8700	J
H	Calcium	38000.0000	
H	Carbazole	820.0000	U
H	Chromium	11.0000	
H	Chrysene	820.0000	U
H	Copper	24.6000	J
H	Di-n-butylphthalate	820.0000	U
H	Di-n-octylphthalate	820.0000	U
H	Dibenz(a,h)anthracene	820.0000	U
H	Dibenzofuran	820.0000	U
H	Dieldrin	12.0000	J
H	Diethylphthalate	820.0000	U
H	Dimethylphthalate	820.0000	U
H	Endosulfan I	4.2000	U
H	Endosulfan II	8.2000	U
H	Endosulfan sulfate	8.1000	J
H	Endrin aldehyde	5.9000	J
H	Fluoranthene	820.0000	U
H	Fluorene	820.0000	U
H	Heptachlor	4.2000	U
H	Hexachlorobenzene	820.0000	U
H	Hexachlorobutadiene	820.0000	UJ
H	Hexachlorocyclopentadiene	820.0000	U
H	Hexachloroethane	820.0000	U
H	Indeno(1,2,3-cd)pyrene	820.0000	U
H	Iron	4740.0000	J
H	Isophorone	820.0000	U
H	Lead	353.0000	
H	Magnesium	1540.0000	U
H	Manganese	130.0000	J
H	Mercury	0.4800	J
H	Methoxychlor	42.0000	U
H	N-Nitroso-di-n-propylamine	820.0000	U
H	N-Nitrosodiphenylamine (1)	820.0000	UJ
H	Naphthalene	820.0000	U
H	Nickel	8.1000	J
H	Nitrobenzene	820.0000	U
H	Pentachlorophenol	2100.0000	U

H	Phenanthrene	820.0000 U
H	Phenol	820.0000 U
H	Potassium	284.0000 U
H	Pyrene	820.0000 U
H	Selenium	3.2000
H	Silver	3.8000 J
H	Sodium	535.0000 U
H	Thallium	2.5000 U
H	Toxaphene	420.0000 U
H	Vanadium	6.4000 J
H	Zinc	808.0000 J
H	alpha-BHC	4.2000 U
H	alpha-Chlordane	6.8000
H	beta-BHC	4.2000 U
H	bis(2-Chloroethoxy)methane	820.0000 U
H	bis(2-Chloroethyl)ether	820.0000 U
H	bis(2-Ethylhexyl)phthalate	820.0000 U
H	gamma-BHC (Lindane)	4.2000 U
H	gamma-Chlordane	9.7000

08S01000 low: 3/10 hi: 88/97

L	Antimony	0.7300 U
L	Benzo(a)anthracene	140.0000 J
L	Chrysene	110.0000 J
L	Cobalt	0.1800 U
L	Dieldrin	0.7000 J
L	Endosulfan II	0.9700 J
L	Endrin aldehyde	1.0000 J
L	Nickel	1.4000 J
L	Potassium	30.6000 U
L	gamma-Chlordane	1.3000 J

H	1,2,4-Trichlorobenzene	420.0000 U
H	1,2-Dichlorobenzene	420.0000 U
H	1,3-Dichlorobenzene	420.0000 U
H	1,4-Dichlorobenzene	420.0000 U
H	2,2'-oxybis(1-Chloropropane)	420.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	420.0000 U
H	2,4-Dichlorophenol	420.0000 U
H	2,4-Dimethylphenol	420.0000 U
H	2,4-Dinitrophenol	1100.0000 U
H	2,4-Dinitrotoluene	420.0000 U
H	2,6-Dinitrotoluene	420.0000 U
H	2-Chloronaphthalene	420.0000 U
H	2-Chlorophenol	420.0000 U
H	2-Methylnaphthalene	420.0000 U
H	2-Methylphenol	420.0000 U
H	2-Nitroaniline	420.0000 U
H	2-Nitrophenol	1100.0000 U
H	3,3'-Dichlorobenzidine	420.0000 U
H	3-Nitroaniline	420.0000 U
H	4,4'-DDD	1100.0000 UJ
H	4,4'-DDE	4.2000 UJ
H	4,6-Dinitro-2-methylphenol	19.0000 J
H	4-Bromophenyl-phenylether	1100.0000 U
H	4-Chloro-3-methylphenol	420.0000 U
H	4-Chloroaniline	420.0000 U
H	4-Chlorophenyl-phenylether	420.0000 U
H	4-Methylphenol	420.0000 U
H	4-Nitroaniline	420.0000 U
H	4-Nitrophenol	1100.0000 UJ
H	Acenaphthene	1100.0000 U
H	Acenaphthylene	420.0000 U
H	Aldrin	420.0000 U
H	Anthracene	2.2000 UJ
H	Aroclor-1016	420.0000 U
H	Aroclor-1221	42.0000 UJ
H	Aroclor-1232	86.0000 UJ
H	Aroclor-1242	42.0000 UJ
H	Aroclor-1248	42.0000 UJ
H	Aroclor-1254	42.0000 UJ
H	Aroclor-1260	42.0000 UJ

H	Arsenic	7.8000 J
H	Barium	10.4000 J
H	Benzo(a)pyrene	420.0000 U
H	Benzo(b)fluoranthene	420.0000 U
H	Benzo(g,h,i)perylene	420.0000 U
H	Benzo(k)fluoranthene	420.0000 U
H	Beryllium	0.1300 U
H	Butylbenzylphthalate	420.0000 U
H	Carbazole	420.0000 U
H	Chromium	27.4000
H	Copper	11.1000 J
H	Di-n-octylphthalate	420.0000 U
H	Dibenz(a,h)anthracene	420.0000 UJ
H	Dibenzofuran	420.0000 U
H	Diethylphthalate	420.0000 U
H	Dimethylphthalate	420.0000 U
H	Endosulfan I	2.2000 UJ
H	Endosulfan sulfate	4.2000 UJ
H	Endrin	4.2000 UJ
H	Endrin ketone	4.2000 UJ
H	Fluoranthene	420.0000 U
H	Fluorene	420.0000 U
H	Heptachlor	2.2000 UJ
H	Heptachlor epoxide	2.2000 UJ
H	Hexachlorobenzene	420.0000 U
H	Hexachlorobutadiene	420.0000 U
H	Hexachlorocyclopentadiene	420.0000 U
H	Hexachloroethane	420.0000 U
H	Indeno(1,2,3-cd)pyrene	420.0000 U
H	Isophorone	420.0000 U
H	Lead	43.6000
H	Magnesium	179.0000 U
H	Manganese	12.7000 J
H	Mercury	0.1600 J
H	Methoxychlor	22.0000 UJ
H	N-Nitroso-di-n-propylamine	420.0000 U
H	N-Nitrosodiphenylamine (1)	420.0000 UJ
H	Naphthalene	420.0000 U
H	Nitrobenzene	420.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	420.0000 U
H	Phenol	420.0000 U
H	Pyrene	420.0000 U
H	Selenium	1.1000 U
H	Silver	62.7000 J
H	Sodium	241.0000 U
H	Thallium	1.3000 U
H	Toxaphene	220.0000 UJ
H	Zinc	35.8000 U
H	alpha-BHC	2.2000 UJ
H	beta-BHC	2.2000 UJ
H	bis(2-Chloroethoxy)methane	420.0000 U
H	bis(2-Chloroethyl)ether	420.0000 U
H	bis(2-Ethylhexyl)phthalate	420.0000 U
H	delta-BHC	2.2000 UJ
H	gamma-BHC (Lindane)	2.2000 UJ

08S01100 low: 2/16 hi: 68/78

L	Acenaphthylene	67.0000 J
L	Antimony	0.6900 U
L	Benzo(a)anthracene	120.0000 J
L	Benzo(a)pyrene	150.0000 J
L	Benzo(g,h,i)perylene	80.0000 J
L	Cadmium	0.0700 J
L	Chrysene	230.0000 J
L	Cobalt	0.1700 J
L	Dieldrin	1.4000 J
L	Endrin aldehyde	1.4000 J
L	Fluoranthene	260.0000 J
L	Indeno(1,2,3-cd)pyrene	120.0000 J
L	Nickel	0.8800 J
L	Phenanthrene	80.0000 J
L	Potassium	56.4000 U

L	bis(2-Ethylhexyl)phthalate	270.0000 J
H	1,2,4-Trichlorobenzene	400.0000 U
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U
H	2,4-Dinitrophenol	1000.0000 U
H	2,4-Dinitrotoluene	400.0000 U
H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U
H	2-Methylnaphthalene	400.0000 U
H	2-Methylphenol	400.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	400.0000 U
H	3,3'-Dichlorobenzidine	400.0000 U
H	3-Nitroaniline	1000.0000 U
H	4,4'-DDD	6.4000 J
H	4,6-Dinitro-2-methylphenol	1000.0000 U
H	4-Bromophenyl-phenylether	400.0000 U
H	4-Chloro-3-methylphenol	400.0000 U
H	4-Chloroaniline	400.0000 U
H	4-Chlorophenyl-phenylether	400.0000 U
H	4-Methylphenol	400.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 U
H	Acenaphthene	400.0000 U
H	Aldrin	2.0000 U
H	Anthracene	400.0000 U
H	Arsenic	3.5000 J
H	Barium	28.4000 J
H	Beryllium	0.1300 U
H	Butylbenzylphthalate	400.0000 U
H	Calcium	13000.0000
H	Carbazole	400.0000 UJ
H	Chromium	5.4000
H	Copper	5.1000 U
H	Di-n-octylphthalate	400.0000 U
H	Dibenz(a,h)anthracene	400.0000 U
H	Dibenzofuran	400.0000 U
H	Diethylphthalate	400.0000 U
H	Dimethylphthalate	400.0000 U
H	Endosulfan I	2.0000 U
H	Fluorene	400.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Hexachlorobenzene	400.0000 U
H	Hexachlorobutadiene	400.0000 U
H	Hexachlorocyclopentadiene	400.0000 U
H	Hexachloroethane	400.0000 U
H	Isophorone	400.0000 U
H	Lead	37.3000
H	Magnesium	487.0000 U
H	Manganese	18.5000 J
H	Mercury	0.1000 J
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	400.0000 U
H	N-Nitrosodiphenylamine (1)	400.0000 U
H	Naphthalene	400.0000 U
H	Nitrobenzene	400.0000 U
H	Pentachlorophenol	1000.0000 U
H	Phenol	400.0000 U
H	Selenium	1.0000 U
H	Silver	3.8000 J
H	Sodium	249.0000 U
H	Thallium	1.2000 U
H	Toxaphene	200.0000 U
H	Zinc	33.1000 U

H alpha-BHC	2.0000	U
H beta-BHC	2.0000	U
H bis(2-Chloroethoxy)methane	400.0000	U
H bis(2-Chloroethyl)ether	400.0000	U
H delta-BHC	2.0000	U
H gamma-BHC (Lindane)	2.0000	U
H gamma-Chlordane	5.0000	

08S01200 low: 9/12 hi: 69/89

L Aldrin	1.7000	U
L Cobalt	0.1900	U
L Endosulfan I	0.7300	J
L Endosulfan sulfate	2.0000	J
L Heptachlor	1.7000	U
L Heptachlor epoxide	1.5000	J
L Methoxychlor	17.0000	U
L Toxaphene	170.0000	U
L alpha-BHC	1.7000	U
L beta-BHC	1.7000	U
L delta-BHC	1.7000	U
L gamma-BHC (Lindane)	1.7000	U
H 1,2,4-Trichlorobenzene	450.0000	U
H 1,2-Dichlorobenzene	450.0000	U
H 1,3-Dichlorobenzene	450.0000	U
H 1,4-Dichlorobenzene	450.0000	U
H 2,2'-oxybis(1-Chloropropane)	450.0000	U
H 2,4,5-Trichlorophenol	1100.0000	U
H 2,4,6-Trichlorophenol	450.0000	U
H 2,4-Dichlorophenol	450.0000	U
H 2,4-Dimethylphenol	450.0000	U
H 2,4-Dinitrophenol	1100.0000	U
H 2,4-Dinitrotoluene	450.0000	U
H 2,6-Dinitrotoluene	450.0000	U
H 2-Chloronaphthalene	450.0000	U
H 2-Chlorophenol	450.0000	U
H 2-Methylnaphthalene	450.0000	U
H 2-Methylphenol	450.0000	U
H 2-Nitroaniline	1100.0000	U
H 2-Nitrophenol	450.0000	U
H 3,3'-Dichlorobenzidine	450.0000	U
H 3-Nitroaniline	1100.0000	U
H 4,4'-DDD	9.7000	J
H 4,4'-DDE	22.0000	
H 4,6-Dinitro-2-methylphenol	1100.0000	U
H 4-Bromophenyl-phenylether	450.0000	U
H 4-Chloro-3-methylphenol	450.0000	U
H 4-Chloroaniline	450.0000	U
H 4-Chlorophenyl-phenylether	450.0000	U
H 4-Methylphenol	450.0000	U
H 4-Nitroaniline	1100.0000	U
H 4-Nitrophenol	1100.0000	U
H Acenaphthene	450.0000	U
H Acenaphthylene	450.0000	U
H Anthracene	450.0000	U
H Antimony	7.8000	J
H Aroclor-1260	420.0000	J
H Arsenic	6.2000	J
H Barium	36.9000	J
H Benzo(a)anthracene	450.0000	U
H Benzo(a)pyrene	450.0000	U
H Benzo(b)fluoranthene	450.0000	U
H Benzo(g,h,i)perylene	450.0000	U
H Benzo(k)fluoranthene	450.0000	U
H Beryllium	0.1400	U
H Butylbenzylphthalate	450.0000	U
H Cadmium	1.5000	
H Carbazole	450.0000	UJ
H Chromium	208.0000	
H Chrysene	450.0000	U
H Copper	49.3000	J
H Di-n-butylphthalate	450.0000	U
H Di-n-octylphthalate	450.0000	U

H	Dibenz(a,h)anthracene	450.0000 U
H	Dibenzofuran	450.0000 U
H	Dieldrin	9.0000 J
H	Diethylphthalate	450.0000 U
H	Dimethylphthalate	450.0000 U
H	Endrin	6.7000
H	Endrin aldehyde	7.1000
H	Fluoranthene	450.0000 U
H	Fluorene	450.0000 U
H	Hexachlorobenzene	450.0000 U
H	Hexachlorobutadiene	450.0000 U
H	Hexachlorocyclopentadiene	450.0000 U
H	Hexachloroethane	450.0000 U
H	Indeno(1,2,3-cd)pyrene	450.0000 U
H	Iron	1230.0000 J
H	Isophorone	450.0000 U
H	Lead	156.0000
H	Magnesium	312.0000 U
H	Manganese	16.9000 J
H	Mercury	0.5800 J
H	N-Nitroso-di-n-propylamine	450.0000 U
H	N-Nitrosodiphenylamine (1)	450.0000 U
H	Naphthalene	450.0000 U
H	Nitrobenzene	450.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	450.0000 U
H	Phenol	450.0000 U
H	Pyrene	450.0000 U
H	Selenium	1.2000 U
H	Silver	122.0000 J
H	Sodium	346.0000 U
H	Thallium	1.3000 U
H	Zinc	137.0000 J
H	alpha-Chlordane	19.0000
H	bis(2-Chloroethoxy)methane	450.0000 U
H	bis(2-Chloroethyl)ether	450.0000 U
H	bis(2-Ethylhexyl)phthalate	450.0000 U
H	gamma-Chlordane	11.0000 J

08S01300 low: 6/9 hi: 4/6

L	4,4'-DDD	0.8800 J
L	Antimony	0.6300 U
L	Beryllium	0.0300 U
L	Cadmium	0.0600 U
L	Cobalt	0.1500 U
L	Endrin aldehyde	0.5500 J
L	Nickel	0.2800 U
L	Potassium	10.3000 U
L	gamma-Chlordane	0.4800 J
H	Arsenic	1.3000 U
H	Lead	24.3000
H	Selenium	0.9500 U
H	Silver	0.6500 J
H	Sodium	197.0000 U
H	Thallium	1.1000 U

08S01400 low: 4/7 hi: 61/66

L	4,4'-DDD	0.9200 J
L	Antimony	0.6500 U
L	Cadmium	0.1000 U
L	Cobalt	0.1600 U
L	Endrin aldehyde	0.4600 J
L	Nickel	0.4100 J
L	Potassium	37.7000 U
H	1,2,4-Trichlorobenzene	380.0000 U
H	1,2-Dichlorobenzene	380.0000 U
H	1,3-Dichlorobenzene	380.0000 U
H	1,4-Dichlorobenzene	380.0000 U
H	2,2'-oxybis(1-Chloropropane)	380.0000 U
H	2,4,6-Trichlorophenol	380.0000 U
H	2,4-Dichlorophenol	380.0000 U

H	2,4-Dimethylphenol	380.0000 U
H	2,4-Dinitrotoluene	380.0000 U
H	2,6-Dinitrotoluene	380.0000 U
H	2-Chloronaphthalene	380.0000 U
H	2-Chlorophenol	380.0000 U
H	2-Methylnaphthalene	380.0000 U
H	2-Methylphenol	380.0000 U
H	2-Nitrophenol	380.0000 U
H	3,3'-Dichlorobenzidine	380.0000 U
H	4-Bromophenyl-phenylether	380.0000 U
H	4-Chloro-3-methylphenol	380.0000 U
H	4-Chloroaniline	380.0000 U
H	4-Chlorophenyl-phenylether	380.0000 U
H	4-Methylphenol	380.0000 U
H	Acenaphthene	380.0000 U
H	Acenaphthylene	380.0000 U
H	Anthracene	380.0000 U
H	Arsenic	1.3000 U
H	Benzo(a)anthracene	380.0000 U
H	Benzo(a)pyrene	380.0000 U
H	Benzo(b)fluoranthene	380.0000 U
H	Benzo(g,h,i)perylene	380.0000 U
H	Benzo(k)fluoranthene	380.0000 U
H	Beryllium	0.0500 U
H	Butylbenzylphthalate	380.0000 U
H	Carbazole	380.0000 UJ
H	Chromium	9.2000
H	Chrysene	380.0000 U
H	Copper	3.3000 U
H	Di-n-octylphthalate	380.0000 U
H	Dibenz(a,h)anthracene	380.0000 U
H	Dibenzofuran	380.0000 U
H	Dieldrin	6.5000 J
H	Diethylphthalate	380.0000 U
H	Dimethylphthalate	380.0000 U
H	Fluoranthene	380.0000 U
H	Fluorene	380.0000 U
H	Hexachlorobenzene	380.0000 U
H	Hexachlorobutadiene	380.0000 U
H	Hexachlorocyclopentadiene	380.0000 U
H	Hexachloroethane	380.0000 U
H	Indeno(1,2,3-cd)pyrene	380.0000 U
H	Isophorone	380.0000 U
H	Lead	21.6000
H	Mercury	0.0800 J
H	N-Nitroso-di-n-propylamine	380.0000 U
H	N-Nitrosodiphenylamine (1)	380.0000 U
H	Naphthalene	380.0000 U
H	Nitrobenzene	380.0000 U
H	Phenanthrene	380.0000 U
H	Phenol	380.0000 U
H	Pyrene	380.0000 U
H	Selenium	0.9800 U
H	Silver	9.6000 J
H	Sodium	257.0000 U
H	Thallium	1.1000 U
H	bis(2-Chloroethoxy)methane	380.0000 U
H	bis(2-Chloroethyl)ether	380.0000 U
H	bis(2-Ethylhexyl)phthalate	380.0000 U

08S01500 low: 2/11 hi: 83/102

L	Antimony	0.7400 U
L	Benzo(a)anthracene	31.0000 J
L	Benzo(a)pyrene	41.0000 J
L	Benzo(b)fluoranthene	75.0000 J
L	Benzo(k)fluoranthene	74.0000 J
L	Chrysene	54.0000 J
L	Cobalt	0.1800 U
L	Endosulfan sulfate	2.3000 J
L	Fluoranthene	50.0000 J
L	Nickel	1.1000 J
L	Pyrene	61.0000 J

H	1,2,4-Trichlorobenzene	430.0000 U
H	1,2-Dichlorobenzene	430.0000 U
H	1,3-Dichlorobenzene	430.0000 U
H	1,4-Dichlorobenzene	430.0000 U
H	2,2'-oxybis(1-Chloropropane)	430.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	430.0000 U
H	2,4-Dichlorophenol	430.0000 U
H	2,4-Dimethylphenol	430.0000 U
H	2,4-Dinitrophenol	1100.0000 U
H	2,4-Dinitrotoluene	430.0000 U
H	2,6-Dinitrotoluene	430.0000 U
H	2-Chloronaphthalene	430.0000 U
H	2-Chlorophenol	430.0000 U
H	2-Methylnaphthalene	430.0000 U
H	2-Methylphenol	430.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	430.0000 U
H	3,3'-Dichlorobenzidine	430.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	36.0000 J
H	4,4'-DDE	22.0000 U
H	4,4'-DDT	160.0000
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	430.0000 U
H	4-Chloro-3-methylphenol	430.0000 U
H	4-Chloroaniline	430.0000 U
H	4-Chlorophenyl-phenylether	430.0000 U
H	4-Methylphenol	430.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	430.0000 U
H	Acenaphthylene	430.0000 U
H	Aldrin	11.0000 U
H	Anthracene	430.0000 U
H	Aroclor-1016	220.0000 U
H	Aroclor-1221	440.0000 U
H	Aroclor-1232	220.0000 U
H	Aroclor-1242	220.0000 U
H	Aroclor-1248	220.0000 U
H	Aroclor-1254	220.0000 U
H	Aroclor-1260	220.0000 U
H	Arsenic	10.4000 J
H	Barium	135.0000
H	Benzo(g,h,i)perylene	430.0000 U
H	Beryllium	0.1000 U
H	Butylbenzylphthalate	430.0000 U
H	Cadmium	1.1000 J
H	Calcium	12400.0000
H	Carbazole	430.0000 UJ
H	Chromium	5.6000
H	Copper	24.8000 J
H	Di-n-butylphthalate	430.0000 U
H	Di-n-octylphthalate	430.0000 U
H	Dibenz(a,h)anthracene	430.0000 U
H	Dibenzofuran	430.0000 U
H	Dieldrin	22.0000 U
H	Diethylphthalate	430.0000 U
H	Dimethylphthalate	430.0000 U
H	Endosulfan I	11.0000 U
H	Endosulfan II	22.0000 U
H	Endrin	22.0000 U
H	Endrin aldehyde	22.0000 U
H	Endrin ketone	22.0000 U
H	Fluorene	430.0000 U
H	Heptachlor	14.0000 U
H	Heptachlor epoxide	11.0000
H	Hexachlorobenzene	430.0000 U
H	Hexachlorobutadiene	430.0000 U
H	Hexachlorocyclopentadiene	430.0000 U
H	Hexachloroethane	430.0000 U
H	Indeno(1,2,3-cd)pyrene	430.0000 U
H	Iron	2570.0000 J

H	Isophorone	430.0000 U
H	Lead	66.7000
H	Magnesium	529.0000 U
H	Manganese	52.4000 J
H	Mercury	0.7700 J
H	Methoxychlor	110.0000 U
H	N-Nitroso-di-n-propylamine	430.0000 U
H	N-Nitrosodiphenylamine (1)	430.0000 U
H	Naphthalene	430.0000 U
H	Nitrobenzene	430.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	430.0000 U
H	Phenol	430.0000 U
H	Potassium	122.0000 U
H	Selenium	1.6000
H	Silver	16.8000 J
H	Sodium	225.0000 U
H	Thallium	1.3000 U
H	Toxaphene	1100.0000 U
H	Zinc	260.0000 J
H	alpha-BHC	11.0000 U
H	alpha-Chlordane	78.0000
H	beta-BHC	11.0000 U
H	bis(2-Chloroethoxy)methane	430.0000 U
H	bis(2-Chloroethyl)ether	430.0000 U
H	bis(2-Ethylhexyl)phthalate	430.0000 U
H	delta-BHC	5.9000 J
H	gamma-BHC (Lindane)	11.0000 U
H	gamma-Chlordane	140.0000

08S01600 low: 3/15 hi: 81/95

L	Acenaphthylene	63.0000 J
L	Antimony	0.6700 U
L	Benzo(a)anthracene	120.0000 J
L	Benzo(a)pyrene	170.0000 J
L	Benzo(g,h,i)perylene	120.0000 J
L	Cadmium	0.0700 U
L	Chrysene	250.0000 J
L	Cobalt	0.1600 U
L	Endrin	1.8000 J
L	Fluoranthene	160.0000 J
L	Indeno(1,2,3-cd)pyrene	150.0000 J
L	Nickel	1.2000 J
L	Phenanthrene	64.0000 J
L	Pyrene	280.0000 J
L	bis(2-Ethylhexyl)phthalate	42.0000 J
H	1,2,4-Trichlorobenzene	390.0000 U
H	1,2-Dichlorobenzene	390.0000 U
H	1,3-Dichlorobenzene	390.0000 U
H	1,4-Dichlorobenzene	390.0000 U
H	2,2'-oxybis(1-Chloropropane)	390.0000 U
H	2,4,5-Trichlorophenol	980.0000 U
H	2,4,6-Trichlorophenol	390.0000 U
H	2,4-Dichlorophenol	390.0000 U
H	2,4-Dimethylphenol	390.0000 U
H	2,4-Dinitrophenol	980.0000 U
H	2,4-Dinitrotoluene	390.0000 U
H	2,6-Dinitrotoluene	390.0000 U
H	2-Chloronaphthalene	390.0000 U
H	2-Chlorophenol	390.0000 U
H	2-Methylnaphthalene	390.0000 U
H	2-Methylphenol	390.0000 U
H	2-Nitroaniline	980.0000 U
H	2-Nitrophenol	390.0000 U
H	3,3'-Dichlorobenzidine	390.0000 U
H	3-Nitroaniline	980.0000 U
H	4,4'-DDD	40.0000 J
H	4,4'-DDE	22.0000 J
H	4,4'-DDT	1200.0000 D
H	4,6-Dinitro-2-methylphenol	980.0000 U
H	4-Bromophenyl-phenylether	390.0000 U
H	4-Chloro-3-methylphenol	390.0000 U

H	4-Chloroaniline	390.0000 U
H	4-Chlorophenyl-phenylether	390.0000 U
H	4-Methylphenol	390.0000 U
H	4-Nitroaniline	980.0000 U
H	4-Nitrophenol	980.0000 U
H	Acenaphthene	390.0000 U
H	Aldrin	20.0000 U
H	Anthracene	390.0000 U
H	Aroclor-1016	390.0000 U
H	Aroclor-1221	790.0000 U
H	Aroclor-1232	390.0000 U
H	Aroclor-1242	390.0000 U
H	Aroclor-1248	390.0000 U
H	Aroclor-1254	390.0000 U
H	Aroclor-1260	390.0000 U
H	Arsenic	6.2000 J
H	Barium	25.5000 J
H	Beryllium	0.2600 U
H	Butylbenzylphthalate	390.0000 U
H	Calcium	63200.0000
H	Carbazole	390.0000 UJ
H	Chromium	10.7000
H	Copper	6.8000 J
H	Di-n-octylphthalate	390.0000 U
H	Dibenz(a,h)anthracene	390.0000 U
H	Dibenzofuran	390.0000 U
H	Dieldrin	39.0000 U
H	Diethylphthalate	390.0000 U
H	Dimethylphthalate	390.0000 U
H	Endosulfan I	20.0000 U
H	Endosulfan II	39.0000 U
H	Endosulfan sulfate	39.0000 U
H	Endrin aldehyde	39.0000 U
H	Endrin ketone	39.0000 U
H	Fluorene	390.0000 U
H	Heptachlor	20.0000 U
H	Heptachlor epoxide	20.0000 U
H	Hexachlorobenzene	390.0000 U
H	Hexachlorobutadiene	390.0000 U
H	Hexachlorocyclopentadiene	390.0000 U
H	Hexachloroethane	390.0000 U
H	Isophorone	390.0000 U
H	Lead	25.2000
H	Magnesium	1620.0000 U
H	Manganese	33.4000 J
H	Mercury	0.1800 J
H	Methoxychlor	200.0000 U
H	N-Nitroso-di-n-propylamine	390.0000 U
H	N-Nitrosodiphenylamine (1)	390.0000 U
H	Naphthalene	390.0000 U
H	Nitrobenzene	390.0000 U
H	Pentachlorophenol	980.0000 U
H	Phenol	390.0000 U
H	Potassium	142.0000 U
H	Selenium	1.0000 U
H	Silver	4.2000 J
H	Sodium	244.0000 U
H	Thallium	1.2000 U
H	Toxaphene	2000.0000 U
H	Vanadium	4.5000 J
H	Zinc	31.8000 U
H	alpha-BHC	20.0000 U
H	alpha-Chlordane	14.0000 J
H	beta-BHC	20.0000 U
H	bis(2-Chloroethoxy)methane	390.0000 U
H	bis(2-Chloroethyl)ether	390.0000 U
H	delta-BHC	20.0000 U
H	gamma-BHC (Lindane)	20.0000 U
H	gamma-Chlordane	20.0000 U

08S01700 low: 1/6 hi: 89/106

L	Antimony	0.7100 U
L	Cadmium	0.3100 J

L	Cobalt	0.3600 J
L	Di-n-butylphthalate	58.0000 J
L	Endrin aldehyde	0.2700 J
L	delta-BHC	0.2400 J
H	1,2,4-Trichlorobenzene	410.0000 U
H	1,2-Dichlorobenzene	410.0000 U
H	1,3-Dichlorobenzene	410.0000 U
H	1,4-Dichlorobenzene	410.0000 U
H	2,2'-oxybis(1-Chloropropane)	410.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	410.0000 U
H	2,4-Dichlorophenol	410.0000 U
H	2,4-Dimethylphenol	410.0000 U
H	2,4-Dinitrophenol	1000.0000 U
H	2,4-Dinitrotoluene	410.0000 U
H	2,6-Dinitrotoluene	410.0000 U
H	2-Chloronaphthalene	410.0000 U
H	2-Chlorophenol	410.0000 U
H	2-Methylnaphthalene	410.0000 U
H	2-Methylphenol	410.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	410.0000 U
H	3,3'-Dichlorobenzidine	410.0000 U
H	3-Nitroaniline	1000.0000 U
H	4,4'-DDD	5.0000 J
H	4,4'-DDE	17.0000
H	4,6-Dinitro-2-methylphenol	1000.0000 U
H	4-Bromophenyl-phenylether	410.0000 U
H	4-Chloro-3-methylphenol	410.0000 U
H	4-Chloroaniline	410.0000 U
H	4-Chlorophenyl-phenylether	410.0000 U
H	4-Methylphenol	410.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 U
H	Acenaphthene	410.0000 U
H	Acenaphthylene	410.0000 U
H	Aldrin	2.1000 U
H	Aluminum	3190.0000
H	Anthracene	410.0000 U
H	Aroclor-1016	41.0000 U
H	Aroclor-1221	84.0000 U
H	Aroclor-1232	41.0000 U
H	Aroclor-1242	41.0000 U
H	Aroclor-1248	41.0000 U
H	Aroclor-1254	41.0000 U
H	Aroclor-1260	41.0000 U
H	Arsenic	6.6000 J
H	Barium	48.8000 J
H	Benzo(a)anthracene	410.0000 U
H	Benzo(a)pyrene	410.0000 U
H	Benzo(b)fluoranthene	410.0000 U
H	Benzo(g,h,i)perylene	410.0000 U
H	Benzo(k)fluoranthene	410.0000 U
H	Beryllium	0.4500
H	Butylbenzylphthalate	410.0000 U
H	Calcium	41700.0000
H	Carbazole	410.0000 UJ
H	Chromium	27.0000
H	Chrysene	410.0000 U
H	Copper	16.6000 J
H	Di-n-octylphthalate	410.0000 U
H	Dibenz(a,h)anthracene	410.0000 U
H	Dibenzofuran	410.0000 U
H	Diethylphthalate	410.0000 U
H	Dimethylphthalate	410.0000 U
H	Endosulfan I	2.1000 U
H	Endosulfan II	4.1000 U
H	Endosulfan sulfate	4.1000 U
H	Endrin	4.1000 U
H	Endrin ketone	4.1000 U
H	Fluoranthene	410.0000 U
H	Fluorene	410.0000 U

H	Heptachlor	2.1000 U
H	Heptachlor epoxide	2.1000 U
H	Hexachlorobenzene	410.0000 U
H	Hexachlorobutadiene	410.0000 U
H	Hexachlorocyclopentadiene	410.0000 U
H	Hexachloroethane	410.0000 U
H	Indeno(1,2,3-cd)pyrene	410.0000 U
H	Iron	962.0000 J
H	Isophorone	410.0000 U
H	Lead	400.0000
H	Magnesium	2280.0000 U
H	Manganese	127.0000 J
H	Mercury	0.1600 J
H	Methoxychlor	21.0000 U
H	N-Nitroso-di-n-propylamine	410.0000 U
H	N-Nitrosodiphenylamine (1)	410.0000 U
H	Naphthalene	410.0000 U
H	Nickel	2.5000 J
H	Nitrobenzene	410.0000 U
H	Pentachlorophenol	1000.0000 U
H	Phenanthrene	410.0000 U
H	Phenol	410.0000 U
H	Potassium	303.0000 U
H	Pyrene	410.0000 U
H	Selenium	1.1000 U
H	Silver	44.0000 J
H	Sodium	307.0000 U
H	Thallium	1.2000 U
H	Toxaphene	210.0000 U
H	Vanadium	4.8000 J
H	Zinc	92.5000 U
H	alpha-BHC	2.1000 U
H	alpha-Chlordane	7.3000
H	beta-BHC	2.1000 U
H	bis(2-Chloroethoxy)methane	410.0000 U
H	bis(2-Chloroethyl)ether	410.0000 U
H	bis(2-Ethylhexyl)phthalate	410.0000 U
H	gamma-BHC (Lindane)	2.1000 U

08S01800 low: 1/8 hi: 89/99

L	Antimony	0.7000 U
L	Cobalt	0.2900 J
L	Dieldrin	1.7000 J
L	Endosulfan II	0.4300 J
L	Endrin aldehyde	0.9100 J
L	Nickel	1.6000 J
L	delta-BHC	0.1000 J
L	gamma-Chlordane	0.3100 J

H	1,2,4-Trichlorobenzene	420.0000 U
H	1,2-Dichlorobenzene	420.0000 U
H	1,3-Dichlorobenzene	420.0000 U
H	1,4-Dichlorobenzene	420.0000 U
H	2,2'-oxybis(1-Chloropropane)	420.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	420.0000 U
H	2,4-Dichlorophenol	420.0000 U
H	2,4-Dimethylphenol	420.0000 U
H	2,4-Dinitrophenol	1100.0000 U
H	2,4-Dinitrotoluene	420.0000 U
H	2,6-Dinitrotoluene	420.0000 U
H	2-Chloronaphthalene	420.0000 U
H	2-Chlorophenol	420.0000 U
H	2-Methylnaphthalene	420.0000 U
H	2-Methylphenol	420.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	420.0000 U
H	3,3'-Dichlorobenzidine	420.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	4.2000 U
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	420.0000 U
H	4-Chloro-3-methylphenol	420.0000 U

H	4-Chloroaniline	420.0000 U
H	4-Chlorophenyl-phenylether	420.0000 U
H	4-Methylphenol	420.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	420.0000 U
H	Acenaphthylene	420.0000 U
H	Aldrin	2.2000 U
H	Anthracene	420.0000 U
H	Aroclor-1016	42.0000 U
H	Aroclor-1221	85.0000 U
H	Aroclor-1232	42.0000 U
H	Aroclor-1242	42.0000 U
H	Aroclor-1248	42.0000 U
H	Aroclor-1254	42.0000 U
H	Aroclor-1260	42.0000 U
H	Arsenic	6.3000 J
H	Barium	19.3000 J
H	Benzo(a)anthracene	420.0000 U
H	Benzo(a)pyrene	420.0000 U
H	Benzo(b)fluoranthene	420.0000 U
H	Benzo(g,h,i)perylene	420.0000 U
H	Benzo(k)fluoranthene	420.0000 U
H	Beryllium	0.1400 U
H	Butylbenzylphthalate	420.0000 U
H	Calcium	19900.0000
H	Carbazole	420.0000 UJ
H	Chromium	14.6000
H	Chrysene	420.0000 U
H	Copper	7.9000 J
H	Di-n-octylphthalate	420.0000 U
H	Dibenz(a,h)anthracene	420.0000 U
H	Dibenzofuran	420.0000 U
H	Diethylphthalate	420.0000 U
H	Dimethylphthalate	420.0000 U
H	Endosulfan I	2.2000 U
H	Endosulfan sulfate	4.2000 U
H	Endrin	4.2000 U
H	Endrin ketone	4.2000 U
H	Fluoranthene	420.0000 U
H	Fluorene	420.0000 U
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	2.2000 U
H	Hexachlorobenzene	420.0000 U
H	Hexachlorobutadiene	420.0000 U
H	Hexachlorocyclopentadiene	420.0000 U
H	Hexachloroethane	420.0000 U
H	Indeno(1,2,3-cd)pyrene	420.0000 U
H	Iron	982.0000 J
H	Isophorone	420.0000 U
H	Lead	53.7000
H	Magnesium	521.0000 U
H	Manganese	37.9000 J
H	Mercury	0.1300 J
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	420.0000 U
H	N-Nitrosodiphenylamine (1)	420.0000 U
H	Naphthalene	420.0000 U
H	Nitrobenzene	420.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	420.0000 U
H	Phenol	420.0000 U
H	Pyrene	420.0000 U
H	Selenium	1.1000 U
H	Silver	16.3000 J
H	Sodium	244.0000 U
H	Thallium	1.2000 U
H	Toxaphene	220.0000 U
H	Zinc	53.8000 U
H	alpha-BHC	2.2000 U
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	420.0000 U
H	bis(2-Chloroethyl)ether	420.0000 U

H	bis(2-Ethylhexyl)phthalate	420.0000 U
H	gamma-BHC (Lindane)	2.2000 U

08S01900 low: 6/8 hi: 5/8

L	Antimony	0.6400 U
L	Beryllium	0.0300 U
L	Cadmium	0.0700 U
L	Cobalt	0.1600 U
L	Endrin aldehyde	0.5100 J
L	Nickel	0.2900 U
L	Potassium	17.1000 U
L	alpha-Chlordane	0.1200 J
H	Arsenic	1.3000 U
H	Di-n-octylphthalate	370.0000 U
H	Dieldrin	6.2000 J
H	Mercury	0.1900 J
H	Selenium	0.9700 U
H	Silver	1.4000 J
H	Sodium	193.0000 U
H	Thallium	1.1000 U

08S02000 low: 5/9 hi: 4/5

L	Antimony	0.5900 U
L	Cadmium	0.0600 U
L	Cobalt	0.1400 U
L	Endrin aldehyde	0.7200 J
L	Nickel	0.2700 U
L	Potassium	15.4000 U
L	Silver	0.3700 J
L	alpha-Chlordane	0.1200 J
L	delta-BHC	0.5300 J
H	Beryllium	0.0500 U
H	Dieldrin	5.1000 J
H	Selenium	0.9000 U
H	Sodium	184.0000 U
H	Thallium	1.0000 U

08S02100 low: 2/7 hi: 87/103

L	Antimony	0.7000 U
L	Cobalt	0.3100 J
L	Endosulfan II	1.6000 J
L	Endrin aldehyde	1.0000 J
L	Potassium	55.4000 U
L	delta-BHC	0.5000 J
L	gamma-Chlordane	0.6300 J
H	1,2,4-Trichlorobenzene	400.0000 U
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U
H	2,4-Dinitrophenol	1000.0000 U
H	2,4-Dinitrotoluene	400.0000 U
H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U
H	2-Methylnaphthalene	400.0000 U
H	2-Methylphenol	400.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	400.0000 U
H	3,3'-Dichlorobenzidine	400.0000 U
H	3-Nitroaniline	1000.0000 U
H	4,4'-DDD	20.0000 U
H	4,4'-DDE	57.0000
H	4,4'-DDT	18.0000 J
H	4,6-Dinitro-2-methylphenol	1000.0000 U
H	4-Bromophenyl-phenylether	400.0000 U

H	4-Chloro-3-methylphenol	400.0000 U
H	4-Chloroaniline	400.0000 U
H	4-Chlorophenyl-phenylether	400.0000 U
H	4-Methylphenol	400.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 U
H	Acenaphthene	400.0000 U
H	Acenaphthylene	400.0000 U
H	Aldrin	10.0000 U
H	Anthracene	400.0000 U
H	Aroclor-1016	200.0000 U
H	Aroclor-1221	410.0000 U
H	Aroclor-1232	200.0000 U
H	Aroclor-1242	200.0000 U
H	Aroclor-1248	200.0000 U
H	Aroclor-1254	200.0000 U
H	Aroclor-1260	200.0000 U
H	Arsenic	19.6000 J
H	Barium	32.6000 J
H	Benzo(a)anthracene	400.0000 U
H	Benzo(a)pyrene	400.0000 U
H	Benzo(b)fluoranthene	400.0000 U
H	Benzo(g,h,i)perylene	400.0000 U
H	Benzo(k)fluoranthene	400.0000 U
H	Beryllium	0.1000 U
H	Butylbenzylphthalate	400.0000 U
H	Cadmium	5.0000
H	Carbazole	400.0000 UJ
H	Chromium	88.3000
H	Chrysene	400.0000 U
H	Copper	34.2000 J
H	Di-n-octylphthalate	400.0000 U
H	Dibenz(a,h)anthracene	400.0000 U
H	Dibenzofuran	400.0000 U
H	Dieldrin	5.3000 J
H	Diethylphthalate	400.0000 U
H	Dimethylphthalate	400.0000 U
H	Endosulfan I	10.0000 U
H	Endosulfan sulfate	20.0000 U
H	Endrin	20.0000 U
H	Endrin ketone	20.0000 U
H	Fluoranthene	400.0000 U
H	Fluorene	400.0000 U
H	Heptachlor	10.0000 U
H	Heptachlor epoxide	10.0000 U
H	Hexachlorobenzene	400.0000 U
H	Hexachlorobutadiene	400.0000 U
H	Hexachlorocyclopentadiene	400.0000 U
H	Hexachloroethane	400.0000 U
H	Indeno(1,2,3-cd)pyrene	400.0000 U
H	Iron	1690.0000 J
H	Isophorone	400.0000 U
H	Lead	81.6000
H	Manganese	24.8000 J
H	Mercury	0.2100 J
H	Methoxychlor	100.0000 U
H	N-Nitroso-di-n-propylamine	400.0000 U
H	N-Nitrosodiphenylamine (1)	400.0000 U
H	Naphthalene	400.0000 U
H	Nickel	3.9000 J
H	Nitrobenzene	400.0000 U
H	Pentachlorophenol	1000.0000 U
H	Phenanthrene	400.0000 U
H	Phenol	400.0000 U
H	Pyrene	400.0000 U
H	Selenium	1.1000 U
H	Silver	5.1000 J
H	Sodium	241.0000 U
H	Thallium	1.2000 U
H	Toxaphene	1000.0000 U
H	Zinc	106.0000 J
H	alpha-BHC	10.0000 U
H	alpha-Chlordane	10.0000 U

H	beta-BHC	10.0000 U
H	bis(2-Chloroethoxy)methane	400.0000 U
H	bis(2-Chloroethyl)ether	400.0000 U
H	bis(2-Ethylhexyl)phthalate	990.0000
H	gamma-BHC (Lindane)	10.0000 U

08S02200 low: 3/15 hi: 73/84

L	Antimony	0.6700 U
L	Benzo(b)fluoranthene	45.0000 J
L	Benzo(k)fluoranthene	17.0000 J
L	Cadmium	0.3500 J
L	Cobalt	0.1600 U
L	Dieldrin	1.9000 J
L	Endosulfan I	0.4100 J
L	Endosulfan II	0.2400 J
L	Endrin aldehyde	0.2700 J
L	Fluoranthene	25.0000 J
L	Nickel	1.2000 J
L	Potassium	45.2000 U
L	Pyrene	42.0000 J
L	beta-BHC	0.7900 J
L	gamma-Chlordane	0.9300 J
H	1,2,4-Trichlorobenzene	390.0000 U
H	1,2-Dichlorobenzene	390.0000 U
H	1,3-Dichlorobenzene	390.0000 U
H	1,4-Dichlorobenzene	390.0000 U
H	2,2'-oxybis(1-Chloropropane)	390.0000 U
H	2,4,5-Trichlorophenol	980.0000 U
H	2,4,6-Trichlorophenol	390.0000 U
H	2,4-Dichlorophenol	390.0000 U
H	2,4-Dimethylphenol	390.0000 U
H	2,4-Dinitrophenol	980.0000 U
H	2,4-Dinitrotoluene	390.0000 U
H	2,6-Dinitrotoluene	390.0000 U
H	2-Chloronaphthalene	390.0000 U
H	2-Chlorophenol	390.0000 U
H	2-Methylnaphthalene	390.0000 U
H	2-Methylphenol	390.0000 U
H	2-Nitroaniline	980.0000 U
H	2-Nitrophenol	390.0000 U
H	3,3'-Dichlorobenzidine	390.0000 U
H	3-Nitroaniline	980.0000 U
H	4,4'-DDE	110.0000
H	4,4'-DDT	23.0000 J
H	4,6-Dinitro-2-methylphenol	980.0000 U
H	4-Bromophenyl-phenylether	390.0000 U
H	4-Chloro-3-methylphenol	390.0000 U
H	4-Chloroaniline	390.0000 U
H	4-Chlorophenyl-phenylether	390.0000 U
H	4-Methylphenol	390.0000 U
H	4-Nitroaniline	980.0000 U
H	4-Nitrophenol	980.0000 U
H	Acenaphthene	390.0000 U
H	Acenaphthylene	390.0000 U
H	Aldrin	2.0000 U
H	Anthracene	390.0000 U
H	Arsenic	10.1000 J
H	Barium	15.8000 J
H	Benzo(a)anthracene	390.0000 U
H	Benzo(a)pyrene	390.0000 U
H	Benzo(g,h,i)perylene	390.0000 U
H	Beryllium	0.1300 U
H	Butylbenzylphthalate	390.0000 U
H	Calcium	28500.0000
H	Carbazole	390.0000 UJ
H	Chromium	9.8000
H	Chrysene	390.0000 U
H	Copper	11.0000 J
H	Di-n-octylphthalate	390.0000 U
H	Dibenz(a,h)anthracene	390.0000 U
H	Dibenzofuran	390.0000 U
H	Diethylphthalate	390.0000 U

H	Dimethylphthalate	390.0000 U
H	Fluorene	390.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Hexachlorobenzene	390.0000 U
H	Hexachlorobutadiene	390.0000 U
H	Hexachlorocyclopentadiene	390.0000 U
H	Hexachloroethane	390.0000 U
H	Indeno(1,2,3-cd)pyrene	390.0000 U
H	Isophorone	390.0000 U
H	Lead	26.3000
H	Magnesium	287.0000 U
H	Manganese	27.0000 J
H	Mercury	0.5300 J
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	390.0000 U
H	N-Nitrosodiphenylamine (1)	390.0000 U
H	Naphthalene	390.0000 U
H	Nitrobenzene	390.0000 U
H	Pentachlorophenol	980.0000 U
H	Phenanthrene	390.0000 U
H	Phenol	390.0000 U
H	Selenium	1.0000 U
H	Silver	6.9000 J
H	Sodium	223.0000 U
H	Thallium	1.2000 U
H	Toxaphene	200.0000 U
H	Zinc	27.5000 U
H	alpha-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	390.0000 U
H	bis(2-Chloroethyl)ether	390.0000 U
H	bis(2-Ethylhexyl)phthalate	390.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U

08S02300 low: 1/5 hi: 92/107

L	Antimony	0.6600 U
L	Cobalt	0.3000 J
L	Di-n-butylphthalate	47.0000 J
L	bis(2-Ethylhexyl)phthalate	44.0000 J
L	delta-BHC	1.2000 J
H	1,2,4-Trichlorobenzene	380.0000 U
H	1,2-Dichlorobenzene	380.0000 U
H	1,3-Dichlorobenzene	380.0000 U
H	1,4-Dichlorobenzene	380.0000 U
H	2,2'-oxybis(1-Chloropropane)	380.0000 U
H	2,4,5-Trichlorophenol	950.0000 U
H	2,4,6-Trichlorophenol	380.0000 U
H	2,4-Dichlorophenol	380.0000 U
H	2,4-Dimethylphenol	380.0000 U
H	2,4-Dinitrophenol	950.0000 U
H	2,4-Dinitrotoluene	380.0000 U
H	2,6-Dinitrotoluene	380.0000 U
H	2-Chloronaphthalene	380.0000 U
H	2-Chlorophenol	380.0000 U
H	2-Methylnaphthalene	380.0000 U
H	2-Methylphenol	380.0000 U
H	2-Nitroaniline	950.0000 U
H	2-Nitrophenol	380.0000 U
H	3,3'-Dichlorobenzidine	380.0000 U
H	3-Nitroaniline	950.0000 U
H	4,4'-DDD	19.0000 U
H	4,4'-DDE	35.0000
H	4,6-Dinitro-2-methylphenol	950.0000 U
H	4-Bromophenyl-phenylether	380.0000 U
H	4-Chloro-3-methylphenol	380.0000 U
H	4-Chloroaniline	380.0000 U
H	4-Chlorophenyl-phenylether	380.0000 U
H	4-Methylphenol	380.0000 U
H	4-Nitroaniline	950.0000 U
H	4-Nitrophenol	950.0000 U
H	Acenaphthene	380.0000 U

H	Acenaphthylene	380.0000 U
H	Aldrin	9.8000 U
H	Anthracene	380.0000 U
H	Aroclor-1016	190.0000 U
H	Aroclor-1221	380.0000 U
H	Aroclor-1232	190.0000 U
H	Aroclor-1242	190.0000 U
H	Aroclor-1248	190.0000 U
H	Aroclor-1254	190.0000 U
H	Aroclor-1260	190.0000 U
H	Arsenic	53.0000 J
H	Barium	36.3000 J
H	Benzo(a)anthracene	380.0000 U
H	Benzo(a)pyrene	380.0000 U
H	Benzo(b)fluoranthene	380.0000 U
H	Benzo(g,h,i)perylene	380.0000 U
H	Benzo(k)fluoranthene	380.0000 U
H	Beryllium	0.2400 U
H	Butylbenzylphthalate	380.0000 U
H	Cadmium	2.8000
H	Calcium	47000.0000
H	Carbazole	380.0000 UJ
H	Chromium	16.4000
H	Chrysene	380.0000 U
H	Copper	14.9000 J
H	Di-n-octylphthalate	380.0000 U
H	Dibenz(a,h)anthracene	380.0000 U
H	Dibenzofuran	380.0000 U
H	Dieldrin	19.0000 U
H	Diethylphthalate	380.0000 U
H	Dimethylphthalate	380.0000 U
H	Endosulfan I	9.8000 U
H	Endosulfan II	19.0000 U
H	Endosulfan sulfate	19.0000 U
H	Endrin	19.0000 U
H	Endrin aldehyde	19.0000 U
H	Endrin ketone	19.0000 U
H	Fluoranthene	380.0000 U
H	Fluorene	380.0000 U
H	Heptachlor	9.8000 U
H	Heptachlor epoxide	9.8000 U
H	Hexachlorobenzene	380.0000 U
H	Hexachlorobutadiene	380.0000 U
H	Hexachlorocyclopentadiene	380.0000 U
H	Hexachloroethane	380.0000 U
H	Indeno(1,2,3-cd)pyrene	380.0000 U
H	Iron	380.0000 U
H	Isophorone	1140.0000 J
H	Lead	380.0000 U
H	Magnesium	289.0000
H	Manganese	1200.0000 U
H	Mercury	75.3000 J
H	Methoxychlor	0.1100 J
H	N-Nitroso-di-n-propylamine	98.0000 U
H	N-Nitrosodiphenylamine (1)	380.0000 U
H	Naphthalene	380.0000 U
H	Nitrobenzene	380.0000 U
H	Pentachlorophenol	380.0000 U
H	Phenanthrene	950.0000 U
H	Phenol	380.0000 U
H	Potassium	380.0000 U
H	Pyrene	202.0000 U
H	Selenium	380.0000 U
H	Silver	1.0000 U
H	Sodium	2.4000 J
H	Thallium	266.0000 U
H	Toxaphene	1.1000 U
H	Vanadium	980.0000 U
H	Zinc	4.6000 J
H	alpha-BHC	83.0000 U
H	alpha-Chlordane	9.8000 U
H	beta-BHC	96.0000 J
H	bis(2-Chloroethoxy)methane	9.8000 U
		380.0000 U

H	bis(2-Chloroethyl)ether	380.0000 U
H	gamma-BHC (Lindane)	9.8000 U
H	gamma-Chlordane	93.0000 J

08S02400 low: 4/8 hi: 78/85

L	Aldrin	0.2900 J
L	Antimony	1.8000 J
L	Cadmium	0.1000 U
L	Cobalt	0.1600 U
L	Endosulfan II	2.4000 J
L	Endrin aldehyde	1.3000 J
L	Nickel	0.6800 U
L	Potassium	35.7000 U
H	1,2,4-Trichlorobenzene	380.0000 U
H	1,2-Dichlorobenzene	380.0000 U
H	1,3-Dichlorobenzene	380.0000 U
H	1,4-Dichlorobenzene	380.0000 U
H	2,2'-oxybis(1-Chloropropane)	380.0000 U
H	2,4,5-Trichlorophenol	960.0000 U
H	2,4,6-Trichlorophenol	380.0000 U
H	2,4-Dichlorophenol	380.0000 U
H	2,4-Dimethylphenol	380.0000 U
H	2,4-Dinitrophenol	960.0000 U
H	2,4-Dinitrotoluene	380.0000 U
H	2,6-Dinitrotoluene	380.0000 U
H	2-Chloronaphthalene	380.0000 U
H	2-Chlorophenol	380.0000 U
H	2-Methylnaphthalene	380.0000 U
H	2-Methylphenol	380.0000 U
H	2-Nitroaniline	960.0000 U
H	2-Nitrophenol	380.0000 U
H	3,3'-Dichlorobenzidine	380.0000 U
H	3-Nitroaniline	960.0000 U
H	4,4'-DDD	14.0000
H	4,4'-DDE	14.0000 J
H	4,6-Dinitro-2-methylphenol	960.0000 U
H	4-Bromophenyl-phenylether	380.0000 U
H	4-Chloro-3-methylphenol	380.0000 U
H	4-Chloroaniline	380.0000 U
H	4-Chlorophenyl-phenylether	380.0000 U
H	4-Methylphenol	380.0000 U
H	4-Nitroaniline	960.0000 U
H	4-Nitrophenol	960.0000 U
H	Acenaphthene	380.0000 U
H	Acenaphthylene	380.0000 U
H	Anthracene	380.0000 U
H	Arsenic	1.3000 U
H	Barium	7.5000 J
H	Benzo(a)anthracene	380.0000 U
H	Benzo(a)pyrene	380.0000 U
H	Benzo(b)fluoranthene	380.0000 U
H	Benzo(g,h,i)perylene	380.0000 U
H	Benzo(k)fluoranthene	380.0000 U
H	Beryllium	0.0700 U
H	Butylbenzylphthalate	380.0000 U
H	Carbazole	380.0000 U
H	Chromium	36.9000
H	Chrysene	380.0000 U
H	Copper	8.3000
H	Di-n-octylphthalate	380.0000 U
H	Dibenz(a,h)anthracene	380.0000 U
H	Dibenzofuran	380.0000 U
H	Diethylphthalate	380.0000 U
H	Dimethylphthalate	380.0000 U
H	Endosulfan I	2.0000 U
H	Fluoranthene	380.0000 U
H	Fluorene	380.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Hexachlorobenzene	380.0000 U
H	Hexachlorobutadiene	380.0000 U
H	Hexachlorocyclopentadiene	380.0000 U

H	Hexachloroethane	380.0000 U
H	Indeno(1,2,3-cd)pyrene	380.0000 U
H	Isophorone	380.0000 U
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	380.0000 U
H	N-Nitrosodiphenylamine (1)	380.0000 U
H	Naphthalene	380.0000 U
H	Nitrobenzene	380.0000 U
H	Pentachlorophenol	960.0000 U
H	Phenanthrene	380.0000 U
H	Phenol	380.0000 U
H	Pyrene	380.0000 U
H	Selenium	0.9900 U
H	Silver	108.0000 J
H	Sodium	147.0000 U
H	Thallium	1.1000 U
H	Toxaphene	200.0000 U
H	Zinc	26.0000 U
H	alpha-BHC	2.0000 U
H	beta-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	380.0000 U
H	bis(2-Chloroethyl)ether	380.0000 U
H	bis(2-Ethylhexyl)phthalate	380.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U
H	gamma-Chlordane	5.9000

08S02500 low: 0/5 hi: 28/47

L	Aldrin	0.6200 J
L	Antimony	1.8000 J
L	Di-n-butylphthalate	210.0000 J
L	Heptachlor epoxide	1.1000 J
L	bis(2-Ethylhexyl)phthalate	91.0000 J
H	4,4'-DDD	18.0000 U
H	4,4'-DDE	17.0000 J
H	Aluminum	2920.0000
H	Aroclor-1016	180.0000 U
H	Aroclor-1221	370.0000 U
H	Aroclor-1232	180.0000 U
H	Aroclor-1242	180.0000 U
H	Aroclor-1248	180.0000 U
H	Aroclor-1254	180.0000 U
H	Aroclor-1260	180.0000 U
H	Arsenic	9.9000 J
H	Barium	67.1000
H	Beryllium	0.4900 J
H	Cadmium	7.1000
H	Calcium	27500.0000
H	Chromium	130.0000
H	Copper	70.5000 J
H	Di-n-octylphthalate	370.0000 U
H	Dieldrin	10.0000 J
H	Endosulfan I	9.4000 U
H	Endosulfan II	18.0000 U
H	Endosulfan sulfate	18.0000 U
H	Endrin	18.0000 U
H	Endrin aldehyde	18.0000 U
H	Endrin ketone	18.0000 U
H	Heptachlor	9.4000 U
H	Iron	2120.0000 J
H	Lead	541.0000
H	Magnesium	2260.0000 U
H	Manganese	122.0000 J
H	Mercury	0.3000 J
H	Methoxychlor	94.0000 U
H	Nickel	9.3000
H	Potassium	296.0000 U
H	Selenium	0.9600 U
H	Silver	3.1000 J
H	Sodium	217.0000 U
H	Thallium	1.1000 U
H	Toxaphene	940.0000 U

H	Vanadium	3.9000 J
H	Zinc	178.0000 J
H	alpha-BHC	9.4000 U
H	alpha-Chlordane	9.4000 U
H	beta-BHC	9.4000 U
H	delta-BHC	9.4000 U
H	gamma-BHC (Lindane)	9.4000 U
H	gamma-Chlordane	37.0000 J

08S02600 low: 3/14 hi: 5/12

L	Antimony	0.6200 U
L	Benzo(a)anthracene	39.0000 J
L	Benzo(a)pyrene	40.0000 J
L	Benzo(b)fluoranthene	92.0000 J
L	Benzo(k)fluoranthene	92.0000 J
L	Chrysene	50.0000 J
L	Cobalt	0.1500 U
L	Di-n-butylphthalate	52.0000 J
L	Endrin aldehyde	0.4500 J
L	Fluoranthene	58.0000 J
L	Nickel	0.6000 J
L	Potassium	35.0000 U
L	Pyrene	73.0000 J
L	bis(2-Ethylhexyl)phthalate	37.0000 J
H	Arsenic	1.3000 U
H	Barium	57.6000
H	Beryllium	0.0500 U
H	Chromium	7.9000
H	Copper	9.8000 J
H	Lead	37.1000
H	Manganese	15.6000 J
H	Mercury	0.0900 J
H	Selenium	0.9400 U
H	Sodium	177.0000 U
H	Thallium	1.1000 U
H	Zinc	125.0000 J

08S02700 low: 3/15 hi: 83/91

L	4,4'-DDD	2.4000 J
L	Antimony	0.7400 U
L	Benzo(a)anthracene	110.0000 J
L	Benzo(a)pyrene	140.0000 J
L	Benzo(b)fluoranthene	230.0000 J
L	Benzo(g,h,i)perylene	73.0000 J
L	Benzo(k)fluoranthene	230.0000 J
L	Chrysene	140.0000 J
L	Cobalt	0.1800 U
L	Endrin aldehyde	0.5900 J
L	Fluoranthene	69.0000 J
L	Indeno(1,2,3-cd)pyrene	87.0000 J
L	Nickel	0.9400 J
L	Potassium	36.9000 U
L	Pyrene	120.0000 J
H	1,2,4-Trichlorobenzene	450.0000 U
H	1,2-Dichlorobenzene	450.0000 U
H	1,3-Dichlorobenzene	450.0000 U
H	1,4-Dichlorobenzene	450.0000 U
H	2,2'-oxybis(1-Chloropropane)	450.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	450.0000 U
H	2,4-Dichlorophenol	450.0000 U
H	2,4-Dimethylphenol	450.0000 U
H	2,4-Dinitrophenol	1100.0000 U
H	2,4-Dinitrotoluene	450.0000 U
H	2,6-Dinitrotoluene	450.0000 U
H	2-Chloronaphthalene	450.0000 U
H	2-Chlorophenol	450.0000 U
H	2-Methylnaphthalene	450.0000 U
H	2-Methylphenol	450.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	450.0000 U

H	3,3'-Dichlorobenzidine	450.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	450.0000 U
H	4-Chloro-3-methylphenol	450.0000 U
H	4-Chloroaniline	450.0000 U
H	4-Chlorophenyl-phenylether	450.0000 U
H	4-Methylphenol	450.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	450.0000 U
H	Acenaphthylene	450.0000 U
H	Aldrin	2.3000 U
H	Anthracene	450.0000 U
H	Aroclor-1016	44.0000 U
H	Aroclor-1221	90.0000 U
H	Aroclor-1232	44.0000 U
H	Aroclor-1242	44.0000 U
H	Aroclor-1248	44.0000 U
H	Aroclor-1254	44.0000 U
H	Aroclor-1260	44.0000 U
H	Arsenic	3.5000 J
H	Barium	12.0000 J
H	Beryllium	0.0900 U
H	Butylbenzylphthalate	450.0000 U
H	Carbazole	450.0000 U
H	Chromium	15.0000
H	Copper	7.3000 J
H	Di-n-butylphthalate	450.0000 U
H	Di-n-octylphthalate	450.0000 U
H	Dibenz(a,h)anthracene	450.0000 U
H	Dibenzofuran	450.0000 U
H	Dieldrin	4.4000 U
H	Diethylphthalate	450.0000 U
H	Dimethylphthalate	450.0000 U
H	Endosulfan I	2.3000 U
H	Endosulfan II	4.4000 U
H	Endosulfan sulfate	4.4000 U
H	Endrin	4.4000 U
H	Endrin ketone	4.4000 U
H	Fluorene	450.0000 U
H	Heptachlor	2.3000 U
H	Heptachlor epoxide	2.3000 U
H	Hexachlorobenzene	450.0000 U
H	Hexachlorobutadiene	450.0000 U
H	Hexachlorocyclopentadiene	450.0000 U
H	Hexachloroethane	450.0000 U
H	Isophorone	450.0000 U
H	Lead	23.2000
H	Manganese	27.7000 J
H	Mercury	0.1200 J
H	Methoxychlor	23.0000 U
H	N-Nitroso-di-n-propylamine	450.0000 U
H	N-Nitrosodiphenylamine (1)	450.0000 U
H	Naphthalene	450.0000 U
H	Nitrobenzene	450.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	450.0000 U
H	Phenol	450.0000 U
H	Selenium	1.1000 U
H	Silver	28.9000 J
H	Sodium	197.0000 U
H	Thallium	1.3000 U
H	Toxaphene	230.0000 U
H	Zinc	81.6000 U
H	alpha-BHC	2.3000 U
H	beta-BHC	2.3000 U
H	bis(2-Chloroethoxy)methane	450.0000 U
H	bis(2-Chloroethyl)ether	450.0000 U
H	bis(2-Ethylhexyl)phthalate	450.0000 U
H	delta-BHC	2.3000 U
H	gamma-BHC (Lindane)	2.3000 U
H	gamma-Chlordane	2.3000 U

08S02800 low: 2/14 hi: 69/81

L	Benzo(a)anthracene	97.0000 J
L	Benzo(a)pyrene	110.0000 J
L	Benzo(b)fluoranthene	180.0000 J
L	Benzo(g,h,i)perylene	47.0000 J
L	Benzo(k)fluoranthene	54.0000 J
L	Chrysene	120.0000 J
L	Cobalt	0.3700 U
L	Endosulfan sulfate	1.5000 J
L	Fluoranthene	170.0000 J
L	Heptachlor epoxide	0.1400 J
L	Indeno(1,2,3-cd)pyrene	61.0000 J
L	Potassium	45.9000 U
L	Pyrene	140.0000 J
L	delta-BHC	0.4200 J
H	1,2,4-Trichlorobenzene	400.0000 UJ
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U
H	2,4-Dinitrophenol	1000.0000 UJ
H	2,4-Dinitrotoluene	400.0000 U
H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U
H	2-Methylnaphthalene	400.0000 U
H	2-Methylphenol	400.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	400.0000 U
H	3,3'-Dichlorobenzidine	400.0000 U
H	3-Nitroaniline	1000.0000 U
H	4,6-Dinitro-2-methylphenol	1000.0000 UJ
H	4-Bromophenyl-phenylether	400.0000 U
H	4-Chloro-3-methylphenol	400.0000 U
H	4-Chloroaniline	400.0000 U
H	4-Chlorophenyl-phenylether	400.0000 U
H	4-Methylphenol	400.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 UJ
H	Acenaphthene	400.0000 U
H	Acenaphthylene	400.0000 U
H	Aldrin	2.1000 U
H	Anthracene	400.0000 U
H	Aroclor-1221	82.0000 U
H	Arsenic	13.4000
H	Barium	11.7000 J
H	Beryllium	0.1000 U
H	Butylbenzylphthalate	400.0000 U
H	Cadmium	0.7700 J
H	Calcium	25200.0000 J
H	Carbazole	400.0000 U
H	Chromium	7.0000
H	Copper	9.1000
H	Di-n-octylphthalate	400.0000 U
H	Dibenz(a,h)anthracene	400.0000 U
H	Dibenzofuran	400.0000 U
H	Diethylphthalate	400.0000 U
H	Dimethylphthalate	400.0000 U
H	Endosulfan I	2.1000 U
H	Fluorene	400.0000 U
H	Heptachlor	2.1000 U
H	Hexachlorobenzene	400.0000 U
H	Hexachlorobutadiene	400.0000 U
H	Hexachlorocyclopentadiene	400.0000 UJ
H	Hexachloroethane	400.0000 U
H	Iron	1520.0000
H	Isophorone	400.0000 U
H	Lead	344.0000 J

H	Magnesium	232.0000 U
H	Manganese	31.3000
H	Mercury	0.1200 U
H	Methoxychlor	21.0000 U
H	N-Nitroso-di-n-propylamine	400.0000 UJ
H	N-Nitrosodiphenylamine (1)	400.0000 U
H	Naphthalene	400.0000 U
H	Nitrobenzene	400.0000 U
H	Pentachlorophenol	1000.0000 UJ
H	Phenanthrene	400.0000 U
H	Phenol	400.0000 U
H	Selenium	1.1000 U
H	Sodium	214.0000 U
H	Thallium	1.2000 U
H	Toxaphene	210.0000 U
H	Zinc	710.0000
H	alpha-BHC	2.1000 U
H	alpha-Chlordane	4.1000
H	beta-BHC	2.1000 U
H	bis(2-Chloroethoxy)methane	400.0000 U
H	bis(2-Chloroethyl)ether	400.0000 U
H	bis(2-Ethylhexyl)phthalate	400.0000 U
H	gamma-BHC (Lindane)	2.1000 U
H	gamma-Chlordane	3.2000 J

08S02800D low: 2/16 hi: 67/81

L	Benzo(a)anthracene	120.0000 J
L	Benzo(a)pyrene	120.0000 J
L	Benzo(b)fluoranthene	250.0000 J
L	Benzo(g,h,i)perylene	86.0000 J
L	Benzo(k)fluoranthene	250.0000 J
L	Chrysene	130.0000 J
L	Cobalt	0.3700 U
L	Dibenz(a,h)anthracene	49.0000 J
L	Endosulfan sulfate	1.5000 J
L	Fluoranthene	200.0000 J
L	Heptachlor epoxide	0.1200 J
L	Indeno(1,2,3-cd)pyrene	130.0000 J
L	Potassium	26.0000 U
L	Pyrene	150.0000 J
L	bis(2-Ethylhexyl)phthalate	52.0000 J
L	delta-BHC	0.3900 J
H	1,2,4-Trichlorobenzene	400.0000 U
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U
H	2,4-Dinitrophenol	1000.0000 U
H	2,4-Dinitrotoluene	400.0000 U
H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U
H	2-Methylnaphthalene	400.0000 U
H	2-Methylphenol	400.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	400.0000 U
H	3,3'-Dichlorobenzidine	400.0000 U
H	3-Nitroaniline	1000.0000 U
H	4,6-Dinitro-2-methylphenol	1000.0000 U
H	4-Bromophenyl-phenylether	400.0000 U
H	4-Chloro-3-methylphenol	400.0000 U
H	4-Chloroaniline	400.0000 U
H	4-Chlorophenyl-phenylether	400.0000 U
H	4-Methylphenol	400.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 U
H	Acenaphthene	400.0000 U
H	Acenaphthylene	400.0000 U

H	Aldrin	2.0000 U
H	Anthracene	400.0000 U
H	Aroclor-1221	81.0000 U
H	Arsenic	12.8000
H	Barium	10.7000 J
H	Beryllium	0.1000 U
H	Butylbenzylphthalate	400.0000 U
H	Cadmium	0.9600 J
H	Calcium	23400.0000 J
H	Carbazole	400.0000 U
H	Chromium	8.7000
H	Copper	9.5000
H	Di-n-octylphthalate	400.0000 U
H	Dibenzofuran	400.0000 U
H	Diethylphthalate	400.0000 U
H	Dimethylphthalate	400.0000 U
H	Endosulfan I	2.0000 U
H	Fluorene	400.0000 U
H	Heptachlor	2.0000 U
H	Hexachlorobenzene	400.0000 U
H	Hexachlorobutadiene	400.0000 U
H	Hexachlorocyclopentadiene	400.0000 U
H	Hexachloroethane	400.0000 U
H	Iron	4760.0000
H	Isophorone	400.0000 U
H	Lead	379.0000 J
H	Magnesium	221.0000 U
H	Manganese	37.2000
H	Mercury	0.0900 U
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	400.0000 U
H	N-Nitrosodiphenylamine (1)	400.0000 U
H	Naphthalene	400.0000 U
H	Nickel	2.3000 J
H	Nitrobenzene	400.0000 U
H	Pentachlorophenol	1000.0000 U
H	Phenanthrene	400.0000 U
H	Phenol	400.0000 U
H	Selenium	1.1000 U
H	Silver	0.6400 J
H	Sodium	182.0000 U
H	Thallium	1.2000 U
H	Toxaphene	200.0000 U
H	Zinc	833.0000
H	alpha-BHC	2.0000 U
H	alpha-Chlordane	4.1000
H	beta-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	400.0000 U
H	bis(2-Chloroethyl)ether	400.0000 U
H	gamma-BHC (Lindane)	2.0000 U
H	gamma-Chlordane	3.1000 J

08S02900 low: 0/5 hi: 78/94

L	Aldrin	0.3500 J
L	Antimony	2.4000 J
L	Endrin aldehyde	0.7100 J
L	Heptachlor epoxide	0.2200 J
L	bis(2-Ethylhexyl)phthalate	77.0000 J
H	1,2,4-Trichlorobenzene	400.0000 U
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U
H	2,4-Dinitrophenol	1000.0000 U
H	2,4-Dinitrotoluene	400.0000 U
H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U

H	2-Methylnaphthalene	400.0000	U
H	2-Methylphenol	400.0000	U
H	2-Nitroaniline	1000.0000	U
H	2-Nitrophenol	400.0000	U
H	3,3'-Dichlorobenzidine	400.0000	U
H	3-Nitroaniline	1000.0000	U
H	4,6-Dinitro-2-methylphenol	1000.0000	U
H	4-Bromophenyl-phenylether	400.0000	U
H	4-Chloro-3-methylphenol	400.0000	U
H	4-Chloroaniline	400.0000	U
H	4-Chlorophenyl-phenylether	400.0000	U
H	4-Methylphenol	400.0000	U
H	4-Nitroaniline	1000.0000	U
H	4-Nitrophenol	1000.0000	UJ
H	Acenaphthene	400.0000	U
H	Acenaphthylene	400.0000	U
H	Anthracene	400.0000	U
H	Aroclor-1221	82.0000	U
H	Arsenic	41.2000	
H	Barium	31.5000	J
H	Benzo(a)anthracene	400.0000	U
H	Benzo(a)pyrene	400.0000	U
H	Benzo(b)fluoranthene	400.0000	U
H	Benzo(g,h,i)perylene	400.0000	U
H	Benzo(k)fluoranthene	400.0000	U
H	Beryllium	0.2900	U
H	Butylbenzylphthalate	400.0000	U
H	Cadmium	5.9000	
H	Calcium	103000.0000	J
H	Carbazole	400.0000	U
H	Chromium	31.7000	
H	Chrysene	400.0000	U
H	Cobalt	2.6000	J
H	Copper	26.5000	
H	Di-n-octylphthalate	400.0000	U
H	Dibenz(a,h)anthracene	400.0000	U
H	Dibenzofuran	400.0000	U
H	Diethylphthalate	400.0000	U
H	Dimethylphthalate	400.0000	U
H	Endosulfan I	2.1000	U
H	Fluoranthene	400.0000	U
H	Fluorene	400.0000	U
H	Heptachlor	2.1000	U
H	Hexachlorobenzene	400.0000	U
H	Hexachlorobutadiene	400.0000	U
H	Hexachlorocyclopentadiene	400.0000	U
H	Hexachloroethane	400.0000	U
H	Indeno(1,2,3-cd)pyrene	400.0000	U
H	Iron	2690.0000	
H	Isophorone	400.0000	U
H	Lead	408.0000	J
H	Magnesium	1110.0000	U
H	Manganese	106.0000	
H	Mercury	0.1400	U
H	Methoxychlor	21.0000	U
H	N-Nitroso-di-n-propylamine	400.0000	U
H	N-Nitrosodiphenylamine (1)	400.0000	U
H	Naphthalene	400.0000	U
H	Nickel	3.8000	J
H	Nitrobenzene	400.0000	U
H	Pentachlorophenol	1000.0000	UJ
H	Phenanthrene	400.0000	U
H	Phenol	400.0000	U
H	Potassium	161.0000	U
H	Pyrene	400.0000	U
H	Selenium	1.1000	U
H	Silver	2.1000	J
H	Sodium	245.0000	U
H	Thallium	1.2000	U
H	Toxaphene	210.0000	U
H	Vanadium	8.5000	J
H	Zinc	486.0000	
H	alpha-BHC	2.1000	U

H alpha-Chlordane	26.0000	
H beta-BHC	2.1000	U
H bis(2-Chloroethoxy)methane	400.0000	U
H bis(2-Chloroethyl)ether	400.0000	U
H delta-BHC	2.1000	U
H gamma-BHC (Lindane)	2.1000	U
H gamma-Chlordane	29.0000	

08S03000 low: 5/8 hi: 6/9

L Antimony	0.6500	U
L Cadmium	0.0700	U
L Cobalt	0.1600	U
L Endrin	1.0000	J
L Nickel	0.3600	U
L Potassium	17.0000	U
L Silver	0.2200	J
L alpha-Chlordane	1.0000	J
H 4,4'-DDD	7.1000	
H Arsenic	7.2000	
H Beryllium	0.0500	U
H Di-n-octylphthalate	370.0000	U
H Mercury	0.0900	U
H Selenium	0.9800	U
H Sodium	154.0000	U
H Thallium	1.1000	U
H bis(2-Ethylhexyl)phthalate	1700.0000	

08S03100 low: 3/5 hi: 20/37

L Antimony	0.6100	U
L Cobalt	0.1500	U
L Nickel	1.6000	J
L Potassium	22.2000	U
L Silver	0.4000	J
H 4,4'-DDD	780.0000	DJ
H 4,4'-DDE	460.0000	J
H 4,4'-DDT	450.0000	
H Aldrin	49.0000	J
H Aroclor-1016	350.0000	U
H Aroclor-1221	700.0000	U
H Aroclor-1232	350.0000	U
H Aroclor-1242	350.0000	U
H Aroclor-1248	350.0000	U
H Aroclor-1254	350.0000	U
H Aroclor-1260	350.0000	U
H Arsenic	39.2000	J
H Beryllium	0.0500	U
H Cadmium	1.5000	
H Copper	12.6000	J
H Dieldrin	35.0000	U
H Dinoseb	240.0000	J
H Endosulfan I	18.0000	U
H Endosulfan II	35.0000	U
H Endosulfan sulfate	25.0000	J
H Endrin	130.0000	J
H Endrin aldehyde	35.0000	U
H Endrin ketone	35.0000	U
H Heptachlor	680.0000	D
H Heptachlor epoxide	130.0000	J
H Methoxychlor	180.0000	U
H Selenium	0.9300	U
H Sodium	237.0000	U
H Thallium	1.1000	U
H Toxaphene	1800.0000	U
H Zinc	370.0000	J
H alpha-BHC	18.0000	U
H alpha-Chlordane	3700.0000	D
H beta-BHC	12.0000	J
H delta-BHC	77.0000	J
H gamma-BHC (Lindane)	18.0000	U
H gamma-Chlordane	2900.0000	D

08S03200 low: 5/6 hi: 6/10

L	Antimony	0.6200 U
L	Cadmium	0.0600 U
L	Cobalt	0.1500 U
L	Nickel	0.8500 U
L	Potassium	37.5000 U
L	Silver	0.1800 J
H	Arsenic	2.5000
H	Beryllium	0.0600 U
H	Calcium	14900.0000 J
H	Copper	7.1000
H	Manganese	10.8000
H	Mercury	0.0800 U
H	Selenium	0.9400 U
H	Sodium	156.0000 U
H	Thallium	1.1000 U
H	Zinc	17.0000 U

08S03300 low: 4/8 hi: 90/98

L	Antimony	0.7900 J
L	Cadmium	0.2000 U
L	Cobalt	0.1800 U
L	Dieldrin	1.2000 J
L	Nickel	0.7200 U
L	Potassium	24.2000 U
L	bis(2-Ethylhexyl)phthalate	35.0000 J
L	delta-BHC	0.2200 J
H	1,2,4-Trichlorobenzene	430.0000 U
H	1,2-Dichlorobenzene	430.0000 U
H	1,3-Dichlorobenzene	430.0000 U
H	1,4-Dichlorobenzene	430.0000 U
H	2,2'-oxybis(1-Chloropropane)	430.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	430.0000 U
H	2,4-Dichlorophenol	430.0000 U
H	2,4-Dimethylphenol	430.0000 U
H	2,4-Dinitrophenol	1100.0000 U
H	2,4-Dinitrotoluene	430.0000 U
H	2,6-Dinitrotoluene	430.0000 U
H	2-Chloronaphthalene	430.0000 U
H	2-Chlorophenol	430.0000 U
H	2-Methylnaphthalene	430.0000 U
H	2-Methylphenol	430.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	430.0000 U
H	3,3'-Dichlorobenzidine	430.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	6.8000
H	4,4'-DDE	79.0000 D
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	430.0000 U
H	4-Chloro-3-methylphenol	430.0000 U
H	4-Chloroaniline	430.0000 U
H	4-Chlorophenyl-phenylether	430.0000 U
H	4-Methylphenol	430.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	430.0000 U
H	Acenaphthylene	430.0000 U
H	Aldrin	2.2000 U
H	Anthracene	430.0000 U
H	Aroclor-1016	43.0000 U
H	Aroclor-1221	87.0000 U
H	Aroclor-1232	43.0000 U
H	Aroclor-1242	43.0000 U
H	Aroclor-1248	43.0000 U
H	Aroclor-1254	43.0000 U
H	Aroclor-1260	43.0000 U
H	Arsenic	8.1000
H	Benzo(a)anthracene	430.0000 U
H	Benzo(a)pyrene	430.0000 U

H	Benzo(b)fluoranthene	430.0000 U
H	Benzo(g,h,i)perylene	430.0000 U
H	Benzo(k)fluoranthene	430.0000 U
H	Beryllium	0.0800 U
H	Butylbenzylphthalate	430.0000 U
H	Carbazole	430.0000 U
H	Chrysene	430.0000 U
H	Copper	3.6000 J
H	Di-n-butylphthalate	430.0000 U
H	Di-n-octylphthalate	430.0000 U
H	Dibenz(a,h)anthracene	430.0000 U
H	Dibenzofuran	430.0000 U
H	Diethylphthalate	430.0000 U
H	Dimethylphthalate	430.0000 U
H	Endosulfan I	2.2000 U
H	Endosulfan II	4.3000 U
H	Endosulfan sulfate	4.3000 U
H	Endrin	4.3000 U
H	Endrin aldehyde	4.3000 U
H	Endrin ketone	4.3000 U
H	Fluoranthene	430.0000 U
H	Fluorene	430.0000 U
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	2.2000 U
H	Hexachlorobenzene	430.0000 U
H	Hexachlorobutadiene	430.0000 U
H	Hexachlorocyclopentadiene	430.0000 U
H	Hexachloroethane	430.0000 U
H	Indeno(1,2,3-cd)pyrene	430.0000 U
H	Isophorone	430.0000 U
H	Lead	23.4000 J
H	Mercury	0.0900 U
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	430.0000 U
H	N-Nitrosodiphenylamine (1)	430.0000 U
H	Naphthalene	430.0000 U
H	Nitrobenzene	430.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	430.0000 U
H	Phenol	430.0000 U
H	Pyrene	430.0000 U
H	Selenium	1.1000 U
H	Silver	0.5800 J
H	Sodium	179.0000 U
H	Thallium	1.3000 U
H	Toxaphene	220.0000 U
H	Zinc	46.4000 U
H	alpha-BHC	2.2000 U
H	alpha-Chlordane	5.7000 J
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	430.0000 U
H	bis(2-Chloroethyl)ether	430.0000 U
H	gamma-BHC (Lindane)	2.2000 U
H	gamma-Chlordane	7.3000

08S03400 low: 1/3 hi: 90/112

L	Antimony	1.9000 U
L	Endrin aldehyde	1.2000 J
L	Heptachlor epoxide	1.6000 J
H	1,2,4-Trichlorobenzene	1100.0000 U
H	1,2-Dichlorobenzene	1100.0000 U
H	1,3-Dichlorobenzene	1100.0000 U
H	1,4-Dichlorobenzene	1100.0000 U
H	2,2'-oxybis(1-Chloropropane)	1100.0000 U
H	2,4,5-Trichlorophenol	2700.0000 U
H	2,4,6-Trichlorophenol	1100.0000 U
H	2,4-Dichlorophenol	1100.0000 U
H	2,4-Dimethylphenol	1100.0000 U
H	2,4-Dinitrophenol	2700.0000 UJ
H	2,4-Dinitrotoluene	1100.0000 U
H	2,6-Dinitrotoluene	1100.0000 U
H	2-Chloronaphthalene	1100.0000 U

H	2-Chlorophenol	1100.0000 U
H	2-Methylnaphthalene	1100.0000 U
H	2-Methylphenol	1100.0000 U
H	2-Nitroaniline	2700.0000 U
H	2-Nitrophenol	1100.0000 U
H	3,3'-Dichlorobenzidine	1100.0000 U
H	3-Nitroaniline	2700.0000 U
H	4,4'-DDD	11.0000 U
H	4,4'-DDE	170.0000
H	4,4'-DDT	33.0000
H	4,6-Dinitro-2-methylphenol	2700.0000 UJ
H	4-Bromophenyl-phenylether	1100.0000 U
H	4-Chloro-3-methylphenol	1100.0000 U
H	4-Chloroaniline	1100.0000 U
H	4-Chlorophenyl-phenylether	1100.0000 U
H	4-Methylphenol	1100.0000 U
H	4-Nitroaniline	2700.0000 U
H	4-Nitrophenol	2700.0000 UJ
H	Acenaphthene	1100.0000 U
H	Acenaphthylene	1100.0000 U
H	Aldrin	5.6000 U
H	Aluminum	3770.0000
H	Anthracene	1100.0000 U
H	Aroclor-1016	110.0000 U
H	Aroclor-1221	220.0000 U
H	Aroclor-1232	110.0000 U
H	Aroclor-1242	110.0000 U
H	Aroclor-1248	110.0000 U
H	Aroclor-1254	110.0000 U
H	Aroclor-1260	110.0000 U
H	Arsenic	90.0000
H	Barium	44.9000 J
H	Benzo(a)anthracene	1100.0000 U
H	Benzo(a)pyrene	1100.0000 U
H	Benzo(b)fluoranthene	1100.0000 U
H	Benzo(g,h,i)perylene	1100.0000 U
H	Benzo(k)fluoranthene	1100.0000 U
H	Beryllium	0.3400 U
H	Butylbenzylphthalate	1100.0000 U
H	Cadmium	5.2000
H	Calcium	168000.0000
H	Carbazole	1100.0000 U
H	Chromium	65.7000 J
H	Chrysene	1100.0000 U
H	Cobalt	1.3000 J
H	Copper	77.5000
H	Di-n-butylphthalate	1100.0000 UJ
H	Di-n-octylphthalate	1100.0000 U
H	Dibenz(a,h)anthracene	1100.0000 U
H	Dibenzofuran	1100.0000 U
H	Dieldrin	26.0000 J
H	Diethylphthalate	1100.0000 U
H	Dimethylphthalate	1100.0000 U
H	Endosulfan I	5.6000 U
H	Endosulfan II	11.0000 U
H	Endosulfan sulfate	11.0000 U
H	Endrin	11.0000 U
H	Endrin ketone	11.0000 U
H	Fluoranthene	1100.0000 U
H	Fluorene	1100.0000 U
H	Heptachlor	5.6000 U
H	Hexachlorobenzene	1100.0000 U
H	Hexachlorobutadiene	1100.0000 U
H	Hexachlorocyclopentadiene	1100.0000 UJ
H	Hexachloroethane	1100.0000 U
H	Indeno(1,2,3-cd)pyrene	1100.0000 U
H	Iron	4690.0000
H	Isophorone	1100.0000 U
H	Lead	190.0000
H	Magnesium	2230.0000 U
H	Manganese	414.0000
H	Mercury	1.1000 J
H	Methoxychlor	56.0000 U

H	N-Nitroso-di-n-propylamine	1100.0000 U
H	N-Nitrosodiphenylamine (1)	1100.0000 U
H	Naphthalene	1100.0000 U
H	Nickel	9.0000 J
H	Nitrobenzene	1100.0000 U
H	Pentachlorophenol	2700.0000 U
H	Phenanthrene	1100.0000 U
H	Phenol	1100.0000 U
H	Potassium	321.0000 U
H	Pyrene	1100.0000 U
H	Selenium	3.4000
H	Silver	4.3000 J
H	Sodium	739.0000 U
H	Thallium	3.2000 U
H	Toxaphene	560.0000 U
H	Vanadium	18.1000 J
H	Zinc	1040.0000 J
H	alpha-BHC	5.6000 U
H	alpha-Chlordane	69.0000
H	beta-BHC	5.6000 U
H	bis(2-Chloroethoxy)methane	1100.0000 U
H	bis(2-Chloroethyl)ether	1100.0000 U
H	bis(2-Ethylhexyl)phthalate	1100.0000 U
H	delta-BHC	5.6000 U
H	gamma-BHC (Lindane)	5.6000 U
H	gamma-Chlordane	68.0000

08S03500 low: 1/7 hi: 89/106

L	Antimony	0.8100 U
L	Benzo(b)fluoranthene	55.0000 J
L	Cobalt	0.3000 J
L	Endrin	0.2800 J
L	Endrin aldehyde	0.9600 J
L	Fluoranthene	61.0000 J
L	Pyrene	58.0000 J

H	1,2,4-Trichlorobenzene	470.0000 U
H	1,2-Dichlorobenzene	470.0000 U
H	1,3-Dichlorobenzene	470.0000 U
H	1,4-Dichlorobenzene	470.0000 U
H	2,2'-oxybis(1-Chloropropane)	470.0000 U
H	2,4,5-Trichlorophenol	1200.0000 U
H	2,4,6-Trichlorophenol	470.0000 U
H	2,4-Dichlorophenol	470.0000 U
H	2,4-Dimethylphenol	470.0000 U
H	2,4-Dinitrophenol	1200.0000 UJ
H	2,4-Dinitrotoluene	470.0000 U
H	2,6-Dinitrotoluene	470.0000 U
H	2-Chloronaphthalene	470.0000 U
H	2-Chlorophenol	470.0000 U
H	2-Methylnaphthalene	470.0000 U
H	2-Methylphenol	470.0000 U
H	2-Nitroaniline	1200.0000 U
H	2-Nitrophenol	470.0000 U
H	3,3'-Dichlorobenzidine	470.0000 U
H	3-Nitroaniline	1200.0000 U
H	4,4'-DDD	4.7000 U
H	4,4'-DDE	28.0000 J
H	4,6-Dinitro-2-methylphenol	1200.0000 UJ
H	4-Bromophenyl-phenylether	470.0000 U
H	4-Chloro-3-methylphenol	470.0000 U
H	4-Chloroaniline	470.0000 U
H	4-Chlorophenyl-phenylether	470.0000 U
H	4-Methylphenol	470.0000 U
H	4-Nitroaniline	1200.0000 U
H	4-Nitrophenol	1200.0000 UJ
H	Acenaphthene	470.0000 U
H	Acenaphthylene	470.0000 U
H	Aldrin	2.4000 U
H	Anthracene	470.0000 U
H	Aroclor-1016	47.0000 U
H	Aroclor-1221	96.0000 U
H	Aroclor-1232	47.0000 U

H	Aroclor-1242	47.0000 U
H	Aroclor-1248	47.0000 U
H	Aroclor-1254	47.0000 U
H	Aroclor-1260	47.0000 U
H	Arsenic	55.9000
H	Barium	19.4000 J
H	Benzo(a)anthracene	470.0000 U
H	Benzo(a)pyrene	470.0000 U
H	Benzo(g,h,i)perylene	470.0000 U
H	Benzo(k)fluoranthene	470.0000 U
H	Beryllium	0.1600 U
H	Butylbenzylphthalate	470.0000 U
H	Cadmium	3.5000
H	Calcium	61200.0000
H	Carbazole	470.0000 U
H	Chromium	29.1000 J
H	Chrysene	470.0000 U
H	Copper	23.4000
H	Di-n-butylphthalate	470.0000 UJ
H	Di-n-octylphthalate	470.0000 U
H	Dibenz(a,h)anthracene	470.0000 U
H	Dibenzofuran	470.0000 U
H	Dieldrin	4.7000 U
H	Diethylphthalate	470.0000 U
H	Dimethylphthalate	470.0000 U
H	Endosulfan I	2.4000 U
H	Endosulfan II	4.7000 U
H	Endosulfan sulfate	4.7000 U
H	Endrin ketone	4.7000 U
H	Fluorene	470.0000 U
H	Heptachlor	2.4000 U
H	Heptachlor epoxide	3.8000
H	Hexachlorobenzene	470.0000 U
H	Hexachlorobutadiene	470.0000 U
H	Hexachlorocyclopentadiene	470.0000 UJ
H	Hexachloroethane	470.0000 U
H	Indeno(1,2,3-cd)pyrene	470.0000 U
H	Iron	2230.0000
H	Isophorone	470.0000 U
H	Lead	121.0000
H	Magnesium	705.0000 U
H	Manganese	66.7000
H	Mercury	0.2300 UJ
H	Methoxychlor	24.0000 U
H	N-Nitroso-di-n-propylamine	470.0000 U
H	N-Nitrosodiphenylamine (1)	470.0000 U
H	Naphthalene	470.0000 U
H	Nickel	3.1000 J
H	Nitrobenzene	470.0000 U
H	Pentachlorophenol	1200.0000 U
H	Phenanthrene	470.0000 U
H	Phenol	470.0000 U
H	Potassium	97.7000 U
H	Selenium	1.2000 U
H	Silver	4.1000
H	Sodium	346.0000 U
H	Thallium	1.4000 U
H	Toxaphene	240.0000 U
H	Vanadium	5.9000 J
H	Zinc	460.0000 J
H	alpha-BHC	2.4000 U
H	alpha-Chlordane	90.0000 D
H	beta-BHC	2.4000 U
H	bis(2-Chloroethoxy)methane	470.0000 U
H	bis(2-Chloroethyl)ether	470.0000 U
H	bis(2-Ethylhexyl)phthalate	470.0000 U
H	delta-BHC	2.4000 U
H	gamma-BHC (Lindane)	2.4000 U
H	gamma-Chlordane	95.0000 D

08S03600 low: 4/11 hi: 8/16

L	Antimony	0.6100 U
L	Benzo(a)anthracene	42.0000 J

L	Benzo(b)fluoranthene	43.0000 J
L	Chrysene	41.0000 J
L	Cobalt	0.1500 U
L	Fluoranthene	86.0000 J
L	Nickel	0.5700 U
L	Phenanthrene	40.0000 J
L	Potassium	18.3000 U
L	Pyrene	61.0000 J
L	Silver	0.4000 J
H	4,4'-DDE	90.0000 D
H	4,4'-DDT	22.0000 J
H	Arsenic	5.6000
H	Beryllium	0.0500 U
H	Calcium	17500.0000
H	Copper	11.0000
H	Di-n-octylphthalate	370.0000 U
H	Lead	43.2000
H	Magnesium	187.0000 U
H	Mercury	0.0900 UJ
H	Selenium	0.9300 U
H	Sodium	164.0000 U
H	Thallium	1.1000 U
H	Zinc	58.7000 U
H	alpha-Chlordane	4.7000
H	gamma-Chlordane	4.8000

08S03700 low: 5/9 hi: 91/96

L	Antimony	0.7000 U
L	Cadmium	0.0700 U
L	Cobalt	0.1700 U
L	Endosulfan sulfate	2.1000 J
L	Endrin	0.8800 J
L	Nickel	0.8700 U
L	Silver	0.1900 U
L	alpha-Chlordane	0.3500 J
L	gamma-Chlordane	0.3700 J
H	1,2,4-Trichlorobenzene	420.0000 U
H	1,2-Dichlorobenzene	420.0000 U
H	1,3-Dichlorobenzene	420.0000 U
H	1,4-Dichlorobenzene	420.0000 U
H	2,2'-oxybis(1-Chloropropane)	420.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	420.0000 U
H	2,4-Dichlorophenol	420.0000 U
H	2,4-Dimethylphenol	420.0000 U
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	420.0000 U
H	2,6-Dinitrotoluene	420.0000 U
H	2-Chloronaphthalene	420.0000 U
H	2-Chlorophenol	420.0000 U
H	2-Methylnaphthalene	420.0000 U
H	2-Methylphenol	420.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	420.0000 U
H	3,3'-Dichlorobenzidine	420.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	4.2000 U
H	4,6-Dinitro-2-methylphenol	1100.0000 UJ
H	4-Bromophenyl-phenylether	420.0000 U
H	4-Chloro-3-methylphenol	420.0000 U
H	4-Chloroaniline	420.0000 U
H	4-Chlorophenyl-phenylether	420.0000 U
H	4-Methylphenol	420.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 UJ
H	Acenaphthene	420.0000 U
H	Acenaphthylene	420.0000 U
H	Aldrin	2.2000 U
H	Anthracene	420.0000 U
H	Aroclor-1016	42.0000 U
H	Aroclor-1221	86.0000 U

H	Aroclor-1232	42.0000 U
H	Aroclor-1242	42.0000 U
H	Aroclor-1248	42.0000 U
H	Aroclor-1254	42.0000 U
H	Aroclor-1260	320.0000
H	Arsenic	1.4000 U
H	Benzo(a)anthracene	420.0000 U
H	Benzo(a)pyrene	420.0000 U
H	Benzo(b)fluoranthene	420.0000 U
H	Benzo(g,h,i)perylene	420.0000 U
H	Benzo(k)fluoranthene	420.0000 U
H	Beryllium	0.0600 U
H	Butylbenzylphthalate	420.0000 U
H	Calcium	78600.0000
H	Carbazole	420.0000 U
H	Chrysene	420.0000 U
H	Copper	3.4000 J
H	Di-n-octylphthalate	420.0000 U
H	Dibenz(a,h)anthracene	420.0000 U
H	Dibenzofuran	420.0000 U
H	Dieldrin	4.2000 U
H	Diethylphthalate	420.0000 U
H	Dimethylphthalate	420.0000 U
H	Endosulfan I	2.2000 U
H	Endosulfan II	4.2000 U
H	Endrin aldehyde	4.2000 U
H	Endrin ketone	4.2000 U
H	Fluoranthene	420.0000 U
H	Fluorene	420.0000 U
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	2.2000 U
H	Hexachlorobenzene	420.0000 U
H	Hexachlorobutadiene	420.0000 U
H	Hexachlorocyclopentadiene	420.0000 UJ
H	Hexachloroethane	420.0000 U
H	Indeno(1,2,3-cd)pyrene	420.0000 U
H	Isophorone	420.0000 U
H	Lead	23.6000 U
H	Magnesium	478.0000 U
H	Manganese	22.4000
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	420.0000 U
H	N-Nitrosodiphenylamine (1)	420.0000 U
H	Naphthalene	420.0000 U
H	Nitrobenzene	420.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	420.0000 U
H	Phenol	420.0000 U
H	Pyrene	420.0000 U
H	Selenium	1.1000 U
H	Sodium	253.0000 U
H	Thallium	1.2000 U
H	Toxaphene	220.0000 U
H	Zinc	383.0000 J
H	alpha-BHC	2.2000 U
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	420.0000 U
H	bis(2-Chloroethyl)ether	420.0000 U
H	bis(2-Ethylhexyl)phthalate	420.0000 U
H	delta-BHC	2.2000 U
H	gamma-BHC (Lindane)	2.2000 U

08S03800 low: 6/13 hi: 84/91

L	Antimony	0.6900 U
L	Benzo(g,h,i)perylene	300.0000 J
L	Benzo(k)fluoranthene	230.0000 J
L	Cadmium	0.0700 U
L	Cobalt	0.1700 U
L	Dibenz(a,h)anthracene	70.0000 J
L	Endosulfan sulfate	0.8700 J
L	Indeno(1,2,3-cd)pyrene	270.0000 J
L	Nickel	0.9300 U
L	Phenanthrene	48.0000 J

L	Potassium	56.6000 U
L	Silver	0.1900 U
L	alpha-Chlordane	1.0000 J
H	1,2,4-Trichlorobenzene	410.0000 U
H	1,2-Dichlorobenzene	410.0000 U
H	1,3-Dichlorobenzene	410.0000 U
H	1,4-Dichlorobenzene	410.0000 U
H	2,2'-oxybis(1-Chloropropane)	410.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	410.0000 U
H	2,4-Dichlorophenol	410.0000 U
H	2,4-Dimethylphenol	410.0000 U
H	2,4-Dinitrophenol	1000.0000 UJ
H	2,4-Dinitrotoluene	410.0000 U
H	2,6-Dinitrotoluene	410.0000 U
H	2-Chloronaphthalene	410.0000 U
H	2-Chlorophenol	410.0000 U
H	2-Methylnaphthalene	410.0000 U
H	2-Methylphenol	410.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	410.0000 U
H	3,3'-Dichlorobenzidine	410.0000 U
H	3-Nitroaniline	1000.0000 U
H	4,4'-DDD	4.1000 U
H	4,6-Dinitro-2-methylphenol	1000.0000 UJ
H	4-Bromophenyl-phenylether	410.0000 U
H	4-Chloro-3-methylphenol	410.0000 U
H	4-Chloroaniline	410.0000 U
H	4-Chlorophenyl-phenylether	410.0000 U
H	4-Methylphenol	410.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 UJ
H	Acenaphthene	410.0000 U
H	Acenaphthylene	410.0000 U
H	Aldrin	2.1000 U
H	Anthracene	410.0000 U
H	Aroclor-1016	41.0000 U
H	Aroclor-1221	82.0000 U
H	Aroclor-1232	41.0000 U
H	Aroclor-1242	41.0000 U
H	Aroclor-1248	41.0000 U
H	Aroclor-1254	41.0000 U
H	Aroclor-1260	41.0000 U
H	Arsenic	1.4000 U
H	Benzo(a)pyrene	430.0000
H	Benzo(b)fluoranthene	580.0000
H	Beryllium	0.0900 U
H	Butylbenzylphthalate	410.0000 U
H	Calcium	42700.0000
H	Carbazole	410.0000 U
H	Chrysene	420.0000
H	Copper	4.3000 U
H	Di-n-octylphthalate	410.0000 U
H	Dibenzofuran	410.0000 U
H	Dieldrin	4.1000 U
H	Diethylphthalate	410.0000 U
H	Dimethylphthalate	410.0000 U
H	Endosulfan I	2.1000 U
H	Endosulfan II	4.1000 U
H	Endrin	4.1000 U
H	Endrin aldehyde	4.1000 U
H	Endrin ketone	4.1000 U
H	Fluoranthene	540.0000
H	Fluorene	410.0000 U
H	Heptachlor	2.1000 U
H	Heptachlor epoxide	2.1000 U
H	Hexachlorobenzene	410.0000 U
H	Hexachlorobutadiene	410.0000 U
H	Hexachlorocyclopentadiene	410.0000 UJ
H	Hexachloroethane	410.0000 U
H	Isophorone	410.0000 U
H	Magnesium	376.0000 U

H	Manganese	25.8000
H	Mercury	0.0900 UJ
H	Methoxychlor	21.0000 U
H	N-Nitroso-di-n-propylamine	410.0000 U
H	N-Nitrosodiphenylamine (1)	410.0000 U
H	Naphthalene	410.0000 U
H	Nitrobenzene	410.0000 U
H	Pentachlorophenol	1000.0000 U
H	Phenol	410.0000 U
H	Pyrene	580.0000
H	Selenium	1.0000 U
H	Sodium	171.0000 U
H	Thallium	1.2000 U
H	Toxaphene	210.0000 U
H	Zinc	23.7000 U
H	alpha-BHC	2.1000 U
H	beta-BHC	2.1000 U
H	bis(2-Chloroethoxy)methane	410.0000 U
H	bis(2-Chloroethyl)ether	410.0000 U
H	bis(2-Ethylhexyl)phthalate	410.0000 U
H	delta-BHC	2.1000 U
H	gamma-BHC (Lindane)	2.1000 U

08S03800D low: 5/13 hi: 84/92

L	Antimony	0.7000 U
L	Benzo(g,h,i)perylene	260.0000 J
L	Benzo(k)fluoranthene	210.0000 J
L	Cadmium	0.0700 U
L	Cobalt	0.1700 U
L	Dibenz(a,h)anthracene	59.0000 J
L	Endosulfan sulfate	0.7700 J
L	Indeno(1,2,3-cd)pyrene	240.0000 J
L	Nickel	0.6500 U
L	Phenanthrene	43.0000 J
L	Silver	0.1900 U
L	alpha-Chlordane	0.7900 J
L	gamma-Chlordane	0.6800 J
H	1,2,4-Trichlorobenzene	420.0000 U
H	1,2-Dichlorobenzene	420.0000 U
H	1,3-Dichlorobenzene	420.0000 U
H	1,4-Dichlorobenzene	420.0000 U
H	2,2'-oxybis(1-Chloropropane)	420.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	420.0000 U
H	2,4-Dichlorophenol	420.0000 U
H	2,4-Dimethylphenol	420.0000 U
H	2,4-Dinitrophenol	1100.0000 U
H	2,4-Dinitrotoluene	420.0000 U
H	2,6-Dinitrotoluene	420.0000 U
H	2-Chloronaphthalene	420.0000 U
H	2-Chlorophenol	420.0000 U
H	2-Methylnaphthalene	420.0000 U
H	2-Methylphenol	420.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	420.0000 U
H	3,3'-Dichlorobenzidine	420.0000 UJ
H	3-Nitroaniline	1100.0000 UJ
H	4,4'-DDD	4.2000 U
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	420.0000 U
H	4-Chloro-3-methylphenol	420.0000 U
H	4-Chloroaniline	420.0000 U
H	4-Chlorophenyl-phenylether	420.0000 U
H	4-Methylphenol	420.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 UJ
H	Acenaphthene	420.0000 U
H	Acenaphthylene	420.0000 U
H	Aldrin	2.2000 U
H	Anthracene	420.0000 U
H	Aroclor-1016	42.0000 U
H	Aroclor-1221	85.0000 U

H	Aroclor-1232	42.0000 U
H	Aroclor-1242	42.0000 U
H	Aroclor-1248	42.0000 U
H	Aroclor-1254	42.0000 U
H	Aroclor-1260	42.0000 U
H	Arsenic	1.4000 U
H	Benzo(b)fluoranthene	520.0000
H	Beryllium	0.0900 U
H	Butylbenzylphthalate	420.0000 U
H	Calcium	38800.0000
H	Carbazole	420.0000 U
H	Chromium	4.6000 J
H	Chrysene	390.0000 J
H	Copper	6.5000
H	Di-n-octylphthalate	420.0000 U
H	Dibenzofuran	420.0000 U
H	Dieldrin	4.2000 U
H	Diethylphthalate	420.0000 U
H	Dimethylphthalate	420.0000 U
H	Endosulfan I	2.2000 U
H	Endosulfan II	4.2000 U
H	Endrin	4.2000 U
H	Endrin aldehyde	4.2000 U
H	Endrin ketone	4.2000 U
H	Fluoranthene	610.0000
H	Fluorene	420.0000 U
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	2.2000 U
H	Hexachlorobenzene	420.0000 U
H	Hexachlorobutadiene	420.0000 U
H	Hexachlorocyclopentadiene	420.0000 U
H	Hexachloroethane	420.0000 U
H	Isophorone	420.0000 U
H	Magnesium	481.0000 U
H	Manganese	24.7000
H	Mercury	0.1000 UJ
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	420.0000 U
H	N-Nitrosodiphenylamine (1)	420.0000 U
H	Naphthalene	420.0000 U
H	Nitrobenzene	420.0000 U
H	Pentachlorophenol	1100.0000 UJ
H	Phenol	420.0000 U
H	Potassium	103.0000 U
H	Pyrene	500.0000
H	Selenium	1.1000 U
H	Sodium	159.0000 U
H	Thallium	1.2000 U
H	Toxaphene	220.0000 U
H	Zinc	37.3000 U
H	alpha-BHC	2.2000 U
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	420.0000 U
H	bis(2-Chloroethyl)ether	420.0000 U
H	bis(2-Ethylhexyl)phthalate	420.0000 U
H	delta-BHC	2.2000 U
H	gamma-BHC (Lindane)	2.2000 U

08S03900 low: 1/4 hi: 79/94

L	Antimony	0.6500 U
L	Cadmium	0.1900 J
L	Cobalt	0.4200 J
L	Silver	0.2600 J

H	1,2,4-Trichlorobenzene	400.0000 U
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U

H	2,4-Dinitrophenol	1000.0000 U
H	2,4-Dinitrotoluene	400.0000 U
H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U
H	2-Methylnaphthalene	400.0000 U
H	2-Methylphenol	400.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	400.0000 U
H	3,3'-Dichlorobenzidine	400.0000 UJ
H	3-Nitroaniline	1000.0000 UJ
H	4,4'-DDE	19.0000 JD
H	4,4'-DDT	44.0000
H	4,6-Dinitro-2-methylphenol	1000.0000 U
H	4-Bromophenyl-phenylether	400.0000 U
H	4-Chloro-3-methylphenol	400.0000 U
H	4-Chloroaniline	400.0000 U
H	4-Chlorophenyl-phenylether	400.0000 U
H	4-Methylphenol	400.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 UJ
H	Acenaphthene	400.0000 U
H	Acenaphthylene	400.0000 U
H	Aldrin	2.1000 U
H	Anthracene	400.0000 U
H	Aroclor-1221	82.0000 U
H	Arsenic	16.1000
H	Barium	14.5000 J
H	Benzo(a)anthracene	400.0000 U
H	Benzo(a)pyrene	400.0000 U
H	Benzo(b)fluoranthene	400.0000 U
H	Benzo(g,h,i)perylene	400.0000 U
H	Benzo(k)fluoranthene	400.0000 U
H	Beryllium	0.1400 U
H	Butylbenzylphthalate	400.0000 U
H	Calcium	47100.0000
H	Carbazole	400.0000 U
H	Chromium	11.8000 J
H	Chrysene	400.0000 U
H	Copper	7.4000
H	Di-n-octylphthalate	400.0000 U
H	Dibenz(a,h)anthracene	400.0000 U
H	Dibenzofuran	400.0000 U
H	Diethylphthalate	400.0000 U
H	Dimethylphthalate	400.0000 U
H	Endosulfan I	2.1000 U
H	Fluoranthene	400.0000 U
H	Fluorene	400.0000 U
H	Heptachlor	2.1000 U
H	Heptachlor epoxide	7.9000
H	Hexachlorobenzene	400.0000 U
H	Hexachlorobutadiene	400.0000 U
H	Hexachlorocyclopentadiene	400.0000 U
H	Hexachloroethane	400.0000 U
H	Indeno(1,2,3-cd)pyrene	400.0000 U
H	Isophorone	400.0000 U
H	Magnesium	508.0000 U
H	Manganese	26.9000
H	Mercury	0.3500 J
H	Methoxychlor	21.0000 U
H	N-Nitroso-di-n-propylamine	400.0000 U
H	N-Nitrosodiphenylamine (1)	400.0000 U
H	Naphthalene	400.0000 U
H	Nickel	2.3000 J
H	Nitrobenzene	400.0000 U
H	Pentachlorophenol	1000.0000 UJ
H	Phenanthrene	400.0000 U
H	Phenol	400.0000 U
H	Potassium	115.0000 U
H	Pyrene	400.0000 U
H	Selenium	1.3000
H	Sodium	220.0000 U
H	Thallium	1.1000 U

H	Toxaphene	210.0000 U
H	Vanadium	7.4000 J
H	Zinc	97.3000 U
H	alpha-BHC	2.1000 U
H	alpha-Chlordane	31.0000 JD
H	beta-BHC	2.1000 U
H	bis(2-Chloroethoxy)methane	400.0000 U
H	bis(2-Chloroethyl)ether	400.0000 U
H	bis(2-Ethylhexyl)phthalate	400.0000 U
H	delta-BHC	2.1000 U
H	gamma-BHC (Lindane)	2.1000 U
H	gamma-Chlordane	9.5000 JD

08S04000 low: 4/6 hi: 81/89

L	Antimony	0.6700 U
L	Cadmium	0.0700 U
L	Dieldrin	0.8300 J
L	Potassium	60.4000 U
L	Silver	0.1800 U
L	gamma-Chlordane	1.2000 J

H	1,2,4-Trichlorobenzene	390.0000 U
H	1,2-Dichlorobenzene	390.0000 U
H	1,3-Dichlorobenzene	390.0000 U
H	1,4-Dichlorobenzene	390.0000 U
H	2,2'-oxybis(1-Chloropropane)	390.0000 U
H	2,4,5-Trichlorophenol	990.0000 U
H	2,4,6-Trichlorophenol	390.0000 U
H	2,4-Dichlorophenol	390.0000 U
H	2,4-Dimethylphenol	390.0000 U
H	2,4-Dinitrophenol	990.0000 UJ
H	2,4-Dinitrotoluene	390.0000 U
H	2,6-Dinitrotoluene	390.0000 U
H	2-Chloronaphthalene	390.0000 U
H	2-Chlorophenol	390.0000 U
H	2-Methylnaphthalene	390.0000 U
H	2-Methylphenol	390.0000 U
H	2-Nitroaniline	990.0000 U
H	2-Nitrophenol	390.0000 U
H	3,3'-Dichlorobenzidine	390.0000 U
H	3-Nitroaniline	990.0000 U
H	4,6-Dinitro-2-methylphenol	990.0000 UJ
H	4-Bromophenyl-phenylether	390.0000 U
H	4-Chloro-3-methylphenol	390.0000 U
H	4-Chloroaniline	390.0000 U
H	4-Chlorophenyl-phenylether	390.0000 U
H	4-Methylphenol	390.0000 U
H	4-Nitroaniline	990.0000 U
H	4-Nitrophenol	990.0000 UJ
H	Acenaphthene	390.0000 U
H	Acenaphthylene	390.0000 U
H	Aldrin	2.0000 U
H	Anthracene	390.0000 U
H	Arsenic	1.4000 J
H	Benzo(a)anthracene	390.0000 U
H	Benzo(a)pyrene	390.0000 U
H	Benzo(b)fluoranthene	390.0000 U
H	Benzo(g,h,i)perylene	390.0000 U
H	Benzo(k)fluoranthene	390.0000 U
H	Beryllium	0.1000 U
H	Butylbenzylphthalate	390.0000 U
H	Calcium	334000.0000
H	Carbazole	390.0000 U
H	Chromium	11.7000 J
H	Chrysene	390.0000 U
H	Copper	3.6000 U
H	Di-n-octylphthalate	390.0000 U
H	Dibenz(a,h)anthracene	390.0000 U
H	Dibenzofuran	390.0000 U
H	Diethylphthalate	390.0000 U
H	Dimethylphthalate	390.0000 U
H	Endosulfan I	2.0000 U
H	Fluoranthene	390.0000 U

H	Fluorene	390.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Hexachlorobenzene	390.0000 U
H	Hexachlorobutadiene	390.0000 U
H	Hexachlorocyclopentadiene	390.0000 UJ
H	Hexachloroethane	390.0000 U
H	Indeno(1,2,3-cd)pyrene	390.0000 U
H	Iron	967.0000
H	Isophorone	390.0000 U
H	Magnesium	2390.0000 U
H	Manganese	24.0000
H	Mercury	0.0800 UJ
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	390.0000 U
H	N-Nitrosodiphenylamine (1)	390.0000 U
H	Naphthalene	390.0000 U
H	Nickel	2.2000 J
H	Nitrobenzene	390.0000 U
H	Pentachlorophenol	990.0000 U
H	Phenanthrene	390.0000 U
H	Phenol	390.0000 U
H	Pyrene	390.0000 U
H	Selenium	1.0000 U
H	Sodium	352.0000 U
H	Thallium	1.2000 U
H	Toxaphene	200.0000 U
H	Vanadium	18.6000
H	Zinc	10.0000 U
H	alpha-BHC	2.0000 U
H	alpha-Chlordane	3.0000 J
H	beta-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	390.0000 U
H	bis(2-Chloroethyl)ether	390.0000 U
H	bis(2-Ethylhexyl)phthalate	430.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U

08S04100 low: 2/4 hi: 8/23

L	Aldrin	0.2700 J
L	Antimony	0.6200 U
L	Cadmium	0.0600 U
L	Cobalt	0.2900 J
H	Arsenic	25.0000
H	Barium	10.7000 J
H	Beryllium	0.1000 U
H	Calcium	48600.0000
H	Chromium	9.4000 J
H	Copper	11.3000
H	Di-n-octylphthalate	370.0000 U
H	Dieldrin	23.0000
H	Iron	2050.0000
H	Lead	40.1000
H	Magnesium	496.0000 U
H	Manganese	45.4000
H	Mercury	1.7000 J
H	Nickel	2.2000 J
H	Potassium	92.9000 U
H	Selenium	0.9300 U
H	Silver	0.5900 J
H	Sodium	197.0000 U
H	Thallium	1.1000 U
H	Vanadium	3.5000 J
H	Zinc	51.9000 U
H	alpha-Chlordane	17.0000
H	gamma-Chlordane	16.0000

08S04200 low: 6/7 hi: 3/5

L	Antimony	0.6000 U
L	Cadmium	0.0600 U
L	Cobalt	0.1500 U
L	Nickel	0.2700 U

L Potassium	18.4000	U
L Silver	0.1700	U
L alpha-Chlordane	0.4500	J
H Aroclor-1260	66.0000	J
H Calcium	27300.0000	
H Selenium	0.9200	U
H Sodium	133.0000	U
H Thallium	1.0000	U

08S04300 low: 3/12 hi: 79/94

L Antimony	0.7300	U
L Benzo(a)pyrene	310.0000	J
L Benzo(g,h,i)perylene	200.0000	J
L Benzo(k)fluoranthene	170.0000	J
L Cobalt	0.1800	U
L Dibenz(a,h)anthracene	50.0000	J
L Endosulfan I	1.2000	J
L Endrin aldehyde	1.6000	J
L Heptachlor epoxide	0.6800	J
L Indeno(1,2,3-cd)pyrene	200.0000	J
L Potassium	40.4000	U
L Silver	0.2400	J
H 1,2,4-Trichlorobenzene	440.0000	U
H 1,2-Dichlorobenzene	440.0000	U
H 1,3-Dichlorobenzene	440.0000	U
H 1,4-Dichlorobenzene	440.0000	U
H 2,2'-oxybis(1-Chloropropane)	440.0000	U
H 2,4,5-Trichlorophenol	1100.0000	U
H 2,4,6-Trichlorophenol	440.0000	U
H 2,4-Dichlorophenol	440.0000	U
H 2,4-Dimethylphenol	440.0000	U
H 2,4-Dinitrophenol	1100.0000	U
H 2,4-Dinitrotoluene	440.0000	U
H 2,6-Dinitrotoluene	440.0000	U
H 2-Chloronaphthalene	440.0000	U
H 2-Chlorophenol	440.0000	U
H 2-Methylnaphthalene	440.0000	U
H 2-Methylphenol	440.0000	U
H 2-Nitroaniline	1100.0000	U
H 2-Nitrophenol	440.0000	U
H 3,3'-Dichlorobenzidine	440.0000	UJ
H 3-Nitroaniline	1100.0000	UJ
H 4,4'-DDD	4.8000	J
H 4,4'-DDE	1600.0000	D
H 4,4'-DDT	2200.0000	D
H 4,6-Dinitro-2-methylphenol	1100.0000	U
H 4-Bromophenyl-phenylether	440.0000	U
H 4-Chloro-3-methylphenol	440.0000	U
H 4-Chloroaniline	440.0000	U
H 4-Chlorophenyl-phenylether	440.0000	U
H 4-Methylphenol	440.0000	U
H 4-Nitroaniline	1100.0000	U
H 4-Nitrophenol	1100.0000	UJ
H Acenaphthene	440.0000	U
H Acenaphthylene	440.0000	U
H Aldrin	2.2000	U
H Anthracene	440.0000	U
H Aroclor-1016	44.0000	U
H Aroclor-1221	89.0000	U
H Aroclor-1232	44.0000	U
H Aroclor-1242	44.0000	U
H Aroclor-1248	44.0000	U
H Aroclor-1254	44.0000	U
H Aroclor-1260	44.0000	U
H Arsenic	3.6000	
H Barium	10.4000	J
H Benzo(b)fluoranthene	440.0000	
H Beryllium	0.2100	U
H Butylbenzylphthalate	440.0000	U
H Cadmium	2.5000	
H Carbazole	440.0000	U

H	Chromium	37.9000 J
H	Copper	15.2000
H	Di-n-butylphthalate	440.0000 UJ
H	Di-n-octylphthalate	440.0000 U
H	Dibenzofuran	440.0000 U
H	Dieldrin	4.4000 U
H	Diethylphthalate	440.0000 U
H	Dimethylphthalate	440.0000 U
H	Endosulfan II	4.4000 U
H	Endosulfan sulfate	4.4000 U
H	Endrin	4.4000 U
H	Endrin ketone	4.4000 U
H	Fluoranthene	570.0000
H	Fluorene	440.0000 U
H	Heptachlor	2.2000 U
H	Hexachlorobenzene	440.0000 U
H	Hexachlorobutadiene	440.0000 U
H	Hexachlorocyclopentadiene	440.0000 U
H	Hexachloroethane	440.0000 U
H	Isophorone	440.0000 U
H	Magnesium	176.0000 U
H	Mercury	0.7200 J
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	440.0000 U
H	N-Nitrosodiphenylamine (1)	440.0000 U
H	Naphthalene	440.0000 U
H	Nickel	3.9000 J
H	Nitrobenzene	440.0000 U
H	Pentachlorophenol	1100.0000 UJ
H	Phenanthrene	440.0000 U
H	Phenol	440.0000 U
H	Pyrene	450.0000
H	Selenium	1.3000
H	Sodium	194.0000 U
H	Thallium	1.3000 U
H	Toxaphene	220.0000 U
H	Vanadium	3.6000 J
H	Zinc	25.7000 U
H	alpha-BHC	2.2000 U
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	440.0000 U
H	bis(2-Chloroethyl)ether	440.0000 U
H	bis(2-Ethylhexyl)phthalate	440.0000 U
H	delta-BHC	2.2000 U
H	gamma-BHC (Lindane)	2.2000 U

08S04400 low: 2/7 hi: 85/107

L	Antimony	0.8400 U
L	Benzo(b)fluoranthene	69.0000 J
L	Chrysene	59.0000 J
L	Endosulfan sulfate	2.5000 J
L	Fluoranthene	100.0000 J
L	Potassium	51.2000 U
L	Pyrene	70.0000 J

H	1,2,4-Trichlorobenzene	510.0000 U
H	1,2-Dichlorobenzene	510.0000 U
H	1,3-Dichlorobenzene	510.0000 U
H	1,4-Dichlorobenzene	510.0000 U
H	2,2'-oxybis(1-Chloropropane)	510.0000 U
H	2,4,5-Trichlorophenol	1300.0000 U
H	2,4,6-Trichlorophenol	510.0000 U
H	2,4-Dichlorophenol	510.0000 U
H	2,4-Dimethylphenol	510.0000 U
H	2,4-Dinitrophenol	1300.0000 U
H	2,4-Dinitrotoluene	510.0000 U
H	2,6-Dinitrotoluene	510.0000 U
H	2-Chloronaphthalene	510.0000 U
H	2-Chlorophenol	510.0000 U
H	2-Methylnaphthalene	510.0000 U
H	2-Methylphenol	510.0000 U
H	2-Nitroaniline	1300.0000 UJ
H	2-Nitrophenol	510.0000 U

H	3,3'-Dichlorobenzidine	510.0000 UJ
H	3-Nitroaniline	1300.0000 U
H	4,4'-DDD	33.0000 J
H	4,4'-DDT	30.0000
H	4,6-Dinitro-2-methylphenol	1300.0000 U
H	4-Bromophenyl-phenylether	510.0000 U
H	4-Chloro-3-methylphenol	510.0000 U
H	4-Chloroaniline	510.0000 U
H	4-Chlorophenyl-phenylether	510.0000 U
H	4-Methylphenol	510.0000 U
H	4-Nitroaniline	1300.0000 U
H	4-Nitrophenol	1300.0000 UJ
H	Acenaphthene	510.0000 U
H	Acenaphthylene	510.0000 U
H	Aldrin	2.6000 U
H	Aluminum	2900.0000
H	Anthracene	510.0000 U
H	Aroclor-1016	51.0000 U
H	Aroclor-1221	100.0000 U
H	Aroclor-1232	51.0000 U
H	Aroclor-1242	51.0000 U
H	Aroclor-1248	51.0000 U
H	Aroclor-1254	51.0000 U
H	Aroclor-1260	51.0000 U
H	Arsenic	11.7000
H	Barium	18.1000 J
H	Benzo(a)anthracene	510.0000 U
H	Benzo(a)pyrene	510.0000 U
H	Benzo(g,h,i)perylene	510.0000 U
H	Benzo(k)fluoranthene	510.0000 U
H	Beryllium	0.1400 U
H	Butylbenzylphthalate	510.0000 U
H	Cadmium	3.0000
H	Carbazole	510.0000 U
H	Chromium	63.3000 J
H	Copper	27.8000
H	Di-n-butylphthalate	510.0000 UJ
H	Di-n-octylphthalate	510.0000 U
H	Dibenz(a,h)anthracene	510.0000 U
H	Dibenzofuran	510.0000 U
H	Dieldrin	91.0000 D
H	Diethylphthalate	510.0000 U
H	Dimethylphthalate	510.0000 U
H	Dinoseb	36.0000 J
H	Endosulfan I	2.6000 U
H	Endosulfan II	5.1000 U
H	Endrin	5.1000 U
H	Endrin aldehyde	5.1000 U
H	Endrin ketone	5.1000 U
H	Fluorene	510.0000 U
H	Heptachlor	2.6000 U
H	Heptachlor epoxide	11.0000
H	Hexachlorobenzene	510.0000 U
H	Hexachlorobutadiene	510.0000 U
H	Hexachlorocyclopentadiene	510.0000 U
H	Hexachloroethane	510.0000 U
H	Indeno(1,2,3-cd)pyrene	510.0000 U
H	Iron	1390.0000
H	Isophorone	510.0000 U
H	Lead	20.6000
H	MCPP	44000.0000 U
H	Magnesium	176.0000 U
H	Manganese	51.2000
H	Mercury	0.4700 J
H	Methoxychlor	26.0000 U
H	N-Nitroso-di-n-propylamine	510.0000 U
H	N-Nitrosodiphenylamine (1)	510.0000 U
H	Naphthalene	510.0000 U
H	Nickel	5.4000 J
H	Nitrobenzene	510.0000 U
H	Pentachlorophenol	1300.0000 UJ
H	Phenanthrene	510.0000 U
H	Phenol	510.0000 U

H	Selenium	1.3000 U
H	Silver	1.1000 J
H	Sodium	187.0000 U
H	Thallium	1.4000 U
H	Toxaphene	260.0000 U
H	Vanadium	4.9000 J
H	Zinc	162.0000 J
H	alpha-BHC	2.6000 U
H	alpha-Chlordane	280.0000 D
H	beta-BHC	2.6000 U
H	bis(2-Chloroethoxy)methane	510.0000 U
H	bis(2-Chloroethyl)ether	510.0000 U
H	bis(2-Ethylhexyl)phthalate	510.0000 U
H	delta-BHC	2.4000 J
H	gamma-BHC (Lindane)	2.6000 U
H	gamma-Chlordane	180.0000 D

08S04500 low: 3/4 hi: 91/103

L	Antimony	0.8200 U
L	Cobalt	0.2000 U
L	Potassium	41.2000 U
L	delta-BHC	0.3700 J
H	1,2,4-Trichlorobenzene	470.0000 U
H	1,2-Dichlorobenzene	470.0000 U
H	1,3-Dichlorobenzene	470.0000 U
H	1,4-Dichlorobenzene	470.0000 U
H	2,2'-oxybis(1-Chloropropane)	470.0000 U
H	2,4,5-Trichlorophenol	1200.0000 U
H	2,4,6-Trichlorophenol	470.0000 U
H	2,4-Dichlorophenol	470.0000 U
H	2,4-Dimethylphenol	470.0000 U
H	2,4-Dinitrophenol	1200.0000 U
H	2,4-Dinitrotoluene	470.0000 U
H	2,6-Dinitrotoluene	470.0000 U
H	2-Chloronaphthalene	470.0000 U
H	2-Chlorophenol	470.0000 U
H	2-Methylnaphthalene	470.0000 U
H	2-Methylphenol	470.0000 U
H	2-Nitroaniline	1200.0000 U
H	2-Nitrophenol	470.0000 U
H	3,3'-Dichlorobenzidine	470.0000 UJ
H	3-Nitroaniline	1200.0000 UJ
H	4,4'-DDD	4.7000 U
H	4,6-Dinitro-2-methylphenol	1200.0000 U
H	4-Bromophenyl-phenylether	470.0000 U
H	4-Chloro-3-methylphenol	470.0000 U
H	4-Chloroaniline	470.0000 U
H	4-Chlorophenyl-phenylether	470.0000 U
H	4-Methylphenol	470.0000 U
H	4-Nitroaniline	1200.0000 U
H	4-Nitrophenol	1200.0000 UJ
H	Acenaphthene	470.0000 U
H	Acenaphthylene	470.0000 U
H	Aldrin	2.4000 U
H	Anthracene	470.0000 U
H	Aroclor-1016	47.0000 U
H	Aroclor-1221	96.0000 U
H	Aroclor-1232	47.0000 U
H	Aroclor-1242	47.0000 U
H	Aroclor-1248	47.0000 U
H	Aroclor-1254	47.0000 U
H	Aroclor-1260	47.0000 U
H	Arsenic	11.6000
H	Barium	8.6000 J
H	Benzo(a)anthracene	470.0000 U
H	Benzo(a)pyrene	470.0000 U
H	Benzo(b)fluoranthene	470.0000 U
H	Benzo(g,h,i)perylene	470.0000 U
H	Benzo(k)fluoranthene	470.0000 U
H	Beryllium	0.0800 U
H	Butylbenzylphthalate	470.0000 U
H	Cadmium	1.6000

H	Carbazole	470.0000 U
H	Chromium	21.5000 J
H	Chrysene	470.0000 U
H	Copper	18.5000
H	Di-n-butylphthalate	470.0000 UJ
H	Di-n-octylphthalate	470.0000 U
H	Dibenz(a,h)anthracene	470.0000 U
H	Dibenzofuran	470.0000 U
H	Dieldrin	4.7000 U
H	Diethylphthalate	470.0000 U
H	Dimethylphthalate	470.0000 U
H	Endosulfan I	2.4000 U
H	Endosulfan II	4.7000 U
H	Endosulfan sulfate	4.7000 U
H	Endrin	4.7000 U
H	Endrin aldehyde	4.7000 U
H	Endrin ketone	4.7000 U
H	Fluoranthene	470.0000 U
H	Fluorene	470.0000 U
H	Heptachlor	2.4000 U
H	Heptachlor epoxide	2.4000 U
H	Hexachlorobenzene	470.0000 U
H	Hexachlorobutadiene	470.0000 U
H	Hexachlorocyclopentadiene	470.0000 U
H	Hexachloroethane	470.0000 U
H	Indeno(1,2,3-cd)pyrene	470.0000 U
H	Iron	1140.0000
H	Isophorone	470.0000 U
H	Lead	40.7000
H	Manganese	24.6000
H	Mercury	0.6400 J
H	Methoxychlor	24.0000 U
H	N-Nitroso-di-n-propylamine	470.0000 U
H	N-Nitrosodiphenylamine (1)	470.0000 U
H	Naphthalene	470.0000 U
H	Nitrobenzene	470.0000 U
H	Pentachlorophenol	1200.0000 UJ
H	Phenanthrene	470.0000 U
H	Phenol	470.0000 U
H	Pyrene	470.0000 U
H	Selenium	1.2000 U
H	Silver	2.2000 J
H	Sodium	254.0000 U
H	Thallium	1.4000 U
H	Toxaphene	240.0000 U
H	Zinc	325.0000 J
H	alpha-BHC	2.4000 U
H	beta-BHC	2.4000 U
H	bis(2-Chloroethoxy)methane	470.0000 U
H	bis(2-Chloroethyl)ether	470.0000 U
H	bis(2-Ethylhexyl)phthalate	470.0000 U
H	gamma-BHC (Lindane)	2.4000 U
H	gamma-Chlordane	3.6000

08SD4600 low: 2/6 hi: 81/93

L	Antimony	0.7000 U
L	Cadmium	0.0700 U
L	Cobalt	0.4000 J
L	Endosulfan I	0.5000 J
L	alpha-Chlordane	0.3900 J
L	gamma-Chlordane	0.1600 J

H	1,2,4-Trichlorobenzene	400.0000 U
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U
H	2,4-Dinitrophenol	1000.0000 U
H	2,4-Dinitrotoluene	400.0000 U

H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U
H	2-Methylnaphthalene	400.0000 U
H	2-Methylphenol	400.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	400.0000 U
H	3,3'-Dichlorobenzidine	400.0000 UJ
H	3-Nitroaniline	1000.0000 UJ
H	4,4'-DDD	150.0000 J
H	4,4'-DDE	170.0000 D
H	4,4'-DDT	49.0000
H	4,6-Dinitro-2-methylphenol	1000.0000 U
H	4-Bromophenyl-phenylether	400.0000 U
H	4-Chloro-3-methylphenol	400.0000 U
H	4-Chloroaniline	400.0000 U
H	4-Chlorophenyl-phenylether	400.0000 U
H	4-Methylphenol	400.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 UJ
H	Acenaphthene	400.0000 U
H	Acenaphthylene	400.0000 U
H	Aldrin	2.0000 U
H	Anthracene	400.0000 U
H	Arsenic	14.6000
H	Barium	12.3000 J
H	Benzo(a)anthracene	400.0000 U
H	Benzo(a)pyrene	400.0000 U
H	Benzo(b)fluoranthene	400.0000 U
H	Benzo(g,h,i)perylene	400.0000 U
H	Benzo(k)fluoranthene	400.0000 U
H	Beryllium	0.1400 U
H	Butylbenzylphthalate	400.0000 U
H	Calcium	30900.0000
H	Carbazole	400.0000 U
H	Chromium	11.0000 J
H	Chrysene	400.0000 U
H	Copper	5.6000 U
H	Di-n-octylphthalate	400.0000 U
H	Dibenz(a,h)anthracene	400.0000 U
H	Dibenzofuran	400.0000 U
H	Diethylphthalate	400.0000 U
H	Dimethylphthalate	400.0000 U
H	Endrin	5.2000 J
H	Fluoranthene	400.0000 U
H	Fluorene	400.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Hexachlorobenzene	400.0000 U
H	Hexachlorobutadiene	400.0000 U
H	Hexachlorocyclopentadiene	400.0000 U
H	Hexachloroethane	400.0000 U
H	Indeno(1,2,3-cd)pyrene	400.0000 U
H	Iron	909.0000
H	Isophorone	400.0000 U
H	Magnesium	351.0000 U
H	Manganese	89.8000
H	Mercury	0.1000 UJ
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	400.0000 U
H	N-Nitrosodiphenylamine (1)	400.0000 U
H	Naphthalene	400.0000 U
H	Nitrobenzene	400.0000 U
H	Pentachlorophenol	1000.0000 UJ
H	Phenanthrene	400.0000 U
H	Phenol	400.0000 U
H	Potassium	133.0000 U
H	Pyrene	400.0000 U
H	Selenium	1.1000 U
H	Silver	0.6200 J
H	Sodium	222.0000 U
H	Thallium	1.2000 U
H	Toxaphene	200.0000 U

H	Vanadium	5.2000 J
H	Zinc	15.2000 U
H	alpha-BHC	2.0000 U
H	beta-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	400.0000 U
H	bis(2-Chloroethyl)ether	400.0000 U
H	bis(2-Ethylhexyl)phthalate	400.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U

08S04700 low: 2/2 hi: 97/109

L	Antimony	2.5000 U
L	Cadmium	0.2600 U
H	1,2,4-Trichlorobenzene	1500.0000 U
H	1,2-Dichlorobenzene	1500.0000 U
H	1,3-Dichlorobenzene	1500.0000 U
H	1,4-Dichlorobenzene	1500.0000 U
H	2,2'-oxybis(1-Chloropropane)	1500.0000 U
H	2,4,5-Trichlorophenol	3800.0000 U
H	2,4,6-Trichlorophenol	1500.0000 U
H	2,4-Dichlorophenol	1500.0000 U
H	2,4-Dimethylphenol	1500.0000 U
H	2,4-Dinitrophenol	3800.0000 U
H	2,4-Dinitrotoluene	1500.0000 U
H	2,6-Dinitrotoluene	1500.0000 U
H	2-Chloronaphthalene	1500.0000 U
H	2-Chlorophenol	1500.0000 U
H	2-Methylnaphthalene	1500.0000 U
H	2-Methylphenol	1500.0000 U
H	2-Nitroaniline	3800.0000 U
H	2-Nitrophenol	1500.0000 U
H	3,3'-Dichlorobenzidine	1500.0000 UJ
H	3-Nitroaniline	3800.0000 UJ
H	4,4'-DDD	15.0000 U
H	4,4'-DDE	15.0000 U
H	4,6-Dinitro-2-methylphenol	3800.0000 U
H	4-Bromophenyl-phenylether	1500.0000 U
H	4-Chloro-3-methylphenol	1500.0000 U
H	4-Chloroaniline	1500.0000 U
H	4-Chlorophenyl-phenylether	1500.0000 U
H	4-Methylphenol	1500.0000 U
H	4-Nitroaniline	3800.0000 U
H	4-Nitrophenol	3800.0000 UJ
H	Acenaphthene	1500.0000 U
H	Acenaphthylene	1500.0000 U
H	Aldrin	7.7000 U
H	Anthracene	1500.0000 U
H	Aroclor-1016	150.0000 U
H	Aroclor-1221	300.0000 U
H	Aroclor-1232	150.0000 U
H	Aroclor-1242	150.0000 U
H	Aroclor-1248	150.0000 U
H	Aroclor-1254	150.0000 U
H	Aroclor-1260	150.0000 U
H	Arsenic	8.2000 J
H	Barium	24.7000 J
H	Benzo(a)anthracene	1500.0000 U
H	Benzo(a)pyrene	1500.0000 U
H	Benzo(b)fluoranthene	1500.0000 U
H	Benzo(g,h,i)perylene	1500.0000 U
H	Benzo(k)fluoranthene	1500.0000 U
H	Beryllium	0.2700 U
H	Butylbenzylphthalate	1500.0000 U
H	Calcium	38000.0000
H	Carbazole	1500.0000 U
H	Chromium	7.0000 J
H	Chrysene	1500.0000 U
H	Copper	16.8000 J
H	Di-n-butylphthalate	1500.0000 UJ
H	Di-n-octylphthalate	1500.0000 U
H	Dibenz(a,h)anthracene	1500.0000 U
H	Dibenzofuran	1500.0000 U

H	Dieldrin	15.0000 U
H	Diethylphthalate	1500.0000 U
H	Dimethylphthalate	1500.0000 U
H	Endosulfan I	7.7000 U
H	Endosulfan II	15.0000 U
H	Endosulfan sulfate	15.0000 U
H	Endrin	15.0000 U
H	Endrin aldehyde	15.0000 U
H	Endrin ketone	15.0000 U
H	Fluoranthene	1500.0000 U
H	Fluorene	1500.0000 U
H	Heptachlor	7.7000 U
H	Heptachlor epoxide	7.7000 U
H	Hexachlorobenzene	1500.0000 U
H	Hexachlorobutadiene	1500.0000 U
H	Hexachlorocyclopentadiene	1500.0000 U
H	Hexachloroethane	1500.0000 U
H	Indeno(1,2,3-cd)pyrene	1500.0000 U
H	Iron	1170.0000
H	Isophorone	1500.0000 U
H	Lead	163.0000
H	Magnesium	919.0000 U
H	Manganese	33.2000
H	Mercury	0.5100 J
H	Methoxychlor	77.0000 U
H	N-Nitroso-di-n-propylamine	1500.0000 U
H	N-Nitrosodiphenylamine (1)	1500.0000 U
H	Naphthalene	1500.0000 U
H	Nickel	4.3000 J
H	Nitrobenzene	1500.0000 U
H	Pentachlorophenol	3800.0000 UJ
H	Phenanthrene	1500.0000 U
H	Phenol	1500.0000 U
H	Potassium	366.0000 U
H	Pyrene	1500.0000 U
H	Selenium	4.5000
H	Silver	0.7000 U
H	Sodium	1390.0000 U
H	Thallium	4.4000 U
H	Toxaphene	770.0000 U
H	Vanadium	4.8000 J
H	Zinc	44.9000 U
H	alpha-BHC	7.7000 U
H	beta-BHC	7.7000 U
H	bis(2-Chloroethoxy)methane	1500.0000 U
H	bis(2-Chloroethyl)ether	1500.0000 U
H	bis(2-Ethylhexyl)phthalate	1500.0000 U
H	delta-BHC	7.7000 U
H	gamma-BHC (Lindane)	7.7000 U
H	gamma-Chlordane	7.7000 U

08S04800 low: 1/14 hi: 81/98

L	Aldrin	0.5100 J
L	Antimony	0.7500 U
L	Benzo(a)anthracene	63.0000 J
L	Benzo(a)pyrene	73.0000 J
L	Benzo(b)fluoranthene	180.0000 J
L	Benzo(g,h,i)perylene	40.0000 J
L	Benzo(k)fluoranthene	190.0000 J
L	Chrysene	100.0000 J
L	Endrin aldehyde	0.6800 J
L	Fluoranthene	120.0000 J
L	Heptachlor epoxide	1.4000 J
L	Indeno(1,2,3-cd)pyrene	58.0000 J
L	Pyrene	140.0000 J
L	bis(2-Ethylhexyl)phthalate	150.0000 J
H	1,2,4-Trichlorobenzene	440.0000 U
H	1,2-Dichlorobenzene	440.0000 U
H	1,3-Dichlorobenzene	440.0000 U
H	1,4-Dichlorobenzene	440.0000 U
H	2,2'-oxybis(1-Chloropropane)	440.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U

H	2,4,6-Trichlorophenol	440.0000 U
H	2,4-Dichlorophenol	440.0000 U
H	2,4-Dimethylphenol	440.0000 U
H	2,4-Dinitrophenol	1100.0000 U
H	2,4-Dinitrotoluene	440.0000 U
H	2,6-Dinitrotoluene	440.0000 U
H	2-Chloronaphthalene	440.0000 U
H	2-Chlorophenol	440.0000 U
H	2-Methylnaphthalene	440.0000 U
H	2-Methylphenol	440.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	440.0000 U
H	3,3'-Dichlorobenzidine	440.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	4.4000 U
H	4,4'-DDT	28.0000
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	440.0000 U
H	4-Chloro-3-methylphenol	440.0000 U
H	4-Chloroaniline	440.0000 U
H	4-Chlorophenyl-phenylether	440.0000 U
H	4-Methylphenol	440.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	440.0000 U
H	Acenaphthylene	440.0000 U
H	Anthracene	440.0000 U
H	Aroclor-1016	44.0000 U
H	Aroclor-1221	90.0000 U
H	Aroclor-1232	44.0000 U
H	Aroclor-1242	44.0000 U
H	Aroclor-1248	44.0000 U
H	Aroclor-1254	44.0000 U
H	Aroclor-1260	44.0000 U
H	Arsenic	65.6000
H	Barium	19.5000 J
H	Beryllium	0.1300 U
H	Butylbenzylphthalate	440.0000 U
H	Cadmium	1.9000
H	Calcium	35400.0000
H	Carbazole	440.0000 U
H	Chromium	20.3000 J
H	Copper	43.7000
H	Di-n-butylphthalate	440.0000 U
H	Di-n-octylphthalate	440.0000 U
H	Dibenz(a,h)anthracene	440.0000 U
H	Dibenzofuran	440.0000 U
H	Dieldrin	4.4000 U
H	Diethylphthalate	440.0000 U
H	Dimethylphthalate	440.0000 U
H	Endosulfan I	2.3000 U
H	Endosulfan II	4.4000 U
H	Endosulfan sulfate	4.4000 U
H	Endrin	4.4000 U
H	Endrin ketone	4.4000 U
H	Fluorene	440.0000 U
H	Heptachlor	2.3000 U
H	Hexachlorobenzene	440.0000 U
H	Hexachlorobutadiene	440.0000 U
H	Hexachlorocyclopentadiene	440.0000 U
H	Hexachloroethane	440.0000 U
H	Iron	3090.0000
H	Isophorone	440.0000 U
H	Lead	72.8000
H	Magnesium	666.0000 U
H	Manganese	131.0000
H	Mercury	0.2000 UJ
H	Methoxychlor	23.0000 U
H	N-Nitroso-di-n-propylamine	440.0000 UJ
H	N-Nitrosodiphenylamine (1)	440.0000 U
H	Naphthalene	440.0000 U
H	Nickel	4.4000 J
H	Nitrobenzene	440.0000 U

H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	440.0000 U
H	Phenol	440.0000 U
H	Potassium	175.0000 U
H	Selenium	1.4000
H	Silver	2.5000 J
H	Sodium	243.0000 U
H	Thallium	1.3000 U
H	Toxaphene	230.0000 U
H	Vanadium	4.4000 J
H	Zinc	296.0000 J
H	alpha-BHC	2.3000 U
H	alpha-Chlordane	50.0000 D
H	beta-BHC	2.3000 U
H	bis(2-Chloroethoxy)methane	440.0000 U
H	bis(2-Chloroethyl)ether	440.0000 U
H	delta-BHC	2.3000 U
H	gamma-BHC (Lindane)	2.3000 U
H	gamma-Chlordane	51.0000 D

08S04900 low: 3/13 hi: 80/95

L	Antimony	0.7300 U
L	Benzo(a)anthracene	37.0000 J
L	Benzo(a)pyrene	36.0000 J
L	Benzo(b)fluoranthene	88.0000 J
L	Benzo(k)fluoranthene	89.0000 J
L	Chrysene	45.0000 J
L	Cobalt	0.1800 U
L	Endosulfan I	0.5800 J
L	Endrin aldehyde	1.4000 J
L	Fluoranthene	59.0000 J
L	Potassium	48.2000 U
L	Pyrene	71.0000 J
L	bis(2-Ethylhexyl)phthalate	38.0000 J
H	1,2,4-Trichlorobenzene	430.0000 U
H	1,2-Dichlorobenzene	430.0000 U
H	1,3-Dichlorobenzene	430.0000 U
H	1,4-Dichlorobenzene	430.0000 U
H	2,2'-oxybis(1-Chloropropane)	430.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	430.0000 U
H	2,4-Dichlorophenol	430.0000 U
H	2,4-Dimethylphenol	430.0000 U
H	2,4-Dinitrophenol	1100.0000 U
H	2,4-Dinitrotoluene	430.0000 U
H	2,6-Dinitrotoluene	430.0000 U
H	2-Chloronaphthalene	430.0000 U
H	2-Chlorophenol	430.0000 U
H	2-Methylnaphthalene	430.0000 U
H	2-Methylphenol	430.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	430.0000 U
H	3,3'-Dichlorobenzidine	430.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	36.0000 J
H	4,4'-DDE	96.0000 D
H	4,4'-DDT	27.0000 J
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	430.0000 U
H	4-Chloro-3-methylphenol	430.0000 U
H	4-Chloroaniline	430.0000 U
H	4-Chlorophenyl-phenylether	430.0000 U
H	4-Methylphenol	430.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	430.0000 U
H	Acenaphthylene	430.0000 U
H	Aldrin	2.2000 U
H	Anthracene	430.0000 U
H	Aroclor-1016	43.0000 U
H	Aroclor-1221	88.0000 U
H	Aroclor-1232	43.0000 U

H	Aroclor-1242	43.0000 U
H	Aroclor-1248	43.0000 U
H	Aroclor-1254	43.0000 U
H	Aroclor-1260	43.0000 U
H	Arsenic	14.6000
H	Barium	9.3000 J
H	Benzo(g,h,i)perylene	430.0000 U
H	Butylbenzylphthalate	430.0000 U
H	Cadmium	1.2000 J
H	Carbazole	430.0000 U
H	Chromium	13.5000 J
H	Copper	11.0000
H	Di-n-butylphthalate	430.0000 U
H	Di-n-octylphthalate	430.0000 U
H	Dibenz(a,h)anthracene	430.0000 U
H	Dibenzofuran	430.0000 U
H	Dieldrin	4.3000 U
H	Diethylphthalate	430.0000 U
H	Dimethylphthalate	430.0000 U
H	Endosulfan II	4.3000 U
H	Endosulfan sulfate	4.3000 U
H	Endrin	4.3000 U
H	Fluorene	430.0000 U
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	2.2000 U
H	Hexachlorobenzene	430.0000 U
H	Hexachlorobutadiene	430.0000 U
H	Hexachlorocyclopentadiene	430.0000 U
H	Hexachloroethane	430.0000 U
H	Indeno(1,2,3-cd)pyrene	430.0000 U
H	Isophorone	430.0000 U
H	Lead	21.5000
H	MCPP	99000.0000 J
H	Manganese	48.4000
H	Mercury	0.3600 J
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	430.0000 UJ
H	N-Nitrosodiphenylamine (1)	430.0000 U
H	Naphthalene	430.0000 U
H	Nitrobenzene	430.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	430.0000 U
H	Phenol	430.0000 U
H	Selenium	1.1000 U
H	Silver	7.8000
H	Sodium	259.0000 U
H	Thallium	1.3000 U
H	Toxaphene	220.0000 U
H	Zinc	34.1000 U
H	alpha-BHC	2.2000 U
H	alpha-Chlordane	12.0000
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	430.0000 U
H	bis(2-Chloroethyl)ether	430.0000 U
H	delta-BHC	2.2000 U
H	gamma-BHC (Lindane)	2.2000 U
H	gamma-Chlordane	13.0000

08S05000 low: 3/5 hi: 94/102

L	Antimony	0.6800 U
L	Cadmium	0.1400 U
L	Cobalt	0.1700 U
L	Heptachlor epoxide	0.5400 J
L	Silver	0.3900 J

H	1,2,4-Trichlorobenzene	430.0000 U
H	1,2-Dichlorobenzene	430.0000 U
H	1,3-Dichlorobenzene	430.0000 U
H	1,4-Dichlorobenzene	430.0000 U
H	2,2'-oxybis(1-Chloropropane)	430.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	430.0000 U
H	2,4-Dichlorophenol	430.0000 U

H	2,4-Dimethylphenol	430.0000 U
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	430.0000 U
H	2,6-Dinitrotoluene	430.0000 U
H	2-Chloronaphthalene	430.0000 U
H	2-Chlorophenol	430.0000 U
H	2-Methylnaphthalene	430.0000 U
H	2-Methylphenol	430.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	430.0000 U
H	3,3'-Dichlorobenzidine	430.0000 U
H	3-Nitroaniline	1100.0000 UJ
H	4,4'-DDD	8.6000 U
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	430.0000 U
H	4-Chloro-3-methylphenol	430.0000 U
H	4-Chloroaniline	430.0000 UJ
H	4-Chlorophenyl-phenylether	430.0000 U
H	4-Methylphenol	430.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	430.0000 U
H	Acenaphthylene	430.0000 U
H	Aldrin	4.4000 U
H	Anthracene	430.0000 U
H	Aroclor-1016	86.0000 U
H	Aroclor-1221	170.0000 U
H	Aroclor-1232	86.0000 U
H	Aroclor-1242	86.0000 U
H	Aroclor-1248	86.0000 U
H	Aroclor-1254	86.0000 U
H	Aroclor-1260	86.0000 U
H	Arsenic	4.0000
H	Barium	8.7000 J
H	Benzo(a)anthracene	430.0000 U
H	Benzo(a)pyrene	430.0000 U
H	Benzo(b)fluoranthene	430.0000 U
H	Benzo(g,h,i)perylene	430.0000 U
H	Benzo(k)fluoranthene	430.0000 U
H	Beryllium	0.0600 U
H	Butylbenzylphthalate	430.0000 U
H	Calcium	50400.0000
H	Carbazole	430.0000 U
H	Chromium	14.7000 J
H	Chrysene	430.0000 U
H	Copper	16.9000
H	Di-n-butylphthalate	430.0000 U
H	Di-n-octylphthalate	430.0000 U
H	Dibenz(a,h)anthracene	430.0000 U
H	Dibenzofuran	430.0000 U
H	Dieldrin	8.6000 U
H	Diethylphthalate	430.0000 U
H	Dimethylphthalate	430.0000 U
H	Endosulfan I	4.4000 U
H	Endosulfan II	8.6000 U
H	Endosulfan sulfate	8.6000 U
H	Endrin	8.6000 U
H	Endrin aldehyde	8.6000 U
H	Endrin ketone	8.6000 U
H	Fluoranthene	430.0000 U
H	Fluorene	430.0000 U
H	Heptachlor	4.4000 U
H	Hexachlorobenzene	430.0000 U
H	Hexachlorobutadiene	430.0000 U
H	Hexachlorocyclopentadiene	430.0000 U
H	Hexachloroethane	430.0000 U
H	Indeno(1,2,3-cd)pyrene	430.0000 U
H	Isophorone	430.0000 U
H	Magnesium	485.0000 U
H	Manganese	41.6000
H	Mercury	0.0900 UJ
H	Methoxychlor	44.0000 U
H	N-Nitroso-di-n-propylamine	430.0000 UJ

H	N-Nitrosodiphenylamine (1)	430.0000 U
H	Naphthalene	430.0000 U
H	Nitrobenzene	430.0000 U
H	Pentachlorophenol	1100.0000 UJ
H	Phenanthrene	430.0000 U
H	Phenol	430.0000 UJ
H	Pyrene	430.0000 U
H	Selenium	1.0000 U
H	Sodium	222.0000 U
H	Thallium	1.2000 U
H	Toxaphene	440.0000 U
H	Zinc	87.0000 U
H	alpha-BHC	4.4000 U
H	alpha-Chlordane	100.0000 D
H	beta-BHC	4.4000 U
H	bis(2-Chloroethoxy)methane	430.0000 U
H	bis(2-Chloroethyl)ether	430.0000 U
H	bis(2-Ethylhexyl)phthalate	430.0000 U
H	delta-BHC	4.4000 U
H	gamma-BHC (Lindane)	4.4000 U
H	gamma-Chlordane	100.0000 D

08S05100 low: 5/5 hi: 94/102

L	Antimony	0.7400 U
L	Cadmium	0.0800 U
L	Cobalt	0.1800 U
L	Nickel	1.0000 U
L	Silver	0.2000 U

H	1,2,4-Trichlorobenzene	420.0000 U
H	1,2-Dichlorobenzene	420.0000 U
H	1,3-Dichlorobenzene	420.0000 U
H	1,4-Dichlorobenzene	420.0000 U
H	2,2'-oxybis(1-Chloropropane)	420.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	420.0000 U
H	2,4-Dichlorophenol	420.0000 U
H	2,4-Dimethylphenol	420.0000 U
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	420.0000 U
H	2,6-Dinitrotoluene	420.0000 U
H	2-Chloronaphthalene	420.0000 U
H	2-Chlorophenol	420.0000 U
H	2-Methylnaphthalene	420.0000 U
H	2-Methylphenol	420.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	420.0000 U
H	3,3'-Dichlorobenzidine	420.0000 U
H	3-Nitroaniline	1100.0000 UJ
H	4,4'-DDD	4.2000 U
H	4,6-Dinitro-2-methylphenol	1100.0000 U
H	4-Bromophenyl-phenylether	420.0000 U
H	4-Chloro-3-methylphenol	420.0000 U
H	4-Chloroaniline	420.0000 UJ
H	4-Chlorophenyl-phenylether	420.0000 U
H	4-Methylphenol	420.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	420.0000 U
H	Acenaphthylene	420.0000 U
H	Aldrin	2.2000 U
H	Anthracene	420.0000 U
H	Aroclor-1016	42.0000 U
H	Aroclor-1221	86.0000 U
H	Aroclor-1232	42.0000 U
H	Aroclor-1242	42.0000 U
H	Aroclor-1248	42.0000 U
H	Aroclor-1254	42.0000 U
H	Aroclor-1260	42.0000 U
H	Arsenic	3.4000
H	Benzo(a)anthracene	420.0000 U
H	Benzo(a)pyrene	420.0000 U
H	Benzo(b)fluoranthene	420.0000 U

H	Benzo(g,h,i)perylene	420.0000 U
H	Benzo(k)fluoranthene	420.0000 U
H	Beryllium	0.0600 U
H	Butylbenzylphthalate	420.0000 U
H	Calcium	172000.0000
H	Carbazole	420.0000 U
H	Chromium	6.8000 J
H	Chrysene	420.0000 U
H	Copper	6.4000
H	Di-n-octylphthalate	420.0000 U
H	Dibenz(a,h)anthracene	420.0000 U
H	Dibenzofuran	420.0000 U
H	Dieldrin	4.2000 U
H	Diethylphthalate	420.0000 U
H	Dimethylphthalate	420.0000 U
H	Endosulfan I	2.2000 U
H	Endosulfan II	4.2000 U
H	Endosulfan sulfate	4.2000 U
H	Endrin	4.2000 U
H	Endrin aldehyde	4.2000 U
H	Endrin ketone	4.2000 U
H	Fluoranthene	420.0000 U
H	Fluorene	420.0000 U
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	2.2000 U
H	Hexachlorobenzene	420.0000 UJ
H	Hexachlorobutadiene	420.0000 U
H	Hexachlorocyclopentadiene	420.0000 U
H	Hexachloroethane	420.0000 U
H	Indeno(1,2,3-cd)pyrene	420.0000 U
H	Isophorone	420.0000 U
H	Magnesium	1240.0000 U
H	Manganese	49.0000
H	Mercury	0.0800 UJ
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	420.0000 UJ
H	N-Nitrosodiphenylamine (1)	420.0000 U
H	Naphthalene	420.0000 U
H	Nitrobenzene	420.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	420.0000 U
H	Phenol	420.0000 UJ
H	Pyrene	420.0000 U
H	Selenium	1.1000 U
H	Sodium	274.0000 U
H	Thallium	1.3000 U
H	Toxaphene	220.0000 U
H	Vanadium	3.6000 J
H	Zinc	35.2000 U
H	alpha-BHC	2.2000 U
H	alpha-Chlordane	11.0000
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	420.0000 U
H	bis(2-Chloroethyl)ether	420.0000 U
H	bis(2-Ethylhexyl)phthalate	420.0000 U
H	delta-BHC	2.2000 U
H	gamma-BHC (Lindane)	2.2000 U
H	gamma-Chlordane	11.0000

08S05100D low: 5/6 hi: 81/89

L	Antimony	0.7000 U
L	Cadmium	0.0700 U
L	Cobalt	0.1700 U
L	Dieldrin	0.6900 J
L	Nickel	1.2000 U
L	Silver	0.1900 U

H	1,2,4-Trichlorobenzene	400.0000 UJ
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U

H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U
H	2,4-Dinitrophenol	1000.0000 UJ
H	2,4-Dinitrotoluene	400.0000 U
H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U
H	2-Methylnaphthalene	400.0000 U
H	2-Methylphenol	400.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	400.0000 U
H	3,3'-Dichlorobenzidine	400.0000 U
H	3-Nitroaniline	1000.0000 UJ
H	4,6-Dinitro-2-methylphenol	1000.0000 U
H	4-Bromophenyl-phenylether	400.0000 U
H	4-Chloro-3-methylphenol	400.0000 U
H	4-Chloroaniline	400.0000 UJ
H	4-Chlorophenyl-phenylether	400.0000 U
H	4-Methylphenol	400.0000 U
H	4-Nitroaniline	1000.0000 U
H	4-Nitrophenol	1000.0000 UJ
H	Acenaphthene	400.0000 U
H	Acenaphthylene	400.0000 U
H	Aldrin	2.1000 U
H	Anthracene	400.0000 U
H	Aroclor-1221	82.0000 U
H	Arsenic	2.4000
H	Benzo(a)anthracene	400.0000 U
H	Benzo(a)pyrene	400.0000 U
H	Benzo(b)fluoranthene	400.0000 U
H	Benzo(g,h,i)perylene	400.0000 U
H	Benzo(k)fluoranthene	400.0000 U
H	Beryllium	0.0600 U
H	Butylbenzylphthalate	400.0000 U
H	Calcium	114000.0000 J
H	Carbazole	400.0000 UJ
H	Chromium	5.7000
H	Chrysene	400.0000 U
H	Copper	6.8000
H	Di-n-octylphthalate	400.0000 U
H	Dibenz(a,h)anthracene	400.0000 U
H	Dibenzofuran	400.0000 U
H	Diethylphthalate	400.0000 U
H	Dimethylphthalate	400.0000 U
H	Endosulfan I	2.1000 U
H	Fluoranthene	400.0000 U
H	Fluorene	400.0000 U
H	Heptachlor	2.1000 U
H	Heptachlor epoxide	2.1000 U
H	Hexachlorobenzene	400.0000 U
H	Hexachlorobutadiene	400.0000 U
H	Hexachlorocyclopentadiene	400.0000 U
H	Hexachloroethane	400.0000 U
H	Indeno(1,2,3-cd)pyrene	400.0000 U
H	Isophorone	400.0000 U
H	Magnesium	804.0000 U
H	Manganese	43.7000
H	Methoxychlor	21.0000 U
H	N-Nitroso-di-n-propylamine	400.0000 U
H	N-Nitrosodiphenylamine (1)	400.0000 U
H	Naphthalene	400.0000 U
H	Nitrobenzene	400.0000 U
H	Pentachlorophenol	1000.0000 UJ
H	Phenanthrene	400.0000 U
H	Phenol	400.0000 U
H	Potassium	82.5000 U
H	Pyrene	400.0000 U
H	Selenium	1.1000 U
H	Sodium	211.0000 U
H	Thallium	1.2000 U
H	Toxaphene	210.0000 U
H	Vanadium	3.4000 J

H	Zinc	42.2000 U
H	alpha-BHC	2.1000 U
H	alpha-Chlordane	10.0000
H	beta-BHC	2.1000 U
H	bis(2-Chloroethoxy)methane	400.0000 U
H	bis(2-Chloroethyl)ether	400.0000 UJ
H	bis(2-Ethylhexyl)phthalate	400.0000 U
H	delta-BHC	2.1000 U
H	gamma-BHC (Lindane)	2.1000 U
H	gamma-Chlordane	11.0000

08S05200 low: 5/16 hi: 71/76

L	Antimony	0.6800 U
L	Benzo(a)anthracene	76.0000 J
L	Benzo(a)pyrene	61.0000 J
L	Benzo(b)fluoranthene	120.0000 J
L	Benzo(g,h,i)perylene	42.0000 J
L	Benzo(k)fluoranthene	110.0000 J
L	Cadmium	0.0700 U
L	Chrysene	56.0000 J
L	Cobalt	0.1600 U
L	Endosulfan sulfate	1.0000 J
L	Fluoranthene	81.0000 J
L	Indeno(1,2,3-cd)pyrene	38.0000 J
L	Nickel	0.8200 U
L	Potassium	39.3000 U
L	Pyrene	83.0000 J
L	alpha-Chlordane	1.0000 J
H	1,2,4-Trichlorobenzene	400.0000 UJ
H	1,2-Dichlorobenzene	400.0000 U
H	1,3-Dichlorobenzene	400.0000 U
H	1,4-Dichlorobenzene	400.0000 U
H	2,2'-oxybis(1-Chloropropane)	400.0000 U
H	2,4,5-Trichlorophenol	1000.0000 U
H	2,4,6-Trichlorophenol	400.0000 U
H	2,4-Dichlorophenol	400.0000 U
H	2,4-Dimethylphenol	400.0000 U
H	2,4-Dinitrophenol	1000.0000 UJ
H	2,4-Dinitrotoluene	400.0000 U
H	2,6-Dinitrotoluene	400.0000 U
H	2-Chloronaphthalene	400.0000 U
H	2-Chlorophenol	400.0000 U
H	2-Methylnaphthalene	400.0000 U
H	2-Methylphenol	400.0000 U
H	2-Nitroaniline	1000.0000 U
H	2-Nitrophenol	400.0000 U
H	3,3'-Dichlorobenzidine	400.0000 U
H	3-Nitroaniline	1000.0000 UJ
H	4,6-Dinitro-2-methylphenol	1000.0000 U
H	4-Bromophenyl-phenylether	400.0000 U
H	4-Chloro-3-methylphenol	400.0000 U
H	4-Chloroaniline	400.0000 UJ
H	4-Chlorophenyl-phenylether	400.0000 U
H	4-Methylphenol	400.0000 U
H	4-Nitroaniline	1000.0000 UJ
H	4-Nitrophenol	1000.0000 U
H	Acenaphthene	400.0000 U
H	Acenaphthylene	400.0000 U
H	Aldrin	2.1000 U
H	Anthracene	400.0000 U
H	Aroclor-1221	82.0000 U
H	Arsenic	1.8000 J
H	Beryllium	0.0600 U
H	Butylbenzylphthalate	400.0000 U
H	Calcium	37400.0000 J
H	Carbazole	400.0000 UJ
H	Chromium	5.5000
H	Copper	5.3000 J
H	Di-n-octylphthalate	400.0000 U
H	Dibenz(a,h)anthracene	400.0000 U
H	Dibenzofuran	400.0000 U
H	Diethylphthalate	400.0000 U

H	Dimethylphthalate	400.0000 U
H	Endosulfan I	2.1000 U
H	Fluorene	400.0000 U
H	Heptachlor	2.1000 U
H	Heptachlor epoxide	2.1000 U
H	Hexachlorobenzene	400.0000 U
H	Hexachlorobutadiene	400.0000 U
H	Hexachlorocyclopentadiene	400.0000 U
H	Hexachloroethane	400.0000 U
H	Isophorone	400.0000 U
H	Magnesium	302.0000 U
H	Manganese	44.5000
H	Methoxychlor	21.0000 U
H	N-Nitroso-di-n-propylamine	400.0000 U
H	N-Nitrosodiphenylamine (1)	400.0000 U
H	Naphthalene	400.0000 U
H	Nitrobenzene	400.0000 U
H	Pentachlorophenol	1000.0000 UJ
H	Phenanthrene	400.0000 U
H	Phenol	400.0000 U
H	Selenium	1.0000 U
H	Sodium	122.0000 U
H	Thallium	1.2000 U
H	Toxaphene	210.0000 U
H	Zinc	40.0000 U
H	alpha-BHC	2.1000 U
H	beta-BHC	2.1000 U
H	bis(2-Chloroethoxy)methane	400.0000 U
H	bis(2-Chloroethyl)ether	400.0000 UJ
H	bis(2-Ethylhexyl)phthalate	400.0000 U
H	delta-BHC	2.1000 U
H	gamma-BHC (Lindane)	2.1000 U

08S05301 low: 5/18 hi: 58/62

L	Antimony	0.5400 U
L	Benzo(a)pyrene	270.0000 J
L	Benzo(g,h,i)perylene	120.0000 J
L	Benzo(k)fluoranthene	280.0000 J
L	Cadmium	0.0600 U
L	Chrysene	310.0000 J
L	Cobalt	0.1700 U
L	Dibenz(a,h)anthracene	85.0000 J
L	Dieldrin	0.3300 J
L	Heptachlor	0.2300 J
L	Indeno(1,2,3-cd)pyrene	160.0000 J
L	Methoxychlor	1.4000 J
L	Nickel	0.6200 J
L	Phenanthrene	130.0000 J
L	Potassium	21.4000 U
L	Silver	0.1500 U
L	bis(2-Ethylhexyl)phthalate	69.0000 J
L	gamma-Chlordane	0.8200 J
H	1,2,4-Trichlorobenzene	380.0000 U
H	1,2-Dichlorobenzene	380.0000 U
H	1,3-Dichlorobenzene	380.0000 U
H	1,4-Dichlorobenzene	380.0000 U
H	2,2'-oxybis(1-Chloropropane)	380.0000 UJ
H	2,4,5-Trichlorophenol	960.0000 U
H	2,4,6-Trichlorophenol	380.0000 U
H	2,4-Dichlorophenol	380.0000 U
H	2,4-Dimethylphenol	380.0000 U
H	2,4-Dinitrophenol	960.0000 UJ
H	2,4-Dinitrotoluene	380.0000 U
H	2,6-Dinitrotoluene	380.0000 U
H	2-Chloronaphthalene	380.0000 U
H	2-Chlorophenol	380.0000 U
H	2-Methylnaphthalene	380.0000 U
H	2-Methylphenol	380.0000 U
H	2-Nitroaniline	960.0000 U
H	2-Nitrophenol	380.0000 U
H	3,3'-Dichlorobenzidine	380.0000 U
H	3-Nitroaniline	960.0000 U

H	4,6-Dinitro-2-methylphenol	960.0000 UJ
H	4-Bromophenyl-phenylether	380.0000 U
H	4-Chloro-3-methylphenol	380.0000 U
H	4-Chloroaniline	380.0000 U
H	4-Chlorophenyl-phenylether	380.0000 U
H	4-Methylphenol	380.0000 U
H	4-Nitroaniline	960.0000 U
H	4-Nitrophenol	960.0000 U
H	Acenaphthene	380.0000 U
H	Acenaphthylene	380.0000 U
H	Anthracene	380.0000 U
H	Arsenic	5.3000
H	Beryllium	0.0800 U
H	Butylbenzylphthalate	380.0000 U
H	Calcium	14600.0000 U
H	Carbazole	380.0000 U
H	Copper	7.0000
H	Di-n-octylphthalate	380.0000 U
H	Dibenzofuran	380.0000 U
H	Diethylphthalate	380.0000 U
H	Dimethylphthalate	380.0000 U
H	Fluoranthene	700.0000
H	Fluorene	380.0000 U
H	Hexachlorobenzene	380.0000 U
H	Hexachlorobutadiene	380.0000 U
H	Hexachlorocyclopentadiene	380.0000 U
H	Hexachloroethane	380.0000 U
H	Isophorone	380.0000 U
H	Manganese	15.1000 U
H	N-Nitroso-di-n-propylamine	380.0000 U
H	N-Nitrosodiphenylamine (1)	380.0000 U
H	Naphthalene	380.0000 U
H	Nitrobenzene	380.0000 U
H	Pentachlorophenol	960.0000 U
H	Phenol	380.0000 U
H	Pyrene	460.0000
H	Selenium	0.7800 U
H	Sodium	99.6000 U
H	Thallium	0.9000 U
H	Zinc	31.3000 U
H	bis(2-Chloroethoxy)methane	380.0000 U
H	bis(2-Chloroethyl)ether	380.0000 U

08S05401 low: 3/12 hi: 70/82

L	Antimony	0.5900 U
L	Benzo(a)pyrene	50.0000 J
L	Benzo(b)fluoranthene	82.0000 J
L	Benzo(k)fluoranthene	110.0000 J
L	Chrysene	43.0000 J
L	Cobalt	0.1900 U
L	Endrin aldehyde	1.4000 J
L	Endrin ketone	1.2000 J
L	Fluoranthene	51.0000 J
L	Potassium	18.7000 U
L	Pyrene	51.0000 J
L	bis(2-Ethylhexyl)phthalate	170.0000 J
H	1,2,4-Trichlorobenzene	390.0000 U
H	1,2-Dichlorobenzene	390.0000 U
H	1,3-Dichlorobenzene	390.0000 U
H	1,4-Dichlorobenzene	390.0000 U
H	2,2'-oxybis(1-Chloropropane)	390.0000 UJ
H	2,4,5-Trichlorophenol	970.0000 U
H	2,4,6-Trichlorophenol	390.0000 U
H	2,4-Dichlorophenol	390.0000 U
H	2,4-Dimethylphenol	390.0000 U
H	2,4-Dinitrophenol	970.0000 UJ
H	2,4-Dinitrotoluene	390.0000 U
H	2,6-Dinitrotoluene	390.0000 U
H	2-Chloronaphthalene	390.0000 U
H	2-Chlorophenol	390.0000 U
H	2-Methylnaphthalene	390.0000 U
H	2-Methylphenol	390.0000 U

H	2-Nitroaniline	970.0000 U
H	2-Nitrophenol	390.0000 U
H	3,3'-Dichlorobenzidine	390.0000 U
H	3-Nitroaniline	970.0000 U
H	4,4'-DDE	160.0000 D
H	4,6-Dinitro-2-methylphenol	970.0000 UJ
H	4-Bromophenyl-phenylether	390.0000 U
H	4-Chloro-3-methylphenol	390.0000 U
H	4-Chloroaniline	390.0000 U
H	4-Chlorophenyl-phenylether	390.0000 U
H	4-Methylphenol	390.0000 U
H	4-Nitroaniline	970.0000 U
H	4-Nitrophenol	970.0000 U
H	Acenaphthene	390.0000 U
H	Acenaphthylene	390.0000 U
H	Aldrin	2.0000 U
H	Anthracene	390.0000 U
H	Arsenic	14.6000
H	Barium	14.7000 J
H	Benzo(a)anthracene	390.0000 U
H	Benzo(g,h,i)perylene	390.0000 U
H	Beryllium	0.1200 U
H	Butylbenzylphthalate	390.0000 U
H	Cadmium	2.1000
H	Carbazole	390.0000 U
H	Chromium	38.8000
H	Copper	24.5000
H	Di-n-octylphthalate	390.0000 U
H	Dibenz(a,h)anthracene	390.0000 U
H	Dibenzofuran	390.0000 U
H	Diethylphthalate	390.0000 U
H	Dimethylphthalate	390.0000 U
H	Endosulfan I	2.0000 U
H	Fluorene	390.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	9.7000
H	Hexachlorobenzene	390.0000 U
H	Hexachlorobutadiene	390.0000 U
H	Hexachlorocyclopentadiene	390.0000 U
H	Hexachloroethane	390.0000 U
H	Indeno(1,2,3-cd)pyrene	390.0000 U
H	Isophorone	390.0000 U
H	Mercury	0.1400
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	390.0000 U
H	N-Nitrosodiphenylamine (1)	390.0000 U
H	Naphthalene	390.0000 U
H	Nickel	3.3000 J
H	Nitrobenzene	390.0000 U
H	Pentachlorophenol	970.0000 U
H	Phenanthrene	390.0000 U
H	Phenol	390.0000 U
H	Selenium	0.8500 U
H	Silver	2.3000 J
H	Sodium	148.0000 U
H	Thallium	1.0000 U
H	Toxaphene	200.0000 U
H	Zinc	39.5000 U
H	alpha-BHC	2.0000 U
H	alpha-Chlordane	7.7000 J
H	beta-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	390.0000 U
H	bis(2-Chloroethyl)ether	390.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U
H	gamma-Chlordane	6.0000

08S05501 low: 3/15 hi: 84/93

L	Antimony	1.2000 J
L	Benzo(a)anthracene	48.0000 J
L	Benzo(b)fluoranthene	72.0000 J
L	Benzo(k)fluoranthene	93.0000 J
L	Cadmium	0.1100 U

L	Cobalt	0.2100 U
L	Dieldrin	2.6000 J
L	Endrin aldehyde	0.5400 J
L	Fluoranthene	110.0000 J
L	Heptachlor epoxide	0.2400 J
L	Nickel	0.9400 J
L	Pyrene	67.0000 J
L	Silver	0.1800 U
L	bis(2-Ethylhexyl)phthalate	51.0000 J
L	gamma-BHC (Lindane)	0.2200 J
H	1,2,4-Trichlorobenzene	470.0000 U
H	1,2-Dichlorobenzene	470.0000 U
H	1,3-Dichlorobenzene	470.0000 U
H	1,4-Dichlorobenzene	470.0000 U
H	2,2'-oxybis(1-Chloropropane)	470.0000 UJ
H	2,4,5-Trichlorophenol	1200.0000 U
H	2,4,6-Trichlorophenol	470.0000 U
H	2,4-Dichlorophenol	470.0000 U
H	2,4-Dimethylphenol	470.0000 U
H	2,4-Dinitrophenol	1200.0000 UJ
H	2,4-Dinitrotoluene	470.0000 U
H	2,6-Dinitrotoluene	470.0000 U
H	2-Chloronaphthalene	470.0000 U
H	2-Chlorophenol	470.0000 U
H	2-Methylnaphthalene	470.0000 U
H	2-Methylphenol	470.0000 U
H	2-Nitroaniline	1200.0000 U
H	2-Nitrophenol	470.0000 U
H	3,3'-Dichlorobenzidine	470.0000 U
H	3-Nitroaniline	1200.0000 U
H	4,4'-DDD	6.8000 J
H	4,4'-DDE	28.0000
H	4,4'-DDT	18.0000
H	4,6-Dinitro-2-methylphenol	1200.0000 UJ
H	4-Bromophenyl-phenylether	470.0000 U
H	4-Chloro-3-methylphenol	470.0000 U
H	4-Chloroaniline	470.0000 U
H	4-Chlorophenyl-phenylether	470.0000 U
H	4-Methylphenol	470.0000 U
H	4-Nitroaniline	1200.0000 U
H	4-Nitrophenol	1200.0000 U
H	Acenaphthene	470.0000 U
H	Acenaphthylene	470.0000 U
H	Aldrin	2.4000 U
H	Anthracene	470.0000 U
H	Aroclor-1016	46.0000 U
H	Aroclor-1221	94.0000 U
H	Aroclor-1232	46.0000 U
H	Aroclor-1242	46.0000 U
H	Aroclor-1248	46.0000 U
H	Aroclor-1254	46.0000 U
H	Aroclor-1260	46.0000 U
H	Arsenic	2.5000 J
H	Barium	8.6000 U
H	Benzo(a)pyrene	470.0000 U
H	Benzo(g,h,i)perylene	470.0000 U
H	Beryllium	0.1400 J
H	Butylbenzylphthalate	470.0000 U
H	Carbazole	470.0000 U
H	Chrysene	470.0000 U
H	Copper	23.5000
H	Di-n-butylphthalate	470.0000 U
H	Di-n-octylphthalate	470.0000 U
H	Dibenz(a,h)anthracene	470.0000 U
H	Dibenzofuran	470.0000 U
H	Diethylphthalate	470.0000 U
H	Dimethylphthalate	470.0000 U
H	Endosulfan I	2.4000 U
H	Endosulfan II	4.6000 U
H	Endosulfan sulfate	4.6000 U
H	Endrin	4.6000 U
H	Endrin ketone	4.6000 U

H	Fluorene	470.0000 U
H	Heptachlor	2.4000 U
H	Hexachlorobenzene	470.0000 U
H	Hexachlorobutadiene	470.0000 U
H	Hexachlorocyclopentadiene	470.0000 U
H	Hexachloroethane	470.0000 U
H	Indeno(1,2,3-cd)pyrene	470.0000 U
H	Isophorone	470.0000 U
H	Lead	83.0000
H	Magnesium	286.0000 U
H	Mercury	0.0800 J
H	Methoxychlor	24.0000 U
H	N-Nitroso-di-n-propylamine	470.0000 U
H	N-Nitrosodiphenylamine (1)	470.0000 U
H	Naphthalene	470.0000 U
H	Nitrobenzene	470.0000 U
H	Pentachlorophenol	1200.0000 U
H	Phenanthrene	470.0000 U
H	Phenol	470.0000 U
H	Potassium	195.0000 U
H	Selenium	0.9200 U
H	Sodium	172.0000 U
H	Thallium	1.1000 U
H	Toxaphene	240.0000 U
H	Zinc	13.9000 U
H	alpha-BHC	2.4000 U
H	alpha-Chlordane	2.6000
H	beta-BHC	2.4000 U
H	bis(2-Chloroethoxy)methane	470.0000 U
H	bis(2-Chloroethyl)ether	470.0000 U
H	delta-BHC	2.4000 U

08S05601 low: 3/12 hi: 86/98

L	Antimony	2.7000 U
L	Cadmium	0.1500 U
L	Cobalt	0.4000 U
L	Dieldrin	2.0000 J
L	Endosulfan sulfate	1.7000 J
L	Fluoranthene	88.0000 J
L	Heptachlor epoxide	0.2400 J
L	Methoxychlor	7.6000 J
L	Nickel	1.5000 J
L	alpha-BHC	0.2800 J
L	bis(2-Ethylhexyl)phthalate	140.0000 J
L	gamma-Chlordane	0.8000 J

H	1,2,4-Trichlorobenzene	820.0000 U
H	1,2-Dichlorobenzene	820.0000 U
H	1,3-Dichlorobenzene	820.0000 U
H	1,4-Dichlorobenzene	820.0000 U
H	2,2'-oxybis(1-Chloropropane)	820.0000 UJ
H	2,4,5-Trichlorophenol	2100.0000 U
H	2,4,6-Trichlorophenol	820.0000 U
H	2,4-Dichlorophenol	820.0000 U
H	2,4-Dimethylphenol	820.0000 U
H	2,4-Dinitrophenol	2100.0000 UJ
H	2,4-Dinitrotoluene	820.0000 U
H	2,6-Dinitrotoluene	820.0000 U
H	2-Chloronaphthalene	820.0000 U
H	2-Chlorophenol	820.0000 U
H	2-Methylnaphthalene	820.0000 U
H	2-Methylphenol	820.0000 U
H	2-Nitroaniline	2100.0000 U
H	2-Nitrophenol	820.0000 U
H	3,3'-Dichlorobenzidine	820.0000 U
H	3-Nitroaniline	2100.0000 U
H	4,4'-DDD	8.2000 U
H	4,4'-DDE	32.0000
H	4,6-Dinitro-2-methylphenol	2100.0000 UJ
H	4-Bromophenyl-phenylether	820.0000 U
H	4-Chloro-3-methylphenol	820.0000 U
H	4-Chloroaniline	820.0000 U
H	4-Chlorophenyl-phenylether	820.0000 U

H	4-Methylphenol	820.0000 U
H	4-Nitroaniline	2100.0000 U
H	4-Nitrophenol	2100.0000 U
H	Acenaphthene	820.0000 U
H	Acenaphthylene	820.0000 U
H	Aldrin	4.2000 U
H	Aluminum	3250.0000
H	Anthracene	820.0000 U
H	Aroclor-1016	82.0000 U
H	Aroclor-1221	170.0000 U
H	Aroclor-1232	82.0000 U
H	Aroclor-1242	82.0000 U
H	Aroclor-1248	82.0000 U
H	Aroclor-1254	82.0000 U
H	Aroclor-1260	82.0000 U
H	Arsenic	8.6000
H	Barium	15.5000 J
H	Benzo(a)anthracene	820.0000 U
H	Benzo(a)pyrene	820.0000 U
H	Benzo(b)fluoranthene	820.0000 U
H	Benzo(g,h,i)perylene	820.0000 U
H	Benzo(k)fluoranthene	820.0000 U
H	Beryllium	0.4700 U
H	Butylbenzylphthalate	820.0000 U
H	Carbazole	820.0000 U
H	Chrysene	820.0000 U
H	Copper	8.0000 J
H	Di-n-butylphthalate	820.0000 U
H	Di-n-octylphthalate	820.0000 U
H	Dibenz(a,h)anthracene	820.0000 U
H	Dibenzofuran	820.0000 U
H	Diethylphthalate	820.0000 U
H	Dimethylphthalate	820.0000 U
H	Endosulfan I	4.2000 U
H	Endosulfan II	5.9000 J
H	Endrin	8.2000 U
H	Endrin aldehyde	8.2000 U
H	Endrin ketone	8.2000 U
H	Fluorene	820.0000 U
H	Heptachlor	4.2000 U
H	Hexachlorobenzene	820.0000 U
H	Hexachlorobutadiene	820.0000 U
H	Hexachlorocyclopentadiene	820.0000 U
H	Hexachloroethane	820.0000 U
H	Indeno(1,2,3-cd)pyrene	820.0000 U
H	Iron	1000.0000 J
H	Isophorone	820.0000 U
H	Lead	144.0000
H	Magnesium	514.0000 U
H	Manganese	13.3000 U
H	Mercury	0.1100 J
H	N-Nitroso-di-n-propylamine	820.0000 U
H	N-Nitrosodiphenylamine (1)	820.0000 U
H	Naphthalene	820.0000 U
H	Nitrobenzene	820.0000 U
H	Pentachlorophenol	2100.0000 U
H	Phenanthrene	820.0000 U
H	Phenol	820.0000 U
H	Pyrene	820.0000 U
H	Selenium	1.8000 U
H	Sodium	317.0000 U
H	Thallium	2.1000 U
H	Toxaphene	420.0000 U
H	Vanadium	3.9000 J
H	Zinc	81.3000 J
H	alpha-Chlordane	17.0000 J
H	beta-BHC	4.2000 U
H	bis(2-Chloroethoxy)methane	820.0000 U
H	bis(2-Chloroethyl)ether	820.0000 U
H	delta-BHC	4.2000 U
H	gamma-BHC (Lindane)	4.2000 U

08S05701 low: 5/13 hi: 77/90

L	Acenaphthylene	140.0000 J
L	Antimony	0.7000 U
L	Benzo(g,h,i)perylene	260.0000 J
L	Cadmium	0.0800 U
L	Carbazole	260.0000 J
L	Cobalt	0.2200 U
L	Dibenz(a,h)anthracene	280.0000 J
L	Dieldrin	0.2900 J
L	Nickel	0.4600 J
L	Potassium	32.7000 U
L	Silver	0.2000 U
L	alpha-Chlordane	0.1900 J
L	bis(2-Ethylhexyl)phthalate	54.0000 J
H	1,2,4-Trichlorobenzene	470.0000 U
H	1,2-Dichlorobenzene	470.0000 U
H	1,3-Dichlorobenzene	470.0000 U
H	1,4-Dichlorobenzene	470.0000 U
H	2,2'-oxybis(1-Chloropropane)	470.0000 U
H	2,4,5-Trichlorophenol	1200.0000 U
H	2,4,6-Trichlorophenol	470.0000 U
H	2,4-Dichlorophenol	470.0000 U
H	2,4-Dimethylphenol	470.0000 U
H	2,4-Dinitrophenol	1200.0000 U
H	2,4-Dinitrotoluene	470.0000 U
H	2,6-Dinitrotoluene	470.0000 U
H	2-Chloronaphthalene	470.0000 U
H	2-Chlorophenol	470.0000 U
H	2-Methylnaphthalene	470.0000 U
H	2-Methylphenol	470.0000 U
H	2-Nitroaniline	1200.0000 U
H	2-Nitrophenol	470.0000 U
H	3,3'-Dichlorobenzidine	470.0000 U
H	3-Nitroaniline	1200.0000 U
H	4,4'-DDD	4.7000 U
H	4,6-Dinitro-2-methylphenol	1200.0000 U
H	4-Bromophenyl-phenylether	470.0000 U
H	4-Chloro-3-methylphenol	470.0000 U
H	4-Chloroaniline	470.0000 U
H	4-Chlorophenyl-phenylether	470.0000 U
H	4-Methylphenol	470.0000 U
H	4-Nitroaniline	1200.0000 U
H	4-Nitrophenol	1200.0000 U
H	Acenaphthene	470.0000 U
H	Aldrin	2.4000 U
H	Anthracene	540.0000
H	Aroclor-1016	47.0000 U
H	Aroclor-1221	96.0000 U
H	Aroclor-1232	47.0000 U
H	Aroclor-1242	47.0000 U
H	Aroclor-1248	47.0000 U
H	Aroclor-1254	47.0000 U
H	Aroclor-1260	47.0000 U
H	Benzo(a)anthracene	1300.0000
H	Benzo(a)pyrene	1100.0000
H	Benzo(b)fluoranthene	3700.0000 J
H	Benzo(k)fluoranthene	3700.0000 J
H	Beryllium	0.1000 U
H	Butylbenzylphthalate	470.0000 U
H	Chrysene	1900.0000
H	Di-n-butylphthalate	470.0000 U
H	Di-n-octylphthalate	470.0000 U
H	Dibenzofuran	470.0000 U
H	Diethylphthalate	470.0000 U
H	Dimethylphthalate	470.0000 U
H	Endosulfan I	2.4000 U
H	Endosulfan II	4.2000 J
H	Endosulfan sulfate	4.7000 U
H	Endrin	6.3000 J
H	Endrin aldehyde	4.7000 U
H	Endrin ketone	4.7000 U
H	Fluoranthene	2600.0000
H	Fluorene	470.0000 U

H	Heptachlor	2.4000 U
H	Heptachlor epoxide	2.4000 U
H	Hexachlorobenzene	470.0000 U
H	Hexachlorobutadiene	470.0000 U
H	Hexachlorocyclopentadiene	470.0000 U
H	Hexachloroethane	470.0000 U
H	Indeno(1,2,3-cd)pyrene	460.0000 J
H	Isophorone	470.0000 U
H	Magnesium	229.0000 U
H	Manganese	13.5000 U
H	Methoxychlor	87.0000 J
H	N-Nitroso-di-n-propylamine	470.0000 U
H	N-Nitrosodiphenylamine (1)	470.0000 U
H	Naphthalene	470.0000 U
H	Nitrobenzene	470.0000 U
H	Pentachlorophenol	1200.0000 U
H	Phenanthrene	470.0000 U
H	Phenol	470.0000 U
H	Pyrene	2600.0000
H	Selenium	1.0000 U
H	Sodium	379.0000 U
H	Thallium	1.2000 U
H	Toxaphene	240.0000 U
H	Zinc	17.6000 U
H	alpha-BHC	2.4000 U
H	beta-BHC	2.4000 U
H	bis(2-Chloroethoxy)methane	470.0000 U
H	bis(2-Chloroethyl)ether	470.0000 U
H	delta-BHC	2.4000 U
H	gamma-BHC (Lindane)	3.2000 J
H	gamma-Chlordane	2.4000 U

08S05801 low: 0/8 hi: 88/103

L	4,4'-DDD	1.6000 J
L	Dieldrin	1.7000 J
L	Endosulfan II	1.2000 J
L	Endosulfan sulfate	2.7000 J
L	Endrin ketone	2.6000 J
L	Heptachlor epoxide	1.4000 J
L	alpha-BHC	1.3000 J
L	bis(2-Ethylhexyl)phthalate	230.0000 J
H	1,2,4-Trichlorobenzene	1400.0000 U
H	1,2-Dichlorobenzene	1400.0000 U
H	1,3-Dichlorobenzene	1400.0000 U
H	1,4-Dichlorobenzene	1400.0000 U
H	2,2'-oxybis(1-Chloropropane)	1400.0000 UJ
H	2,4,5-Trichlorophenol	3600.0000 U
H	2,4,6-Trichlorophenol	1400.0000 U
H	2,4-Dichlorophenol	1400.0000 U
H	2,4-Dimethylphenol	1400.0000 U
H	2,4-Dinitrophenol	3600.0000 UJ
H	2,4-Dinitrotoluene	1400.0000 U
H	2,6-Dinitrotoluene	1400.0000 U
H	2-Chloronaphthalene	1400.0000 U
H	2-Chlorophenol	1400.0000 U
H	2-Methylnaphthalene	1400.0000 U
H	2-Methylphenol	1400.0000 U
H	2-Nitroaniline	3600.0000 U
H	2-Nitrophenol	1400.0000 U
H	3,3'-Dichlorobenzidine	1400.0000 U
H	3-Nitroaniline	3600.0000 U
H	4,6-Dinitro-2-methylphenol	3600.0000 UJ
H	4-Bromophenyl-phenylether	1400.0000 U
H	4-Chloro-3-methylphenol	1400.0000 U
H	4-Chloroaniline	1400.0000 U
H	4-Chlorophenyl-phenylether	1400.0000 U
H	4-Methylphenol	1400.0000 U
H	4-Nitroaniline	3600.0000 U
H	4-Nitrophenol	3600.0000 U
H	Acenaphthene	1400.0000 U
H	Acenaphthylene	1400.0000 U
H	Aldrin	7.4000 U

H	Aluminum	9130.0000
H	Anthracene	1400.0000 U
H	Antimony	16.3000 J
H	Aroclor-1016	140.0000 U
H	Aroclor-1221	290.0000 U
H	Aroclor-1232	140.0000 U
H	Aroclor-1242	140.0000 U
H	Aroclor-1248	140.0000 U
H	Aroclor-1254	140.0000 U
H	Aroclor-1260	140.0000 U
H	Arsenic	2.9000 J
H	Barium	23.2000 J
H	Benzo(a)anthracene	1400.0000 U
H	Benzo(a)pyrene	1400.0000 U
H	Benzo(b)fluoranthene	1400.0000 U
H	Benzo(g,h,i)perylene	1400.0000 U
H	Benzo(k)fluoranthene	1400.0000 U
H	Beryllium	2.0000 J
H	Butylbenzylphthalate	1400.0000 U
H	Cadmium	2.5000 J
H	Calcium	15300.0000 U
H	Carbazole	1400.0000 U
H	Chromium	6.5000 J
H	Chrysene	1400.0000 U
H	Cobalt	0.6400 U
H	Copper	17.4000 J
H	Di-n-butylphthalate	1400.0000 U
H	Di-n-octylphthalate	1400.0000 U
H	Dibenz(a,h)anthracene	1400.0000 U
H	Dibenzofuran	1400.0000 U
H	Diethylphthalate	1400.0000 U
H	Dimethylphthalate	1400.0000 U
H	Endosulfan I	7.4000 U
H	Endrin	14.0000 U
H	Endrin aldehyde	14.0000 U
H	Fluoranthene	1400.0000 U
H	Fluorene	1400.0000 U
H	Heptachlor	7.4000 U
H	Hexachlorobenzene	1400.0000 U
H	Hexachlorobutadiene	1400.0000 U
H	Hexachlorocyclopentadiene	1400.0000 U
H	Hexachloroethane	1400.0000 U
H	Indeno(1,2,3-cd)pyrene	1400.0000 U
H	Iron	1260.0000 J
H	Isophorone	1400.0000 U
H	Lead	902.0000
H	Magnesium	1190.0000 U
H	Mercury	0.2000 U
H	Methoxychlor	74.0000 U
H	N-Nitroso-di-n-propylamine	1400.0000 U
H	N-Nitrosodiphenylamine (1)	1400.0000 U
H	Naphthalene	1400.0000 U
H	Nickel	6.2000 J
H	Nitrobenzene	1400.0000 U
H	Pentachlorophenol	3600.0000 U
H	Phenanthrene	1400.0000 U
H	Phenol	1400.0000 U
H	Potassium	144.0000 U
H	Pyrene	1400.0000 U
H	Selenium	2.9000 U
H	Silver	0.5600 U
H	Sodium	780.0000 U
H	Thallium	3.4000 U
H	Toxaphene	740.0000 U
H	Vanadium	8.1000 J
H	Zinc	45.4000 J
H	alpha-Chlordane	37.0000 J
H	beta-BHC	7.4000 U
H	bis(2-Chloroethoxy)methane	1400.0000 U
H	bis(2-Chloroethyl)ether	1400.0000 U
H	delta-BHC	7.4000 U
H	gamma-BHC (Lindane)	18.0000 J

08S05901 low: 2/9 hi: 90/102

L	Benzo(b)fluoranthene	81.0000 J
L	Benzo(k)fluoranthene	110.0000 J
L	Cadmium	0.1700 U
L	Cobalt	0.4400 U
L	Dieldrin	2.5000 J
L	Endrin ketone	0.6600 J
L	bis(2-Ethylhexyl)phthalate	120.0000 J
L	gamma-BHC (Lindane)	0.3000 J
L	gamma-Chlordane	0.6400 J
H	1,2,4-Trichlorobenzene	1000.0000 U
H	1,2-Dichlorobenzene	1000.0000 U
H	1,3-Dichlorobenzene	1000.0000 U
H	1,4-Dichlorobenzene	1000.0000 U
H	2,2'-oxybis(1-Chloropropane)	1000.0000 UJ
H	2,4,5-Trichlorophenol	2500.0000 U
H	2,4,6-Trichlorophenol	1000.0000 U
H	2,4-DB	310.0000 J
H	2,4-Dichlorophenol	1000.0000 U
H	2,4-Dimethylphenol	1000.0000 U
H	2,4-Dinitrophenol	2500.0000 UJ
H	2,4-Dinitrotoluene	1000.0000 U
H	2,6-Dinitrotoluene	1000.0000 U
H	2-Chloronaphthalene	1000.0000 U
H	2-Chlorophenol	1000.0000 U
H	2-Methylnaphthalene	1000.0000 U
H	2-Methylphenol	1000.0000 U
H	2-Nitroaniline	2500.0000 U
H	2-Nitrophenol	1000.0000 U
H	3,3'-Dichlorobenzidine	1000.0000 U
H	3-Nitroaniline	2500.0000 U
H	4,6-Dinitro-2-methylphenol	2500.0000 UJ
H	4-Bromophenyl-phenylether	1000.0000 U
H	4-Chloro-3-methylphenol	1000.0000 U
H	4-Chloroaniline	1000.0000 U
H	4-Chlorophenyl-phenylether	1000.0000 U
H	4-Methylphenol	1000.0000 U
H	4-Nitroaniline	2500.0000 U
H	4-Nitrophenol	2500.0000 U
H	Acenaphthene	1000.0000 U
H	Acenaphthylene	1000.0000 U
H	Aldrin	5.2000 U
H	Anthracene	1000.0000 U
H	Antimony	5.8000 J
H	Aroclor-1016	100.0000 U
H	Aroclor-1221	200.0000 U
H	Aroclor-1232	100.0000 U
H	Aroclor-1242	100.0000 U
H	Aroclor-1248	100.0000 U
H	Aroclor-1254	100.0000 U
H	Aroclor-1260	100.0000 U
H	Arsenic	6.7000
H	Barium	31.1000 J
H	Benzo(a)anthracene	1000.0000 U
H	Benzo(a)pyrene	1000.0000 U
H	Benzo(g,h,i)perylene	1000.0000 U
H	Beryllium	0.2400 U
H	Butylbenzylphthalate	1000.0000 U
H	Calcium	19000.0000 U
H	Carbazole	1000.0000 U
H	Chromium	6.8000
H	Chrysene	1000.0000 U
H	Copper	11.0000 J
H	Di-n-butylphthalate	1000.0000 U
H	Di-n-octylphthalate	1000.0000 U
H	Dibenz(a,h)anthracene	1000.0000 U
H	Dibenzofuran	1000.0000 U
H	Diethylphthalate	1000.0000 U
H	Dimethylphthalate	1000.0000 U
H	Endosulfan I	5.2000 U
H	Endosulfan II	10.0000 U
H	Endosulfan sulfate	10.0000 U

H	Endrin	10.0000 U
H	Endrin aldehyde	10.0000 U
H	Fluoranthene	1000.0000 U
H	Fluorene	1000.0000 U
H	Heptachlor	5.2000 U
H	Heptachlor epoxide	5.2000 U
H	Hexachlorobenzene	1000.0000 U
H	Hexachlorobutadiene	1000.0000 U
H	Hexachlorocyclopentadiene	1000.0000 U
H	Hexachloroethane	1000.0000 U
H	Indeno(1,2,3-cd)pyrene	1000.0000 U
H	Iron	1780.0000 J
H	Isophorone	1000.0000 U
H	Lead	268.0000
H	Magnesium	1010.0000 U
H	Manganese	20.1000 U
H	Mercury	0.1400 U
H	Methoxychlor	52.0000 U
H	N-Nitroso-di-n-propylamine	1000.0000 U
H	N-Nitrosodiphenylamine (1)	1000.0000 U
H	Naphthalene	1000.0000 U
H	Nickel	4.3000 J
H	Nitrobenzene	1000.0000 U
H	Pentachlorophenol	2500.0000 U
H	Phenanthrene	1000.0000 U
H	Phenol	1000.0000 U
H	Potassium	251.0000 U
H	Pyrene	1000.0000 U
H	Selenium	2.0000 U
H	Silver	5.9000
H	Sodium	458.0000 U
H	Thallium	2.3000 U
H	Toxaphene	520.0000 U
H	Zinc	79.3000 J
H	alpha-BHC	5.2000 U
H	alpha-Chlordane	5.4000 J
H	beta-BHC	5.2000 U
H	bis(2-Chloroethoxy)methane	1000.0000 U
H	bis(2-Chloroethyl)ether	1000.0000 U
H	delta-BHC	5.2000 U

08S06001 low: 3/5 hi: 92/94

L	Antimony	0.9000 U
L	Cadmium	0.0800 J
L	Cobalt	0.2100 U
L	Potassium	10.8000 U
L	bis(2-Ethylhexyl)phthalate	46.0000 J
H	1,2,4-Trichlorobenzene	440.0000 U
H	1,2-Dichlorobenzene	440.0000 U
H	1,3-Dichlorobenzene	440.0000 U
H	1,4-Dichlorobenzene	440.0000 U
H	2,2'-oxybis(1-Chloropropane)	440.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	440.0000 U
H	2,4-Dichlorophenol	440.0000 U
H	2,4-Dimethylphenol	440.0000 U
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	440.0000 U
H	2,6-Dinitrotoluene	440.0000 UJ
H	2-Chloronaphthalene	440.0000 U
H	2-Chlorophenol	440.0000 U
H	2-Methylnaphthalene	440.0000 U
H	2-Methylphenol	440.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	440.0000 U
H	3,3'-Dichlorobenzidine	440.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	4.4000 U
H	4,6-Dinitro-2-methylphenol	1100.0000 UJ
H	4-Bromophenyl-phenylether	440.0000 U
H	4-Chloro-3-methylphenol	440.0000 U
H	4-Chloroaniline	440.0000 U

H	4-Chlorophenyl-phenylether	440.0000 U
H	4-Methylphenol	440.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 U
H	Acenaphthene	440.0000 U
H	Acenaphthylene	440.0000 U
H	Aldrin	2.2000 U
H	Anthracene	440.0000 U
H	Aroclor-1016	44.0000 U
H	Aroclor-1221	89.0000 U
H	Aroclor-1232	44.0000 U
H	Aroclor-1242	44.0000 U
H	Aroclor-1248	44.0000 U
H	Aroclor-1254	44.0000 U
H	Aroclor-1260	44.0000 U
H	Benzo(a)anthracene	440.0000 U
H	Benzo(a)pyrene	440.0000 U
H	Benzo(b)fluoranthene	440.0000 U
H	Benzo(g,h,i)perylene	440.0000 U
H	Benzo(k)fluoranthene	440.0000 U
H	Beryllium	0.0800 U
H	Butylbenzylphthalate	440.0000 U
H	Carbazole	440.0000 U
H	Chrysene	440.0000 U
H	Di-n-butylphthalate	440.0000 U
H	Di-n-octylphthalate	440.0000 U
H	Dibenz(a,h)anthracene	440.0000 U
H	Dibenzofuran	440.0000 U
H	Dieldrin	4.4000 U
H	Diethylphthalate	440.0000 U
H	Dimethylphthalate	440.0000 U
H	Endosulfan I	2.2000 U
H	Endosulfan II	4.4000 U
H	Endosulfan sulfate	4.4000 U
H	Endrin	4.4000 U
H	Endrin aldehyde	4.4000 U
H	Endrin ketone	4.4000 U
H	Fluoranthene	440.0000 U
H	Fluorene	440.0000 U
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	2.2000 U
H	Hexachlorobenzene	440.0000 U
H	Hexachlorobutadiene	440.0000 U
H	Hexachlorocyclopentadiene	440.0000 U
H	Hexachloroethane	440.0000 U
H	Indeno(1,2,3-cd)pyrene	440.0000 U
H	Isophorone	440.0000 U
H	Lead	19.9000
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	440.0000 U
H	N-Nitrosodiphenylamine (1)	440.0000 U
H	Naphthalene	440.0000 U
H	Nitrobenzene	440.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	440.0000 U
H	Phenol	440.0000 U
H	Pyrene	440.0000 U
H	Selenium	0.9400 U
H	Silver	1.1000 J
H	Sodium	162.0000 U
H	Thallium	1.1000 U
H	Toxaphene	220.0000 U
H	Zinc	11.4000 U
H	alpha-BHC	2.2000 U
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	440.0000 U
H	bis(2-Chloroethyl)ether	440.0000 U
H	delta-BHC	2.2000 U
H	gamma-BHC (Lindane)	2.2000 U

08S06101 low: 4/9 hi: 5/8

L	Antimony	0.5000 U
L	Cadmium	0.0600 U

L	Cobalt	0.1600 U
L	Endrin aldehyde	0.4700 J
L	Nickel	0.4100 J
L	Potassium	13.4000 U
L	alpha-Chlordane	0.4100 J
L	bis(2-Ethylhexyl)phthalate	83.0000 J
L	gamma-Chlordane	0.1100 J
H	Arsenic	3.4000
H	Beryllium	0.0700 U
H	Copper	3.2000 J
H	Di-n-octylphthalate	370.0000 U
H	Selenium	0.7300 U
H	Silver	1.6000 J
H	Sodium	130.0000 U
H	Thallium	0.8500 U

08S06201 low: 6/7 hi: 4/4

L	Antimony	0.5300 U
L	Cadmium	0.0600 U
L	Cobalt	0.1700 U
L	Nickel	0.2500 U
L	Potassium	20.7000 U
L	Silver	0.1500 U
L	bis(2-Ethylhexyl)phthalate	47.0000 J
H	Beryllium	0.0800 U
H	Selenium	0.7600 U
H	Sodium	134.0000 U
H	Thallium	0.8800 U

08S06301 low: 3/8 hi: 68/78

L	Antimony	0.6200 U
L	Cobalt	0.1800 U
L	Endrin aldehyde	0.7300 J
L	Endrin ketone	0.3600 J
L	Heptachlor epoxide	0.2300 J
L	Nickel	1.2000 J
L	Potassium	23.3000 U
L	bis(2-Ethylhexyl)phthalate	50.0000 J
H	1,2,4-Trichlorobenzene	380.0000 U
H	1,2-Dichlorobenzene	380.0000 U
H	1,3-Dichlorobenzene	380.0000 U
H	1,4-Dichlorobenzene	380.0000 U
H	2,2'-oxybis(1-Chloropropane)	380.0000 UJ
H	2,4,5-Trichlorophenol	950.0000 U
H	2,4,6-Trichlorophenol	380.0000 U
H	2,4-Dichlorophenol	380.0000 U
H	2,4-Dimethylphenol	380.0000 U
H	2,4-Dinitrophenol	950.0000 UJ
H	2,4-Dinitrotoluene	380.0000 U
H	2,6-Dinitrotoluene	380.0000 U
H	2-Chloronaphthalene	380.0000 U
H	2-Chlorophenol	380.0000 U
H	2-Methylnaphthalene	380.0000 U
H	2-Methylphenol	380.0000 U
H	2-Nitroaniline	950.0000 U
H	2-Nitrophenol	380.0000 U
H	3,3'-Dichlorobenzidine	380.0000 U
H	3-Nitroaniline	950.0000 U
H	4,6-Dinitro-2-methylphenol	950.0000 UJ
H	4-Bromophenyl-phenylether	380.0000 U
H	4-Chloro-3-methylphenol	380.0000 U
H	4-Chloroaniline	380.0000 U
H	4-Chlorophenyl-phenylether	380.0000 U
H	4-Methylphenol	380.0000 U
H	4-Nitroaniline	950.0000 U
H	4-Nitrophenol	950.0000 U
H	Acenaphthene	380.0000 U
H	Acenaphthylene	380.0000 U
H	Anthracene	380.0000 U
H	Arsenic	3.3000

H	Barium	11.7000 J
H	Benzo(a)anthracene	380.0000 U
H	Benzo(a)pyrene	380.0000 U
H	Benzo(b)fluoranthene	380.0000 U
H	Benzo(g,h,i)perylene	380.0000 U
H	Benzo(k)fluoranthene	380.0000 U
H	Beryllium	0.1200 U
H	Butylbenzylphthalate	380.0000 U
H	Cadmium	0.6100 J
H	Carbazole	380.0000 U
H	Chromium	17.7000
H	Chrysene	380.0000 U
H	Copper	13.3000
H	Di-n-octylphthalate	380.0000 U
H	Dibenz(a,h)anthracene	380.0000 U
H	Dibenzofuran	380.0000 U
H	Dieldrin	20.0000 J
H	Diethylphthalate	380.0000 U
H	Dimethylphthalate	380.0000 U
H	Fluoranthene	380.0000 U
H	Fluorene	380.0000 U
H	Hexachlorobenzene	380.0000 U
H	Hexachlorobutadiene	380.0000 U
H	Hexachlorocyclopentadiene	380.0000 U
H	Hexachloroethane	380.0000 U
H	Indeno(1,2,3-cd)pyrene	380.0000 U
H	Isophorone	380.0000 U
H	Manganese	12.9000 U
H	Mercury	0.1700
H	N-Nitroso-di-n-propylamine	380.0000 U
H	N-Nitrosodiphenylamine (1)	380.0000 U
H	Naphthalene	380.0000 U
H	Nitrobenzene	380.0000 U
H	Pentachlorophenol	950.0000 U
H	Phenanthrene	380.0000 U
H	Phenol	380.0000 U
H	Pyrene	380.0000 U
H	Selenium	0.8300 U
H	Silver	1.3000 J
H	Sodium	136.0000 U
H	Thallium	0.9600 U
H	Zinc	32.1000 U
H	alpha-Chlordane	6.1000
H	bis(2-Chloroethoxy)methane	380.0000 U
H	bis(2-Chloroethyl)ether	380.0000 U
H	gamma-Chlordane	2.8000

08S06301D low: 3/8 hi: 68/79

L	Antimony	0.5400 U
L	Cobalt	0.1700 U
L	Endrin aldehyde	0.8600 J
L	Endrin ketone	0.5100 J
L	Heptachlor epoxide	0.2700 J
L	Nickel	1.4000 J
L	Potassium	29.0000 U
L	bis(2-Ethylhexyl)phthalate	130.0000 J
H	1,2,4-Trichlorobenzene	380.0000 U
H	1,2-Dichlorobenzene	380.0000 U
H	1,3-Dichlorobenzene	380.0000 U
H	1,4-Dichlorobenzene	380.0000 U
H	2,2'-oxybis(1-Chloropropane)	380.0000 UJ
H	2,4,5-Trichlorophenol	950.0000 U
H	2,4,6-Trichlorophenol	380.0000 U
H	2,4-Dichlorophenol	380.0000 U
H	2,4-Dimethylphenol	380.0000 U
H	2,4-Dinitrophenol	950.0000 UJ
H	2,4-Dinitrotoluene	380.0000 U
H	2,6-Dinitrotoluene	380.0000 U
H	2-Chloronaphthalene	380.0000 U
H	2-Chlorophenol	380.0000 U
H	2-Methylnaphthalene	380.0000 U
H	2-Methylphenol	380.0000 U

H	2-Nitroaniline	950.0000 U
H	2-Nitrophenol	380.0000 U
H	3,3'-Dichlorobenzidine	380.0000 U
H	3-Nitroaniline	950.0000 U
H	4,6-Dinitro-2-methylphenol	950.0000 UJ
H	4-Bromophenyl-phenylether	380.0000 U
H	4-Chloro-3-methylphenol	380.0000 U
H	4-Chloroaniline	380.0000 U
H	4-Chlorophenyl-phenylether	380.0000 U
H	4-Methylphenol	380.0000 U
H	4-Nitroaniline	950.0000 U
H	4-Nitrophenol	950.0000 U
H	Acenaphthene	380.0000 U
H	Acenaphthylene	380.0000 U
H	Anthracene	380.0000 U
H	Arsenic	4.3000
H	Barium	16.5000 J
H	Benzo(a)anthracene	380.0000 U
H	Benzo(a)pyrene	380.0000 U
H	Benzo(b)fluoranthene	380.0000 U
H	Benzo(g,h,i)perylene	380.0000 U
H	Benzo(k)fluoranthene	380.0000 U
H	Beryllium	0.1100 U
H	Butylbenzylphthalate	380.0000 U
H	Cadmium	0.6600 J
H	Carbazole	380.0000 U
H	Chromium	14.5000
H	Chrysene	380.0000 U
H	Copper	14.7000
H	Di-n-octylphthalate	380.0000 U
H	Dibenz(a,h)anthracene	380.0000 U
H	Dibenzofuran	380.0000 U
H	Dieldrin	24.0000 J
H	Diethylphthalate	380.0000 U
H	Dimethylphthalate	380.0000 U
H	Fluoranthene	380.0000 U
H	Fluorene	380.0000 U
H	Hexachlorobenzene	380.0000 U
H	Hexachlorobutadiene	380.0000 U
H	Hexachlorocyclopentadiene	380.0000 U
H	Hexachloroethane	380.0000 U
H	Indeno(1,2,3-cd)pyrene	380.0000 U
H	Isophorone	380.0000 U
H	Lead	22.8000
H	Manganese	16.1000 U
H	Mercury	0.3400
H	N-Nitroso-di-n-propylamine	380.0000 U
H	N-Nitrosodiphenylamine (1)	380.0000 U
H	Naphthalene	380.0000 U
H	Nitrobenzene	380.0000 U
H	Pentachlorophenol	950.0000 U
H	Phenanthrene	380.0000 U
H	Phenol	380.0000 U
H	Pyrene	380.0000 U
H	Selenium	0.7800 U
H	Silver	2.0000 J
H	Sodium	613.0000 U
H	Thallium	0.9100 U
H	Zinc	40.2000 U
H	alpha-Chlordane	6.4000
H	bis(2-Chloroethoxy)methane	380.0000 U
H	bis(2-Chloroethyl)ether	380.0000 U
H	gamma-Chlordane	3.2000

09S00500 low: 6/6 hi: 90/100

L	Antimony	0.7100 U
L	Cadmium	0.0700 U
L	Cobalt	0.1700 U
L	Nickel	0.4200 U
L	Potassium	28.5000 U
L	Silver	0.2000 U

H	1,2,4-Trichlorobenzene	440.0000 UJ

H	1,2-Dichlorobenzene	440.0000 UJ
H	1,3-Dichlorobenzene	440.0000 UJ
H	1,4-Dichlorobenzene	440.0000 UJ
H	2,2'-oxybis(1-Chloropropane)	440.0000 UJ
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	440.0000 U
H	2,4-Dichlorophenol	440.0000 U
H	2,4-Dimethylphenol	440.0000 U
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	440.0000 U
H	2,6-Dinitrotoluene	440.0000 UJ
H	2-Chloronaphthalene	440.0000 UJ
H	2-Chlorophenol	440.0000 U
H	2-Methylnaphthalene	440.0000 UJ
H	2-Methylphenol	440.0000 U
H	2-Nitroaniline	1100.0000 UJ
H	2-Nitrophenol	440.0000 U
H	3,3'-Dichlorobenzidine	440.0000 UJ
H	3-Nitroaniline	1100.0000 UJ
H	4,4'-DDD	15000.0000 D
H	4,4'-DDE	710.0000
H	4,4'-DDT	3600.0000
H	4,6-Dinitro-2-methylphenol	1100.0000 UJ
H	4-Bromophenyl-phenylether	440.0000 UJ
H	4-Chloro-3-methylphenol	440.0000 U
H	4-Chloroaniline	440.0000 UJ
H	4-Chlorophenyl-phenylether	440.0000 UJ
H	4-Methylphenol	440.0000 U
H	4-Nitroaniline	1100.0000 UJ
H	4-Nitrophenol	1100.0000 UJ
H	Acenaphthene	440.0000 UJ
H	Acenaphthylene	440.0000 UJ
H	Aldrin	230.0000 U
H	Anthracene	440.0000 UJ
H	Aroclor-1016	4400.0000 U
H	Aroclor-1221	8900.0000 U
H	Aroclor-1232	4400.0000 U
H	Aroclor-1242	4400.0000 U
H	Aroclor-1248	4400.0000 U
H	Aroclor-1254	4400.0000 U
H	Aroclor-1260	4400.0000 U
H	Arsenic	4.8000
H	Benzo(a)anthracene	440.0000 UJ
H	Benzo(a)pyrene	440.0000 UJ
H	Benzo(b)fluoranthene	440.0000 UJ
H	Benzo(g,h,i)perylene	440.0000 UJ
H	Benzo(k)fluoranthene	440.0000 UJ
H	Butylbenzylphthalate	440.0000 UJ
H	Carbazole	440.0000 UJ
H	Chrysene	440.0000 UJ
H	Copper	8.7000
H	Di-n-butylphthalate	440.0000 UJ
H	Di-n-octylphthalate	440.0000 UJ
H	Dibenz(a,h)anthracene	440.0000 UJ
H	Dibenzofuran	440.0000 UJ
H	Dieldrin	440.0000 U
H	Diethylphthalate	440.0000 UJ
H	Dimethylphthalate	440.0000 UJ
H	Endosulfan I	230.0000 U
H	Endosulfan II	440.0000 U
H	Endosulfan sulfate	440.0000 U
H	Endrin	440.0000 U
H	Endrin aldehyde	440.0000 U
H	Endrin ketone	440.0000 U
H	Fluoranthene	440.0000 UJ
H	Fluorene	440.0000 UJ
H	Heptachlor	230.0000 U
H	Heptachlor epoxide	230.0000 U
H	Hexachlorobenzene	440.0000 UJ
H	Hexachlorobutadiene	440.0000 UJ
H	Hexachlorocyclopentadiene	440.0000 UJ
H	Hexachloroethane	440.0000 UJ
H	Indeno(1,2,3-cd)pyrene	440.0000 UJ

H	Isophorone	440.0000 UJ
H	Lead	18.7000 J
H	Mercury	0.0900 J
H	Methoxychlor	2300.0000 U
H	N-Nitroso-di-n-propylamine	440.0000 UJ
H	N-Nitrosodiphenylamine (1)	440.0000 UJ
H	Naphthalene	440.0000 UJ
H	Nitrobenzene	440.0000 UJ
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	440.0000 UJ
H	Phenol	440.0000 U
H	Pyrene	440.0000 UJ
H	Selenium	1.1000 U
H	Sodium	241.0000 U
H	Thallium	1.2000 U
H	Toxaphene	23000.0000 U
H	Zinc	89.1000 J
H	alpha-BHC	230.0000 U
H	alpha-Chlordane	3900.0000 D
H	beta-BHC	230.0000 U
H	bis(2-Chloroethoxy)methane	440.0000 UJ
H	bis(2-Chloroethyl)ether	440.0000 UJ
H	bis(2-Ethylhexyl)phthalate	440.0000 UJ
H	delta-BHC	230.0000 U
H	gamma-BHC (Lindane)	230.0000 U
H	gamma-Chlordane	4200.0000 D

09S00500D low: 6/6 hi: 91/102

L	Antimony	0.7700 U
L	Cadmium	0.0800 U
L	Cobalt	0.1900 U
L	Nickel	0.6600 U
L	Potassium	39.9000 U
L	Silver	0.2100 U
H	1,2,4-Trichlorobenzene	440.0000 U
H	1,2-Dichlorobenzene	440.0000 U
H	1,3-Dichlorobenzene	440.0000 U
H	1,4-Dichlorobenzene	440.0000 U
H	2,2'-oxybis(1-Chloropropane)	440.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	440.0000 U
H	2,4-Dichlorophenol	440.0000 U
H	2,4-Dimethylphenol	440.0000 U
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	440.0000 U
H	2,6-Dinitrotoluene	440.0000 U
H	2-Chloronaphthalene	440.0000 U
H	2-Chlorophenol	440.0000 U
H	2-Methylnaphthalene	440.0000 U
H	2-Methylphenol	440.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	440.0000 U
H	3,3'-Dichlorobenzidine	440.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	20000.0000 D
H	4,4'-DDE	1000.0000
H	4,4'-DDT	12000.0000 D
H	4,6-Dinitro-2-methylphenol	1100.0000 UJ
H	4-Bromophenyl-phenylether	440.0000 U
H	4-Chloro-3-methylphenol	440.0000 U
H	4-Chloroaniline	440.0000 U
H	4-Chlorophenyl-phenylether	440.0000 U
H	4-Methylphenol	440.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 UJ
H	Acenaphthene	440.0000 U
H	Acenaphthylene	440.0000 U
H	Aldrin	230.0000 U
H	Anthracene	440.0000 U
H	Aroclor-1016	4400.0000 U
H	Aroclor-1221	9000.0000 U
H	Aroclor-1232	4400.0000 U

H	Aroclor-1242	4400.0000 U
H	Aroclor-1248	4400.0000 U
H	Aroclor-1254	4400.0000 U
H	Aroclor-1260	4400.0000 U
H	Arsenic	4.4000
H	Benzo(a)anthracene	440.0000 U
H	Benzo(a)pyrene	440.0000 U
H	Benzo(b)fluoranthene	440.0000 U
H	Benzo(g,h,i)perylene	440.0000 U
H	Benzo(k)fluoranthene	440.0000 U
H	Beryllium	0.0600 U
H	Butylbenzylphthalate	440.0000 U
H	Carbazole	440.0000 UJ
H	Chrysene	440.0000 U
H	Copper	10.9000
H	Di-n-butylphthalate	440.0000 UJ
H	Di-n-octylphthalate	440.0000 U
H	Dibenz(a,h)anthracene	440.0000 U
H	Dibenzofuran	440.0000 U
H	Dieldrin	440.0000 U
H	Diethylphthalate	440.0000 U
H	Dimethylphthalate	440.0000 U
H	Dinoseb	40.0000
H	Endosulfan I	230.0000 U
H	Endosulfan II	440.0000 U
H	Endosulfan sulfate	440.0000 U
H	Endrin	440.0000 U
H	Endrin aldehyde	440.0000 U
H	Endrin ketone	440.0000 U
H	Fluoranthene	440.0000 U
H	Fluorene	440.0000 U
H	Heptachlor	230.0000 U
H	Heptachlor epoxide	230.0000 U
H	Hexachlorobenzene	440.0000 U
H	Hexachlorobutadiene	440.0000 U
H	Hexachlorocyclopentadiene	440.0000 UJ
H	Hexachloroethane	440.0000 U
H	Indeno(1,2,3-cd)pyrene	440.0000 U
H	Isophorone	440.0000 U
H	Lead	24.6000 J
H	Mercury	0.0900 J
H	Methoxychlor	2300.0000 U
H	N-Nitroso-di-n-propylamine	440.0000 U
H	N-Nitrosodiphenylamine (1)	440.0000 U
H	Naphthalene	440.0000 U
H	Nitrobenzene	440.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	440.0000 U
H	Phenol	440.0000 U
H	Pyrene	440.0000 U
H	Selenium	1.2000 U
H	Sodium	275.0000 U
H	Thallium	1.3000 U
H	Toxaphene	23000.0000 U
H	Zinc	40.1000 U
H	alpha-BHC	230.0000 U
H	alpha-Chlordane	5300.0000 D
H	beta-BHC	230.0000 U
H	bis(2-Chloroethoxy)methane	440.0000 U
H	bis(2-Chloroethyl)ether	440.0000 U
H	bis(2-Ethylhexyl)phthalate	440.0000 U
H	delta-BHC	230.0000 U
H	gamma-BHC (Lindane)	32.0000 J
H	gamma-Chlordane	6000.0000 D

09S00600 low: 5/5 hi: 8/18

L	Antimony	0.6000 U
L	Cadmium	0.0600 U
L	Cobalt	0.2300 U
L	Nickel	0.5200 U
L	Silver	0.1700 U

H	4,4'-DDD	21.0000

H 4,4'-DDE	14.0000	
H Barium	47.1000	J
H Beryllium	0.4600	J
H Calcium	18700.0000	J
H Copper	4.3000	U
H Di-n-octylphthalate	370.0000	U
H Lead	23.9000	J
H Magnesium	1900.0000	U
H Manganese	137.0000	J
H Potassium	344.0000	U
H Selenium	0.9100	U
H Sodium	173.0000	U
H Thallium	1.0000	U
H Vanadium	4.2000	J
H Zinc	13.5000	U
H alpha-Chlordane	15.0000	
H gamma-Chlordane	16.0000	J

09S00700 low: 2/4 hi: 90/109

L 2-Methylnaphthalene	77.0000	J
L Antimony	0.9800	U
L Cadmium	0.1000	U
L Pyrene	78.0000	J
H 1,2,4-Trichlorobenzene	580.0000	U
H 1,2-Dichlorobenzene	580.0000	U
H 1,3-Dichlorobenzene	580.0000	U
H 1,4-Dichlorobenzene	580.0000	U
H 2,2'-oxybis(1-Chloropropane)	580.0000	U
H 2,4,5-Trichlorophenol	1500.0000	U
H 2,4,6-Trichlorophenol	580.0000	U
H 2,4-Dichlorophenol	580.0000	U
H 2,4-Dimethylphenol	580.0000	U
H 2,4-Dinitrophenol	1500.0000	UJ
H 2,4-Dinitrotoluene	580.0000	U
H 2,6-Dinitrotoluene	580.0000	U
H 2-Chloronaphthalene	580.0000	U
H 2-Chlorophenol	580.0000	U
H 2-Methylphenol	580.0000	U
H 2-Nitroaniline	1500.0000	U
H 2-Nitrophenol	580.0000	U
H 3,3'-Dichlorobenzidine	580.0000	U
H 3-Nitroaniline	1500.0000	U
H 4,4'-DDD	4600.0000	D
H 4,4'-DDE	570.0000	
H 4,4'-DDT	35.0000	J
H 4,6-Dinitro-2-methylphenol	1500.0000	UJ
H 4-Bromophenyl-phenylether	580.0000	U
H 4-Chloro-3-methylphenol	580.0000	U
H 4-Chloroaniline	580.0000	U
H 4-Chlorophenyl-phenylether	580.0000	U
H 4-Methylphenol	580.0000	U
H 4-Nitroaniline	1500.0000	U
H 4-Nitrophenol	1500.0000	UJ
H Acenaphthene	580.0000	U
H Acenaphthylene	580.0000	U
H Aldrin	60.0000	U
H Anthracene	580.0000	U
H Aroclor-1016	1200.0000	U
H Aroclor-1221	2400.0000	U
H Aroclor-1232	1200.0000	U
H Aroclor-1242	1200.0000	U
H Aroclor-1248	1200.0000	U
H Aroclor-1254	1200.0000	U
H Aroclor-1260	1200.0000	U
H Arsenic	20.2000	
H Barium	40.8000	J
H Benzo(a)anthracene	580.0000	U
H Benzo(a)pyrene	580.0000	U
H Benzo(b)fluoranthene	580.0000	U
H Benzo(g,h,i)perylene	580.0000	U
H Benzo(k)fluoranthene	580.0000	U
H Beryllium	0.1700	U

H	Butylbenzylphthalate	580.0000 U
H	Calcium	37200.0000 J
H	Carbazole	580.0000 UJ
H	Chromium	15.9000 J
H	Chrysene	580.0000 U
H	Cobalt	0.6500 U
H	Copper	29.7000
H	Di-n-butylphthalate	580.0000 UJ
H	Di-n-octylphthalate	580.0000 U
H	Dibenz(a,h)anthracene	580.0000 U
H	Dibenzofuran	580.0000 U
H	Dieldrin	120.0000 U
H	Diethylphthalate	580.0000 U
H	Dimethylphthalate	580.0000 U
H	Endosulfan I	60.0000 U
H	Endosulfan II	120.0000 U
H	Endosulfan sulfate	120.0000 U
H	Endrin	120.0000 U
H	Endrin aldehyde	120.0000 U
H	Endrin ketone	120.0000 U
H	Fluoranthene	580.0000 U
H	Fluorene	580.0000 U
H	Heptachlor	60.0000 U
H	Heptachlor epoxide	60.0000 U
H	Hexachlorobenzene	580.0000 U
H	Hexachlorobutadiene	580.0000 U
H	Hexachlorocyclopentadiene	580.0000 UJ
H	Hexachloroethane	580.0000 U
H	Indeno(1,2,3-cd)pyrene	580.0000 U
H	Iron	1630.0000 J
H	Isophorone	580.0000 U
H	Lead	47.6000 J
H	Magnesium	417.0000 U
H	Manganese	45.1000 J
H	Mercury	0.1800 J
H	Methoxychlor	600.0000 U
H	N-Nitroso-di-n-propylamine	580.0000 U
H	N-Nitrosodiphenylamine (1)	580.0000 U
H	Naphthalene	580.0000 U
H	Nickel	7.0000 J
H	Nitrobenzene	580.0000 U
H	Pentachlorophenol	1500.0000 U
H	Phenanthrene	580.0000 U
H	Phenol	580.0000 U
H	Selenium	1.7000
H	Silver	1.2000 J
H	Sodium	278.0000 U
H	Thallium	1.7000 U
H	Toxaphene	6000.0000 U
H	Vanadium	5.0000 J
H	Zinc	187.0000 J
H	alpha-BHC	60.0000 U
H	alpha-Chlordane	2400.0000 D
H	beta-BHC	60.0000 U
H	bis(2-Chloroethoxy)methane	580.0000 U
H	bis(2-Chloroethyl)ether	580.0000 U
H	bis(2-Ethylhexyl)phthalate	580.0000 U
H	delta-BHC	60.0000 U
H	gamma-BHC (Lindane)	60.0000 U
H	gamma-Chlordane	2600.0000 D

09S00800 low: 6/9 hi: 24/30

L	Antimony	0.6300 U
L	Cadmium	0.0700 U
L	Cobalt	0.1500 U
L	Heptachlor epoxide	0.2400 J
L	Nickel	0.3700 U
L	Potassium	19.0000 U
L	Silver	0.1700 U
L	bis(2-Ethylhexyl)phthalate	170.0000 J
L	gamma-BHC (Lindane)	0.5300 J

H	4,4'-DDD	43.0000

H	4,4'-DDE	18.0000
H	Aldrin	3.8000 U
H	Aroclor-1016	74.0000 U
H	Aroclor-1221	150.0000 U
H	Aroclor-1232	74.0000 U
H	Aroclor-1242	74.0000 U
H	Aroclor-1248	74.0000 U
H	Aroclor-1254	74.0000 U
H	Aroclor-1260	74.0000 U
H	Arsenic	3.2000
H	Di-n-octylphthalate	370.0000 U
H	Dieldrin	7.4000 U
H	Endosulfan I	3.8000 U
H	Endosulfan II	7.4000 U
H	Endosulfan sulfate	7.4000 U
H	Endrin	8.5000 J
H	Endrin aldehyde	7.4000 U
H	Endrin ketone	7.4000 U
H	Heptachlor	3.8000 U
H	Methoxychlor	38.0000 U
H	Selenium	0.9600 U
H	Sodium	184.0000 U
H	Thallium	1.1000 U
H	Toxaphene	380.0000 U
H	alpha-BHC	3.8000 U
H	alpha-Chlordane	33.0000
H	beta-BHC	3.8000 U
H	delta-BHC	3.8000 U
H	gamma-Chlordane	29.0000

09S00900 low: 7/10 hi: 87/94

L	Antimony	0.8000 U
L	Beryllium	0.0300 U
L	Cadmium	0.0800 U
L	Cobalt	0.1900 U
L	Heptachlor epoxide	0.2300 J
L	Nickel	0.4000 U
L	Potassium	27.6000 U
L	Silver	0.2200 U
L	alpha-BHC	0.5200 J
L	beta-BHC	0.1800 J
H	1,2,4-Trichlorobenzene	460.0000 U
H	1,2-Dichlorobenzene	460.0000 U
H	1,3-Dichlorobenzene	460.0000 U
H	1,4-Dichlorobenzene	460.0000 U
H	2,2'-oxybis(1-Chloropropane)	460.0000 U
H	2,4,5-Trichlorophenol	1100.0000 U
H	2,4,6-Trichlorophenol	460.0000 U
H	2,4-Dichlorophenol	460.0000 U
H	2,4-Dimethylphenol	460.0000 U
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	460.0000 U
H	2,6-Dinitrotoluene	460.0000 U
H	2-Chloronaphthalene	460.0000 U
H	2-Chlorophenol	460.0000 U
H	2-Methylnaphthalene	460.0000 U
H	2-Methylphenol	460.0000 U
H	2-Nitroaniline	1100.0000 U
H	2-Nitrophenol	460.0000 U
H	3,3'-Dichlorobenzidine	460.0000 U
H	3-Nitroaniline	1100.0000 U
H	4,4'-DDD	140.0000 D
H	4,4'-DDE	22.0000 J
H	4,6-Dinitro-2-methylphenol	1100.0000 UJ
H	4-Bromophenyl-phenylether	460.0000 U
H	4-Chloro-3-methylphenol	460.0000 U
H	4-Chloroaniline	460.0000 U
H	4-Chlorophenyl-phenylether	460.0000 U
H	4-Methylphenol	460.0000 U
H	4-Nitroaniline	1100.0000 U
H	4-Nitrophenol	1100.0000 UJ
H	Acenaphthene	460.0000 U

H	Acenaphthylene	460.0000 U
H	Aldrin	2.4000 U
H	Anthracene	460.0000 U
H	Aroclor-1016	46.0000 U
H	Aroclor-1221	93.0000 U
H	Aroclor-1232	46.0000 U
H	Aroclor-1242	46.0000 U
H	Aroclor-1248	46.0000 U
H	Aroclor-1254	46.0000 U
H	Aroclor-1260	46.0000 U
H	Arsenic	14.4000
H	Benzo(a)anthracene	460.0000 U
H	Benzo(a)pyrene	460.0000 U
H	Benzo(b)fluoranthene	460.0000 U
H	Benzo(g,h,i)perylene	460.0000 U
H	Benzo(k)fluoranthene	460.0000 U
H	Butylbenzylphthalate	460.0000 U
H	Carbazole	460.0000 UJ
H	Chrysene	460.0000 U
H	Copper	16.5000
H	Di-n-butylphthalate	460.0000 UJ
H	Di-n-octylphthalate	460.0000 U
H	Dibenz(a,h)anthracene	460.0000 U
H	Dibenzofuran	460.0000 U
H	Dieldrin	4.6000 U
H	Diethylphthalate	460.0000 U
H	Dimethylphthalate	460.0000 U
H	Endosulfan I	2.4000 U
H	Endosulfan II	4.6000 U
H	Endosulfan sulfate	4.6000 U
H	Endrin	4.6000 U
H	Endrin aldehyde	4.6000 U
H	Endrin ketone	4.6000 U
H	Fluoranthene	460.0000 U
H	Fluorene	460.0000 U
H	Heptachlor	2.4000 U
H	Hexachlorobenzene	460.0000 U
H	Hexachlorobutadiene	460.0000 U
H	Hexachlorocyclopentadiene	460.0000 UJ
H	Hexachloroethane	460.0000 U
H	Indeno(1,2,3-cd)pyrene	460.0000 U
H	Isophorone	460.0000 U
H	Methoxychlor	24.0000 U
H	N-Nitroso-di-n-propylamine	460.0000 U
H	N-Nitrosodiphenylamine (1)	460.0000 U
H	Naphthalene	460.0000 U
H	Nitrobenzene	460.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	460.0000 U
H	Phenol	460.0000 U
H	Pyrene	460.0000 U
H	Selenium	1.2000 U
H	Sodium	252.0000 U
H	Thallium	1.4000 U
H	Toxaphene	240.0000 U
H	Zinc	14.7000 U
H	alpha-Chlordane	23.0000
H	bis(2-Chloroethoxy)methane	460.0000 U
H	bis(2-Chloroethyl)ether	460.0000 U
H	bis(2-Ethylhexyl)phthalate	460.0000 U
H	delta-BHC	5.4000
H	gamma-BHC (Lindane)	2.4000 U
H	gamma-Chlordane	18.0000 J

09S01000 low: 7/8 hi: 3/7

L	Antimony	0.5900 U
L	Beryllium	0.0200 U
L	Cadmium	0.0600 U
L	Cobalt	0.1400 U
L	Nickel	0.2600 U
L	Potassium	20.2000 U
L	Silver	0.1600 U
L	beta-BHC	0.5100 J

H	4,4'-DDD	19.0000 J
H	4,4'-DDE	14.0000 J
H	Selenium	0.8900 U
H	Sodium	201.0000 U
H	Thallium	1.0000 U
H	alpha-Chlordane	14.0000 J
H	gamma-Chlordane	14.0000 J

09S01100 low: 7/8 hi: 91/98

L	Antimony	0.8000 U
L	Beryllium	0.0300 U
L	Cadmium	0.0800 U
L	Cobalt	0.1900 U
L	Nickel	0.5400 U
L	Potassium	40.1000 U
L	Pyrene	46.0000 J
L	Silver	0.2200 U
H	1,2,4-Trichlorobenzene	480.0000 U
H	1,2-Dichlorobenzene	480.0000 U
H	1,3-Dichlorobenzene	480.0000 U
H	1,4-Dichlorobenzene	480.0000 U
H	2,2'-oxybis(1-Chloropropane)	480.0000 U
H	2,4,5-Trichlorophenol	1200.0000 U
H	2,4,6-Trichlorophenol	480.0000 U
H	2,4-Dichlorophenol	480.0000 U
H	2,4-Dimethylphenol	480.0000 U
H	2,4-Dinitrophenol	1200.0000 UJ
H	2,4-Dinitrotoluene	480.0000 U
H	2,6-Dinitrotoluene	480.0000 U
H	2-Chloronaphthalene	480.0000 U
H	2-Chlorophenol	480.0000 U
H	2-Methylnaphthalene	480.0000 U
H	2-Methylphenol	480.0000 U
H	2-Nitroaniline	1200.0000 U
H	2-Nitrophenol	480.0000 U
H	3,3'-Dichlorobenzidine	480.0000 U
H	3-Nitroaniline	1200.0000 U
H	4,4'-DDD	4400.0000 D
H	4,4'-DDE	300.0000 J
H	4,4'-DDT	1200.0000 J
H	4,6-Dinitro-2-methylphenol	1200.0000 UJ
H	4-Bromophenyl-phenylether	480.0000 U
H	4-Chloro-3-methylphenol	480.0000 U
H	4-Chloroaniline	480.0000 U
H	4-Chlorophenyl-phenylether	480.0000 U
H	4-Methylphenol	480.0000 U
H	4-Nitroaniline	1200.0000 U
H	4-Nitrophenol	1200.0000 UJ
H	Acenaphthene	480.0000 U
H	Acenaphthylene	480.0000 U
H	Aldrin	49.0000 U
H	Anthracene	480.0000 U
H	Aroclor-1016	950.0000 U
H	Aroclor-1221	1900.0000 U
H	Aroclor-1232	950.0000 U
H	Aroclor-1242	950.0000 U
H	Aroclor-1248	950.0000 U
H	Aroclor-1254	950.0000 U
H	Aroclor-1260	950.0000 U
H	Arsenic	1.6000 U
H	Benzo(a)anthracene	480.0000 U
H	Benzo(a)pyrene	480.0000 U
H	Benzo(b)fluoranthene	480.0000 U
H	Benzo(g,h,i)perylene	480.0000 U
H	Benzo(k)fluoranthene	480.0000 U
H	Butylbenzylphthalate	480.0000 U
H	Carbazole	480.0000 UJ
H	Chrysene	480.0000 U
H	Copper	17.6000
H	Di-n-butylphthalate	480.0000 UJ
H	Di-n-octylphthalate	480.0000 U
H	Dibenz(a,h)anthracene	480.0000 U

H	Dibenzofuran	480.0000 U
H	Dieldrin	95.0000 U
H	Diethylphthalate	480.0000 U
H	Dimethylphthalate	480.0000 U
H	Endosulfan I	49.0000 U
H	Endosulfan II	95.0000 U
H	Endosulfan sulfate	95.0000 U
H	Endrin	95.0000 U
H	Endrin aldehyde	95.0000 U
H	Endrin ketone	95.0000 U
H	Fluoranthene	480.0000 U
H	Fluorene	480.0000 U
H	Heptachlor	49.0000 U
H	Heptachlor epoxide	49.0000 U
H	Hexachlorobenzene	480.0000 U
H	Hexachlorobutadiene	480.0000 U
H	Hexachlorocyclopentadiene	480.0000 UJ
H	Hexachloroethane	480.0000 U
H	Indeno(1,2,3-cd)pyrene	480.0000 U
H	Isophorone	480.0000 U
H	Mercury	0.0900 J
H	Methoxychlor	490.0000 U
H	N-Nitroso-di-n-propylamine	480.0000 U
H	N-Nitrosodiphenylamine (1)	480.0000 U
H	Naphthalene	480.0000 U
H	Nitrobenzene	480.0000 U
H	Pentachlorophenol	1200.0000 U
H	Phenanthrene	480.0000 U
H	Phenol	480.0000 U
H	Selenium	1.2000 U
H	Sodium	282.0000 U
H	Thallium	1.4000 U
H	Toxaphene	4900.0000 U
H	Zinc	10.6000 U
H	alpha-BHC	49.0000 U
H	alpha-Chlordane	1200.0000 D
H	beta-BHC	49.0000 U
H	bis(2-Chloroethoxy)methane	480.0000 U
H	bis(2-Chloroethyl)ether	480.0000 U
H	bis(2-Ethylhexyl)phthalate	480.0000 U
H	delta-BHC	49.0000 U
H	gamma-BHC (Lindane)	49.0000 U
H	gamma-Chlordane	1300.0000 D

09S01200 low: 7/10 hi: 3/3

L	Antimony	0.5900 U
L	Beryllium	0.0300 U
L	Cadmium	0.0600 U
L	Cobalt	0.1400 U
L	Dieldrin	0.4700 J
L	Nickel	0.2700 U
L	Potassium	23.2000 U
L	Silver	0.1600 U
L	alpha-Chlordane	0.6800 J
L	gamma-Chlordane	0.0860 J
H	Selenium	0.9000 U
H	Sodium	206.0000 U
H	Thallium	1.0000 U

09S01300 low: 7/11 hi: 3/6

L	Antimony	0.6100 U
L	Beryllium	0.0200 U
L	Cadmium	0.0600 U
L	Cobalt	0.1500 U
L	Endosulfan II	2.2000 J
L	Endrin aldehyde	0.1100 J
L	Heptachlor epoxide	0.0810 J
L	Nickel	0.2700 U
L	Potassium	43.8000 U
L	Silver	0.1700 U
L	bis(2-Ethylhexyl)phthalate	74.0000 J

H 4,4'-DDD	19.0000	J
H Selenium	0.9200	U
H Sodium	202.0000	U
H Thallium	1.0000	U
H alpha-Chlordane	20.0000	
H gamma-Chlordane	18.0000	J

09S01400 low: 7/8 hi: 91/97

L Antimony	0.7500	U
L Beryllium	0.0300	U
L Cadmium	0.0800	U
L Cobalt	0.1800	U
L Nickel	0.3400	U
L Potassium	24.7000	U
L Silver	0.2100	U
L bis(2-Ethylhexyl)phthalate	220.0000	J
H 1,2,4-Trichlorobenzene	440.0000	U
H 1,2-Dichlorobenzene	440.0000	U
H 1,3-Dichlorobenzene	440.0000	U
H 1,4-Dichlorobenzene	440.0000	U
H 2,2'-oxybis(1-Chloropropane)	440.0000	U
H 2,4,5-Trichlorophenol	1100.0000	U
H 2,4,6-Trichlorophenol	440.0000	U
H 2,4-Dichlorophenol	440.0000	U
H 2,4-Dimethylphenol	440.0000	U
H 2,4-Dinitrophenol	1100.0000	UJ
H 2,4-Dinitrotoluene	440.0000	U
H 2,6-Dinitrotoluene	440.0000	U
H 2-Chloronaphthalene	440.0000	U
H 2-Chlorophenol	440.0000	U
H 2-Methylnaphthalene	440.0000	U
H 2-Methylphenol	440.0000	U
H 2-Nitroaniline	1100.0000	U
H 2-Nitrophenol	440.0000	U
H 3,3'-Dichlorobenzidine	440.0000	U
H 3-Nitroaniline	1100.0000	U
H 4,4'-DDD	41.0000	
H 4,6-Dinitro-2-methylphenol	1100.0000	UJ
H 4-Bromophenyl-phenylether	440.0000	U
H 4-Chloro-3-methylphenol	440.0000	U
H 4-Chloroaniline	440.0000	U
H 4-Chlorophenyl-phenylether	440.0000	U
H 4-Methylphenol	440.0000	U
H 4-Nitroaniline	1100.0000	U
H 4-Nitrophenol	1100.0000	UJ
H Acenaphthene	440.0000	U
H Acenaphthylene	440.0000	U
H Aldrin	2.2000	U
H Anthracene	440.0000	U
H Aroclor-1016	44.0000	U
H Aroclor-1221	89.0000	U
H Aroclor-1232	44.0000	U
H Aroclor-1242	44.0000	U
H Aroclor-1248	44.0000	U
H Aroclor-1254	44.0000	U
H Aroclor-1260	44.0000	U
H Arsenic	1.5000	U
H Benzo(a)anthracene	440.0000	U
H Benzo(a)pyrene	440.0000	U
H Benzo(b)fluoranthene	440.0000	U
H Benzo(g,h,i)perylene	440.0000	U
H Benzo(k)fluoranthene	440.0000	U
H Butylbenzylphthalate	440.0000	U
H Carbazole	440.0000	UJ
H Chrysene	440.0000	U
H Copper	5.1000	U
H Di-n-butylphthalate	440.0000	UJ
H Di-n-octylphthalate	440.0000	U
H Dibenz(a,h)anthracene	440.0000	U
H Dibenzofuran	440.0000	U
H Dieldrin	4.4000	U
H Diethylphthalate	440.0000	U

H	Dimethylphthalate	440.0000 U
H	Endosulfan I	2.2000 U
H	Endosulfan II	4.4000 U
H	Endosulfan sulfate	4.4000 U
H	Endrin	4.4000 U
H	Endrin aldehyde	4.4000 U
H	Endrin ketone	4.4000 U
H	Fluoranthene	440.0000 U
H	Fluorene	440.0000 U
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	2.2000 U
H	Hexachlorobenzene	440.0000 U
H	Hexachlorobutadiene	440.0000 U
H	Hexachlorocyclopentadiene	440.0000 UJ
H	Hexachloroethane	440.0000 U
H	Indeno(1,2,3-cd)pyrene	440.0000 U
H	Isophorone	440.0000 U
H	MCPP	77000.0000 DJ
H	Manganese	12.1000 J
H	Mercury	0.1000 J
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	440.0000 U
H	N-Nitrosodiphenylamine (1)	440.0000 U
H	Naphthalene	440.0000 U
H	Nitrobenzene	440.0000 U
H	Pentachlorophenol	1100.0000 U
H	Phenanthrene	440.0000 U
H	Phenol	440.0000 U
H	Pyrene	440.0000 U
H	Selenium	1.1000 U
H	Sodium	185.0000 U
H	Thallium	1.3000 U
H	Toxaphene	220.0000 U
H	alpha-BHC	2.2000 U
H	alpha-Chlordane	60.0000 D
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	440.0000 U
H	bis(2-Chloroethyl)ether	440.0000 U
H	delta-BHC	2.2000 U
H	gamma-BHC (Lindane)	2.2000 U
H	gamma-Chlordane	63.0000 D

09S01500 low: 7/12 hi: 57/58

L	Antimony	0.6500 U
L	Beryllium	0.0300 U
L	Cadmium	0.0700 U
L	Cobalt	0.1600 U
L	Dieldrin	0.9900 J
L	Heptachlor epoxide	0.0520 J
L	Nickel	0.2900 U
L	Potassium	48.4000 U
L	Pyrene	36.0000 J
L	Silver	0.1800 U
L	bis(2-Ethylhexyl)phthalate	180.0000 J
L	gamma-Chlordane	0.6200 J

H	1,2,4-Trichlorobenzene	380.0000 U
H	1,2-Dichlorobenzene	380.0000 U
H	1,3-Dichlorobenzene	380.0000 U
H	1,4-Dichlorobenzene	380.0000 U
H	2,2'-oxybis(1-Chloropropane)	380.0000 U
H	2,4,6-Trichlorophenol	380.0000 U
H	2,4-Dichlorophenol	380.0000 U
H	2,4-Dimethylphenol	380.0000 U
H	2,4-Dinitrotoluene	380.0000 U
H	2,6-Dinitrotoluene	380.0000 U
H	2-Chloronaphthalene	380.0000 U
H	2-Chlorophenol	380.0000 U
H	2-Methylnaphthalene	380.0000 U
H	2-Methylphenol	380.0000 U
H	2-Nitrophenol	380.0000 U
H	3,3'-Dichlorobenzidine	380.0000 U
H	4-Bromophenyl-phenylether	380.0000 U

H	4-Chloro-3-methylphenol	380.0000 U
H	4-Chloroaniline	380.0000 U
H	4-Chlorophenyl-phenylether	380.0000 U
H	4-Methylphenol	380.0000 U
H	Acenaphthene	380.0000 U
H	Acenaphthylene	380.0000 U
H	Anthracene	380.0000 U
H	Arsenic	1.3000 U
H	Benzo(a)anthracene	380.0000 U
H	Benzo(a)pyrene	380.0000 U
H	Benzo(b)fluoranthene	380.0000 U
H	Benzo(g,h,i)perylene	380.0000 U
H	Benzo(k)fluoranthene	380.0000 U
H	Butylbenzylphthalate	380.0000 U
H	Carbazole	380.0000 UJ
H	Chrysene	380.0000 U
H	Di-n-octylphthalate	380.0000 U
H	Dibenz(a,h)anthracene	380.0000 U
H	Dibenzofuran	380.0000 U
H	Diethylphthalate	380.0000 U
H	Dimethylphthalate	380.0000 U
H	Fluoranthene	380.0000 U
H	Fluorene	380.0000 U
H	Hexachlorobenzene	380.0000 U
H	Hexachlorobutadiene	380.0000 U
H	Hexachlorocyclopentadiene	380.0000 UJ
H	Hexachloroethane	380.0000 U
H	Indeno(1,2,3-cd)pyrene	380.0000 U
H	Isophorone	380.0000 U
H	MCPP	62000.0000 J
H	N-Nitroso-di-n-propylamine	380.0000 U
H	N-Nitrosodiphenylamine (1)	380.0000 U
H	Naphthalene	380.0000 U
H	Nitrobenzene	380.0000 U
H	Phenanthrene	380.0000 U
H	Phenol	380.0000 U
H	Selenium	0.9900 U
H	Sodium	193.0000 U
H	Thallium	1.1000 U
H	bis(2-Chloroethoxy)methane	380.0000 U
H	bis(2-Chloroethyl)ether	380.0000 U

09S01600 low: 7/11 hi: 3/3

L	Antimony	0.5800 U
L	Beryllium	0.0200 U
L	Cadmium	0.0600 U
L	Cobalt	0.1400 U
L	Dieldrin	0.1800 J
L	Endosulfan II	0.0980 J
L	Nickel	0.2600 U
L	Potassium	12.7000 U
L	Silver	0.1600 U
L	alpha-Chlordane	0.4700 J
L	gamma-Chlordane	0.2400 J
H	Selenium	0.8700 U
H	Sodium	147.0000 U
H	Thallium	0.9900 U

09S01700 low: 6/8 hi: 6/14

L	Antimony	0.6200 U
L	Beryllium	0.0300 U
L	Cadmium	0.0900 U
L	Cobalt	0.1500 U
L	Heptachlor epoxide	0.1000 J
L	Nickel	0.3900 U
L	Potassium	33.5000 U
L	beta-BHC	0.2100 J
H	4,4'-DDD	25.0000 J
H	Arsenic	1.3000 U
H	Chromium	21.1000 J
H	Copper	5.6000 U

H	Dieldrin	9.1000 J
H	Endosulfan II	7.0000 J
H	Mercury	0.1300 J
H	Selenium	0.9400 U
H	Silver	60.1000
H	Sodium	246.0000 U
H	Thallium	1.1000 U
H	Zinc	11.5000 U
H	alpha-Chlordane	13.0000
H	gamma-Chlordane	9.4000

09S01800 low: 7/9 hi: 3/3

L	Antimony	0.6000 U
L	Beryllium	0.0200 U
L	Cadmium	0.0600 U
L	Cobalt	0.1400 U
L	Dieldrin	0.5700 J
L	Endrin	0.6100 J
L	Nickel	0.2700 U
L	Potassium	16.3000 U
L	Silver	0.1600 U
H	Selenium	0.9100 U
H	Sodium	164.0000 U
H	Thallium	1.0000 U

09S01800D low: 4/10 hi: 3/4

L	4,4'-DDD	1.2000 J
L	Antimony	0.6100 U
L	Cadmium	0.2100 U
L	Dieldrin	0.5400 J
L	Endrin	0.0810 J
L	Nickel	0.5300 U
L	Potassium	30.5000 U
L	Silver	0.3200 J
L	alpha-Chlordane	0.1300 J
L	gamma-BHC (Lindane)	0.1000 J
H	Beryllium	0.4600 J
H	Selenium	0.9300 U
H	Sodium	213.0000 U
H	Thallium	1.1000 U

09S01900 low: 7/8 hi: 3/3

L	Antimony	0.5700 U
L	Beryllium	0.0200 U
L	Cadmium	0.0600 U
L	Cobalt	0.1400 U
L	Dieldrin	0.2800 J
L	Nickel	0.2600 U
L	Potassium	14.2000 U
L	Silver	0.1600 U
H	Selenium	0.8700 U
H	Sodium	98.7000 U
H	Thallium	0.9900 U

09S02000 low: 69/72 hi: 3/3

L	1,2,4-Trichlorobenzene	10.0000 U
L	1,2-Dichlorobenzene	10.0000 U
L	1,3-Dichlorobenzene	10.0000 U
L	1,4-Dichlorobenzene	10.0000 U
L	2,2'-oxybis(1-Chloropropane)	10.0000 U
L	2,4,5-Trichlorophenol	25.0000 U
L	2,4,6-Trichlorophenol	10.0000 U
L	2,4-Dichlorophenol	10.0000 U
L	2,4-Dimethylphenol	10.0000 U
L	2,4-Dinitrophenol	25.0000 UJ
L	2,4-Dinitrotoluene	10.0000 U
L	2,6-Dinitrotoluene	10.0000 U
L	2-Chloronaphthalene	10.0000 U
L	2-Chlorophenol	10.0000 U
L	2-Methylnaphthalene	10.0000 U

L	2-Methylphenol	10.0000 U
L	2-Nitroaniline	25.0000 U
L	2-Nitrophenol	10.0000 U
L	3,3'-Dichlorobenzidine	10.0000 U
L	3-Nitroaniline	25.0000 U
L	4,6-Dinitro-2-methylphenol	25.0000 UJ
L	4-Bromophenyl-phenylether	10.0000 U
L	4-Chloro-3-methylphenol	10.0000 U
L	4-Chloroaniline	10.0000 U
L	4-Chlorophenyl-phenylether	10.0000 U
L	4-Methylphenol	10.0000 U
L	4-Nitroaniline	25.0000 U
L	4-Nitrophenol	25.0000 UJ
L	Acenaphthene	10.0000 U
L	Acenaphthylene	10.0000 U
L	Anthracene	10.0000 U
L	Antimony	0.5900 U
L	Benzo(a)anthracene	10.0000 U
L	Benzo(a)pyrene	10.0000 U
L	Benzo(b)fluoranthene	10.0000 U
L	Benzo(g,h,i)perylene	10.0000 U
L	Benzo(k)fluoranthene	10.0000 U
L	Beryllium	0.0300 U
L	Butylbenzylphthalate	10.0000 U
L	Cadmium	0.0600 U
L	Carbazole	10.0000 U
L	Chrysene	10.0000 U
L	Cobalt	0.1400 U
L	Di-n-butylphthalate	10.0000 UJ
L	Di-n-octylphthalate	1.0000 J
L	Dibenz(a,h)anthracene	10.0000 U
L	Dibenzofuran	10.0000 U
L	Diethylphthalate	10.0000 U
L	Dimethylphthalate	10.0000 U
L	Fluoranthene	10.0000 U
L	Fluorene	10.0000 U
L	Hexachlorobenzene	10.0000 U
L	Hexachlorobutadiene	10.0000 U
L	Hexachlorocyclopentadiene	10.0000 UJ
L	Hexachloroethane	10.0000 U
L	Indeno(1,2,3-cd)pyrene	10.0000 U
L	Isophorone	10.0000 U
L	N-Nitroso-di-n-propylamine	10.0000 U
L	N-Nitrosodiphenylamine (1)	10.0000 U
L	Naphthalene	10.0000 U
L	Nickel	0.2600 U
L	Nitrobenzene	10.0000 U
L	Pentachlorophenol	25.0000 U
L	Phenanthrene	10.0000 U
L	Phenol	10.0000 U
L	Potassium	35.9000 U
L	Pyrene	10.0000 U
L	Silver	0.1600 U
L	alpha-Chlordane	1.2000 J
L	bis(2-Chloroethoxy)methane	10.0000 U
L	bis(2-Chloroethyl)ether	10.0000 U
L	bis(2-Ethylhexyl)phthalate	3.0000 J
H	Selenium	0.9000 U
H	Sodium	168.0000 U
H	Thallium	1.0000 U

09S02100 low: 7/9 hi: 3/6

L	Antimony	0.5900 U
L	Beryllium	0.0300 U
L	Cadmium	0.0600 U
L	Cobalt	0.1400 U
L	Endrin	0.5600 J
L	Endrin aldehyde	0.3300 J
L	Nickel	0.2600 U
L	Potassium	18.8000 U
L	Silver	0.1600 U

H	Heptachlor epoxide	2.0000
H	Selenium	0.9000 U
H	Sodium	172.0000 U
H	Thallium	1.0000 U
H	alpha-Chlordane	27.0000 D
H	gamma-Chlordane	16.0000

09S02200 low: 4/8 hi: 5/13

L	Antimony	0.6000 U
L	Cadmium	0.1200 J
L	Cobalt	0.1400 U
L	Endosulfan II	1.1000 J
L	Heptachlor epoxide	1.7000 J
L	Nickel	0.4500 U
L	Potassium	29.3000 U
L	bis(2-Ethylhexyl)phthalate	81.0000 J
H	4,4'-DDE	20.0000
H	4,4'-DDT	24.0000
H	Barium	8.7000 J
H	Copper	3.2000 U
H	Lead	45.2000 J
H	Manganese	11.2000 J
H	Mercury	0.1300 J
H	Selenium	0.9100 U
H	Silver	0.6900 J
H	Sodium	227.0000 U
H	Thallium	1.0000 U
H	Zinc	27.0000 U
H	alpha-Chlordane	14.0000

09S02300 low: 6/7 hi: 77/84

L	Antimony	0.6600 U
L	Cadmium	0.2800 U
L	Cobalt	0.1800 U
L	Endrin aldehyde	0.3200 J
L	Nickel	0.4800 U
L	Potassium	30.9000 U
L	Silver	0.1800 U
H	1,2,4-Trichlorobenzene	380.0000 UJ
H	1,2-Dichlorobenzene	380.0000 U
H	1,3-Dichlorobenzene	380.0000 U
H	1,4-Dichlorobenzene	380.0000 U
H	2,2'-oxybis(1-Chloropropane)	380.0000 U
H	2,4,5-Trichlorophenol	950.0000 U
H	2,4,6-Trichlorophenol	380.0000 U
H	2,4-Dichlorophenol	380.0000 U
H	2,4-Dimethylphenol	380.0000 U
H	2,4-Dinitrophenol	950.0000 UJ
H	2,4-Dinitrotoluene	380.0000 U
H	2,6-Dinitrotoluene	380.0000 U
H	2-Chloronaphthalene	380.0000 U
H	2-Chlorophenol	380.0000 U
H	2-Methylnaphthalene	380.0000 U
H	2-Methylphenol	380.0000 U
H	2-Nitroaniline	950.0000 U
H	2-Nitrophenol	380.0000 U
H	3,3'-Dichlorobenzidine	380.0000 U
H	3-Nitroaniline	950.0000 UJ
H	4,4'-DDE	55.0000
H	4,4'-DDT	38.0000
H	4,6-Dinitro-2-methylphenol	950.0000 U
H	4-Bromophenyl-phenylether	380.0000 U
H	4-Chloro-3-methylphenol	380.0000 U
H	4-Chloroaniline	380.0000 UJ
H	4-Chlorophenyl-phenylether	380.0000 U
H	4-Methylphenol	380.0000 U
H	4-Nitroaniline	950.0000 UJ
H	4-Nitrophenol	950.0000 U
H	Acenaphthene	380.0000 U
H	Acenaphthylene	380.0000 U
H	Aldrin	2.0000 U

H	Anthracene	380.0000 U
H	Arsenic	1.3000 U
H	Barium	7.4000 J
H	Benzo(a)anthracene	380.0000 U
H	Benzo(a)pyrene	380.0000 U
H	Benzo(b)fluoranthene	380.0000 U
H	Benzo(g,h,i)perylene	380.0000 U
H	Benzo(k)fluoranthene	380.0000 U
H	Butylbenzylphthalate	380.0000 U
H	Carbazole	380.0000 UJ
H	Chrysene	380.0000 U
H	Copper	3.8000 J
H	Di-n-octylphthalate	380.0000 U
H	Dibenz(a,h)anthracene	380.0000 U
H	Dibenzofuran	380.0000 U
H	Diethylphthalate	380.0000 U
H	Dimethylphthalate	380.0000 U
H	Endosulfan I	2.0000 U
H	Fluoranthene	380.0000 U
H	Fluorene	380.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	5.4000
H	Hexachlorobenzene	380.0000 U
H	Hexachlorobutadiene	380.0000 U
H	Hexachlorocyclopentadiene	380.0000 U
H	Hexachloroethane	380.0000 U
H	Indeno(1,2,3-cd)pyrene	380.0000 U
H	Isophorone	380.0000 U
H	Lead	43.7000 J
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	380.0000 U
H	N-Nitrosodiphenylamine (1)	380.0000 U
H	Naphthalene	380.0000 U
H	Nitrobenzene	380.0000 U
H	Pentachlorophenol	950.0000 UJ
H	Phenanthrene	380.0000 U
H	Phenol	380.0000 U
H	Pyrene	380.0000 U
H	Selenium	1.0000 U
H	Sodium	144.0000 U
H	Thallium	1.1000 U
H	Toxaphene	200.0000 U
H	Zinc	14.7000 U
H	alpha-BHC	2.0000 U
H	alpha-Chlordane	33.0000 D
H	beta-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	380.0000 U
H	bis(2-Chloroethyl)ether	380.0000 UJ
H	bis(2-Ethylhexyl)phthalate	380.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U

09S02400 low: 4/7 hi: 79/89

L	Antimony	0.6700 U
L	Cobalt	0.3000 U
L	Dieldrin	2.1000 J
L	Endrin	0.7400 J
L	Endrin aldehyde	0.2800 J
L	Nickel	1.5000 U
L	Potassium	30.0000 U
H	1,2,4-Trichlorobenzene	380.0000 UJ
H	1,2-Dichlorobenzene	380.0000 UJ
H	1,3-Dichlorobenzene	380.0000 UJ
H	1,4-Dichlorobenzene	380.0000 UJ
H	2,2'-oxybis(1-Chloropropane)	380.0000 UJ
H	2,4,5-Trichlorophenol	950.0000 UJ
H	2,4,6-Trichlorophenol	380.0000 UJ
H	2,4-Dichlorophenol	380.0000 UJ
H	2,4-Dimethylphenol	380.0000 UJ
H	2,4-Dinitrophenol	950.0000 UJ
H	2,4-Dinitrotoluene	380.0000 UJ
H	2,6-Dinitrotoluene	380.0000 UJ

H	2-Chloronaphthalene	380.0000 UJ
H	2-Chlorophenol	380.0000 UJ
H	2-Methylnaphthalene	380.0000 UJ
H	2-Methylphenol	380.0000 UJ
H	2-Nitroaniline	950.0000 UJ
H	2-Nitrophenol	380.0000 UJ
H	3,3'-Dichlorobenzidine	380.0000 UJ
H	3-Nitroaniline	950.0000 UJ
H	4,4'-DDE	39.0000
H	4,4'-DDT	16.0000 J
H	4,6-Dinitro-2-methylphenol	950.0000 UJ
H	4-Bromophenyl-phenylether	380.0000 UJ
H	4-Chloro-3-methylphenol	380.0000 UJ
H	4-Chloroaniline	380.0000 UJ
H	4-Chlorophenyl-phenylether	380.0000 UJ
H	4-Methylphenol	380.0000 UJ
H	4-Nitroaniline	950.0000 UJ
H	4-Nitrophenol	950.0000 UJ
H	Acenaphthene	380.0000 UJ
H	Acenaphthylene	380.0000 UJ
H	Aldrin	2.0000 U
H	Anthracene	380.0000 UJ
H	Arsenic	1.4000 U
H	Barium	35.2000 J
H	Benzo(a)anthracene	380.0000 UJ
H	Benzo(a)pyrene	380.0000 UJ
H	Benzo(b)fluoranthene	380.0000 UJ
H	Benzo(g,h,i)perylene	380.0000 UJ
H	Benzo(k)fluoranthene	380.0000 UJ
H	Beryllium	0.1200 U
H	Butylbenzylphthalate	380.0000 UJ
H	Cadmium	0.7400 J
H	Carbazole	380.0000 UJ
H	Chromium	11.3000
H	Chrysene	380.0000 UJ
H	Copper	10.0000
H	Di-n-octylphthalate	380.0000 UJ
H	Dibenz(a,h)anthracene	380.0000 UJ
H	Dibenzofuran	380.0000 UJ
H	Diethylphthalate	380.0000 UJ
H	Dimethylphthalate	380.0000 UJ
H	Endosulfan I	2.0000 U
H	Fluoranthene	380.0000 UJ
H	Fluorene	380.0000 UJ
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	3.9000
H	Hexachlorobenzene	380.0000 UJ
H	Hexachlorobutadiene	380.0000 UJ
H	Hexachlorocyclopentadiene	380.0000 UJ
H	Hexachloroethane	380.0000 UJ
H	Indeno(1,2,3-cd)pyrene	380.0000 UJ
H	Isophorone	380.0000 UJ
H	Lead	25.0000 J
H	Mercury	0.1000 U
H	Methoxychlor	20.0000 U
H	N-Nitroso-di-n-propylamine	380.0000 UJ
H	N-Nitrosodiphenylamine (1)	380.0000 UJ
H	Naphthalene	380.0000 UJ
H	Nitrobenzene	380.0000 UJ
H	Pentachlorophenol	950.0000 UJ
H	Phenanthrene	380.0000 UJ
H	Phenol	380.0000 UJ
H	Pyrene	380.0000 UJ
H	Selenium	1.0000 U
H	Silver	0.5700 J
H	Sodium	157.0000 U
H	Thallium	1.1000 U
H	Toxaphene	200.0000 U
H	Zinc	30.0000 U
H	alpha-BHC	2.0000 U
H	alpha-Chlordane	44.0000 D
H	beta-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	380.0000 UJ

H	bis(2-Chloroethyl)ether	380.0000 UJ
H	bis(2-Ethylhexyl)phthalate	380.0000 UJ
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U

09S02500 low: 5/7 hi: 90/101

L	Antimony	0.7300 U
L	Cadmium	0.1100 U
L	Cobalt	0.1800 U
L	Endrin aldehyde	1.3000 J
L	Nickel	0.5300 U
L	Potassium	46.2000 U
L	gamma-BHC (Lindane)	0.4600 J
H	1,2,4-Trichlorobenzene	420.0000 UJ
H	1,2-Dichlorobenzene	420.0000 UJ
H	1,3-Dichlorobenzene	420.0000 UJ
H	1,4-Dichlorobenzene	420.0000 UJ
H	2,2'-oxybis(1-Chloropropane)	420.0000 UJ
H	2,4,5-Trichlorophenol	1100.0000 UJ
H	2,4,6-Trichlorophenol	420.0000 UJ
H	2,4-Dichlorophenol	420.0000 UJ
H	2,4-Dimethylphenol	420.0000 UJ
H	2,4-Dinitrophenol	1100.0000 UJ
H	2,4-Dinitrotoluene	420.0000 UJ
H	2,6-Dinitrotoluene	420.0000 UJ
H	2-Chloronaphthalene	420.0000 UJ
H	2-Chlorophenol	420.0000 UJ
H	2-Methylnaphthalene	420.0000 UJ
H	2-Methylphenol	420.0000 UJ
H	2-Nitroaniline	1100.0000 UJ
H	2-Nitrophenol	420.0000 UJ
H	3,3'-Dichlorobenzidine	420.0000 UJ
H	3-Nitroaniline	1100.0000 UJ
H	4,4'-DDD	4.2000 U
H	4,4'-DDE	24.0000 J
H	4,4'-DDT	37.0000 J
H	4,6-Dinitro-2-methylphenol	1100.0000 UJ
H	4-Bromophenyl-phenylether	420.0000 UJ
H	4-Chloro-3-methylphenol	420.0000 UJ
H	4-Chloroaniline	420.0000 UJ
H	4-Chlorophenyl-phenylether	420.0000 UJ
H	4-Methylphenol	420.0000 UJ
H	4-Nitroaniline	1100.0000 UJ
H	4-Nitrophenol	1100.0000 UJ
H	Acenaphthene	420.0000 UJ
H	Acenaphthylene	420.0000 UJ
H	Aldrin	2.2000 U
H	Anthracene	420.0000 UJ
H	Aroclor-1016	42.0000 U
H	Aroclor-1221	85.0000 U
H	Aroclor-1232	42.0000 U
H	Aroclor-1242	42.0000 U
H	Aroclor-1248	42.0000 U
H	Aroclor-1254	42.0000 U
H	Aroclor-1260	42.0000 U
H	Arsenic	1.5000 U
H	Barium	20.7000 J
H	Benzo(a)anthracene	420.0000 UJ
H	Benzo(a)pyrene	420.0000 UJ
H	Benzo(b)fluoranthene	420.0000 UJ
H	Benzo(g,h,i)perylene	420.0000 UJ
H	Benzo(k)fluoranthene	420.0000 UJ
H	Beryllium	0.1100 U
H	Butylbenzylphthalate	420.0000 UJ
H	Carbazole	420.0000 UJ
H	Chrysene	420.0000 UJ
H	Copper	3.2000 J
H	Di-n-octylphthalate	420.0000 UJ
H	Dibenz(a,h)anthracene	420.0000 UJ
H	Dibenzofuran	420.0000 UJ
H	Dieldrin	4.2000 U
H	Diethylphthalate	420.0000 UJ

H	Dimethylphthalate	420.0000 UJ
H	Dinoseb	320.0000 J
H	Endosulfan I	2.2000 U
H	Endosulfan II	4.2000 U
H	Endosulfan sulfate	4.2000 U
H	Endrin	8.7000 J
H	Endrin ketone	4.2000 U
H	Fluoranthene	420.0000 UJ
H	Fluorene	420.0000 UJ
H	Heptachlor	2.2000 U
H	Heptachlor epoxide	27.0000
H	Hexachlorobenzene	420.0000 UJ
H	Hexachlorobutadiene	420.0000 UJ
H	Hexachlorocyclopentadiene	420.0000 UJ
H	Hexachloroethane	420.0000 UJ
H	Indeno(1,2,3-cd)pyrene	420.0000 UJ
H	Isophorone	420.0000 UJ
H	MCPP	57000.0000 U
H	Mercury	0.2300 J
H	Methoxychlor	22.0000 U
H	N-Nitroso-di-n-propylamine	420.0000 UJ
H	N-Nitrosodiphenylamine (1)	420.0000 UJ
H	Naphthalene	420.0000 UJ
H	Nitrobenzene	420.0000 UJ
H	Pentachlorophenol	1100.0000 UJ
H	Phenanthrene	420.0000 UJ
H	Phenol	420.0000 UJ
H	Pyrene	420.0000 UJ
H	Selenium	1.1000 U
H	Silver	2.5000 J
H	Sodium	163.0000 U
H	Thallium	1.3000 U
H	Toxaphene	220.0000 U
H	Zinc	11.7000 U
H	alpha-BHC	2.2000 U
H	alpha-Chlordane	530.0000 D
H	beta-BHC	2.2000 U
H	bis(2-Chloroethoxy)methane	420.0000 UJ
H	bis(2-Chloroethyl)ether	420.0000 UJ
H	bis(2-Ethylhexyl)phthalate	420.0000 UJ
H	delta-BHC	2.2000 U
H	gamma-Chlordane	500.0000 D

09S02600 low: 5/6 hi: 10/16

L	Antimony	0.6400 U
L	Cadmium	0.0700 U
L	Cobalt	0.3700 U
L	Endrin	0.2400 J
L	Nickel	1.4000 U
L	Silver	0.1800 U
H	Arsenic	1.3000 U
H	Barium	37.4000 J
H	Beryllium	0.4400 U
H	Calcium	153000.0000 J
H	Chromium	5.6000
H	Copper	4.4000 J
H	Di-n-octylphthalate	370.0000 UJ
H	Magnesium	3080.0000 U
H	Manganese	103.0000
H	Mercury	0.0800 U
H	Potassium	417.0000 U
H	Selenium	0.9700 U
H	Sodium	235.0000 U
H	Thallium	1.1000 U
H	Vanadium	6.6000 J
H	Zinc	9.7000 U

09S02700 low: 5/11 hi: 76/88

L	Antimony	0.6800 U
L	Benzo(b)fluoranthene	58.0000 J
L	Benzo(k)fluoranthene	60.0000 J
L	Cadmium	0.0700 U

L	Cobalt	0.4200 U
L	Endosulfan sulfate	0.2800 J
L	Endrin	0.7500 J
L	Fluoranthene	30.0000 J
L	Nickel	1.5000 U
L	Pyrene	40.0000 J
L	Silver	0.1900 U
H	1,2,4-Trichlorobenzene	390.0000 U
H	1,2-Dichlorobenzene	390.0000 U
H	1,3-Dichlorobenzene	390.0000 U
H	1,4-Dichlorobenzene	390.0000 U
H	2,2'-oxybis(1-Chloropropane)	390.0000 U
H	2,4,5-Trichlorophenol	980.0000 U
H	2,4,6-Trichlorophenol	390.0000 U
H	2,4-Dichlorophenol	390.0000 U
H	2,4-Dimethylphenol	390.0000 U
H	2,4-Dinitrophenol	980.0000 U
H	2,4-Dinitrotoluene	390.0000 U
H	2,6-Dinitrotoluene	390.0000 U
H	2-Chloronaphthalene	390.0000 U
H	2-Chlorophenol	390.0000 U
H	2-Methylnaphthalene	390.0000 U
H	2-Methylphenol	390.0000 U
H	2-Nitroaniline	980.0000 U
H	2-Nitrophenol	390.0000 U
H	3,3'-Dichlorobenzidine	390.0000 U
H	3-Nitroaniline	980.0000 U
H	4,4'-DDD	4.6000 J
H	4,4'-DDE	140.0000 D
H	4,4'-DDT	76.0000 D
H	4,6-Dinitro-2-methylphenol	980.0000 U
H	4-Bromophenyl-phenylether	390.0000 U
H	4-Chloro-3-methylphenol	390.0000 U
H	4-Chloroaniline	390.0000 U
H	4-Chlorophenyl-phenylether	390.0000 U
H	4-Methylphenol	390.0000 U
H	4-Nitroaniline	980.0000 U
H	4-Nitrophenol	980.0000 U
H	Acenaphthene	390.0000 U
H	Acenaphthylene	390.0000 U
H	Aldrin	2.0000 U
H	Aluminum	3160.0000
H	Anthracene	390.0000 U
H	Arsenic	1.4000 U
H	Barium	65.3000
H	Benzo(a)anthracene	390.0000 U
H	Benzo(a)pyrene	390.0000 U
H	Benzo(g,h,i)perylene	390.0000 U
H	Beryllium	0.5800 J
H	Butylbenzylphthalate	390.0000 U
H	Calcium	91100.0000 J
H	Carbazole	390.0000 U
H	Chrysene	390.0000 U
H	Di-n-octylphthalate	390.0000 U
H	Dibenz(a,h)anthracene	390.0000 U
H	Dibenzofuran	390.0000 U
H	Diethylphthalate	390.0000 U
H	Dimethylphthalate	390.0000 U
H	Endosulfan I	2.0000 U
H	Fluorene	390.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Hexachlorobenzene	390.0000 U
H	Hexachlorobutadiene	390.0000 U
H	Hexachlorocyclopentadiene	390.0000 U
H	Hexachloroethane	390.0000 U
H	Indeno(1,2,3-cd)pyrene	390.0000 U
H	Iron	975.0000
H	Isophorone	390.0000 U
H	Magnesium	2390.0000 U
H	Manganese	111.0000
H	Methoxychlor	20.0000 U

H	N-Nitroso-di-n-propylamine	390.0000 U
H	N-Nitrosodiphenylamine (1)	390.0000 U
H	Naphthalene	390.0000 U
H	Nitrobenzene	390.0000 U
H	Pentachlorophenol	980.0000 U
H	Phenanthrene	390.0000 U
H	Phenol	390.0000 U
H	Potassium	342.0000 U
H	Selenium	1.0000 U
H	Sodium	178.0000 U
H	Thallium	1.2000 U
H	Toxaphene	200.0000 U
H	Vanadium	6.9000 J
H	Zinc	13.5000 U
H	alpha-BHC	2.0000 U
H	alpha-Chlordane	5.5000
H	beta-BHC	2.0000 U
H	bis(2-Chloroethoxy)methane	390.0000 U
H	bis(2-Chloroethyl)ether	390.0000 U
H	bis(2-Ethylhexyl)phthalate	390.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U
H	gamma-Chlordane	6.2000

09S02800 low: 5/8 hi: 8/16

L	Antimony	0.6400 U
L	Cadmium	0.0700 U
L	Cobalt	0.1600 U
L	Endrin	0.5100 J
L	Endrin aldehyde	0.3800 J
L	Heptachlor epoxide	0.3400 J
L	Nickel	0.3300 U
L	Silver	0.1800 U
H	4,4'-DDE	110.0000 DJ
H	4,4'-DDT	110.0000 DJ
H	Arsenic	1.3000 U
H	Barium	35.3000 J
H	Beryllium	0.5900 J
H	Calcium	24100.0000
H	Di-n-octylphthalate	370.0000 U
H	Magnesium	2610.0000 U
H	Manganese	97.8000
H	Potassium	373.0000 U
H	Selenium	0.9800 U
H	Sodium	259.0000 U
H	Thallium	1.1000 U
H	Zinc	8.8000 U
H	alpha-Chlordane	24.0000
H	gamma-Chlordane	25.0000

09S02901 low: 6/9 hi: 15/18

L	Antimony	0.5900 U
L	Cadmium	0.0700 U
L	Cobalt	0.1900 U
L	Dieldrin	1.1000 J
L	Endrin	2.0000 J
L	Endrin ketone	0.2000 J
L	Nickel	0.2900 U
L	Potassium	13.5000 U
L	Silver	0.1700 U
H	4,4'-DDD	9.7000 J
H	Aldrin	2.0000 U
H	Aroclor-1221	81.0000 U
H	Beryllium	0.1200 U
H	Endosulfan I	2.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Methoxychlor	20.0000 U
H	Selenium	0.8600 U
H	Sodium	182.0000 U
H	Thallium	1.0000 U

H	Toxaphene	200.0000 U
H	alpha-BHC	2.0000 U
H	alpha-Chlordane	20.0000
H	beta-BHC	2.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U
H	gamma-Chlordane	18.0000

09S02901D low: 5/6 hi: 14/16

L	Antimony	0.5600 U
L	Cadmium	0.0700 U
L	Cobalt	0.1800 U
L	Nickel	0.2700 J
L	Potassium	13.9000 U
L	Silver	0.1600 U
H	Aldrin	2.0000 U
H	Beryllium	0.1300 U
H	Endosulfan I	2.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Methoxychlor	20.0000 U
H	Selenium	0.8000 U
H	Sodium	144.0000 U
H	Thallium	0.9300 U
H	Toxaphene	200.0000 U
H	alpha-BHC	2.0000 U
H	alpha-Chlordane	5.0000
H	beta-BHC	2.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U
H	gamma-Chlordane	3.8000

09S03001 low: 4/9 hi: 25/41

L	Antimony	4.4000 J
L	Cadmium	0.1200 U
L	Cobalt	0.3300 U
L	Endosulfan sulfate	1.2000 J
L	Endrin	2.9000 J
L	Endrin ketone	1.4000 J
L	Methoxychlor	2.2000 J
L	Potassium	56.6000 U
L	Silver	0.2900 U
H	4,4'-DDD	22.0000 J
H	4,4'-DDE	32.0000
H	4,4'-DDT	18.0000
H	Aldrin	3.9000 U
H	Aluminum	7170.0000
H	Aroclor-1016	75.0000 U
H	Aroclor-1221	150.0000 U
H	Aroclor-1232	75.0000 U
H	Aroclor-1242	75.0000 U
H	Aroclor-1248	75.0000 U
H	Aroclor-1254	75.0000 U
H	Aroclor-1260	75.0000 U
H	Arsenic	1.3000 U
H	Barium	19.1000 J
H	Beryllium	0.3800 U
H	Chromium	7.9000
H	Copper	6.8000 J
H	Dicamba	85.0000 J
H	Dieldrin	11.0000 J
H	Endosulfan I	3.9000 U
H	Endosulfan II	7.5000 U
H	Endrin aldehyde	7.5000 U
H	Heptachlor	2.3000 J
H	Heptachlor epoxide	3.9000 U
H	Lead	50.1000
H	MCPA	67000.0000 J
H	Magnesium	329.0000 U
H	Mercury	0.1100 U
H	Nickel	2.3000 J

H	Selenium	1.5000 U
H	Sodium	457.0000 U
H	Thallium	1.7000 U
H	Toxaphene	390.0000 U
H	Vanadium	4.1000 J
H	Zinc	9.3000 U
H	alpha-BHC	3.9000 U
H	alpha-Chlordane	33.0000
H	beta-BHC	3.9000 U
H	delta-BHC	3.9000 U
H	gamma-BHC (Lindane)	3.9000 U
H	gamma-Chlordane	17.0000 J

09S03101 low: 4/5 hi: 28/44

L	Antimony	1.1000 U
L	Cadmium	0.1300 U
L	Cobalt	0.3600 U
L	Heptachlor	1.1000 J
L	Silver	0.3100 U
H	4,4'-DDD	120.0000 J
H	4,4'-DDE	170.0000 D
H	4,4'-DDT	38.0000
H	Aldrin	3.9000 U
H	Aluminum	6720.0000
H	Aroclor-1016	76.0000 U
H	Aroclor-1221	150.0000 U
H	Aroclor-1232	76.0000 U
H	Aroclor-1242	76.0000 U
H	Aroclor-1248	76.0000 U
H	Aroclor-1254	76.0000 U
H	Aroclor-1260	76.0000 U
H	Arsenic	6.0000
H	Barium	25.3000 J
H	Beryllium	0.4200 U
H	Calcium	12000.0000 U
H	Chromium	8.7000
H	Copper	11.0000 J
H	Dieldrin	17.0000 J
H	Endosulfan I	3.9000 U
H	Endosulfan II	7.6000 U
H	Endosulfan sulfate	7.6000 U
H	Endrin	11.0000 J
H	Endrin aldehyde	7.6000 U
H	Endrin ketone	7.6000 U
H	Heptachlor epoxide	3.0000 J
H	Lead	44.7000
H	Magnesium	562.0000 U
H	Manganese	22.6000 U
H	Mercury	0.1000 U
H	Methoxychlor	39.0000 U
H	Nickel	2.5000 J
H	Selenium	1.6000 U
H	Sodium	399.0000 U
H	Thallium	1.9000 U
H	Toxaphene	390.0000 U
H	Vanadium	4.2000 J
H	Zinc	21.3000 U
H	alpha-BHC	3.9000 U
H	alpha-Chlordane	520.0000 D
H	beta-BHC	3.9000 U
H	delta-BHC	3.9000 U
H	gamma-BHC (Lindane)	3.9000 U
H	gamma-Chlordane	360.0000 D

09S03201 low: 5/7 hi: 25/31

L	Antimony	0.7300 U
L	Cadmium	0.0900 U
L	Cobalt	0.2300 U
L	Heptachlor	0.1200 J
L	Nickel	0.4400 J
L	Potassium	22.9000 U
L	Silver	0.2100 U

H	4,4'-DDD	19.0000 J
H	4,4'-DDE	18.0000
H	Aldrin	2.5000 U
H	Aroclor-1016	49.0000 U
H	Aroclor-1221	100.0000 U
H	Aroclor-1232	49.0000 U
H	Aroclor-1242	49.0000 U
H	Aroclor-1248	49.0000 U
H	Aroclor-1254	49.0000 U
H	Aroclor-1260	49.0000 U
H	Arsenic	2.9000 J
H	Beryllium	0.1400 U
H	Dieldrin	4.9000 U
H	Endosulfan I	2.5000 U
H	Endosulfan II	4.9000 U
H	Endosulfan sulfate	4.9000 U
H	Endrin	4.5000 J
H	Endrin aldehyde	4.9000 U
H	Endrin ketone	4.9000 U
H	Heptachlor epoxide	2.5000 U
H	Methoxychlor	25.0000 U
H	Selenium	1.1000 U
H	Sodium	198.0000 U
H	Thallium	1.2000 U
H	Toxaphene	250.0000 U
H	alpha-BHC	2.5000 U
H	alpha-Chlordane	110.0000 D
H	beta-BHC	2.5000 U
H	delta-BHC	2.5000 U
H	gamma-BHC (Lindane)	2.5000 U
H	gamma-Chlordane	91.0000 D

09S03301 low: 2/3 hi: 28/41

L	Antimony	1.5000 U
L	Cadmium	0.1900 U
L	Dieldrin	2.1000 J
H	4,4'-DDD	10.0000 U
H	4,4'-DDE	17.0000 J
H	Aldrin	5.3000 U
H	Aluminum	14300.0000
H	Aroclor-1016	100.0000 U
H	Aroclor-1221	210.0000 U
H	Aroclor-1232	100.0000 U
H	Aroclor-1242	100.0000 U
H	Aroclor-1248	100.0000 U
H	Aroclor-1254	100.0000 U
H	Aroclor-1260	100.0000 U
H	Arsenic	5.9000 J
H	Barium	23.2000 J
H	Beryllium	0.6600 J
H	Chromium	16.0000
H	Copper	9.7000 J
H	Endosulfan I	5.3000 U
H	Endosulfan II	10.0000 U
H	Endosulfan sulfate	10.0000 U
H	Endrin	10.0000 U
H	Endrin aldehyde	10.0000 U
H	Endrin ketone	10.0000 U
H	Heptachlor	5.3000 U
H	Heptachlor epoxide	5.3000 U
H	Magnesium	637.0000 U
H	Mercury	0.2700 J
H	Methoxychlor	53.0000 U
H	Nickel	4.5000 J
H	Potassium	95.4000 U
H	Selenium	5.5000 J
H	Sodium	417.0000 U
H	Thallium	2.6000 U
H	Toxaphene	530.0000 U
H	Vanadium	10.1000 J
H	Zinc	22.7000 U
H	alpha-BHC	5.3000 U

H	alpha-Chlordane	130.0000 DJ
H	beta-BHC	5.3000 U
H	delta-BHC	5.3000 U
H	gamma-BHC (Lindane)	5.3000 U
H	gamma-Chlordane	120.0000 D

09S03401 low: 5/6 hi: 26/38

L	Antimony	0.7000 U
L	Cadmium	0.0800 U
L	Cobalt	0.2200 U
L	Nickel	1.1000 J
L	Potassium	28.0000 U
L	Silver	0.1900 U
H	4,4'-DDD	340.0000 J
H	4,4'-DDE	360.0000 J
H	4,4'-DDT	160.0000 J
H	Aldrin	46.0000 U
H	Aroclor-1016	900.0000 U
H	Aroclor-1221	1800.0000 U
H	Aroclor-1232	900.0000 U
H	Aroclor-1242	900.0000 U
H	Aroclor-1248	900.0000 U
H	Aroclor-1254	900.0000 U
H	Aroclor-1260	900.0000 U
H	Barium	16.0000 J
H	Beryllium	0.2500 U
H	Copper	54.0000
H	Dieldrin	14.0000 J
H	Endosulfan I	46.0000 U
H	Endosulfan II	90.0000 U
H	Endosulfan sulfate	90.0000 U
H	Endrin	54.0000 J
H	Endrin aldehyde	90.0000 U
H	Endrin ketone	90.0000 U
H	Heptachlor	46.0000 U
H	Heptachlor epoxide	29.0000 J
H	Lead	19.9000
H	Magnesium	223.0000 U
H	Manganese	14.5000 U
H	Methoxychlor	460.0000 U
H	Selenium	1.0000 U
H	Sodium	169.0000 U
H	Thallium	1.2000 U
H	Toxaphene	4600.0000 U
H	Zinc	63.4000 J
H	alpha-BHC	46.0000 U
H	alpha-Chlordane	2200.0000 D
H	beta-BHC	46.0000 U
H	delta-BHC	46.0000 U
H	gamma-BHC (Lindane)	46.0000 U
H	gamma-Chlordane	2200.0000 D

09S03501 low: 6/8 hi: 13/13

L	Antimony	0.5600 U
L	Cadmium	0.0700 U
L	Cobalt	0.1800 U
L	Methoxychlor	1.9000 J
L	Nickel	0.2700 U
L	Potassium	25.1000 U
L	Silver	0.1600 U
L	alpha-Chlordane	0.8300 J
H	Aldrin	2.0000 U
H	Beryllium	0.1200 U
H	Endosulfan I	2.0000 U
H	Heptachlor	2.0000 U
H	Heptachlor epoxide	2.0000 U
H	Selenium	0.8100 U
H	Sodium	131.0000 U
H	Thallium	0.9400 U
H	Toxaphene	200.0000 U
H	alpha-BHC	2.0000 U

H	beta-BHC	2.0000 U
H	delta-BHC	2.0000 U
H	gamma-BHC (Lindane)	2.0000 U

09S03601 low: 5/10 hi: 6/8

L	Antimony	0.5200 U
L	Cadmium	0.0600 U
L	Cobalt	0.1700 U
L	Dieldrin	0.1500 J
L	Heptachlor epoxide	0.4800 J
L	Nickel	0.8300 J
L	Potassium	52.1000 U
L	Silver	0.1500 U
L	alpha-Chlordane	0.4300 J
L	gamma-Chlordane	0.1700 J
H	Beryllium	0.1100 U
H	Calcium	120000.0000
H	Copper	13.1000
H	Magnesium	735.0000 U
H	Manganese	13.9000 U
H	Selenium	0.7500 U
H	Sodium	201.0000 U
H	Thallium	0.8800 U

Outside values - parameters counts

parameter	low values BDL/total	high values: BDL/total
1,2,4-Trichlorobenzene	1/1	59/59
1,2-Dichlorobenzene	1/1	59/59
1,3-Dichlorobenzene	1/1	59/59
1,4-Dichlorobenzene	1/1	59/59
2,2'-oxybis(1-Chloropropane)	1/1	59/59
2,4,5-Trichlorophenol	1/1	57/57
2,4,6-Trichlorophenol	1/1	59/59
2,4-DB	0/0	0/1
2,4-Dichlorophenol	1/1	59/59
2,4-Dimethylphenol	1/1	59/59
2,4-Dinitrophenol	1/1	57/57
2,4-Dinitrotoluene	1/1	59/59
2,6-Dinitrotoluene	1/1	59/59
2-Chloronaphthalene	1/1	59/59
2-Chlorophenol	1/1	59/59
2-Methylnaphthalene	1/2	58/58
2-Methylphenol	1/1	59/59
2-Nitroaniline	1/1	57/57
2-Nitrophenol	1/1	59/59
3,3'-Dichlorobenzidine	1/1	59/59
3-Nitroaniline	1/1	57/57
4,4'-DDD	0/6	20/53
4,4'-DDE	0/0	2/42
4,4'-DDT	0/0	0/27
4,6-Dinitro-2-methylphenol	1/1	57/57
4-Bromophenyl-phenylether	1/1	59/59
4-Chloro-3-methylphenol	1/1	59/59
4-Chloroaniline	1/1	59/59
4-Chlorophenyl-phenylether	1/1	59/59
4-Methylphenol	1/1	59/59
4-Nitroaniline	1/1	57/57
4-Nitrophenol	1/1	57/57
Acenaphthene	1/1	59/59
Acenaphthylene	1/4	56/56
Aldrin	2/8	57/58
Aluminum	0/0	0/12
Anthracene	1/1	58/59
Antimony	82/89	0/3
Aroclor-1016	0/0	45/45
Aroclor-1221	0/0	52/52
Aroclor-1232	0/0	45/45
Aroclor-1242	0/0	45/45
Aroclor-1248	0/0	45/45
Aroclor-1254	0/0	45/45

Aroclor-1260	0/0	44/47
Arsenic	0/0	19/74
Barium	0/0	1/51
Benzo(a)anthracene	1/15	42/43
Benzo(a)pyrene	1/14	44/46
Benzo(b)fluoranthene	1/18	37/41
Benzo(g,h,i)perylene	1/13	47/47
Benzo(k)fluoranthene	1/19	39/40
Beryllium	15/15	65/74
Butylbenzylphthalate	1/1	58/59
Cadmium	61/67	0/23
Calcium	0/0	4/41
Carbazole	1/2	58/58
Chromium	0/0	0/49
Chrysene	1/17	41/44
Cobalt	73/83	2/5
Copper	0/0	9/70
Di-n-butylphthalate	1/5	28/28
Di-n-octylphthalate	0/1	69/69
Dibenz(a,h)anthracene	1/7	53/53
Dibenzofuran	1/1	59/59
Dicamba	0/0	0/1
Dieldrin	0/25	26/42
Diethylphthalate	1/1	59/59
Dimethylphthalate	1/1	59/59
Dinoseb	0/0	0/4
Endosulfan I	1/6	59/59
Endosulfan II	0/9	39/42
Endosulfan sulfate	0/13	34/37
Endrin	0/15	32/41
Endrin aldehyde	0/31	31/33
Endrin ketone	0/7	39/39
Fluoranthene	1/20	37/42
Fluorene	1/1	59/59
Heptachlor	2/5	59/61
Heptachlor epoxide	1/25	37/49
Hexachlorobenzene	1/1	59/59
Hexachlorobutadiene	1/1	59/59
Hexachlorocyclopentadiene	1/1	59/59
Hexachloroethane	1/1	59/59
Indeno(1,2,3-cd)pyrene	1/12	47/48
Iron	0/0	0/26
Isophorone	1/1	59/59
Lead	0/0	1/47
MCPA	0/0	0/1
MCPP	0/0	2/5
Magnesium	0/0	48/48
Manganese	0/0	9/53
Mercury	0/0	21/60
Methoxychlor	2/6	59/60
N-Nitroso-di-n-propylamine	1/1	59/59
N-Nitrosodiphenylamine (1)	1/1	59/59
Naphthalene	1/1	59/59
Nickel	43/64	0/23
Nitrobenzene	1/1	59/59
Pentachlorophenol	1/1	57/57
Phenanthrene	1/7	54/54
Phenol	1/1	59/59
Potassium	62/62	25/25
Pyrene	1/21	35/40
Selenium	0/0	85/95
Silver	39/48	2/42
Sodium	0/0	95/95
Thallium	0/0	95/95
Toxaphene	2/2	63/63
Vanadium	0/0	0/28
Zinc	0/0	47/70
alpha-BHC	2/5	60/60
alpha-Chlordane	0/17	3/59
beta-BHC	2/6	60/61
bis(2-Chloroethoxy)methane	1/1	59/59
bis(2-Chloroethyl)ether	1/1	59/59
bis(2-Ethylhexyl)phthalate	0/28	38/40

delta-BHC	2/12	49/54
gamma-BHC (Lindane)	2/7	56/59
gamma-Chlordane	0/18	4/54

APPENDIX C-5

LABORATORY ANALYTICAL TABLES

Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08B01001	08S00900	08S00900D	08S01000	08S01100	08S01200	08S01300	08S01400	08S01500	08S01502
Lab ID	882697	874892	874897	874904	874905	874906	874907	874908	874909	882706
Sampling Date	13-Feb-98	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	13-Feb-98
Semivolatile Organics, ug/kg										
1,2,4-Trichlorobenzene	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
1,2-Dichlorobenzene	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
1,3-Dichlorobenzene	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
1,4-Dichlorobenzene	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2,2'-oxybis(1-Chloropropane)	450 UJ	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2,4,5-Trichlorophenol	1100 U	2000 U	2100 U	1100 U	1000 U	1100 U	900 U	940 U	1100 U	NA
2,4,6-Trichlorophenol	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2,4-Dichlorophenol	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2,4-Dimethylphenol	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2,4-Dinitrophenol	1100 UJ	2000 U	2100 U	1100 U	1000 U	1100 U	900 U	940 U	1100 U	NA
2,4-Dinitrotoluene	450 UJ	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2,6-Dinitrotoluene	450 UJ	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2-Chloronaphthalene	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2-Chlorophenol	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2-Methylnaphthalene	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2-Methylphenol	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
2-Nitroaniline	1100 U	2000 UJ	2100 U	1100 U	1000 U	1100 U	900 U	940 U	1100 U	NA
2-Nitrophenol	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
3,3'-Dichlorobenzidine	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
3-Nitroaniline	1100 U	2000 U	2100 UJ	1100 UJ	1000 U	1100 U	900 U	940 U	1100 U	NA
4,6-Dinitro-2-methylphenol	1100 U	2000 U	2100 U	1100 U	1000 U	1100 U	900 U	940 U	1100 U	NA
4-Bromophenyl-phenylether	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
4-Chloro-3-methylphenol	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
4-Chloroaniline	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
4-Chlorophenyl-phenylether	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
4-Methylphenol	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
4-Nitroaniline	1100 U	2000 U	2100 UJ	1100 UJ	1000 U	1100 U	900 U	940 U	1100 U	NA
4-Nitrophenol	1100 UJ	2000 U	2100 U	1100 U	1000 U	1100 U	900 U	940 U	1100 U	NA
Acenaphthene	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
Acenaphthylene	450 U	800 U	820 U	420 U	67 J	450 U	360 U	380 U	430 U	NA
Anthracene	450 U	800 U	820 U	420 U	400 U	450 U	360 U	380 U	430 U	NA
Benzo(a)anthracene	450 U	78 J	820 U	140 J	120 J	450 U	360 U	380 U	31 J	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08B01001		08S00900		08S00900D		08S01000		08S01100		08S01200		08S01300		08S01400		08S01500		08S01502	
Lab ID	882697		874892		874897		874904		874905		874906		874907		874908		874909		882706	
Sampling Date	13-Feb-98		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		13-Feb-98	
Benzo(a)pyrene	450	U	800	U	820	U	420	U	150	J	450	U	360	U	380	U	41	J	NA	
Benzo(b)fluoranthene	450	U	170	J	820	U	420	U	340	J	450	U	360	U	380	U	75	J	NA	
Benzo(g,h,i)perylene	450	U	800	U	820	U	420	U	80	J	450	U	360	U	380	U	430	U	NA	
Benzo(k)fluoranthene	450	U	170	J	820	U	420	U	330	J	450	U	360	U	380	U	74	J	NA	
bis(2-Chloroethoxy)methane	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
bis(2-Chloroethyl)ether	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
bis(2-Ethylhexyl)phthalate	450	U	800	U	820	U	420	U	270	J	450	U	360	U	380	U	430	U	NA	
Butylbenzylphthalate	450	U	440	J	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Carbazole	450	U	800	UJ	820	U	420	U	400	UJ	450	UJ	360	UJ	380	UJ	430	UJ	NA	
Chrysene	450	U	85	J	820	U	110	J	230	J	450	U	360	U	380	U	54	J	NA	
Di-n-butylphthalate	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Di-n-octylphthalate	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Dibenz(a,h)anthracene	450	U	800	U	820	U	420	UJ	400	U	450	U	360	U	380	U	430	U	NA	
Dibenzofuran	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Diethylphthalate	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Dimethylphthalate	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Fluoranthene	450	U	78	J	820	U	420	U	260	J	450	U	360	U	380	U	50	J	NA	
Fluorene	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Hexachlorobenzene	450	UJ	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Hexachlorobutadiene	450	UJ	800	UJ	820	UJ	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Hexachlorocyclopentadiene	450	UJ	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Hexachloroethane	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Indeno(1,2,3-cd)pyrene	450	U	800	U	820	U	420	U	120	J	450	U	360	U	380	U	430	U	NA	
Isophorone	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
N-Nitroso-di-n-propylamine	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
N-Nitrosodiphenylamine (1)	450	U	800	U	820	UJ	420	UJ	400	U	450	U	360	U	380	U	430	U	NA	
Naphthalene	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Nitrobenzene	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Pentachlorophenol	1100	UJ	2000	U	2100	U	1100	U	1000	U	1100	U	900	U	940	U	1100	U	NA	
Phenanthrene	450	U	800	U	820	U	420	U	80	J	450	U	360	U	380	U	430	U	NA	
Phenol	450	U	800	U	820	U	420	U	400	U	450	U	360	U	380	U	430	U	NA	
Pyrene	450	U	310	J	820	U	420	U	350	J	450	U	360	U	380	U	61	J	NA	
Pesticides/PCBs, ug/kg																				

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08B01001	08S00900	08S00900D	08S01000	08S01100	08S01200	08S01300	08S01400	08S01500	08S01502
Lab ID	882697	874892	874897	874904	874905	874906	874907	874908	874909	882706
Sampling Date	13-Feb-98	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	13-Feb-98
4,4'-DDD	4.1 J	1.4 J	13 J	4.2 UJ	6.4 J	9.7 J	0.88 J	0.92 J	36 J	NA
4,4'-DDE	2.5 J	7.4 J	9.4	19 J	6.4 J	22	3.6 U	3.8 U	22 U	NA
4,4'-DDT	2 J	12 J	13 J	3.6 J	6.5 J	3.3 U	1 J	0.35 J	160	NA
Aldrin	1.7 UJ	4.1 U	0.56 J	2.2 UJ	2 U	1.7 U	1.8 U	1.9 U	11 U	NA
alpha-BHC	1.7 U	4.1 U	4.2 U	2.2 UJ	2 U	1.7 U	1.8 U	1.9 U	11 U	NA
alpha-Chlordane	5.1	4.1 U	6.8	1.7 J	2 U	19	1.8 U	1.9 U	78	NA
Aroclor-1016	33 U	80 U	82 U	42 UJ	40 U	33 U	36 U	38 U	220 U	NA
Aroclor-1221	67 U	160 U	170 U	86 UJ	80 U	67 U	73 U	76 U	440 U	NA
Aroclor-1232	33 U	80 U	82 U	42 UJ	40 U	33 U	36 U	38 U	220 U	NA
Aroclor-1242	33 U	80 U	82 U	42 UJ	40 U	33 U	36 U	38 U	220 U	NA
Aroclor-1248	33 U	80 U	82 U	42 UJ	40 U	33 U	36 U	38 U	220 U	NA
Aroclor-1254	33 U	80 U	82 U	42 UJ	40 U	33 U	36 U	38 U	220 U	NA
Aroclor-1260	33 U	80 U	82 U	42 UJ	40 U	420 J	36 U	38 U	220 U	NA
beta-BHC	1.7 U	4.1 U	4.2 U	2.2 UJ	2 U	1.7 U	1.8 U	1.9 U	11 U	NA
delta-BHC	1.7 U	2.1 J	1.6 J	2.2 UJ	2 U	1.7 U	1.8 U	1.9 U	5.9 J	NA
Dieldrin	1.3 J	1.5 J	12 J	0.7 J	1.4 J	9 J	3.6 U	6.5 J	22 U	NA
Endosulfan I	1.7 U	4.1 U	4.2 U	2.2 UJ	2 U	0.73 J	1.8 U	1.9 U	11 U	NA
Endosulfan II	3.3 U	8 U	8.2 U	0.97 J	4 U	3.3 U	3.6 U	3.8 U	22 U	NA
Endosulfan sulfate	3.3 U	11	8.1 J	4.2 UJ	4 U	2 J	3.6 U	3.8 U	2.3 J	NA
Endrin	3.3 UJ	0.74 J	1 J	4.2 UJ	4 U	6.7	3.6 U	3.8 U	22 U	NA
Endrin aldehyde	3.3 U	1.5 J	5.9 J	1 J	1.4 J	7.1	0.55 J	0.46 J	22 U	NA
Endrin ketone	3.3 U	3.4 J	3.5 J	4.2 UJ	4 U	3.3 U	3.6 U	3.8 U	22 U	NA
gamma-BHC (Lindane)	1.7 UJ	4.1 U	4.2 U	2.2 UJ	2 U	1.7 U	1.8 U	1.9 U	11 U	NA
gamma-Chlordane	5.8	0.32 J	9.7	1.3 J	5	11 J	0.48 J	1.9 U	140	NA
Heptachlor	1.7 UJ	4.1 U	4.2 U	2.2 UJ	2 U	1.7 U	1.8 U	1.9 U	14 U	NA
Heptachlor epoxide	1.7 U	0.6 J	1.1 J	2.2 UJ	2 U	1.5 J	1.8 U	1.9 U	11	NA
Methoxychlor	17 U	41 U	42 U	22 UJ	20 U	17 U	18 U	19 U	110 U	NA
Toxaphene	170 U	410 U	420 U	220 UJ	200 U	170 U	180 U	190 U	1100 U	NA
Chlorinated Herbicides, ug/kg										
2,4 5-TP (Silvex)	0.46 J	4.9 U	5 U	2.6 U	2.4 U	9.3 U	2.2 U	2.8 U	13 U	NA
2,4,5-T	3.4 U	6.1 U	10 J	3.2 U	3 U	5.5 U	2.7 U	2.8 U	16 U	NA
2,4-D	10.2 U	17 J	37 J	6.4 U	13 J	36 J	5.4 U	16 J	33 U	NA
2,4-DB	34 U	100 J	63 J	32 U	30 U	63 J	27 U	28 U	160 U	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08B01001	08S00900	08S00900D	08S01000	08S01100	08S01200	08S01300	08S01400	08S01500	08S01502
Lab ID	882697	874892	874897	874904	874905	874906	874907	874908	874909	882706
Sampling Date	13-Feb-98	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	13-Feb-98
Dalapon	34 U	61 U	62 U	32 U	30 U	34 U	27 U	28 U	160 U	NA
Dicamba	3.9 U	6.1 U	16 U	3.2 U	3 U	3.4 U	2.7 U	2.8 U	16 U	NA
Dichloroprop	20 J	19 U	88 J	10 U	9.6 U	41 J	8.7 U	9.1 U	56 U	NA
Dinoseb	9.7 J	12 U	22 J	6.4 U	6 U	6.8 U	5.4 U	5.7 U	33 U	NA
MCPA	270 U	21000 U	26000 U	260 U	240 U	19000 U	4400 U	5200 U	1300 U	NA
MCPP	2300 J	35000 J	750 U	22000 J	360 U	1500 U	26000 J	18000 U	2000 U	NA
Inorganics, mg/kg										
Aluminum		5800	6060	1110	1940	1600	64.7	127	931	NA
Antimony		4.2 J	4.6 J	0.73 U	0.69 U	7.8 J	0.63 U	0.65 U	0.74 U	NA
Arsenic		30.5 J	30.7 J	7.8 J	3.5 J	6.2 J	1.3 U	1.3 U	10.4 J	NA
Barium		54.3 J	53.7 J	10.4 J	28.4 J	36.9 J	3.8 J	2.3 J	135	NA
Beryllium		0.3 U	0.35 U	0.13 U	0.13 U	0.14 U	0.03 U	0.05 U	0.1 U	NA
Cadmium		0.87 J	0.87 J	0.36 J	0.07 J	1.5	0.06 U	0.1 U	1.1 J	NA
Calcium		38100	38000	6610 U	13000	4010 U	174 U	513 U	12400	NA
Chromium		11.4	11	27.4	5.4	208	1.6 J	9.2	5.6	NA
Cobalt		0.76 J	0.36 J	0.18 U	0.17 J	0.19 U	0.15 U	0.16 U	0.18 U	NA
Copper		25.5 J	24.6 J	11.1 J	5.1 U	49.3 J	1.7 U	3.3 U	24.8 J	NA
Iron		6440 J	4740 J	517 J	478 J	1230 J	34.3 U	108 J	2570 J	NA
Lead		337	353	43.6	37.3	156	24.3	21.6	66.7	NA
Magnesium		1540 U	1540 U	179 U	487 U	312 U	13.6 U	37.6 U	529 U	NA
Manganese		146 J	130 J	12.7 J	18.5 J	16.9 J	1.3 U	8.4 J	52.4 J	NA
Mercury		0.47 J	0.48 J	0.16 J	0.1 J	0.58 J	0.06 J	0.08 J	0.77 J	NA
Nickel		8.1 J	8.1 J	1.4 J	0.88 J	2.1 J	0.28 U	0.41 J	1.1 J	NA
Potassium		273 U	284 U	30.6 U	56.4 U	80 U	10.3 U	37.7 U	122 U	NA
Selenium		4.2	3.2	1.1 U	1 U	1.2 U	0.95 U	0.98 U	1.6	NA
Silver		4 J	3.8 J	62.7 J	3.8 J	122 J	0.65 J	9.6 J	16.8 J	NA
Sodium		555 U	535 U	241 U	249 U	346 U	197 U	257 U	225 U	NA
Thallium		2.4 U	2.5 U	1.3 U	1.2 U	1.3 U	1.1 U	1.1 U	1.3 U	NA
Vanadium		6.7 J	6.4 J	1.7 J	2.4 J	2 J	0.15 J	0.19 J	2.2 J	NA
Zinc		764 J	808 J	35.8 U	33.1 U	137 J	2.3 U	6.6 U	260 J	NA
General Chemistry, mg/kg										
Iron Oxide	275 J	NA	NA	NA	NA	NA	NA	NA	NA	155 J
Total Organic Carbon	10900	NA	NA	NA	NA	NA	NA	NA	NA	151000

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S01600		08S01700		08S01800		08S01900		08S02000		08S02100		08S02200		08S02300		08S02400		08S02500	
Lab ID	874910		874911		874912		874913		874914		874915		874916		874917		875256		874918	
Sampling Date	12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		17-Nov-97		12-Nov-97	
Semivolatile Organics, ug/kg																				
1,2,4-Trichlorobenzene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
1,2-Dichlorobenzene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
1,3-Dichlorobenzene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
1,4-Dichlorobenzene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2,2'-oxybis(1-Chloropropane)	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2,4,5-Trichlorophenol	980	U	1000	U	1100	U	930	U	860	U	1000	U	980	U	950	U	960	U	920	U
2,4,6-Trichlorophenol	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2,4-Dichlorophenol	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2,4-Dimethylphenol	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2,4-Dinitrophenol	980	U	1000	U	1100	U	930	U	860	U	1000	U	980	U	950	U	960	U	920	U
2,4-Dinitrotoluene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2,6-Dinitrotoluene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2-Chloronaphthalene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2-Chlorophenol	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2-Methylnaphthalene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2-Methylphenol	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
2-Nitroaniline	980	U	1000	U	1100	U	930	U	860	U	1000	U	980	U	950	U	960	U	920	U
2-Nitrophenol	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
3,3'-Dichlorobenzidine	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
3-Nitroaniline	980	U	1000	U	1100	U	930	U	860	U	1000	U	980	U	950	U	960	U	920	U
4,6-Dinitro-2-methylphenol	980	U	1000	U	1100	U	930	U	860	U	1000	U	980	U	950	U	960	U	920	U
4-Bromophenyl-phenylether	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
4-Chloro-3-methylphenol	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
4-Chloroaniline	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
4-Chlorophenyl-phenylether	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
4-Methylphenol	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
4-Nitroaniline	980	U	1000	U	1100	U	930	U	860	U	1000	U	980	U	950	U	960	U	920	U
4-Nitrophenol	980	U	1000	U	1100	U	930	U	860	U	1000	U	980	U	950	U	960	U	920	U
Acenaphthene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
Acenaphthylene	63	J	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
Anthracene	390	U	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U
Benzo(a)anthracene	120	J	410	U	420	U	370	U	340	U	400	U	390	U	380	U	380	U	370	U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S01600	08S01700	08S01800	08S01900	08S02000	08S02100	08S02200	08S02300	08S02400	08S02500
Lab ID	874910	874911	874912	874913	874914	874915	874916	874917	875256	874918
Sampling Date	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	17-Nov-97	12-Nov-97
Benzo(a)pyrene	170 J	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Benzo(b)fluoranthene	330 J	410 U	420 U	370 U	340 U	400 U	45 J	380 U	380 U	370 U
Benzo(g,h,i)perylene	120 J	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Benzo(k)fluoranthene	330 J	410 U	420 U	370 U	340 U	400 U	17 J	380 U	380 U	370 U
bis(2-Chloroethoxy)methane	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
bis(2-Chloroethyl)ether	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
bis(2-Ethylhexyl)phthalate	42 J	410 U	420 U	370 U	340 U	990	390 U	44 J	380 U	91 J
Butylbenzylphthalate	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Carbazole	390 UJ	410 UJ	420 UJ	370 UJ	340 UJ	400 UJ	390 UJ	380 UJ	380 U	370 UJ
Chrysene	250 J	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Di-n-butylphthalate	390 U	58 J	420 U	370 U	340 U	400 U	390 U	47 J	380 U	210 J
Di-n-octylphthalate	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Dibenz(a,h)anthracene	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Dibenzofuran	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Diethylphthalate	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Dimethylphthalate	390 U	410 U	420 U	370 U	340 U	400 U	25 J	380 U	380 U	370 U
Fluoranthene	160 J	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Fluorene	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Hexachlorobenzene	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Hexachlorobutadiene	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Hexachlorocyclopentadiene	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Hexachloroethane	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Indeno(1,2,3-cd)pyrene	150 J	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Isophorone	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
N-Nitroso-di-n-propylamine	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
N-Nitrosodiphenylamine (1)	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Naphthalene	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Nitrobenzene	980 U	1000 U	1100 U	930 U	860 U	1000 U	980 U	950 U	960 U	920 U
Pentachlorophenol	64 J	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Phenanthrene	390 U	410 U	420 U	370 U	340 U	400 U	390 U	380 U	380 U	370 U
Phenol	280 J	410 U	420 U	370 U	340 U	400 U	42 J	380 U	380 U	370 U
Pyrene										
Pesticides/PCBs, ug/kg										

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S01600	08S01700	08S01800	08S01900	08S02000	08S02100	08S02200	08S02300	08S02400	08S02500
Lab ID	874910	874911	874912	874913	874914	874915	874916	874917	875256	874918
Sampling Date	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	12-Nov-97	17-Nov-97	12-Nov-97
4,4'-DDD	40 J	5 J	4.2 U	3.7 U	3.4 U	20 U	3.9 U	19 U	14	18 U
4,4'-DDE	22 J	17	2.1 J	3.7 U	3.4 U	57	110	35	14 J	17 J
4,4'-DDT	1200 D	7 J	1.2 J	3.7 U	3.4 U	18 J	23 J	5.3 J	3.8 U	4.2 J
Aldrin	20 U	2.1 U	2.2 U	1.9 U	1.8 U	10 U	2 U	9.8 U	0.29 J	0.62 J
alpha-BHC	20 U	2.1 U	2.2 U	1.9 U	1.8 U	10 U	2 U	9.8 U	2 U	9.4 U
alpha-Chlordane	14 J	7.3	2.2 U	0.12 J	0.12 J	10 U	2 J	96 J	2.1 J	9.4 U
Aroclor-1016	390 U	41 U	42 U	37 U	34 U	200 U	39 U	190 U	38 U	180 U
Aroclor-1221	790 U	84 U	85 U	75 U	70 U	410 U	78 U	380 U	78 U	370 U
Aroclor-1232	390 U	41 U	42 U	37 U	34 U	200 U	39 U	190 U	38 U	180 U
Aroclor-1242	390 U	41 U	42 U	37 U	34 U	200 U	39 U	190 U	38 U	180 U
Aroclor-1248	390 U	41 U	42 U	37 U	34 U	200 U	39 U	190 U	38 U	180 U
Aroclor-1254	390 U	41 U	42 U	37 U	34 U	200 U	39 U	190 U	38 U	180 U
Aroclor-1260	390 U	41 U	42 U	37 U	34 U	200 U	39 U	190 U	38 U	180 U
beta-BHC	20 U	2.1 U	2.2 U	1.9 U	1.8 U	10 U	0.79 J	9.8 U	2 U	9.4 U
delta-BHC	20 U	0.24 J	0.1 J	1.9 U	0.53 J	0.5 J	2 U	1.2 J	2 U	9.4 U
Dieldrin	39 U	3.8 J	1.7 J	6.2 J	5.1 J	5.3 J	1.9 J	19 U	3.8 U	10 J
Endosulfan I	20 U	2.1 U	2.2 U	1.9 U	1.8 U	10 U	0.41 J	9.8 U	2 U	9.4 U
Endosulfan II	39 U	4.1 U	0.43 J	3.7 U	3.4 U	1.6 J	0.24 J	19 U	2.4 J	18 U
Endosulfan sulfate	39 U	4.1 U	4.2 U	3.7 U	3.4 U	20 U	3.9 U	19 U	3.8 U	18 U
Endrin	1.8 J	4.1 U	4.2 U	3.7 U	3.4 U	20 U	3.9 U	19 U	3.1 J	18 U
Endrin aldehyde	39 U	0.27 J	0.91 J	0.51 J	0.72 J	1 J	0.27 J	19 U	1.3 J	18 U
Endrin ketone	39 U	4.1 U	4.2 U	3.7 U	3.4 U	20 U	3.9 U	19 U	3.8 U	18 U
gamma-BHC (Lindane)	20 U	2.1 U	2.2 U	1.9 U	1.8 U	10 U	2 U	9.8 U	2 U	9.4 U
gamma-Chlordane	20 U	2.1 U	0.31 J	1.9 U	1.8 U	0.63 J	0.93 J	93 J	5.9	37 J
Heptachlor	20 U	2.1 U	2.2 U	1.9 U	1.8 U	10 U	2 U	9.8 U	2 U	9.4 U
Heptachlor epoxide	20 U	2.1 U	2.2 U	1.9 U	1.8 U	10 U	2 U	9.8 U	2 U	1.1 J
Methoxychlor	200 U	21 U	22 U	19 U	18 U	100 U	20 U	98 U	20 U	94 U
Toxaphene	2000 U	210 U	220 U	190 U	180 U	1000 U	200 U	980 U	200 U	940 U
Chlorinated Herbicides, ug/kg										
2,4 5-TP (Silvex)	2.3 U	2.5 U	2.5 U	2.2 U	2.1 U	2.4 U	2.3 U	2.3 U	2.3 U	2.2 U
2,4,5-T	2.9 U	3.1 U	3.2 U	2.8 U	2.6 U	3 U	2.9 U	2.9 U	2.9 U	2.8 U
2,4-D	7 U	14 J	7 U	8.3 U	8.8 U	6.1 U	1.8 U	14 J	2.2 J	5.5 U
2,4-DB	29 U	31 U	32 U	28 U	26 U	30 U	29 U	29 U	14 J	28 U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S01600		08S01700		08S01800		08S01900		08S02000		08S02100		08S02200		08S02300		08S02400		08S02500	
Lab ID	874910		874911		874912		874913		874914		874915		874916		874917		875256		874918	
Sampling Date	12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		12-Nov-97		17-Nov-97		12-Nov-97	
Dalapon	29	U	31	U	32	U	28	U	26	U	30	U	29	U	29	U	29	U	28	U
Dicamba	2.9	U	3.1	U	3.2	U	2.8	U	2.6	U	3	U	2.9	U	2.9	U	3	U	2.8	U
Dichloroprop	9.4	U	10	U	10	U	8.9	U	12	U	9.8	U	9.4	U	9.2	U	9.3	U	8.8	U
Dinoseb	5.9	U	6.2	U	6.3	U	5.6	U	5.2	U	6.1	U	5.9	U	5.7	U	5.8	U	5.5	U
MCPA	8200	U	5900	U	4500	U	4000	U	6600	U	4200	U	1000	U	6900	U	13000	U	13000	U
MCPP	6900	U	17000	U	24000	J	14000	U	26000	J	360	U	350	U	3500	U	19000	U	330	U
Inorganics, mg/kg																				
Aluminum	2240		3190		2190		122		33.1	J	694		1100		2280		1290		2920	
Antimony	0.67	U	0.71	U	0.7	U	0.64	U	0.59	U	0.7	U	0.67	U	0.66	U	1.8	J	1.8	J
Arsenic	6.2	J	6.6	J	6.3	J	1.3	U	1.2	U	19.6	J	10.1	J	53	J	1.3	U	9.9	J
Barium	25.5	J	48.8	J	19.3	J	3.5	J	1.2	J	32.6	J	15.8	J	36.3	J	7.5	J	67.1	
Beryllium	0.26	U	0.45		0.14	U	0.03	U	0.05	U	0.1	U	0.13	U	0.24	U	0.07	U	0.49	J
Cadmium	0.07	U	0.31	J	0.55	J	0.07	U	0.06	U	5		0.35	J	2.8		0.1	U	7.1	
Calcium	63200		41700		19900		432	U	180	U	4020	U	28500		47000		4130	U	27500	
Chromium	10.7		27		14.6		3.8		1.8	J	88.3		9.8		16.4		36.9		130	
Cobalt	0.16	U	0.36	J	0.29	J	0.16	U	0.14	U	0.31	J	0.16	U	0.3	J	0.16	U	0.55	J
Copper	6.8	J	16.6	J	7.9	J	2.2	U	2	U	34.2	J	11	J	14.9	J	8.3		70.5	J
Iron	526	J	962	J	982	J	87.2	J	29.9	U	1690	J	601	J	1140	J	352		2120	J
Lead	25.2		400		53.7		8.8		8.9		81.6		26.3		289		10	J	541	
Magnesium	1620	U	2280	U	521	U	22.8	U	16.2	U	154	U	287	U	1200	U	95.4	U	2260	U
Manganese	33.4	J	127	J	37.9	J	4.9	U	2.2	U	24.8	J	27	J	75.3	J	2.3	U	122	J
Mercury	0.18	J	0.16	J	0.13	J	0.19	J	0.05	J	0.21	J	0.53	J	0.11	J	0.06	U	0.3	J
Nickel	1.2	J	2.5	J	1.6	J	0.29	U	0.27	U	3.9	J	1.2	J	1.8	J	0.68	U	9.3	
Potassium	142	U	303	U	80.2	U	17.1	U	15.4	U	55.4	U	45.2	U	202	U	35.7	U	296	U
Selenium	1	U	1.1	U	1.1	U	0.97	U	0.9	U	1.1	U	1	U	1	U	0.99	U	0.96	U
Silver	4.2	J	44	J	16.3	J	1.4	J	0.37	J	5.1	J	6.9	J	2.4	J	108	J	3.1	J
Sodium	244	U	307	U	244	U	193	U	184	U	241	U	223	U	266	U	147	U	217	U
Thallium	1.2	U	1.2	U	1.2	U	1.1	U	1	U	1.2	U	1.2	U	1.1	U	1.1	U	1.1	U
Vanadium	4.5	J	4.8	J	3.1	J	0.26	J	0.19	J	2	J	2.6	J	4.6	J	1.4	J	3.9	J
Zinc	31.8	U	92.5	U	53.8	U	6.9	U	1	U	106	J	27.5	U	83	U	26	U	178	J
General Chemistry, mg/kg																				
Iron Oxide	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	
Total Organic Carbon	NA		NA		NA		NA		NA		NA		NA		NA		NA		NA	

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S02600		08S02700		08S02800		08S02800D		08S02802		08S02802D		08S02900		08S03000		08S03100		08S03200	
Lab ID	875056		875057		875254		875255		882698		882704		875261		875262		874919		875263	
Sampling Date	14-Nov-97		14-Nov-97		17-Nov-97		17-Nov-97		13-Feb-98		13-Feb-98		17-Nov-97		17-Nov-97		12-Nov-97		17-Nov-97	
Semivolatile Organics, ug/kg																				
1,2,4-Trichlorobenzene	360	U	450	U	400	UJ	400	U	NA		NA		400	U	370	U	350	U	350	U
1,2-Dichlorobenzene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
1,3-Dichlorobenzene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
1,4-Dichlorobenzene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2,2'-oxybis(1-Chloropropane)	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2,4,5-Trichlorophenol	900	U	1100	U	1000	U	1000	U	NA		NA		1000	U	930	U	870	U	880	U
2,4,6-Trichlorophenol	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2,4-Dichlorophenol	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2,4-Dimethylphenol	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2,4-Dinitrophenol	900	U	1100	U	1000	UJ	1000	U	NA		NA		1000	U	930	U	870	U	880	U
2,4-Dinitrotoluene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2,6-Dinitrotoluene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2-Chloronaphthalene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2-Chlorophenol	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2-Methylnaphthalene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2-Methylphenol	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
2-Nitroaniline	900	U	1100	U	1000	U	1000	U	NA		NA		1000	U	930	U	870	U	880	U
2-Nitrophenol	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
3,3'-Dichlorobenzidine	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
3-Nitroaniline	900	U	1100	U	1000	U	1000	U	NA		NA		1000	U	930	U	870	U	880	U
4,6-Dinitro-2-methylphenol	900	U	1100	U	1000	UJ	1000	U	NA		NA		1000	U	930	U	870	U	880	U
4-Bromophenyl-phenylether	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
4-Chloro-3-methylphenol	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
4-Chloroaniline	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
4-Chlorophenyl-phenylether	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
4-Methylphenol	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
4-Nitroaniline	900	U	1100	U	1000	U	1000	U	NA		NA		1000	U	930	U	870	U	880	U
4-Nitrophenol	900	U	1100	U	1000	UJ	1000	U	NA		NA		1000	UJ	930	U	870	U	880	U
Acenaphthene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
Acenaphthylene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
Anthracene	360	U	450	U	400	U	400	U	NA		NA		400	U	370	U	350	U	350	U
Benzo(a)anthracene	39	J	110	J	97	J	120	J	NA		NA		400	U	370	U	350	U	350	U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S02600	08S02700	08S02800	08S02800D	08S02802	08S02802D	08S02900	08S03000	08S03100	08S03200
Lab ID	875056	875057	875254	875255	882698	882704	875261	875262	874919	875263
Sampling Date	14-Nov-97	14-Nov-97	17-Nov-97	17-Nov-97	13-Feb-98	13-Feb-98	17-Nov-97	17-Nov-97	12-Nov-97	17-Nov-97
Benzo(a)pyrene	40 J	140 J	110 J	120 J	NA	NA	400 U	370 U	350 U	350 U
Benzo(b)fluoranthene	92 J	230 J	180 J	250 J	NA	NA	400 U	370 U	350 U	350 U
Benzo(g,h,i)perylene	360 U	73 J	47 J	86 J	NA	NA	400 U	370 U	350 U	350 U
Benzo(k)fluoranthene	92 J	230 J	54 J	250 J	NA	NA	400 U	370 U	350 U	350 U
bis(2-Chloroethoxy)methane	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
bis(2-Chloroethyl)ether	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
bis(2-Ethylhexyl)phthalate	37 J	450 U	400 U	52 J	NA	NA	77 J	1700	350 U	350 U
Butylbenzylphthalate	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Carbazole	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 UJ	350 U
Chrysene	50 J	140 J	120 J	130 J	NA	NA	400 U	370 U	350 U	350 U
Di-n-butylphthalate	52 J	450 U	400 UJ	400 U	NA	NA	400 U	370 U	350 U	350 U
Di-n-octylphthalate	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Dibenz(a,h)anthracene	360 U	450 U	400 U	49 J	NA	NA	400 U	370 U	350 U	350 U
Dibenzofuran	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Diethylphthalate	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Dimethylphthalate	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Fluoranthene	58 J	69 J	170 J	200 J	NA	NA	400 U	370 U	350 U	350 U
Fluorene	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Hexachlorobenzene	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Hexachlorobutadiene	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Hexachlorocyclopentadiene	360 U	450 U	400 UJ	400 U	NA	NA	400 U	370 U	350 U	350 U
Hexachloroethane	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Indeno(1,2,3-cd)pyrene	360 U	87 J	61 J	130 J	NA	NA	400 U	370 U	350 U	350 U
Isophorone	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
N-Nitroso-di-n-propylamine	360 U	450 U	400 UJ	400 U	NA	NA	400 U	370 U	350 U	350 U
N-Nitrosodiphenylamine (1)	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Naphthalene	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Nitrobenzene	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Pentachlorophenol	900 U	1100 U	1000 UJ	1000 U	NA	NA	1000 UJ	930 U	870 U	880 U
Phenanthrene	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Phenol	360 U	450 U	400 U	400 U	NA	NA	400 U	370 U	350 U	350 U
Pyrene	73 J	120 J	140 J	150 J	NA	NA	400 U	370 U	350 U	350 U
Pesticides/PCBs, ug/kg										

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S02600		08S02700		08S02800		08S02800D		08S02802		08S02802D		08S02900		08S03000		08S03100		08S03200	
Lab ID	875056		875057		875254		875255		882698		882704		875261		875262		874919		875263	
Sampling Date	14-Nov-97		14-Nov-97		17-Nov-97		17-Nov-97		13-Feb-98		13-Feb-98		17-Nov-97		17-Nov-97		12-Nov-97		17-Nov-97	
4,4'-DDD	3.3	J	2.4	J	4	U	4	U	NA		NA		4	U	7.1		780	DJ	3.5	U
4,4'-DDE	7.6		10		7.1		6	J	NA		NA		4	U	9.5	J	460	J	0.53	J
4,4'-DDT	8.4	J	10	J	8.1	J	8.2	J	NA		NA		4.1	J	1.3	J	450		2.8	J
Aldrin	1.8	U	2.3	U	2.1	U	2	U	NA		NA		0.35	J	1.9	U	49	J	1.8	U
alpha-BHC	1.8	U	2.3	U	2.1	U	2	U	NA		NA		2.1	U	1.9	U	18	U	1.8	U
alpha-Chlordane	2		2	J	4.1		4.1		NA		NA		26		1	J	3700	D	1.8	U
Aroclor-1016	36	U	44	U	40	U	40	U	NA		NA		40	U	37	U	350	U	35	U
Aroclor-1221	73	U	90	U	82	U	81	U	NA		NA		82	U	75	U	700	U	71	U
Aroclor-1232	36	U	44	U	40	U	40	U	NA		NA		40	U	37	U	350	U	35	U
Aroclor-1242	36	U	44	U	40	U	40	U	NA		NA		40	U	37	U	350	U	35	U
Aroclor-1248	36	U	44	U	40	U	40	U	NA		NA		40	U	37	U	350	U	35	U
Aroclor-1254	36	U	44	U	40	U	40	U	NA		NA		40	U	37	U	350	U	35	U
Aroclor-1260	36	U	44	U	40	U	40	U	NA		NA		40	U	37	U	350	U	35	U
beta-BHC	1.8	U	2.3	U	2.1	U	2	U	NA		NA		2.1	U	1.9	U	12	J	1.8	U
delta-BHC	1.8	U	2.3	U	0.42	J	0.39	J	NA		NA		2.1	U	1.9	U	77	J	1.8	U
Dieldrin	3.6	U	4.4	U	4	U	4	U	NA		NA		4	U	3.7	U	35	U	3.5	U
Endosulfan I	1.8	U	2.3	U	2.1	U	2	U	NA		NA		2.1	U	1.9	U	18	U	1.8	U
Endosulfan II	3.6	U	4.4	U	4	U	4	U	NA		NA		4	U	3.7	U	35	U	3.5	U
Endosulfan sulfate	3.6	U	4.4	U	1.5	J	1.5	J	NA		NA		4	U	3.7	U	25	J	3.5	U
Endrin	3.6	U	4.4	U	4	U	4	U	NA		NA		4	UJ	1	J	130	J	3.5	U
Endrin aldehyde	0.45	J	0.59	J	4	U	4	U	NA		NA		0.71	J	3.7	U	35	U	3.5	U
Endrin ketone	3.6	U	4.4	U	4	U	4	U	NA		NA		4	U	3.7	U	35	U	3.5	U
gamma-BHC (Lindane)	1.8	U	2.3	U	2.1	U	2	U	NA		NA		2.1	U	1.9	U	18	U	1.8	U
gamma-Chlordane	1.8	U	2.3	U	3.2	J	3.1	J	NA		NA		29		1.4	J	2900	D	1.8	U
Heptachlor	1.8	U	2.3	U	2.1	U	2	U	NA		NA		2.1	U	1.9	U	680	D	1.8	U
Heptachlor epoxide	1.8	U	2.3	U	0.14	J	0.12	J	NA		NA		0.22	J	1.9	U	130	J	1.8	U
Methoxychlor	18	U	23	U	21	U	20	U	NA		NA		21	U	19	U	180	U	18	U
Toxaphene	180	U	230	U	210	U	200	U	NA		NA		210	U	190	U	1800	U	180	U
Chlorinated Herbicides, ug/kg																				
2,4 5-TP (Silvex)	2.2	U	2.7	U	2.4	U	2.4	U	NA		NA		2.4	U	2.2	U	2.1	U	2.1	U
2,4,5-T	2.7	U	3.4	U	3	U	3	U	NA		NA		3.7	U	2.8	U	2.6	U	2.6	U
2,4-D	4.3	J	13	J	34		44	J	NA		NA		24	J	1.6	J	5.3	U	9.2	J
2,4-DB	8.7	J	3.9	J	11	J	4.5	J	NA		NA		30	J	13	J	72	J	4.7	J

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S02600	08S02700	08S02800	08S02800D	08S02802	08S02802D	08S02900	08S03000	08S03100	08S03200
Lab ID	875056	875057	875254	875255	882698	882704	875261	875262	874919	875263
Sampling Date	14-Nov-97	14-Nov-97	17-Nov-97	17-Nov-97	13-Feb-98	13-Feb-98	17-Nov-97	17-Nov-97	12-Nov-97	17-Nov-97
Dalapon	27 U	34 U	30 U	30 U	NA	NA	30 U	28 U	26 U	26 U
Dicamba	2.7 U	6.7 U	3 U	4.7 U	NA	NA	3 U	4.4 U	2.6 U	4.1 U
Dichloroprop	8.7 U	11 U	9.8 U	9.6 U	NA	NA	9.8 U	9 U	8.4 U	8.5 U
Dinoseb	5.4 U	6.7 U	6.1 U	6 U	NA	NA	6.1 U	3.2 J	240 J	3.4 J
MCPA	24000 U	5200 U	240 U	240 U	NA	NA	7300 U	220 U	6500 U	31000 J
MCPP	330 U	11000 U	360 U	11000 U	NA	NA	18000 U	22000 U	18000 U	3200 U
Inorganics, mg/kg										
Aluminum	179	680	1100	974	NA	NA	1980	159	105	187
Antimony	0.62 U	0.74 U	4.8 J	4.8 J	NA	NA	2.4 J	0.65 U	0.61 U	0.62 U
Arsenic	1.3 U	3.5 J	13.4	12.8	NA	NA	41.2	7.2	39.2 J	2.5
Barium	57.6	12 J	11.7 J	10.7 J	NA	NA	31.5 J	2 J	2.3 J	4.2 J
Beryllium	0.05 U	0.09 U	0.1 U	0.1 U	NA	NA	0.29 U	0.05 U	0.05 U	0.06 U
Cadmium	0.42 J	0.48 J	0.77 J	0.96 J	NA	NA	5.9	0.07 U	1.5	0.06 U
Calcium	9950	3410 U	25200 J	23400 J	NA	NA	103000 J	2570 U	1390 U	14900 J
Chromium	7.9	15	7	8.7	NA	NA	31.7	1.5 J	2.6	3.6
Cobalt	0.15 U	0.18 U	0.37 U	0.37 U	NA	NA	2.6 J	0.16 U	0.15 U	0.15 U
Copper	9.8 J	7.3 J	9.1	9.5	NA	NA	26.5	1.2 U	12.6 J	7.1
Iron	287 J	330 J	1520	4760	NA	NA	2690	81.9	240 J	174
Lead	37.1	23.2	344 J	379 J	NA	NA	408 J	9.7 J	8.9	12.4 J
Magnesium	172 U	117 U	232 U	221 U	NA	NA	1110 U	82.1 U	89.9 U	164 U
Manganese	15.6 J	27.7 J	31.3	37.2	NA	NA	106	2.4 U	9.4 J	10.8
Mercury	0.09 J	0.12 J	0.12 U	0.09 U	NA	NA	0.14 U	0.09 U	0.07 J	0.08 U
Nickel	0.6 J	0.94 J	2.1 J	2.3 J	NA	NA	3.8 J	0.36 U	1.6 J	0.85 U
Potassium	35 U	36.9 U	45.9 U	26 U	NA	NA	161 U	17 U	22.2 U	37.5 U
Selenium	0.94 U	1.1 U	1.1 U	1.1 U	NA	NA	1.1 U	0.98 U	0.93 U	0.94 U
Silver	0.45 J	28.9 J	0.52 J	0.64 J	NA	NA	2.1 J	0.22 J	0.4 J	0.18 J
Sodium	177 U	197 U	214 U	182 U	NA	NA	245 U	154 U	237 U	156 U
Thallium	1.1 U	1.3 U	1.2 U	1.2 U	NA	NA	1.2 U	1.1 U	1.1 U	1.1 U
Vanadium	0.82 J	1 J	2.6 J	2.4 J	NA	NA	8.5 J	0.43 U	0.25 J	1.2 J
Zinc	125 J	81.6 U	710	833	NA	NA	486	6.1 U	370 J	17 U
General Chemistry, mg/kg										
Iron Oxide	NA	NA	NA	NA	153 J	239 J	NA	NA	NA	NA
Total Organic Carbon	NA	NA	NA	NA	5260	7160	NA	NA	NA	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S03300		08S03400		08S03500		08S03600		08S03700		08S03800		08S03800D		08S03900		08S04000		08S04100	
Lab ID	875264		875058		875070		875071		875072		875073		875074		875075		875076		875077	
Sampling Date	17-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97	
Semivolatile Organics, ug/kg																				
1,2,4-Trichlorobenzene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
1,2-Dichlorobenzene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
1,3-Dichlorobenzene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
1,4-Dichlorobenzene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2,2'-oxybis(1-Chloropropane)	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2,4,5-Trichlorophenol	1100	U	2700	U	1200	U	930	U	1100	U	1000	U	1100	U	1000	U	990	U	940	U
2,4,6-Trichlorophenol	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2,4-Dichlorophenol	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2,4-Dimethylphenol	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2,4-Dinitrophenol	1100	U	2700	UJ	1200	UJ	930	UJ	1100	UJ	1000	UJ	1100	U	1000	U	990	UJ	940	UJ
2,4-Dinitrotoluene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2,6-Dinitrotoluene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2-Chloronaphthalene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2-Chlorophenol	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2-Methylnaphthalene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2-Methylphenol	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
2-Nitroaniline	1100	U	2700	U	1200	U	930	U	1100	U	1000	U	1100	U	1000	U	990	U	940	U
2-Nitrophenol	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
3,3'-Dichlorobenzidine	430	U	1100	U	470	U	370	U	420	U	410	U	420	UJ	400	UJ	390	U	370	U
3-Nitroaniline	1100	U	2700	U	1200	U	930	U	1100	U	1000	U	1100	UJ	1000	UJ	990	U	940	U
4,6-Dinitro-2-methylphenol	1100	U	2700	UJ	1200	UJ	930	UJ	1100	UJ	1000	UJ	1100	U	1000	U	990	UJ	940	UJ
4-Bromophenyl-phenylether	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
4-Chloro-3-methylphenol	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
4-Chloroaniline	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
4-Chlorophenyl-phenylether	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
4-Methylphenol	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
4-Nitroaniline	1100	U	2700	U	1200	U	930	U	1100	U	1000	U	1100	U	1000	U	990	U	940	U
4-Nitrophenol	1100	U	2700	UJ	1200	UJ	930	UJ	1100	UJ	1000	UJ	1100	UJ	1000	UJ	990	UJ	940	UJ
Acenaphthene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
Acenaphthylene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
Anthracene	430	U	1100	U	470	U	370	U	420	U	410	U	420	U	400	U	390	U	370	U
Benzo(a)anthracene	430	U	1100	U	470	U	42	J	420	U	350	J	360	J	400	U	390	U	370	U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S03300	08S03400	08S03500	08S03600	08S03700	08S03800	08S03800D	08S03900	08S04000	08S04100
Lab ID	875264	875058	875070	875071	875072	875073	875074	875075	875076	875077
Sampling Date	17-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97
Benzo(a)pyrene	430 U	1100 U	470 U	370 U	420 U	430	370 J	400 U	390 U	370 U
Benzo(b)fluoranthene	430 U	1100 U	55 J	43 J	420 U	580	520	400 U	390 U	370 U
Benzo(g,h,i)perylene	430 U	1100 U	470 U	370 U	420 U	300 J	260 J	400 U	390 U	370 U
Benzo(k)fluoranthene	430 U	1100 U	470 U	370 U	420 U	230 J	210 J	400 U	390 U	370 U
bis(2-Chloroethoxy)methane	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
bis(2-Chloroethyl)ether	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
bis(2-Ethylhexyl)phthalate	35 J	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	430 U	370 U
Butylbenzylphthalate	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Carbazole	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Chrysene	430 U	1100 U	470 U	41 J	420 U	420	390 J	400 U	390 U	370 U
Di-n-butylphthalate	430 U	1100 UJ	470 UJ	370 UJ	420 UJ	410 UJ	420 UJ	400 UJ	390 UJ	370 UJ
Di-n-octylphthalate	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Dibenz(a,h)anthracene	430 U	1100 U	470 U	370 U	420 U	70 J	59 J	400 U	390 U	370 U
Dibenzofuran	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Diethylphthalate	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Dimethylphthalate	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Fluoranthene	430 U	1100 U	61 J	86 J	420 U	540	610	400 U	390 U	370 U
Fluorene	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Hexachlorobenzene	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Hexachlorobutadiene	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Hexachlorocyclopentadiene	430 U	1100 UJ	470 UJ	370 UJ	420 UJ	410 UJ	420 U	400 U	390 UJ	370 UJ
Hexachloroethane	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Indeno(1,2,3-cd)pyrene	430 U	1100 U	470 U	370 U	420 U	270 J	240 J	400 U	390 U	370 U
Isophorone	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
N-Nitroso-di-n-propylamine	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
N-Nitrosodiphenylamine (1)	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Naphthalene	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Nitrobenzene	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Pentachlorophenol	1100 U	2700 U	1200 U	930 U	1100 U	1000 U	1100 UJ	1000 UJ	990 U	940 U
Phenanthrene	430 U	1100 U	470 U	40 J	420 U	48 J	43 J	400 U	390 U	370 U
Phenol	430 U	1100 U	470 U	370 U	420 U	410 U	420 U	400 U	390 U	370 U
Pyrene	430 U	1100 U	58 J	61 J	420 U	580	500	400 U	390 U	370 U
Pesticides/PCBs, ug/kg										

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S03300		08S03400		08S03500		08S03600		08S03700		08S03800		08S03800D		08S03900		08S04000		08S04100	
Lab ID	875264		875058		875070		875071		875072		875073		875074		875075		875076		875077	
Sampling Date	17-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97	
4,4'-DDD	6.8		11	U	4.7	U	3.7	U	4.2	U	4.1	U	4.2	U	4	U	3.9	U	3.7	U
4,4'-DDE	79	D	170		28	J	90	D	2	J	0.53	J	4.2	U	19	JD	0.64	J	3.7	U
4,4'-DDT	7.6	J	33		6.9	J	22	J	4.2	U	4.2		2.5	J	44		2	J	1.8	J
Aldrin	2.2	U	5.6	U	2.4	U	1.9	U	2.2	U	2.1	U	2.2	U	2.1	U	2	U	0.27	J
alpha-BHC	2.2	U	5.6	U	2.4	U	1.9	U	2.2	U	2.1	U	2.2	U	2.1	U	2	U	1.9	U
alpha-Chlordane	5.7	J	69		90	D	4.7		0.35	J	1	J	0.79	J	31	JD	3	J	17	
Aroclor-1016	43	U	110	U	47	U	37	U	42	U	41	U	42	U	40	U	39	U	37	U
Aroclor-1221	87	U	220	U	96	U	75	U	86	U	82	U	85	U	82	U	80	U	76	U
Aroclor-1232	43	U	110	U	47	U	37	U	42	U	41	U	42	U	40	U	39	U	37	U
Aroclor-1242	43	U	110	U	47	U	37	U	42	U	41	U	42	U	40	U	39	U	37	U
Aroclor-1248	43	U	110	U	47	U	37	U	42	U	41	U	42	U	40	U	39	U	37	U
Aroclor-1254	43	U	110	U	47	U	37	U	42	U	41	U	42	U	40	U	39	U	37	U
Aroclor-1260	43	U	110	U	47	U	37	U	320		41	U	42	U	40	U	39	U	37	U
beta-BHC	2.2	U	5.6	U	2.4	U	1.9	U	2.2	U	2.1	U	2.2	U	2.1	U	2	U	1.9	U
delta-BHC	0.22	J	5.6	U	2.4	U	1.9	U	2.2	U	2.1	U	2.2	U	2.1	U	2	U	1.9	U
Dieldrin	1.2	J	26	J	4.7	U	3.7	U	4.2	U	4.1	U	4.2	U	4	U	0.83	J	23	
Endosulfan I	2.2	U	5.6	U	2.4	U	1.9	U	2.2	U	2.1	U	2.2	U	2.1	U	2	U	1.9	U
Endosulfan II	4.3	U	11	U	4.7	U	3.7	U	4.2	U	4.1	U	4.2	U	4	U	3.9	U	3.7	U
Endosulfan sulfate	4.3	U	11	U	4.7	U	3.7	U	2.1	J	0.87	J	0.77	J	4	U	3.9	U	3.7	U
Endrin	4.3	U	11	U	0.28	J	3.7	U	0.88	J	4.1	U	4.2	U	4	U	3.9	U	3.7	U
Endrin aldehyde	4.3	U	1.2	J	0.96	J	3.7	U	4.2	U	4.1	U	4.2	U	4	U	3.9	U	3.7	U
Endrin ketone	4.3	U	11	U	4.7	U	3.7	U	4.2	U	4.1	U	4.2	U	4	U	3.9	U	3.7	U
gamma-BHC (Lindane)	2.2	U	5.6	U	2.4	U	1.9	U	2.2	U	2.1	U	2.2	U	2.1	U	2	U	1.9	U
gamma-Chlordane	7.3		68		95	D	4.8		0.37	J	2.1	U	0.68	J	9.5	JD	1.2	J	16	
Heptachlor	2.2	U	5.6	U	2.4	U	1.9	U	2.2	U	2.1	U	2.2	U	2.1	U	2	U	1.9	U
Heptachlor epoxide	2.2	U	1.6	J	3.8		1.9	U	2.2	U	2.1	U	2.2	U	7.9		2	U	1.9	U
Methoxychlor	22	U	56	U	24	U	19	U	22	U	21	U	22	U	21	U	20	U	19	U
Toxaphene	220	U	560	U	240	U	190	U	220	U	210	U	220	U	210	U	200	U	190	U
Chlorinated Herbicides, ug/kg																				
2,4 5-TP (Silvex)	2.6	U	8.3	UJ	2.8	U	2.2	U	2.6	UJ	2.5	U	2.5	U	2.4	U	2.4	UJ	2.3	U
2,4,5-T	3.2	J	8.3	UJ	3.6	U	2.8	U	3.2	U	3.1	U	3.2	U	3	U	3	UJ	2.8	U
2,4-D	4.5	J	53	J	7.9	U	5.6	U	2.1	J	14	J	7.6	U	6.1	U	2.6	J	6.1	U
2,4-DB	32	U	83	UJ	36	U	28	U	32	UJ	31	U	32	U	30	U	30	UJ	28	U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S03300	08S03400	08S03500	08S03600	08S03700	08S03800	08S03800D	08S03900	08S04000	08S04100
Lab ID	875264	875058	875070	875071	875072	875073	875074	875075	875076	875077
Sampling Date	17-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97
Dalapon	32 U	83 UJ	3.6 U	28 U	32 UJ	31 U	32 U	30 U	30 UJ	28 U
Dicamba	3.2 U	8.3 UJ	3.6 U	2.8 U	3.2 UJ	3.1 U	3.2 U	3 U	3 UJ	2.8 U
Dichloroprop	10 U	26 UJ	11 U	9 U	3.2 UJ	9.8 U	10 U	9.8 U	14 UJ	9.1 U
Dinoseb	6.5 U	16 UJ	7.1 U	5.6 U	3.6 J	6.2 U	6.3 U	6.1 U	5.9 UJ	5.7 U
MCPA	3700 U	660 UJ	280 U	890 U	330 UJ	2000 U	250 U	240 U	240 UJ	230 U
MCPP	390 U	22000 UJ	430 U	2400 U	380 UJ	6200 U	12000 U	360 U	360 UJ	13000 U
Inorganics, mg/kg										
Aluminum	919	3770	1570	211	471	710	596	2200	216	837
Antimony	0.79 J	1.9 U	0.81 U	0.61 U	0.7 U	0.69 U	0.7 U	0.65 U	0.67 U	0.62 U
Arsenic	8.1	90	55.9	5.6	1.4 U	1.4 U	1.4 U	16.1	1.4 J	25
Barium	5.4 J	44.9 J	19.4 J	4.3 J	4.7 J	6.1 J	6 J	14.5 J	5.3 J	10.7 J
Beryllium	0.08 U	0.34 U	0.16 U	0.05 U	0.06 U	0.09 U	0.09 U	0.14 U	0.1 U	0.1 U
Cadmium	0.2 U	5.2	3.5	0.37 J	0.07 U	0.07 U	0.07 U	0.19 J	0.07 U	0.06 U
Calcium	3730 U	168000	61200	17500	78600	42700	38800	47100	334000	48600
Chromium	3.4	65.7 J	29.1 J	3.5 J	3.8	4.3 J	4.6 J	11.8 J	11.7 J	9.4 J
Cobalt	0.18 U	1.3 J	0.3 J	0.15 U	0.17 U	0.17 U	0.17 U	0.42 J	0.51 J	0.29 J
Copper	3.6 J	77.5	23.4	11	3.4 J	4.3 U	6.5	7.4	3.6 U	11.3
Iron	455	4690	2230	347	276 U	372	340	688	967	2050
Lead	23.4 J	190	121	43.2	23.6 U	18.6	18	8.9	1.3 U	40.1
Magnesium	63 U	2230 U	705 U	187 U	478 U	376 U	481 U	508 U	2390 U	496 U
Manganese	10 U	414	66.7	9.5	22.4	25.8	24.7	26.9	24	45.4
Mercury	0.09 U	1.1 J	0.23 UJ	0.09 UJ	0.07 UJ	0.09 UJ	0.1 UJ	0.35 J	0.08 UJ	1.7 J
Nickel	0.72 U	9 J	3.1 J	0.57 U	0.87 U	0.93 U	0.65 U	2.3 J	2.2 J	2.2 J
Potassium	24.2 U	321 U	97.7 U	18.3 U	75.6 U	56.6 U	103 U	115 U	60.4 U	92.9 U
Selenium	1.1 U	3.4	1.2 U	0.93 U	1.1 U	1 U	1.1 U	1.3	1 U	0.93 U
Silver	0.58 J	4.3 J	4.1	0.4 J	0.19 U	0.19 U	0.19 U	0.26 J	0.18 U	0.59 J
Sodium	179 U	739 U	346 U	164 U	253 U	171 U	159 U	220 U	352 U	197 U
Thallium	1.3 U	3.2 U	1.4 U	1.1 U	1.2 U	1.2 U	1.2 U	1.1 U	1.2 U	1.1 U
Vanadium	1.3 J	18.1 J	5.9 J	0.69 J	2.7 J	2 J	1.8 J	7.4 J	18.6	3.5 J
Zinc	46.4 U	1040 J	460 J	58.7 U	383 J	23.7 U	37.3 U	97.3 U	10 U	51.9 U
General Chemistry, mg/kg										
Iron Oxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S04200		08S04300		08S04400		08S04500		08S04600		08S04700		08S04800		08S04802		08S04900		08S05000	
Lab ID	875078		875079		875080		875081		875082		875083		875084		882696		875085		875086	
Sampling Date	14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		13-Feb-98		14-Nov-97		14-Nov-97	
Semivolatile Organics, ug/kg																				
1,2,4-Trichlorobenzene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
1,2-Dichlorobenzene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
1,3-Dichlorobenzene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
1,4-Dichlorobenzene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2,2'-oxybis(1-Chloropropane)	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2,4,5-Trichlorophenol	890	U	1100	U	1300	U	1200	U	1000	U	3800	U	1100	U	NA		1100	U	1100	U
2,4,6-Trichlorophenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2,4-Dichlorophenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2,4-Dimethylphenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2,4-Dinitrophenol	890	U	1100	U	1300	U	1200	U	1000	U	3800	U	1100	U	NA		1100	U	1100	UJ
2,4-Dinitrotoluene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2,6-Dinitrotoluene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2-Chloronaphthalene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2-Chlorophenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2-Methylnaphthalene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2-Methylphenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
2-Nitroaniline	890	U	1100	U	1300	UJ	1200	U	1000	U	3800	U	1100	U	NA		1100	U	1100	U
2-Nitrophenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
3,3'-Dichlorobenzidine	350	UJ	440	UJ	510	UJ	470	UJ	400	UJ	1500	UJ	440	U	NA		430	U	430	U
3-Nitroaniline	890	UJ	1100	UJ	1300	U	1200	UJ	1000	UJ	3800	UJ	1100	U	NA		1100	U	1100	UJ
4,6-Dinitro-2-methylphenol	890	U	1100	U	1300	U	1200	U	1000	U	3800	U	1100	U	NA		1100	U	1100	U
4-Bromophenyl-phenylether	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
4-Chloro-3-methylphenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
4-Chloroaniline	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	UJ
4-Chlorophenyl-phenylether	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
4-Methylphenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
4-Nitroaniline	890	U	1100	U	1300	U	1200	U	1000	U	3800	U	1100	U	NA		1100	U	1100	U
4-Nitrophenol	890	UJ	1100	UJ	1300	UJ	1200	UJ	1000	UJ	3800	UJ	1100	U	NA		1100	U	1100	U
Acenaphthene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Acenaphthylene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Anthracene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Benzo(a)anthracene	350	U	330	J	510	U	470	U	400	U	1500	U	63	J	NA		37	J	430	U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S04200		08S04300		08S04400		08S04500		08S04600		08S04700		08S04800		08S04802		08S04900		08S05000	
Lab ID	875078		875079		875080		875081		875082		875083		875084		882696		875085		875086	
Sampling Date	14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		13-Feb-98		14-Nov-97		14-Nov-97	
Benzo(a)pyrene	350	U	310	J	510	U	470	U	400	U	1500	U	73	J	NA		36	J	430	U
Benzo(b)fluoranthene	350	U	440		69	J	470	U	400	U	1500	U	180	J	NA		88	J	430	U
Benzo(g,h,i)perylene	350	U	200	J	510	U	470	U	400	U	1500	U	40	J	NA		430	U	430	U
Benzo(k)fluoranthene	350	U	170	J	510	U	470	U	400	U	1500	U	190	J	NA		89	J	430	U
bis(2-Chloroethoxy)methane	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
bis(2-Chloroethyl)ether	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
bis(2-Ethylhexyl)phthalate	350	U	440	U	510	U	470	U	400	U	1500	U	150	J	NA		38	J	430	U
Butylbenzylphthalate	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Carbazole	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Chrysene	350	U	440	U	510	U	470	U	400	U	1500	U	100	J	NA		45	J	430	U
Di-n-butylphthalate	350	UJ	330	J	59	J	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Di-n-octylphthalate	350	U	440	UJ	510	UJ	470	UJ	400	UJ	1500	UJ	440	U	NA		430	U	430	U
Dibenz(a,h)anthracene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Dibenzofuran	350	U	50	J	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Diethylphthalate	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Dimethylphthalate	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Fluoranthene	350	U	570		100	J	470	U	400	U	1500	U	120	J	NA		59	J	430	U
Fluorene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Hexachlorobenzene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Hexachlorobutadiene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Hexachlorocyclopentadiene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Hexachloroethane	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Indeno(1,2,3-cd)pyrene	350	U	200	J	510	U	470	U	400	U	1500	U	58	J	NA		430	U	430	U
Isophorone	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
N-Nitroso-di-n-propylamine	350	U	440	U	510	U	470	U	400	U	1500	U	440	UJ	NA		430	UJ	430	UJ
N-Nitrosodiphenylamine (1)	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Naphthalene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Nitrobenzene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Pentachlorophenol	890	UJ	1100	UJ	1300	UJ	1200	UJ	1000	UJ	3800	UJ	1100	U	NA		1100	U	1100	UJ
Phenanthrene	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	U
Phenol	350	U	440	U	510	U	470	U	400	U	1500	U	440	U	NA		430	U	430	UJ
Pyrene	350	U	450		70	J	470	U	400	U	1500	U	140	J	NA		71	J	430	U
Pesticides/PCBs, ug/kg																				

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S04200	08S04300	08S04400	08S04500	08S04600	08S04700	08S04800	08S04802	08S04900	08S05000
Lab ID	875078	875079	875080	875081	875082	875083	875084	882696	875085	875086
Sampling Date	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	13-Feb-98	14-Nov-97	14-Nov-97
4,4'-DDD	3.5 U	4.8 J	33 J	4.7 U	150 J	15 U	4.4 U	NA	36 J	8.6 U
4,4'-DDE	3.5 U	1600 D	5.1 U	4.7 U	170 D	15 U	4.4 U	NA	96 D	8.6 U
4,4'-DDT	3.5 U	2200 D	30	2 J	49	6.2 J	28	NA	27 J	1.5 J
Aldrin	1.8 U	2.2 U	2.6 U	2.4 U	2 U	7.7 U	0.51 J	NA	2.2 U	4.4 U
alpha-BHC	1.8 U	2.2 U	2.6 U	2.4 U	2 U	7.7 U	2.3 U	NA	2.2 U	4.4 U
alpha-Chlordane	0.45 J	1.6 J	280 D	1.6 J	0.39 J	2.2 J	50 D	NA	12	100 D
Aroclor-1016	35 U	44 U	51 U	47 U	40 U	150 U	44 U	NA	43 U	86 U
Aroclor-1221	72 U	89 U	100 U	96 U	80 U	300 U	90 U	NA	88 U	170 U
Aroclor-1232	35 U	44 U	51 U	47 U	40 U	150 U	44 U	NA	43 U	86 U
Aroclor-1242	35 U	44 U	51 U	47 U	40 U	150 U	44 U	NA	43 U	86 U
Aroclor-1248	35 U	44 U	51 U	47 U	40 U	150 U	44 U	NA	43 U	86 U
Aroclor-1254	35 U	44 U	51 U	47 U	40 U	150 U	44 U	NA	43 U	86 U
Aroclor-1260	66 J	44 U	51 U	47 U	40 U	150 U	44 U	NA	43 U	86 U
beta-BHC	1.8 U	2.2 U	2.6 U	2.4 U	2 U	7.7 U	2.3 U	NA	2.2 U	4.4 U
delta-BHC	1.8 U	2.2 U	2.4 J	0.37 J	2 U	7.7 U	2.3 U	NA	2.2 U	4.4 U
Dieldrin	3.5 U	4.4 U	91 D	4.7 U	4 U	15 U	4.4 U	NA	4.3 U	8.6 U
Endosulfan I	1.8 U	1.2 J	2.6 U	2.4 U	0.5 J	7.7 U	2.3 U	NA	0.58 J	4.4 U
Endosulfan II	3.5 U	4.4 U	5.1 U	4.7 U	4 U	15 U	4.4 U	NA	4.3 U	8.6 U
Endosulfan sulfate	3.5 U	4.4 U	2.5 J	4.7 U	4 U	15 U	4.4 U	NA	4.3 U	8.6 U
Endrin	3.5 U	4.4 U	5.1 U	4.7 U	5.2 J	15 U	4.4 U	NA	4.3 U	8.6 U
Endrin aldehyde	3.5 U	1.6 J	5.1 U	4.7 U	4 U	15 U	0.68 J	NA	1.4 J	8.6 U
Endrin ketone	3.5 U	4.4 U	5.1 U	4.7 U	4 U	15 U	4.4 U	NA	3.7 J	8.6 U
gamma-BHC (Lindane)	1.8 U	2.2 U	2.6 U	2.4 U	2 U	7.7 U	2.3 U	NA	2.2 U	4.4 U
gamma-Chlordane	1.8 U	2.2 U	180 D	3.6	0.16 J	7.7 U	51 D	NA	13	100 D
Heptachlor	1.8 U	2.2 U	2.6 U	2.4 U	2 U	7.7 U	2.3 U	NA	2.2 U	4.4 U
Heptachlor epoxide	1.8 U	0.68 J	11	2.4 U	2 U	7.7 U	1.4 J	NA	2.2 U	0.54 J
Methoxychlor	18 U	22 U	26 U	24 U	20 U	77 U	23 U	NA	22 U	44 U
Toxaphene	180 U	220 U	260 U	240 U	200 U	770 U	230 U	NA	220 U	440 U
Chlorinated Herbicides, ug/kg										
2,4 5-TP (Silvex)	2.2 UJ	2.7 U	3.1 U	3.6 U	2.4 U	15 J	2.7 U	NA	2.6 U	2.6 UJ
2,4,5-T	2.7 UJ	3.3 U	3.8 U	3.6 U	3 U	20 J	3.4 U	NA	3.3 U	3.2 UJ
2,4-D	15 J	6.7 U	14 J	7.1 U	6 U	13 J	3 J	NA	4.8 U	6.5 UJ
2,4-DB	7.1 J	33 U	38 U	36 U	30 U	35 J	28 J	NA	6 J	32 UJ

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S04200	08S04300	08S04400	08S04500	08S04600	08S04700	08S04800	08S04802	08S04900	08S05000
Lab ID	875078	875079	875080	875081	875082	875083	875084	882696	875085	875086
Sampling Date	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	13-Feb-98	14-Nov-97	14-Nov-97
Dalapon	27 UJ	33 U	38 U	36 U	30 U	110 UJ	34 U	NA	33 U	32 UJ
Dicamba	2.7 UJ	3.3 U	3.8 U	3.6 U	4.3 U	11 UJ	3.4 U	NA	3.3 U	3.2 UJ
Dichloroprop	25 UJ	11 U	12 U	11 U	9.6 U	48 J	11 U	NA	24 U	10 UJ
Dinoseb	5.4 UJ	6.7 U	36 J	7.1 U	6 U	11 J	6.8 U	NA	6.6 U	6.5 UJ
MCPA	3800 UJ	270 U	14000 U	8200 U	240 U	10000 UJ	32000 U	NA	4800 U	260 UJ
MCPP	320 UJ	16000 U	44000 U	430 U	360 U	16000 UJ	400 U	NA	99000 J	390 UJ
Inorganics, mg/kg										
Aluminum	207	2370	2900	608	1860	2080	1800	NA	770	836
Antimony	0.6 U	0.73 U	0.84 U	0.82 U	0.7 U	2.5 U	0.75 U	NA	0.73 U	0.68 U
Arsenic	1.2 U	3.6	11.7	11.6	14.6	8.2 J	65.6	NA	14.6	4
Barium	2.2 J	10.4 J	18.1 J	8.6 J	12.3 J	24.7 J	19.5 J	NA	9.3 J	8.7 J
Beryllium	0.04 U	0.21 U	0.14 U	0.08 U	0.14 U	0.27 U	0.13 U	NA	0.04 U	0.06 U
Cadmium	0.06 U	2.5	3	1.6	0.07 U	0.26 U	1.9	NA	1.2 J	0.14 U
Calcium	27300	7740 U	4100 U	6170 U	30900	38000	35400	NA	2270 U	50400
Chromium	1.5 U	37.9 J	63.3 J	21.5 J	11 J	7 J	20.3 J	NA	13.5 J	14.7 J
Cobalt	0.15 U	0.18 U	0.53 J	0.2 U	0.4 J	0.61 U	0.6 J	NA	0.18 U	0.17 U
Copper	1.3 U	15.2	27.8	18.5	5.6 U	16.8 J	43.7	NA	11	16.9
Iron	142	359	1390	1140	909	1170	3090	NA	658	606
Lead	2.7	9.9	20.6	40.7	15.9	163	72.8	NA	21.5	12.4
Magnesium	161 U	176 U	176 U	155 U	351 U	919 U	666 U	NA	96.4 U	485 U
Manganese	4.5 U	1.8 U	51.2	24.6	89.8	33.2	131	NA	48.4	41.6
Mercury	0.05 UJ	0.72 J	0.47 J	0.64 J	0.1 UJ	0.51 J	0.2 UJ	NA	0.36 J	0.09 UJ
Nickel	0.27 U	3.9 J	5.4 J	2 J	2.1 J	4.3 J	4.4 J	NA	1.8 J	1.9 J
Potassium	18.4 U	40.4 U	51.2 U	41.2 U	133 U	366 U	175 U	NA	48.2 U	62.5 U
Selenium	0.92 U	1.3	1.3 U	1.2 U	1.1 U	4.5	1.4	NA	1.1 U	1 U
Silver	0.17 U	0.24 J	1.1 J	2.2 J	0.62 J	0.7 U	2.5 J	NA	7.8	0.39 J
Sodium	133 U	194 U	187 U	254 U	222 U	1390 U	243 U	NA	259 U	222 U
Thallium	1 U	1.3 U	1.4 U	1.4 U	1.2 U	4.4 U	1.3 U	NA	1.3 U	1.2 U
Vanadium	0.76 J	3.6 J	4.9 J	2.4 J	5.2 J	4.8 J	4.4 J	NA	1.2 J	2.7 J
Zinc	1.7 U	25.7 U	162 J	325 J	15.2 U	44.9 U	296 J	396 J	34.1 U	87 U
General Chemistry, mg/kg										
Iron Oxide	NA	NA	NA	NA	NA	NA	NA	12500	NA	NA
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA		NA	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S05002	08S05100	08S05100D	08S05200	08S05301	08S05401	08S05501	08S05601	08S05701	08S05702
Lab ID	882695	875087	875088	875099	882319	882322	882324	882325	882326	882705
Sampling Date	13-Feb-98	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	13-Feb-98
Semivolatile Organics, ug/kg										
1,2,4-Trichlorobenzene	NA	420 U	400 UJ	400 UJ	380 U	390 U	470 U	820 U	470 U	NA
1,2-Dichlorobenzene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
1,3-Dichlorobenzene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
1,4-Dichlorobenzene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2,2'-oxybis(1-Chloropropane)	NA	420 U	400 U	400 U	380 UJ	390 UJ	470 UJ	820 UJ	470 U	NA
2,4,5-Trichlorophenol	NA	1100 U	1000 U	1000 U	960 U	970 U	1200 U	2100 U	1200 U	NA
2,4,6-Trichlorophenol	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2,4-Dichlorophenol	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2,4-Dimethylphenol	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2,4-Dinitrophenol	NA	1100 UJ	1000 UJ	1000 UJ	960 UJ	970 UJ	1200 UJ	2100 UJ	1200 U	NA
2,4-Dinitrotoluene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2,6-Dinitrotoluene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2-Chloronaphthalene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2-Chlorophenol	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2-Methylnaphthalene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2-Methylphenol	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
2-Nitroaniline	NA	1100 U	1000 U	1000 U	960 U	970 U	1200 U	2100 U	1200 U	NA
2-Nitrophenol	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
3,3'-Dichlorobenzidine	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
3-Nitroaniline	NA	1100 UJ	1000 UJ	1000 UJ	960 U	970 U	1200 U	2100 U	1200 U	NA
4,6-Dinitro-2-methylphenol	NA	1100 U	1000 U	1000 U	960 UJ	970 UJ	1200 UJ	2100 UJ	1200 U	NA
4-Bromophenyl-phenylether	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
4-Chloro-3-methylphenol	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
4-Chloroaniline	NA	420 UJ	400 UJ	400 UJ	380 U	390 U	470 U	820 U	470 U	NA
4-Chlorophenyl-phenylether	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
4-Methylphenol	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
4-Nitroaniline	NA	1100 U	1000 U	1000 UJ	960 U	970 U	1200 U	2100 U	1200 U	NA
4-Nitrophenol	NA	1100 U	1000 UJ	1000 U	960 U	970 U	1200 U	2100 U	1200 U	NA
Acenaphthene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Acenaphthylene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	140 J	NA
Anthracene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	540	NA
Benzo(a)anthracene	NA	420 U	400 U	76 J	320 J	390 U	48 J	820 U	1300	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S05002	08S05100	08S05100D	08S05200	08S05301	08S05401	08S05501	08S05601	08S05701	08S05702
Lab ID	882695	875087	875088	875099	882319	882322	882324	882325	882326	882705
Sampling Date	13-Feb-98	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	13-Feb-98
Benzo(a)pyrene	NA	420 U	400 U	61 J	270 J	50 J	470 U	820 U	1100	NA
Benzo(b)fluoranthene	NA	420 U	400 U	120 J	320 J	82 J	72 J	820 U	3700 J	NA
Benzo(g,h,i)perylene	NA	420 U	400 U	42 J	120 J	390 U	470 U	820 U	260 J	NA
Benzo(k)fluoranthene	NA	420 U	400 U	110 J	280 J	110 J	93 J	820 U	3700 J	NA
bis(2-Chloroethoxy)methane	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
bis(2-Chloroethyl)ether	NA	420 U	400 UJ	400 UJ	380 U	390 U	470 U	820 U	470 U	NA
bis(2-Ethylhexyl)phthalate	NA	420 U	400 U	400 U	69 J	170 J	51 J	140 J	54 J	NA
Butylbenzylphthalate	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Carbazole	NA	420 U	400 UJ	400 UJ	380 U	390 U	470 U	820 U	260 J	NA
Chrysene	NA	420 U	400 U	56 J	310 J	43 J	470 U	820 U	1900	NA
Di-n-butylphthalate	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Di-n-octylphthalate	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Dibenz(a,h)anthracene	NA	420 U	400 U	400 U	85 J	390 U	470 U	820 U	280 J	NA
Dibenzofuran	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Diethylphthalate	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Dimethylphthalate	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Fluoranthene	NA	420 U	400 U	81 J	700	51 J	110 J	88 J	2600	NA
Fluorene	NA	420 UJ	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Hexachlorobenzene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Hexachlorobutadiene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Hexachlorocyclopentadiene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Hexachloroethane	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Indeno(1,2,3-cd)pyrene	NA	420 U	400 U	38 J	160 J	390 U	470 U	820 U	460 J	NA
Isophorone	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
N-Nitroso-di-n-propylamine	NA	420 UJ	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
N-Nitrosodiphenylamine (1)	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Naphthalene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Nitrobenzene	NA	420 U	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Pentachlorophenol	NA	1100 U	1000 UJ	1000 UJ	960 U	970 U	1200 U	2100 U	1200 U	NA
Phenanthrene	NA	420 U	400 U	400 U	130 J	390 U	470 U	820 U	470 U	NA
Phenol	NA	420 UJ	400 U	400 U	380 U	390 U	470 U	820 U	470 U	NA
Pyrene	NA	420 U	400 U	83 J	460	51 J	67 J	820 U	2600	NA
Pesticides/PCBs, ug/kg										

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S05002	08S05100	08S05100D	08S05200	08S05301	08S05401	08S05501	08S05601	08S05701	08S05702
Lab ID	882695	875087	875088	875099	882319	882322	882324	882325	882326	882705
Sampling Date	13-Feb-98	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	13-Feb-98
4,4'-DDD	NA	4.2 U	4 U	4 U	3.8 U	3.9 U	6.8 J	8.2 U	4.7 U	NA
4,4'-DDE	NA	4.2 U	4 U	4 U	0.34 J	160 D	28	32	1.1 J	NA
4,4'-DDT	NA	0.42 J	0.31 J	1.2 J	1.5 J	11 J	18	3 J	4.2 J	NA
Aldrin	NA	2.2 U	2.1 U	2.1 U	1.9 U	2 U	2.4 U	4.2 U	2.4 U	NA
alpha-BHC	NA	2.2 U	2.1 U	2.1 U	1.9 U	2 U	2.4 U	0.28 J	2.4 U	NA
alpha-Chlordane	NA	11	10	1 J	1.3 J	7.7 J	2.6	17 J	0.19 J	NA
Aroclor-1016	NA	42 U	40 U	40 U	38 U	39 U	46 U	82 U	47 U	NA
Aroclor-1221	NA	86 U	82 U	82 U	76 U	80 U	94 U	170 U	96 U	NA
Aroclor-1232	NA	42 U	40 U	40 U	38 U	39 U	46 U	82 U	47 U	NA
Aroclor-1242	NA	42 U	40 U	40 U	38 U	39 U	46 U	82 U	47 U	NA
Aroclor-1248	NA	42 U	40 U	40 U	38 U	39 U	46 U	82 U	47 U	NA
Aroclor-1254	NA	42 U	40 U	40 U	38 U	39 U	46 U	82 U	47 U	NA
Aroclor-1260	NA	42 U	40 U	40 U	38 U	39 U	46 U	82 U	47 U	NA
beta-BHC	NA	2.2 U	2.1 U	2.1 U	1.9 U	2 U	2.4 U	4.2 U	2.4 U	NA
delta-BHC	NA	2.2 U	2.1 U	2.1 U	1.9 U	2 U	2.4 U	4.2 U	2.4 U	NA
Dieldrin	NA	4.2 U	0.69 J	4 U	0.33 J	3.9 U	2.6 J	2 J	0.29 J	NA
Endosulfan I	NA	2.2 U	2.1 U	2.1 U	1.9 U	2 U	2.4 U	4.2 U	2.4 U	NA
Endosulfan II	NA	4.2 U	4 U	4 U	3.8 U	3.9 U	4.6 U	5.9 J	4.2 J	NA
Endosulfan sulfate	NA	4.2 U	4 U	1 J	3.8 U	3.9 U	4.6 U	1.7 J	4.7 U	NA
Endrin	NA	4.2 U	4 U	4 U	3.8 U	3.9 U	4.6 U	8.2 U	6.3 J	NA
Endrin aldehyde	NA	4.2 U	4 U	4 U	3.8 U	1.4 J	0.54 J	8.2 U	4.7 U	NA
Endrin ketone	NA	4.2 U	4 U	4 U	3.8 U	1.2 J	4.6 U	8.2 U	4.7 U	NA
gamma-BHC (Lindane)	NA	2.2 U	2.1 U	2.1 U	1.9 U	2 U	0.22 J	4.2 U	3.2 J	NA
gamma-Chlordane	NA	11	11	2.1 U	0.82 J	6	2.1 J	0.8 J	2.4 U	NA
Heptachlor	NA	2.2 U	2.1 U	2.1 U	0.23 J	2 U	2.4 U	4.2 U	2.4 U	NA
Heptachlor epoxide	NA	2.2 U	2.1 U	2.1 U	1.9 U	9.7	0.24 J	0.24 J	2.4 U	NA
Methoxychlor	NA	22 U	21 U	21 U	1.4 J	20 U	24 U	7.6 J	87 J	NA
Toxaphene	NA	220 U	210 U	210 U	190 U	200 U	240 U	420 U	240 U	NA
Chlorinated Herbicides, ug/kg										
2,4 5-TP (Silvex)	NA	2.6 U	2.4 U	2.4 U	0.46 J	3 U	1.3 J	0.61 J	0.33 J	NA
2,4,5-T	NA	3.2 U	3 U	3 U	2.9 U	3 U	4.6 J	6.2 U	1.9 J	NA
2,4-D	NA	6.4 U	2.1 J	1.2 J	5.8 U	6 U	7.1 U	12 U	23 J	NA
2,4-DB	NA	4.9 J	5.1 J	30 U	140 J	110 J	120 J	62 U	120 J	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S05002	08S05100	08S05100D	08S05200	08S05301	08S05401	08S05501	08S05601	08S05701	08S05702
Lab ID	882695	875087	875088	875099	882319	882322	882324	882325	882326	882705
Sampling Date	13-Feb-98	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98	13-Feb-98
Dalapon	NA	32 U	30 U	30 U	29 U	30 U	35 U	8.4 J	36 U	NA
Dicamba	NA	3.2 U	3 U	3 U	2.9 U	3 U	6.3 U	12 U	5 U	NA
Dichloroprop	NA	10 U	9.8 U	9.8 U	15 J	61 J	140 J	20 U	15 J	NA
Dinoseb	NA	6.4 U	6.1 U	6.1 U	5.8 U	6 U	7.1 U	12 U	7.1 U	NA
MCPA	NA	260 U	240 U	1700 U	230 U	16000 J	280 U	6000 J	280 U	NA
MCPP	NA	380 U	3800 U	8300 U	340 U	4600 J	420 U	740 U	6800 J	NA
Inorganics, mg/kg										
Aluminum	NA	475	476	374	576	1230	879 U	3250	218	NA
Antimony	NA	0.74 U	0.7 U	0.68 U	0.54 U	0.59 U	1.2 J	2.7 U	0.7 U	NA
Arsenic	NA	3.4	2.4	1.8 J	5.3	14.6	2.5 J	8.6	0.86 U	NA
Barium	NA	6.2 J	5.1 J	4.7 J	7.1 J	14.7 J	8.6 U	15.5 J	4.9 J	NA
Beryllium	NA	0.06 U	0.06 U	0.06 U	0.08 U	0.12 U	0.14 J	0.47 U	0.1 U	NA
Cadmium	NA	0.08 U	0.07 U	0.07 U	0.06 U	2.1	0.11 U	0.15 U	0.08 U	NA
Calcium	NA	172000	114000 J	37400 J	14600 U	3240 U	7230 J	10300 U	3380 U	NA
Chromium	NA	6.8 J	5.7	5.5	3.6	38.8	2.3 U	3.8 J	0.95 J	NA
Cobalt	NA	0.18 U	0.17 U	0.16 U	0.17 U	0.19 U	0.21 U	0.4 U	0.22 U	NA
Copper	NA	6.4	6.8	5.3 J	7	24.5	23.5	8 J	2.8 J	NA
Iron	NA	440	418	294	428 J	694 J	510 J	1000 J	306 J	NA
Lead	NA	6.2	10.8 J	10.3 J	17.8	18	83	144	15.9	NA
Magnesium	NA	1240 U	804 U	302 U	165 U	108 U	286 U	514 U	229 U	NA
Manganese	NA	49	43.7	44.5	15.1 U	5.1 U	2.6 U	13.3 U	13.5 U	NA
Mercury	NA	0.08 UJ	0.06 U	0.06 U	0.06 U	0.14	0.08 J	0.11 J	0.07 U	NA
Nickel	NA	1 U	1.2 U	0.82 U	0.62 J	3.3 J	0.94 J	1.5 J	0.46 J	NA
Potassium	NA	73.5 U	82.5 U	39.3 U	21.4 U	18.7 U	195 U	77.5 U	32.7 U	NA
Selenium	NA	1.1 U	1.1 U	1 U	0.78 U	0.85 U	0.92 U	1.8 U	1 U	NA
Silver	NA	0.2 U	0.19 U	0.51 J	0.15 U	2.3 J	0.18 U	0.47 J	0.2 U	NA
Sodium	NA	274 U	211 U	122 U	99.6 U	148 U	172 U	317 U	379 U	NA
Thallium	NA	1.3 U	1.2 U	1.2 U	0.9 U	1 U	1.1 U	2.1 U	1.2 U	NA
Vanadium	NA	3.6 J	3.4 J	2.1 J	1.3 J	1.2 J	2 J	3.9 J	1.1 J	NA
Zinc	NA	35.2 U	42.2 U	40 U	31.3 U	39.5 U	13.9 U	81.3 J	17.6 U	NA
General Chemistry, mg/kg										
Iron Oxide	54.4 J	NA	NA	NA	NA	NA	NA	NA	NA	205 J
Total Organic Carbon	16000 >	NA	NA	NA	NA	NA	NA	NA	NA	16000 >

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S05801		08S05901		08S06001		08S06101		08S06201		08S06301		08S06301D		09S00500		09S00500D		09S00502	
Lab ID	882327		882304		882316		882317		882323		882320		882321		874816		874821		885662	
Sampling Date	10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		11-Nov-97		11-Nov-97		17-Mar-98	
Semivolatile Organics, ug/kg																				
1,2,4-Trichlorobenzene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
1,2-Dichlorobenzene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
1,3-Dichlorobenzene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
1,4-Dichlorobenzene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
2,2'-oxybis(1-Chloropropane)	1400	UJ	1000	UJ	440	U	370	UJ	360	UJ	380	UJ	380	UJ	440	UJ	440	U	NA	
2,4,5-Trichlorophenol	3600	U	2500	U	1100	U	920	U	910	U	950	U	950	U	1100	U	1100	U	NA	
2,4,6-Trichlorophenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
2,4-Dichlorophenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
2,4-Dimethylphenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
2,4-Dinitrophenol	3600	UJ	2500	UJ	1100	UJ	920	UJ	910	UJ	950	UJ	950	UJ	1100	UJ	1100	UJ	NA	
2,4-Dinitrotoluene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
2,6-Dinitrotoluene	1400	U	1000	U	440	UJ	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
2-Chloronaphthalene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
2-Chlorophenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
2-Methylnaphthalene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
2-Methylphenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
2-Nitroaniline	3600	U	2500	U	1100	U	920	U	910	U	950	U	950	U	1100	UJ	1100	U	NA	
2-Nitrophenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
3,3'-Dichlorobenzidine	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
3-Nitroaniline	3600	U	2500	U	1100	U	920	U	910	U	950	U	950	U	1100	UJ	1100	U	NA	
4,6-Dinitro-2-methylphenol	3600	UJ	2500	UJ	1100	UJ	920	UJ	910	UJ	950	UJ	950	UJ	1100	UJ	1100	UJ	NA	
4-Bromophenyl-phenylether	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
4-Chloro-3-methylphenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
4-Chloroaniline	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
4-Chlorophenyl-phenylether	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
4-Methylphenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
4-Nitroaniline	3600	U	2500	U	1100	U	920	U	910	U	950	U	950	U	1100	UJ	1100	U	NA	
4-Nitrophenol	3600	U	2500	U	1100	U	920	U	910	U	950	U	950	U	1100	UJ	1100	UJ	NA	
Acenaphthene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Acenaphthylene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Anthracene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Benzo(a)anthracene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S05801		08S05901		08S06001		08S06101		08S06201		08S06301		08S06301D		09S00500		09S00500D		09S00502	
Lab ID	882327		882304		882316		882317		882323		882320		882321		874816		874821		885662	
Sampling Date	10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		11-Nov-97		11-Nov-97		17-Mar-98	
Benzo(a)pyrene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Benzo(b)fluoranthene	1400	U	81	J	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Benzo(g,h,i)perylene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Benzo(k)fluoranthene	1400	U	110	J	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
bis(2-Chloroethoxy)methane	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
bis(2-Chloroethyl)ether	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
bis(2-Ethylhexyl)phthalate	230	J	120	J	46	J	83	J	47	J	50	J	130	J	440	UJ	440	U	NA	
Butylbenzylphthalate	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	UJ	NA	
Carbazole	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Chrysene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	UJ	NA	
Di-n-butylphthalate	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Di-n-octylphthalate	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Dibenz(a,h)anthracene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Dibenzofuran	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Diethylphthalate	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Dimethylphthalate	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Fluoranthene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Fluorene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Hexachlorobenzene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Hexachlorobutadiene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	UJ	NA	
Hexachlorocyclopentadiene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Hexachloroethane	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Indeno(1,2,3-cd)pyrene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Isophorone	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
N-Nitroso-di-n-propylamine	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
N-Nitrosodiphenylamine (1)	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Naphthalene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Nitrobenzene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Pentachlorophenol	3600	U	2500	U	1100	U	920	U	910	U	950	U	950	U	1100	U	1100	U	NA	
Phenanthrene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Phenol	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	U	440	U	NA	
Pyrene	1400	U	1000	U	440	U	370	U	360	U	380	U	380	U	440	UJ	440	U	NA	
Pesticides/PCBs, ug/kg																				

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S05801		08S05901		08S06001		08S06101		08S06201		08S06301		08S06301D		09S00500		09S00500D		09S00502	
Lab ID	882327		882304		882316		882317		882323		882320		882321		874816		874821		885662	
Sampling Date	10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		11-Nov-97		11-Nov-97		17-Mar-98	
4,4'-DDD	1.6	J	3.8	J	4.4	U	3.6	U	3.6	U	3.7	U	3.7	U	15000	D	20000	D	NA	
4,4'-DDE	9.5	J	7.4	J	2	J	3.6	U	3.6	U	3.7	U	3.7	U	710		1000		NA	
4,4'-DDT	4.2	J	3.8	J	4.4	U	3.6	U	3.6	U	0.22	J	0.44	J	3600		12000	D	NA	
Aldrin	7.4	U	5.2	U	2.2	U	1.9	U	1.8	U	1.9	U	1.9	U	230	U	230	U	NA	
alpha-BHC	1.3	J	5.2	U	2.2	U	1.9	U	1.8	U	1.9	U	1.9	U	230	U	230	U	NA	
alpha-Chlordane	37	J	5.4	J	2.2	U	0.41	J	1.8	U	6.1		6.4		3900	D	5300	D	NA	
Aroclor-1016	140	U	100	U	44	U	36	U	36	U	37	U	37	U	4400	U	4400	U	NA	
Aroclor-1221	290	U	200	U	89	U	74	U	73	U	76	U	76	U	8900	U	9000	U	NA	
Aroclor-1232	140	U	100	U	44	U	36	U	36	U	37	U	37	U	4400	U	4400	U	NA	
Aroclor-1242	140	U	100	U	44	U	36	U	36	U	37	U	37	U	4400	U	4400	U	NA	
Aroclor-1248	140	U	100	U	44	U	36	U	36	U	37	U	37	U	4400	U	4400	U	NA	
Aroclor-1254	140	U	100	U	44	U	36	U	36	U	37	U	37	U	4400	U	4400	U	NA	
Aroclor-1260	140	U	100	U	44	U	36	U	36	U	37	U	37	U	4400	U	4400	U	NA	
beta-BHC	7.4	U	5.2	U	2.2	U	1.9	U	1.8	U	1.9	U	1.9	U	230	U	230	U	NA	
delta-BHC	7.4	U	5.2	U	2.2	U	1.9	U	1.8	U	1.9	U	1.9	U	230	U	230	U	NA	
Dieldrin	1.7	J	2.5	J	4.4	U	3.6	U	3.6	U	20	J	24	J	440	U	440	U	NA	
Endosulfan I	7.4	U	5.2	U	2.2	U	1.9	U	1.8	U	1.9	U	1.9	U	230	U	230	U	NA	
Endosulfan II	1.2	J	10	U	4.4	U	3.6	U	3.6	U	3.7	U	3.7	U	440	U	440	U	NA	
Endosulfan sulfate	2.7	J	10	U	4.4	U	3.6	U	3.6	U	3.7	U	3.7	U	440	U	440	U	NA	
Endrin	14	U	10	U	4.4	U	3.6	U	3.6	U	3.7	U	3.7	U	440	U	440	U	NA	
Endrin aldehyde	14	U	10	U	4.4	U	0.47	J	3.6	U	0.73	J	0.86	J	440	U	440	U	NA	
Endrin ketone	2.6	J	0.66	J	4.4	U	3.6	U	3.6	U	0.36	J	0.51	J	440	U	440	U	NA	
gamma-BHC (Lindane)	18	J	0.3	J	2.2	U	1.9	U	1.8	U	1.9	U	1.9	U	230	U	32	J	NA	
gamma-Chlordane	1.4	J	0.64	J	2.2	U	0.11	J	1.8	U	2.8		3.2		4200	D	6000	D	NA	
Heptachlor	7.4	U	5.2	U	2.2	U	1.9	U	1.8	U	1.9	U	1.9	U	230	U	230	U	NA	
Heptachlor epoxide	1.4	J	5.2	U	2.2	U	1.9	U	1.8	U	0.23	J	0.27	J	230	U	230	U	NA	
Methoxychlor	74	U	52	U	22	U	19	U	18	U	19	U	19	U	2300	U	2300	U	NA	
Toxaphene	740	U	520	U	220	U	190	U	180	U	190	U	190	U	23000	U	23000	U	NA	
Chlorinated Herbicides, ug/kg																				
2,4 5-TP (Silvex)	NA		1.7	J	16	J	0.25	J	2.2	U	0.2	J	0.9	J	2.7	U	2.7	U	NA	
2,4,5-T	NA		2.8	J	4.8	J	2.8	U	2.1	J	2.9	U	1.9	J	3.3	U	3.4	U	NA	
2,4-D	NA		13	J	6.6	U	5.5	U	13	J	7.1	U	16	J	9.4	J	0.31	J	NA	
2,4-DB	NA		310	J	1.9	J	100	J	100	J	87	J	2.8	J	5.3	J	33	J	NA	

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	08S05801		08S05901		08S06001		08S06101		08S06201		08S06301		08S06301D		09S00500		09S00500D		09S00502	
Lab ID	882327		882304		882316		882317		882323		882320		882321		874816		874821		885662	
Sampling Date	10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98		11-Nov-97		11-Nov-97		17-Mar-98	
Dalapon	NA		50	J	33	U	28	U	27	U	29	U	29	U	3.3	U	34	U	NA	
Dicamba	NA		7.4	U	3.3	U	4.4	U	2.7	U	5.4	U	4	U	3.3	U	5	U	NA	
Dichloroprop	NA		4	J	62	J	43	J	28	J	14	J	68	J	17	U	11	U	NA	
Dinoseb	NA		15	U	6.6	U	5.5	U	5.4	U	5.7	U	5.7	U	33	J	40		NA	
MCPA	NA		32000	J	260	U	9400	J	11000	J	4200	U	230	U	8100	U	16000	U	NA	
MCPP	NA		38000	J	10000	J	7900	J	3700	J	3200	J	16000	J	400	U	400	U	NA	
Inorganics, mg/kg																				
Aluminum	9130		1780		90.6		781		65.6		304		361		877	J	964	J	NA	
Antimony	16.3	J	5.8	J	0.9	U	0.5	U	0.53	U	0.62	U	0.54	U	0.71	U	0.77	U	NA	
Arsenic	2.9	J	6.7		0.81	U	3.4		0.65	U	3.3		4.3		4.8		4.4		NA	
Barium	23.2	J	31.1	J	3.5	J	2.4	J	1.4	J	11.7	J	16.5	J	6.2	J	6.8	J	NA	
Beryllium	2	J	0.24	U	0.08	U	0.07	U	0.08	U	0.12	U	0.11	U	0.04	U	0.06	U	NA	
Cadmium	2.5	J	0.17	U	0.08	J	0.06	U	0.06	U	0.61	J	0.66	J	0.07	U	0.08	U	NA	
Calcium	15300	U	19000	U	1540	U	703	U	927	U	6860	U	5380	U	2620	U	2960	U	NA	
Chromium	6.5	J	6.8		2.3	J	4.2		1.7	J	17.7		14.5		2	J	3.4	J	NA	
Cobalt	0.64	U	0.44	U	0.21	U	0.16	U	0.17	U	0.18	U	0.17	U	0.17	U	0.19	U	NA	
Copper	17.4	J	11	J	2.6	J	3.2	J	1.5	J	13.3		14.7		8.7		10.9		NA	
Iron	1260	J	1780	J	75.1	J	188	J	93	J	305	J	352	J	242	J	282	J	NA	
Lead	902		268		19.9		7.1		2.8		15		22.8		18.7	J	24.6	J	NA	
Magnesium	1190	U	1010	U	92.5	U	29	U	19.8	U	106	U	96.8	U	71.6	U	79.8	U	NA	
Manganese	7.2	U	20.1	U	0.67	U	8.4	U	6.7	U	12.9	U	16.1	U	9.6	J	10.6	J	NA	
Mercury	0.2	U	0.14	U	0.06	U	0.05	U	0.05	U	0.17		0.34		0.09	J	0.09	J	NA	
Nickel	6.2	J	4.3	J	2.1	J	0.41	J	0.25	U	1.2	J	1.4	J	0.42	U	0.66	U	NA	
Potassium	144	U	251	U	10.8	U	13.4	U	20.7	U	23.3	U	29	U	28.5	U	39.9	U	NA	
Selenium	2.9	U	2	U	0.94	U	0.73	U	0.76	U	0.83	U	0.78	U	1.1	U	1.2	U	NA	
Silver	0.56	U	5.9		1.1	J	1.6	J	0.15	U	1.3	J	2	J	0.2	U	0.21	U	NA	
Sodium	780	U	458	U	162	U	130	U	134	U	136	U	613	U	241	U	275	U	NA	
Thallium	3.4	U	2.3	U	1.1	U	0.85	U	0.88	U	0.96	U	0.91	U	1.2	U	1.3	U	NA	
Vanadium	8.1	J	3	J	0.72	J	0.48	J	0.13	U	0.76	J	0.66	J	1.5	U	1.4	U	NA	
Zinc	45.4	J	79.3	J	11.4	U	5	U	1.7	U	32.1	U	40.2	U	89.1	J	40.1	U	NA	
General Chemistry, mg/kg																				
Iron Oxide	NA		NA		NA		NA		NA		NA		NA		NA		NA		33.8	J
Total Organic Carbon	NA		NA		NA		NA		NA		NA		NA		NA		NA		16000	>

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S00600		09S00700		09S00702	09S00800		09S00802	09S00900		09S01000		09S01100		09S01200		09S01300	
Lab ID	874828		874829		885654	874830		882694	874831		874832		874833		874834		874835	
Sampling Date	11-Nov-97		11-Nov-97		17-Mar-98	11-Nov-97		13-Feb-98	11-Nov-97		11-Nov-97		11-Nov-97		11-Nov-97		11-Nov-97	
Semivolatile Organics, ug/kg																		
1,2,4-Trichlorobenzene	370	UJ	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
1,2-Dichlorobenzene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
1,3-Dichlorobenzene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
1,4-Dichlorobenzene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2,2'-oxybis(1-Chloropropane)	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2,4,5-Trichlorophenol	920	U	1500	U	NA	930	U	NA	1100	U	870	U	1200	U	870	U	860	U
2,4,6-Trichlorophenol	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2,4-Dichlorophenol	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2,4-Dimethylphenol	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2,4-Dinitrophenol	920	UJ	1500	UJ	NA	930	UJ	NA	1100	UJ	870	UJ	1200	UJ	870	UJ	860	UJ
2,4-Dinitrotoluene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2,6-Dinitrotoluene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2-Chloronaphthalene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2-Chlorophenol	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2-Methylnaphthalene	370	U	77	J	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2-Methylphenol	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
2-Nitroaniline	920	U	1500	U	NA	930	U	NA	1100	U	870	U	1200	U	870	U	860	U
2-Nitrophenol	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
3,3'-Dichlorobenzidine	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
3-Nitroaniline	920	U	1500	U	NA	930	U	NA	1100	U	870	U	1200	U	870	U	860	U
4,6-Dinitro-2-methylphenol	920	UJ	1500	UJ	NA	930	UJ	NA	1100	UJ	870	UJ	1200	UJ	870	UJ	860	UJ
4-Bromophenyl-phenylether	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
4-Chloro-3-methylphenol	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
4-Chloroaniline	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
4-Chlorophenyl-phenylether	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
4-Methylphenol	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
4-Nitroaniline	920	U	1500	U	NA	930	U	NA	1100	U	870	U	1200	U	870	U	860	U
4-Nitrophenol	920	UJ	1500	UJ	NA	930	UJ	NA	1100	UJ	870	UJ	1200	UJ	870	U	860	UJ
Acenaphthene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
Acenaphthylene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
Anthracene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U
Benzo(a)anthracene	370	U	580	U	NA	370	U	NA	460	U	350	U	480	U	350	U	340	U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S00600	09S00700	09S00702	09S00800	09S00802	09S00900	09S01000	09S01100	09S01200	09S01300
Lab ID	874828	874829	885654	874830	882694	874831	874832	874833	874834	874835
Sampling Date	11-Nov-97	11-Nov-97	17-Mar-98	11-Nov-97	13-Feb-98	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97
Benzo(a)pyrene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Benzo(b)fluoranthene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Benzo(g,h,i)perylene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Benzo(k)fluoranthene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
bis(2-Chloroethoxy)methane	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
bis(2-Chloroethyl)ether	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
bis(2-Ethylhexyl)phthalate	370 U	580 U	NA	170 J	NA	460 U	350 U	480 U	350 U	74 J
Butylbenzylphthalate	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Carbazole	370 U	580 UJ	NA	370 UJ	NA	460 UJ	350 UJ	480 UJ	350 U	340 U
Chrysene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Di-n-butylphthalate	370 U	580 UJ	NA	370 UJ	NA	460 UJ	350 UJ	480 UJ	350 U	340 U
Di-n-octylphthalate	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Dibenz(a,h)anthracene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Dibenzofuran	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Diethylphthalate	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Dimethylphthalate	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Fluoranthene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Fluorene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Hexachlorobenzene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Hexachlorobutadiene	370 U	580 U	NA	370 UJ	NA	460 UJ	350 UJ	480 UJ	350 UJ	340 UJ
Hexachlorocyclopentadiene	370 UJ	580 UJ	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Hexachloroethane	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Indeno(1,2,3-cd)pyrene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Isophorone	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
N-Nitroso-di-n-propylamine	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
N-Nitrosodiphenylamine (1)	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Naphthalene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Nitrobenzene	920 U	1500 U	NA	930 U	NA	1100 U	870 U	1200 U	870 U	860 U
Pentachlorophenol	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Phenanthrene	370 U	580 U	NA	370 U	NA	460 U	350 U	480 U	350 U	340 U
Phenol	370 U	78 J	NA	370 U	NA	460 U	350 U	46 J	350 U	340 U
Pyrene										
Pesticides/PCBs, ug/kg										

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S00600	09S00700	09S00702	09S00800	09S00802	09S00900	09S01000	09S01100	09S01200	09S01300
Lab ID	874828	874829	885654	874830	882694	874831	874832	874833	874834	874835
Sampling Date	11-Nov-97	11-Nov-97	17-Mar-98	11-Nov-97	13-Feb-98	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97
4,4'-DDD	21	4600 D	NA	43	NA	140 D	19 J	4400 D	3.5 U	19 J
4,4'-DDE	14	570	NA	18	NA	22 J	14 J	300 J	1.7 J	9.3 J
4,4'-DDT	8.4 J	35 J	NA	12	NA	9.5 J	11 J	1200 J	3.5 U	4.8 J
Aldrin	1.9 U	60 U	NA	3.8 U	NA	2.4 U	1.8 U	49 U	1.8 U	1.8 U
alpha-BHC	1.9 U	60 U	NA	3.8 U	NA	0.52 J	1.8 U	49 U	1.8 U	1.8 U
alpha-Chlordane	15	2400 D	NA	33	NA	23	14 J	1200 D	0.68 J	20
Aroclor-1016	37 U	1200 U	NA	74 U	NA	46 U	35 U	950 U	35 U	34 U
Aroclor-1221	74 U	2400 U	NA	150 U	NA	93 U	70 U	1900 U	70 U	70 U
Aroclor-1232	37 U	1200 U	NA	74 U	NA	46 U	35 U	950 U	35 U	34 U
Aroclor-1242	37 U	1200 U	NA	74 U	NA	46 U	35 U	950 U	35 U	34 U
Aroclor-1248	37 U	1200 U	NA	74 U	NA	46 U	35 U	950 U	35 U	34 U
Aroclor-1254	37 U	1200 U	NA	74 U	NA	46 U	35 U	950 U	35 U	34 U
Aroclor-1260	37 U	1200 U	NA	74 U	NA	46 U	35 U	950 U	35 U	34 U
beta-BHC	1.9 U	60 U	NA	3.8 U	NA	0.18 J	0.51 J	49 U	1.8 U	1.8 U
delta-BHC	1.9 U	60 U	NA	3.8 U	NA	5.4	1.8 U	49 U	1.8 U	1.8 U
Dieldrin	3.7 U	120 U	NA	7.4 U	NA	4.6 U	3.5 U	95 U	0.47 J	3.1 J
Endosulfan I	1.9 U	60 U	NA	3.8 U	NA	2.4 U	1.8 U	49 U	1.8 U	1.8 U
Endosulfan II	3.7 U	120 U	NA	7.4 U	NA	4.6 U	3.5 U	95 U	3.5 U	2.2 J
Endosulfan sulfate	3.7 U	120 U	NA	7.4 U	NA	4.6 U	3.5 U	95 U	3.5 U	3.4 U
Endrin	3.7 U	120 U	NA	8.5 J	NA	4.6 U	3.5 U	95 U	3.5 U	3.4 U
Endrin aldehyde	3.7 U	120 U	NA	7.4 U	NA	4.6 U	3.5 U	95 U	3.5 U	0.11 J
Endrin ketone	3.7 U	120 U	NA	7.4 U	NA	4.6 U	3.5 U	95 U	3.5 U	3.4 U
gamma-BHC (Lindane)	1.9 U	60 U	NA	0.53 J	NA	2.4 U	1.8 U	49 U	1.8 U	1.8 U
gamma-Chlordane	16 J	2600 D	NA	29	NA	18 J	14 J	1300 D	0.09 J	18 J
Heptachlor	1.9 U	60 U	NA	3.8 U	NA	2.4 U	1.8 U	49 U	1.8 U	1.8 U
Heptachlor epoxide	1.9 U	60 U	NA	0.24 J	NA	0.23 J	1.8 U	49 U	1.8 U	0.08 J
Methoxychlor	19 U	600 U	NA	38 U	NA	24 U	18 U	490 U	18 U	18 U
Toxaphene	190 U	6000 U	NA	380 U	NA	240 U	180 U	4900 U	180 U	180 U
Chlorinated Herbicides, ug/kg										
2,4 5-TP (Silvex)	2.2 U	3.5 U	NA	2.2 U	NA	2.8 U	2.1 U	2.9 U	2.1 U	4.7 U
2,4,5-T	2.8 UJ	4.4 U	NA	2.8 U	NA	3.5 U	2.6 U	3.6 U	2.6 U	2.6 U
2,4-D	0.75 J	1.9 J	NA	5.6 U	NA	4.2 J	14	10	7 J	23 J
2,4-DB	15 J	14 J	NA	6.1 J	NA	4.6 J	10 J	36 U	2.4 J	11 J

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S00600		09S00700		09S00702		09S00800		09S00802		09S00900		09S01000		09S01100		09S01200		09S01300	
Lab ID	874828		874829		885654		874830		882694		874831		874832		874833		874834		874835	
Sampling Date	11-Nov-97		11-Nov-97		17-Mar-98		11-Nov-97		13-Feb-98		11-Nov-97		11-Nov-97		11-Nov-97		11-Nov-97		11-Nov-97	
Dalapon	28	U	44	U	NA		28	U	NA		35	U	26	U	36	U	26	U	26	U
Dicamba	2.8	U	4.4	U	NA		2.8	U	NA		4.3	U	2.6	U	3.6	U	2.6	U	4.6	U
Dichloroprop	16	U	52	U	NA		9	U	NA		11	U	14	U	12	U	8.4	U	8.3	U
Dinoseb	2.8	U	8.8	U	NA		5.6	U	NA		11		5.2	U	9	J	6.1	U	5.2	U
MCPA	220	U	350	U	NA		7000	U	NA		4300	U	5200	U	3200	U	9400	U	14000	U
MCPP	2800	U	3700	U	NA		11000	U	NA		15000	U	9200	U	11000	U	13000	U	310	U
Inorganics, mg/kg																				
Aluminum	2250	J	2540	J	NA		390	J	NA		438	J	58.7	J	422	J	31.4	U	109	J
Antimony	0.6	U	0.98	U	NA		0.63	U	NA		0.8	U	0.59	U	0.8	U	0.59	U	0.61	U
Arsenic	1.2	U	20.2		NA		3.2		NA		14.4		1.2	U	1.6	U	1.2	U	1.2	U
Barium	47.1	J	40.8	J	NA		4.2	U	NA		5.9	J	0.93	U	6.1	J	0.9	U	2.9	U
Beryllium	0.46	J	0.17	U	NA		0.04	U	NA		0.03	U	0.02	U	0.03	U	0.03	U	0.02	U
Cadmium	0.06	U	0.1	U	NA		0.07	U	NA		0.08	U	0.06	U	0.08	U	0.06	U	0.06	U
Calcium	18700	J	37200	J	NA		2890	U	NA		1450	U	243	U	1140	U	123	U	589	U
Chromium	2.5	J	15.9	J	NA		0.87	U	NA		1.6	J	0.55	U	1.6	J	0.57	U	0.68	U
Cobalt	0.23	U	0.65	U	NA		0.15	U	NA		0.19	U	0.14	U	0.19	U	0.14	U	0.15	U
Copper	4.3	U	29.7		NA		1.1	U	NA		16.5		0.96	U	17.6		1.1	U	2.6	U
Iron	444	J	1630	J	NA		311	J	NA		330	J	33.5	U	209	J	19.1	U	82.2	J
Lead	23.9	J	47.6	J	NA		2.2	J	NA		8.2	J	0.84	J	9.8	J	0.62	J	5.1	J
Magnesium	1900	U	417	U	NA		27.1	U	NA		60.1	U	10.1	U	50.5	U	15.8	U	61.4	U
Manganese	137	J	45.1	J	NA		1.2	U	NA		7.7	J	0.58	U	9	J	0.7	U	3.1	U
Mercury	0.05	J	0.18	J	NA		0.05	J	NA		0.07	J	0.05	UJ	0.09	J	0.04	UJ	0.06	J
Nickel	0.52	U	7	J	NA		0.37	U	NA		0.4	U	0.26	U	0.54	U	0.27	U	0.27	U
Potassium	344	U	66	U	NA		19	U	NA		27.6	U	20.2	U	40.1	U	23.2	U	43.8	U
Selenium	0.91	U	1.7		NA		0.96	U	NA		1.2	U	0.89	U	1.2	U	0.9	U	0.92	U
Silver	0.17	U	1.2	J	NA		0.17	U	NA		0.22	U	0.16	U	0.22	U	0.16	U	0.17	U
Sodium	173	U	278	U	NA		184	U	NA		252	U	201	U	282	U	206	U	202	U
Thallium	1	U	1.7	U	NA		1.1	U	NA		1.4	U	1	U	1.4	U	1	U	1	U
Vanadium	4.2	J	5	J	NA		0.57	U	NA		1.1	U	0.15	U	1.2	U	0.14	U	0.34	U
Zinc	13.5	U	187	J	NA		2	U	NA		14.7	U	2.8	U	10.6	U	2.7	U	4.7	U
General Chemistry, mg/kg																				
Iron Oxide	NA		NA		42.5	J	NA		50.3	J	NA		NA		NA		NA		NA	
Total Organic Carbon	NA		NA		3980		NA		1570		NA		NA		NA		NA		NA	

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S01400	09S01500	09S01600	09S01700	09S01800	09S01800D	09S01900	09S02000	09S02100	09S02200
Lab ID	874836	874837	874838	874839	874840	874841	874842	874843	874844	874845
Sampling Date	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97
Semivolatile Organics, ug/kg										
1,2,4-Trichlorobenzene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
1,2-Dichlorobenzene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
1,3-Dichlorobenzene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
1,4-Dichlorobenzene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2,2'-oxybis(1-Chloropropane)	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2,4,5-Trichlorophenol	1100 U	940 U	860 U	900 U	860 U	880 U	870 U	25 U	880 U	860 U
2,4,6-Trichlorophenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2,4-Dichlorophenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2,4-Dimethylphenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2,4-Dinitrophenol	1100 UJ	940 UJ	860 UJ	900 UJ	860 UJ	880 UJ	870 UJ	25 UJ	880 UJ	860 UJ
2,4-Dinitrotoluene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2,6-Dinitrotoluene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2-Chloronaphthalene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2-Chlorophenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2-Methylnaphthalene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2-Methylphenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
2-Nitroaniline	1100 U	940 U	860 U	900 U	860 U	880 U	870 U	25 U	880 U	860 U
2-Nitrophenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
3,3'-Dichlorobenzidine	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
3-Nitroaniline	1100 U	940 U	860 U	900 U	860 U	880 U	870 U	25 U	880 U	860 U
4,6-Dinitro-2-methylphenol	1100 UJ	940 UJ	860 UJ	900 UJ	860 UJ	880 UJ	870 UJ	25 UJ	880 UJ	860 UJ
4-Bromophenyl-phenylether	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
4-Chloro-3-methylphenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
4-Chloroaniline	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
4-Chlorophenyl-phenylether	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
4-Methylphenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
4-Nitroaniline	1100 U	940 U	860 U	900 U	860 U	880 U	870 U	25 U	880 U	860 U
4-Nitrophenol	1100 UJ	940 UJ	860 UJ	900 UJ	860 UJ	880 UJ	870 UJ	25 UJ	880 UJ	860 UJ
Acenaphthene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Acenaphthylene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Anthracene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Benzo(a)anthracene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S01400	09S01500	09S01600	09S01700	09S01800	09S01800D	09S01900	09S02000	09S02100	09S02200
Lab ID	874836	874837	874838	874839	874840	874841	874842	874843	874844	874845
Sampling Date	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97
Benzo(a)pyrene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Benzo(b)fluoranthene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Benzo(g,h,i)perylene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Benzo(k)fluoranthene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
bis(2-Chloroethoxy)methane	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
bis(2-Chloroethyl)ether	440 U	380 U	340 U	360 U	340 U	350 U	350 U	3 J	350 U	81 J
bis(2-Ethylhexyl)phthalate	220 J	180 J	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Butylbenzylphthalate	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Carbazole	440 UJ	380 UJ	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Chrysene	440 U	380 U	340 U	360 U	340 U	350 U	350 UJ	10 UJ	350 UJ	340 UJ
Di-n-butylphthalate	440 UJ	380 UJ	340 U	360 U	340 U	350 U	350 U	1 J	350 U	340 U
Di-n-octylphthalate	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Dibenz(a,h)anthracene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Dibenzofuran	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Diethylphthalate	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Dimethylphthalate	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Fluoranthene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Fluorene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Hexachlorobenzene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Hexachlorobutadiene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Hexachlorocyclopentadiene	440 UJ	380 UJ	340 UJ	360 UJ	340 UJ	350 UJ	350 UJ	10 UJ	350 UJ	340 UJ
Hexachloroethane	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Indeno(1,2,3-cd)pyrene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Isophorone	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
N-Nitroso-di-n-propylamine	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
N-Nitrosodiphenylamine (1)	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Naphthalene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Nitrobenzene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Pentachlorophenol	1100 U	940 U	860 U	900 U	860 U	880 U	870 U	25 U	880 U	860 U
Phenanthrene	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Phenol	440 U	380 U	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Pyrene	440 U	36 J	340 U	360 U	340 U	350 U	350 U	10 U	350 U	340 U
Pesticides/PCBs, ug/kg										

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S01400	09S01500	09S01600	09S01700	09S01800	09S01800D	09S01900	09S02000	09S02100	09S02200
Lab ID	874836	874837	874838	874839	874840	874841	874842	874843	874844	874845
Sampling Date	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97
4,4'-DDD	41	3.6 J	3.4 U	25 J	3.4 U	1.2 J	3.4 U	3.5 U	3.5 U	3.4 U
4,4'-DDE	7.5 J	2.1 J	0.22 J	8.5 J	0.79 J	3.5 U	3.4 U	3.5 U	2 J	20
4,4'-DDT	8 J	3.8 U	3.4 U	11 J	5.4 J	3.5 U	0.43 J	3.5 U	5.1	24
Aldrin	2.2 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
alpha-BHC	2.2 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
alpha-Chlordane	60 D	2.1	0.47 J	13	1.8 U	0.13 J	1.8 U	1.2 J	27 D	14
Aroclor-1016	44 U	38 U	34 U	36 U	34 U	35 U	34 U	35 U	35 U	34 U
Aroclor-1221	89 U	76 U	70 U	73 U	70 U	71 U	70 U	72 U	71 U	69 U
Aroclor-1232	44 U	38 U	34 U	36 U	34 U	35 U	34 U	35 U	35 U	34 U
Aroclor-1242	44 U	38 U	34 U	36 U	34 U	35 U	34 U	35 U	35 U	34 U
Aroclor-1248	44 U	38 U	34 U	36 U	34 U	35 U	34 U	35 U	35 U	34 U
Aroclor-1254	44 U	38 U	34 U	36 U	34 U	35 U	34 U	35 U	35 U	34 U
Aroclor-1260	44 U	38 U	34 U	36 U	34 U	35 U	34 U	35 U	35 U	34 U
beta-BHC	2.2 U	1.9 U	1.8 U	0.21 J	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
delta-BHC	2.2 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Dieldrin	4.4 U	0.99 J	0.18 J	9.1 J	0.57 J	0.54 J	0.28 J	3.5 J	3.5 U	3.4 U
Endosulfan I	2.2 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Endosulfan II	4.4 U	3.8 U	0.1 J	7 J	3.4 U	3.5 U	3.4 U	3.5 U	3.5 U	1.1 J
Endosulfan sulfate	4.4 U	3.8 U	3.4 U	3.6 U	3.4 U	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U
Endrin	4.4 U	3.8 U	3.4 U	3.6 U	0.61 J	0.08 J	3.4 U	3.5 U	0.56 J	3.4 U
Endrin aldehyde	4.4 U	3.8 U	3.4 U	3.6 U	3.4 U	3.5 U	3.4 U	3.5 U	0.33 J	3.4 U
Endrin ketone	4.4 U	3.8 U	3.4 U	3.6 U	3.4 U	3.5 U	3.4 U	3.5 U	3.5 U	3.4 U
gamma-BHC (Lindane)	2.2 U	1.9 U	1.8 U	1.8 U	1.8 U	0.1 J	1.8 U	1.8 U	1.8 U	1.8 U
gamma-Chlordane	63 D	0.62 J	0.24 J	9.4	1.8 U	1.8 U	1.8 U	1.8 U	16	1.8 U
Heptachlor	2.2 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Heptachlor epoxide	2.2 U	0.05 J	1.8 U	0.1 J	1.8 U	1.8 U	1.8 U	1.8 U	2	1.7 J
Methoxychlor	22 U	19 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U	18 U
Toxaphene	220 U	190 U	180 U	180 U	180 U	180 U	180 U	180 U	180 U	180 U
Chlorinated Herbicides, ug/kg										
2,4 5-TP (Silvex)	2.7 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U	10.5 UJ	5.3 U	2.1 U	2.1 U
2,4,5-T	3.3 U	2.7 U	2.6 U	2.7 U	2.6 U	2.6 U	13 UJ	2.7 U	2.6 U	2.6 U
2,4-D	1.5 J	11 J	0.08 J	14	3.5 J	6.8 J	26 UJ	24 J	5.3 U	21
2,4-DB	11 J	18 J	8.1 J	27 U	8 J	10 J	130 UJ	13 J	26 U	26 U

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S01400	09S01500	09S01600	09S01700	09S01800	09S01800D	09S01900	09S02000	09S02100	09S02200
Lab ID	874836	874837	874838	874839	874840	874841	874842	874843	874844	874845
Sampling Date	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97
Dalapon	33 U	27 U	26 U	27 U	26 U	26 U	130 UJ	27 U	26 U	26 U
Dicamba	3.3 U	2.7 U	2.6 U	2.7 U	2.6 U	2.6 U	13 UJ	4.4 U	2.6 U	2.6 U
Dichloroprop	14 U	8.8 U	8.3 U	9 U	17 U	8.5 U	42 UJ	28 U	8.5 U	8.2 U
Dinoseb	7.4 U	8.7 J	5.2 U	5.4 U	5.2 U	5.3 U	26 UJ	5.4 U	5.3 U	5.2 U
MCPA	7800 U	9600 U	2500 U	4800 U	5500 U	4500 U	21000 UJ	12000 U	8500 U	7000 U
MCPP	77000 DJ	62000 J	7600 U	9200 U	310 U	17000 U	21000 UJ	6100 U	20000 U	30000 U
Inorganics, mg/kg										
Aluminum	342 J	250 J	45.3 J	214 J	33.4 J	48.5 J	69.9 J	89.3 J	113 J	234 J
Antimony	0.75 U	0.65 U	0.58 U	0.62 U	0.6 U	0.61 U	0.57 U	0.59 U	0.59 U	0.6 U
Arsenic	1.5 U	1.3 U	1.2 U	1.3 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Barium	3.2 U	3.8 U	1.2 U	4.7 J	1.2 U	1.4 U	1.7 U	1.8 U	2 U	8.7 J
Beryllium	0.03 U	0.03 U	0.02 U	0.03 U	0.02 U	0.46 J	0.02 U	0.03 U	0.03 U	0.04 U
Cadmium	0.08 U	0.07 U	0.06 U	0.09 U	0.06 U	0.21 U	0.06 U	0.06 U	0.06 U	0.12 J
Calcium	1230 U	651 U	151 U	416 U	122 U	103 U	399 U	276 U	192 U	723 U
Chromium	1.5 J	0.85 U	0.41 U	21.1 J	0.42 U	0.87 U	0.32 U	0.5 U	0.55 U	1.6 J
Cobalt	0.18 U	0.16 U	0.14 U	0.15 U	0.14 U	0.53 U	0.14 U	0.14 U	0.14 U	0.14 U
Copper	5.1 U	1.7 U	0.68 U	5.6 U	0.69 U	1.7 U	0.87 U	0.99 U	0.66 U	3.2 U
Iron	226 J	132 J	33.6 U	197 J	25.6 U	61.5 J	44.1 J	47 J	37.3 J	285 J
Lead	15.5 J	5.9 J	0.79 J	6.8 J	0.91 J	1.5 J	0.9 J	3 J	0.91 J	45.2 J
Magnesium	72 U	49.6 U	15.3 U	43.2 U	17.1 U	18.9 U	32.4 U	35.4 U	16 U	61.5 U
Manganese	12.1 J	5.7 U	0.53 U	1.4 U	1.2 U	1.2 U	0.49 U	0.87 U	0.67 U	11.2 J
Mercury	0.1 J	0.06 J	0.05 UJ	0.13 J	0.05 J	0.05 J	0.05 UJ	0.06 J	0.05 UJ	0.13 J
Nickel	0.34 U	0.29 U	0.26 U	0.39 U	0.27 U	0.53 U	0.26 U	0.26 U	0.26 U	0.45 U
Potassium	24.7 U	48.4 U	12.7 U	33.5 U	16.3 U	30.5 U	14.2 U	35.9 U	18.8 U	29.3 U
Selenium	1.1 U	0.99 U	0.87 U	0.94 U	0.91 U	0.93 U	0.87 U	0.9 U	0.9 U	0.91 U
Silver	0.21 U	0.18 U	0.16 U	60.1	0.16 U	0.32 J	0.16 U	0.16 U	0.16 U	0.69 J
Sodium	185 U	193 U	147 U	246 U	164 U	213 U	98.7 U	168 U	172 U	227 U
Thallium	1.3 U	1.1 U	0.99 U	1.1 U	1 U	1.1 U	0.99 U	1 U	1 U	1 U
Vanadium	0.86 U	0.44 U	0.14 U	0.32 U	0.15 U	0.71 U	0.27 U	0.2 U	0.28 U	0.36 U
Zinc	5.9 U	5.6 U	0.87 U	11.5 U	0.48 U	1.8 U	0.57 U	2.1 U	1.5 U	27 U
General Chemistry, mg/kg										
Iron Oxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S02300		09S02400		09S02500		09S02600		09S02700		09S02800		09S02901	09S02901D	09S03001	09S03101
Lab ID	875100		875101		875102		875103		875104		875069		882332	882333	882329	882330
Sampling Date	14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
Semivolatile Organics, ug/kg																
1,2,4-Trichlorobenzene	380	UJ	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
1,2-Dichlorobenzene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
1,3-Dichlorobenzene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
1,4-Dichlorobenzene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2,2'-oxybis(1-Chloropropane)	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2,4,5-Trichlorophenol	950	U	950	UJ	1100	UJ	930	UJ	980	U	930	U	NA	NA	NA	NA
2,4,6-Trichlorophenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2,4-Dichlorophenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2,4-Dimethylphenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2,4-Dinitrophenol	950	UJ	950	UJ	1100	UJ	930	UJ	980	U	930	U	NA	NA	NA	NA
2,4-Dinitrotoluene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2,6-Dinitrotoluene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2-Chloronaphthalene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2-Chlorophenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2-Methylnaphthalene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2-Methylphenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
2-Nitroaniline	950	U	950	UJ	1100	UJ	930	UJ	980	U	930	U	NA	NA	NA	NA
2-Nitrophenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
3,3'-Dichlorobenzidine	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
3-Nitroaniline	950	UJ	950	UJ	1100	UJ	930	UJ	980	U	930	U	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	950	U	950	UJ	1100	UJ	930	UJ	980	U	930	U	NA	NA	NA	NA
4-Bromophenyl-phenylether	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
4-Chloro-3-methylphenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
4-Chloroaniline	380	UJ	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
4-Chlorophenyl-phenylether	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
4-Methylphenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
4-Nitroaniline	950	UJ	950	UJ	1100	UJ	930	UJ	980	U	930	U	NA	NA	NA	NA
4-Nitrophenol	950	U	950	UJ	1100	UJ	930	UJ	980	U	930	U	NA	NA	NA	NA
Acenaphthene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
Acenaphthylene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
Anthracene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA
Benzo(a)anthracene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA	NA	NA	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S02300		09S02400		09S02500		09S02600		09S02700		09S02800		09S02901		09S02901D		09S03001		09S03101	
Lab ID	875100		875101		875102		875103		875104		875069		882332		882333		882329		882330	
Sampling Date	14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		14-Nov-97		10-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98	
Benzo(a)pyrene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Benzo(b)fluoranthene	380	U	380	UJ	420	UJ	370	UJ	58	J	370	U	NA		NA		NA		NA	
Benzo(g,h,i)perylene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Benzo(k)fluoranthene	380	U	380	UJ	420	UJ	370	UJ	60	J	370	U	NA		NA		NA		NA	
bis(2-Chloroethoxy)methane	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
bis(2-Chloroethyl)ether	380	UJ	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
bis(2-Ethylhexyl)phthalate	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Butylbenzylphthalate	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Carbazole	380	UJ	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Chrysene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Di-n-butylphthalate	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Di-n-octylphthalate	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Dibenz(a,h)anthracene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Dibenzofuran	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Diethylphthalate	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Dimethylphthalate	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Fluoranthene	380	U	380	UJ	420	UJ	370	UJ	30	J	370	U	NA		NA		NA		NA	
Fluorene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Hexachlorobenzene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Hexachlorobutadiene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Hexachlorocyclopentadiene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Hexachloroethane	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Indeno(1,2,3-cd)pyrene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Isophorone	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
N-Nitroso-di-n-propylamine	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
N-Nitrosodiphenylamine (1)	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Naphthalene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Nitrobenzene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Pentachlorophenol	950	UJ	950	UJ	1100	UJ	930	UJ	980	U	930	U	NA		NA		NA		NA	
Phenanthrene	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Phenol	380	U	380	UJ	420	UJ	370	UJ	390	U	370	U	NA		NA		NA		NA	
Pyrene	380	U	380	UJ	420	UJ	370	UJ	40	J	370	U	NA		NA		NA		NA	
Pesticides/PCBs, ug/kg																				

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S02300	09S02400	09S02500	09S02600	09S02700	09S02800	09S02901	09S02901D	09S03001	09S03101
Lab ID	875100	875101	875102	875103	875104	875069	882332	882333	882329	882330
Sampling Date	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
4,4'-DDD	3.8 U	3.8 U	4.2 U	3.7 U	4.6 J	3.7 U	9.7 J	3.9 U	22 J	120 J
4,4'-DDE	55	39	24 J	6.4	140 D	110 DJ	13	6.2	32	170 D
4,4'-DDT	38	16 J	37 J	7.3	76 D	110 DJ	4.7	0.87 J	18	38
Aldrin	2 U	2 U	2.2 U	1.9 U	2 U	1.9 U	2 U	2 U	3.9 U	3.9 U
alpha-BHC	2 U	2 U	2.2 U	1.9 U	2 U	1.9 U	2 U	2 U	3.9 U	3.9 U
alpha-Chlordane	33 D	44 D	530 D	1.6 J	5.5	24	20	5	33	520 D
Aroclor-1016	38 U	38 U	42 U	37 U	39 U	37 U	40 U	39 U	75 U	76 U
Aroclor-1221	77 U	77 U	85 U	75 U	80 U	74 U	81 U	80 U	150 U	150 U
Aroclor-1232	38 U	38 U	42 U	37 U	39 U	37 U	40 U	39 U	75 U	76 U
Aroclor-1242	38 U	38 U	42 U	37 U	39 U	37 U	40 U	39 U	75 U	76 U
Aroclor-1248	38 U	38 U	42 U	37 U	39 U	37 U	40 U	39 U	75 U	76 U
Aroclor-1254	38 U	38 U	42 U	37 U	39 U	37 U	40 U	39 U	75 U	76 U
Aroclor-1260	38 U	38 U	42 U	37 U	39 U	37 U	40 U	39 U	75 U	76 U
beta-BHC	2 U	2 U	2.2 U	1.9 U	2 U	1.9 U	2 U	2 U	3.9 U	3.9 U
delta-BHC	2 U	2 U	2.2 U	1.9 U	2 U	1.9 U	2 U	2 U	3.9 U	3.9 U
Dieldrin	3.2 J	2.1 J	4.2 U	3.7 U	3.9 U	3.7 U	1.1 J	3.9 U	11 J	17 J
Endosulfan I	2 U	2 U	2.2 U	1.9 U	2 U	1.9 U	2 U	2 U	3.9 U	3.9 U
Endosulfan II	3.8 U	3.8 U	4.2 U	3.7 U	3.9 U	3.7 U	4 U	3.9 U	7.5 U	7.6 U
Endosulfan sulfate	3.8 U	3.8 U	4.2 U	3.7 U	0.28 J	3.7 U	4 U	3.9 U	1.2 J	7.6 U
Endrin	3.8 U	0.74 J	8.7 J	0.24 J	0.75 J	0.51 J	2 J	3.9 U	2.9 J	11 J
Endrin aldehyde	0.32 J	0.28 J	1.3 J	3.7 U	3.9 U	0.38 J	4 U	3.9 U	7.5 U	7.6 U
Endrin ketone	3.8 U	3.8 U	4.2 U	3.7 U	3.9 U	3.7 U	0.2 J	3.9 U	1.4 J	7.6 U
gamma-BHC (Lindane)	2 U	2 U	0.46 J	1.9 U	2 U	1.9 UJ	2 U	2 U	3.9 U	3.9 U
gamma-Chlordane	2 U	2 U	500 D	1.9 J	6.2	25	18	3.8	17 J	360 D
Heptachlor	2 U	2 U	2.2 U	1.9 U	2 U	1.9 U	2 U	2 U	2.3 J	1.1 J
Heptachlor epoxide	5.4	3.9	27	1.9 U	2 U	0.34 J	2 U	2 U	3.9 U	3 J
Methoxychlor	20 U	20 U	22 U	19 U	20 U	19 U	20 U	20 U	2.2 J	39 U
Toxaphene	200 U	200 U	220 U	190 U	200 U	190 U	200 U	200 U	390 U	390 U
Chlorinated Herbicides, ug/kg										
2,4 5-TP (Silvex)	2.3 U	2.3 U	2.5 U	2.2 U	2.4 U	2.2 U	NA	NA	1.7 J	NA
2,4,5-T	2.9 U	2.9 U	3.2 U	2.8 U	3 U	2.8 U	NA	NA	3.8 J	NA
2,4-D	2.8 J	16 J	5.9 J	3.8 J	17 J	5.5 U	NA	NA	15 J	NA
2,4-DB	10 J	29 U	28 J	5.8 J	12 J	28 U	NA	NA	86 J	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S02300	09S02400	09S02500	09S02600	09S02700	09S02800	09S02901	09S02901D	09S03001	09S03101
Lab ID	875100	875101	875102	875103	875104	875069	882332	882333	882329	882330
Sampling Date	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	14-Nov-97	10-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
Dalapon	29 U	29 U	32 U	28 U	30 U	28 U	NA	NA	62 J	NA
Dicamba	2.9 U	2.9 U	3.2 U	2.8 U	3 U	2.8 U	NA	NA	85 J	NA
Dichloroprop	22	9.2 U	27 J	9 U	9.5 U	8.8 U	NA	NA	66 J	NA
Dinoseb	4.8 J	6.4 J	320 J	5.6 U	5.9 U	5.5 U	NA	NA	22 U	NA
MCPA	9500 U	11000 U	11000 U	7700 U	1800 U	220 U	NA	NA	67000 J	NA
MCPP	14000 U	8900 U	57000 U	5200 U	360 U	330 U	NA	NA	13000 J	NA
Inorganics, mg/kg										
Aluminum	140	869	1800	2520	3160	2560	122	146	7170	6720
Antimony	0.66 U	0.67 U	0.73 U	0.64 U	0.68 U	0.64 U	0.59 U	0.56 U	4.4 J	1.1 U
Arsenic	1.3 U	1.4 U	1.5 U	1.3 U	1.4 U	1.3 U	0.74 U	0.69 U	1.3 U	6
Barium	7.4 J	35.2 J	20.7 J	37.4 J	65.3	35.3 J	2.7 J	3.1 J	19.1 J	25.3 J
Beryllium	0.04 U	0.12 U	0.11 U	0.44 U	0.58 J	0.59 J	0.12 U	0.13 U	0.38 U	0.42 U
Cadmium	0.28 U	0.74 J	0.11 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.12 U	0.13 U
Calcium	1340 U	2450 U	2340 U	153000 J	91100 J	24100	1860 U	1820 U	8780 U	12000 U
Chromium	2.2 J	11.3	3.5	5.6	3.8	2.2 J	0.36 J	0.45 J	7.9	8.7
Cobalt	0.18 U	0.3 U	0.18 U	0.37 U	0.42 U	0.16 U	0.19 U	0.18 U	0.33 U	0.36 U
Copper	3.8 J	10	3.2 J	4.4 J	2.7 U	2.8 U	1 J	1.2 J	6.8 J	11 J
Iron	204	838	183	486	975	485	92.4 J	138 J	803 J	751 J
Lead	43.7 J	25 J	15.8 J	18.2 J	9.9 J	17	2.7	3.5	50.1	44.7
Magnesium	65.4 U	79.3 U	81.6 U	3080 U	2390 U	2610 U	38 U	34.9 U	329 U	562 U
Manganese	3.8 U	8.2 U	4.7 U	103	111	97.8	1.7 U	1.7 U	6.9 U	22.6 U
Mercury	0.06 U	0.1 U	0.23 J	0.08 U	0.06 U	0.07 UJ	0.06 U	0.06 U	0.11 U	0.1 U
Nickel	0.48 U	1.5 U	0.53 U	1.4 U	1.5 U	0.33 U	0.29 U	0.27 J	2.3 J	2.5 J
Potassium	30.9 U	30 U	46.2 U	417 U	342 U	373 U	13.5 U	13.9 U	56.6 U	64.4 U
Selenium	1 U	1 U	1.1 U	0.97 U	1 U	0.98 U	0.86 U	0.8 U	1.5 U	1.6 U
Silver	0.18 U	0.57 J	2.5 J	0.18 U	0.19 U	0.18 U	0.17 U	0.16 U	0.29 U	0.31 U
Sodium	144 U	157 U	163 U	235 U	178 U	259 U	182 U	144 U	457 U	399 U
Thallium	1.1 U	1.1 U	1.3 U	1.1 U	1.2 U	1.1 U	1 U	0.93 U	1.7 U	1.9 U
Vanadium	0.59 U	1.9 J	0.99 J	6.6 J	6.9 J	2.4 J	0.38 J	0.41 J	4.1 J	4.2 J
Zinc	14.7 U	30 U	11.7 U	9.7 U	13.5 U	8.8 U	7.5 U	6.9 U	9.3 U	21.3 U
General Chemistry, mg/kg										
Iron Oxide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S03201	09S03202	09S03301	09S03302	09S03401	09S03501	09S03601
Lab ID	882328	882693	882347	882689	882331	882334	882318
Sampling Date	10-Feb-98	13-Feb-98	10-Feb-98	13-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
Semivolatile Organics, ug/kg							
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
2,2'-oxybis(1-Chloropropane)	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S03201	09S03202	09S03301	09S03302	09S03401	09S03501	09S03601
Lab ID	882328	882693	882347	882689	882331	882334	882318
Sampling Date	10-Feb-98	13-Feb-98	10-Feb-98	13-Feb-98	10-Feb-98	10-Feb-98	10-Feb-98
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA
N-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine (1)	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs, ug/kg							

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S03201		09S03202		09S03301		09S03302		09S03401		09S03501		09S03601	
Lab ID	882328		882693		882347		882689		882331		882334		882318	
Sampling Date	10-Feb-98		13-Feb-98		10-Feb-98		13-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98	
4,4'-DDD	19	J	NA		10	U	NA		340	J	3.8	U	3.6	U
4,4'-DDE	18		NA		17	J	NA		360	J	0.99	J	12	
4,4'-DDT	9.1	J	NA		3.2	J	NA		160	J	0.88	J	10	
Aldrin	2.5	U	NA		5.3	U	NA		46	U	2	U	1.9	U
alpha-BHC	2.5	U	NA		5.3	U	NA		46	U	2	U	1.9	U
alpha-Chlordane	110	D	NA		130	DJ	NA		2200	D	0.83	J	0.43	J
Aroclor-1016	49	U	NA		100	U	NA		900	U	38	U	36	U
Aroclor-1221	100	U	NA		210	U	NA		1800	U	77	U	74	U
Aroclor-1232	49	U	NA		100	U	NA		900	U	38	U	36	U
Aroclor-1242	49	U	NA		100	U	NA		900	U	38	U	36	U
Aroclor-1248	49	U	NA		100	U	NA		900	U	38	U	36	U
Aroclor-1254	49	U	NA		100	U	NA		900	U	38	U	36	U
Aroclor-1260	49	U	NA		100	U	NA		900	U	38	U	36	U
beta-BHC	2.5	U	NA		5.3	U	NA		46	U	2	U	1.9	U
delta-BHC	2.5	U	NA		5.3	U	NA		46	U	2	U	1.9	U
Dieldrin	4.9	U	NA		2.1	J	NA		14	J	3.8	U	0.15	J
Endosulfan I	2.5	U	NA		5.3	U	NA		46	U	2	U	1.9	U
Endosulfan II	4.9	U	NA		10	U	NA		90	U	3.8	U	3.6	U
Endosulfan sulfate	4.9	U	NA		10	U	NA		90	U	3.8	U	3.6	U
Endrin	4.5	J	NA		10	U	NA		54	J	3.8	U	3.6	U
Endrin aldehyde	4.9	U	NA		10	U	NA		90	U	3.8	U	3.6	U
Endrin ketone	4.9	U	NA		10	U	NA		90	U	3.8	U	3.6	U
gamma-BHC (Lindane)	2.5	U	NA		5.3	U	NA		46	U	2	U	1.9	U
gamma-Chlordane	91	D	NA		120	D	NA		2200	D	2	U	0.17	J
Heptachlor	0.12	J	NA		5.3	U	NA		46	U	2	U	1.9	U
Heptachlor epoxide	2.5	U	NA		5.3	U	NA		29	J	2	U	0.48	J
Methoxychlor	25	U	NA		53	U	NA		460	U	1.9	J	19	U
Toxaphene	250	U	NA		530	U	NA		4600	U	200	U	190	U
Chlorinated Herbicides, ug/kg														
2,4 5-TP (Silvex)	NA		NA		NA		NA		NA		NA		NA	
2,4,5-T	NA		NA		NA		NA		NA		NA		NA	
2,4-D	NA		NA		NA		NA		NA		NA		NA	
2,4-DB	NA		NA		NA		NA		NA		NA		NA	

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Appendix C-5, Table C-5.1
Summary of Soil Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Identifier	09S03201		09S03202		09S03301		09S03302		09S03401		09S03501		09S03601	
Lab ID	882328		882693		882347		882689		882331		882334		882318	
Sampling Date	10-Feb-98		13-Feb-98		10-Feb-98		13-Feb-98		10-Feb-98		10-Feb-98		10-Feb-98	
Dalapon	NA		NA		NA		NA		NA		NA		NA	
Dicamba	NA		NA		NA		NA		NA		NA		NA	
Dichloroprop	NA		NA		NA		NA		NA		NA		NA	
Dinoseb	NA		NA		NA		NA		NA		NA		NA	
MCPA	NA		NA		NA		NA		NA		NA		NA	
MCPP	NA		NA		NA		NA		NA		NA		NA	
Inorganics, mg/kg														
Aluminum	1170		NA		14300		NA		2540		194		301	
Antimony	0.73	U	NA		1.5	U	NA		0.7	U	0.56	U	0.52	U
Arsenic	2.9	J	NA		5.9	J	NA		0.86	U	0.69	U	0.65	U
Barium	4.6	J	NA		23.2	J	NA		16	J	2.8	J	4.7	J
Beryllium	0.14	U	NA		0.66	J	NA		0.25	U	0.12	U	0.11	U
Cadmium	0.09	U	NA		0.19	U	NA		0.08	U	0.07	U	0.06	U
Calcium	2180	U	NA		10500	U	NA		5290	U	1690	U	120000	
Chromium	2	J	NA		16		NA		4		0.58	J	3.6	
Cobalt	0.23	U	NA		0.5	U	NA		0.22	U	0.18	U	0.17	U
Copper	1.8	J	NA		9.7	J	NA		54		0.68	U	13.1	
Iron	70.7	J	NA		790	J	NA		581	J	121	J	284	J
Lead	3.1		NA		16		NA		19.9		5.3		3	
Magnesium	78.8	U	NA		637	U	NA		223	U	88.7	U	735	U
Manganese	5.9	U	NA		10.6	U	NA		14.5	U	1.1	U	13.9	U
Mercury	0.06	U	NA		0.27	J	NA		0.06	J	0.06	U	0.05	U
Nickel	0.44	J	NA		4.5	J	NA		1.1	J	0.27	U	0.83	J
Potassium	22.9	U	NA		95.4	U	NA		28	U	25.1	U	52.1	U
Selenium	1.1	U	NA		5.5	J	NA		1	U	0.81	U	0.75	U
Silver	0.21	U	NA		0.43	U	NA		0.19	U	0.16	U	0.15	U
Sodium	198	U	NA		417	U	NA		169	U	131	U	201	U
Thallium	1.2	U	NA		2.6	U	NA		1.2	U	0.94	U	0.88	U
Vanadium	1.6	J	NA		10.1	J	NA		2.1	J	0.56	J	2.9	J
Zinc	6.5	U	NA		22.7	U	NA		63.4	J	0.77	U	1.7	U
General Chemistry, mg/kg														
Iron Oxide	NA		43.8	J	NA		460	J	NA		NA		NA	
Total Organic Carbon	NA		12600		NA		12700		NA		NA		NA	

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	08G00102		08G00202		08G00302		08G00402		08G00501		08G00501D		08G00601		08G00701		08G00801		08G00801D	
Lab ID	873054		873055		873056		873064		873270		873272		873268		873267		873069		873074	
Sampling Date	22-Oct-97		22-Oct-97		22-Oct-97		22-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		22-Oct-97		22-Oct-97	
Semivolatile Organics, ug/L																				
1,2,4-Trichlorobenzene	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	UJ	10	U
1,2-Dichlorobenzene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
1,3-Dichlorobenzene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
1,4-Dichlorobenzene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
2,2'-oxybis(1-Chloropropane)	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	UJ	10	UJ
2,4,5-Trichlorophenol	25	U	25	U	25	U	25	U	25	U	25	U	27	U	25	U	25	U	25	U
2,4,6-Trichlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	U	10	U	10	U
2,4-Dichlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	U	10	U	10	U
2,4-Dimethylphenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	UJ	10	U	10	U
2,4-Dinitrophenol	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ	27	UJ	25	U	25	UJ	25	UJ
2,4-Dinitrotoluene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
2,6-Dinitrotoluene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
2-Chloronaphthalene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
2-Chlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	U	10	U	10	U
2-Methylnaphthalene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
2-Methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	U	10	U	10	U
2-Nitroaniline	25	U	25	U	25	UJ	25	UJ	25	UJ	25	UJ	27	UJ	25	U	25	UJ	25	U
2-Nitrophenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	U	10	U	10	U
3,3'-Dichlorobenzidine	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	UJ	10	UJ
3-Nitroaniline	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ	27	UJ	25	U	25	U	25	UJ
4,6-Dinitro-2-methylphenol	25	U	25	U	25	U	25	UJ	25	UJ	25	UJ	27	UJ	25	U	25	U	25	UJ
4-Bromophenyl-phenylether	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
4-Chloro-3-methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	U	10	U	10	U
4-Chloroaniline	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
4-Chlorophenyl-phenylether	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
4-Methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	U	10	U	10	U
4-Nitroaniline	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ	27	UJ	25	U	25	UJ	25	UJ
4-Nitrophenol	25	U	25	U	25	U	25	U	25	U	25	U	27	U	25	U	25	U	25	U
Acenaphthene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Acenaphthylene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Anthracene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Benzo(a)anthracene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	08G00102		08G00202		08G00302		08G00402		08G00501		08G00501D		08G00601		08G00701		08G00801		08G00801D	
Lab ID	873054		873055		873056		873064		873270		873272		873268		873267		873069		873074	
Sampling Date	22-Oct-97		22-Oct-97		22-Oct-97		22-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		22-Oct-97		22-Oct-97	
Benzo(a)pyrene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Benzo(b)fluoranthene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Benzo(g,h,i)perylene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Benzo(k)fluoranthene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
bis(2-Chloroethoxy)methane	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
bis(2-Chloroethyl)ether	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
bis(2-Ethylhexyl)phthalate	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Butylbenzylphthalate	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Carbazole	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Chrysene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	U	10	U
Di-n-butylphthalate	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Di-n-octylphthalate	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	U	10	U
Dibenz(a,h)anthracene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Dibenzofuran	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Diethylphthalate	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Dimethylphthalate	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Fluoranthene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Fluorene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Hexachlorobenzene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	UJ	10	UJ
Hexachlorobutadiene	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	U	10	U
Hexachlorocyclopentadiene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Hexachloroethane	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	UJ	10	U	10	U
Indeno(1,2,3-cd)pyrene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Isophorone	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
N-Nitroso-di-n-propylamine	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
N-Nitrosodiphenylamine (1)	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Naphthalene	25		10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Nitrobenzene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Pentachlorophenol	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ	25	UJ	27	UJ	25	UJ	25	UJ	25	UJ
Phenanthrene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Phenol	10	U	10	U	10	U	10	U	10	U	10	U	11	U	10	U	10	U	10	U
Pyrene	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	11	UJ	10	U	10	U	10	U
Pesticides/PCBs, ug/L																				

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	08G00102		08G00202		08G00302		08G00402		08G00501		08G00501D		08G00601		08G00701		08G00801		08G00801D	
Lab ID	873054		873055		873056		873064		873270		873272		873268		873267		873069		873074	
Sampling Date	22-Oct-97		22-Oct-97		22-Oct-97		22-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		22-Oct-97		22-Oct-97	
4,4'-DDD	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
4,4'-DDE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
4,4'-DDT	0.01	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
Aldrin	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
alpha-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
alpha-Chlordane	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
Aroclor-1016	0.95	U	0.96	U	0.96	U	0.95	U	1	U	0.95	U	0.95	U	0.96	U	0.96	U	0.95	UJ
Aroclor-1221	1.9	U	1.9	U	1.9	U	1.9	U	2	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	UJ
Aroclor-1232	0.95	U	0.96	U	0.96	U	0.95	U	1	U	0.95	U	0.95	U	0.96	U	0.96	U	0.95	UJ
Aroclor-1242	0.95	U	0.96	U	0.96	U	0.95	U	1	U	0.95	U	0.95	U	0.96	U	0.96	U	0.95	UJ
Aroclor-1248	0.95	U	0.96	U	0.96	U	0.95	U	1	U	0.95	U	0.95	U	0.96	U	0.96	U	0.95	UJ
Aroclor-1254	0.95	U	0.96	U	0.96	U	0.95	U	1	U	0.95	U	0.95	U	0.96	U	0.96	U	0.95	UJ
Aroclor-1260	0.95	U	0.96	U	0.96	U	0.95	U	1	U	0.95	U	0.95	U	0.96	U	0.96	U	0.95	UJ
beta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
delta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
Dieldrin	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
Endosulfan I	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
Endosulfan II	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
Endosulfan sulfate	0.1	U	0.01	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
Endrin	0.01	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
Endrin aldehyde	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
Endrin ketone	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
gamma-BHC (Lindane)	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
gamma-Chlordane	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
Heptachlor	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
Heptachlor epoxide	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UJ
Methoxychlor	0.48	U	0.48	U	0.48	U	0.48	U	0.5	U	0.48	U	0.48	U	0.48	U	0.48	U	0.48	UJ
Toxaphene	4.8	U	4.8	U	4.8	U	4.8	U	5	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	UJ
Herbicides, ug/L																				
2,4 5-TP (Silvex)	0.05	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2,4,5-T	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2,4-D	0.1	J	0.01	J	1.5	U	0.02	J	1.5	U	1.5	U	0.22	J	1.5	U	0.12	J	0.11	J
2,4-DB	0.05	J	0.09	J	0.6	J	0.18	J	1.4	J	5	U	0.57	J	5	U	0.16	J	0.11	J

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	08G00102		08G00202		08G00302		08G00402		08G00501		08G00501D		08G00601		08G00701		08G00801		08G00801D	
Lab ID	873054		873055		873056		873064		873270		873272		873268		873267		873069		873074	
Sampling Date	22-Oct-97		22-Oct-97		22-Oct-97		22-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		22-Oct-97		22-Oct-97	
Dalapon	6	U	6	U	6	U	6	U	6	U	6	U	6	U	6	U	6	U	6	U
Dicamba	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dichloroprop	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U	0.69	J	0.66	J
Dinoseb	1.5	U	1.5	U	1.5	U	1.5	U	0.1	J	1.5	U	0.28	J	1.5	U	1.5	U	1.5	U
MCPA	140	U	500	U	640	J	200	U	160	U	190	U	110	UJ	78	U	82	U	72	U
MCPP	790	J	60	U	400	U	200	U	440	U	240	U	300	UJ	350	U	110	U	710	J
Inorganics, ug/L																				
Aluminum	57.2	U	90.6	U	80.9	U	155	U	96.7	U	120	U	140	U	76	U	37.4	U	33	U
Antimony	3.7	J	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U
Arsenic	133		295		79.9		70.4		57.7		57.3		53		56.4		122		120	
Barium	19	J	25.1	J	14.7	J	4.5	U	11.8	J	11.3	J	12.3	J	8	J	26.6	J	26.1	J
Beryllium	0.1	U	0.1	U	0.12	U	0.19	U	0.15	U	0.24	U	0.13	U	0.19	U	0.12	U	0.1	U
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Calcium	101000		104000		37500		28900		33200		33100		28100		45300		131000		134000	
Chromium	2.6	J	1.4	J	1.7	J	1.5	J	1.8	J	2.3	J	3.4	J	1.1	J	0.8	U	0.8	U
Cobalt	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
Copper	3.6	U	2.5	U	1.5	J	1.3	J	1.2	J	0.96	J	6.7	J	3.3	J	1.5	J	1.4	J
Iron	1460		58.3	U	231		97.2	U	105	U	102	U	198		529		42	U	36.4	U
Lead	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	6.6		1.9	U	1.9	U	1.9	U
Magnesium	6190	U	6490	U	3750	U	3310	U	3620	U	3630	U	3190	U	3060	U	5850	U	6110	U
Manganese	12.6	J	6.7	J	15.3		16.4		160		162		24.2		11	J	6.3	J	6.4	J
Mercury	0.1	U	0.1	U	0.14	U	0.1	U	0.16	U	0.16	U	0.19	U	0.16	U	0.13	U	0.13	U
Nickel	1.7	J	1.4	J	1.6	J	3	J	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Potassium	16000		10800		9130		9940		11200		11200		11700		11000		8670		8900	
Selenium	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U
Silver	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Sodium	12300	U	13400	U	6810	U	6220	U	6680	U	6650	U	5280	U	5690	U	7190	U	7430	U
Thallium	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Vanadium	0.86	J	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2	J	1.8	J	0.7	U	0.7	U
Zinc	33.2	UJ	10.5	UJ	19.2	U	65.6	U	14.5	U	4.1	U	62.3	U	9.8	U	10.5	U	6.8	U
General Chemistry, mg/L																				
Total Organic Carbon	27.4		28.8		30.6		27		31.2		NA		33.7		22.9		20.7		NA	
Total Suspended Solids	5		4	U	4	U	4	U	4	U	NA		4	U	4	U	4	U	NA	

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	08G00901		08G01001		08G01101		08G01201		08G01301	08G01401		08G01501		08G01601	08G01701	08G01801
Lab ID	873070		873269		873271		873266		876943	877090		876942		882951	882943	882980
Sampling Date	22-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		05-Dec-97	08-Dec-97		05-Dec-97		18-Feb-98	18-Feb-98	19-Feb-98
Semivolatile Organics, ug/L																
1,2,4-Trichlorobenzene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
1,2-Dichlorobenzene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
1,3-Dichlorobenzene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
1,4-Dichlorobenzene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2,2'-oxybis(1-Chloropropane)	10	UJ	10	UJ	10	UJ	10	UJ	10 U	10	U	10	U	NA	NA	NA
2,4,5-Trichlorophenol	25	UJ	25	U	25	UJ	25	U	25 U	25	U	25	U	NA	NA	NA
2,4,6-Trichlorophenol	10	UJ	10	U	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2,4-Dichlorophenol	10	UJ	10	U	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2,4-Dimethylphenol	10	UJ	10	U	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2,4-Dinitrophenol	25	UJ	25	UJ	25	UJ	25	UJ	25 U	25	U	25	U	NA	NA	NA
2,4-Dinitrotoluene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2,6-Dinitrotoluene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2-Chloronaphthalene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2-Chlorophenol	10	UJ	10	U	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2-Methylnaphthalene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2-Methylphenol	10	UJ	10	U	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
2-Nitroaniline	25	UJ	25	UJ	25	UJ	25	U	25 U	25	U	25	U	NA	NA	NA
2-Nitrophenol	10	UJ	10	U	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
3,3'-Dichlorobenzidine	10	UJ	10	UJ	10	UJ	10	UJ	10 U	10	U	10	U	NA	NA	NA
3-Nitroaniline	25	UJ	25	UJ	25	UJ	25	UJ	25 U	25	U	25	U	NA	NA	NA
4,6-Dinitro-2-methylphenol	25	UJ	25	UJ	25	UJ	25	UJ	25 U	25	U	25	U	NA	NA	NA
4-Bromophenyl-phenylether	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
4-Chloro-3-methylphenol	10	UJ	10	U	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
4-Chloroaniline	10	UJ	10	UJ	10	UJ	10	U	10 UJ	10	U	10	UJ	NA	NA	NA
4-Chlorophenyl-phenylether	10	UJ	10	UJ	10	UJ	10	UJ	10 U	10	U	10	U	NA	NA	NA
4-Methylphenol	10	UJ	10	U	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
4-Nitroaniline	25	UJ	25	UJ	25	UJ	25	UJ	25 U	25	U	25	U	NA	NA	NA
4-Nitrophenol	25	UJ	25	U	25	UJ	25	U	25 U	25	U	25	U	NA	NA	NA
Acenaphthene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
Acenaphthylene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
Anthracene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA
Benzo(a)anthracene	10	UJ	10	UJ	10	UJ	10	U	10 U	10	U	10	U	NA	NA	NA

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	08G00901	08G01001	08G01101	08G01201	08G01301	08G01401	08G01501	08G01601	08G01701	08G01801
Lab ID	873070	873269	873271	873266	876943	877090	876942	882951	882943	882980
Sampling Date	22-Oct-97	23-Oct-97	23-Oct-97	23-Oct-97	05-Dec-97	08-Dec-97	05-Dec-97	18-Feb-98	18-Feb-98	19-Feb-98
Benzo(a)pyrene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Benzo(b)fluoranthene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Benzo(g,h,i)perylene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Benzo(k)fluoranthene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
bis(2-Chloroethoxy)methane	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
bis(2-Chloroethyl)ether	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
bis(2-Ethylhexyl)phthalate	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Butylbenzylphthalate	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Carbazole	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Chrysene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Di-n-butylphthalate	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Di-n-octylphthalate	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Dibenz(a,h)anthracene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Dibenzofuran	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Diethylphthalate	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Dimethylphthalate	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Fluoranthene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Fluorene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Hexachlorobenzene	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	NA	NA	NA
Hexachlorobutadiene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Hexachlorocyclopentadiene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Hexachloroethane	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Isophorone	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
N-Nitroso-di-n-propylamine	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
N-Nitrosodiphenylamine (1)	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Naphthalene	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Nitrobenzene	25 UJ	25 UJ	25 UJ	25 UJ	25 U	25 U	25 U	NA	NA	NA
Pentachlorophenol	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Phenanthrene	10 UJ	10 U	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Phenol	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA	NA
Pyrene										
Pesticides/PCBs, ug/L										

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	08G00901		08G01001		08G01101		08G01201		08G01301		08G01401		08G01501		08G01601		08G01701		08G01801	
Lab ID	873070		873269		873271		873266		876943		877090		876942		882951		882943		882980	
Sampling Date	22-Oct-97		23-Oct-97		23-Oct-97		23-Oct-97		05-Dec-97		08-Dec-97		05-Dec-97		18-Feb-98		18-Feb-98		19-Feb-98	
4,4'-DDD	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UR	NA		NA		NA	
4,4'-DDE	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UR	NA		NA		NA	
4,4'-DDT	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UR	NA		NA		NA	
Aldrin	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
alpha-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
alpha-Chlordane	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
Aroclor-1016	0.95	U	0.95	U	0.98	U	0.95	U	0.98	U	0.97	U	0.99	UR	NA		NA		NA	
Aroclor-1221	1.9	U	1.9	U	2	U	1.9	U	2	U	1.9	U	2	UR	NA		NA		NA	
Aroclor-1232	0.95	U	0.95	U	0.98	U	0.95	U	0.98	U	0.97	U	0.99	UR	NA		NA		NA	
Aroclor-1242	0.95	U	0.95	U	0.98	U	0.95	U	0.98	U	0.97	U	0.99	UR	NA		NA		NA	
Aroclor-1248	0.95	U	0.95	U	0.98	U	0.95	U	0.98	U	0.97	U	0.99	UR	NA		NA		NA	
Aroclor-1254	0.95	U	0.95	U	0.98	U	0.95	U	0.98	U	0.97	U	0.99	UR	NA		NA		NA	
Aroclor-1260	0.95	U	0.95	U	0.98	U	0.95	U	0.98	U	0.97	U	0.99	UR	NA		NA		NA	
beta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
delta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.01	J	0.05	U	0.01	J	NA		NA		NA	
Dieldrin	0.1	U	0.1	U	0.02	J	0.1	U	0.1	U	0.1	U	0.1	UR	NA		NA		NA	
Endosulfan I	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
Endosulfan II	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UR	NA		NA		NA	
Endosulfan sulfate	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UR	NA		NA		NA	
Endrin	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UR	NA		NA		NA	
Endrin aldehyde	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.01	J	0.1	UR	NA		NA		NA	
Endrin ketone	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UR	NA		NA		NA	
gamma-BHC (Lindane)	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
gamma-Chlordane	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
Heptachlor	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
Heptachlor epoxide	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	UR	NA		NA		NA	
Methoxychlor	0.48	U	0.48	U	0.49	U	0.48	U	0.49	U	0.48	U	0.5	UR	NA		NA		NA	
Toxaphene	4.8	U	4.8	U	4.9	U	4.8	U	4.9	U	4.8	U	5	UR	NA		NA		NA	
Herbicides, ug/L																				
2,4 5-TP (Silvex)	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA		NA		NA	
2,4,5-T	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	NA		NA		NA	
2,4-D	0.08	J	1.5	U	0.05	J	0.08	J	0.16	J	2	U	0.16	J	NA		NA		NA	
2,4-DB	0.06	J	5	U	5	U	5	U	0.31	J	2	U	0.29	J	NA		NA		NA	

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	08G00901	08G01001	08G01101	08G01201	08G01301	08G01401	08G01501	08G01601	08G01701	08G01801
Lab ID	873070	873269	873271	873266	876943	877090	876942	882951	882943	882980
Sampling Date	22-Oct-97	23-Oct-97	23-Oct-97	23-Oct-97	05-Dec-97	08-Dec-97	05-Dec-97	18-Feb-98	18-Feb-98	19-Feb-98
Dalapon	6 U	6 U	6 U	6 U	6 U	1.4 J	6 U	NA	NA	NA
Dicamba	0.52 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA
Dichloroprop	2 U	2 U	2 U	2 U	0.4 J	0.14 J	2 U	NA	NA	NA
Dinoseb	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	NA	NA	NA
MCPA	220 U	160 U	140 U	110 U	660 J	60 U	1200 DJ	NA	NA	NA
MCPP	350 U	900 J	660 J	60 U	60 U	200 J	60 U	NA	NA	NA
Inorganics, ug/L										
Aluminum	372	614	73.2 U	1450	1870	1380 J	1420	454	88.3 J	87.3 J
Antimony	2.9 U	2.9 U	2.9 U	2.9 U	3.5 U	2 U	4 U	2.5 U	2.5 U	2.9 J
Arsenic	117	209	223	5.9 U	88.2	7.1 J	2.2 U	3.9 J	98.8	3.1 U
Barium	4.9 U	15 J	1.5 U	38.5 J	42.1 J	39.2 J	21.6 J	27.7 J	20 J	12.1 J
Beryllium	0.2 U	0.23 U	0.22 U	0.26 U	0.23 U	0.33 U	0.13 U	0.43 U	0.39 U	0.4 U
Cadmium	0.3 U	0.3 U	0.3 U	0.3 U	0.5 U	0.5 U	0.5 U	0.3 U	0.3 U	0.3 U
Calcium	45600	7230	89800	1600 U	12900	34200	18100	7770 U	63200 U	29300 U
Chromium	0.8 U	0.8 U	0.8 U	0.83 J	3.7 U	1.8 U	3.5 U	3.1 U	2.9 U	4 U
Cobalt	0.7 U	0.7 U	0.7 U	0.7 U	1.9 J	2.3 J	1.2 J	1.9 J	0.8 U	0.8 U
Copper	1.2 J	6.5 J	0.9 J	1.5 J	5.5 J	9.5 J	8.3 J	0.7 U	1.2 U	2.8 U
Iron	455	825	73.6 U	5800	447	1730 J	498	580	141 U	550
Lead	1.9 U	1.9 U	1.9 U	1.9 U	3.2	3.1	2.3 J	3.3 U	1.6 U	3.6 U
Magnesium	4670 U	2220 U	6310 U	660 U	2220 U	6650 U	3210 U	2150 U	3290 U	1380 U
Manganese	18.5	54.4	5.3 J	71.8	148	172	72.9	164	10.5 U	23.4 U
Mercury	0.14 U	0.14 U	0.13 U	0.15 U	0.15 U	0.1 U	0.11 U	0.1 U	0.1 U	0.1 U
Nickel	1.3 U	1.3 U	1.3 U	1.3 U	9.6 J	5.8 J	5.9 J	11.4 J	4.4 J	3 J
Potassium	4980 J	991 U	11600	232 U	1290 U	1870 U	4570 U	593 U	10900	2090 U
Selenium	4.4 U	4.4 U	4.4 U	4.4 U	4 U	4.1 U	4 U	3.6 U	3.6 U	3.6 U
Silver	0.8 U	0.8 U	0.8 U	0.8 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Sodium	22400 U	6340 U	10100 U	7120 U	9330 U	21900 U	28900	8690 U	6360 U	6060 U
Thallium	5 U	5 U	5 U	5 U	3.7 U	3.7 U	3.7 U	4.2 U	4.2 U	4.2 U
Vanadium	2.3 J	2.8 J	0.7 U	4.2 J	2 J	2.5 J	3 J	3.5 J	4.4 J	2.4 J
Zinc	21.9 U	9.2 U	52.5 U	6.6 U	16.8 U	151 U	41.3 U	5.5 U	1.7 U	1 U
General Chemistry, mg/L										
Total Organic Carbon	31.5	21.1	20.9	8.47	22.1	46.8	27.2	25.2	19.9	23.5
Total Suspended Solids	4 U	4 U	4 U	8	22	20	13	4 U	4 U	4 U

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G00102	09G00202	09G00202D	09G00302	09G00402	09G00501	09G00601	09G00701	09G00801	09G00901
Lab ID	872936	872937	872939	872938	872975	872976	872659	872977	873307	873310
Sampling Date	20-Oct-97	20-Oct-97	20-Oct-97	20-Oct-97	21-Oct-97	21-Oct-97	17-Oct-97	21-Oct-97	24-Oct-97	24-Oct-97
Semivolatile Organics, ug/L										
1,2,4-Trichlorobenzene	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
1,2-Dichlorobenzene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
1,3-Dichlorobenzene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
1,4-Dichlorobenzene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 UJ
2,2'-oxybis(1-Chloropropane)	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
2,4,5-Trichlorophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	26 U	25 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	2 J	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 UJ	25 U	26 UJ	25 UJ
2,4-Dinitrotoluene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
2,6-Dinitrotoluene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
2-Chloronaphthalene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 UJ	10 U	10 U	10 U	14 J	10 U	10 U	10 UJ	10 UJ	10 U
2-Methylphenol	10 U	10 U	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	25 UJ	25 U	25 U	25 U	25 UJ	25 U	25 U	25 UJ	26 UJ	25 U
2-Nitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 UJ
3-Nitroaniline	25 UJ	25 U	25 U	25 U	25 UJ	25 U	25 UJ	25 UJ	26 UJ	25 UJ
4,6-Dinitro-2-methylphenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	26 UJ	25 U
4-Bromophenyl-phenylether	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
4-Chlorophenyl-phenylether	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
4-Methylphenol	10 U	10 U	3 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	25 UJ	25 U	25 U	25 U	25 UJ	25 U	25 UJ	25 UJ	26 UJ	25 UJ
4-Nitrophenol	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	26 U	25 U
Acenaphthene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Acenaphthylene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Anthracene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Benzo(a)anthracene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G00102	09G00202	09G00202D	09G00302	09G00402	09G00501	09G00601	09G00701	09G00801	09G00901
Lab ID	872936	872937	872939	872938	872975	872976	872659	872977	873307	873310
Sampling Date	20-Oct-97	20-Oct-97	20-Oct-97	20-Oct-97	21-Oct-97	21-Oct-97	17-Oct-97	21-Oct-97	24-Oct-97	24-Oct-97
Benzo(a)pyrene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Benzo(b)fluoranthene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Benzo(g,h,i)perylene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Benzo(k)fluoranthene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
bis(2-Chloroethoxy)methane	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
bis(2-Chloroethyl)ether	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
bis(2-Ethylhexyl)phthalate	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Butylbenzylphthalate	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Carbazole	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Chrysene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Di-n-butylphthalate	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Di-n-octylphthalate	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Dibenz(a,h)anthracene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Dibenzofuran	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Diethylphthalate	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Dimethylphthalate	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Fluoranthene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 UJ
Fluorene	10 UJ	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U
Hexachlorobenzene	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 UJ	10 UJ	10 U
Hexachlorobutadiene	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Hexachlorocyclopentadiene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Hexachloroethane	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Indeno(1,2,3-cd)pyrene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
Isophorone	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
N-Nitroso-di-n-propylamine	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	10 UJ	10 UJ	10 U
N-Nitrosodiphenylamine (1)	10 UJ	10 U	10 U	1 J	6 J	10 U	10 U	10 UJ	10 UJ	10 U
Naphthalene	10 UJ	10 U	10 U	10 U	10 UJ	10 U	10 U	25 UJ	26 UJ	25 UJ
Nitrobenzene	10 UJ	10 U	10 U	25 UJ	25 UJ	25 UJ	25 UJ	10 UJ	10 UJ	10 U
Pentachlorophenol	25 UJ	25 UJ	25 UJ	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U
Phenanthrene	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 U
Phenol	10 U	10 U	2 J	10 U	10 UJ	10 U	10 U			
Pyrene	10 UJ	10 U	10 U	10 U						
Pesticides/PCBs, ug/L										

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G00102		09G00202		09G00202D		09G00302		09G00402		09G00501		09G00601		09G00701		09G00801		09G00901	
Lab ID	872936		872937		872939		872938		872975		872976		872659		872977		873307		873310	
Sampling Date	20-Oct-97		20-Oct-97		20-Oct-97		20-Oct-97		21-Oct-97		21-Oct-97		17-Oct-97		21-Oct-97		24-Oct-97		24-Oct-97	
4,4'-DDD	0.1	UJ	0.1	UJ	0.1	U	0.1	UJ	0.09	J	0.03	J	0.1	UJ	0.1	U	0.1	U	0.1	U
4,4'-DDE	0.1	J	0.1	UJ	0.1	U	0.1	UJ	0.09	U	0.01	J	0.1	UJ	0.1	U	0.1	U	0.1	U
4,4'-DDT	0.1	UJ	0.1	UJ	0.1	U	0.004	J	0.09	U	0.09	U	0.01	J	0.1	U	0.1	U	0.1	U
Aldrin	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	J	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U
alpha-BHC	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U
alpha-Chlordane	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.11	J	0.05	UJ	0.05	U	0.05	U	0.05	U
Aroclor-1016	1	UJ	1	UJ	1	U	1	UJ	0.93	U	0.94	U	1	UJ	0.97	U	1	U	0.95	U
Aroclor-1221	2.1	UJ	2.1	UJ	2.1	U	2	UJ	1.9	U	1.9	U	2	UJ	1.9	U	2.1	U	1.9	U
Aroclor-1232	1	UJ	1	UJ	1	U	1	UJ	0.93	U	0.94	U	1	UJ	0.97	U	1	U	0.95	U
Aroclor-1242	1	UJ	1	UJ	1	U	1	UJ	0.93	U	0.94	U	1	UJ	0.97	U	1	U	0.95	U
Aroclor-1248	1	UJ	1	UJ	1	U	1	UJ	0.93	U	0.94	U	1	UJ	0.97	U	1	U	0.95	U
Aroclor-1254	1	UJ	1	UJ	1	U	1	UJ	0.93	U	0.94	U	1	UJ	0.97	U	1	U	0.95	U
Aroclor-1260	1	UJ	1	UJ	1	U	1	UJ	0.93	U	0.94	U	1	UJ	0.97	U	1	U	0.95	U
beta-BHC	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U
delta-BHC	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.02	J	0.05	UJ	0.05	U	0.05	U	0.05	U
Dieldrin	0.1	UJ	0.1	UJ	0.1	U	0.1	UJ	0.09	U	0.09	U	0.01	J	0.1	U	0.1	U	0.1	U
Endosulfan I	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.09	J	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U
Endosulfan II	0.1	UJ	0.1	UJ	0.1	U	0.1	UJ	0.09	U	0.09	U	0.01	J	0.1	U	0.1	U	0.1	U
Endosulfan sulfate	0.1	UJ	0.1	UJ	0.1	U	0.1	UJ	0.09	U	0.09	U	0.1	UJ	0.1	U	0.1	U	0.1	U
Endrin	0.1	UJ	0.1	UJ	0.1	U	0.1	UJ	0.09	U	0.02	J	0.02	J	0.1	U	0.1	U	0.1	U
Endrin aldehyde	0.1	UJ	0.1	UJ	0.1	U	0.1	UJ	0.09	U	0.09	U	0.1	UJ	0.1	U	0.1	U	0.1	U
Endrin ketone	0.1	UJ	0.1	UJ	0.1	U	0.1	UJ	0.09	U	0.09	U	0.1	UJ	0.1	U	0.1	U	0.1	U
gamma-BHC (Lindane)	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.01	J	0.01	J	0.05	UJ	0.05	U	0.05	U	0.05	U
gamma-Chlordane	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.67		0.17		0.03	J	0.05	U	0.05	U	0.05	U
Heptachlor	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U
Heptachlor epoxide	0.05	UJ	0.05	UJ	0.05	U	0.05	UJ	0.1	J	0.05	U	0.05	UJ	0.05	U	0.05	U	0.05	U
Methoxychlor	0.52	UJ	0.05	UJ	0.53	U	0.5	UJ	0.47	U	0.47	U	0.01	J	0.48	U	0.52	U	0.48	U
Toxaphene	5.2	UJ	5.2	UJ	5.3	U	5	UJ	4.7	U	4.7	U	5.1	UJ	4.8	U	5.2	U	4.8	U
Herbicides, ug/L																				
2,4 5-TP (Silvex)	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U
2,4,5-T	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U
2,4-D	0.002	J	1.5	U	1.6	U	0.004	J	0.1	J	0.11	J	0.9	J	0.005	J	0.21	J	0.24	J
2,4-DB	0.42	J	0.44	J	0.33	J	0.17	J	1.8	J	0.83	J	5	UJ	0.18	J	5	U	5	U

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G00102		09G00202		09G00202D		09G00302		09G00402		09G00501		09G00601		09G00701		09G00801		09G00901	
Lab ID	872936		872937		872939		872938		872975		872976		872659		872977		873307		873310	
Sampling Date	20-Oct-97		20-Oct-97		20-Oct-97		20-Oct-97		21-Oct-97		21-Oct-97		17-Oct-97		21-Oct-97		24-Oct-97		24-Oct-97	
Dalapon	11	U	8.5	U	8.9	U	6	U	6	U	6	U	6	UJ	6	U	6	U	6	U
Dicamba	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	UJ	0.5	U	0.5	U	0.5	U
Dichloroprop	2	U	2	U	3.1	J	2	U	2	U	2	U	2	UJ	2	U	0.59	J	0.37	J
Dinoseb	1.5	U	1.5	U	1.5	U	1.5	U	0.1	J	1.5	U	1.5	UJ	1.5	U	1.5	U	0.1	J
MCPA	640		870	J	670	J	480	U	3100	J	2900	J	53	UJ	150	U	400	U	380	U
MCPP	520	U	840	J	540	U	350	U	1900	J	830	J	63	UJ	1100	J	520	U	60	U
Inorganics, ug/L																				
Aluminum	318		731		781		471		448		224		538		2040		290		243	
Antimony	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	2.9	U	3.5	J
Arsenic	13.2		5.9	U	5.9	U	5.9	U	264		61.3		53		5.9	U	5.9	U	5.9	U
Barium	24.5	J	1.8	J	2.4	J	4	J	8.6	J	7.6	J	9.5	J	13.8	J	12.5	J	5.7	U
Beryllium	0.1	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.11	U	0.23	U	0.21	U
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Calcium	24600		5830		6350		10600		43800		53400		55000		2070	U	17900		31100	
Chromium	0.81	J	1.3	J	1.1	J	0.88	J	1.6	J	1.4	J	1	J	3.7	J	0.8	U	0.8	U
Cobalt	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	1.1	J	0.7	U	1	J
Copper	3	U	2.6	U	3.5	U	3	U	56		3.8	U	2.6	U	3.5	U	0.76	J	2.6	J
Iron	391		105	U	102	U	114	U	1290		188		638		1870		1000		200	
Lead	1.9	U	1.9	U	1.9	U	1.9	U	6.1		1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
Magnesium	1360	U	1570	U	1660	U	2150	U	1030	U	2410	U	2380	U	1570	U	2100	U	2010	U
Manganese	6.7	J	0.52	U	0.78	U	1.3	U	53.7		11.3	J	32.9		48.9		53.6		3	J
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.11	J	0.1	U	0.1	U	0.1	U	0.15	U	0.13	U
Nickel	2.5	J	1.3	U	1.3	U	1.3	U	2.2	J	1.3	U	1.3	U	5.4	J	1.3	U	1.3	U
Potassium	2530	U	3690	U	3850	U	2510	U	3950	U	1990	U	2380	U	3230	U	2100	U	3590	U
Selenium	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U	4.4	U
Silver	0.8	U	1.1	J	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Sodium	2890	U	3320	U	3470	U	2910	U	3270	U	3160	U	4950	U	6120	U	2600	U	4070	U
Thallium	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Vanadium	0.7	U	0.73	J	0.73	J	0.7	U	0.99	J	3.4	J	0.86	J	1.3	J	0.91	J	1.8	J
Zinc	10.8	UJ	7.2	UJ	30	UJ	67.6	UJ	59.6	UJ	5.6	UJ	24	UJ	20	UJ	7.2	U	14.6	U
General Chemistry, mg/L																				
Total Organic Carbon	37.2		34.5		NA		47.5		54.6		33.1		24.3		41.1		47.8		62.3	
Total Suspended Solids	4	U	4	U	NA		4	U	4	U	4	U	20		4	U	4	U	4	U

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G01001		09G01101		09G01201		09G01301		09G01401		09G01401D		09G01501		09G01601		09G01701		09G01801	
Lab ID	872978		872979		872980		872981		876803		876821		876940		876941		882644		882638	
Sampling Date	21-Oct-97		21-Oct-97		21-Oct-97		21-Oct-97		04-Dec-97		04-Dec-97		05-Dec-97		05-Dec-97		12-Feb-98		12-Feb-98	
Semivolatile Organics, ug/L																				
1,2,4-Trichlorobenzene	10	UJ	10	UJ	10	UJ	10	UJ	10	U	10	U	10	U	10	U	NA		NA	
1,2-Dichlorobenzene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
1,3-Dichlorobenzene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
1,4-Dichlorobenzene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
2,2'-oxybis(1-Chloropropane)	10	UJ	10	UJ	10	UJ	10	UJ	10	U	10	U	10	U	10	U	NA		NA	
2,4,5-Trichlorophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		NA	
2,4,6-Trichlorophenol	10	U	10	U	2	J	10	U	10	U	10	U	10	U	10	U	NA		NA	
2,4-Dichlorophenol	10	U	10	U	200		10	U	10	U	10	U	10	U	10	U	NA		NA	
2,4-Dimethylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
2,4-Dinitrophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		NA	
2,4-Dinitrotoluene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
2,6-Dinitrotoluene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
2-Chloronaphthalene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
2-Chlorophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
2-Methylnaphthalene	10	U	10	UJ	10	U	10	U	1	J	10	U	10	U	10	U	NA		NA	
2-Methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
2-Nitroaniline	25	U	25	UJ	25	U	25	U	25	U	25	U	25	U	25	U	NA		NA	
2-Nitrophenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
3,3'-Dichlorobenzidine	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
3-Nitroaniline	25	U	25	UJ	25	U	25	U	25	U	25	U	25	U	25	U	NA		NA	
4,6-Dinitro-2-methylphenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		NA	
4-Bromophenyl-phenylether	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
4-Chloro-3-methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
4-Chloroaniline	10	U	10	UJ	10	U	10	U	10	UJ	10	UJ	10	UJ	10	UJ	NA		NA	
4-Chlorophenyl-phenylether	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
4-Methylphenol	10	U	10	U	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
4-Nitroaniline	25	U	25	UJ	25	U	25	U	25	U	25	U	25	U	25	U	NA		NA	
4-Nitrophenol	25	U	25	U	25	U	25	U	25	U	25	U	25	U	25	U	NA		NA	
Acenaphthene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
Acenaphthylene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
Anthracene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	
Benzo(a)anthracene	10	U	10	UJ	10	U	10	U	10	U	10	U	10	U	10	U	NA		NA	

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G01001	09G01101	09G01201	09G01301	09G01401	09G01401D	09G01501	09G01601	09G01701	09G01801
Lab ID	872978	872979	872980	872981	876803	876821	876940	876941	882644	882638
Sampling Date	21-Oct-97	21-Oct-97	21-Oct-97	21-Oct-97	04-Dec-97	04-Dec-97	05-Dec-97	05-Dec-97	12-Feb-98	12-Feb-98
Benzo(a)pyrene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Benzo(b)fluoranthene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Benzo(g,h,i)perylene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Benzo(k)fluoranthene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
bis(2-Chloroethoxy)methane	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
bis(2-Chloroethyl)ether	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
bis(2-Ethylhexyl)phthalate	10 U	10 UJ	10 U	10 U	10 U	11 U	10 U	10 U	NA	NA
Butylbenzylphthalate	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Carbazole	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Chrysene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Di-n-butylphthalate	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Di-n-octylphthalate	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Dibenz(a,h)anthracene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Dibenzofuran	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Diethylphthalate	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Dimethylphthalate	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Fluoranthene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Fluorene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Hexachlorobenzene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Hexachlorobutadiene	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA
Hexachlorocyclopentadiene	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	NA	NA
Hexachloroethane	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Indeno(1,2,3-cd)pyrene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Isophorone	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
N-Nitroso-di-n-propylamine	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
N-Nitrosodiphenylamine (1)	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Naphthalene	10 U	10 UJ	8 J	2 J	160 D	10 U	5 J	10 U	NA	NA
Nitrobenzene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Pentachlorophenol	25 UJ	25 UJ	25 UJ	25 UJ	25 U	25 U	25 U	25 U	NA	NA
Phenanthrene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Phenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Pyrene	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA
Pesticides/PCBs, ug/L										

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G01001		09G01101		09G01201		09G01301		09G01401		09G01401D		09G01501		09G01601		09G01701		09G01801	
Lab ID	872978		872979		872980		872981		876803		876821		876940		876941		882644		882638	
Sampling Date	21-Oct-97		21-Oct-97		21-Oct-97		21-Oct-97		04-Dec-97		04-Dec-97		05-Dec-97		05-Dec-97		12-Feb-98		12-Feb-98	
4,4'-DDD	0.09	U	0.09	U	0.09	U	0.11	U	0.1	U	0.09	U	0.09	U	0.09	U	NA		NA	
4,4'-DDE	0.09	U	0.01	J	0.09	U	0.11	U	0.1	U	0.09	U	0.09	U	0.09	U	NA		NA	
4,4'-DDT	0.09	U	0.01	J	0.09	U	0.11	U	0.1	U	0.09	U	0.09	U	0.09	U	NA		NA	
Aldrin	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
alpha-BHC	0.05	U	0.004	J	1	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
alpha-Chlordane	0.05	U	0.05	U	0.03	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
Aroclor-1016	0.93	U	0.94	U	0.93	U	1.1	U	1	U	0.94	U	0.93	U	0.93	U	NA		NA	
Aroclor-1221	1.9	U	1.9	U	1.9	U	2.2	U	2	U	1.9	U	1.9	U	1.9	U	NA		NA	
Aroclor-1232	0.93	U	0.94	U	0.93	U	1.1	U	1	U	0.94	U	0.93	U	0.93	U	NA		NA	
Aroclor-1242	0.93	U	0.94	U	0.93	U	1.1	U	1	U	0.94	U	0.93	U	0.93	U	NA		NA	
Aroclor-1248	0.93	U	0.94	U	0.93	U	1.1	U	1	U	0.94	U	0.93	U	0.93	U	NA		NA	
Aroclor-1254	0.93	U	0.94	U	0.93	U	1.1	U	1	U	0.94	U	0.93	U	0.93	U	NA		NA	
Aroclor-1260	0.93	U	0.94	U	0.93	U	1.1	U	1	U	0.94	U	0.93	U	0.93	U	NA		NA	
beta-BHC	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
delta-BHC	0.05	U	0.05	U	0.3		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
Dieldrin	0.09	U	0.09	U	0.09	U	0.11	U	0.1	U	0.09	U	0.09	U	0.09	U	NA		NA	
Endosulfan I	0.05	U	0.05	U	0.05	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
Endosulfan II	0.09	U	0.09	U	0.09	U	0.11	U	0.1	U	0.09	U	0.01	J	0.09	U	NA		NA	
Endosulfan sulfate	0.09	U	0.09	U	0.09	U	0.11	U	0.1	U	0.09	U	0.09	U	0.09	U	NA		NA	
Endrin	0.09	U	0.09	U	0.09	U	0.11	U	0.1	U	0.09	U	0.09	U	0.09	U	NA		NA	
Endrin aldehyde	0.09	U	0.08	J	0.09	U	0.11	U	0.1	U	0.09	U	0.09	U	0.09	U	NA		NA	
Endrin ketone	0.09	U	0.09	U	0.09	U	0.11	U	0.1	U	0.09	U	0.09	U	0.09	U	NA		NA	
gamma-BHC (Lindane)	0.05	U	0.03	J	0.69		0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
gamma-Chlordane	0.05	U	0.05	U	0.01	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
Heptachlor	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
Heptachlor epoxide	0.05	U	0.04	J	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U	NA		NA	
Methoxychlor	0.47	U	0.47	U	0.47	U	0.54	U	0.5	U	0.47	U	0.47	U	0.47	U	NA		NA	
Toxaphene	4.7	U	4.7	U	4.7	U	5.4	U	5	U	4.7	U	4.7	U	4.7	U	NA		NA	
Herbicides, ug/L																				
2,4 5-TP (Silvex)	0.5	U	0.5	U	5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2,4,5-T	0.5	U	0.5	U	5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
2,4-D	1.5	U	1.4	J	110	J	0.001	J	0.26	J	1.5	U	0.07	J	1.5	U	0.32	J	1.5	U
2,4-DB	0.14	J	1	J	50	U	0.38	J	0.21	J	5	U	0.18	J	0.31	J	0.55	J	5	U

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G01001		09G01101		09G01201		09G01301		09G01401		09G01401D		09G01501		09G01601		09G01701		09G01801	
Lab ID	872978		872979		872980		872981		876803		876821		876940		876941		882644		882638	
Sampling Date	21-Oct-97		21-Oct-97		21-Oct-97		21-Oct-97		04-Dec-97		04-Dec-97		05-Dec-97		05-Dec-97		12-Feb-98		12-Feb-98	
Dalapon	6	U	6	U	60	U	6	U	6	U	6	U	6	U	6	U	0.69	J	0.3	J
Dicamba	0.5	U	0.5	U	5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dichloroprop	2	U	2	U	20	U	2	U	2	U	2	U	0.42	J	0.36	J	0.29	J	0.24	J
Dinoseb	1.5	U	1.5	U	15	U	1.5	U	1.5	U	1.5	U	1.5	U	0.12	J	1.5	U	1.5	U
MCPA	60	U	190	U	750	J	60	U	890	J	840	J	420	U	920	J	680	J	630	J
MCPP	60	U	1200	J	1500	J	60	U	120	U	170	U	60	U	0.36	J	60	U	60	U
Inorganics, ug/L																				
Aluminum	212		539		1030		353		315		294		3260		1840		349		567	
Antimony	2.9	U	2.9	U	2.9	U	2.9	U	2	U	3.3	U	2.8	U	2	U	2.5	U	2.5	U
Arsenic	5.9	U	93.9		138		5.9	U	2.2	U	2.2	U	2.2	U	2.2	J	4.3	J	3.1	U
Barium	5.4	J	6.8	J	10.3	J	19.7	J	47.2	J	38	J	18.3	J	17.8	J	9.6	U	20.8	J
Beryllium	0.1	U	0.1	U	0.1	U	0.13	U	0.1	U	0.1	U	0.14	U	0.1	U	0.3	U	0.35	U
Cadmium	0.3	U	0.3	U	0.3	U	0.3	U	0.5	U	0.5	U	0.5	U	0.5	U	0.3	U	0.3	U
Calcium	33700		36900		11700		771	U	105000		80800		9800		15000		33700	U	1060	U
Chromium	0.91	J	1	J	3.3	J	1.3	J	2	U	1.9	U	6.3	U	4.5	U	0.9	U	1.5	J
Cobalt	0.7	U	0.7	U	0.7	U	0.88	J	1.7	J	2.1	J	0.8	J	0.55	J	0.8	U	0.8	U
Copper	4	U	4.2	U	6.1	J	2.6	U	4.5	J	5.6	J	7.2	J	5.1	J	2.7	U	0.7	U
Iron	1030		570		540		2400		430		451		374		249		53.6	J	4680	
Lead	1.9	U	1.9	U	1.9	J	1.9	U	2.2	U	2.2	U	2.8	J	2.2	U	1.6	U	1.6	U
Magnesium	2350	U	1220	U	824	U	905	U	9780		7410		967	U	1130	U	700	U	942	U
Manganese	16.7		11.6	J	24.9		82.9		159		145		55.7		70.8		4.8	U	85.8	U
Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.14	U	0.14	U	0.18	U	0.15	U	0.1	U	0.1	U
Nickel	1.3	U	1.3	U	3.4	J	3.5	J	9.9	J	9.4	J	7.5	J	5.1	J	1.4	J	1.2	U
Potassium	2920	U	2530	U	2190	U	178	U	1180	U	966	U	223	U	745	U	1850	U	239	U
Selenium	4.4	U	4.4	U	4.4	U	4.4	U	4	U	4	U	4	U	4	U	3.6	U	3.6	U
Silver	0.8	U	0.8	U	0.8	U	0.8	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U
Sodium	3340	U	3090	U	2900	U	8070	U	78300	U	58700	U	7770	U	10200	U	1960	U	8000	U
Thallium	5	U	5	U	5	U	5	U	3.7	U	3.7	U	3.7	U	3.7	U	4.2	U	4.2	U
Vanadium	0.7	U	0.7	U	0.79	J	1.3	J	1.6	J	1.6	J	1.9	J	5.1	J	4.3	J	1.6	J
Zinc	15.7	UJ	10.2	UJ	54.9	UJ	12.6	UJ	16.8	U	16.9	U	30.8	U	16.8	U	1	U	1	U
General Chemistry, mg/L																				
Total Organic Carbon	28		36		38.5		10.1		21.2		NA		25.3		22		NA		7.05	
Total Suspended Solids	4	U	28		4	U	4	U	7		NA		58		4		NA		4	U

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G01801D	08F00901	08F01201	08F01301	09F00402	09F00601	09F00701	09F01501	09F01601
Lab ID	882641	873053	873265	876944	872971	872655	872972	876945	876946
Sampling Date	12-Feb-98	22-Oct-97	23-Oct-97	05-Dec-97	21-Oct-97	17-Oct-97	21-Oct-97	05-Dec-97	05-Dec-97
Semivolatile Organics, ug/L									
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-oxybis(1-Chloropropane)	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl-phenylether	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G01801D	08F00901	08F01201	08F01301	09F00402	09F00601	09F00701	09F01501	09F01601
Lab ID	882641	873053	873265	876944	872971	872655	872972	876945	876946
Sampling Date	12-Feb-98	22-Oct-97	23-Oct-97	05-Dec-97	21-Oct-97	17-Oct-97	21-Oct-97	05-Dec-97	05-Dec-97
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethoxy)methane	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Chloroethyl)ether	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Butylbenzylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dimethylphthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitroso-di-n-propylamine	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine (1)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenol	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs, ug/L									

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G01801D	08F00901	08F01201	08F01301	09F00402	09F00601	09F00701	09F01501	09F01601
Lab ID	882641	873053	873265	876944	872971	872655	872972	876945	876946
Sampling Date	12-Feb-98	22-Oct-97	23-Oct-97	05-Dec-97	21-Oct-97	17-Oct-97	21-Oct-97	05-Dec-97	05-Dec-97
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Herbicides, ug/L									
2,4 5-TP (Silvex)	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-T	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-D	1.5 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-DB	5 U	NA	NA	NA	NA	NA	NA	NA	NA

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Appendix C-5, Table C-5.2
Summary of Groundwater Analytical Results
Operable Unit 3

Naval Training Center, Orlando
Orlando, FL

Sample ID	09G01801D		08F00901		08F01201		08F01301		09F00402		09F00601		09F00701		09F01501		09F01601	
Lab ID	882641		873053		873265		876944		872971		872655		872972		876945		876946	
Sampling Date	12-Feb-98		22-Oct-97		23-Oct-97		05-Dec-97		21-Oct-97		17-Oct-97		21-Oct-97		05-Dec-97		05-Dec-97	
Dalapon	6	U	NA		NA		NA		NA		NA		NA		NA		NA	
Dicamba	0.5	U	NA		NA		NA		NA		NA		NA		NA		NA	
Dichloroprop	0.12	J	NA		NA		NA		NA		NA		NA		NA		NA	
Dinoseb	1.5	U	NA		NA		NA		NA		NA		NA		NA		NA	
MCPA	460	J	NA		NA		NA		NA		NA		NA		NA		NA	
MCPP	60	U																
Inorganics, ug/L																		
Aluminum	667		252		412		529		373		129	U	1600		872		405	
Antimony	2.5	U	2.9	U	2.9	U	4.7	U	3.5	J	5.1	J	2.9	U	3.7	U	5	U
Arsenic	3.1	U	96.4		5.9	U	71.1		232		51.5		5.9	U	2.2	U	2.4	J
Barium	23.4	J	4.9	J	18.2	J	25.6	J	8.6	J	13.7	J	11.5	J	13.3	J	10.5	J
Beryllium	0.32	U	0.1	U	0.29	U	0.1	U	0.1	U	0.12	U	0.1	U	0.1	U	0.1	U
Cadmium	0.3	U	0.3	U	0.3	U	0.5	U	0.3	U	0.3	U	0.3	U	0.5	U	0.5	U
Calcium	1130	U	43300		1240	U	11400		48000		53400		2050	U	8060		13100	
Chromium	1.9	J	1.3	J	0.8	U	1.9	U	1.7	J	0.85	J	2.6	J	2.6	U	2.3	U
Cobalt	0.8	U	0.7	U	0.7	U	1.5	J	0.75	J	1.5	J	0.7	U	0.63	J	0.75	J
Copper	0.7	U	4.4	U	0.95	J	4.5	J	42.7		6.3	J	2.6	U	4.4	J	4	J
Iron	5490		410		4080		293		1380		740		1640		284		162	U
Lead	1.6	U	1.9	U	1.9	U	2.2	U	4.2		1.9	U	1.9	U	2.2	U	2.2	U
Magnesium	943	U	4280	U	660	U	2080	U	961	U	2370	U	1560	U	929	U	1080	U
Manganese	104	U	18.9		51		94.1		62.7		39		38.4		46.4		44.5	
Mercury	0.1	U	0.1	U	0.13	U	0.15	U	0.12	J	0.1	U	0.1	U	0.14	U	0.12	U
Nickel	1.2	U	1.7	J	1.3	U	7.3	J	2	J	2.7	J	4.9	J	5.6	J	3	J
Potassium	259	U	4720	J	222	U	1140	U	4120	U	2350	U	3280	U	179	U	810	U
Selenium	3.6	U	4.4	U	4.4	U	4	U	4.4	U	4.4	U	4.4	U	4	U	4	U
Silver	0.7	U	0.8	U	0.8	U	0.7	U	0.8	U	0.95	J	0.8	U	0.7	U	0.7	U
Sodium	8240	U	21700	U	7390	U	8660	U	3150	U	5120	U	6090	U	7890		10500	U
Thallium	4.2	U	5	U	5	U	3.7	U	5	U	5	U	5	U	3.7	U	3.7	U
Vanadium	1.6	J	2.3	J	2.6	J	1.2	J	1.5	J	1.7	J	0.8	J	0.93	J	3.1	J
Zinc	1	U	39.9	UJ	9.5	U	16.8	U	55.9	UJ	35.3	UJ	8.3	UJ	39.6	U	23.8	U
General Chemistry, mg/L																		
Total Organic Carbon	5.94		NA		NA		NA		NA		NA		NA		NA		NA	
Total Suspended Solids	4	U	NA		NA		NA		NA		NA		NA		NA		NA	

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APPENDIX D

FATE AND TRANSPORT SUMMARY

FATE AND TRANSPORT OF CONTAMINANTS OF CONCERN AT OPERABLE UNIT 3

Information regarding the fate and transport of chemicals in the environment was derived primarily from Howard (1991) and Callahan et al., (1979). Refer to these references for additional detail.

SEMIVOLATILE ORGANIC COMPOUNDS AND POLYCHLORINATED BIPHENYLS (PCBs)

POLYNUCLEAR AROMATIC HYDROCARBON (PAHs). This class of compounds is present in the environment primarily as the result of incomplete combustion of organics. They may occur naturally (forest fires, volcanoes, crude oil) or as the result of man-made combustion processes (auto exhaust, incinerators, cigarette smoke). Naphthalene is used in the manufacturing and application of pesticides. The particular PAHs and Aroclor-1260 (PCB) detected at Study Area 8 have relatively high molecular weights. These compounds, with the exception of naphthalenes, exhibit low water solubility and high sorption potential to soil, sediment, or organic matter, which inhibits leaching or volatilization. As a result, they are persistent, particularly in shallow soils, with mobilization and migration being minimal. The analytical results from Operable Unit (OU) 3 support that this is the scenario in both study areas; only naphthalenes are present as contaminants of potential concern (CPCs) in groundwater. Biodegradation can be a significant fate (removal) mechanism for PAHs sorbed to soil or sediment.

PHENOLS. 2,4'-dichlorophenol, 2-methylphenol, and 4-methylphenol were identified as CPCs in groundwater at Study Area 9 only. 2,4'-dichlorophenol is an intermediate product in the manufacturing of 2,4'-dichlorophenoxyacetic acid (2,4'-D). It is also used as a seed disinfectant and germicide (Montgomery, 1996). Phenolic compounds are highly soluble in water and do not sorb readily to particles or organic matter. Transport via infiltration of rainwater and migration of groundwater are likely mechanisms. Biodegradation is a significant removal mechanism in soil and water (Callahan et al., 1979).

PHTHALATE ESTERS. Di-n-butylphthalate and bis(2-ethylhexyl)phthalate were identified as CPCs in soil only. Phthalate esters have a very low solubility, indicating they do not readily dissolve in water. They also have relatively low vapor pressures, so volatilization is not a significant fate or transport process. Neither photolysis nor hydrolysis are important fate processes for phthalates. Both esters have very high sorption values, indicating that they will sorb strongly to soil or sediment particles. Biodegradation occurs slowly, but is an important fate and transport mechanism in soil or water media. Both aerobic and anaerobic degradation may occur, but aerobic will proceed more readily. All of these factors suggest that phthalate esters are moderately persistent in the environment. These compounds are commonly detected in environmental samples, but are attributable to laboratory or sample handling contamination.

PESTICIDES Many of the pesticides detected are no longer legally produced or used in the U.S. In general, they are persistent in the environment, due to high sorption coefficients, low solubilities, resistance to biodegradation or other removal processes, and tendency to bioconcentrate. Their presence at OU 3 may be due, in part, to direct application as part of routine, basewide pest management practices.

ALDRIN is an insecticide that is no longer produced or used in the U.S. It is relatively soluble in water and sorbs to sediment, making it fairly persistent in the environment. Hydrolysis, photolysis, and volatilization are not significant processes affecting aldrin (Howard, 1991). It biodegrades, particularly under anaerobic conditions. Given that aldrin was not detected in most of the groundwater samples at OU 3, sorption, conversion to dieldrin, or biodegradation may be responsible.

DIELDRIN is another chemical mixture used as an insecticide. It is a stereoisomer of endrin, formed by oxidation of aldrin. It is not prone to volatilization, hydrolysis, or photolysis. Dieldrin has a moderately high sorption coefficient, and is relatively insoluble. Biodegradation can be significant under anaerobic conditions.

ENDRIN and ENDRIN ALDEHYDE. Endrin is a stereoisomer of dieldrin. It has been used in this country as an insecticide, rodenticide, and avicide. Endrin aldehyde is a compound formed by the dehydrogenation or oxidation of endrin. Endrin has a very high sorption coefficient; it is expected to sorb strongly to soil or sediment and remain immobile. Its presence in water samples may be attributable to colloidal materials rather than dissolved concentrations derived from leaching (Howard, 1991). It is not subject to biodegradation, particularly in aquatic environments, although biodegradation from soils may be enhanced under anaerobic or flooded conditions (Howard, 1991). It is not subject to volatilization or hydrolysis. It is very persistent in the environment and is known to bioaccumulate in fish, other aquatic organisms, and humans.

BHC (hexachlorobenzene). is a mixture of isomers used primarily as insecticides. Gamma-BHC is also known as lindane. Hydrolysis, volatilization, and photolysis are not expected to be significant processes affecting the fate of BHC isomers in the environment. None of the isomers is particularly soluble, although these compounds were identified as CPCs in groundwater only. They do have relatively high sorption coefficients. Biodegradation is likely in the aqueous environment, particularly under anaerobic conditions (current conditions at OU 3).

CHLORDANE is classified as an organochlorine pesticide and was used primarily for termite control. It has been banned in the U.S. since 1988, and its use was restricted from 1983 to 1988. The alpha- and gamma-isomers are the major components of technical-grade chlordane; heptachlor and chlorinated hydrocarbons may also occur. Chlordane has a relatively low solubility value and a high sorption coefficient. Volatilization may be a significant factor at least in surface soils and surface water (Callahan et al., 1979). Hydrolysis and photolysis are not significant processes. Biodegradation appears to occur, but does not appear significant.

Chlordane has a strong affinity for organics and sorbs strongly to soils. Due to its low solubility, dissolution and transport via groundwater is not considered a significant pathway. Rather, it tends to persist in soils very near its point(s) of introduction to the environment. Minor constituents in technical-grade chlordane tend to disappear quickly, leaving just alpha- and gamma-isomers to persist. This matches the occurrences at OU 3.

DDD (dichlorodiphenyldichloroethane), DDE (dichlorodiphenyldichloroethene), and DDT (dichlorodiphenyltrichloroethane). DDD and DDT were commercially produced in the U.S. up to 1972 and were used almost exclusively as insecticides. DDE occurs solely as a breakdown product of DDT. DDD also occurs as a breakdown

product of DDT. These compounds behave similarly and usually coexist in the environment. They are very persistent compounds (as evidenced by their presence at OU 3 25 years after their use was banned) and are readily bioaccumulated, which accounts for their ubiquitous presence in the food chain worldwide (Callahan et al., 1979). These compounds are not very soluble in water, and tend to remain sorbed to soil, so that migration via mechanical transport through air, soil, or groundwater is the most likely transport mechanism. Volatilization can be significant in surface waters (and shallow soils, to a lesser extent). Photolysis can be very significant for DDE only, from the aqueous environment. Biodegradation is another important removal factor, but only because of the compounds' long residence time, rather than the speed of the degradation processes.

ENDOSULFAN I is an insecticide with a wide variety of applications. Hydrolysis, photolysis, and oxidation are all significant processes affecting the fate of endosulfan, particularly in the aquatic environment (Howard, 1991). Endosulfan has a high sorption coefficient, so like most other pesticide compounds, it remains in soils, where it is subject to hydrolysis and photolysis. Biodegradation is possible, but not expected to be a significant factor in its removal from the environment.

HEPTACHLOR and HEPTACHLOR EPOXIDE. Heptachlor, like chlordane, is classified as an organochlorine pesticide. It was used to control fire ants around utility poles, as well as for termite control. It has not been produced commercially since 1987. Heptachlor epoxide is an oxidation product of heptachlor and was never produced commercially. They frequently coexist in the environment. Heptachlor exhibits low solubility, low volatilization and photolysis potentials, and has limited capacity for biodegradation. As with most pesticide compounds, they tend to sorb strongly to soils, making them persistent in the environment, subject to primarily mechanical transport mechanisms.

HERBICIDES Several of these compounds are no longer produced, and their use has been banned in the U.S. Their presence at OU 3 may be due, in part, to direct application as part of routine, basewide pest management practices.

MCPA (4-chloro-2-methylphenoxy)acetic acid) is commonly used to control broadleaf weeds in turf and non-crop areas (Farm Chemicals Handbook, 1994), and is still in use. It is generally prepared as water soluble concentrates or emulsifiable concentrates, suggesting that it may have been mixed with oil or water as a carrier. It is highly soluble and migration via groundwater transport is likely.

MCPP (potassium (2-methyl-4-chlorophenoxy)propionate) is also used to control common broadleaf weeds in grasses (Farm Chemicals Handbook, 1994), and is still in use. It behaves similarly to MCPA in the environment.

2,4'-D (2,4-dichlorophenoxyacetic acid) is used as a systemic herbicide. It does not sorb readily to soils, although sorption potential increases under lower pH and high organic content conditions in the soil (Howard, 1991). Volatilization is not expected to be significant; however, it is very soluble in water. Leaching through the soil and migration in groundwater are likely transport mechanisms, although 2,4'-D is expected to rapidly biodegrade in the shallow aquatic environment. Biodegradation in soils is also a significant removal process.

2,4,5-TP [silvex; 2-(2,4,5-trichlorophenoxy)propionic acid] use has been banned since 1985. It was used as a general application spray on land, as well as on surface water bodies to control weeds. It has a very high sorption coefficient. Once in soils, biodegradation is considered the primary loss mechanism (Howard, 1991). Transport mechanisms would be the same as for other compounds bound to soil particles. In water, biodegradation is not considered significant. Hydrolization and volatilization are also not significant processes. Photolysis is likely in surface water environments, as is adsorption to sediments.

2,4,5-T (2,4,5-trichlorophenoxyacetic acid). This compound has also been banned since 1985. 2,4,5-T will likely biodegrade rapidly in soil, thereby limiting the availability for leaching. Biodegradation is slowed somewhat under anaerobic soil conditions (Howard, 1991). Its mobility is related to the organic content and clay content of the soil: the more organic the soil or the more fine-grained the soil, the lower the mobility. 2,4,5-T may be present in water as a result of leaching, surface runoff, or by direct application. In water, it will be subject to volatilization, photolysis, and biodegradation (Howard, 1991). It will also tend to sorb to organic material or sediment particles in surface water environments.

2,4-DB (2,4-dichlorophenoxybutyric acid) is chemically related to 2,4-D and is expected to behave similarly in the environment.

Dalapon is used to control annual and perennial grasses. It is commercially available as sodium or magnesium salts (Howard, 1991). In aqueous solution, it is corrosive to iron. In soils, biodegradation is the dominant process controlling fate, assuming favorable conditions for microbial growth (i.e., soil temperatures of 20 to 30 degrees Celsius, adequate moisture, slightly acidic conditions) (Howard, 1991). Soil conditions at OU 3 should therefore, be favorable for microbial growth. In the absence of biodegradation, leaching will be the dominant fate process in soils. In water, dalapon will readily undergo biodegradation, hydrolysis, and photolysis. It is not expected to bind to sediments or bioaccumulate in aquatic organisms.

Dichloroprop (2-[2,4-dichlorophenoxy]propionic acid) is chemically related to 2,4-D and dalapon, and is expected to behave similarly in the environment.

Dinoseb is another general use herbicide that commonly exists as an ammonium salt. It has a relatively low sorption coefficient, although the presence of acidic conditions and silty or clayey soils (both of which may occur at OU 3) enhances its sorption potential. It is not expected to biodegrade or volatilize readily. Photolysis from surface soils is considered an important process, although leaching is the primary fate mechanism. Once in the aquatic environment, photolysis is considered important in surface water. Volatilization, adsorption to sediments, biodegradation, and hydrolysis are not considered likely.

INORGANICS

ALUMINUM is the third most common element in the environment, though not generally found in elevated concentrations in groundwater. Aluminum complexes readily and high concentrations in soil and groundwater are generally due to silt-sized particles of aluminum-containing compounds often present as clays or aluminum hydroxides. Complexing and polymerization of the most common valence

state of aluminum, Al^{+3}, represents the predominant transport mechanism for aluminum in the environment. This is particularly true in the presence of silica (which is available in the sandy soil at OU 3). At relatively low-pH conditions (current conditions at OU 3), aluminum in soils is highly mobile and readily transported via percolation or overland flow, although the presence of silica dampens the effect of lower pH. In waters with pH between 5 and 6 (conditions at OU 3), aluminum is present predominantly as aluminum hydroxide.

ANTIMONY behaves similarly to arsenic (see below). It exists naturally in its elemental form and in various sulfide compounds. Its fate in the aquatic environment depends on factors such as pH, Eh, and the presence of organics. Due to the relatively high solubility of antimonate and antimonite ions, antimony tends to occur and remain in its dissolved form in the aqueous environment. It occurs as the soluble oxide form (antimonite salts) in most natural waters; however, under reducing conditions antimony hydrate may form. It will coprecipitate in the presence of iron and aluminum oxides, both of which are likely present at OU 3 (Callahan et al., 1979).

ARSENIC has two stable forms when in solution in groundwater, arsenate (As^{5+}) and arsenite (As^{3+}). An arsenic speciation study was conducted on samples from OU 3 to determine the nature of species present at OU 3 (refer to Section 4.4 for additional information). Results indicated that in both soil and groundwater at both study areas, roughly 80 percent of the arsenic at OU 3 was present as the arsenite ($^{3+}$) or arsenic (III) form in both soil and groundwater. Arsenic (III) is the more toxic species, and in general is more soluble than Arsenic (V). Arsenic (III) will remain in soil, but it will also readily leach or infiltrate to groundwater. This behavior is supported by the distribution of arsenic at OU 3 (refer to Chapter 4.0).

In groundwater with pH ranging from 3 to 7 (OU 3 conditions), the monovalent arsenate anion $H_2AsO_4^-$ is the dominant form. Upon entering surface water, via groundwater discharge, arsenic may partition to sediment from solution by hydrous iron oxide adsorption and/or co-precipitation (or a combination of both) with sulfides in the sediment (Callahan et al., 1979). Analysis indicates that relatively little iron oxide is present at OU 3, however. The Eh and pH conditions of the surface water and sediment govern the effectiveness of these mechanisms (adsorption and co-precipitation) as a sink for arsenic. These mechanisms appear to be the major inorganic factors controlling arsenic concentrations in surface water (Hem, 1989). Once arsenic reaches the aquatic environment (such as Lake Baldwin), a cycle of oxidation and reduction causes the arsenic species to partition between surface water and sediment (Callahan et al., 1979).

BARIUM is present primarily as the Ba(II) species in the environment. Although it occurs naturally, barium compounds are also used in pesticide formulations. The chloride, hydroxide, and nitrate forms of barium are water soluble; the sulfate and carbonate forms precipitate readily in aquatic environments. Adsorption to soil is possible, particularly to clay-rich soils. Under normal environmental conditions, barium exists primarily as Ba(II), and, as such, is mobile and readily transported by percolation to groundwater.

BERYLLIUM occurs mainly in its $^{2+}$ oxidation state or in its elemental form. In aqueous solutions, beryllium exists as part of hydrated complexes. It will form very stable compounds with small ions such as fluorides and oxides. Beryllium is only slightly soluble at the normal pH range for natural waters (Hem, 1989),

so it is expected to be present in particulate rather than dissolved form at OU 3. At lower pH beryllium tends to sorb to clay mineral sources; at high pHs it tends to form insoluble hydroxide compounds (Callahan et al., 1979).

CHROMIUM is present in minerals predominantly as Cr^{3+}. Dissolved chromium may be present as trivalent cations or as anions in which the oxidation state is Cr^{6+} (hexavalent). Six different ionic forms of chromium are considered to be stable in aqueous systems. The reduced forms are Cr^{3+}, $CrOH^{2+}$, $Cr(OH)_2^+$, and $Cr(OH)^{4-}$. Anionic forms present under oxidizing conditions include chromate and dichromate. The dissolved forms that predominate in reducing systems between pH 5 and 9 (i.e., groundwater conditions at OU 3) are likely $CrOH^{2+}$ and $Cr(OH)_2^+$.

CADMIUM exists in the environment as $CdCl^+$, $CdCl_2$, $CdCl^{2-}$, CdOH, $CdCO_3$, $CdCO_4$, and in its $^{2+}$ oxidation state. The divalent cationic form is most prevalent in unpolluted fresh water. The chlorinated forms tend to occur in saltwater environments. The concentration in fresh water of the cationic form is inversely related to the pH of the water. Above pH of 9, cadmium is normally not present, either due to precipitation or adsorption. In the pH range of 6 to 8, and Eh range of +0.20 volts to +0.50 volts (typical ranges for groundwater), most cadmium exists as the cadmium ion. Under reducing conditions, cadmium sulfide is formed and ultimately precipitates. Cadmium sulfides, oxides, and hydroxides are only slightly soluble in water. Under acidic conditions, all cadmium will be present as the divalent ion, unless anaerobic conditions exist. Adsorption to organic materials in soil and sediments is a relatively important mechanism for removal from aquatic environments.

COBALT is a relatively rare, naturally-occurring, essential nutrient. It has many industrial uses in alloys and coloring for ceramics. It exists in the environment primarily as Co(II); Co(III) also occurs, but not under normal environmental conditions. It may form oxides, amines, nitrates, chlorides, sulfates, and acetates. The carbonate, sulfate, and hydroxide forms are most common in freshwater environments (Hem, 1980). Co(II) compounds are moderately soluble and, therefore, are expected to migrate with groundwater. Cobalt will sorb moderately to soils, especially in the presence of iron and manganese.

COPPER occurs naturally most often in the oxide or sulfide forms. It may exist as either Cu(I) or Cu(II); under anaerobic conditions, Cu(I) is the dominant species (Hem, 1980). In acidic waters (pH less than 7), it occurs most commonly as Cu(II). In soil, copper tends to be adsorbed, particularly in the presence of iron and manganese hydroxides, organic matter, or clay minerals (Hem, 1980).

IRON is the second most abundant element in the environment though dissolved concentrations present in groundwater are generally low. It occurs naturally in soils as iron oxides or sulfides minerals, both as discrete grains and as coatings on other minerals (Hem, 1989). The chemical behavior of iron and its solubility depend upon the oxidation intensity and pH of the environmental system in which it is found. Iron in groundwater exists in two valence states, Fe^{2+} and Fe^{3+}, with the Fe^{2+} or ferrous form the most common under Eh and pH conditions similar to those at OU 3. Dissolved iron generally sorbs to sediment and may precipitate as iron hydroxide or may oxidize to form iron oxides and iron oxyhydroxides (Callahan et al., 1979). Analysis of samples from OU 3 indicates that iron oxides are not present in concentrations high enough to significantly affect the behavior of compounds such as arsenic. Iron also may complex with organic molecules, especially fulvic and humic acids, that are commonly present

in soils. Aerated or flowing water with a pH in the range of 6.5 to 8.5 should contain little dissolved iron.

LEAD is a component of herbicides and insecticides, and is also a natural component of a wide variety of minerals (Hem, 1989). It is present in soils primarily as Pb^{2+}, which may precipitate as lead sulfates, hydroxides, and carbonates. These resulting lead complexes are relatively insoluble and as a result, the migration of lead tends to be linked to physical transport of particles (Callahan et al., 1979). The presence of organic acids may remobilize lead, particularly under acid pH conditions. Neither volatilization or hydrolysis are expected to be significant processes for lead. Adsorption, particularly under reducing conditions, appears to be the dominant mechanism controlling the fate of lead in the environment.

MANGANESE is an essential nutrient and occurs naturally in the earth's crust and in fresh water and saltwater. It occurs in the Mn^{2+}, Mn^{3+}, Mn^{4+}, Mn^{5+}, Mn^{6+}, and Mn^{7+} valence states, with the $^{2+}$ state the most stable and prevalent. In aquatic systems, manganese chloride and sulfate are important species. Manganese carbonates, oxides, and hydroxides are common mineral forms.

Under acidic conditions, Mn^{2+} is highly soluble. Under high-pH conditions, manganese precipitates in the hydroxide form. Sorption to organic material also occurs under higher pH conditions. In general, however, manganese is less likely to adsorb to soil or sediment than other inorganics. As a result, it is generally available for transport. The presence of silicates, hydroxides, and carbonates (common in clayey and sandy soils in Florida) provide a substrate for manganese adsorption, which reduces its solubility (Callahan et al., 1979).

MERCURY may exist in the ^{0} (elemental), $^{1+}$, and $^{2+}$ oxidation states. The $^{2+}$ species is the most common in the natural environment. Mercury chloride and sulfide compounds are common precipitates. Volatilization may be a significant transport process for mercury due to its high vapor pressure. Methylation in soil or groundwater is a common transformation, which makes the mercury more soluble and mobile. However, under anaerobic conditions, mercury sulfide is the dominant species, and it is relatively insoluble and, therefore, unavailable for methylation. In soils, mercury tends to sorb strongly.

SELENIUM is a non-metallic element and an essential animal nutrient in trace amounts. It can exist in the ^{0} (elemental), $^{2+}$, $^{4+}$, and $^{6+}$ oxidations states. Low pH and reducing conditions tend to favor the elemental state (Callahan et al., 1979). In its elemental state, selenium is insoluble in water. Selenate and selenite are soluble and compose most of the dissolved form under environmental conditions. The presence of hydrous iron and manganese oxides increases the adsorption of selenium and is probably the dominant mechanism controlling its fate.

SILVER is relatively rare in the environment, and aquatic concentrations are generally low. Argentite (silver sulfide) is the most common natural mineral form, although silver halides and chlorides occur, and silver complexes with oxides, carbonates, and phosphates are relatively common. Silver is relatively insoluble in most of these forms.

Silver is readily adsorbed in the presence of oxides of manganese or iron (which are extremely common in the natural environment). It also readily adsorbs to organic materials, tending to concentrate in the finer fractions of soil or

sediment (where organic materials are concentrated). Precipitation of silver sulfide may occur under reducing conditions (current conditions at OU 3). Sorption and precipitation are dominant processes affecting the fate of silver in the environment (Callahan et al., 1979). As a result, silver concentrations are usually greater in sediment or soil than in water media. Elemental silver is quite stable over a wide range of environmental conditions (i.e., Eh and pH).

VANADIUM commonly exists in the $^{3+}$, $^{4+}$, and $^{5+}$ valence states. Its aqueous chemistry is quite complex, but overall concentrations seem to be controlled more by availability of a vanadium source rather than by equilibrium considerations. Bioconcentration of vanadium by vegetation has been reported by several researchers.

ZINC is a naturally occurring component of soils. It is also an ingredient in many insecticide and fungicide applications. Under neutral to acidic pH conditions (current conditions at OU 3), zinc is present primarily as zinc (II) ion in solution. At pH greater than 7, zinc (II) tends to sorb completely. Zinc has the ability to form moderately soluble complexes with chlorides, phosphates, nitrates, sulfates, carbonates, and silicates. Zinc sulfate, which is relatively insoluble, is commonly formed under reducing conditions, such as exist at OU 3. In the presence of dissolved organic compounds, zinc (II) tends to bind with the organic constituents, which increases dissolved zinc concentrations in water.

In soils, zinc tends to form complexes, particularly with hydroxide ions. It tends to be enriched in surface soils, relative to subsurface soils (Callahan et al., 1979).

Sorption of zinc by hydrous metal oxides, clay minerals, and organic material is the dominant fate process in aquatic environments. Concentrations of zinc in suspended and bed sediments always exceed dissolved concentrations in water.

APPENDIX E

SUPPORTING HUMAN HEALTH RISK ASSESSMENT INFORMATION AND SPREADSHEETS

APPENDIX E-1

RISK-BASED SCREENING CONCENTRATIONS

EPA REGION III RISK-BASED CONCENTRATION TABLE
TECHNICAL BACKGROUND INFORMATION

(Originally developed by Roy L. Smith, Ph.D.)

Development of Risk-Based Concentrations

General

Separate carcinogenic and non-carcinogenic risk-based concentrations were calculated for each compound for each pathway. The concentration in the table is the lower of the two, rounded to two significant figures. The following terms and values were used in the calculations:

Exposure variables	Value	Symbol
General:		
Carcinogenic potency slope oral (risk per mg/kg/d):	*	CPSo
Carcinogenic potency slope inhaled (risk per mg/kg/d):	*	CPSi
Reference dose oral (mg/kg/d):	*	RfDo
Reference dose inhaled (mg/kg/d):	*	RfDi
Target cancer risk:	1e-06	TR
Target hazard quotient:	1	THQ
Body weight, adult (kg):	70	BWa
Body weight, age 1-6 (kg):	15	BWc
Averaging time carcinogens (d):	25550	ATc
Averaging time non-carcinogens (d):	ED*365	ATn
Inhalation, adult (m3/d):	20	IRAa
Inhalation, child (m3/d):	12	IRAc
Inhalation factor, age-adjusted (m3-y/kg-d):	11.66	IFAadj
Tap water ingestion, adult (L/d):	2	IRWa
Tap water ingestion, age 1-6 (L/d):	1	IRWc
Tap water ingestion factor, age-adjusted (L-y/kg-d):	1.09	IFWadj
Fish ingestion (g/d):	54	IRF
Soil ingestion, adult (mg/d):	100	IRSa
Soil ingestion, age 1-6 (mg/d):	200	IRSc
Soil ingestion factor, age adjusted (mg-y/kg-d):	114.29	IFSadj
Residential:		
Exposure frequency (d/y):	350	EFr
Exposure duration, total (y):	30	EDtot
Exposure duration, age 1-6 (y):	6	EDc
Volatilization factor (L/m3):	0.5	K
Occupational:		
Exposure frequency (d/y):	250	EFo
Exposure duration (y):	25	EDo
Fraction of contaminated soil ingested (unitless)	0.5	FC

*: Contaminant-specific toxicological constants. The priority among sources of toxicological constants was as follows: (1) IRIS, (2) HEAST, (3) HEAST alternative method, (4) EPA-NCEA Superfund Health Risk Technical Support Center, (5) withdrawn from IRIS or HEAST, and (6) other EPA documents. Each source was used only if numbers from higher-priority sources were unavailable. The EPA Superfund Health Risk Technical Support Center, part of the EPA National Center for Environmental Assessment in Cincinnati, develops provisional RfDs and CPSs on request for contaminants not in IRIS or HEAST. These provisional values are labeled "E = EPA-NCEA provisional" in the table. It is possible they may be obsolete. If one of the "E" constants is important to a Superfund risk assessment, consider requesting, through a Regional risk assessor, a new provisional value.

Age-adjusted factors

Because contact rates with tap water, ambient air, and residential soil are different for children and adults, carcinogenic risks during the first 30 years of life were calculated using age-adjusted factors. These factors approximated the integrated exposure from birth until age 30 by combining contact rates, body weights, and exposure durations for two age groups - small children and adults. The age-adjusted factor for soil was obtained from RAGS IB; the others were developed by analogy.

(1) Air inhalation

$$IFAadj \ \frac{m^3 \cdot y}{kg \cdot d} = \frac{EDc \cdot IRAc}{BWc} + \frac{(EDtot - EDc) \cdot IRAa}{BWa}$$

(2) Tap water ingestion

$$IFWadj \ \frac{L \cdot y}{kg \cdot d} = \frac{EDc \cdot IRWc}{BWc} + \frac{(EDtot - EDc) \cdot IRWa}{BWa}$$

(3) Soil ingestion

$$IFSadj \ \frac{mg \cdot y}{kg \cdot d} = \frac{EDc \cdot IRSc}{BWc} + \frac{(EDtot - EDc) \cdot IRSa}{BWa}$$

Residential water

Volatilization terms were calculated only for compounds with a mark in the "VOC" column. Compounds having a Henry's Law constant greater than 10^{-5} were considered volatile. The list may be incomplete, but is unlikely to include false positives. The equations and the volatilization factor (K, above) were obtained from RAGS IB. Oral potency slopes and reference doses were used for both oral and inhaled exposures for volatile compounds lacking inhalation values. RBCs for carcinogens were based on combined childhood and adult exposure; for non-carcinogens RBCs were based on adult exposure.

(4) Carcinogens

$$RBC \ \frac{\mu g}{L} = \frac{TR \cdot ATc \cdot 1000 \frac{\mu g}{mg}}{EFr \cdot ([K \cdot IFAadj \cdot CPSi] + [IFWadj \cdot CPSo])}$$

(5) Non-carcinogens

$$RBC\ \frac{\mu g}{L} = \frac{THQ \cdot BWa \cdot ATn \cdot 1000\frac{\mu g}{mg}}{EFr \cdot EDtot \cdot \left(\frac{K \cdot IRAa}{RfDi} + \frac{IRWa}{RfDo}\right)}$$

Ambient air

Oral potency slopes and references were used where inhalation values were not available. RBCs for carcinogens were based on combined childhood and adult exposure; for non-carcinogens RBCs were based on adult exposure.

(6) Carcinogens

$$RBC\ \frac{\mu g}{m^3} = \frac{TR \cdot ATc \cdot 1000\frac{\mu g}{mg}}{EFr \cdot IFAadj \cdot CPSi}$$

(7) Non-carcinogens

$$RBC\ \frac{\mu g}{m^3} = \frac{THQ \cdot RfDi \cdot BWa \cdot ATn \cdot 1000\frac{\mu g}{mg}}{EFr \cdot EDtot \cdot IRAa}$$

Edible fish

All RBCs were based on adult exposure.

(8) Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot BWa \cdot ATc}{EFr \cdot EDtot \cdot \frac{IRF}{1000\frac{g}{kg}} \cdot CPSo}$$

(9) Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ \cdot RfDo \cdot BWa \cdot ATn}{EFr \cdot EDtot \cdot \frac{IRF}{1000\frac{g}{kg}}}$$

Commercial/industrial soil ingestion

RBCs were based on adult occupational exposure, including an assumption that only 50% of total soil ingestion is work-related.

(10) Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot BWa \cdot ATc}{EFo \cdot EDo \cdot \frac{IRSa}{10^6\ \frac{mg}{kg}} \cdot FC \cdot CPSo}$$

(11) Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ \cdot RfDo \cdot BWa \cdot ATn}{EFo \cdot EDo \cdot \frac{IRSa}{10^6\ \frac{mg}{kg}} \cdot FC}$$

Residential soil ingestion

RBCs for carcinogens were based on combined childhood and adult exposure; RBCs for non-carcinogens were based on childhood exposure only.

(12) Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot ATc}{EFr \cdot \frac{IFSadj}{10^6\ \frac{mg}{kg}} \cdot CPSo}$$

(13) Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ \cdot RfDo \cdot BWc \cdot ATn}{EFr \cdot EDc \cdot \frac{IRSc}{10^6\ \frac{mg}{kg}}}$$

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Risk-Based Concentration Table **DATE:** 10/1/98

FROM: Jennifer Hubbard, Toxicologist
Superfund Technical Support Section (3HS41)

TO: RBC Table Users

Attached is the EPA Region III Risk-Based Concentration (RBC) Table, which we prepare and post periodically for all interested parties.

IMPORTANT NOTES: To make the RBC Table more accessible and to minimize paper usage, it is now primarily available through the Internet. The address is **http://www.epa.gov/reg3hwmd/risk/riskmenu.htm**. The Table is available in both Lotus and Excel as "self-extracting" files. These files should be downloaded and then processed with your computer's "run" function. The files can then be viewed in Lotus or Excel. If you have technical questions about the toxicological or risk assessment aspects of the RBCs, please contact Jennifer Hubbard at 215-814-3328 or hubbard.jennifer@epamail.epa.gov. Other questions can be addressed to Vanessa Sizer or Terri Fields at 215-814-3041. You can also consult the Frequently Asked Questions, below.

CONTENTS, USES, AND LIMITATIONS OF THE RBC TABLE

The RBC Table contains Reference Doses (RfDs) and Cancer Slope Factors (CSFs) for 400-500 chemicals. These toxicity factors have been combined with "standard" exposure scenarios to calculate RBCs--chemical concentrations corresponding to fixed levels of risk (i.e., a Hazard Quotient (HQ) of 1, or lifetime cancer risk of 1E-6, whichever occurs at a lower concentration) in water, air, fish tissue, and soil.

The Region III toxicologists use RBCs to screen sites not yet on the NPL, respond rapidly to citizen inquiries, and spot-check formal baseline risk assessments. The primary use of RBCs is for chemical screening during baseline risk assessment (see EPA Regional Guidance EPA/903/R-93-001, "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening"). The exposure equations come from EPA's Risk Assessment Guidance for Superfund (RAGS), while the exposure factors are those recommended in RAGS or supplemental guidance from the Superfund program. The attached technical background document provides specific equations

and assumptions. Simply put, RBCs are like risk assessments run in reverse. For a single contaminant in a single medium, under standard default exposure assumptions, the RBC corresponds to the target risk or hazard quotient.

RBCs also have several important limitations. Specifically excluded from consideration are (1) transfers from soil to air and groundwater, 2) cumulative risk from multiple contaminants or media, and (3) dermal risk. Additionally, the risks for inhalation of vapors from water are based on a very simple model, whereas detailed risk assessments may use more detailed showering models. Also, the toxicity information in the Table has been assembled by hand and (despite extensive checking and years of use) may contain errors. It's advisable to cross-check before relying on any RfDs or CSFs in the Table. If you note any errors, please let us know.

It is important to note that this Table uses inhalation RfDs and CSFs rather than RfCs and inhalation unit cancer risks. This is because the latter factors incorporate exposure assumptions and therefore can only be used for one exposure scenario. Because risk assessors need to evaluate risks for many types of scenarios, the factors have been converted to the more traditional RfDs and CSFs. Unless otherwise indicated in the toxicity-factor source, the assumption is that RfCs and unit risks should be adjusted by a 70-kilogram body weight and a 20 m^3/day inhalation rate to generate the RfDs and CSFs.

Many users want to know if the RBCs can be used as valid no-action levels or cleanup levels, especially for soils. The answer is a bit complex. First, it is important to realize that the RBC Table does not constitute regulation or guidance, and should not be viewed as a substitute for a site-specific risk assessment. For sites where:

1. A single medium is contaminated;

2. A single contaminant contributes nearly all the health risk;

3. Volatilization, leaching, dermal contact, and other pathways not included in the RBCs are not expected to be significant;

4. The exposure scenarios and assumptions used in the RBC table are appropriate for the site;

5. The fixed risk levels used in the RBC table are appropriate for the site; and

6. Risk to ecological receptors is not expected to be significant;

the RBCs would probably be protective as no-action levels or cleanup goals. However, to the extent that a site deviates from this description, as most do, the RBCs would not necessarily be appropriate.

To summarize, the Table should generally not be used to set cleanup or no-action levels at

CERCLA sites or RCRA Corrective Action sites, to substitute for EPA guidance for preparing baseline risk assessments, or to determine if a waste is hazardous under RCRA.

SPECIAL NOTES

The RBC Table was originally developed by Roy L. Smith, Ph.D., for use by risk assessors in the Region III Superfund program. Dr. Smith is no longer with Region III, and the Table continues to evolve. You may notice some modifications of formatting and conventions used in the Table.

For instance, besides formatting, the following changes are noteworthy:

- As usual, updated toxicity factors have been used wherever available. However, because IRIS and provisional values are updated more frequently than the RBC Table, RBC Table users are ultimately responsible for obtaining the most up-to-date values. The RBC Table is provided as a convenience, but toxicity factors are compiled from the original sources and it is those original sources that should serve as the definitive reference.

- Certain outdated and withdrawn numbers have been removed from the Table.

- BACK BY POPULAR DEMAND: Changes to the table have been marked with asterisks (**). This was the most commonly requested feature over the last six months. Changes may involve a corrected CAS number or a correction in the VOC status, or they may reflect changes of RfDs and CSFs on IRIS.

- RBCs are no longer rounded to 1E6 ppm. For certain low-toxicity chemicals, the RBCs exceed possible concentrations at the target risks. In such cases, Dr. Smith rounded these numbers to the highest possible concentration, or 1E6 ppm. The rounding has been discontinued so that Table users can adjust the RBCs to a different target risk whenever necessary. For example, when screening chemicals at a target HQ of 0.1, noncarcinogenic RBCs may simply be divided by 10. Such scaling is not possible when RBCs are rounded.

- This Table was originally compiled to assist Superfund risk assessors in screening hazardous waste sites. The large number of chemicals made the Table unwieldy and difficult to keep current. Many of the chemicals did not typically (or even occasionally) appear at Superfund sites. Starting with the April 1998 version of the Table, the 600+ chemicals were reduced to some 400-500 chemicals by eliminating many of those atypical chemicals. Through time, the Table may continue to grow or decrease in size. Comments on this issue are appreciated. During the last six months, only one request was received for restoration of a chemical: NuStar has been restored to the Table. (A list of the deleted chemicals is attached.)

- At Region III Superfund sites, noncancer RBCs are typically adjusted downward to correspond to a target HQ of 0.1 rather than 1. (This is done to ensure that chemicals with

additive effects are not prematurely eliminated during screening.) However, some chemicals have RBCs at HQs of 0.1 that are lower than their RBCs at 1E-6 cancer risk. In other words, the screening RBC would change from carcinogenic to noncarcinogenic. A new feature of this Table is that these chemicals are now flagged with a "!" symbol. Therefore, assessors screening with adjusted RBCs will be alerted to this situation.

- Earlier versions of this Table included a substitution of inhalation toxicity factors for oral factors whenever oral factors were unavailable (this applied only to groundwater and air, but not soil or fish). This practice has been discontinued in order to minimize the uncertainty associated with such a conversion. The discontinuation of this practice does not significantly decrease the number of available RBCs.

- CAS numbers and volatility status have begun to be re-checked in accordance with comments from users. At this time, 85% of the chemicals have been checked for volatility, and about 99% of the CAS numbers have been verified.

- Earlier versions of this Table included soil screening levels (SSLs), when those values were available in draft form. Since the finalization of the SSL Guidance, risk assessors are urged to consult the final SSL Guidance directly. The Guidance has detailed recommendations on site-specific sampling and site-specific SSL generation. (Soil Screening Guidance: User's Guide, April 1996, Publication 9355.4-23; and Soil Screening Guidance: Technical Background Document, May 1996; EPA/540/R-95/128)

- One user of the Table pointed out that the CAS numbers do not contain the dashes that are part of their format. CAS numbers have always appeared on the Table without dashes, but may be converted to their dashed form by placing a dash before the last number (farthest to the right), then moving two places to the left and placing another dash. For example, "107131" becomes "107-13-1"; "7440360" becomes "7440-36-0"; "25057890" becomes "25057-89-0." Region III could add the dashes directly to the Table, but we do not wish to make this change without feedback from users on whether this would adversely affect them. Therefore, we are soliciting comments on this issue (see box on first page for address).

FREQUENTLY ASKED QUESTIONS

To help you better understand the RBC Table, here are answers to our most often-asked questions:

1. How can the age-adjusted inhalation factor (11.66) be less than the inhalation rate for either a child (12) or an adult (20)?

   Age-adjusted factors are not intake rates, but rather partial calculations which have different units from intake rates. (Therefore, they are not directly comparable.) The fact that these partial calculations have values similar to intake rates is really coincidental, an

artifact of the similar magnitude of years of exposure and time-averaged body weight.

2. For manganese, IRIS shows an oral RfD of 0.14 mg/kg/day, but the RBC Table uses 2E-2 mg/kg/day. Why?

The IRIS RfD includes manganese from all sources, including diet. The explanatory text in IRIS recommends using a modifying factor of 3 when calculating risks associated with non-food sources, and the Table follows this recommendation. IRIS also recommends subtracting dietary exposure (default assumption in this case 5 mg). Thus, the IRIS RfD has been lowered by a factor of 2 x 3, or 6. The Table now reflects manganese RBCs for both "food" and "non-food" (most environmental) sources.

3. What is the source of the child's inhalation rate of 12 m^3/day?

The calculation comes from basic physiology. It's a scaling of the mass-specific 20 m^3/day rate for adults from a body mass of 70 kg to 15 kg, using the 2/3 power of mass, as follows:

Ircm = mass-specific child inhalation rate (m^3/kg/day)
Irc = child inhalation rate (m^3/day)

20 m^3/day / 70 kg = 0.286 m^3/kg/day (mass-specific adult inhalation rate)

0.286 m^3/kg/day x ($70^{0.67}$) = (Ircm) x ($15^{0.67}$)

Ircm = 0.803 m^3/kg/day

Irc = Ircm x 15 kg = 0.803 m^3/kg/day x 15 kg = 12.04 m^3/day

4. Can the oral RfDs in the RBC Table be applied to dermal exposure?

Not directly. Oral RfDs are usually based on administered dose and therefore tacitly include a GI absorption factor. Thus, any use of oral RfDs in dermal risk calculations should involve removing this absorption factor. Consult the Risk Assessment Guidance for Superfund, Part A, Appendix A, for further details on how to do this.

5. The exposure variables table in the RBC background document lists the averaging time for non-carcinogens as "ED*365." What does that mean?

ED is exposure duration, in years, and * is the computer-ese symbol for multiplication. Multiplying ED by 365 simply converts the duration to days. In fact, the ED term is included in both the numerator and denominator of the RBC algorithms for non-cancer risk, canceling it altogether. See RAGS for more information.

6. Why is inorganic lead not included in the RBC Table?

EPA has no consensus RfD or CSF for inorganic lead, so it is not possible to calculate RBCs as we have done for other chemicals. EPA considers lead to be a special case because of the difficulty in identifying the classic "threshold" needed to develop an RfD.

EPA therefore evaluates lead exposure by using blood-lead modeling, such as the Integrated Exposure-Uptake Biokinetic Model (IEUBK). The EPA Office of Solid Waste has also released a detailed directive on risk assessment and cleanup of residential soil lead. The directive recommends that soil lead levels less than 400 mg/kg are generally safe for residential use. Above that level, the document suggests collecting data and modeling blood-lead levels with the IEUBK model. For the purposes of screening, therefore, 400 mg/kg is recommended for residential soils. For water, we suggest 15 ug/l (the EPA Action Level in water), and for air, the National Ambient Air Quality Standard.

7. Where did the CSFs for carcinogenic PAHs come from?

The PAH CSFs are all calculated relative to benzo[a]pyrene, which has an IRIS slope factor. The relative factors for the other PAHs can be found in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," Final Draft, ECAO-CIN-842 (March, 1993).

8. May I please have a copy of a previous RBC Table?

We do not distribute outdated copies of the RBC Table. Each new version of the Table supersedes all previous versions.

9. Please elaborate on the meaning of the "W" source code in the Table.

The "W" code means that a RfD or CSF is currently not present on either IRIS or HEAST, but that it was once present on either IRIS or HEAST and was removed. Such withdrawal usually indicates that consensus on the number no longer exists among EPA scientists, but not that EPA believes the contaminant to be unimportant.

Withdrawn numbers are shown in the Table because we still need to deal with these contaminants during the long delays before replacement numbers are ready. For the purpose of screening, a "W" value is similar to a provisional value in that neither value has achieved Agency consensus. The "W" code should serve as a clear warning that before making any serious decision involving that contaminant, you will need to develop an interim value based on current scientific understanding.

If you are assessing risks at a site where a major contaminant is coded "W," consider working with your Region EPA risk assessor to develop a current toxicity constant. If the site is being studied under CERCLA, the EPA-NCEA Regional Technical Support group

may be able to assist.

10. Can I get copies of supporting documents for interim toxicity constants which are coded "E" in the RBC Table?

Unfortunately, Region 3 does not have a complete set of supporting documents. The EPA-NCEA Superfund Technical Support Center prepares these interim toxicity constants in response to site-specific requests from Regional risk assessors, and sends the documentation only to the requestor. The RBC Tables contain only the latest interim values that we've either requested or have otherwise received. NCEA maintains the master data base of these chemicals, but will not release documentation of provisional values unless they are recent. Furthermore, since NCEA's Superfund Technical Support Center is mainly for the support of Superfund, it usually cannot develop new criteria unless authorized to do so for a specific Superfund project.

If an "E"-coded contaminant is a chemical of potential concern at your site, we urge you to work with the EPA Regional risk assessor assigned to the project in order to develop or obtain documentation for provisional values. EPA Region 3 furnishes documents only when needed to support Regional risk assessments or recommendations.

Attached is a list of "E"-coded chemicals whose supporting documentation was issued prior to 1996, indicating that toxicity information may need to be updated.

11. Why is there no oral RfD for mercury? How should I handle mercury?

IRIS gives oral RfDs for mercuric chloride and for methylmercury, but not for elemental mercury. Therefore, the RBC Table reflects this primary source. Consult your toxicologist to determine which of the available mercury numbers is suitable for the conditions at your site (e.g., whether mercury is likely to be organic or inorganic.)

Attachments

"DISCONTINUED" CHEMICALS

These chemicals may still have toxicity criteria available in IRIS, HEAST, or NCEA provisional values. However, they are not routine chemicals and therefore will not be routinely maintained in the RBC Table, unless our Table users report a significant need for chemicals to be re-added. Some of the chemicals on this Table were deleted because supporting toxicity information has been withdrawn or is unavailable.

acephate
acetone cyanohyrin
acifluorfen
acrylic acid
ally
allyl alcohol
aluminum phosphide
amdro
ametryn
m-aminophenol
amitraz
ammonium sulfamate
antimony potassium tartrate
apollo
aramite
asulam
avermectin B1
barium cyanide
bayleton
benefin
benomyl
benzotrichloride
bidrin
biphenthin
bis(2-chloro-1-methylethyl)ether
bisphenol A
boron trifluoride
4-bromophenyl phenyl ether
bromoxynil
bromoxynil octanoate
butylphthalyl butylglycolate
cacodylic acid
captafol
captan
carboxin
chloramben
chlorimuron-ethyl
chloroacetaldehyde
2-chloroacetophenone
4-chlorobenzotrifluoride
2-chloroethyl vinyl ether
4-chloro-2-methylaniline hydrochloride
chlorothalonil
chlorpropham
chlorsulfuron
chlorthiophos
coal tar creosote
cyclohexlamine
cyromazine
danitol
decabromodiphenyl ether
demeton
diallate
diethylforamide
diflubenzuron
dimethipin
dimethoate
N,N-dimethylformamide
dimethyl terephthalate
diphenamid
direct black 38
direct blue 6
direct brown 95
dodine
1,2-epoxybutane
ethephon
2-ethoxyethanol acetate
ethyl acrylate
EPTC

ethylene cyanohydrin
ethyl p-nitrophenyl phenylphosphorothioate
ethylphthalyl ethyl glycolate
express
fluoridone
flurprimidol
flutolanil
fluvalinate
folpet
fosteyl-al
furium
furmecyclox
glufosinate-ammonium
haloxyfop-methyl
harmony
imazalil
imazaquin
iprodione
isoxaben
kepone
lactofen
linuron
londax
maleic hydrazide
malononitrile
mancozeb
maneb
merphos
merphos oxide
metalaxyl
methamidophos
methomyl
2-methoxyethanol acetate
2-methoxyethanol
2-methoxy-5-nitroaniline
2-methylaniline hydrochloride
methyl chlorocarbonate
4,4-methylene bisbenzeneamine
metribuzin
molinate
2-naphthylamine
napropamide
nickel subsulfide
nitrapyrin
3-nitroaniline
4-nitroaniline
nitroguanidine
norflurazon
octabromodiphenyl ether
octamethylpyrophosphoramide
paclobutrazol
pebulate
pendimethalin
pentabromo-6-chlorocyclohexane
pentabromodiphenyl ether
phenmedipham
phenylmercuric acetate
phorate
phosmet
picloram
pirimiphos-methyl
prochloraz
profluralin
pronamide
propargyl alcohol
propazine
propham
propiconazole
propylene oxide
pydrin
quinalphos
savey
selenourea
sethoxydim
sodium fluoroacetate
sodium metavanadate
systhane
tebuthiuron
temephos
terbacil
terbufos
terbutryn

tetrachlorovinphos
tetraethyldithiopyrophosphate
thallium selenide
2-(thiocyanomethylthio)-benzothiazole
thiofanox
thiophanate-methyl
thiram
tralomethrin
triallate
triasulfuron
2,4,6-trichloroaniline hydrochloride
tridiphane
triethylamine
trifluralin
vernam

NCEA ("E") CHEMICALS WITH SUPPORTING INFORMATION PRE-1996

aminodinitrotoluenes
bis(2-ethylhexyl)phthalate, inhalation CSF
dibenzofuran
1,4-dichlorobenzene, inhalation CSF
1,2-dichloroethane, oral RfD; RfC
4,6-dinitro-2-methylphenol
2-hexanone
4-nitrophenol
polychlorinated terphenyls
benzo[a]pyrene, inhalation CSF
titanium
titanium dioxide
trichloroethene

NCEA information on lithium, CSFs for PAHs relative to benzo[a]pyrene, and tetrachloroethene CSFs were originally produced prior to 1996, but NCEA has confirmed within the last two years that the information is still current.

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects ! = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
ACETALDEHYDE	75070			2.57E-03 I	7.7E-03 I			8.1E-01 C			
ACETOCHLOR	34256821	2E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
ACETONE	67641	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ACETONITRILE	75058	6.00E-03 I		1.40E-02 A			2.2E+02 N	5.1E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
ACETOPHENONE	98862	1.00E-01 I		5.70E-06 W		y	4.2E-02 N	2.1E-02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ACROLEIN	107028	2.00E-02 H		5.70E-06 I		y	4.2E-02 N	2.1E-02 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
ACRYLAMIDE	79061	2.00E-04 I	4.50E+00 I		4.50E+00 I		1.5E-02 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
ACRYLONITRILE	107131	1.00E-03 H	5.40E-01 I	5.70E-04 I	2.40E-01 I		1.2E-01 C	2.6E-02 C	5.8E-03 C	1.1E+01 C	1.2E+00 C
ALACHLOR	15972608	1.00E-02 I	8.00E-02 H				8.4E-01 C	7.8E-02 C	3.9E-02 C	7.2E+01 C	8.0E+00 C
ALAR	1596845	1.50E-01 I					5.5E+03 N	5.5E+02 N	2.0E+02 N	3.1E+05 N	1.2E+04 N
ALDICARB	116063	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
ALDICARB SULFONE	1646884	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
ALDRIN	309002	3.00E-05 I	1.70E+01 I		1.70E+01 I		3.9E-03 C	3.7E-04 C	1.9E-04 C	3.4E-01 C	3.8E-02 C
ALUMINUM	7429905	1.00E+00 E		1.00E-03 E			3.7E+04 N	3.7E+00 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
AMINODINITROTOLUENES		6.00E-05 E					2.2E+00 N	2.2E-01 N	8.1E-02 N	1.2E+02 N	4.7E+00 N
4-AMINOPYRIDINE	504245	2.00E-05 H					7.3E-01 N	7.3E-02 N	2.7E-02 N	4.1E+01 N	1.6E+00 N
AMMONIA	7664417			2.86E-02 I		y	2.1E+02 N	1.0E+02 N			
ANILINE	62533		5.70E-03 I	2.90E-04 I		y	1.9E+00 C !	1.1E+00 N	5.5E-01 C	1.0E+03 C	1.1E+02 C
ANTIMONY	7440360	4.00E-04 I					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ANTIMONY PENTOXIDE	1314609	5.00E-04 H					1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
ANTIMONY TETROXIDE	1332816	4.00E-04 H					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ANTIMONY TRIOXIDE	1309644	4.00E-04 H		5.70E-05 I			1.5E+01 N	2.1E-01 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ARSENIC	7440382	3.00E-04 I	1.50E+00 I		1.51E+01 I		4.5E-02 C	4.1E-04 C	2.1E-03 C	3.8E+00 C	4.3E-01 C
ARSINE	7784421			1.40E-05 I		y	1.0E-01 N	5.1E-02 N			
ASSURE	76578148	9.00E-03 I					3.3E+02 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
ATRAZINE	1912249	3.50E-02 I	2.20E-01 H				3.0E-01 C	2.8E-02 C	1.4E-02 C	2.6E+01 C	2.9E+00 C
AZOBENZENE	103333		1.10E-01 I		1.10E-01 I		6.1E-01 C	5.7E-02 C	2.9E-02 C	5.2E+01 C	5.8E+00 C
BARIUM	7440393	7.00E-02 I		1.40E-04 A			2.6E+03 N	5.1E-01 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
BAYGON	114261	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
BAYTHROID	68359375	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
BENTAZON	25057890	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
BENZALDEHYDE	100527	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
BENZENE	71432	3.00E-03 E	2.90E-02 I	1.70E-03 E	2.90E-02 I	y	3.6E-01 C	2.2E-01 C	1.1E-01 C	2.0E+02 C	2.2E+01 C
BENZENETHIOL	108985	1.00E-05 H				y	6.1E-02 N	3.7E-02 N	1.4E-02 N	2.0E+01 N	7.8E-01 N
BENZIDINE	92875	3.00E-03 I	2.30E+02 I		2.30E+02 I		2.9E-04 C	2.7E-05 C	1.4E-05 C	2.5E-02 C	2.8E-03 C
BENZOIC ACID	65850	4.00E+00 I					1.5E+05 N	1.5E+04 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
BENZYL ALCOHOL	100516	3.00E-01 H					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
BENZYL CHLORIDE	100447		0.17 I			y	6.2E-02 C	3.7E-02 C	1.9E-02 C	3.4E+01 C	3.8E+00 C
BERYLLIUM	7440417	2.00E-03 I		5.7E-06 I	8.40E+00 I		7.3E+01 N	7.5E-04 C	2.7E+00 N	4.1E+03 N	1.6E+02 N
BIPHENYL	92524	5.00E-02 I				y	3.0E+02 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
BIS(2-CHLOROETHYL)ETHER	111444		1.10E+00 I		1.10E+00 I		6.1E-02 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C
BIS(2-CHLOROISOPROPYL)ETHER	108601	4.00E-02 I	7.00E-02 H		3.50E-02 H	y	2.6E-01 C	1.8E-01 C	4.5E-02 C	8.2E+01 C	9.1E+00 C
**BIS(CHLOROMETHYL)ETHER	542881		2.20E+02 I		2.20E+02 I	y	4.8E-05 C	2.8E-05 C	1.4E-05 C	2.6E-02 C	2.9E-03 C
**BIS(2-ETHYLHEXYL)PHTHALATE	117817	2.00E-02 I	1.40E-02 I		1.40E-02 E		4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C
**BORON	7440428	9.00E-02 I		5.70E-03 H			3.3E+03 N	2.1E+01 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
BROMODICHLOROMETHANE	75274	2.00E-02 I	6.20E-02 I			y	1.7E-01 C	1.0E-01 C	5.1E-02 C	9.2E+01 C	1.0E+01 C
**BROMOETHENE	593602			8.6E-04 I	1.10E-01 H	y	1.1E-01 C	5.7E-02 C			
BROMOFORM	75252	2.00E-02 I	7.90E-03 I		3.90E-03 I	y	2.3E+00 C	1.6E+00 C	4.0E-01 C	7.2E+02 C	8.1E+01 C
BROMOMETHANE	74839	1.40E-03 I		1.40E-03 I		y	8.5E+00 N	5.1E+00 N	1.9E+00 N	2.9E+03 N	1.1E+02 N
BROMOPHOS	2104963	5.00E-03 H				y	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
1,3-BUTADIENE	106990				1.80E+00 H	y	7.0E-03 C	3.5E-03 C			
1-BUTANOL	71363	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
BUTYLBENZYLPHTHALATE	85687	2.00E-01 I					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects ! = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
BUTYLATE	2008415	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
N-BUTYLBENZENE	104518	1.00E-02 E				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
SEC-BUTYLBENZENE	135988	1.00E-02 E				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
TERT-BUTYLBENZENE	98066	1.00E-02 E				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
CADMIUM-WATER	7440439	5.00E-04 I			6.30E+00 I		1.8E+01 N	9.9E-04 C	6.8E-01 N	1.0E+03 N	3.9E+01 N
CADMIUM-FOOD	7440439	1.00E-03 I			6.30E+00 I		3.7E+01 N	9.9E-04 C	1.4E+00 N	2.0E+03 N	7.8E+01 N
CAPROLACTAM	105602	5.00E-01 I					1.8E+04 N	1.8E+03 N	6.8E+02 N	1.0E+06 N	3.9E+04 N
CARBARYL	63252	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CARBON DISULFIDE	75150	1.00E-01 I		2.00E-01 I		y	1.0E+03 N	7.3E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CARBON TETRACHLORIDE	56235	7.00E-04 I	1.30E-01 I	5.71E-04 E	5.30E-02 I	y	1.6E-01 C	1.2E-01 C	2.4E-02 C	4.4E+01 C	4.9E+00 C
CARBOSULFAN	55285148	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
CHLORAL	75876	2.00E-03 I				y	1.2E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
CHLORANIL	118752		4.00E-01 H				1.7E-01 C	1.6E-02 C	7.9E-03 C	1.4E+01 C	1.6E+00 C
CHLORDANE	57749	5.00E-04 I	3.5E-01 I	2.00E-04 I	3.5E-01 I		1.9E-01 C	1.8E-02 C	9.0E-03 C	1.6E+01 C	1.8E+00 C
CHLORINE	7782505	1.00E-01 I				y	6.1E+02 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CHLORINE DIOXIDE	10049044			5.70E-05 I		y	4.2E-01 N	2.1E-01 N			
CHLOROACETIC ACID	79118	2.00E-03 H					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
4-CHLOROANILINE	106478	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
CHLOROBENZENE	108907	2.00E-02 I		5.00E-03 A		y	3.5E+01 N	1.8E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CHLOROBENZILATE	510156	2.00E-02 I	2.70E-01 H		2.70E-01 H		2.5E-01 C	2.3E-02 C	1.2E-02 C	2.1E+01 C	2.4E+00 C
P-CHLOROBENZOIC ACID	74113	2.00E-01 H					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
2-CHLORO-1,3-BUTADIENE	126998	2.00E-02 A		2.00E-03 H		y	1.4E+01 N	7.3E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1-CHLOROBUTANE	109693	4.00E-01 H				y	2.4E+03 N	1.5E+03 N	5.4E+02 N	8.2E+05 N	3.1E+04 N
1-CHLORO-1,1-DIFLUOROETHANE	75683			1.40E+01 I		y	1.0E+05 N	5.1E+04 N			
CHLORODIFLUOROMETHANE	75456			1.40E+01 I		y	1.0E+05 N	5.1E+04 N			
CHLOROETHANE	75003	4.00E-01 E	2.90E-03 E	2.90E+00 I		y	3.6E+00 C	2.2E+00 C	1.1E+00 C	2.0E+03 C	2.2E+02 C
CHLOROFORM	67663	1.00E-02 I	6.10E-03 I	8.6E-05 E	8.10E-02 I	y	1.5E-01 C !	7.7E-02 C !	5.2E-01 C	9.4E+02 C	1.0E+02 C !
CHLOROMETHANE	74873		1.30E-02 H		6.00E-03 H	y	1.5E+00 C	1.0E+00 C	2.4E-01 C	4.4E+02 C	4.9E+01 C
4-CHLORO-2-METHYLANILINE	95692		5.80E-01 H				1.2E-01 C	1.1E-02 C	5.4E-03 C	9.9E+00 C	1.1E+00 C
BETA-CHLORONAPHTHALENE	91587	8.00E-02 I				y	4.9E+02 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
O-CHLORONITROBENZENE	88733		2.50E-02 H			y	4.2E-01 C	2.5E-01 C	1.3E-01 C	2.3E+02 C	2.6E+01 C
P-CHLORONITROBENZENE	100005		1.80E-02 H			y	5.9E-01 C	3.5E-01 C	1.8E-01 C	3.2E+02 C	3.5E+01 C
2-CHLOROPHENOL	95578	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
2-CHLOROPROPANE	75296			2.90E-02 H		y	2.1E+02 N	1.1E+02 N			
O-CHLOROTOLUENE	95498	2.00E-02 I				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CHLORPYRIFOS	2921882	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
CHLORPYRIFOS-METHYL	5598130	1.00E-02 H					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
**CHROMIUM III	16065831	1.50E+00 I					5.5E+04 N	5.5E+03 N	2.0E+03 N	3.1E+06 N	1.2E+05 N
**CHROMIUM VI	18540299	3.00E-03 I		3.00E-05 I	4.10E+01 H		1.1E+02 N	1.5E-04 C	4.1E+00 N	6.1E+03 N	2.3E+02 N
COBALT	7440484	6.00E-02 E					2.2E+03 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
COKE OVEN EMISSIONS (COAL TAR)	8007452				2.2 I	y	5.7E-03 C	2.8E-03 C			
COPPER	7440508	4.00E-02 H					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
CROTONALDEHYDE	123739		1.90E+00 H				3.5E-02 C	3.3E-03 C	1.7E-03 C	3.0E+00 C	3.4E-01 C
CUMENE	98828	1.00E-01 I		1.10E-01 I		y	6.6E+02 N	4.0E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CYANIDE (FREE)	57125	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CALCIUM CYANIDE	592018	4E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
COPPER CYANIDE	544923	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
CYANAZINE	21725462	2.00E-03 H	8.40E-01 H				8.0E-02 C	7.5E-03 C	3.8E-03 C	6.8E+00 C	7.6E-01 C
CYANOGEN	460195	4.00E-02 I				y	2.4E+02 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
CYANOGEN BROMIDE	506683	9.00E-02 I					3.3E+03 N	3.3E+02 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
CYANOGEN CHLORIDE	506774	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
HYDROGEN CYANIDE	74908	2.00E-02 I		8.60E-04 I		y	6.2E+00 N	3.1E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
POTASSIUM CYANIDE	151508	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N

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Basis: C = Carcinogenic effects N = Noncarcinogenic effects ! = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
POTASSIUM SILVER CYANIDE	506616	2.00E-01 I					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
SILVER CYANIDE	506649	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
SODIUM CYANIDE	143339	4.00E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
THIOCYANATE		1.00E-01 E					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ZINC CYANIDE	557211	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
CYCLOHEXANONE	108941	5.00E+00 I					1.8E+05 N	1.8E+04 N	6.8E+03 N	1.0E+07 N	3.9E+05 N
CYHALOTHRIN/KARATE	68085858	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
CYPERMETHRIN	52315078	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DACTHAL	1861321	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DALAPON	75990	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
DDD	72548		2.40E-01 I				2.8E-01 C	2.6E-02 C	1.3E-02 C	2.4E+01 C	2.7E+00 C
DDE	72559		3.40E-01 I				2.0E-01 C	1.8E-02 C	9.3E-03 C	1.7E+01 C	1.9E+00 C
DDT	50293	5.00E-04 I	3.40E-01 I		3.40E-01 I		2.0E-01 C	1.8E-02 C	9.3E-03 C	1.7E+01 C	1.9E+00 C
DIAZINON	333415	9.00E-04 H					3.3E+01 N	3.3E+00 N	1.2E+00 N	1.8E+03 N	7.0E+01 N
DIBENZOFURAN	132649	4.00E-03 E				y	2.4E+01 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
1,4-DIBROMOBENZENE	106376	1.00E-02 I				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DIBROMOCHLOROMETHANE	124481	2.00E-02 I	8.40E-02 I			y	1.3E-01 C	7.5E-02 C	3.8E-02 C	6.8E+01 C	7.6E+00 C
1,2-DIBROMO-3-CHLOROPROPANE	96128		1.40E+00 H	5.70E-05 I	2.40E-03 H	y	4.7E-02 C !	2.1E-01 N	2.3E-03 C	4.1E+00 C	4.6E-01 C
1,2-DIBROMOETHANE	106934		8.50E+01 I	5.70E-05 H	7.60E-01 I	y	7.5E-04 C	8.2E-03 C	3.7E-05 C	6.7E-02 C	7.5E-03 C
DIBUTYLPHTHALATE	84742	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
DICAMBA	1918009	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
1,2-DICHLOROBENZENE	95501	9.00E-02 I		9.00E-03 E		y	6.4E+01 N	3.3E+01 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
1,3-DICHLOROBENZENE	541731	3.00E-02 E		2.00E-03 E		y	1.4E+01 N	7.3E+00 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
1,4-DICHLOROBENZENE	106467	3.00E-02 E	2.40E-02 H	2.29E-01 I	2.2E-02 E	y	4.7E-01 C	2.8E-01 C	1.3E-01 C	2.4E+02 C	2.7E+01 C
3,3'-DICHLOROBENZIDINE	91941		4.50E-01 I				1.5E-01 C	1.4E-02 C	7.0E-03 C	1.3E+01 C	1.4E+00 C
1,4-DICHLORO-2-BUTENE	764410				9.30E+00 H	y	1.3E-03 C	6.7E-04 C			
DICHLORODIFLUOROMETHANE	75718	2.00E-01 I		5.00E-02 A		y	3.5E+02 N	1.8E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
1,1-DICHLOROETHANE	75343	1.00E-01 H		1.40E-01 A		y	8.0E+02 N	5.1E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
1,2-DICHLOROETHANE	107062	3.00E-02 E	9.10E-02 I	1.40E-03 E	9.10E-02 I	y	1.2E-01 C	6.9E-02 C	3.5E-02 C	6.3E+01 C	7.0E+00 C
1,1-DICHLOROETHENE	75354	9.00E-03 I	6.00E-01 I		1.75E-01 I	y	4.4E-02 C	3.6E-02 C	5.3E-03 C	9.5E+00 C	1.1E+00 C
CIS-1,2-DICHLOROETHENE	156592	1.00E-02 H				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
TRANS-1,2-DICHLOROETHENE	156605	2.00E-02 I				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
TOTAL 1,2-DICHLOROETHENE	540590	9.00E-03 H				y	5.5E+01 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
2,4-DICHLOROPHENOL	120832	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
2,4-D	94757	1.00E-02 I				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
4-(2,4-DICHLOROPHENOXY)BUTYRIC ACID	94826	8E-03 I					2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
1,2-DICHLOROPROPANE	78875		6.80E-02 H	1.14E-03 I		y	1.6E-01 C	9.2E-02 C	4.6E-02 C	8.4E+01 C	9.4E+00 C
2,3-DICHLOROPROPANOL	616239	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
1,3-DICHLOROPROPENE	542756	3.00E-04 I	1.80E-01 H	5.71E-03 I	1.30E-01 H	y	7.7E-02 C	4.8E-02 C	1.6E-02 C	3.2E+01 C	3.5E+00 C !
DICHLORVOS	62737	5E-04 I	0.29 I	1.43E-04 I			2.3E-01 C	2.2E-02 C	1.1E-02 C	2.0E+01 C	2.2E+00 C
DICOFOL	115322		4.4E-01 W				1.5E-01 C	1.4E-02 C	7.2E-03 C	1.3E+01 C	1.5E+00 C
DICYCLOPENTADIENE	77736	3E-02 H		6.00E-05 A		y	4.4E-01 N	2.2E-01 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
DIELDRIN	60571	5.00E-05 I	1.60E+01 I		1.60E+01 I		4.2E-03 C	3.9E-04 C	2.0E-04 C	3.6E-01 C	4.0E-02 C
DIESEL EMISSIONS				1.40E-03 I				5.1E+00 N			
DIETHYLPHTHALATE	84662	8.00E-01 I					2.9E+04 N	2.9E+03 N	1.1E+03 N	1.6E+06 N	6.3E+04 N
DIETHYLENE GLYCOL, MONOBUTYL ETHER	112345			5.70E-03 H				2.1E+01 N			
DIETHYLENE GLYCOL, MONOETHYL ETHER	111900	2.00E+00 H					7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
DI(2-ETHYLHEXYL)ADIPATE	103231	6.00E-01 I	1.20E-03 I				5.6E+01 C	5.2E+00 C	2.6E+00 C	4.9E+03 C	5.3E+02 C
DIETHYLSTILBESTROL	56531		4.70E+03 H				1.4E-05 C	1.3E-06 C	6.7E-07 C	1.2E-03 C	1.4E-04 C
DIFENZOQUAT (AVENGE)	43222486	8.00E-02 I					2.9E+03 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
1,1-DIFLUOROETHANE	75376			1.10E+01 I		y	8.0E+04 N	4.0E+04 N			
DIISOPROPYL METHYLPHOSPHONATE (DIMP)	1445756	8.00E-02 I					2.9E+03 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
3,3'-DIMETHOXYBENZIDINE	119904		1.40E-02 H				4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C

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Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
DIMETHYLAMINE	124403			5.70E-06 W				2.1E-02 N			
2,4-DIMETHYLANILINE HYDROCHLORIDE	21436964		5.80E-01 H				1.2E-01 C	1.1E-02 C	5.4E-03 C	9.9E+00 C	1.1E+00 C
2,4-DIMETHYLANILINE	95681		7.50E-01 H				8.9E-02 C	8.3E-03 C	4.2E-03 C	7.6E+00 C	8.5E-01 C
N,N-DIMETHYLANILINE	121697	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
3,3'-DIMETHYLBENZIDINE	119937		9.20E+00 H				7.3E-03 C	6.8E-04 C	3.4E-04 C	6.2E-01 C	6.9E-02 C
1,1-DIMETHYLHYDRAZINE	57147		2.60E+00 W		3.50E+00 W		2.6E-02 C	1.8E-03 C	1.2E-03 C	2.2E+00 C	2.5E-01 C
1,2-DIMETHYLHYDRAZINE	540738		3.70E+01 W		3.70E+01 W		1.8E-03 C	1.7E-04 C	8.5E-05 C	1.5E-01 C	1.7E-02 C
2,4-DIMETHYLPHENOL	105679	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
2,6-DIMETHYLPHENOL	576261	6.00E-04 I					2.2E+01 N	2.2E+00 N	8.1E-01 N	1.2E+03 N	4.7E+01 N
3,4-DIMETHYLPHENOL	95658	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
DIMETHYLPHTHALATE	131113	1.00E+01 W					3.7E+05 N	3.7E+04 N	1.4E+04 N	2.0E+07 N	7.8E+05 N
1,2-DINITROBENZENE	528290	4.00E-04 H					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
1,3-DINITROBENZENE	99650	1.00E-04 I					3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
1,4-DINITROBENZENE	100254	4.00E-04 H					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
4,6-DINITRO-O-CYCLOHEXYL PHENOL	131895	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
4,6-DINITRO-2-METHYLPHENOL	534521	1.00E-04 E					3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
2,4-DINITROPHENOL	51285	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
DINITROTOLUENE MIX			6.80E-01 I				9.8E-02 C	9.2E-03 C	4.6E-03 C	8.4E+00 C	9.4E-01 C
2,4-DINITROTOLUENE	121142	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
2,6-DINITROTOLUENE	606202	1.00E-03 H					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
DINOSEB	88857	1.00E-03 I				y	6.1E+00 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
DIOCTYLPHTHALATE	117840	2.00E-02 H					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1,4-DIOXANE	123911		1.10E-02 I				6.1E+00 C	5.7E-01 C	2.9E-01 C	5.2E+02 C	5.8E+01 C
DIPHENYLAMINE	122394	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
1,2-DIPHENYLHYDRAZINE	122667		8.00E-01 I		8.00E-01 I		8.4E-02 C	7.8E-03 C	3.9E-03 C	7.2E+00 C	8.0E-01 C
DIQUAT	85007	2.20E-03 I					8.0E+01 N	8.0E+00 N	3.0E+00 N	4.5E+03 N	1.7E+02 N
DISULFOTON	298044	4.00E-05 I				y	2.4E-01 N	1.5E-01 N	5.4E-02 N	8.2E+01 N	3.1E+00 N
1,4-DITHIANE	505293	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DIURON	330541	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
ENDOSULFAN	115297	6.00E-03 I					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
ENDRIN	72208	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
EPICHLOROHYDRIN	106898	2.00E-03 H	9.90E-03 I	2.86E-04 I	4.20E-03 I		6.8E+00 C	1.0E+00 N	3.2E-01 C !	5.8E+02 C !	6.5E+01 C !
ETHION	563122	5.00E-04 I					1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
2-ETHOXYETHANOL	110805	4.00E-01 H		5.70E-02 I			1.5E+04 N	2.1E+02 N	5.4E+02 N	8.2E+05 N	3.1E+04 N
ETHYL ACETATE	141786	9.00E-01 I				y	5.5E+03 N	3.3E+03 N	1.2E+03 N	1.8E+06 N	7.0E+04 N
ETHYLBENZENE	100414	1.00E-01 I		2.90E-01 I		y	1.3E+03 N	1.1E+03 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ETHYLENE DIAMINE	107153	2.00E-02 H					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
ETHYLENE GLYCOL	107211	2.00E+00 I					7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
ETHYLENE GLYCOL, MONOBUTYL ETHER	111762			5.70E-03 H				2.1E+01 N			
ETHYLENE OXIDE	75218		1.00E+00 H		3.50E-01 H		6.7E-02 C	1.8E-02 C	3.2E-03 C	5.7E+00 C	6.4E-01 C
ETHYLENE THIOUREA	96457	8.00E-05 I	1.1E-01 H				6.1E-01 C !	5.7E-02 C !	2.9E-02 C !	5.2E+01 C !	5.8E+00 C !
ETHYL ETHER	60297	2.00E-01 I				y	1.2E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
ETHYL METHACRYLATE	97632	9.00E-02 H				y	5.5E+02 N	3.3E+02 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
FENAMIPHOS	22224926	2.50E-04 I					9.1E+00 N	9.1E-01 N	3.4E-01 N	5.1E+02 N	2.0E+01 N
FLUOMETURON	2164172	1.30E-02 I					4.7E+02 N	4.7E+01 N	1.8E+01 N	2.7E+04 N	1.0E+03 N
FLUORINE	7782414	6.00E-02 I					2.2E+03 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
FOMESAFEN	72178020		1.90E-01 I				3.5E-01 C	3.3E-02 C	1.7E-02 C	3.0E+01 C	3.4E+00 C
FONOFOS	944229	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
FORMALDEHYDE	50000	2.00E-01 I			4.50E-02 I		7.3E+03 N	1.4E-01 C	2.7E+02 N	4.1E+05 N	1.6E+04 N
FORMIC ACID	64186	2.00E+00 H					7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
FURAN	110009	1.00E-03 I				y	6.1E+00 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
FURAZOLIDONE	67458		3.80E+00 H				1.8E-02 C	1.6E-03 C	8.3E-04 C	1.5E+00 C	1.7E-01 C
FURFURAL	98011	3.00E-03 I		1.00E-02 A			1.1E+02 N	3.7E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N

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Basis: C = Carcinogenic effects N = Noncarcinogenic effects ! = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
GLYCIDALDEHYDE	765344	4.00E-04 I		2.90E-04 H			1.5E+01 N	1.1E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
GLYPHOSATE	1071836	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
HEPTACHLOR	76448	5.00E-04 I	4.50E+00 I		4.50E+00 I	y	2.3E-03 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
HEPTACHLOR EPOXIDE	1024573	1.30E-05 I	9.10E+00 I		9.10E+00 I	y	1.2E-03 C	6.9E-04 C	3.5E-04 C	6.3E-01 C	7.0E-02 C
HEXABROMOBENZENE	87821	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
HEXACHLOROBENZENE	118741	8.00E-04 I	1.60E+00 I		1.60E+00 I	y	6.6E-03 C	3.9E-03 C	2.0E-03 C	3.6E+00 C	4.0E-01 C
HEXACHLOROBUTADIENE	87683	2.00E-04 H	7.80E-02 I		7.80E-02 I	y	1.4E-01 C !	8.0E-02 C !	4.0E-02 C !	7.3E+01 C !	8.2E+00 C !
ALPHA-HCH	319846		6.30E+00 I		6.30E+00 I		1.1E-02 C	9.9E-04 C	5.0E-04 C	9.1E-01 C	1.0E-01 C
BETA-HCH	319857		1.80E+00 I		1.80E+00 I		3.7E-02 C	3.5E-03 C	1.8E-03 C	3.2E+00 C	3.5E-01 C
GAMMA-HCH (LINDANE)	58899	3.00E-04 I	1.30E+00 H				5.2E-02 C	4.8E-03 C	2.4E-03 C	4.4E+00 C	4.9E-01 C
TECHNICAL HCH	608731		1.80E+00 I		1.80E+00 I		3.7E-02 C	3.5E-03 C	1.8E-03 C	3.2E+00 C	3.5E-01 C
HEXACHLOROCYCLOPENTADIENE	77474	7.00E-03 I		2.00E-05 H		y	1.5E-01 N	7.3E-02 N	9.5E+00 N	1.4E+04 N	5.5E+02 N
HEXACHLORODIBENZODIOXIN MIX	19408743		6.20E+03 I		4.55E+03 I		1.1E-05 C	1.4E-06 C	5.1E-07 C	9.2E-04 C	1.0E-04 C
HEXACHLOROETHANE	67721	1.00E-03 I	1.40E-02 I		1.40E-02 I	y	7.5E-01 C !	4.5E-01 C !	2.3E-01 C !	4.1E+02 C !	4.6E+01 C !
HEXACHLOROPHENE	70304	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
1,6-HEXAMETHYLENE DIISOCYANATE	822060			2.90E-06 I				1.1E-02 N			
HEXANE	110543	6.00E-02 H		5.71E-02 I		y	3.5E+02 N	2.1E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
2-HEXANONE	591786	4.00E-02 E		1.4E-03 E			1.5E+03 N	5.1E+00 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
HEXAZINONE	51235042	3.30E-02 I					1.2E+03 N	1.2E+02 N	4.5E+01 N	6.7E+04 N	2.6E+03 N
HMX	2691410	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
HYDRAZINE	302012		3.00E+00 I		1.70E+01 I		2.2E-02 C	3.7E-04 C	1.1E-03 C	1.9E+00 C	2.1E-01 C
HYDROGEN CHLORIDE	7647010			5.70E-03 I				2.1E+01 N			
HYDROGEN SULFIDE	7783064	3.00E-03 I		2.85E-04 I			1.1E+02 N	1.0E+00 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
HYDROQUINONE	123319	4.00E-02 H					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
IRON	7439896	3.00E-01 E					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ISOBUTANOL	78831	3.00E-01 I				y	1.8E+03 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ISOPHORONE	78591	2.00E-01 I	9.50E-04 I				7.0E+01 C	6.6E+00 C	3.3E+00 C	6.0E+03 C	6.7E+02 C
ISOPROPALIN	33820530	1.50E-02 I					5.5E+02 N	5.5E+01 N	2.0E+01 N	3.1E+04 N	1.2E+03 N
ISOPROPYL METHYL PHOSPHONIC ACID	1832548	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
TETRAETHYLLEAD	78002	1.00E-07 I				y	6.1E-04 N	3.7E-04 N	1.4E-04 N	2.0E-01 N	7.8E-03 N
LITHIUM	7439932	2.00E-02 E					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MALATHION	121755	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MALEIC ANHYDRIDE	108316	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
MANGANESE-NONFOOD	7439965	2.00E-02 I		1.43E-05 I			7.3E+02 N	5.2E-02 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MANGANESE-FOOD	7439965	1.40E-01 I		1.43E-05 I			5.1E+03 N	5.2E-02 N	1.9E+02 N	2.9E+05 N	1.1E+04 N
MEPHOSFOLAN	950107	9.00E-05 H					3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
MEPIQUAT CHLORIDE	24307264	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
MERCURIC CHLORIDE	7487947	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
MERCURY (INORGANIC)	7439976			8.60E-05 I				3.1E-01 N			
METHYLMERCURY	22967926	1.00E-04 I					3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
METHACRYLONITRILE	126987	1.00E-04 I		2.00E-04 A		y	1.0E+00 N	7.3E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
METHANOL	67561	5.00E-01 I					1.8E+04 N	1.8E+03 N	6.8E+02 N	1.0E+06 N	3.9E+04 N
METHIDATHION	950378	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
METHOXYCHLOR	72435	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
METHYL ACETATE	79209	1.00E+00 H				y	6.1E+03 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
METHYL ACRYLATE	96333	3.00E-02 A				y	1.8E+02 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
2-METHYLANILINE	95534		2.40E-01 H				2.8E-01 C	2.6E-02 C	1.3E-02 C	2.4E+01 C	2.7E+00 C
4-(2-METHYL-4-CHLOROPHENOXY) BUTYRIC ACID	94815	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
2-METHYL-4-CHLOROPHENOXYACETIC ACID (MCPA)	94746	5.00E-04 I					1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
2-(2-METHYL-4-CHLOROPHENOXY)PROPIONIC ACID (M	93652	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
METHYLCYCLOHEXANE	108872			8.60E-01 H		y	6.3E+03 N	3.1E+03 N			
METHYLENE BROMIDE	74953	1.00E-02 A				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
METHYLENE CHLORIDE	75092	6.00E-02 I	7.50E-03 I	8.60E-01 H	1.65E-03 I	y	4.1E+00 C	3.8E+00 C	4.2E-01 C	7.6E+02 C	8.5E+01 C

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4,4'-METHYLENE BIS(2-CHLOROANILINE)	101144	7.00E-04 H	1.30E-01 H		1.30E-01 H		5.2E-01 C	4.8E-02 C	2.4E-02 C	4.4E+01 C	4.9E+00 C
4,4'-METHYLENE BIS(N,N'-DIMETHYL)ANILINE	101611		4.60E-02 I				1.5E+00 C	1.4E-01 C	6.9E-02 C	1.2E+02 C	1.4E+01 C
4,4'-METHYLENEDIPHENYL ISOCYANATE	101688			1.7E-04 I				6.2E-01 N			
METHYL ETHYL KETONE (2-BUTANONE)	78933	6.00E-01 I		2.86E-01 I		y	1.9E+03 N	1.0E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
METHYL HYDRAZINE	60344		1.10E+00 W				6.1E-02 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANONE	108101	8.00E-02 H		2.00E-02 A			2.9E+03 N	7.3E+01 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
METHYL METHACRYLATE	80626	1.40E+00 I		2.00E-01 I		y	1.4E+03 N	7.3E+02 N	1.9E+03 N	2.9E+06 N	1.1E+05 N
2-METHYL-5-NITROANILINE	99558		3.30E-02 H				2.0E+00 C	1.9E-01 C	9.6E-02 C	1.7E+02 C	1.9E+01 C
METHYL PARATHION	298000	2.50E-04 I					9.1E+00 N	9.1E-01 N	3.4E-01 N	5.1E+02 N	2.0E+01 N
2-METHYLPHENOL	95487	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
3-METHYLPHENOL	108394	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
4-METHYLPHENOL	106445	5.00E-03 H					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
METHYLSTYRENE MIX	25013154	6.00E-03 A		1.00E-02 A		y	5.5E+01 N	3.7E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
ALPHA-METHYLSTYRENE	98839	7.00E-02 A				y	4.3E+02 N	2.6E+02 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
METHYL TERT-BUTYL ETHER	1634044			8.57E-01 I		y	6.3E+03 N	3.1E+03 N			
METOLACHLOR (DUAL)	51218452	1.50E-01 I					5.5E+03 N	5.5E+02 N	2.0E+02 N	3.1E+05 N	1.2E+04 N
MIREX	2385855	2.00E-04 I				y	1.2E+00 N	7.3E-01 N	2.7E-01 N	4.1E+02 N	1.6E+01 N
MOLYBDENUM	7439987	5E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
MONOCHLORAMINE	10599903	1E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
NALED	300765	2E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
NICKEL REFINERY DUST					8.4E-01 I			7.5E-03 C			
NICKEL	7440020	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
NITRATE	14797558	1.60E+00 I					5.8E+04 N	5.8E+03 N	2.2E+03 N	3.3E+06 N	1.3E+05 N
NITRIC OXIDE	10102439	1.00E-01 W				y	6.1E+02 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
NITRITE	14797650	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
2-NITROANILINE	88744			5.70E-05 H				2.1E-01 N			
**NITROBENZENE	98953	5.00E-04 I		6.00E-04 A		y	3.5E+00 N	2.2E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
NITROFURANTOIN	67209	7.00E-02 H					2.6E+03 N	2.6E+02 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
NITROFURAZONE	59870		1.50E+00 H				4.5E-02 C	4.2E-03 C	2.1E-03 C	3.8E+00 C	4.3E-01 C
NITROGEN DIOXIDE	10102440	1.00E+00 W				y	6.1E+03 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
**NITROGLYCERIN	55630		1.4E-02 E				4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C
4-NITROPHENOL	100027	8.00E-03 E					2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
**2-NITROPROPANE	79469			5.70E-03 I	9.40E+00 H	y	1.3E-03 C	6.7E-04 C			
N-NITROSO-DI-N-BUTYLAMINE	924163		5.40E+00 I		5.60E+00 I		1.2E-02 C	1.1E-03 C	5.8E-04 C	1.1E+00 C	1.2E-01 C
N-NITROSODIETHANOLAMINE	1116547		2.80E+00 I				2.4E-02 C	2.2E-03 C	1.1E-03 C	2.0E+00 C	2.3E-01 C
N-NITROSODIETHYLAMINE	55185		1.50E+02 I		1.50E+02 I		4.5E-04 C	4.2E-05 C	2.1E-05 C	3.8E-02 C	4.3E-03 C
N-NITROSODIMETHYLAMINE	62759		5.10E+01 I		5.10E+01 I		1.3E-03 C	1.2E-04 C	6.2E-05 C	1.1E-01 C	1.3E-02 C
N-NITROSODIPHENYLAMINE	86306		4.90E-03 I				1.4E+01 C	1.3E+00 C	6.4E-01 C	1.2E+03 C	1.3E+02 C
N-NITROSODIPROPYLAMINE	621647		7.00E+00 I				9.6E-03 C	8.9E-04 C	4.5E-04 C	8.2E-01 C	9.1E-02 C
N-NITROSO-N-ETHYLUREA	759739		1.40E+02 H				4.8E-04 C	4.5E-05 C	2.3E-05 C	4.1E-02 C	4.6E-03 C
N-NITROSO-N-METHYLETHYLAMINE	10595956		2.20E+01 I				3.0E-03 C	2.8E-04 C	1.4E-04 C	2.6E-01 C	2.9E-02 C
N-NITROSOPYRROLIDINE	930552		2.10E+00 I		2.10E+00 I		3.2E-02 C	3.0E-03 C	1.5E-03 C	2.7E+00 C	3.0E-01 C
M-NITROTOLUENE	99081	2.00E-02 E				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
O-NITROTOLUENE	88722	1.00E-02 H				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
P-NITROTOLUENE	99990	1.00E-02 H				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
**NUSTAR	85509199	7.00E-04 I					2.6E+00 N	2.6E+00 N	9.5E-01 N	1.4E+03 N	5.5E+01 N
ORYZALIN	19044883	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
OXADIAZON	19666309	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
OXAMYL	23135220	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
OXYFLUORFEN	42874033	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
PARAQUAT DICHLORIDE	1910425	4.50E-03 I					1.6E+02 N	1.6E+01 N	6.1E+00 N	9.2E+03 N	3.5E+02 N
PARATHION	56382	6.00E-03 H					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
PENTACHLOROBENZENE	608935	8.00E-04 I				y	4.9E+00 N	2.9E+00 N	1.1E+00 N	1.6E+03 N	6.3E+01 N

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Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
PENTACHLORONITROBENZENE	82688	3.00E-03 I	2.60E-01 H			y	4.1E-02 C	2.4E-02 C	1.2E-02 C	2.2E+01 C	2.5E+00 C
PENTACHLOROPHENOL	87865	3.00E-02 I	1.20E-01 I				5.6E-01 C	5.2E-02 C	2.6E-02 C	4.8E+01 C	5.3E+00 C
PERMETHRIN	52645531	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
PHENOL	108952	6.00E-01 I					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
M-PHENYLENEDIAMINE	108452	6.00E-03 I					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
O-PHENYLENEDIAMINE	95545		4.70E-02 H				1.4E+00 C	1.3E-01 C	6.7E-02 C	1.2E+02 C	1.4E+01 C
P-PHENYLENEDIAMINE	106503	1.90E-01 H					6.9E+03 N	6.9E+02 N	2.6E+02 N	3.9E+05 N	1.5E+04 N
2-PHENYLPHENOL	90437		1.90E-03 H				3.5E+01 C	3.3E+00 C	1.7E+00 C	3.0E+03 C	3.4E+02 C
PHOSPHINE	7803512	3.00E-04 I		8.60E-05 I			1.1E+01 N	3.1E-01 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
PHOSPHORIC ACID	7664382			2.90E-03 I				1.1E+01 N			
PHOSPHORUS (WHITE)	7723140	2.00E-05 I					7.3E-01 N	7.3E-02 N	2.7E-02 N	4.1E+01 N	1.6E+00 N
P-PHTHALIC ACID	100210	1.00E+00 H					3.7E+04 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
PHTHALIC ANHYDRIDE	85449	2.00E+00 I		3.43E-02 H			7.3E+04 N	1.3E+02 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
POLYBROMINATED BIPHENYLS		7.00E-06 H	8.90E+00 H				7.5E-03 C	7.0E-04 C	3.5E-04 C	6.4E-01 C	7.2E-02 C !
POLYCHLORINATED BIPHENYLS	1336363		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1016	12674112	7.00E-05 I	7.00E-02 I		7.00E-02 I		9.6E-01 C !	8.9E-02 C !	4.5E-02 C !	8.2E+01 C !	5.5E+00 N
AROCLOR-1221	11104282		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1232	11141165		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1242	53469219		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1248	12672296		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1254	11097691	2.00E-05 I	2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C !
AROCLOR-1260	11096825		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
POLYCHLORINATED TERPHENYLS	61788338		4.50E+00 E				1.5E-02 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
POLYNUCLEAR AROMATIC HYDROCARBONS:											
ACENAPHTHENE	83329	6.00E-02 I					2.2E+03 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
ANTHRACENE	120127	3.00E-01 I					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
BENZ[A]ANTHRACENE	56553		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
BENZO[B]FLUORANTHENE	205992		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
BENZO[K]FLUORANTHENE	207089		7.30E-02 E				9.2E-01 C	8.6E-02 C	4.3E-02 C	7.8E+01 C	8.7E+00 C
BENZO[A]PYRENE	50328		7.30E+00 I		3.10E+00 E		9.2E-03 C	2.0E-03 C	4.3E-04 C	7.8E-01 C	8.7E-02 C
CARBAZOLE	86748		2.00E-02 H				3.3E+00 C	3.1E-01 C	1.6E-01 C	2.9E+02 C	3.2E+01 C
CHRYSENE	218019		7.30E-03 E				9.2E+00 C	8.6E-01 C	4.3E-01 C	7.8E+02 C	8.7E+01 C
DIBENZ[A,H]ANTHRACENE	53703		7.30E+00 E				9.2E-03 C	8.6E-04 C	4.3E-04 C	7.8E-01 C	8.7E-02 C
**DIBENZOFURAN	132649	4.00E-03 E				y	2.4E+01 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
FLUORANTHENE	206440	4.00E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
FLUORENE	86737	4.00E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
INDENO[1,2,3-C,D]PYRENE	193395		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
**2-METHYLNAPHTHALENE	91576	2.00E-02 O				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
**NAPHTHALENE	91203	2.00E-02 I		9.00E-04 I			7.3E+02 N	3.3E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
PYRENE	129000	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
PROMETON	1610180	1.50E-02 I					5.5E+02 N	5.5E+01 N	2.0E+01 N	3.1E+04 N	1.2E+03 N
PROMETRYN	7287196	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
PROPACHLOR	1918167	1.30E-02 I					4.7E+02 N	4.7E+01 N	1.8E+01 N	2.7E+04 N	1.0E+03 N
PROPANIL	709988	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
PROPARGITE	2312358	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
N-PROPYLBENZENE		1.00E-02 E				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
PROPYLENE GLYCOL	57556	2.00E+01 H					7.3E+05 N	7.3E+04 N	2.7E+04 N	4.1E+07 N	1.6E+06 N
PROPYLENE GLYCOL, MONOETHYL ETHER	52125538	7.00E-01 H					2.6E+04 N	2.6E+03 N	9.5E+02 N	1.4E+06 N	5.5E+04 N
PROPYLENE GLYCOL, MONOMETHYL ETHER	107982	7.00E-01 H		5.70E-01 I			2.6E+04 N	2.1E+03 N	9.5E+02 N	1.4E+06 N	5.5E+04 N
PURSUIT	81335775	2.50E-01 I					9.1E+03 N	9.1E+02 N	3.4E+02 N	5.1E+05 N	2.0E+04 N
PYRIDINE	110861	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
QUINOLINE	91225		1.20E+01 H				5.6E-03 C	5.2E-04 C	2.6E-04 C	4.8E-01 C	5.3E-02 C
RDX	121824	3.00E-03 I	1.10E-01 I				6.1E-01 C	5.7E-02 C	2.9E-02 C	5.2E+01 C	5.8E+00 C

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects ! = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
RESMETHRIN	10453868	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
**RONNEL	299843	5.00E-02 H				y	3.0E+02 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
ROTENONE	83794	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
SELENIOUS ACID	7783008	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SELENIUM	7782492	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SILVER	7440224	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SIMAZINE	122349	5.00E-03 I	1.20E-01 H				5.6E-01 C	5.2E-02 C	2.6E-02 C	4.8E+01 C	5.3E+00 C
SODIUM AZIDE	26628228	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
SODIUM DIETHYLDITHIOCARBAMATE	148185	3.00E-02 I	2.70E-01 H				2.5E-01 C	2.3E-02 C	1.2E-02 C	2.1E+01 C	2.4E+00 C
STRONTIUM, STABLE	7440246	6.00E-01 I					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
STRYCHNINE	57249	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
STYRENE	100425	2.00E-01 I		2.86E-01 I		y	1.6E+03 N	1.0E+03 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
2,3,7,8-TETRACHLORODIBENZODIOXIN	1746016		1.50E+05 H		1.50E+05 H		4.5E-07 C	4.2E-08 C	2.1E-08 C	3.8E-05 C	4.3E-06 C
1,2,4,5-TETRACHLOROBENZENE	95943	3.00E-04 I				y	1.8E+00 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
1,1,1,2-TETRACHLOROETHANE	630206	3.00E-02 I	2.60E-02 I		2.60E-02 I	y	4.1E-01 C	2.4E-01 C	1.2E-01 C	2.2E+02 C	2.5E+01 C
**1,1,2,2-TETRACHLOROETHANE	79345	6.00E-02 E	2.00E-01 I		2.00E-01 I	y	5.3E-02 C	3.1E-02 C	1.6E-02 C	2.9E+01 C	3.2E+00 C
TETRACHLOROETHENE	127184	1.00E-02 I	5.20E-02 E	1.4E-01 E	2.00E-03 E	y	1.1E+00 C	3.1E+00 C	6.1E-02 C	1.1E+02 C	1.2E+01 C
2,3,4,6-TETRACHLOROPHENOL	58902	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
P,A,A,A-TETRACHLOROTOLUENE	5216251		2.00E+01 H			y	5.3E-04 C	3.1E-04 C	1.6E-04 C	2.9E-01 C	3.2E-02 C
1,1,1,2-TETRAFLUOROETHANE	811972			2.29E+01 I		y	1.7E+05 N	8.4E+04 N			
TETRYL	479458	1.00E-02 H					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
THALLIC OXIDE	1314325	7.00E-05 W					2.6E+00 N	2.6E-01 N	9.5E-02 N	1.4E+02 N	5.5E+00 N
THALLIUM	7440280	7.00E-05 O					2.6E+00 N	2.6E-01 N	9.5E-02 N	1.4E+02 N	5.5E+00 N
THALLIUM ACETATE	563688	9.00E-05 I					3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
THALLIUM CARBONATE	6533739	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THALLIUM CHLORIDE	7791120	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THALLIUM NITRATE	10102451	9.00E-05 I					3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
THALLIUM SULFATE (2:1)	7446186	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THIOBENCARB	28249776	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
TIN	7440315	6.00E-01 H					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
TITANIUM	7440326	4.00E+00 E		8.60E-03 E			1.5E+05 N	3.1E+01 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
TITANIUM DIOXIDE	13463677	4.00E+00 E		8.60E-03 E			1.5E+05 N	3.1E+01 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
TOLUENE	108883	2.00E-01 I		1.14E-01 I		y	7.5E+02 N	4.2E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
TOLUENE-2,4-DIAMINE	95807		3.20E+00 H				2.1E-02 C	2.0E-03 C	9.9E-04 C	1.8E+00 C	2.0E-01 C
TOLUENE-2,5-DIAMINE	95705	6.00E-01 H					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
TOLUENE-2,6-DIAMINE	823405	2.00E-01 H					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
P-TOLUIDINE	106490		1.90E-01 H				3.5E-01 C	3.3E-02 C	1.7E-02 C	3.0E+01 C	3.4E+00 C
**TOXAPHENE	8001352		1.10E+00 I		1.10E+00 I	y	9.6E-03 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C
1,2,4-TRIBROMOBENZENE	615543	5.00E-03 I				y	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
TRIBUTYLTIN OXIDE	56359	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
2,4,6-TRICHLOROANILINE	634935		3.40E-02 H				2.0E+00 C	1.8E-01 C	9.3E-02 C	1.7E+02 C	1.9E+01 C
1,2,4-TRICHLOROBENZENE	120821	1.00E-02 I		5.70E-02 H		y	1.9E+02 N	2.1E+02 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
1,1,1-TRICHLOROETHANE	71556	2.00E-02 E		2.86E-01 E		y	5.4E+02 N	1.0E+03 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1,1,2-TRICHLOROETHANE	79005	4.00E-03 I	5.70E-02 I		5.60E-02 I	y	1.9E-01 C	1.1E-01 C	5.5E-02 C	1.0E+02 C	1.1E+01 C
TRICHLOROETHENE	79016	6.00E-03 E	1.10E-02 E		6.00E-03 E	y	1.6E+00 C	1.0E+00 C	2.9E-01 C	5.2E+02 C	5.8E+01 C !
TRICHLOROFLUOROMETHANE	75694	3.00E-01 I		2.00E-01 A		y	1.3E+03 N	7.3E+02 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
2,4,5-TRICHLOROPHENOL	95954	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
2,4,6-TRICHLOROPHENOL	88062		1.10E-02 I		1.00E-02 I		6.1E+00 C	6.3E-01 C	2.9E-01 C	5.2E+02 C	5.8E+01 C
2,4,5-T	93765	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
2-(2,4,5-TRICHLOROPHENOXY)PROPIONIC ACID	93721	8.00E-03 I					2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
1,1,2-TRICHLOROPROPANE	598776	5.00E-03 I				y	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
1,2,3-TRICHLOROPROPANE	96184	6.00E-03 I	7.00E+00 H			y	1.5E-03 C	8.9E-04 C	4.5E-04 C	8.2E-01 C	9.1E-02 C
1,2,3-TRICHLOROPROPENE	96195	5.00E-03 H				y	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N

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Basis: C = Carcinogenic effects N = Noncarcinogenic effects ! = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76131	3.00E+01 I		8.60E+00 H		y	5.9E+04 N	3.1E+04 N	4.1E+04 N	6.1E+07 N	2.3E+06 N
1,2,4-TRIMETHYLBENZENE	95636	5.00E-02 E		1.70E-03 E		y	1.2E+01 N	6.2E+00 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
1,3,5-TRIMETHYLBENZENE	108678	5.00E-02 E		1.70E-03 E		y	1.2E+01 N	6.2E+00 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
TRIMETHYL PHOSPHATE	512561		3.70E-02 H				1.8E+00 C	1.7E-01 C	8.5E-02 C	1.5E+02 C	1.7E+01 C
1,3,5-TRINITROBENZENE	99354	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
2,4,6-TRINITROTOLUENE	118967	5.00E-04 I	3.00E-02 I				2.2E+00 C !	2.1E-01 C !	1.1E-01 C !	1.9E+02 C !	2.1E+01 C !
URANIUM (SOLUBLE SALTS)		3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
VANADIUM	7440622	7.00E-03 H					2.6E+02 N	2.6E+01 N	9.5E+00 N	1.4E+04 N	5.5E+02 N
VANADIUM PENTOXIDE	1314621	9.00E-03 I					3.3E+02 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
VANADIUM SULFATE	16785812	2.00E-02 H					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
VINCLOZOLIN	50471448	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
VINYL ACETATE	108054	1.00E+00 H		5.71E-02 I		y	4.1E+02 N	2.1E+02 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
VINYL CHLORIDE	75014		1.90E+00 H		3.00E-01 H	y	1.9E-02 C	2.1E-02 C	1.7E-03 C	3.0E+00 C	3.4E-01 C
WARFARIN	81812	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
M-XYLENE	108383	2.00E+00 H				y	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
O-XYLENE	95476	2.00E+00 H				y	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
P-XYLENE	106423					y					
XYLENES	1330207	2.00E+00 I				y	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
ZINC	7440666	3.00E-01 I					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ZINC PHOSPHIDE	1314847	3E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
ZINEB	12122677	5E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N

APPENDIX E-2

FLORIDA SCREENING CONCENTRATIONS

APPENDIX E-2-2

FLORIDA GROUNDWATER CLEANUP TARGET LEVELS
(BROWNFIELDS CLEANUP CRITERIA RULE)
F.A.C. CHAPTER 62-785 (7/6/98)

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
2,3,7,8-TCDD [or dioxin]	1746-01-6	★	P/C	*	*	N	★★	carcinogen
acenaphthene	83-32-9	20	MC/O	3	3	TC	200	liver
acenaphthylene	208-96-8	210	MC/ST	*	*	N	2100	decreased body weight, liver
acephate	30560-19-	7.5	PQL/C	190	190	TC	75	carcinogen
acetone	67-64-1	700	MC/ST	1692	1692	TC	7000	central nervous system, kidney, liver
acetonitrile	75-05-8	500	PQL/ST	19983	19983	TC	5000	blood, liver
acetophenone	98-86-2	700	MC/ST	7750	7750	TC	7000	none observed
acifluorfen, sodium [or	62476-59-	1	HAL/ST	190	190	TC	10	increased mortality, kidney
acrolein	107-02-8	20	O/ST	0.4	0.4	TC	200	respiratory (nasal epithelium)
acrylamide	79-06-1	1	PQL/C	5.98	5.98	HH	10	carcinogen
acrylic acid	79-10-7	3500	MC/ST	NA	NA		35000	decreased offspring weight
acrylonitrile	107-13-1	5	PQL/C	49.9	49.9	HH	50	carcinogen
alachlor	15972-60-	★	P/C	0.596	0.596	HH	★★	carcinogen
aldicarb	116-06-3	7	MC/ST	0.85	0.85	TC	70	central nervous system
aldicarb sulfone	1646-88-4	7	MC/ST	46	46	TC	70	central nervous system
aldicarb sulfoxide	1646-87-3	7	HAL/ST	4.2	4.2	TC	70	central nervous system
aldrin	309-00-2	0.005	PQL/C	*	*	N	0.05	carcinogen
ally [or metsulfuron-	74223-64-	1750	MC/ST	NA	NA		17500	decreased body weight
allyl alcohol	107-18-6	250	PQL/ST	5	5	TC	2500	kidney, liver
allyl chloride	107-05-1	35	MC/ST	NA	NA		350	nerve damage
aluminum	7429-90-5	★	S/	13	13	TC	★★	altered body weight
aluminum phosphide (as	20859-73-	50	PQL/ST	6.5	6.5	TC	500	body weight and clinical parameters
ametryn	834-12-8	63	MC/ST	6.2	6.2	TC	630	liver
ammonia	7664-41-7	2800	MC/ST	*	NA	N	28000	sensory (taste threshold)
ammonium sulfamate	7773-06-0	1400	MC/ST	10150	10150	TC	14000	decreased body weight
anilazine	101-05-3	100	PQL/ST	NA	NA		1000	OPP RfD
aniline	62-53-3	6.1	MC/C	4	4	TC	61	carcinogen
anthracene	120-12-7	2100	MC/ST	0.3	0.3	TC	21000	no observed effects
antimony	7440-36-0	6	P/ST	*	*	N	60	blood
antimony pentoxide (as Sb)	1314-60-9	3.5	MC/ST	NA	NA		35	blood, increased mortality
antimony potassium tartrate (as Sb)	304-61-0	6.3	MC/ST	NA	NA		63	blood, increased mortality
antimony tetroxide (as Sb)	1332-81-6	2.8	MC/ST	NA	NA		28	blood, increased mortality
antimony trioxide (as Sb)	1309-64-4	2.8	MC/ST	3	3	TC	28	blood, increased mortality
aramite	140-57-8	10	PQL/C	3	3	TC	100	carcinogen
Aroclor [or polychlorinated biphenyls (PCBs)]	1336-36-3	0.5	P/C	NA	NA		.5	carcinogen
arsenic	7440-38-2	★	P/C	*	*	N	★★	carcinogen
atrazine	1912-24-9	★	P/C	1.8	1.8	HH	★★	carcinogen
azobenzene	103-33-3	4	PQL/C	0.559	0.559	HH	40	carcinogen
barium	7440-39-3	★	P/ST	*b*	*b*	#	★★	increased blood pressure

Table I
Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
baygon [or propoxur]	114-26-1	5	POL/ST	0.35	0.35	TC	50	blood, central nervous system
bayleton	43121-43-	210	MC/ST	500	500	TC	2100	blood, decreased weight gain
baythroid	68359-37-	175	MC/ST	0.015	0.015	TC	1750	decreased body weight, kidney
bendiocarb	22781-23-	35	MC/ST	NA	NA		350	blod, eyes
benefin	1861-40-1	2100	MC/ST	40	40	TC	21000	blood
benomyl	17804-35-	35	MC/ST	0.3	0.3	TC	350	decreased offspring weights
bensulide	741-58-2	46.2	MC/ST	NA	NA		462	OPP RfD
bentazon	25057-89-	17.5	MC/ST	NA	NA		175	prostate
benzaldehyde	100-52-7	700	MC/ST	53.5	53.5	TC	7000	kidney, stomach
benzene	71-43-2	★	P/C	*	*	N	★★	carcinogen
benzenethiol	108-98-5	20	POL/ST	NA	NA		200	liver
benzidine	92-87-5	400	POL/C	NA	NA		4000	carcinogen
benzo(a)anthracene	56-55-3	0.2	POL/C	*	*	N	2	carcinogen
benzo(a)pyrene	50-32-8	★	P/C	*	*	N	★★	carcinogen
benzo(b)fluoranthene	205-99-2	0.2	POL/C	*	*	N	2	carcinogen
benzo(g,h,i)perylene	191-24-2	210	MC/ST(a)	*	*	N	2100	central nervous system
benzo(k)fluoranthene	207-08-9	0.5	MC/C	*	*	N	5	carcinogen
benzoic acid	65-85-0	28000	MC/ST	9000	9000	TC	280000	none observed
benzotrichloride	98-07-7	0.06	POL/C	0.0029	0.0029	HH	0.6	carcinogen
benzyl alcohol	100-51-6	2100	MC/ST	500	500	TC	21000	eye, stomach
benzyl chloride	100-44-7	0.5	POL/C	2.95	2.95	HH	5	carcinogen
beryllium	7440-41-7	★	P/C	*	*	N	★	carcinogen
beta radiation		★	P	NA	NA		★	NA
betanal [or phenmedipham]	13684-63-	1750	MC/ST	199	199	TC	17500	no adverse effects
bidrin [or dicrotophos]	141-66-2	1	MDL/ST	21.5	21.5	TC	10	decreased offspring survival
bioallethrin	28057-48-	35	MC/ST	NA	NA		350	alteration of clinical chemistries, liver
biphenyl, 1,1- [or diphenyl]	92-52-4	0.5	O/ST	18	18	TC	5	kidney
bis(2-chloro-1-methylethyl)ether	108-06-1	10	PQL/C	0.5	0.5	HH	100	carcinogen
bis(2-chloroethyl)ether	111-44-4	4	PQL/C	9.99	9.99	HH	40	carcinogen
bis(2-chloroisopropyl)ether	39638-32-	280	MC/C	7	7	HH	2800	blood
bis(2-ethylhexyl)adipate	103-23-1	★	P/C	NA	NA		★★	carcinogen
bis(2-ethylhexyl)phthalate	117-81-7	★	P/C	0.02	0.02	HH	★★	carcinogen
bisphenol A	80-05-7	350	MC/ST	55	55	TC	3500	decreased body weight
Blazer [or acifluorfen,	62476-59-	1	HAL/ST	190	190	TC	10	increased mortality, kidney
boron	7440-42-8	630	HAL/ST	NA	NA		6300	male reproductive, respiratory
bromacil	314-40-9	91	HAL/ST	97	97	TC	910	decreased body weight
bromochloromethane	74-97-5	91	HAL/ST	NA	NA		910	NA
bromodichloromethane	75-27-4	1	POL/C	*	*	N	10	carcinogen
bromoform	75-25-2	4.4	MC/C	*	*	N	44	carcinogen

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B & C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
bromomethane [or methyl bromide]	74-83-9	9.8	MC/ST	35	35	TC	98	stomach
bromophenyl phenyl ether,	101-55-3	406	MC/ST	NA	NA		4060	REG III RfD
bromoxynil	1689-84-5	140	MC/ST	NA	NA		1400	none observed
bromoxynil octanoate	1689-99-2	140	MC/ST	NA	NA		1400	none observed
butanol, 1-	71-36-3	700	MC/ST	25000	25000	TC	7000	central nervous system
butanone, 2- [or MEK]	78-93-3	4200	MC/ST	120000	120000	TC	42000	fetus
butyl acetate, n-	123-86-4	43	O/	1000	1000	TC	430	organoleptic
butyl benzyl phthalate, N-	85-68-7	140	MC/ST	25.5	25.5	TC	1400	liver
butylate	2008-41-5	350	MC/ST	10.5	10.5	TC	3500	liver
butylphthalyl butylglycolate	85-70-1	7000	MC/ST	NA	NA		70000	none observed
cacodylic acid (as As)	75-60-5	21	MC/ST	850	850	TC	210	calculated by analogy to arsenic
cadmium	7440-43-9	★	P/C	*a*	*	N	★★	kidney, liver/carcinogen
calcium cyanide	592-01-8	280	MC/ST	NA	NA		2800	nerve damage, thyroid, weight loss
captafol	2425-06-1	100	PQL/C	0.85	0.85	TC	1000	carcinogen
captan	133-06-2	250	PQL/C	1.9	1.9	TC	2500	carcinogen
carbaryl	63-25-2	700	MC/ST	0.06	0.06	TC	7000	kidney, liver
carbazole	86-74-8	4	PQL/C	46.5	46.5	TC	40	carcinogen
carbofuran	1563-66-2	★	P/ST	0.1	0.1	TC	★★	blood, reproductive
carbon disulfide	75-15-0	700	MC/ST	105	105	TC	7000	fetus
carbon tetrachloride	56-23-5	★	P/C	*	*	N	★★	carcinogen
carbophenothion	786-19-6	0.9	MC/ST	0.1	0.1	TC	9	blood, central nervous system
carboxin	5234-68-4	700	MC/ST	60	60	TC	7000	decreased body weight, increased mortality, organ weight
chloral	75-87-6	14	MC/ST	NA	NA		140	liver
chloramben	133-90-4	105	MC/ST	NA	NA		1050	liver
chlordane	57-74-9	★	P/C	*	*	N	★★	carcinogen
chloride	16887-00-	★	S/	*b*	*b*	N	★★	NA
chlorine	7782-50-5	700	MC/ST	*	*	N	7000	none observed
chlorine cyanide	506-77-4	350	MC/ST	1.45	1.45	TC	3500	none observed
chlorite	7758-19-2	100	PQL/ST	29	29	TC	1000	neurobehavioral
chloro-1,3-butadiene [or Chloroprene]	126-99-8	140	MC/ST	NA	NA		1400	respiratory (olfactory epithelium)
chloro-3-methyl phenol, 4- [or chloro-m-cresol, p-]	59-50-7	63	MC/ST	100	100	TC	630	decreased weight gain
chloro-m-cresol, p- [or 4-chloro-3-methyl phenol]	59-50-7	63	MC/ST	NA	NA		630	brain
chloroacetic acid	79-11-8	14	MC/ST	NA	NA		140	heart
chloroaniline, 4-	106-47-8	28	MC/ST	2.5	2.5	TC	280	spleen
chlorobenzene	108-90-7	★	P/ST	17	17	TC	★★	kidney, liver
chlorobenzilate	510-15-6	0.4	PQL/C	0.09	0.09	HH	4	carcinogen
chlorodibromomethane	124-48-1	0.4	MC/C	NA	NA		4	carcinogen

Table I
Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
chloroethane [or ethyl	75-00-3	2800	MC/ST	NA	NA		28000	fetus
chloroethylvinylether, 2-	110-75-8	175	MC/ST	NA	NA		1750	NA
chloroform	67-66-3	5.7	MC/C	*	*	N	57	carcinogen
chloromethane	74-87-3	2.7	MC/C	*	*	N	27	carcinogen
chloronaphthalene, beta-	91-58-7	560	MC/ST	NA	NA		5600	liver, respiratory
chloronitrobenzene, o-	88-78-3	1.4	MC/C	NA	NA		14	carcinogen
chloronitrobenzene, p-	100-00-5	250	PQL/C	107	107	TC	2500	carcinogen
chlorophenol, 2-	95-57-8	35	MC/ST	130	130	TC	350	reproductive
chlorophenol, 3-	108-43-0	10	PQL/O(f)	173.5	173.5	TC	100	reproductive
chlorophenol, 4-	106-48-9	5.5	POL/O(f)	175	175	TC	55	reproductive
chloropicrin	76-06-2	7.3	O/	NA	NA		73	organoleptic
chloroprene [or chloro-1,3-butadiene]	126-99-8	140	MC/ST	NA	NA		1400	respiratory (olfactory epithelium)
chlorothalonil	1897-45-6	3.2	MC/C	0.8	0.8	TC	32	carcinogen
chlorotoluene, o-	95-49-8	140	MC/ST	390	390	TC	1400	decreased body weight
chlorotoluene, p-	106-43-4	140	HAL/ST	NA	NA		1400	decreased body weight
chlorpropham	101-21-3	1400	MC/ST	190	190	TC	14000	bone marrow, kidney, liver, spleen
chlorpyrifos	2921-88-2	21	MC/ST	0.002	0.002	TC	210	blood
chlorpyrifos-methyl	5598-13-0	70	MC/ST	0.035	0.035	TC	700	decreased fertility
chlorsulfuron	64902-72-	350	MC/ST	16	16	TC	3500	decreased body weight
chromium III	16065-83-	★	P/ST	a	515	##	★★	none observed
chromium VI	18540-29-	★	P/C	*	*	N	★★	carcinogen
chromium, total		★	P/	NA	NA		★★	carcinogen
chrysene	218-01-9	4.8	MC/C	*	*	N	48	carcinogen
cobalt	7440-48-4	420	MC/ST	NA	NA		4200	NA
copper	7440-50-8	1000	S/ST	*	*	N	10000	NA
copper cyanide	544-92-3	35	MC/ST	NA	NA		350	decreased body and organ weight, kidney, liver
coumaphos	56-72-4	1.8	MC/ST	0.004	0.004	TC	18	blood
crotonaldehyde	123-73-9	0.02	MC/C	NA	NA		0.2	carcinogen
cumene [or isopropyl	98-82-8	0.8	O/ST	255	255	TC	8	kidney
cyanazine	21725-46-	0.5	POL/C	5.5	5.5	TC	5	carcinogen
cyanide	57-12-5	★	P/ST	*	*	N	★★	central nervous system, thyroid
cyanogen	460-19-5	10000	POL/ST	NA	NA		100000	decreased body weight, nerve damage, thyroid
cycloate	1134-23-2	35	MC/ST	130	130	TC	350	nerve damage
cyclohexanone	108-94-1	35000	MC/ST	26350	26350	TC	350000	decreased body weight
cyclohexylamine	108-91-8	5000	POL/ST	4000	4000	TC	50000	decreased weight gain, testis
cypermethrin	52315-07-	7	MC/ST	0.0005	0.0005	TC	70	GI disturbances
dacthal [or DCPA]	1861-32-1	70	MC/ST	310	310	TC	700	kidney, liver, lung, thyroid
dalapon	75-99-0	★	P/ST	5000	5000	TC	★★	kidney
DBCP [or dibromo-3-chloropropane 1,2-]	96-12-8	★	P/C	NA	NA		★★	carcinogen

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Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
DCPA [or dacthal]	1861-32-1	70	MC/ST	310	310	TC	700	kidney, liver, lung, thyroid
DDD, 4,4'-	72-54-8	0.1	MC/C	0.003	0.003	HH	1	carcinogen
DDE, 4,4'-	72-55-9	0.1	MC/C	0.0006	0.0006	HH	1	carcinogen
DDT, 4,4'-	50-29-3	0.1	MC/C	*	*	N	1	carcinogen
decabromodiphenyl ether	1163-19-5	7	MC/ST	NA	NA		70	carcinogen
DEET	134-62-3	6300	MC/ST	NA	NA		63000	decreased body weight
demeton	8065-48-3	0.5	PQL/ST	1.35	1.35	TC	5	blood, optic nerve
di(2-ethylhexyl)adipate	103-23-1	★	P/C	33	33	TC	★★	carcinogen
di-n-butylphthalate	84-74-2	700	MC/ST	23	23	TC	7000	increased mortality
di-n-octylphthalate	117-84-0	140	MC/ST	NA	NA		1400	kidney, liver
diallate	2303-16-4	0.6	MC/C	NA	NA		6	carcinogen
diazinon	333-41-5	6.3	MC/ST	0.002	0.002	TC	63	blood
dibenz(a,h)anthracene	53-70-3	0.2	PQL/C	*	*	N	2	carcinogen
dibenzofuran	132-64-9	28	MC/ST	67	67	TC	280	NA
dibromo-3-chloropropane, 1,2- [or DBCP]	96-12-8	★	P/C	NA	NA		★★	carcinogen
dibromoacetonitrile		14	HAL/ST	NA	NA		140	HAL RfD
dibromobenzene, 1,4-	106-37-6	70	MC/ST	590	590	HH	700	carcinogen
dibromochloromethane	124-48-1	0.4	MC/C	*	*	N	4	carcinogen
dibromoethane, 1,2- [or	106-93-4	★	P/C	13	13	TC	★★	carcinogen
dibutyl phthalate	84-74-2	700	MC/ST	NA	NA		7000	increased mortality
dicamba	1918-00-9	210	MC/ST	195	195	TC	2100	fetus
dichloroacetic acid	79-43-6	28	HAL/C	1150	1150	TC	280	carcinogen
dichloroacetonitrile	3018-12-0	5.6	HAL/ST	NA	NA		56	HAL RfD
dichlorobenzene, 1,2-	95-50-1	★	P/ST	99	99	TC	★★	no adverse effects observed
dichlorobenzene, 1,3-	541-73-1	10	MC/O	85	85	TC	100	NA
dichlorobenzene, 1,4-	106-46-7	★	P/C	100	100	TC	★★	carcinogen
dichlorobenzidine, 3,3'-	91-94-1	12	PQL/C	0.06	0.06	HH	120	carcinogen
dichlorodifluoromethane	75-71-8	1400	MC/ST	NA	NA		14000	decreased body weight
dichloroethane, 1,1-	75-34-3	70	MC/ST	NA	NA		700	central nervous system, kidney
dichloroethane, 1,2- [or	107-06-2	★	P/C	5	5	HH	★★	carcinogen
dichloroethene, 1,1-	75-35-4	★	P/C	*	*	N	★★	carcinogen
dichloroethene, 1,2-	540-59-0	63	MC/ST	7000	7000	TC	630	carcinogen
dichloroethene, cis-1,2-	156-59-2	★	P/ST	NA	NA		★★	blood, liver
dichloroethene, trans-1,2-	156-60-5	★	P/ST	11000	11000	TC	★★	blood, liver
dichlorophenol, 2,3-	576-24-9	10	PQL/O(g)	56	56	TC	100	immune system
dichlorophenol, 2,4-	120-83-2	4	PQL/O(g)	13	13	TC	40	immune system
dichlorophenol, 2,5-	583-78-8	10	PQL/O(g)	90	90	TC	100	immune system
dichlorophenol, 2,6-	87-65-0	4	PQL/O(g)	73	73	TC	40	immune system
dichlorophenol, 3,4-	95-77-2	10	PQL/O(g)	61	61	TC	100	immune system

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Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
dichlorophenoxy acetic acid, 2,4-	94-75-7	★	P/ST	80	80	TC	★★	blood, kidney, liver
dichlorophenoxy)butyric acid, 4-(2,4- [2,4-DB]	94-82-6	56	MC/ST	NA	NA		560	internal hemorrhage, mortality
dichloropropane, 1,2-	78-87-5	★	P/C	2600	2600	TC	★★	carcinogen
dichloropropene, 1,3-	542-75-6	0.2	PQL/C	12	12	TC	2	carcinogen
dichlorprop	120-36-5	35	MC/ST	42	42	TC	350	kidney, liver
dichlorvos	62-73-7	0.1	MC/C	0.005	0.005	TC	1	carcinogen
dicofol	115-32-2	0.4	PQL/C	0.003	0.003	HH	4	carcinogen
dicrotophos [or bidrin]	141-66-2	1	MDL/ST	21.5	21.5	TC	10	decreased offspring survival
dieldrin	60-57-1	0.005	PQL/C	*	*	N	0.05	carcinogen
diethylene glycol monoethyl ether	111-90-0	14000	MC/ST	167000	167000	TC	140000	kidney
diethylphthalate	84-66-2	5600	MC/ST	380	380	TC	56000	brain, decreased growth rate, kidney, liver
diethylstilbestrol	56-53-1	100	PQL/C	NA	NA		1000	carcinogen
diisopropyl methylphosphonate [or	1445-75-6	560	MC/ST	13350	13350	TC	5600	no observed effects
dimethoate	60-51-5	5	PQL/ST	0.1	0.1	TC	50	brain
dimethoxybenzidine, 3,3'-	119-90-4	250	PQL/C	NA	NA		2500	carcinogen
dimethrin	70-38-2	2100	HAL/ST	1.1	1.1	TC	21000	NA
dimethylaniline, 2,4-	95-68-1	0.05	MC/C	1650	1650	TC	0.5	carcinogen
dimethylaniline, N,N-	121-69-7	50	PQL/ST	1650	1650	TC	500	spleen
dimethylbenzidine, 3,3'-	119-93-7	160	PQL/C	NA	NA		1600	carcinogen
dimethylformamide, N,N-	68-12-2	700	MC/ST	50000	50000	TC	7000	liver
dimethylphenol, 2,4-	105-67-9	140	MC/ST	261	261	HH	1400	central nervous system, blood
dimethylphenol, 2,6-	576-26-1	4.2	MC/ST	560	560	TC	42	body weight changes, kidney, liver, spleen
dimethylphenol, 3,4-	95-65-8	7	MC/ST	436	436	HH	70	changes in blood pressure and body weight, liver spleen,
dimethylphthalate	131-11-3	70000	MC/ST	1450	1450	TC	700000	kidney
DIMP [or diisopropyl methylphosphonate]	1445-75-6	560	MC/ST	13350	13350	TC	5600	no observed effects
dinitro-o-cyclohexyl phenol, 4,6-	131-89-5	100	PQL/ST	NA	NA		1000	eye
dinitrobenzene, 1,2- (o-)	528-29-0	200	PQL/ST	30	30	TC	2000	spleen
dinitrobenzene, 1,3- (m-)	99-65-0	8	PQL/ST	72	72	TC	80	spleen
dinitrobenzene, 1,4- (p-)	100-25-4	50	PQL/ST	30	30	TC	500	spleen
dinitrophenol, 2,4-	51-28-5	30	MC/ST	3	3	TC	300	eye
dinitrotoluene (mixture)		0.2	PQL/C	NA	NA		2	carcinogen
dinitrotoluene, 2,4-	121-14-2	0.2	PQL/C	*	*	N	2	carcinogen
dinitrotoluene, 2,6-	606-20-2	0.1	PQL/C	4	4	HH	1	carcinogen
dinoseb	88-85-7	★	P/ST	5.9	5.9	TC	★★	fetus
dioxane, 1,4-	123-91-1	5	PQL/C	245	245	HH	50	carcinogen

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B & C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
dioxin [or 2,3,7,8-TCDD]	1746-01-6	★	P/C	*	*	N	★★	carcinogen
diphenamid	957-51-7	210	MC/ST	1600	1600	TC	2100	liver
diphenyl [or 1,1-biphenyl]	92-52-4	0.5	O/ST	18	18	TC	5	kidney
diphenylamine, N,N-	122-39-4	175	MC/ST	NA	NA		1750	decreased weight gain, kidney, liver
diphenylhydrazine, 1,2-	122-66-7	10	PQL/C	0.38	0.38	HH	100	carcinogen
diquat	85-00-7	20	P/ST	1.5	1.5	TC	200	eye
disulfoton	298-04-4	0.3	MC/ST	0.3	0.3	TC	3	blood, eye
diuron	330-54-1	14	MC/ST	8	8	TC	140	blood
EDB [or dibromoethane,	106-93-4	★	P/C	13	13	TC	★★	carcinogen
EDC [or dichloroethane,	107-06-2	★	P/C	5	5	HH	★★	carcinogen
endosulfan	115-29-7	42	MC/ST	*	*	N	420	blood vessels, decreased weight gain, kidney
endothall	145-73-3	★	P/ST	105	105	TC	★★	small intestine, stomach
endrin	72-20-8	★	P/ST	*	*	N	★★	central nervous system, liver
EPEG [or ethylphthalyl ethylglycolate]	84-72-0	21000	MC/ST	NA	NA		210000	kidney, reduced lifespan
epichlorohydrin	106-89-8	3.5	MC/C	272	272	HH	35	carcinogen
EPN [or ethyl p-nitrophenyl phenylphosphorothioate]	2104-64-5	0.2	PQL/ST	0.015	0.015	TC	2	central nervous system
EPTC [or ethyl dipropylthiocarbamate, S-]	759-94-4	175	MC/ST	235	235	TC	1750	heart
ethion	563-12-2	3.5	MC/ST	0.007	0.007	TC	35	blood
ethoprop	13194-48-	0.7	MC/ST	0.315	0.315	TC	7	blood
ethoxyethanol acetate, 2-	111-15-9	2100	MC/ST	2000	2000	TC	21000	fetus
ethoxyethanol, 2-	110-80-5	25000	PQL/ST	NA	NA		250000	blood, male reproductive
ethyl acetate	141-78-6	6300	MC/ST	6250	6250	TC	63000	decreased body weight, increased mortality
ethyl acrylate	140-88-5	5000	PQL/C	125	125	TC	50000	carcinogen
ethyl chloride [or	75-00-3	12	MC/C	NA	NA		120	carcinogen
ethyl dipropylthiocarbamate, S-	759-94-4	175	MC/ST	235	235	TC	1750	heart
ethyl ether	60-29-7	750	O/ST	128000	128000	TC	7500	liver
ethyl methacrylate	97-63-2	630	MC/ST	NA	NA		6300	kidney
ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	2104-64-5	0.2	PQL/ST	0.015	0.015	TC	2	central nervous system
ethylbenzene	100-41-4	★	S/ST	605	605	TC	★★	central nervous system, kidney, liver
ethylene diamine	107-15-3	10000	PQL/ST	800	800	TC	100000	blood, heart
ethylene glycol	107-21-1	14000	MC/ST	16300	16300	TC	140000	fetus
ethylene oxide	75-21-8	10	PQL/C	4200	4200	TC	100	carcinogen
ethylene thiourea [or ETU]	96-45-7	5	PQL/C	1320	1320	TC	50	carcinogen
ethylphthalyl ethylglycolate [or EPEG]	84-72-0	21000	MC/ST	NA	NA		210000	kidney, reduced lifespan

Table I
Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
ETU [or ethylene thioureal	96-45-7	5	POL/C	1320	1320	TC	50	carcinogen
famphur	52-85-7	3.5	MC/ST	NA	NA		35	blood
fenamiphos	22224-92-	1.8	MC/ST	0.225	0.225	TC	18	blood, central nervous system
fenamiphos metabolites	No CAS#	0.9	MC/ST	NA	NA		9	blood, central nervous system
fensulfothion	115-90-2	1.8	MC/ST	0.5	0.5	TC	18	blood
fluometuron	2164-17-2	91	MC/ST	190	190	TC	910	no adverse effect
fluoranthene	206-44-0	280	MC/ST	0.3	0.3	TC	2800	blood, kidney, liver
fluorene	86-73-7	280	MC/ST	30	30	TC	2800	blood
fluoride	16984-58-	★	S/ST	*	*	N	★★	dental
fluoridone	59756-60-	560	MC/ST	105	105	TC	5600	decreased body weight, kidney, testis
fonofos	944-22-9	14	MC/ST	0.095	0.095	TC	140	central nervous system, liver
formaldehyde	50-00-0	600	O/C	105	105	TC	6000	carcinogen
formic acid	64-18-6	14000	MC/ST	4500	4500	TC	140000	decreased growth
furfural	98-01-1	250	POL/ST	650	650	TC	2500	liver
glycialdehyde	765-34-4	2.8	MC/ST	NA	NA		28	decreased body weight, kidney
glyphosate [or Roundup]	1071-83-6	★	P/ST	115	115	TC	★★	kidney
gross alpha radiation	14127-62-	★	P	NA	NA			NA
guthion	86-50-0	10.5	MC/ST	*	*	N	105	blood
heptachlor	76-44-8	★	P/C	*	*	N	★★	carcinogen
heptachlor epoxide	1024-57-3	★	P/C	0.002	0.002	TC	★★	carcinogen
hexachloro-1,3-butadiene	87-68-3	★	MC/C	*	*	N	★★	carcinogen
hexachlorobenzene	118-74-1	1	P/C	0.00036	0.00036	HH	10	carcinogen
hexachlorocyclohexane, technical-	608-73-1	0.02	MC/C	0.017	0.017	TC	0.2	carcinogen
hexachlorocyclohexanone, alpha- (α-BHC) or (α-	319-84-6	0.006	MC/C	0.0116	0.0116	HH	0.06	carcinogen
hexachlorocyclohexanone, beta- (β-BHC) or (β-HCH)	319-85-7	0.02	MC/C	*	*		0.2	carcinogen
hexachlorocyclohexanone, delta- (δ-BHC) or (δ-HCH)	319-86-8	2.1	MC/ST(b)	NA	NA		21	kidney,liver
hexachlorocyclohexanone, gamma- (γ-BHC) or (γ-HCH) [or lindane]	58-89-9	★	P/C	*	*		2	carcinogen
hexachlorocyclopentadiene	77-47-4	★	P/ST	2.95	2.95	TC	★★	nasal cavity, stomach
hexachlorodibenzo-p-dioxin mixture [HxCDD]	19408-74-3	0.00025	POL/C	NA	NA		0.0025	carcinogen
hexachloroethane	67-72-1	2.5	MC/C	1.1	1.1	HH	25	carcinogen
hexachlorophene	70-30-4	6	POL/ST	1.05	1.05	TC	60	brain, optic nerve, salivary gland
hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	121-82-4	1	POL/C	180	180	TC	10	carcinogen

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
hexane, n-	110-54-3	10	POL/ST	3400	3400	TC	100	male reproductive, nervous system
hexanone, 2- [or methyl butyl ketone]	591-78-6	280	MC/ST	NA	NA		2800	kidney, liver, whole body
hexazinone	51235-04-	231	MC/ST	1020	1020	HH	2310	decreased body weight
hydrogen cyanide (as Cn)	74-90-8	140	MC/ST	3.45	3.45	TC	1400	decreased body weight, nerve damage, thyroid
hydrogen sulfide (as S)	7783-06-4	100	POL/ST	0.1	0.1	TC	1000	GI disturbances
hydroquinone	123-31-9	280	MC/ST	4.5	4.5	TC	2800	blood
indeno(1,2,3-cd)pyrene	193-39-5	0.2	POL/C	*	*	N	2	carcinogen
iprodione	36734-19-	280	MC/ST	153	153	TC	2800	blood, prostrate
iron	7439-89-6	★	S/	*	*	N	★★	NA
isobutyl alcohol	78-83-1	2100	MC/ST	47450	47450	TC	21000	central nervous system
isophorone	78-59-1	37	MC/C	645	645	TC	370	carcinogen
isopropalin	33820-53-	105	MC/ST	13.5	13.5	TC	1050	blood
isopropyl benzene [or	98-82-8	0.8	O/ST	255	255	TC	18	blood
karate [or cylohalothrin, lambda]	98085-85-8	35	MC/ST	5	5	HH	350	decreased body weight gain, decreased weight in offspring
kepone	143-50-0	20	POL/C	NA	NA		200	carcinogen
lead	7439-92-1	★	P/ST	a	*	N	★★	NA
lindane [or hexachlorocyclohexanone, gamma-] (γ-BHC) or (γ-	58-89-9	★	P/C	*	*		★★	carcinogen
linuron	330-55-2	1.4	MC/ST	44.5	44.5	TC	14	blood
lithium	7439-93-2	140	MC/ST	NA	NA		1400	NA
malathion	121-75-5	140	MC/ST	*	*	N	1400	blood
maleic hydrazide	123-33-1	3500	MC/ST	750	750	TC	35000	kidney
malononitrile	109-77-3	0.1	MC/ST	NA	NA		1	liver, spleen
mancozeb	8018-01-7	210	MC/ST	3.5	3.5	TC	2100	thyroid
maneb	12427-38-	75	POL/ST	5.5	5.5	TC	750	thyroid
manganese	7439-96-5	★	S/ST	NA	NA		★★	central nervous system
MEK [or 2-butanone]	78-93-3	4200	MC/ST	120000	120000	TC	42000	fetus
mercuric chloride (as Hg)	7487-94-7	0.2	MC/ST	0.05	0.05	TC	2	autoimmune effects
mercury	7438-97-6	★	P/ST	*	*	N	★★	CNS
mercury, methyl	22967-92-	0.07	MC/ST	NA	NA		0.7	developmental neurologic effects in human infants
merphos	150-50-5	1	POL/ST	NA	NA		10	decreased body weight, nervous system
merphos oxide	78-48-8	0.2	MC/ST	0.23	0.23	TC	2	decreased body weight, nervous system
metalaxyl	57837-19-	420	MC/ST	36.5	36.5	TC	4200	blood, brain, liver
methacrylonitrile	126-98-7	5	POL/ST	NA	NA		50	liver
methamidophos	10265-92-	5	POL/ST	0.000011	0.000011	TC	50	central nervous system
methanol	67-56-1	5000	POL/ST	45037	45037	TC	50000	blood, brain
methidathion	950-37-8	0.7	MC/ST	0.03	0.03	TC	7	liver
methomyl	16752-77-	175	MC/ST	0.95	0.95	TC	1750	kidney

Table I
Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
methoxy-5-nitroaniline, 2-	99-59-2	50	POL/C	NA	NA		500	carcinogen
methoxychlor	72-43-5	★	P/ST	*	*	N	★★	reproduction
methoxyethanol, 2-	109-86-4	100000	PQL/ST	NA	NA		1000000	testis
methyl acetate	79-20-9	5000	PQL/ST	NA	NA		50000	liver
methyl acrylate	96-33-3	210	MC/ST	NA	NA		2100	none observed
methyl bromide [or bromomethane]	74-83-9	9.8	MC/ST	35	35	TC	98	stomach
methyl butyl ketone [or hexanone, 2-]	591-78-6	280	MC/ST	NA	NA		2800	kidney, liver, whole body
methyl isobutyl ketone [or MIBK]	108-10-1	560	MC/ST	23000	23000	TC	5600	kidney, liver, whole body
methyl methyacrylate	80-62-6	25	O/ST	6500	6500	TC	250	kidney
methyl parathion	298-00-0	1.8	MC/ST	0.01	0.01		18	blood
methyl styrene (mixed)	25013-15-	42	MC/ST	NA	NA		420	nasal cavity
methyl styrene, alpha	98-83-9	490	MC/ST	NA	NA		4900	liver, kidney
methyl tert-butyl ether	1634-04-4	35	MC/ST	33600	33600	TC	350	increased prostration, kidney, liver, ocular
methyl-(1,4-chlorophenoxy)propionic acid, 2-	7085-19-0	7	MC/ST	NA	NA		70	OPP RfD
methyl-4-chlorophenoxy acetic acid, 2-	94-74-6	3.5	MC/ST	72	72	TC	35	kidney, liver
methyl-5-nitroaniline, 2-	99-55-8	10	PQL/C	NA	NA		100	carcinogen
methylaniline, 2-	95-53-4	50	PQL/C	26	26	TC	500	carcinogen
methylene bis(2-chloroaniline), 4,4'-	101-14-4	50	PQL/C	NA	NA		500	carcinogen
methylene bromide	74-95-3	70	MC/ST	NA	NA		700	blood
methylene chloride	75-09-2	★	P/C	*	*	N	★★	carcinogen
methylnaphthalene, 1-	90-12-0	20	MC/O(c)	95	95	TC	200	blood
methylnaphthalene, 2-	91-57-6	20	MC/O	30	30	TC	200	blood
methylphenol, 2- (o-cresol)	95-48-7	35	MC/ST	250	250	TC	350	blood, CNS, decreased body weight, kidney, liver
methylphenol, 3- (m-cresol)	108-39-4	35	MC/ST	445	445	TC	350	decreased body weights, central nervous system
methylphenol, 4- (p-cresol)	106-44-5	4	PQL/ST	70	70	TC	40	blood, central nervous system, kidney, liver, respiratory
metolachlor	51218-45-	105	MC/ST	1.08	1.08	TC	1050	decreased weight gain
metribuzin	21087-64-	175	MC/ST	64	64	TC	1750	decreased weight, kidney, liver, mortality
metsulfuron-methyl [or allyl]	74223-64-	1750	MC/ST	NA	NA		17500	decreased body weight
mevinphos	7786-34-7	1.8	MC/ST	0.0475	0.0475	TC	18	blood
MIBK [or methyl isobutyl ketone]	108-10-1	560	MC/ST	23000	23000	TC	5600	kidney, liver, whole body
mirex	2385-85-5	1	MC/ST	25	25	TC	10	liver, thyroid
molinate	2212-67-1	14	MC/ST	17	17	TC	140	reproductive system
molybdenum	7439-98-7	35	MC/ST	NA	NA		350	increased uric acid levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
naled	300-76-5	14	MC/ST	0.018	0.018	TC	140	central nervous system
naphthalene	91-20-3	20	O/ST	26	26	TC	200	blood
naphthylamine, 2-	91-59-8	10	PQL/C	NA	NA		100	carcinogen
napropamide	15299-99-	700	MC/ST	210	210	TC	7000	decreased weight gain
nickel	7440-02-0	★	P/ST	*	*	N	★★	decreased body weight, female reproductive, kidney, liver,
nickel subsulfide (as Ni)	12035-72-	★	P/C	*	*	N	★★	carcinogen
nitrate	14797-55-	★	P/	*b*	*b*	N	★★	blood
nitrate + nitrite		★	P/	*b*	*b*	N	★★	blood
nitrite	14797-65-	★	P/	*b*	*b*	N	★★	blood
nitroaniline, m- (3-)	99-09-2	50	PQL/ST	NA	NA		500	REG III RfD
nitroaniline, o-	88-74-4	50	PQL/ST	NA	NA		500	blood
nitroaniline, p-	100-01-6	21	MC/ST	1200	1200	TC	210	NA
nitrobenzene	98-95-3	4	PQL/ST	90	90	TC	40	adrenal, blood, kidney, liver
nitrophenol, 4-	100-02-7	56	MC/ST	55	55	TC	560	HAL RfD
nitroso-di-ethylamine, N-	55-18-5	4	PQL/C	0.18	0.18	HH	40	carcinogen
nitroso-di-n-butylamine, N-	924-16-3	4	PQL/C	0.16	0.16	HH	40	carcinogen
nitroso-di-n-propylamine, N-	621-64-7	4	PQL/C	0.83	0.83	HH	40	carcinogen
nitroso-dimethylamine, N-	62-75-9	2	PQL/C	0.53	0.53	HH	20	carcinogen
nitroso-diphenylamine, N-	86-30-6	7	MC/C	44	44	HH	70	carcinogen
nitroso-N-	10595-95-	8	PQL/C	1.22	1.22	HH	80	carcinogen
nitrosopyrrolidine, N-	930-55-2	8	PQL/C	NA	NA		80	carcinogen
nitrotoluene, m-	99-08-1	250	PQL/ST	375	375	TC	2500	spleen
nitrotoluene, o-	88-72-2	250	PQL/ST	550	550	TC	2500	spleen
nitrotoluene, p-	99-99-0	250	PQL/ST	550	550	TC	2500	spleen
norflurazon	27314-13-	280	MC/ST	NA	NA		2800	liver, thyroid
octahydro-1357-tetranitro-1357-tetrazocine [HMX]	2691-41-0	350	MC/ST	1250	1250	TC	3500	blood
octamethylpyrophosphoramide	152-16-9	1000	PQL/ST	NA	NA		10000	blood
oryzalin	19044-88-	350	MC/ST	NA	NA		3500	blood, liver, kidney
oxadiazon	19666-30-	35	MC/ST	44	44	TC	350	liver
oxamyl	23135-22-	200	P/ST	8.5	8.5	TC	2000	decreased body weight gain and food consumption
paraquat	1910-42-5	31.5	MC/ST	47	47	TC	315	respiratory
parathion	56-38-2	42	MC/ST	*	*	N	420	blood
PCBs [or Aroclor; or polychlorinated biphenyls]	1336-36-3	★	P/C	*	*	N	★★	carcinogen
PCE [or tetrachloroethene]	127-18-4	★	P/C	80	80	TC	★★	carcinogen
pebulate	1114-71-2	350	MC/ST	305	305	TC	3500	blood
pendimethalin	40487-42-	280	MC/ST	10	10	TC	2800	blood, liver
pentachlorobenzene	608-93-5	5.6	MC/ST	1.7	1.7	HH	56	kidney, liver
pentachloronitrobenzene	82-68-8	12	PQL/C	0.04	0.04	HH	120	carcinogen
pentachlorophenol	87-86-5	★	P/C	*	*	N	★★	carcinogen

Table I
Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
permethrin	52645-53-	350	MC/ST	0.001	0.001	TC	3500	liver
phenanthrene	85-01-8	210	MC/ST(a)	*	*	N	2100	central nervous system, decreased body weight, liver
phenmedipham [or betanal]	13684-63-	1750	MC/ST	199	199	TC	17500	no adverse effects
phenol	108-95-2	10	O/ST	6.5	6.5	TC	100	central nervous system, female reproductive, lung, fetus
phenylenediamine, m-	108-45-2	42	MC/ST	NA	NA		420	liver
phenylenediamine, o-	95-54-5	0.7	MC/C	NA	NA		7	carcinogen
phenylenediamine, p-	106-50-3	1330	MC/ST	NA	NA		13300	whole body
phenylphenol, 2-	90-43-7	18	MC/C	35.5	35.5	TC	180	carcinogen
phorate	298-02-2	1.4	MC/ST	0.0055	0.0055		14	central nervous system
phosmet	732-11-6	140	MC/ST	0.1	0.1	TC	1400	central nervous system, decreased body weight, liver
phosphine	7803-51-2	125	PQL/ST	NA	NA		1250	altered body weight
phthalic acid, p-	100-21-0	7000	MC/ST	NA	NA		70000	NA
phthalic anhydride	85-44-9	14000	MC/ST	NA	NA		140000	kidney, lung
picloram	1918-02-1	★	P/ST	70	70	TC	★★	liver
polychlorinated biphenyls (PCBs) [or Aroclor]	1336-36-3	★	P/C	NA	NA		★★	carcinogen
potassium cyanide	151-50-8	350	MC/ST	5.5	5.5	TC	3500	nerve damage, thyroid, weight loss
profluralin	26399-36-	42	MC/ST	NA	NA		420	none observed
prometon	1610-18-0	105	MC/ST	600	600	TC	1050	none observed
prometryn	7287-19-6	28	MC/ST	21	21	TC	280	bone marrow, kidney, liver
pronamide	23950-58-	53	MC/ST	NA	NA		530	none observed
propachlor	1918-16-7	91	MC/ST	11.5	11.5	TC	910	decreased weight gain
propanil	709-98-8	35	MC/ST	20	20	TC	350	spleen
propargite	2312-35-8	140	MC/ST	1.55	1.55	TC	1400	none observed
propazine	139-40-2	14	MC/ST	185	185	TC	140	decrease in body weight
propham	122-42-9	140	MC/ST	500	500	TC	1400	central nervous system, spleen
propiconazole	60207-90-	90	MC/ST	25.5	25.5	TC	900	gastric irritation
propoxur [or baygon]	114-26-1	5	PQL/ST	0.35	0.35	TC	50	blood, central nervous system
propylene glycol	57-55-6	140000	MC/ST	35500	35500	TC	1400000	blood
propylene glycol monoethyl ether	1569-02-4	4900	MC/ST	NA	NA		49000	decreased weight gain
propylene oxide	75-56-9	5000	PQL/C	NA	NA		50000	carcinogen
pydrin	51630-58-	1750	MC/ST	0.00035	0.00035	TC	17500	neurological dysfunction
pyrene	129-00-0	210	MC/ST	0.3	0.3	TC	2100	central nervous system, decreased body weight, kidney
pyridine	110-86-1	7	PQL/ST	1300	1300	TC	70	liver
radium, 226 and 228	7440-14-4	★	P	NA	NA			NA
RDX [or hexahydro-1,3,5-trinitro-1,3,5-triazine]	121-82-4	1	PQL/C	180	180	TC	10	carcinogen
resmethrin	10453-86-	210	MC/ST	0.0026	0.0026	TC	2100	reproductive
ronnel	299-84-3	350	MC/ST	0.061	0.061	TC	3500	blood, central nervous system, liver
rotenone	83-79-4	28	MC/ST	0.115	0.115	TC	280	decreased offspring weight

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Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
Roundup [or glyphosate]	1071-83-6	★	P/ST	115	115	TC	★★	kidney
selenious acid (as Se)	7783-00-8	35	MC/ST	40	40	TC	350	selenosis
selenium	7782-49-2	★	P/ST	*	*	N	★★	central nervous system, gastrointestinal, skin
silver	7440-22-4	★	S/ST	*	0.35	##	★★	heart, liver, skin
silvex [or trichlorophenoxy proprionic acid, 2(2,4,5)-]	93-72-1	★	P/ST	NA	NA		★★	liver
simazine	122-34-9	★	P/C	5.8	5.8	HH	★★	carcinogen
sodium	7440-23-5	★	P	**	**	N	★★	NA
sodium cyanide (as Cn)	143-33-9	280	MC/ST	3.79	3.79	TC	2800	central nervous system
strontium	7440-24-6	4200	MC/ST	NA	NA		42000	bone
strychnine	57-24-9	100	PQL/ST	38	38	TC	1000	unspecified toxicity/histopathology
styrene	100-42-5	★	P/ST	455	455	TC	★★	blood, liver
sulfate	14808-79-	★	S/	*b*	*b*		★★	NA
TCE [or trichloroethene]	79-01-6	★	P/C	*	*	N	★★	carcinogen
tebuthiruon	34014-18-	490	MC/ST	307	307	TC	4900	decreased body weight gain
temephos	3383-96-8	140	MC/ST	0.002	0.002	TC	1400	none observed
terbacil	5902-51-2	91	MC/ST	2450	2450	TC	910	liver, thyroid
terbufos	13071-79-	0.5	PQL/ST	0.01	0.01	TC	5	central nervous system
terbutryn	886-50-0	330	PQL/ST	3.1	3.1	TC	3300	blood
tetrachlorobenzene, 1,2,4,5-	95-94-3	4	PQL/ST	2.3	2.3	HH	40	kidney
tetrachloroethane, 1,1,1,2-	630-20-6	1	MC/C	*	*	N	10	carcinogen
tetrachloroethane, 1,1,2,2-	79-34-5	0.5	PQL/C	*	*	N	5	carcinogen
tetrachloroethene [or PCE]	127-18-4	★	P/C	80	80	TC	★★	carcinogen
tetrachlorophenol, 2,3,4,6-	58-90-2	210	MC/ST	4.5	4.5	TC	2100	liver
tetraethyl	3689-24-5	3.5	POL/ST	0.0115	0.0115	TC	35	blood
thallium	7440-28-0	★	P/	6.3	6.3	TC	★★	blood, hair, liver
thallium acetate (as Tl)	563-68-8	0.6	MC/ST	NA	NA		6	blood, hair, liver
thallium carbonate (as Tl)	6533-73-9	0.6	MC/ST	NA	NA		6	blood, hair, liver
thallium chloride (as Tl)	7791-12-0	0.6	MC/ST	NA	NA		6	blood, hair, liver
thallium nitrate (as Tl)	10102-45-	0.6	MC/ST	NA	NA		6	blood, hair, liver
thallium sulfate (as Tl)	7446-18-6	0.6	MC/ST	26	26	TC	6	blood, hair, liver
thiocyanomethylthio)-benzothiazole, 2-(	21564-17-0	210	MC/ST	0.435	0.435	TC	2100	stomach
thiram	137-26-8	35	MC/ST	0.168	0.168	TC	350	reproduction
tin	7440-31-5	4200	MC/ST	NA	NA		42000	kidney, liver
toluene	108-88-3	★	S/ST	475	475	TC	★★	kidney, liver
toluene-2,4-diamine	95-80-7	100	PQL/C	NA	NA		1000	carcinogen
toluidine, p-	106-49-0	150	PQL/C	NA	NA		1500	carcinogen
total dissolved solids	C-010	★	S/	NA	NA		★★	NA
toxaphene	8001-35-2	3	P/C	*	*	N	30	carcinogen
triallate	2303-17-5	91	MC/ST	65	65	TC	910	liver, spleen

Table I
Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B & C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
tributyltin oxide (as Sn)	56-35-9	10	PQL/ST	0.05	0.05	TC	100	immune system
[TRTO]								
trichloro-1,2,2,-trifluoroethane, 1,1,2-	76-13-1	500000	PQL/ST	NA	NA		5000000	psychomotor impairment
trichloroacetic acid	76-03-9	300	HAL/ST	100000	100000	TC	3000	HAL RfD
trichlorobenzene, 1,2,3-	87-61-6	70	MC/ST(d	85	85	TC	700	increased adrenal weights, central nervous system
trichlorobenzene, 1,2,4-	120-82-1	★	P/ST	22.5	22.5	TC	★★	increased adrenal weights, central nervous system
trichlorobenzene, 1,3,5-	108-70-3	42	HAL/ST	NA	NA		420	HAL RfD
trichloroethane, 1,1,1-	71-55-6	★	P/ST	270	270	TC	★★	NA
trichloroethane, 1,1,2-	79-00-5	★	P/C	28.5	28.5	HH	★★	carcinogen
trichloroethene [or TCE]	79-01-6	★	P/C	*	*	N	★★	carcinogen
trichlorofluoromethane	75-69-4	2100	MC/ST	NA	NA		21000	central nervous system, heart, liver, lung
trichlorophenol, 2,4,5-	95-95-4	4	PQL/O	22.5	22.5	TC	40	kidney, liver
trichlorophenol, 2,4,6-	88-06-2	5	PQL/C	*	*	N	50	carcinogen
trichlorophenoxy acetic acid, 2,4,5-	93-76-5	70	MC/ST	145	145	TC	700	proteinuria
trichlorophenoxy proprionic acid, 2(2,4,5)- [or silvex]	93-72-1	★	P/ST	NA	NA		★★	liver
trichloropropane, 1,1,2-	598-77-6	35	MC/ST	NA	NA		350	kidney, liver, thyroid
trichloropropane, 1,2,3-	96-18-4	5	PQL/C	0.26	0.26	HH	50	carcinogen
trichloropropene, 1,2,3-	96-19-5	35	MC/ST	NA	NA	TC	350	eye
trifluralin	1582-09-8	4.5	MC/C	0.78	0.78	HH	45	carcinogen
trimethyl phosphate	512-56-1	50	PQL/C	NA	NA		500	carcinogen
trimethylbenzene, 1,2,3-	526-73-8	10	PQL/ST (e)	NA	NA		100	NA
trimethylbenzene, 1,2,4-	95-63-6	10	PQL/O	217.5	217.5	TC	100	NA
trimethylbenzene, 1,3,5-	108-67-8	10	PQL/O	215	215	TC	100	NA
trinitrobenzene, 1,3,5-	99-35-4	32	PQL/ST	19	19	TC	320	spleen
trinitrophenylmethylnitrami	479-45-8	70	MC/ST	NA	NA		700	kidney, liver, spleen
trinitrotoluene, 2,4,6-	118-96-7	10	PQL/C	49	49	TC	100	carcinogen
TRPH		5000	###	5000	5000	###	50000	NA
uranium	7440-61-1	21	MC/ST	NA	NA		210	NA
vanadium	7440-62-2	49	MC/ST	NA	NA		490	NOAEL
vanadium pentoxide (as V)	1314-62-1	63	MC/ST	12.5	12.5	TC	630	hair
vanadium sulfate (as V)	36907-42-	140	MC/ST	NA	NA		1400	none observed
vernam	1929-77-7	7	MC/ST	11.5	11.5	TC	70	decreased body weight
vinyl acetate	108-05-4	88	O/ST	700	700	TC	880	nasal epithelial lesions
vinyl chloride	75-01-4	★	P/C	NA	NA		★★	carcinogen
white phosphorous	7723-14-0	0.1	MC/ST	*	*	N	1	forelimb hair loss, parturition mortality
xylenes	1330-20-7	★	S/ST	370	370	TC	★★	central nervous system, kidney, whole body
zinc	7440-66-6	★	S/ST	*	*	N	★★	blood

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B & C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
zinc chloride (as Zn)		2100	MC/ST	1.5	1.5	TC	21000	blood
zinc phosphide	1314-84-7	2.1	MC/ST	NA	NA		21	decreased food intake, decreased weight
zineb	12122-67-	350	MC/ST	13.5	13.5	TC	3500	thyroid
toxicity bioassay tests				pass test	pass test			

GCTLs for other chemicals can be found in Chapters 62-550 and 62-520, F.A.C.
N = As provided in Chapter 62-302, F.A.C.
TC = Toxicity Criteria, 1/20 of applicable LC50 data.
C = Carcinogen
ST= Systemic Toxicant
PQL = Permissible Quantitation Limit
MRL = Minimum Risk Level from ATSDR Toxicant Profile
# = Based on similarity to chloride considerations as provided in Chapter 62-302, F.A.C.
= As provided in Chapter 62-302, F.A.C. Toxicity Criteria (marine); Numerical (freshwater)
= Based on similarity to oil and grease standard as provided in Chapter 62-302, F.A.C.
a = Hardness-dependent per Chapter 62-302, F.A.C.
b = Not greater than 10% above background.
P = Florida Department of Environmental Protection Groundwater Standard.
S = Florida Department of Environmental Protection Secondary Groundwater Standard.
MC = Florida Department of Environmental Protection Groundwater Guidance Concentration based on minimum criteria.
* = As provided in Chapter 62-302, F.A.C. If the PQL using the most sensitive and currently available technology is higher than the specified criterion, the PQL shall b
**= Based on Specific Conductance and Salinity as provided in Chapter 62-302, F.A.C.
O= Florida Department of Environmental Protection Groundwater Guidance Concentration based on organoleptic criteria.
Surrogate (a): Surrogate RfD based on other non-carcinogenic PAHs (e.g., pyrene).
Surrogate (b): Surrogate RfD based on oral RfD for HCH-gamma (lindane).
Surrogate (c): Surrogate RfD based on other non-carcinogenic PAHs (e.g., naphthalene).
Surrogate (d): Surrogate based on Primary Groundwater Standard for 1,2,4-trichlorobenzene.
Surrogate (e): Surrogate based on Primary Groundwater Standard for 1,2,4-trimethylbenzene.
Surrogate (f): Surrogate RfD based on oral RfD for 2-chlorophenol.
Surrogate (g): Surrogate RfD based on oral RfD for 2,4-dichlorophenol.

¥ = The residential SCTL for nickel is based on non-carcinogenic endpoints and the industrial SCTL is based on carcinogenic endpoints.
As a result, the Groundwater of Low Yield/Poor Quality Criteria is based on the more conservative non-carcinogenic endpoint.

NA = Not Available.

pass test = "pass test" shall mean mortality less than fifty percent in a 96-hour acute toxicity test performed, in predominantly fresh waters, on both Cyprinella leedsi (bannerfin shiner) and Ceriodaphnia dubia (water flea), and in predominantly marine waters, on both Menidia beryllina (inland silversides) and Americamysis bahia (possum shrimp).

Note: If more than one contaminant is present at a site, the direct exposure values are to be modified, if necessary, such that the sum of the hazard quotients for non-carcinogenic contaminants affecting the same organ(s) s is 1 or less. For carcinogens, the direct exposure values shall be modified such that the excess cumulative lifetime risk level posed by the contaminants is 1.0E-06.

Table I
Groundwater Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number CAS #	A Groundwater Criteria (ug/L)	Basis for A	B Freshwater Surface Water Criteria (ug/L)	C Marine Surface Water Criteria (ug/L)	Basis for B &C	D Groundwater of Low Yield/Poor Quality Criteria (ug/L)	Target Organ/System or Effect
★ = As provided in Chapters 62-550 and 62-520, F.A.C.								
★★ = Equal to ten times the value provided in Chapters 62-550 or 62-520, F.A.C.								

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality
	CAS#	I[#]	II[##]	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
2,3,7,8-TCDD [or dioxin]	1746-01-6	7.00E-06	3.00E-05	0.005	3.00E-06	3.00E-06	0.05
acenaphthene	83-32-9	2300	22000	4.0	0.6	0.6	40
acenaphthylene	208-96-8	1100	11000	22	0.003*	0.003*	220
acephate	30560-19-1	67	140	0.03	0.8	0.8	0.3
acetone	67-64-1	770	5500	2.8	6.8	6.8	28
acetonitrile	75-05-8	52	370	2.3	93	93	23
acetophenone	98-86-2	680**	680**	2.9	32	32	29
acrolein	107-02-8	0.03	0.2	0.08	0.001	0.001	0.8
acrylamide	79-06-1	0.2	0.3	0.004	0.02	0.02	0.04
acrylic acid	79-10-7	33	220	14	NA	NA	140
acrylonitrile	107-13-1	0.3	0.4	0.02	0.2	0.2	0.2
alachlor	15972-60-8	4	6.7	0.02	0.006	0.006	0.2
aldicarb	116-06-3	57	790	0.03	0.004	0.004	0.3
aldrin	309-00-2	0.06	0.2	0.01	2.5	2.5	0.1
allyl alcohol	107-18-6	72	550	1	0.02	0.02	10
aluminum	7429-90-5	72000	1.00E+06	☆	☆	☆	☆
aluminum phosphide (as Al)	20859-73-8	31	800	☆	☆	☆	☆
ametryn	834-12-8	600	9600	1.2	0.1	0.1	12
ammonia[III]	7664-41-7	90	600	2100	0.08	NA	21000
ammonium sulfamate	7773-06-0	16000	370000	☆	☆	☆	☆
aniline	62-53-3	17	130	0.03	0.02	0.02	0.3
anthracene	120-12-7	19000	290000	2000	0.3	0.3	20000
antimony	7440-36-0	26	240	5◆	☆	☆	50
antimony pentoxide (as Sb)	1314-60-9	39	1000	☆	☆	☆	☆
antimony potassium tartrate (as Sb)	304-61-0	69	1500	☆	☆	☆	☆
antimony tetroxide (as Sb)	1332-81-6	31	800	☆	☆	☆	☆
antimony trioxide (as Sb)	1309-64-4	31	800	☆	☆	☆	☆
Aroclor [or PCBs; or polychlorinated biphenyls]	1336-36-3	0.6	2.2	6.2	0.2	0.4	62
arsenic	7440-38-2	0.8	3.7	29◆	☆	☆	290
atrazine	1912-24-9	4.1	12	0.06	0.04	0.04	0.6
azobenzene	103-33-3	7.6	20	0.5	0.07	0.07	5
barium[II]	7440-39-3	105	87000	1600◆	P	P	16000
bayleton	43121-43-3	2300	45000	5	12	12	50
benomyl	17804-35-2	3500	58000	31	0.03	0.03	310
bentazon	25057-89-0	130	1500	0.1	NA	NA	1
benzaldehyde	100-52-7	4500**	4500**	5.4	0.4	0.4	54
benzene	71-43-2	1.1	1.5	0.007	0.007	0.5	0.07
benzenethiol	108-98-5	0.1	0.8	0.3	NA	NA	3
benzo(a)anthracene	56-55-3	1.4	5.2	2.9	0.4	0.4	29
benzo(a)pyrene	50-32-8	0.1	0.5	7.8	1.2	1.2	78
benzo(b)fluoranthene	205-99-2	1.4	5.1	9.8	1.5	1.5	98
benzo(g,h,i)perylene	191-24-2	2300	45000	13000	2	2	130000
benzo(k)fluoranthene	207-08-9	15	52	25	1.5	1.5	250
benzoic acid	65-85-0	150000	1.00E+06	110	48	48	1100

APPENDIX E-2-1

FLORIDA SOIL CLEANUP TARGET LEVELS
(BROWNFIELDS CLEANUP CRITERIA RULE)
F.A.C CHAPTER 62-785 (7/6/98)

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
2,3,7,8-TCDD [or dioxin]	1746-01-6	7.00E-06	3.00E-05	0.005	3.00E-06	3.00E-06	0.05	carcinogen
acenaphthene	83-32-9	2300	22000	4.0	0.6	0.6	40	liver
acenaphthylene	208-96-8	1100	11000	22	0.003*	0.003*	220	decreased body weight, liver
acephate	30560-19-1	67	140	0.03	0.8	0.8	0.3	carcinogen
acetone	67-64-1	770	5500	2.8	6.8	6.8	28	central nervous system, kidney, liver
acetonitrile	75-05-8	52	370	2.3	93	93	23	blood, liver
acetophenone	98-86-2	680**	680**	2.9	32	32	29	general toxicity
acrolein	107-02-8	0.03	0.2	0.08	0.001	0.001	0.8	respiratory (nasal epithelium)
acrylamide	79-06-1	0.2	0.3	0.004	0.02	0.02	0.04	carcinogen
acrylic acid	79-10-7	33	220	14	NA	NA	140	decreased offspring weights
acrylonitrile	107-13-1	0.3	0.4	0.02	0.2	0.2	0.2	carcinogen
alachlor	15972-60-8	4	6.7	0.02	0.006	0.006	0.2	carcinogen
aldicarb	116-06-3	57	790	0.03	0.004	0.004	0.3	central nervous system
aldrin	309-00-2	0.06	0.2	0.01	2.5	2.5	0.1	carcinogen
allyl alcohol	107-18-6	72	550	1	0.02	0.02	10	kidney, liver
aluminum	7429-90-5	72000	1.00E+06	☆	☆	☆	☆	altered body weight
aluminum phosphide (as Al)	20859-73-8	31	800	☆	☆	☆	☆	altered body weight
ametryn	834-12-8	600	9600	1.2	0.1	0.1	12	liver
ammonia[III]	7664-41-7	90	600	2100	0.08	NA	21000	systemic effects
ammonium sulfamate	7773-06-0	16000	370000	☆	☆	☆	☆	decreased body weight
aniline	62-53-3	17	130	0.03	0.02	0.02	0.3	carcinogen
anthracene	120-12-7	19000	290000	2000	0.3	0.3	20000	none observed
antimony	7440-36-0	26	240	5◆	☆	☆	50	blood, increased mortality
antimony pentoxide (as Sb)	1314-60-9	39	1000	☆	☆	☆	☆	blood, increased mortality
antimony potassium tartrate (as Sb)	304-61-0	69	1500	☆	☆	☆	☆	blood, increased mortality
antimony tetroxide (as Sb)	1332-81-6	31	800	☆	☆	☆	☆	blood, increased mortality
antimony trioxide (as Sb)	1309-64-4	31	800	☆	☆	☆	☆	blood, increased mortality
Aroclor [or PCBs; or polychlorinated biphenyls]	1336-36-3	0.6	2.2	6.2	0.2	0.4	62	carcinogen
arsenic	7440-38-2	0.8	3.7	29◆	☆	☆	290	carcinogen
atrazine	1912-24-9	4.1	12	0.06	0.04	0.04	0.6	carcinogen
azobenzene	103-33-3	7.6	20	0.5	0.07	0.07	5	carcinogen
barium[II]	7440-39-3	105	87000	1600◆	P	P	16000	increased blood pressure
bayleton	43121-43-3	2300	45000	5	12	12	50	blood, decreased body weight gain
benomyl	17804-35-2	3500	58000	31	0.03	0.03	310	decreased offspring weights
bentazon	25057-89-0	1800	25000	0.1	NA	NA	1	blood
benzaldehyde	100-52-7	4500**	4500**	5.4	0.4	0.4	54	kidney, stomach
benzene	71-43-2	1.1	1.5	0.007	0.007	0.5	0.07	carcinogen
benzenethiol	108-98-5	0.1	0.8	0.3	NA	NA	3	liver
benzo(a)anthracene	56-55-3	1.4	5.2	2.9	0.4	0.4	29	carcinogen
benzo(a)pyrene	50-32-8	0.1	0.5	7.8	1.2	1.2	78	carcinogen
benzo(b)fluoranthene	205-99-2	1.4	5.1	9.8	1.5	1.5	98	carcinogen

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
benzo(g,h,i)perylene	191-24-2	2300	45000	13000	2	2	130000	central nervous system
benzo(k)fluoranthene	207-08-9	15	52	25	1.5	1.5	250	carcinogen
benzoic acid	65-85-0	150000	1.00E+06	110	48	48	1100	none observed
benzotrichloride	98-07-7	0.02	0.04	0.003	0.0002	0.0002	0.03	carcinogen
benzyl alcohol	100-51-6	5500**	5500**	8.9	2	2	89	eye, stomach
benzyl chloride	100-44-7	1.3	2	0.008	0.05	0.05	0.08	carcinogen
beryllium[I]	7440-41-7	120	700	63•	☆	☆	630	carcinogen
betanal [or phenmedipham]	13684-63-4	18000	280000	180	NA	NA	1800	none observed
bidrin [or dicrotophos]	141-66-2	7.5	140	0.008	0.2	0.2	0.08	decreased offspring survival
biphenyl, 1,1- [or diphenyl]	92-52-4	1000	8400	0.03	1.1	1.1	0.3	kidney
bis (2-chloro-1-methylethyl) ether	108-06-1	0.3	0.5	0.1	7.00E-03	7.00E-03	1	carcinogen
bis (2-chloroethyl) ether	111-44-4	0.4	0.7	0.03	0.07	0.07	0.3	carcinogen
bis (2-chloroisopropyl) ether	39638-32-9	0.3	0.5	0.3	0.1	0.1	3	carcinogen
bis (2-ethylhexyl) phthalate	117-81-7	75	230**	27	0.09	0.09	270	carcinogen
bisphenol A	80-05-7	3500	57000	14	2.2	2.2	140	decreased body weight
boron	7440-42-8	7000	170000	☆	☆	☆	☆	male reproductive, respiratory
bromacil	314-40-9	5300	63000	0.6	NA	NA	6	decreased body weight
bromochloromethane	74-97-5	38	260	0.7	NA	NA	7	liver
bromodichloromethane	75-27-4	1.4	2	0.006	0.1	0.1	0.06	carcinogen
bromoform	75-25-2	53	95	0.04	3.3	3.3	0.4	carcinogen
bromomethane [or methyl bromide]	74-83-9	2.2	15	0.05	0.2	0.2	0.5	stomach
butanol, 1-	71-36-3	1300	10000	3	107	107	30	central nervous system
butanone, 2- [or MEK]	78-93-3	4800	35000	22	639	639	220	fetus
butyl benzyl phthalate, N-	85-68-7	220**	220**	77	14	14	770	liver
butylate	2008-41-5	2000	21000	7	0.2	0.2	70	liver
butylphthalyl butylglycolate	85-70-1	240**	240**	120	NA	NA	1200	none observed
cadmium[II]	7440-43-9	75	1300	8•	☆	☆	80	kidney, liver/carcinogen
calcium cyanide	592-01-8	3100	80000	☆	☆	☆	☆	none observed
captan	133-06-2	250	720	24	0.18	0.18	240	carcinogen
carbaryl	63-25-2	6800	120000	9.2	0.0007	0.0007	92	kidney, liver
carbazole	86-74-8	53	200	0.6	6.49	6.49	6	carcinogen
carbofuran	1563-66-2	52	380	0.3	0.001	0.001	3	blood, reproductive
carbon disulfide	75-15-0	200	730**	5.6	0.8	0.8	56	fetus
carbon tetrachloride	56-23-5	0.4	0.6	0.04	0.05	0.05	0.4	carcinogen
carbophenothion	786-19-6	9.5	170	0.5	0.06	0.06	5	blood, central nervous system
chlordane	57-74-9	3	11	4.1	0.008	0.008	41	carcinogen
chlorine	7782-50-5	7800	200000	☆	☆	☆	☆	none observed
chlorine cyanide	506-77-4	3900	100000	☆	☆	☆	☆	none observed
chlorine dioxide	10049-04-4	780	19000	☆	☆	☆	☆	no effect level on neurological development in offspring
chlorite	7758-19-2	230	6000	☆	☆	☆	☆	neurobehavorial
chloro-1,3-butadiene [or chloroprene]	126-99-8	2.7	18	1.9	NA	NA	19	respiratory (nasal epithelium)

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
chloro-3-methyl phenol, 4- [or chloro-m-cresol, p-]	59-50-7	390	4100	18	NA	NA	180	reproductive system
chloro-m-cresol, p- [or 4-chloro-3-methyl phenol]	59-50-7	390	4100	18	NA	NA	180	reproductive system
chloroacetic acid	79-11-8	86	900	0.07	NA	NA	0.7	heart
chloroaniline, 4-	106-47-8	190	2000	0.2	0.02	0.02	2	spleen
chlorobenzene	108-90-7	30	210	1.3	0.2	0.2	13	kidney, liver
chlorobenzilate	510-15-6	3.9	14	0.04	0.009	0.009	0.4	carcinogen
chlorobenzoic acid, p-	74-11-3	14000	240000	28	NA	NA	280	none observed
chlorobenzotrifluoride, 4-	98-15-7	80	190**	3.8	NA	NA	38	kidney
chlorobutane, 1-	109-69-3	430	540**	26	NA	NA	260	blood, central nervous system, increased mortality
chlorodibromomethane	124-48-1	1.4	2.1	0.003	0.3	0.3	0.03	carcinogen
chloroethane [or ethyl chloride]	75-00-3	5.8	8	23	NA	NA	230	carcinogen
chloroethylvinylether, 2-	110-75-8	99	690	0.8	NA	NA	8	NA
chloroform	67-66-3	0.4	0.6	0.04	3	3	0.4	carcinogen
chloromethane	74-87-3	1.7	2.3	0.01	2.2	2.2	0.1	carcinogen
chloronaphthalene, beta	91-58-7	3300	35000	110	NA	NA	1100	liver, respiratory
chloronitrobenzene, o-	88-78-3	2.5	3.5	0.02	1.8	1.8	0.2	carcinogen
chloronitrobenzene, p-	100-00-5	29	57	4.1	NA	NA	41	carcinogen
chlorophenol, 2-	95-57-8	82	640	0.7	2.6	2.6	7	reproductive system
chlorophenol, 3-	108-43-0	240	2800	0.2	2.6	2.6	2	reproductive system
chlorophenol, 4-	106-48-9	270	3400	0.08	2.4	2.4	0.8	reproductive system
chloroprene [or chloro-1,3-butadiene]	126-99-8	2.7	18	1.9	NA	NA	19	respiratory (nasal epithelium)
chloropropane, 2-	75-29-6	35	230	5.2	NA	NA	52	liver
chlorothalonil	1897-45-6	86	260	0.2	NA	NA	2	carcinogen
chlorotoluene, o-	95-49-8	110	740	2.7	NA	NA	27	decreased body weight gain
chlorotoluene, p-	106-43-4	120	880	2.5	NA	NA	25	HAL RfD
chlorpropham	101-21-3	13000	200000	51	NA	NA	510	bone marrow, kidney, liver, spleen
chlorpyrifos	2921-88-2	210	4000	5.2	0.0004	0.0004	52	blood
chromium (hexavalent)	18540-29-9	290	430	38♦	☆	☆	380	carcinogen
chrysene	218-01-9	140	510	80	0.5	0.5	800	carcinogen
cobalt	7440-48-4	4700	110000	☆	☆	☆	☆	NA
copper cyanide	544-92-3	390	9100	☆	☆	☆	☆	decreased body and organ weights, kidney, liver
copper[II+A317]	7440-50-8	105	1.20E+04	☆	☆	☆	☆	GI irritation/liver damage
coumaphos	56-72-4	18	270	0.3	0.0006	0.0006	3	blood
crotonaldehyde	123-73-9	0.09	0.1	0.00009	NA	NA	0.0009	carcinogen
cumene [or isopropyl benzene]	98-82-8	150	1000	0.2	23	23	2	kidney
cyanide[II]	57-12-5	30	5000	40 ♦	0.004	0.004	400	decreased body weight, nerve damage, thyroid
cyanogen	460-19-5	37	250	54	NA	NA	540	none observed
cycloate	1134-23-2	150	160**	0.6	2.3	2.3	6	nerve damage
cyclohexanone	108-94-1	980**	980**	160	122	122	1600	body weight depression

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
cyhalothrin, lambda [or karate]	98085-85-8	6**	6**	360	50	50	3600	decreased body weight, decreased body weight gain in offspring
cypermethrin	52315-07-8	60**	60**	70	0.005	0.005	700	gastrointestinal tract
DBCP [or dibromo-3-chloropropane, 1,2-]	96-12-8	0.8	2.7	0.002	NA	NA	0.02	carcinogen
DDD, 4,4'-	72-54-8	4.5	17	0.2	0.006	0.006	2	carcinogen
DDE, 4,4'-	72-55-9	3.2	12	0.3	0.002	0.002	3	carcinogen
DDT, 4,4'-	50-29-3	3.2	13	2.7	0.03	0.03	27	carcinogen
decabromodiphenyl ether	1163-19-5	740	13000	9.3	NA	NA	93	liver
di-n-butylphthalate	84-74-2	110**	110**	47	1.5	1.5	470	increased mortality
di-n-octylphthalate	117-84-0	1500	27000	4.7E+05	NA	NA	4700000	kidney, liver
diallate	2303-16-4	11	25	0.02	NA	NA	0.2	carcinogen
diazinon	333-41-5	64	1100	0.06	0.0001	0.0001	0.6	blood
dibenz(a,h)anthracene	53-70-3	0.1	0.5	14	2.2	2.2	140	carcinogen
dibenzofuran	132-64-9	270	4400	10	25	25	100	NA
dibromo-3-chloropropane, 1-2- [or DBCP]	96-12-8	0.8	2.7	0.002	NA	NA	0.02	carcinogen
dibromobenzene, 1,4-	106-37-6	150	1200	7.8	66	66	78	liver
dibromochloromethane	124-48-1	1.4	2.1	0.003	0.3	0.3	0.03	carcinogen
dibromoethane, 1,2- [or EDB]	106-93-4	0.01	0.04	0.0001	0.08	0.08	0.001	carcinogen
dicamba	1918-00-9	9.8	60	0.9	0.8	0.8	9	fetus
dichloroacetic acid	79-43-6	190	2200	0.2	8.1	8.1	2	cerebellum, cerebrum, liver, testes
dichloroacetonitrile	3018-12-0	130	1000	0.03	NA	NA	0.3	HAL RfD
dichlorobenzene, 1,2-	95-50-1	88	370**	12	1.9	1.9	120	no adverse effects observed
dichlorobenzene, 1,3-	541-73-1	390**	390**	0.2	2.1	2.1	2	NA
dichlorobenzene, 1,4-	106-46-7	5.6	8.3	2.2	NA	NA	22	carcinogen
dichlorobenzidine, 3,3'-	91-94-1	2.1	6.3	0.4	0.002	0.002	4	carcinogen
dichlorodifluoromethane	75-71-8	63	420	52	NA	NA	520	decreased body weight
dichloroethane, 1,1-	75-34-3	340	2300	0.5	NA	NA	5	central nervous system, kidney
dichloroethane, 1,2- [or EDC]	107-06-2	0.6	0.9	0.02	0.03	0.03	0.2	carcinogen
dichloroethene, 1,1-	75-35-4	0.01	0.02	0.06	0.03	0.03	0.6	carcinogen
dichloroethene, cis-1,2-	156-59-2	19	130	0.4	NA	NA	4	blood, liver
dichloroethene, trans-1,2-	156-60-5	35	240	0.6	68.3	68.3	6	blood, liver
dichlorophenol, 2,3-	576-24-9	180	2500	0.2	1.2	1.2	2	immune system
dichlorophenol, 2,4-	120-83-2	150	1700	0.04	0.1	0.1	0.4	immune system
dichlorophenol, 2,5-	583-78-8	190	2700	0.3	2.5	2.5	3	immune system
dichlorophenol, 2,6-	87-65-0	170	2300	0.06	1.1	1.1	0.6	immune system
dichlorophenol, 3,4-	95-77-2	200	3100	0.6	3.4	3.4	6	immune system
dichlorophenoxy acetic acid, 2,4-	94-75-7	580	8000	0.3	0.4	0.4	3	blood, kidney, liver
dichloropropane, 1,2-	78-87-5	0.6	0.8	0.03	NA	NA	0.3	carcinogen
dichloropropene, 1,3-	542-75-6	0.1	0.2	0.001	0.08	0.08	0.01	carcinogen
dichlorprop	120-36-5	270	3400	0.0006	0.25	0.25	0.006	OPP RfD
dichlorvos	62-73-7	0.3	0.4	0.0005	0.00003	0.00003	0.005	carcinogen
dicofol	115-32-2	2.3	7.4	0.06	0.0004	0.0004	0.6	carcinogen

Table 11
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
dicrotophos [or bidrin]	141-66-2	7.5	140	0.008	0.2	0.2	0.1	decreased offspring survival
dieldrin	60-57-1	0.07	0.3	0.005	0.002	0.002	0.05	carcinogen
diethylene glycol, monoethyl ether	11-90-0	84000	170000**	63	NA	NA	630	kidney
diethylphthalate	84-66-2	640**	640**	41	2.8	2.8	410	brain, decreased growth rate, kidney, liver
diisopropyl methylphosphonate [or DIMP]	1445-75-6	1900	16000	2.9	70	70	29	none observed
dimethoate	60-51-5	9.4	100	0.02	0.0005	0.0005	0.2	brain
dimethrin	70-38-2	20000	320000	2500	1.4	1.4	25000	HAL RfD
dimethylaniline, 2,4-	95-68-1	0.8	1.7	0.0006	NA	NA	0.006	carcinogen
dimethylformamide, N,N-	68-12-2	990	7200	3	214	214	30	liver
dimethylphenol, 2,4-	105-67-9	910	9800	1.7	2.3	2.3	17	blood, central nervous system
dimethylphenol, 2,6-	576-26-1	20	190	0.06	3.6	3.6	0.6	body weight changes, kidney, liver, spleen
dimethylphenol, 3,4-	95-65-8	54	660	0.09	5.5	5.5	0.9	body weight changes, blood pressure, kidney, liver, spleen
dimethylphthalate	131-11-3	1600**	1600**	410	8.5	8.5	4100	kidney
DIMP [or diisopropyl methylphosphonate]	1445-75-6	1900	16000	2.9	70	70	29	none observed
dinitrobenzene, 1,2- (o-)	528-29-0	30	550	1	0.4	0.4	10	spleen
dinitrobenzene, 1,3- (m-)	99-65-0	4.3	45	0.04	0.2	0.2	0.4	spleen
dinitrophenol, 2,4-	51-28-5	67	630	0.1	0.01	0.01	1	eye
dinitrotoluene, 2,4-	121-14-2	1.3	3.7	0.002	0.07	0.07	0.02	carcinogen
dinitrotoluene, 2,6-	606-20-2	0.9	2.1	0.0007	NA	NA	0.007	carcinogen
dinoseb	88-85-7	74	1400	0.8	0.69	0.69	8	fetus
dioxane, 1,4-	123-91-1	23	37	0.02	1.1	1.1	0.2	carcinogen
dioxin [or 2,3,7,8-TCDD]	1746-01-6	7.00E-06	3.00E-05	0.005	3.00E-06	3.00E-06	0.05	carcinogen
diphenamid	957-51-7	1700	24000	2.6	19.8	19.8	26	liver
diphenyl [or biphenyl, 1,1-]	92-52-4	1000	8400	0.03	1.1	1.1	0.3	kidney
diphenylhydrazine, 1,2-	122-66-7	1.2	3.7	0.4	0.02	0.02	4	carcinogen
disulfoton	298-04-4	2.6	41	0.03	0.02	0.02	0.3	blood, eye
diuron	330-54-1	140	2600	0.3	0.2	0.2	3	blood
EDB [or dibromoethane, 1,2-]	106-93-4	0.01	0.04	0.0001	0.08	0.08	0.001	carcinogen
EDC [or dichloroethane, 1,2-]	107-06-2	0.6	0.9	0.02	0.03	0.03	0.2	carcinogen
endosulfan	115-29-7	410	6700	3.6	0.0007	0.001	36	blood vessels, decreased weight gain, kidney
endothall	145-73-3	800	8100	0.4	0.4	0.4	4	small intestine, stomach
endrin	72-20-8	21	380	0.9	0.001	0.001	9	central nervous system, liver
epichlorohydrin	106-89-8	8.8	61	0.04	2.4	2.4	0.4	carcinogen
EPTC [or ethyl dipropylthiocarbamate, S-]	759-94-4	770	7000	2.2	2.9	2.9	22	heart
ethion	563-12-2	37	56**	2.2	0.002	0.002	22	blood
ethoprop	13194-48-4	5.3	65	0.006	0.003	0.003	0.06	blood
ethoxyethanol acetate, 2-	111-15-9	7700	30000**	8.8	8.4	8.4	88	fetus
ethoxyethanol, 2-	110-80-5	6800	53000	120	NA	NA	1200	blood, male reproductive
ethyl acetate	141-78-6	4100	11000**	27	26	26	270	body weight loss, increased mortality
ethyl acrylate	140-88-5	1.3	1.8	25	0.61	0.61	250	carcinogen
ethyl chloride [or chloroethane]	75-00-3	5.8	8.0	23	NA	NA	230	carcinogen
ethyl dipropylthiocarbamate, S- [or EPTC]	759-94-4	770	7000	2.2	2.9	2.9	22	heart

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
ethyl ether	60-29-7	190	1300	7	1195	1195	70	decreased body weight
ethyl methacrylate	97-63-2	640	4500	9.4	NA	NA	94	kidney
ethyl p-nitrophenyl phenylphosphorothioate [or EPN]	2104-64-5	0.7	14	0.01	0.0008	0.0008	0.1	nerve damage
ethylbenzene	100-41-4	240**	240**	0.4	7.7	7.7	4	central nervous system, kidney, liver
ethylene diamine	107-15-3	1500	28000	42	3.4	3.4	420	blood, heart
ethylene glycol	107-21-1	65000	120000**	58	67.8	67.8	580	kidney
ethylene oxide	75-21-8	0.2	0.3	0.05	19.5	19.5	0.5	carcinogen
fenamiphos	22224-92-6	15	190	0.02	0.003	0.003	0.2	blood, central nervous system
fenamiphos metabolites	No CAS#	8.7	140	0.1	NA	NA	1	blood, central nervous system
fensulfothion	115-90-2	13	160	0.01	0.004	0.004	0.1	blood
fluometuron	2164-17-2	790	11000	1	2.2	2.2	10	none observed
fluoranthene	206-44-0	2800	45000	550	0.6	0.6	5500	blood, kidney, liver
fluorene	86-73-7	2100	24000	87	9.4	9.4	870	blood
fluoride[II]	16984-58-8	500	120000	☆	☆	☆	☆	dental
fonofos	944-22-9	120	1700	0.5	0.004	0.004	5	central nervous system, liver
formaldehyde	50-00-0	12	19	2.5	0.43	0.43	25	carcinogen
furan	110-00-9	2	14	0.07	NA	NA	0.7	liver
furfural	98-01-1	180	2500	1.2	3	3	12	liver
glycidaldehyde	765-34-4	13	120	0.01	0.51	0.51	0.1	adrenals, altered weight gain, hematopoiesis, kidney
guthion	86-50-0	110	2100	0.2	2.00E-04	2.00E-04	2	blood
heptachlor	76-44-8	0.01	0.02	0.2	0.002	0.002	2	carcinogen
heptachlor epoxide	1024-57-3	0.1	0.4	0.7	0.007	0.007	7	carcinogen
hexachloro-1,3-butadiene	87-68-3	6.2	12	1.1	0.02	0.02	11	carcinogen
hexachlorobenzene	118-74-1	0.5	1.2	3.2	0.001	0.001	32	carcinogen
hexachlorocyclohexanone, alpha- (αBHC) or (α-HCH)	319-84-6	0.2	0.5	0.0005	0.0009	0.0009	0.005	carcinogen
hexachlorocyclohexanone, beta- (βBHC) or (β-HCH)	319-85-7	0.6	2.2	0.002	0.004	0.004	0.02	carcinogen
hexachlorocyclohexanone, delta- (δBHC) or (δ-HCH)	319-86-8	22	430	0.2	NA	NA	2	kidney, liver
hexachlorocyclohexanone, gamma- (γBHC) or (γ-HCH) [or lindane]	58-89-9	0.7	2.3	0.01	0.005	0.009	0.1	carcinogen
hexachlorocyclopentadiene	77-47-4	2.4	16	400	24	24	4000	nasal cavity, stomach
hexachloroethane	67-72-1	17	78	0.2	0.08	0.08	2	carcinogen
hexahydro-1,3,5-trinitro-1,3,5-triazine [or RDX]	121-82-4	6.7	16	0.008	1.4	1.4	0.08	carcinogen
hexane, n-	110-54-3	420	3000	1.3	445	445	13	male reproductive, central nervous system
hexanone, 2- [or methyl butyl ketone]	591-78-6	650	5000	2	NA	NA	20	kidney, liver, whole body
hexazinone	51235-04-2	2400	42000	36	160	160	360	decreased body weight
hydroquinone	123-31-9	1900	20000	1.5	0.02	0.02	15	blood
indeno(1,2,3-cd)pyrene	193-39-5	1.5	5.2	28	4.3	4.3	280	carcinogen

Table 1
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
iron	7439-89-6	23000	490000	☆	☆	☆	☆	NHANES Study
isobutyl alcohol	78-83-1	3500	11000**	8.9	200	200	89	central nervous system
isophorone	78-59-1	340	580	0.2	3.8	3.8	2	carcinogen
isopropyl benzene [or cumene]	98-82-8	150	1000	0.2	23	23	2	kidney
karate [or cyhalothrin, lambda]	98085-85-8	6**	6**	360	50	50	3600	decreased body weight, decreased body weight gain in offspring
lead***	7439-92-1	500	920	☆	☆	☆	☆	NA
lindane [or hexachlorocyclohexanone, gamma-] (γ-BHC) or (γ-HCH)	58-89-9	0.7	2.3	0.01	0.005	0.009	0.1	carcinogen
linuron	330-55-2	130	1900	0.03	0.9	0.9	0.3	blood
lithium	7439-93-2	1600	40000	☆	☆	☆	☆	NA
malathion	121-75-5	1100**	1100**	7.7	0.005	0.005	77	blood
maleic hydrazide	123-33-1	1100	7200	42	9.1	9.1	420	kidney
malonitrile	109-77-3	0.1	0.8	0.0004	NA	NA	0.004	liver, spleen
maneb	12427-38-2	350	6000	6.3	0.5	0.5	63	thyroid
manganese	7439-96-5	1600	20000	☆	☆	☆	☆	central nervous system
MEK [or butanone, 2-]	78-93-3	4800	35000	22	639	639	220	fetus
mercury, inorganic	7438-97-6	3.7	28	2.1	NA	NA	21	central nervous system
mercury, methyl	22967-92-6	0.3	2.1	0.002	NA	NA	0.02	none observed
merphos	150-50-5	2.1	35	2.5	NA	NA	25	central nervous system, decreased body weight
merphos oxide	78-48-8	220	4200	0.2	0.3	0.3	2	central nervous system, decreased body weight
methacrylonitrile	126-98-7	1	6.9	0.02	NA	NA	0.2	liver
methamidophos	10265-92-6	2.1	22	0.02	5E-08	5E-08	0.2	central nervous system
methanol	67-56-1	4300	31000	20	181	181	200	brain, liver
methidathion	950-37-8	50	570	0.04	0.0002	0.0002	0.4	liver
methomyl	16752-77-5	25	170	1.2	0.007	0.007	12	kidney
methoxy-5-nitroaniline, 2-	99-59-2	17	42	0.4	NA	NA	4	carcinogen
methoxychlor	72-43-5	380	7600	130	0.1	0.1	1300	reproductive system
methyl acetate	79-20-9	6500	46000	23	NA	NA	230	liver
methyl acrylate	96-33-3	1300	8000**	0.9	NA	NA	9	none observed
methyl bromide [or bromomethane]	74-83-9	2.2	15	0.05	0.2	0.2	0.5	stomach
methyl butyl ketone [or hexanone, 2-]	591-78-6	650	5000	2	NA	NA	20	kidney, liver, whole body
methyl isobutyl ketone [or MIBK]	108-10-1	280	1900	3.7	150	150	37	kidney, liver, whole body
methyl methylacrylate	80-62-6	1800	8300	0.2	49	49	2	none observed
methyl parathion	298-00-0	16	250	0.04	0.0	0.0	0.4	blood
methyl styrene (mixed)	25013-15-4	36	200**	0.8	NA	NA	8	nasal cavity
methyl styrene, alpha	98-83-9	1100	3000**	19	NA	NA	190	kidney, liver
methyl tert-butyl ether	1634-04-4	350	5900	0.2	151	151	2	eye, increased prostration, kidney, liver
methyl-4-chlorophenoxy acetic acid, 2-	94-74-6	31	460	0.02	0.4	0.4	0.2	kidney, liver
methylaniline, 2-	95-53-4	2	3.7	0.5	0.3	0.3	5	carcinogen
methylene bis(2-chloroaniline), 4,4'-	101-14-4	7.8	26	9.8	NA	NA	98	carcinogen
methylene bromide	74-95-3	28	190	0.4	NA	NA	4	blood
methylene chloride	75-09-2	16	23	0.02	7.2	7.2	0.2	carcinogen

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
methylnaphthalene, 1-	90-12-0	290**	290**	1.6	7.5	7.5	16	blood
methylnaphthalene, 2-	91-57-6	1500	15000	6.4	9.6	9.6	64	blood
methylphenol, 2- (o-cresol)	95-48-7	2500	29000	0.3	1.9	1.9	3	blood, central nervous system, decreased body weight, kidney, liver
methylphenol, 3- (m-cresol)	108-39-4	2600	20000**	0.3	3.4	3.4	3	central nervous system, decreased body weights
methylphenol, 4- (p-cresol)	106-44-5	220	2400	0.03	0.5	0.5	0.3	blood, central nervous system, kidney, liver, respiratory
metolachlor	51218-45-2	9300	130000	13	0.01	0.01	130	decreased body weight gain
metribuzin	21087-64-9	18	120	2.2	0.8	0.8	22	decreased weight, kidney, liver, mortality
mevinphos	7786-34-7	16	250	0.01	0.0003	0.0003	0.1	blood
MIBK [or methyl isobutyl ketone]	108-10-1	280	1900	3.7	150	150	37	kidney, liver, whole body
molinate	2212-67-1	130	2000	1.3	1.52	1.52	13	reproductive system
molybdenum	7439-98-7	390	9600	☆	☆	☆	☆	increased uric acid levels
naled	300-76-5	130	2200	0.1	0.0002	0.0002	1	central nervous system
naphthalene	91-20-3	1000	8600	1	1.3	1.3	10	blood
nickel subsulfide	12035-72-2	7000	10000	☆	☆	☆	☆	carcinogen
nickel[II]	7440-02-0	105	28000	130♦	☆	☆	1300	decreased body weight, kidney, liver, female reproductive, skin
nitrate	14797-55-8	120000	1.00E+06	☆	☆	☆	☆	blood
nitrite	14797-65-0	7800	180000	☆	☆	☆	☆	blood
nitroaniline, o-	88-74-4	3.4	43	0.3	NA	NA	3	blood
nitroaniline, p-	100-01-6	160	2100	0.1	7.4	7.4	1	NA
nitrobenzene	98-95-3	16	150	0.04	0.8	0.8	0.4	adrenal, blood, kidney, liver
nitrophenol, 4-	100-02-7	380	4100	2.4	0.3	0.3	24	HAL RfD
nitroso-di-ethylamine, N-	55-18-5	0.003	0.006	0.02	0.001	0.001	0.2	carcinogen
nitroso-di-n-butylamine, N-	924-16-3	0.04	0.06	0.06	0.002	0.002	1	carcinogen
nitroso-di-n-propylamine, N-	621-64-7	0.06	0.1	0.02	0.004	0.004	0.2	carcinogen
nitroso-dimethylamine, N-	62-75-9	0.01	0.02	0.009	2.5	2.5	0.09	carcinogen
nitroso-diphenylamine, N-	86-30-6	170	430	0.4	0.007	0.007	4	carcinogen
nitroso-N-methylethylamine, N-	10595-95-6	0.02	0.05	0.04	0.002	0.002	0.4	carcinogen
nitrotoluene, m-	99-08-1	160	480**	2.4	3.6	3.6	24	spleen
nitrotoluene, o-	88-72-2	220	1100**	3.8	8.3	8.3	38	spleen
nitrotoluene, p-	99-99-0	240	2100	4.1	9.0	9.0	41	spleen
octamethylpyrophosphoramide	152-16-9	29	79	4.3	NA	NA	43	blood
oxamyl	23135-22-0	1000	11000	0.9	0.04	0.04	9	decreased body weight gain and food consumption
paraquat	1910-42-5	320	4100	650	955	955	6500	respiratory
parathion	56-38-2	160**	160**	6.9	0.007	0.007	69	blood
PCBs [or Aroclor; or polychlorinated biphenyls]	1336-36-3	0.6	2.2	6.2	0.2	0.4	62	carcinogen
PCE [or tetrachloroethene]	127-18-4	10	20	0.05	1.3	1.3	0.5	carcinogen
pebulate	1114-71-2	1200	11000	7.8	6.8	6.8	78	blood
pendimethalin	40487-42-1	1900	22000	65	2.3	2.3	650	blood, liver
pentachlorobenzene	608-93-5	22	190	3.1	0.9	0.9	31	kidney, liver
pentachloronitrobenzene	82-68-8	2	4	10	0.03	0.03	100	carcinogen
pentachlorophenol	87-86-5	8.6	30	0.8	6.3	6.3	8	carcinogen

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
permethrin	52645-53-1	3800	71000	880	0.003	0.003	8800	liver
phenanthrene	85-01-8	1900	29000	120	0.02*	0.02*	1200	central nervous system, decreased body weight, liver
phenmedipham [or betanal]	13684-63-4	18000	280000	180	NA	NA	1800	none observed
phenol[II]	108-95-2	900	390000	0.05	0.03	0.03	1	central nervous system, female reproductive, fetus, lung
phenylenediamine, m-	108-45-2	260	2700	0.2	NA	NA	2	liver
phenylenediamine, o-	95-54-5	14	30	0.004	NA	NA	0.04	carcinogen
phenylenediamine, p-	106-50-3	8300	89000	6.2	NA	NA	62	whole body
phenylphenol, 2-	90-43-7	480	1400	0.7	NA	NA	7	carcinogen
phorate	298-02-2	13	160**	0.03	0.0001	0.0001	0.3	central nervous system
phosmet	732-11-6	1400	21000	5.2	0.004	0.004	52	blood, decreased body weight, liver
phthalic acid, p-	100-21-0	3800	26000	110	NA	NA	1100	bladder
phthalic anhydride	85-44-9	7800	53000	76	NA	NA	760	kidney, lung
polychlorinated biphenyls [or PCBs; or Aroclor]	1336-36-3	0.6	2.2	6.2	0.2	0.4	62	carcinogen
prometon	1610-18-0	990	15000	2.6	15	15	26	none observed
prometryn	7287-19-6	280	4500	2	1.5	1.5	20	bone marrow, kidney, liver,
propachlor	1918-16-7	690	8400	0.7	0.08	0.08	7	decreased body weight, liver
propanil	709-98-8	310	4400	0.3	0.2	0.2	3	spleen
propazine	139-40-2	1300	20000	0.5	6.1	6.1	5	decrease in body weight
propylene glycol	57-55-6	100000**	100000**	560	142	142	5600	blood
propylene glycol monomethyl ether	1569-02-4	31000	41000**	20	NA	NA	200	kidney, liver
propylene oxide	75-56-9	2.8	6.4	21	NA	NA	210	carcinogen
pydrin	51630-58-1	1800	29000	770	0.0002	0.0002	7700	central nervous system
pyrene	129-00-0	2200	40000	570	0.8	0.8	5700	central nervous system, decreased body weight, kidney
pyridine	110-86-1	15	120	0.07	5.4	5.4	0.7	liver
RDX [or hexahydro-1,3,5-trinitro-1,3,5-triazine]	121-82-4	6.7	16	0.008	NA	NA	0.08	carcinogen
resmethrin	10453-86-8	680	5600	0.9	1E-05	1E-05	9	reproductive system
ronnel	299-84-3	2800	36000	120	0.02	0.02	1200	blood, central nervous system, liver
selenium	7782-49-2	390	10000	5•	☆	☆	50	central nervous system, gastrointestinal, skin
silver	7440-22-4	390	9100	34•	☆	☆	340	heart, liver, skin
silvex [or trichlorophenoxy proprionic acid, 2(2,4,5)-]	93-72-1	590	12000	5.4	NA	NA	54	liver
simazine	122-34-9	8	25	0.2	0.3	0.3	2	carcinogen
strontium	7440-24-6	47000	1.00E+06	☆	☆	☆	☆	bone
strychnine	57-24-9	20	310	1.5	0.6	0.6	15	increased mortality
styrene	100-42-5	1700**	1700**	4.1	19	19	41	blood, liver
TCDD, 2,3,7,8- [or dioxin]	1746-01-6	7.00E-06	3.00E-05	0.005	NA	NA	0.05	carcinogen
TCE [or trichloroethene]	79-01-6	4.8	6.8	0.03	0.7	0.7	0.3	carcinogen
terbacil	5902-51-2	590	6400	0.5	NA	NA	5	liver, thyroid
terbufos	13071-79-9	1	10	0.05	0.001	0.001	0.5	blood
tetrachlorobenzene, 1,2,4,5-	95-94-3	4.9	38	1.2	0.7	0.7	12	kidney
tetrachloroethane, 1,1,1,2-	630-20-6	4.1	6.0	0.01	NA	NA	0.1	carcinogen

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
tetrachloroethane, 1,1,2,2-	79-34-5	0.7	1	0.004	0.06	0.06	0.04	carcinogen
tetrachloroethene [or PCE]	127-18-4	10	20	0.05	1.3	1.3	0.5	carcinogen
tetrachlorophenol, 2,3,4,6-	58-90-2	2000	30000	53	1.1	1.1	530	liver
tetraethyl dithiopyrophosphate	3689-24-5	34	560	0.1	0.0004	0.0004	1	blood
thiobencarb	28249-77-6	150**	150**	2.8	0.3	0.3	28	decreased body weight, kidney
thiram	137-26-8	330	5100	1.1	0.005	0.005	11	central nervous system
tin	7440-31-5	44000	710000	☆	☆	☆	☆	kidney, liver
toluene	108-88-3	300	520**	0.4	4.8	4.8	4	kidney, liver
toluidine, p-	106-49-0	2.6	4.9	3.3	NA	NA	33	carcinogen
toxaphene	8001-35-2	1	3.7	31	0.002	0.002	310	carcinogen
triallate	2303-17-5	620	7000	8.4	6	6	84	liver, spleen
tributyltin oxide (as Sn) [TBTO]	56-35-9	2.3	45	360	1.8	1.8	3600	immune system
trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	880**	880**	24000	NA	NA	240000	psychomotor impairment
trichloroacetic acid	76-03-9	3600	34000	2.8	404	404	28	developmental effects to offspring, kidney, liver, spleen
trichlorobenzene, 1,2,3-	87-61-6	330	3100	6.7	8.2	8.2	67	central nervous system, increased adrenal weights
trichlorobenzene, 1,2,4-	120-82-1	560	3000**	4.9	1.6	1.6	49	central nervous system, increased adrenal weights
trichlorobenzene, 1,3,5-	108-70-3	510	6200	7.4	NA	NA	74	HAL RfD
trichloroethane, 1,1,1-	71-55-6	420	1400**	2.1	2.9	2.9	21	NA
trichloroethane, 1,1,2-	79-00-5	1.4	2.1	0.04	0.2	0.2	0.4	carcinogen
trichloroethene [or TCE]	79-01-6	4.8	6.8	0.03	0.7	0.7	0.3	carcinogen
trichlorofluoromethane	75-69-4	210	1400	37	NA	NA	370	central nervous system, heart, liver, lung
trichlorophenol, 2,4,5-	95-95-4	6300	88000	0.4	2.2	2.2	4	kidney, liver
trichlorophenol, 2,4,6-	88-06-2	81	230	0.5	0.3	0.3	5	carcinogen
trichlorophenoxy acetic acid, 2,4,5-	93-76-5	670	11000	0.8	1.7	1.7	8	proteinuria
trichlorophenoxy propionic acid, 2(2,4,5)- [or silvex]	93-72-1	590	12000	5.4	NA	NA	54	liver
trichloropropane, 1,1,2-	598-77-6	30	210	0.2	NA	NA	2	kidney, liver, thyroid
trichloropropane, 1,2,3-	96-18-4	0.01	0.02	0.03	0.002	0.002	0.3	carcinogen
trichloropropene, 1,2,3-	96-19-5	6.5	44	0.4	NA	NA	4	eye
trifluralin	1582-09-8	34	54	0.2	0.03	0.03	2	carcinogen
trimethyl phosphate	512-56-1	15	31	0.2	NA	NA	2	carcinogen
trimethylbenzene, 1,2,3-	526-73-8	240	260**	0.3	NA	NA	3	NA
trimethylbenzene, 1,2,4-	95-63-6	8.4	56	0.2	3.3	3.3	2	NA
trimethylbenzene, 1,3,5-	108-67-8	8.5	57	0.3	6.8	6.8	3	NA
trinitrobenzene, 1,3,5-	99-35-4	200	3300	1	0.6	0.6	10	spleen
trinitrophenylmethylnitramine	479-45-8	640	9300	1.4	NA	NA	14	kidney, liver, spleen
trinitrotoluene, 2,4,6-	118-96-7	32	100	0.7	3.3	3.3	7	carcinogen
TRPHs	7440-61-1	350	2500	340	340	340	3400	decreased body weight
uranium, natural	7440-62-2	120	470	21	NA	NA	210	NA
vanadium pentoxide (as V)	1314-62-1	700	18000	☆	☆	☆	☆	decreased hair cystine
vanadium[fl]	7440-62-2	15	7700	6000♦	☆	☆	60000	no adverse effects observed
vernam	1929-77-7	24	200	0.1	0.2	0.2	1	decreased body weight
vinyl acetate	108-05-4	230	1600	0.4	3	3	4	nasal epithelial lesions

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
vinyl chloride	75-01-4	0.04	0.05	0.007	NA	NA	0.07	carcinogen
white phosphorous	7723-14-0	1.6	36	☆	☆	☆	☆	hair loss, increased maternal death at parturition
xylenes, total	1330-20-7	290**	290**	0.3	5.3	5.3	3	central nervous system, kidney, whole body
zinc	7440-66-6	23000	560000	12000♦	☆	☆	120000	blood
zinc phosphide	1314-84-7	23	600	☆	☆	☆	☆	decreased body weight
zineb	12122-67-7	3500	58000	19	0.7	0.7	190	thyroid

Table II
Soil Cleanup Target Levels

Chemical Name	Chemical Abstract Registry Number	Direct Exposure (mg/kg)		Leachability Based on Groundwater Criteria	Leachability Based on Freshwater Surface Water Criteria	Leachability Based on Marine Surface Water Criteria	Leachability Based on Groundwater of Low Yield/ Poor Quality	Target Organ/System or Effect
	CAS#	I#	II##	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	

Values rounded to two significant figures if >1 and to one significant figure if <1.
*Unless the method detection limit (MDL) using the most sensitive and currently available technology is higher than the specified criterion.
**Direct exposure values based on soil saturation limit (C_{sat}).
***Residential direct exposure value from USEPA *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*. OSWER Directive 9355.4-12 (1994). Residential Value is the middle of the USEPA suggested range of 400-600 mg/kg. The industrial direct exposure value was derived using methodologies outlined in USEPA *Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil*, December 1996.
☆ = Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.
HAL RfD = Reference dose obtained from USEPA *Drinking Water Regulations and Health Advisories*, Office of Water, EPA 822-B96-002, October 1996.
OPP RfD = Reference dose obtained from USEPA *Office of Pesticide Programs Reference Dose Tracking Report*, 2/19/97.
• Values from the USEPA Soil Screening Guidance (1996). These values were derived assuming soil pH 6.8. These leachability values are dependent upon both the metal concentration in soil and soil characterisitics. Thus, if site-specific soil characteristics are different than the defaults, these leachability values may not apply. If this is the case, site-specific leachability values should be derived using methods such as TCLP/SPLP.
#Values based on residential use assumptions.
##Values based on worker industrial exposure assumptions.
[I] Based on a dermal absorption of 0.0001.
[II] Based on acute toxicity considerations.
[III] See discussion on the Development of SCTLs for Ammonia in the Technical Report: Development of Soil Cleanup Target Levels for Chapter 62-785, F.A.C., Final Report dated April 30, 1998.

Note: If more than one contaminant is present at a site, the direct exposure values are to be modified, if necessary, such that the sum of the hazard quotients for non-carcinogenic contaminants affecting the same organ(s) s is 1 or less. For carcinogens, the direct exposure values shall be modified such that the excess cumulative lifetime risk level posed by the contaminants is 1.0E-06.

NA = Not available at time of rule adoption.

APPENDIX E-3

DERIVATION OF SURFACE SOIL AND GROUNDWATER SCREENING CONCENTRATIONS OF ESSENTIAL NUTRIENTS FOR COPC SELECTION

DERIVATION OF SURFACE SOIL AND GROUNDWATER SCREENING CONCENTRATIONS FOR COPC SELECTION

Certain inorganics (calcium, iron, magnesium, potassium, and sodium) that are present as naturally-occurring constituents in soil and groundwater are required in limited intakes to maintain normal human physiological functions, and are therefore considered essential nutrients. The Risk Assessment Guidance for Superfund (RAGS), Volume I, Part A, regarding the treatment of essential nutrients in selection of human health contaminants of potential concern (COPCs), states that essential nutrients need not be quantitatively evaluated in a public health risk assessment if they are: 1) present at low concentrations (only slightly above background); and 2) toxic only at doses much higher than those which might be related to exposure at the site (USEPA, 1989). In this report, "only slightly above background" is interpreted to mean that the arithmetic mean of the site concentrations is less than two times the arithmetic mean of the background concentrations. The focus of this section of the document is the technical approach for determining that an analyte is "toxic only at doses higher than those associated with exposures at the site" and a mechanism for making that determination by employing soil and groundwater screening concentrations. The screening concentrations are used to streamline the process and to eliminate the need to calculate essential nutrient doses as part of COPC selection at every site. If the maximum concentration of an essential nutrient does not exceed the appropriate screening concentration shown below, the essential nutrient is considered non-toxic. Essential nutrients are not retained as COPCs if they are detected at concentrations that are either consistent with background or do not exceed the screening concentrations.

Currently, no published essential nutrient screening concentrations for use in risk assessment COPC selection are available. Therefore, HLA-ES has derived surface soil and groundwater screening concentrations of essential nutrients that, when contacted in accordance with the exposure assumptions described below, are not expected to result in adverse health effects. The screening concentrations for groundwater and surface soil are presented in Table E-3-1. The essential nutrient concentrations in surface soil and groundwater are to be compared directly to the nutrient screening concentrations for the purposes of COPC selection.

Table E-3-1
Essential Nutrient Screening Concentrations for Surface Soil and Groundwater

Remedial Investigation
Operable Unit 4
Naval Training Center
Orlando, Florida

Essential Nutrient	Surface Soil Screening Concentration (mg/kg)	Groundwater Screening Concentration (µg/L)
Calcium	[1]1,000,000	1,055,398
Iron	47,824	13,267
Magnesium	460,468	118,807
Potassium	[1]1,000,000	297,016
Sodium	[1]1,000,000	396,022

[1] Actual calculated screening concentration is greater than 1,000,000 mg/kg (Table E-3-5), indicating that this essential nutrient would not be present at toxic levels in surface soil.

As described below, screening concentrations for surface soil and groundwater represent conservative screening concentrations for other media. These surface soil and groundwater screening concentrations are used to screen sediment, subsurface soil, sludge, and surface water, respectively.

DOCUMENTATION OF SURFACE SOIL AND GROUNDWATER SCREENING CONCENTRATIONS

The essential nutrient toxicity screening concentrations were derived in two steps: first, a "non-toxic" dose was identified for each essential nutrient; second, the soil and groundwater concentrations associated with the "non-toxic" doses were calculated using standard residential exposure assumptions. The details of the derivation of the screening values are presented below.

Identification of non-toxic doses

The identification of doses which are not toxic is often accomplished by identifying Reference Doses (RfDs) which are published by USEPA. These RfDs represent doses, including a margin of safety, to which even sensitive subpopulations could be exposed for a lifetime without adverse non-carcinogenic effects. Because no RfDs for calcium, iron, magnesium, potassium, or sodium are available in the Integrated Risk Information System (IRIS) (USEPA, 1998) or the Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997), other published non-toxic doses were sought out. Recommended Dietary Allowances (RDAs) prepared by the Food and Nutrition Board (FNB) of the National Research Council (NRC, 1989) have been selected here to represent non-toxic doses.

RDAs are defined by the FNB as "the levels of intake of essential nutrients that, on the basis of scientific knowledge, are judged by the Food and Nutrition Board to be adequate to meet the known nutrient needs of practically all healthy persons." It is assumed here that, because the RDA represents a requirement for good nutrition, it also represents a dose that is non-toxic. Although some essential nutrients (arsenic for example) have been classified as carcinogens, none of the five nutrients discussed here have been classified as carcinogens. The available RDA data for calcium, iron, magnesium, potassium and sodium are presented in Table E-3-2. From this data set, RDAs for children were preferentially selected to coincide with the child exposure scenario. RDAs were converted from units of mg/day to units of mg/kg/day by dividing the RDA by the child resident body weight of 15 kg (USEPA, 1991). Dermal RDAs were developed by adjusting the oral RDA to compensate for the oral absorption efficiency in a manner similar to that presented in Appendix A of RAGS, Volume I, Part A (USEPA, 1989).

Table E-3-2
Recommended Dietary Allowances[1]

Remedial Investigation
Operable Unit 4
Naval Training Center
Orlando, Florida

Nutrient	RDA	Age (years)	Oral Absorption (%)	Typical Dietary Intake (mg/day)	Toxicity Threshold (mg/day)	Oral RDA (mg/kg/day) [2]	Dermal RDA (mg/kg/day) [3]
Calcium	800 (mg/day)	1-10	40	743 (average of all ages)	NA	53.3	21.2
	1200 (mg/day)	11-24		1179	NA		
	800 (mg/day)	>24		743 (average of all ages); 530 (women ages 35-50)	>2500		
Iron	10 (mg/day)	1-20	10-15	10-15	25-75 (NOAEL); 3000 (lethal)	0.67	0.067
	15 (mg/day)	>20		10-15	25-75 (NOAEL); 14000 (lethal)		
Magnesium	6 (mg/kg/day)	1-15	50	193 (age 1-5)	NA	6	3
	4.5 (mg/kg/day)	>15		207-329	NA		
Potassium	15-20 (mg/kg/day)	1-10	90	1500	NA	15	13.5
	1600-2000 (mg/day)	>20		2500	18000 (hyperkalemia)		
Sodium	300 (mg/day)	2-5	90 [4]	NA	NA	20	18
	500 (mg/day)	Adult		1800-5000	2400 (intake not to be exceeded)		

[1] All data are from the National Resource Council (1989).
[2] Adjusted oral RDA calculated by dividing the RDA (mg/kg) by the bodyweight of a child ages 1-6 (15 kg) (USEPA, 1991); RDAs provided in mg/kg/day were not modified.
[3] Adjusted dermal RDA calculated by multiplying the oral RDA by the oral absorption efficiency (USEPA, 1989).
[4] Oral absorption data not available; value for potassium used as a surrogate based on physio-chemical similarities.

Notes: % = percent.
RDA = recommended daily allowance.
mg/day = milligrams per day.
mg/kg = milligrams per kilogram.
mg/kg/day = milligrams per kilogram per day.

Calculation of screening concentrations

Risk-based screening concentrations for essential nutrients were derived by estimating concentrations in soil and groundwater that correspond to the RDAs for a residential exposure scenario. When the dose is equal to the RDA, the hazard quotient for the situation would equal one. Risk calculation spreadsheets have been used to assist in the calculation of the screening concentrations. When the concentration of an essential nutrient and the associated hazard quotient are known, only a simple calculation is needed to identify the concentration associated with a hazard quotient of one. An arbitrary nutrient concentration has been entered into risk spreadsheets to derive associated hazard quotient values as shown in Tables E-3-3 and E-3-4. Once that information was available, the equality was used to calculate screening soil concentration with the target hazard quotient equal to one.

Screening groundwater concentrations were calculated in a similar manner.

To derive screening concentrations that would be protective to the majority of the exposed population, the exposure assumptions for the most sensitive receptor (e.g., a child resident) were used. For groundwater, screening concentrations were based on ingestion of groundwater as drinking water. For surface soil, screening concentrations were based on ingestion of surface soil and dermal contact with surface soil. Child resident exposure to surface soil and groundwater used as drinking water is usually greater than or equal to oral and dermal exposure to media treated as soil and groundwater, respectively, for exposure assessment. Therefore, screening values for surface soil represent conservative screening values for sediment, subsurface soil, and sludge, and screening values for groundwater used as drinking water represent conservative screening values for surface water. The exposure parameters for the child resident are presented in the accompanying surface soil and groundwater screening concentration spreadsheets (Tables E-3-3 and E-3-4, respectively).

The calculated essential nutrient screening concentrations for surface soil and groundwater are presented in Table E-3-5. These values represent the concentrations of individual essential nutrients in media that, if contacted in accordance with the exposure parameters used to derive the screening concentration, would theoretically result in the receptor receiving his or her recommended dietary allowance of an essential nutrient solely from the contacted media. For some nutrients, the calculated screening concentrations exceed 1,000,000 mg/kg (i.e., 100%). Such concentrations indicate that no concentration of nutrient in the particular medium would result in an intake that exceeds the RDA, given the exposure assumptions on which the screening value is based. Because these screening concentrations do not take into account the additivity of exposures between media (and other dietary intakes, including food), a receptor exposed to essential nutrients that are present in multiple media at the screening concentrations would, in essence, be receiving more than his or her recommended dietary allowance of nutrient. However, data provided in Table E-3-2 indicate that the toxicity threshold for most essential nutrients is several times greater than the RDA; the RDA is not a toxicity threshold value. Therefore, these screening concentrations do not represent concentrations which, if exceeded, would necessarily result in deleterious effects.

Table E-3-5
Theoretical Essential Nutrient Screening Concentrations For Surface Soil and Groundwater

Remedial Investigation
Operable Unit 4
Naval Training Center
Orlando, Florida

Essential Nutrient	Surface Soil Screening Concentration (mg/kg)[1]	Groundwater Screening Concentration (µg/l)[2]
Calcium	[3]4,070,824	1,055,398
Iron	47,824	13,267
Magnesium	460,468	118,807
Potassium	[3]1,160,864	297,016
Sodium	[3]1,547,819	396,022

[1] Surface soil screening concentrations calculated as described in text, using RDAs presented in Table E-3-2 and the exposure parameters and risk calculations presented in Table E-3-3.
[2] Surface soil screening concentrations calculated as described in text, using RDAs presented in Table E-3-2 and the exposure parameters and risk calculations presented in Table E-3-4.
[3] The calculation of a screening concentration larger than 1,000,000 mg/kg indicates that no concentration results in an intake greater than the RDA, given the standard exposure parameters.

Notes: mg/kg = milligrams per kilogram.
ig/l = micrograms per liter.

REFERENCES

National Research Council (NRC). (1989) "Recommended Dietary Allowances, Tenth Edition". National Research Council Subcommittee on the Tenth Edition of the RDAs, Food and Nutrition Board Commission on Life Sciences. National Academy of Sciences. National Academy Press, Washington, D.C.

USEPA (1989) "Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A)". U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C., December. EPA/540/1-89/002.

USEPA (1991) "Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors". OSWER Directive 9285.6-03.

USEPA (1997). "Health Effects Assessment Summary Tables: FY-1997 Annual". U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C., July, 1997. EPA 540-R-94-020.

USEPA (1998). Integrated Risk Information System (IRIS). Online. Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH.

TABLE E-3.3
DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - ESSENTIAL NUTRIENTS
CHILD RESIDENT
OPERABLE UNIT 4
NTC ORLANDO

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical specific	chemical-specific	
INGESTION RATE	IR	200	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992a
AGE-SPECIFIC SURFACE AREA	SAi	age-specific	cm²	USEPA, 1989
ABSORPTION FRACTION	ABSd	chemical specific	unitless	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-06	kg/mg	SEE BELOW
BODY WEIGHT	BW	15	kg	USEPA, 1991
AGE-SPECIFIC BODY WEIGHT	BWi	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	350	days/year *	USEPA, 1991
EXPOSURE DURATION	ED	6	years	USEPA, 1991
AGE-SPECIFIC EXPOSURE DURATION	EDi	age-specific	years	Assumption
AGE-WEIGHTED SURFACE AREA [1]	$SA_{soil/adj}$	766	cm2-year/kg	Per USEPA, 1992a
DOSE ABSORBED PER EVENT	DA_{event}	chemical specific	mg/cm^2-event	Per USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1991

* Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.
[1] In estimating the dermally absorbed dose for children age 1 through 6, the time-weighted, bodyweight normalized surface area exposed is calculated from surface area, exposure duration, and body weight for each of 6 age periods, age 1 through 6, per USEPA, 1992.
USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992 and Dermal Exposure Appendix of this document.
USEPA, 1992b. USEPA Region IV Guidance Memo February 10, 1992.
CF = 10E-09 kg/ug for organics

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)[1]

HAZARD QUOTIENT = INTAKE (mg/kg-day) / RECOMMEDED DIETARY ALLOWANCE (mg/kg-day)

$$\text{INTAKE-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

INTAKE-DERMAL = (DAevent x EF / AT x 365 days/year) x SAsoil/adj

Where:

SAsoil/adj = SUM (SAi x EDi / BWi)
DAevent = CS x AF x ABSd x CF

Note:
For noncarcinogenic effects: AT = ED

TABLE F-4
INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - ESSENTIAL NUTRIENTS
CHILD RESIDENT
STUDY AREA 16
NTC ORLANDO

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical specific	ug/liter	
INGESTION RATE	IR	0.79	liters/day	USEPA, 1989
BODY WEIGHT	BW	15	kg	USEPA, 1991
CONVERSION FACTOR	CR	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	6	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1991

USEPA, 1989. Exposure Factors Handbook, Final Report, EPA/600/8-89/043, May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)^{1}

HAZARD QUOTIENT = INTAKE (mg/kg-day) / RECOMMENDED DIETARY ALLOWANCE (mg/kg-day)

$$INTAKE_{ing} = \frac{CW \times IR \times EF \times ED \times CF}{BW \times AT \times 365\ days/year}$$

NOTE:
For noncarcinogenic effects AT = ED

CARCINOGENIC EFFECTS

COMPOUND [1]	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
				TOTAL CANCER RISK	0E+00

[1] Essential nutrients are not considered carcinogenic from exposure through the oral route.

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	RECOMMENDED DIETARY ALLOWANCE (mg/kg-day)	HAZARD QUOTIENT INGESTION
Calcium	5000	ug/liter	2.5E-01	5.3E+01	4.7E-03
Iron	5000	ug/liter	2.5E-01	6.7E-01	3.8E-01
Magnesium	5000	ug/liter	2.5E-01	6.0E+00	4.2E-02
Potassium	5000	ug/liter	2.5E-01	1.5E+01	1.7E-02
Sodium	5000	ug/liter	2.5E-01	2.0E+01	1.3E-02
				TOTAL HAZARD INDEX	5E-01

APPENDIX E-4

PHYSICAL CHARACTERISTICS OF EXPOSED POPULATIONS

Table E-4-1
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Resident (Adult and Child)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

Parameter	Symbol	Child Value (Age 1-6)	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific		Chemical-specific	
Soil Ingestion Rate	IR_{soil}	200	100	mg/day	[2]
Fraction Ingested	FI	100%	100%	unitless	Assumption
Conversion Factor					
Inorganics	CF	1×10^{-6}	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	1×10^{-9}	kg/μg	
Exposure Frequency	EF	350	350	days/year	[2]
Exposure Duration	ED	6	24	years	[2]
Exposure Time [1]	ET	24	24	hours/day	[2]
Averaging Time	AT				
Cancer		70	70	years	[2]
Noncancer		6	24	years	[2]
Surface Area	SA		5750	cm^2	Appendix E-7
Age-weighted Surface Area	$SA_{soil/adj}$	766		cm^2-year/kg	Appendix E-7

See notes at end of table.

Table E-4-1 (Continued)
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Resident (Adult and Child)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Child Value (Age 1-6)	Adult Value	Units	Source
Surface Area	SA	1869	5750	cm^2	Appendix E-7
Inhalation Rate	IR_{air}	0.625	0.833	m^3/hour	[2]
Body Weight	BW	15	70	kg	[2]
Adherence Factor	AF	1	1	mg/cm^2-event	[3]
Absorption Fraction	ABS_d	Chemical-specific		unitless	[5]
Particulate Emission Factor	PEF	$1.24x10^9$	$1.24x10^9$	m^3/kg	[4]
Concentration in Air	CA	Chemical-specific		mg/m^3	[4]

References:

[1] Exposure Time is used only in the Inhalation of Particulates Scenario.
[2] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".
[3] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January, 1992.
[4] Florida Soil Cleanup Goal Variable; FDEP, 1995.
[5] USEPA, 1995. USEPA Region IV Guidance Memorandum; November 1995.

Table E-4-2
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Trespasser/Recreational User (Adult and Adolescent)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

Parameter	Symbol	Adolescent Value (Age 7-18)	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific		Chemical-specific	
Particulate Emission Factor	PEF	1.24×10^9	1.24×10^9	m^3/kg	[2]
Dose Absorbed per Unit Area per Event	DA_{event}	Chemical-specific		mg/m^2-event	[3]
Soil Ingestion Rate	IR_{soil}	100	100	mg/day	[4]
Fraction Ingested	FI	100%	100%	unitless	Assumption
Conversion Factor					
Inorganics	CF	1×10^{-6}	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	1×10^{-9}	kg/μg	
Exposure Frequency	EF	45	45	days/year	Assumption
Exposure Duration	ED	10	20	years	[4]
Exposure Time [1]	ET	4	4	hours/day	Assumption
Averaging Time	AT				
Cancer		70	70	years	[4]
Non-cancer		10	20	years	[4]

See notes at end of table.

Table E-4-2 (Continued)
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Trespasser/Recreational User (Adult and Adolescent)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Adolescent Value (Age 7-18)	Adult Value	Units	Source
Surface Area	SA	4429	5750	cm^2	Appendix E-7
Inhalation Rate	IR_{air}	0.625	0.833	m^3/hour	[4]
Body Weight	BW	45	70	kg	[4,5]
Adherence Factor	AF	1	1	mg/cm^2-event	[3]
Absorption Fraction	ABS_d	Chemical-specific		unitless	[5]
Concentration in Air	CA	Chemical-specific		mg/m^3	[2]

References:

[1] Exposure Time is used only in the Inhalation of Particulate Scenario.
[2] Florida Soil Cleanup Goal Variable; FDEP, 1995.
[3] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January, 1992.
[4] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".
[5] USEPA, 1995. USEPA Region IV Guidance Memorandum; November 1995.
[6] USEPA, 1989. Exposure Factors Handbook; EPA/600/8-89/043; July 1989.

Table E-4-3
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Site Maintenance Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Parameter	Symbol	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific	Chemical-specific	
Particulate Emission Factor	PEF	1.24×10^9	m^3/kg	[2]
Soil Ingestion Rate	IR_{soil}	50	mg/day	[3]
Fraction Ingested	FI	100%	unitless	Assumption
Conversion Factor				
Inorganics	CF	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	kg/µg	
Exposure Frequency	EF	30	days/year	Assumption
Exposure Duration	ED	25	years	[3]
Exposure Time [1]	ET	8	hours/day	Assumption
Averaging Time	AT			
Cancer		70	years	[3]
Non-cancer		25	years	[3]
Surface Area	SA	5750	cm^2	Appendix E-7
Inhalation Rate	IR_{air}	2.5	m^3/hour	[3]
Body Weight	BW	70	kg	[3]

See notes at end of table.

Table E-4-3 (Continued)
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Site Maintenance Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Adherence Factor	AF	1	mg/cm^2-event	[4]
Absorption Fraction	ABS_d	Chemical-specific	unitless	[5]
Concentration in Air	CA	Chemical-specific	mg/m^3	[2]

References:

[1] Exposure Time is only used in the Inhalation of Particulates Scenario.
[2] Florida Soil Cleanup Goal Variable; FDEP, 1995.
[3] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".
[4] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January, 1992.
[5] USEPA, 1995. USEPA Region IV Guidance Memorandum; November, 1995.

Table E-4-4
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Excavation Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

Parameter	Symbol	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific	Chemical-specific	
Particulate Emission Factor	PEF	1.24×10^9	m^3/kg	[5]
Soil Ingestion Rate	IR_{soil}	480	mg/day	[3]
Fraction Ingested	FI	100%	unitless	Assumption
Conversion Factor				
Inorganics	CF	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	kg/µg	
Exposure Frequency	EF	30	days/year	Assumption
Exposure Duration	ED	1	years	[3]
Exposure Time [1]	ET	8	hours/day	Assumption
Averaging Time	AT			
Cancer		70	years	[3]
Non-cancer		1	years	[3]
Surface Area	SA	5,750	cm^2	Appendix E-7
Inhalation Rate	IR_{air}	2.5	m^3/hour	[3]
Body Weight	BW	70	kg	[3]
Adherence Factor	AF	1	mg/cm^2-event	[4]
Absorption Fraction	ABS_d	Chemical-specific	unitless	[4]
Concentration in Air	CA	Chemical-specific	mg/m^3	[5]

See notes on following page.

Table E-4-4 (Continued)
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Excavation Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

References:

[1] Exposure Time is only used in the Inhalation of Particulates Scenario.
[2] USEPA, 1989. Exposure Factors Handbook; EPA/600/8-89/0-43; May 1989.
[3] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance. "Standard Default Exposure Parameters."
[4] USEPA, 1995. USEPA Region IV Guidance Memorandum; November 1995.
[5] Florida Soil Cleanup Goal Variable, FDEP, 1995.

Table E-4-5
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Commercial Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

Parameter	Symbol	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific	Chemical-specific	
Particulate Emission Factor	PEF	1.24×10^9	m^3/kg	[5]
Soil Ingestion Rate	IR_{soil}	50	mg/day	[2]
Fraction Ingested	FI	100%	unitless	Assumption
Conversion Factor				
Inorganics	CF	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	kg/μg	
Exposure Frequency	EF	250	days/year	[2]
Exposure Duration	ED	25	years	[2]
Exposure Time [1]	ET	8	hours/day	Assumption
Averaging Time	AT			
Cancer		70	years	[2]
Non-cancer		25	years	[2]
Surface Area	SA	2300	cm^2	[3]
Inhalation Rate	IR_{air}	2.5	m^3/hour	[2]

See notes at end of table.

Table E-4-5 (Continued)
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
RME Commercial Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Body Weight	BW	70	kg	[2]
Concentration in Air	CA	Chemical-specific	mg/m^3	[5]
Adherence Factor	AF	1	mg/cm^2-event	[3]
Absorption Fraction	ABS_d	Chemical-specific	unitless	[4]

References:

[1] Exposure Time is only used in the Inhalation of Particulates Scenario.
[2] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".
[3] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January, 1992
[4] USEPA, 1995. USEPA Region IV Guidance Memorandum; November 1995.
[5] Florida Soil Cleanup Goal Variable, FDEP, 1995.

Table E-4-6
Exposure Parameters for Groundwater Ingestion
RME Resident (Adult and Child)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$Intake_{ing} = \frac{CW \times IR_{groundwater} \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA_{air} \times ET \times EF \times ED}{CF2 \times AT \times 356\ days/year}$$

Parameter	Symbol	Child Value (Age 1-6)	Adult Value	Units	Source
Concentration in Groundwater	CW	Chemical-specific		µg/liter	
Water Ingestion Rate	IR_{water}	1	2	liters/day	[1]
Conversion Factor	CF	0.001	0.001	mg/µg	
Exposure Frequency	EF	350	350	days/year	[1]
Exposure Duration	ED	6	30	years	[1]
Averaging Time	AT				
Cancer		70	70	years	[1]
Non-cancer		6	30	years	[1]
Body Weight	BW	15	70	kg	[1]

References:
[1] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".

Table E-4-7
Exposure Parameters for Surface Soil Ingestion and Dermal Contact
Central Tendency Resident (Adult and Child)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

Parameter	Symbol	Child Value (Age 1-6)	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific		Chemical-specific	
Soil Ingestion Rate	IR_{soil}	100	50	mg/day	[4]
Fraction Ingested	FI	100%	100%	unitless	Assumption
Conversion Factor					
Inorganics	CF	1×10^{-6}	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	1×10^{-9}	kg/μg	
Exposure Frequency	EF	350	350	days/year	[1]
Exposure Duration	ED	2	7	years	[2]
Averaging Time	AT				
Cancer		70	70	years	[1]
Noncancer		2	7	years	[2]
Surface Area	SA	1869	5000	cm^2	Appendix E-7
Dose Absorbed per Unit Area per Event	DA_{event}	Chemical-specific		mg/cm^2-event	[2]
Particulate Emission Factor	PEF	1.24×10^9	1.24×10^9	m^3/kg	[5]

See notes at end of table

Table E-4-7 (Continued)
Exposure Parameters for Surface Soil Ingestion and Dermal Contact
Central Tendency Resident (Adult and Child)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Child Value (Age 1-6)	Adult Value	Units	Source
Body Weight	BW	15	70	kg	[1]
Adherence Factor	AF	0.2	0.2	mg/cm^2-event	[3]
Absorption Fraction	ABS_d	Chemical-specific		unitless	[3]
Concentration in Air	CA	Chemical-specific		mg/m^3	[5]

References:

[1] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".
[2] USEPA, 1992. Region 6 Memorandum: "Central Tendency and RME Exposure Parameters".
[3] USEPA, 1995b. USEPA Region IV Guidance Memorandum; November, 1995.
[4] USEPA, 1996. Exposure Factors Handbook, 1996
[5] Florida Soil Cleanup Goal Variable, FDEP, 1995.

Table E-4-8
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
Central Tendency Trespasser/Recreational User (Adult and Adolescent)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

Parameter	Symbol	Adolescent Value (Age 7-18)	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific		Chemical-specific	
Particulate Emission Factor	PEF	1.24×10^9	1.24×10^9	m^3/kg	[6]
Dose Absorbed per Unit Area per Event	DA_{event}	Chemical-specific		mg/m^2-event	[3]
Soil Ingestion Rate	IR_{soil}	100	100	mg/day	[7]
Fraction Ingested	FI	100%	100%	unitless	Assumption
Conversion Factor					
Inorganics	CF	1×10^{-6}	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	1×10^{-9}	kg/μg	
Exposure Frequency	EF	45	45	days/year	Assumption
Exposure Duration	ED	10	20	years	[2]
Exposure Time [1]	ET	4	4	hours/day	Assumption
Averaging Time	AT				
Cancer		70	70	years	[2]
Non-cancer		10	20	years	[2]

See notes at end of table.

Table E-4-8 (Continued)
Exposure Parameters for Surface Soil Ingestion, Inhalation, and Dermal Contact
Central Tendency Trespasser/Recreational User (Adult and Adolescent)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Adolescent Value (Age 7-18)	Adult Value	Units	Source
Surface Area	SA	4429	5750	cm^2	Appendix E-7
Inhalation Rate	IR_{air}	0.625	0.833	m^3/hour	[2]
Body Weight	BW	45	70	kg	[2,5]
Adherence Factor	AF	1	1	mg/cm^2-event	[3]
Absorption Fraction	ABS_d	Chemical-specific		unitless	[4]
Concentration in Air	CA	Chemical-specific		mg/m^3	[6]

References:

[1] Exposure Time is used only in the Inhalation of Particulate Scenario.
[2] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".
[3] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January, 1992.
[4] USEPA, 1995. USEPA Region IV Guidance Memorandum; November 1995.
[5] USEPA, 1989. Exposure Factors Handbook; EPA/600/8-89/043; July 1989.
[6] Florida Soil Cleanup Goal Variable, FDEP, 1995.
[7] USEPA, 1996. Exposure Factors Handbook; EPA/600/P-95/002Ba; August 1996.

Table E-4-9
Exposure Parameters for Surface Soil Ingestion and Dermal Contact
Central Tendency Site Maintenance Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Parameter	Symbol	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific	Chemical-specific	
Particulate Emission Factor	PEF	1.24E+09	m^3/kg	Default [1]
Soil Ingestion Rate	IR_{soil}	50	mg/day	[4]
Fraction Ingested	FI	100%	unitless	Assumption
Conversion Factor				
Inorganics	CF	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	kg/μg	
Exposure Frequency	EF	30	days/year	[4]
Exposure Duration	ED	9	years	[3]
Exposure Time [1]	ET	8	hours/day	Assumption
Averaging Time	AT			
Cancer		70	years	[2]
Non-cancer		9	years	[2]
Surface Area	SA	5000	cm^2	[5]
Body Weight	BW	70	kg	[2]

See notes at end of table

Table E-4-9 (Continued)
Exposure Parameters for Surface Soil Ingestion and Dermal Contact
Central Tendency Site Maintenance Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Adherence Factor	AF	0.2	mg/cm^2-event	[3]
Absorption Fraction	ABS_d	Chemical-specific	unitless	[4]

References:

[1] Florida Soil Cleanup Goal Variable. FDEP, 1995.
[2] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".
[3] USEPA, 1992. Region 6 Memorandum: Central Tendency and RME Exposure Parmaters.
[4] USEPA, 1995. USEPA Region IV Guidance Memorandum; November, 1995.
[5] USEPA, 1996. Exposure Factors Handbook, 1996.

Table E-4-10
Exposure Parameters for Surface Soil Ingestion and Dermal Contact
Central Tendency Commercial Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

Parameter	Symbol	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific	Chemical-specific	
Particulate Emission Factor	PEF	1.24E+09	m^3/kg	[1]
Soil Ingestion Rate	IR_{soil}	50	mg/day	[2]
Fraction Ingested	FI	100%	unitless	Assumption
Conversion Factor				
Inorganics	CF	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	kg/µg	
Exposure Frequency	EF	250	days/year	[2]
Exposure Duration	ED	9	years	[2]
Averaging Time	AT			
Cancer		70	years	[2]
Non-cancer		9	years	[2]
Surface Area	SA	2300	cm^2	[3]

See notes at end of table

Table E-4-10 (Continued)
Exposure Parameters for Surface Soil Ingestion and Dermal Contact
Central Tendency Commercial Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Body Weight	BW	70	kg	[2]
Concentration in Air	CA	Chemical-specific	mg/m^3	[1]
Adherence Factor	AF	0.2	mg/cm^2-event	[4]
Absorption Fraction	ABS_d	Chemical-specific	unitless	[5]

References:

[1] Florida Soil Cleanup Goal Variable. FDEP, 1995.
[2] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".
[3] USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January, 1992.
[4] USEPA, 1992. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
[5] USEPA, 1995. USEPA Region IV Guidance Memorandum; November, 1995.

Table E-4-11
Exposure Parameters for Surface Soil Ingestion and Dermal Contact
Central Tendency Excavation Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$INTAKE_{ing} = \frac{CS \times IR_{soil} \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA \times IR_{air} \times ET \times EF \times ED}{BW \times AT \times 356\ days/year}$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

$$INTAKE_{dermal} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/year}$$

Parameter	Symbol	Adult Value	Units	Source
Concentration in Soil	CS	Chemical-specific	Chemical-specific	
Particulate Emission Factor	PEF	1.24E+09	m^3/kg	[1]
Soil Ingestion Rate	IR_{soil}	110	mg/day	[2]
Fraction Ingested	FI	100%	unitless	Assumption
Conversion Factor				
Inorganics	CF	1×10^{-6}	kg/mg	
Organics	CF	1×10^{-9}	kg/µg	
Exposure Frequency	EF	30	days/year	Assumption
Exposure Duration	ED	1	years	[3]
Exposure Time [1]	ET	8	hours/day	Assumption
Averaging Time	AT			
Cancer		70	years	[3]
Non-cancer		1	years	[3]
Surface Area	SA	5,000	cm^2	[6]
Body Weight	BW	70	kg	[3]

See notes at end of table

Table E-4-11 (Continued)
Exposure Parameters for Surface Soil Ingestion and Dermal Contact
Central Tendency Excavation Worker (Adult)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Parameter	Symbol	Adult Value	Units	Source
Adherence Factor	AF	0.2	mg/cm^2-event	[4]
Absorption Fraction	ABS_d	Chemical-specific	unitless	[5]

References:

[1] Florida Soil Cleanup Goal Variable. FDEP, 1995.
[2] USEPA, 1989. Exposure Factors Handbook; EPA/600/8-89/0-43; May 1989.
[3] USEPA, 1992. Human Health Evaluation Manual, Supplemental Guidance. "Standard Default Exposure Parameters."
[4] USEPA, 1992. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
[5] USEPA, 1995. USEPA Region IV Guidance Memorandum; November, 1995.
[6] USEPA, 1996. Exposure Factors Handbook, 1996.

Table E-4-12
Exposure Parameters for Groundwater Ingestion
Central Tendency Resident (Adult and Child)

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

$$Intake_{ing} = \frac{CW \times IR_{groundwater} \times CF \times EF \times ED}{BW \times AT \times 365\ days/year}$$

$$INTAKE_{inh} = \frac{CA_{air} \times ET \times EF \times ED}{CF2 \times AT \times 356\ days/year}$$

Parameter	Symbol	Child Value (Age 1-6)	Adult Value	Units	Source
Concentration in Groundwater	CW	Chemical-specific		µg/liter	
Water Ingestion Rate	IR_{water}	0.7	1.4	liters/day	[1]
Conversion Factor	CF	0.001	0.001	mg/µg	
Exposure Frequency	EF	350	350	days/year	[1]
Exposure Duration	ED	2	7	years	[1]
Averaging Time	AT				
Cancer		70	70	years	[1]
Non-cancer		2	7	years	[1]
Body Weight	BW	15	70	kg	[1]

References:
[1] USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Parameters".

APPENDIX E-5

DETERMINATION OF BENZO(A)PYRENE EQUIVALENT CONCENTRATIONS

Table 1
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S00900	adjusted	08S00900D	adjusted	08S01000	adjusted	08S01100	adjusted	08S01200	adjusted	08S01300	adjusted
Polynuclear Aromatic Hydrocarbons (ug/kg)													
Benzo(a)anthracene	0.1	78J	7.8	820U	41	140J	14	120J	12	450U	22.5	360U	18
Benzo(a)pyrene	1	800U	400	820U	410	420U	210	150J	150	450U	225	360U	180
Benzo(b)fluoranthene	0.1	170J	17	820U	41	420U	21	340J	34	450U	22.5	360U	18
Benzo(k)fluoranthene	0.01	170J	1.7	820U	4.1	420U	2.1	330J	3.3	450U	2.25	360U	1.8
Chrysene	0.001	85J	0.085	820U	0.41	110J	0.11	230J	0.23	450U	0.225	360U	0.18
Dibenz(a,h)anthracene	1	800U	400	820U	410	420UJ	210	400U	200	450U	225	360U	180
Indeno(1,2,3-cd)pyrene	0.1	800U	40	820U	41	420U	21	120J	12	450U	22.5	360U	18
Benzo(a)pyrene equivalent concentration			867		948		478		412		520		416

TEF = Toxicity Equivalency Factor

Table E-5.1
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S01400	adjusted	08S01500	adjusted	08S01600	adjusted	08S01700	adjusted	08S01800	adjusted	08S01900	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	380U	19	31J	3.1	120J	12	410U	20.5	420U	21	370U	18.5
Benzo(a)pyrene	1	380U	190	41J	41	170J	170	410U	205	420U	210	370U	185
Benzo(b)fluoranthene	0.1	380U	19	75J	7.5	330J	33	410U	20.5	420U	21	370U	18.5
Benzo(k)fluoranthene	0.01	380U	1.9	74J	0.74	330J	3.3	410U	2.05	420U	2.1	370U	1.85
Chrysene	0.001	380U	0.19	54J	0.054	250J	0.25	410U	0.205	420U	0.21	370U	0.185
Dibenz(a,h)anthracene	1	380U	190	430U	215	390U	195	410U	205	420U	210	370U	185
Indeno(1,2,3-cd)pyrene	0.1	380U	19	430U	21.5	150J	15	410U	20.5	420U	21	370U	18.5
Benzo(a)pyrene equivalent concentra			439		289		429		474		485		428

TEF = Toxicity Equivalency Factor

Table
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S02000	adjusted	08S02100	adjusted	08S02200	adjusted	08S02300	adjusted	08S02400	adjusted	08S02500	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	340U	17	400U	20	390U	19.5	380U	19	380U	19	370U	18.5
Benzo(a)pyrene	1	340U	170	400U	200	390U	195	380U	190	380U	190	370U	185
Benzo(b)fluoranthene	0.1	340U	17	400U	20	45J	4.5	380U	19	380U	19	370U	18.5
Benzo(k)fluoranthene	0.01	340U	1.7	400U	2	17J	0.17	380U	1.9	380U	1.9	370U	1.85
Chrysene	0.001	340U	0.17	400U	0.2	390U	0.195	380U	0.19	380U	0.19	370U	0.185
Dibenz(a,h)anthracene	1	340U	170	400U	200	390U	195	380U	190	380U	190	370U	185
Indeno(1,2,3-cd)pyrene	0.1	340U	17	400U	20	390U	19.5	380U	19	380U	19	370U	18.5
Benzo(a)pyrene equivalent concentra			393		462		434		439		439		428

TEF = Toxicity Equivalency Factor

Table E-5.1
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S02600	adjusted	08S02700	adjusted	08S02800	adjusted	08S02800D	adjusted	08S02900	adjusted	08S03000	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	39J	3.9	110J	11	97J	9.7	120J	12	400U	20	370U	18.5
Benzo(a)pyrene	1	40J	40	140J	140	110J	110	120J	120	400U	200	370U	185
Benzo(b)fluoranthene	0.1	92J	9.2	230J	23	180J	18	250J	25	400U	20	370U	18.5
Benzo(k)fluoranthene	0.01	92J	0.92	230J	2.3	54J	0.54	250J	2.5	400U	2	370U	1.85
Chrysene	0.001	50J	0.05	140J	0.14	120J	0.12	130J	0.13	400U	0.2	370U	0.185
Dibenz(a,h)anthracene	1	360U	180	450U	225	400U	200	49J	49	400U	200	370U	185
Indeno(1,2,3-cd)pyrene	0.1	360U	18	87J	8.7	61J	6.1	130J	13	400U	20	370U	18.5
Benzo(a)pyrene equivalent concentra			252		410		344		222		462		428

TEF = T[illegible]ity Equivalency Factor

Table [illegible]1
Determination of Benzo(a)pyre[illegible] Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S03100	adjusted	08S03200	adjusted	08S03300	adjusted	08S03400	adjusted	08S03500	adjusted	08S03600	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	350U	17.5	350U	17.5	430U	21.5	1100U	55	470U	23.5	42J	4.2
Benzo(a)pyrene	1	350U	175	350U	175	430U	215	1100U	550	470U	235	370U	185
Benzo(b)fluoranthene	0.1	350U	17.5	350U	17.5	430U	21.5	1100U	55	55J	5.5	43J	4.3
Benzo(k)fluoranthene	0.01	350U	1.75	350U	1.75	430U	2.15	1100U	5.5	470U	2.3	370U	1.85
Chrysene	0.001	350U	0.175	350U	0.175	430U	0.215	1100U	0.55	470U	0.235	41J	0.041
Dibenz(a,h)anthracene	1	350U	175	350U	175	430U	215	1100U	550	470U	235	370U	185
Indeno(1,2,3-cd)pyrene	0.1	350U	17.5	350U	17.5	430U	21.5	1100U	55	470U	23.5	370U	18.5
Benzo(a)pyrene equivalent concentra			404		404		497		1271		525		399

TEF = Toxicity Equivalency Factor

Table E-5.1
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S03700	adjusted	08S03800	adjusted	08S03800D	adjusted	08S03900	adjusted	08S04000	adjusted	08S04100	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	420U	21	350J	35	360J	36	400U	20	390U	19.5	370U	18.5
Benzo(a)pyrene	1	420U	210	430	430	370J	370	400U	200	390U	195	370U	185
Benzo(b)fluoranthene	0.1	420U	21	580	58	520	52	400U	20	390U	19.5	370U	18.5
Benzo(k)fluoranthene	0.01	420U	2.1	230J	2.3	210J	2.1	400U	2	390U	1.95	370U	1.85
Chrysene	0.001	420U	0.21	420	0.42	390J	0.39	400U	0.2	390U	0.195	370U	0.185
Dibenz(a,h)anthracene	1	420U	210	70J	70	59J	59	400U	200	390U	195	370U	185
Indeno(1,2,3-cd)pyrene	0.1	420U	21	270J	27	240J	24	400U	20	390U	19.5	370U	18.5
Benzo(a)pyrene equivalent concentra			485		623		543		462		451		428

TEF = Toxicity Equivalency Factor

Table 1
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S04200	adjusted	08S04300	adjusted	08S04400	adjusted	08S04500	adjusted	08S04600	adjusted	08S04700	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	350U	17.5	330J	33	510U	25.5	470U	23.5	400U	20	1500U	75
Benzo(a)pyrene	1	350U	175	310J	310	510U	255	470U	235	400U	200	1500U	750
Benzo(b)fluoranthene	0.1	350U	17.5	440	44	69J	6.9	470U	23.5	400U	20	1500U	75
Benzo(k)fluoranthene	0.01	350U	1.75	170J	1.7	510U	2.5	470U	2.3	400U	2	1500U	7.5
Chrysene	0.001	350U	0.175	330J	0.33	59J	0.059	470U	0.235	400U	0.2	1500U	0.75
Dibenz(a,h)anthracene	1	350U	175	50J	50	510U	255	470U	235	400U	200	1500U	750
Indeno(1,2,3-cd)pyrene	0.1	350U	17.5	200J	20	510U	25.5	470U	23.5	400U	20	1500U	75
Benzo(a)pyrene equivalent concentra			404		459		571		543		462		1733

TEF = Toxicity Equivalency Factor

Table E-5.1
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S04800	adjusted	08S04900	adjusted	08S05000	adjusted	08S05100	adjusted	08S05100D	adjusted	08S05200	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	63J	6.3	37J	3.7	430U	21.5	420U	21	400U	20	76J	7.6
Benzo(a)pyrene	1	73J	73	36J	36	430U	215	420U	210	400U	200	61J	61
Benzo(b)fluoranthene	0.1	180J	18	88J	8.8	430U	21.5	420U	21	400U	20	120J	12
Benzo(k)fluoranthene	0.01	190J	1.9	89J	0.89	430U	2.15	420U	2.1	400U	2	110J	1.1
Chrysene	0.001	100J	0.1	45J	0.045	430U	0.215	420U	0.21	400U	0.2	56J	0.056
Dibenz(a,h)anthracene	1	440U	220	430U	215	430U	215	420U	210	400U	200	400U	200
Indeno(1,2,3-cd)pyrene	0.1	58J	5.8	430U	21.5	430U	21.5	420U	21	400U	20	38J	3.8
Benzo(a)pyrene equivalent concentra			325		286		497		485		462		286

TEF = Toxicity Equivalency Factor

Table 1
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S05301	adjusted	08S05401	adjusted	08S05501	adjusted	08S05601	adjusted	08S05701	adjusted	08S05801	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	320J	32	390U	19.5	48J	4.8	820U	41	1300	130	1400U	70
Benzo(a)pyrene	1	270J	270	50J	50	470U	235	820U	410	1100	1100	1400U	700
Benzo(b)fluoranthene	0.1	320J	32	82J	8.2	72J	7.2	820U	41	3700J	370	1400U	70
Benzo(k)fluoranthene	0.01	280J	2.8	110J	1.1	93J	0.93	820U	4.1	3700J	37	1400U	7.0
Chrysene	0.001	310J	0.31	43J	0.043	470U	0.235	820U	0.41	1900	1.9	1400U	0.7
Dibenz(a,h)anthracene	1	85J	85	390U	195	470U	235	820U	410	280J	280	1400U	700
Indeno(1,2,3-cd)pyrene	0.1	160J	16	390U	19.5	470U	23.5	820U	41	460J	46	1400U	70
Benzo(a)pyrene equivalent concentra			438		293		507		948		1965		1618

TEF = Toxicity Equivalency Factor

Table E-5.1
Determination of Benzo(a)pyrene Equivalent Concentrations

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

	TEF	08S05901	adjusted	08S06001	adjusted	08S06101	adjusted	08S06201	adjusted	08S06301	adjusted	08S06301D	adjusted
Polynuclear Aromatic Hydrocarbons													
Benzo(a)anthracene	0.1	1000U	50	440U	22	370U	18.5	360U	18	380U	19	380U	19
Benzo(a)pyrene	1	1000U	500	440U	220	370U	185	360U	180	380U	190	380U	190
Benzo(b)fluoranthene	0.1	81J	8.1	440U	22	370U	18.5	360U	18	380U	19	380U	19
Benzo(k)fluoranthene	0.01	110J	1.1	440U	2.2	370U	1.85	360U	1.8	380U	1.9	380U	1.9
Chrysene	0.001	1000U	0.5	440U	0.22	370U	0.185	360U	0.18	380U	0.19	380U	0.19
Dibenz(a,h)anthracene	1	1000U	500	440U	220	370U	185	360U	180	380U	190	380U	190
Indeno(1,2,3-cd)pyrene	0.1	1000U	50	440U	22	370U	18.5	360U	18	380U	19	380U	19
Benzo(a)pyrene equivalent concentra			1110		508		428		416		439		439

TEF = Toxicity Equivalency Factor

APPENDIX E-6

RISK CALCULATING SPREADSHEETS

TABLE E-6.1

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER - RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,750	cm²	USEPA, 1992
DOSE ABSORBED PER EVENT	DAevent	chemical specific	mg/cm²-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-06	kg/mg	inorganics
	CF	1.00E-09	kg/ug	organics
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	45	days/year [1]	Assumption
EXPOSURE DURATION	ED	20	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	20	years	Assumption

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; 1/92.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DAevent = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects: AT = ED

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TABLE E-6.1

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER - RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	3.0E-08	7.3	2.2E-07	0.01	1.7E-08	8	1.4E-07	3.6E-07
Aldrin	O	2.3	ug/kg	1.2E-10	17	2.0E-09	0.01	6.7E-11	34	2.3E-09	4.2E-09
Aroclor-1260	O	55	ug/kg	2.8E-09	2	5.5E-09	0.01	1.6E-09	2.2	3.5E-09	9.0E-09
alpha-Chlordane	O	91	ug/kg	4.6E-09	0.35	1.6E-09	0.01	2.6E-09	0.44	1.2E-09	2.8E-09
gamma-Chlordane	O	71	ug/kg	3.6E-09	0.35	1.3E-09	0.01	2.1E-09	0.44	9.0E-10	2.2E-09
4,4'-DDD	O	15	ug/kg	7.5E-13	0.24	1.8E-13	0.01	4.3E-13	0.3	1.3E-13	3.1E-13
4,4'-DDE	O	100	ug/kg	5.0E-12	0.34	1.7E-12	0.01	2.9E-12	0.43	1.2E-12	3.0E-12
4,4'-DDT	O	70	ug/kg	3.5E-09	0.34	1.2E-09	0.01	2.0E-09	0.43	8.7E-10	2.1E-09
Dieldrin	O	7.7	ug/kg	3.9E-10	16	6.2E-09	0.01	2.2E-10	32	7.1E-09	1.3E-08
Heptachlor	O	3.6	ug/kg	1.8E-10	4.5	8.2E-10	0.01	1.0E-10	9.2	9.6E-10	1.8E-09
Heptachlor epoxide	O	3.7	ug/kg	1.9E-10	9.1	1.7E-09	0.01	1.1E-10	19	2.0E-09	3.7E-09
Arsenic	I	25.3	mg/kg	1.3E-06	1.5	1.9E-06	0.001	7.3E-08	1.5	1.1E-07	2.0E-06
Beryllium	I	0.12	mg/kg	6.0E-09	4.3	2.6E-08	0.001	3.5E-10	430	1.5E-07	1.8E-07
Lead	I	179	mg/kg	9.0E-06	ND		0.001	5.2E-07	ND		
SUMMARY CANCER RISK						2E-06				4E-07	3E-06

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

TABLE E-6.1

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER - RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	5.1E-08	ND		0.01	2.9E-08	ND		
Benzo(a)pyrene	O	290	ug/kg	5.1E-08	ND		0.01	2.9E-08	ND		
Benzo(b)fluoranthene	O	310	ug/kg	5.5E-08	ND		0.01	3.1E-08	ND		
Benzo(k)fluoranthene	O	310	ug/kg	5.5E-08	ND		0.01	3.1E-08	ND		
Chrysene	O	300	ug/kg	5.3E-08	ND		0.01	3.0E-08	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	4.6E-08	ND		0.01	2.6E-08	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	4.6E-08	ND		0.01	2.6E-08	ND		
Aldrin	O	2.3	ug/kg	4.1E-10	0.00003	1.4E-05	0.01	2.3E-10	0.000015	1.6E-05	2.9E-05
Aroclor-1260	O	55	ug/kg	9.7E-09	0.00002	4.8E-04	0.01	5.6E-09	0.000018	3.1E-04	7.9E-04
alpha-Chlordane	O	91	ug/kg	1.6E-08	0.0005	3.2E-05	0.01	9.2E-09	0.0004	2.3E-05	5.5E-05
gamma-Chlordane	O	71	ug/kg	1.3E-08	0.0005	2.5E-05	0.01	7.2E-09	0.0004	1.8E-05	4.3E-05
4,4'-DDD	O	15	ug/kg	2.6E-09	0.0005 [3]	5.3E-06	0.01	1.5E-09	0.0004 [3]	3.8E-06	9.1E-06
4,4'-DDE	O	100	ug/kg	1.8E-08	0.0005 [3]	3.5E-05	0.01	1.0E-08	0.0004 [3]	2.5E-05	6.1E-05
4,4'-DDT	O	70	ug/kg	1.2E-08	0.0005	2.5E-05	0.01	7.1E-09	0.0004	1.8E-05	4.2E-05
Dieldrin	O	7.7	ug/kg	1.4E-09	0.00005	2.7E-05	0.01	7.8E-10	0.000025	3.1E-05	5.8E-05
Heptachlor	O	3.6	ug/kg	6.3E-10	0.0005	1.3E-06	0.01	3.6E-10	0.00025	1.5E-06	2.7E-06
Heptachlor epoxide	O	3.7	ug/kg	6.5E-10	0.000013	5.0E-05	0.01	3.7E-10	0.0000064	5.9E-05	1.1E-04
MCPA	O	14000	ug/kg	2.5E-06	0.0005	4.9E-03	0.01	1.4E-06	0.00025	5.7E-03	1.1E-02
MCPP	O	34000	ug/kg	6.0E-06	0.001	6.0E-03	0.01	3.4E-06	0.0005	6.9E-03	1.3E-02
Aluminum	I	2520	mg/kg	4.4E-04	1	4.4E-04	0.001	2.6E-05	0.2	1.3E-04	5.7E-04
Antimony	I	1.2	mg/kg	2.1E-07	0.0004	5.3E-04	0.001	1.2E-08	0.00004	3.0E-04	8.3E-04
Barium	I	27.1	mg/kg	4.8E-06	0.07	6.8E-05	0.001	2.7E-07	0.0049	5.6E-05	1.2E-04
Arsenic	I	25.3	mg/kg	4.5E-06	0.0003	1.5E-02	0.001	2.6E-07	0.00029	8.8E-04	1.6E-02
Beryllium	I	0.12	mg/kg	2.1E-08	0.002	1.1E-05	0.001	1.2E-09	0.00002	6.1E-05	7.1E-05
Cadmium	I	3	mg/kg	5.3E-07	0.001	5.3E-04	0.001	3.0E-08	0.0002	1.5E-04	6.8E-04
Chromium	I	30	mg/kg	5.3E-06	0.005	1.1E-03	0.001	3.0E-07	0.00055	5.5E-04	1.6E-03
Copper	I	24.3	mg/kg	4.3E-06	ND		0.001	2.5E-07	ND		
Iron	I	1850	mg/kg	3.3E-04	0.3	1.1E-03	0.001	1.9E-05	0.006	3.1E-03	4.2E-03
Lead	I	179	mg/kg	3.2E-05	ND		0.001	1.8E-06	ND		
Manganese	I	94.6	mg/kg	1.7E-05	0.047	3.5E-04	0.001	9.6E-07	0.0019	5.0E-04	8.6E-04
Silver	I	20.3	mg/kg	3.6E-06	0.005	7.2E-04	0.001	2.1E-07	0.0011	1.9E-04	9.0E-04
Vanadium	I	5.6	mg/kg	9.9E-07	0.007	1.4E-04	0.001	5.7E-08	0.00021	2.7E-04	4.1E-04
					SUMMARY HAZARD INDEX	0.03				0.02	0.05

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

TABLE E-6.2

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	0.833	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	4	hours/day	Assumption
EXPOSURE FREQUENCY	EF	45	days/year	Assumption
EXPOSURE DURATION	ED	20	years	Assumption
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	20	years	USEPA, 1991

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.2

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.81E-10	8.1E-13	3.1	2.5E-12
Aldrin	O	2.3	ug/kg	1.85E-12	3.1E-15	17	5.3E-14
Aroclor-1260	O	55	ug/kg	4.44E-11	7.4E-14	2	1.5E-13
alpha-Chlordane	O	91	ug/kg	7.34E-11	1.2E-13	0.35	4.3E-14
gamma-Chlordane	O	71	ug/kg	5.73E-11	9.6E-14	0.35	3.4E-14
4,4'-DDT	O	70	ug/kg	5.65E-11	9.5E-14	0.34	3.2E-14
Dieldrin	O	7.7	ug/kg	6.21E-12	1.0E-14	16	1.7E-13
Heptachlor	O	3.6	ug/kg	2.90E-12	4.9E-15	4.5	2.2E-14
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	5.0E-15	9.1	4.6E-14
Arsenic	I	25.3	mg/kg	2.04E-08	3.4E-11	15	5.1E-10
Beryllium	I	0.12	mg/kg	9.68E-11	1.6E-13	8.4	1.4E-12
Cadmium	I	3	mg/kg	2.42E-09	4.1E-12	6.3	2.6E-11
Lead	I	179	mg/kg	1.44E-07	2.4E-10	ND	
						SUMMARY CANCER RISK	5E-10

NE = not evaluated.

TABLE E-6.2

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.34E-10	1.4E-12	ND	
Benzo(a)pyrene	O	290	ug/kg	2.34E-10	1.4E-12	ND	
Benzo(b)fluoranthene	O	310	ug/kg	2.50E-10	1.5E-12	ND	
Benzo(k)fluoranthene	O	310	ug/kg	2.50E-10	1.5E-12	ND	
Chrysene	O	300	ug/kg	2.42E-10	1.4E-12	ND	
Dibenz(a,h)anthracene	O	260	ug/kg	2.10E-10	1.2E-12	ND	
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	2.10E-10	1.2E-12	ND	
Aldrin	O	2.3	ug/kg	1.85E-12	1.1E-14	0.000015	7.3E-10
Aroclor-1260	O	55	ug/kg	4.44E-11	2.6E-13	0.000018	1.4E-08
alpha-Chlordane	O	91	ug/kg	7.34E-11	4.3E-13	0.0004	1.1E-09
gamma-Chlordane	O	71	ug/kg	5.73E-11	3.4E-13	0.0004	8.4E-10
4,4'-DDD	O	15	ug/kg	1.21E-11	7.1E-14	0.0004 [1]	1.8E-10
4,4'-DDE	O	100	ug/kg	8.06E-11	4.7E-13	0.0004 [1]	1.2E-09
4,4'-DDT	O	70	ug/kg	5.65E-11	3.3E-13	0.0004	8.3E-10
Dieldrin	O	7.7	ug/kg	6.21E-12	3.6E-14	0.000025	1.5E-09
Heptachlor	I	3.6	mg/kg	2.90E-09	1.7E-11	0.00025	6.8E-08
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	1.8E-14	0.0000064	2.7E-09
MCPA	O	14000	ug/kg	1.13E-08	6.6E-11	0.00025	2.7E-07
MCPP	O	34000	ug/kg	2.74E-08	1.6E-10	0.0005	3.2E-07
Aluminum	I	2520	mg/kg	2.03E-06	1.2E-08	0.2	6.0E-08
Antimony	I	1.2	mg/kg	9.68E-10	5.7E-12	0.00004	1.4E-07
Arsenic	I	70	mg/kg	5.65E-08	3.3E-10	0.00029	1.1E-06
Barium	I	27.1	mg/kg	2.19E-08	1.3E-10	0.0001	1.3E-06
Beryllium	I	0.12	mg/kg	9.68E-11	5.7E-13	0.00002	2.8E-08
Cadmium	I	3	mg/kg	2.42E-09	1.4E-11	0.0002	7.1E-08
Chromium	I	30	mg/kg	2.42E-08	1.4E-10	0.00055	2.6E-07
Copper	I	24.3	mg/kg	1.96E-08	1.2E-10	ND	
Iron	I	1850	mg/kg	1.49E-06	8.8E-09	0.006	1.5E-06
Lead	I	179	mg/kg	1.44E-07	8.5E-10	ND	
Manganese	I	94.6	mg/kg	7.63E-08	4.5E-10	0.000014	3.2E-05
Silver	I	20.3	mg/kg	1.64E-08	9.6E-11	0.0011	8.7E-08
Vanadium	I	5.6	mg/kg	4.52E-09	2.7E-11	0.00021	1.3E-07
						SUMMARY HAZARD INDEX	4E-05

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.3

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992
AGE-SPECIFIC SURFACE AREA	SA_i	age-specific	cm²	USEPA, 1989
ABSORPTION FRACTION	ABS_d	chemical-specific	unitless	USEPA, 1995
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganics
	CF	1.00E-09	kg/mg	Organics
BODY WEIGHT	BW	45	kg	USEPA, 1995
AGE-SPECIFIC BODY WEIGHT	BW_i	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	45	days/year [1]	Assumption
EXPOSURE DURATION	ED	10	years	USEPA, 1995
AGE-SPECIFIC EXPOSURE DURATION	ED_i	age-specific	years	Assumption
SURFACE AREA	SA	4429	cm²	USEPA, 1997
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm²-event	Per USEPA, 1992
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	10	years	USEPA, 1995

[1] Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.
USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992 and Appendix E-7.
USEPA, 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Bulletin No. 3, November 1995.
USEPA, 1997. Exposure Factors Handbook;EPA/600/P-95/002Fa; August 1997.

EQUATIONS

$$\text{CANCER RISK} = \text{INTAKE (mg/kg-day)} \times \text{CANCER SLOPE FACTOR (mg/kg-day)}^{-1}$$

$$\text{HAZARD QUOTIENT} = \text{INTAKE (mg/kg-day)} / \text{REFERENCE DOSE (mg/kg-day)}$$

$$\text{INTAKE}_{\text{INGESTION}} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365 \text{ days/yr}}$$

$$\text{INTAKE}_{\text{DERMAL}} = (DA_{event} \times EF / AT \times 365 \text{ days/year}) \times SA_{soil/adj}$$

Where:

$$SA_{soil/adj} = \text{SUM}\ (SA_i \times ED_i / BW_i)$$

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects: AT = ED.

TABLE E-6.3

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	2.3E-08	7.3	1.7E-07	0.01	4.6E-08	8	3.7E-07	5.4E-07
Aldrin	O	2.3	ug/kg	9.0E-11	17	1.5E-09	0.01	1.8E-10	34	6.1E-09	7.6E-09
Aroclor-1260	O	55	ug/kg	2.2E-09	2	4.3E-09	0.01	4.3E-09	2.2	9.4E-09	1.4E-08
alpha-Chlordane	O	91	ug/kg	3.6E-09	0.35	1.2E-09	0.01	7.1E-09	0.44	3.1E-09	4.4E-09
gamma-Chlordane	O	71	ug/kg	2.8E-09	0.35	9.7E-10	0.01	5.5E-09	0.44	2.4E-09	3.4E-09
4,4'-DDD	O	15	ug/kg	5.9E-10	0.24	1.4E-10	0.01	1.2E-09	0.3	3.5E-10	4.9E-10
4,4'-DDE	O	100	ug/kg	3.9E-09	0.34	1.3E-09	0.01	7.8E-09	0.43	3.4E-09	4.7E-09
4,4'-DDT	O	70	ug/kg	2.7E-09	0.34	9.3E-10	0.01	5.5E-09	0.43	2.3E-09	3.3E-09
Dieldrin	O	7.7	ug/kg	3.0E-10	16	4.8E-09	0.01	6.0E-10	32	1.9E-08	2.4E-08
Heptachlor	O	3.6	ug/kg	1.4E-10	4.5	6.3E-10	0.01	2.8E-10	9.2	2.6E-09	3.2E-09
Heptachlor epoxide	O	3.7	ug/kg	1.4E-10	9.1	1.3E-09	0.01	2.9E-10	19	5.5E-09	6.8E-09
Arsenic	I	25.3	mg/kg	9.9E-07	1.5	1.5E-06	0.001	2.0E-07	1.5	3.0E-07	1.8E-06
Beryllium	I	0.12	mg/kg	4.7E-09	4.3	2.0E-08	0.001	9.4E-10	430	4.0E-07	4.2E-07
Lead	I	179	mg/kg	7.0E-06	ND		0.001	1.4E-06	ND		
				SUMMARY CANCER RISK		2E-06				1E-06	3E-06

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
ND = no data.

TABLE E-6.3

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	7.9E-08	ND		0.01	1.6E-07	ND		
Benzo(a)pyrene	O	290	ug/kg	7.9E-08	ND		0.01	1.6E-07	ND		
Benzo(b)fluoranthene	O	310	ug/kg	8.5E-08	ND		0.01	1.7E-07	ND		
Benzo(k)fluoranthene	O	310	ug/kg	8.5E-08	ND		0.01	1.7E-07	ND		
Chrysene	O	300	ug/kg	8.2E-08	ND		0.01	1.6E-07	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	7.1E-08	ND		0.01	1.4E-07	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	7.1E-08	ND		0.01	1.4E-07	ND		
Aldrin	O	2.3	ug/kg	6.3E-10	0.00003	2.1E-05	0.01	1.3E-09	0.000015	8.4E-05	1.0E-04
Aroclor-1260	O	55	ug/kg	1.5E-08	0.00002	7.5E-04	0.01	3.0E-08	0.000018	1.7E-03	2.4E-03
alpha-Chlordane	O	91	ug/kg	2.5E-08	0.0005	5.0E-05	0.01	5.0E-08	0.0004	1.2E-04	1.7E-04
gamma-Chlordane	O	71	ug/kg	1.9E-08	0.0005	3.9E-05	0.01	3.9E-08	0.0004	9.7E-05	1.4E-04
4,4'-DDD	O	15	ug/kg	4.1E-09	ND		0.01	8.2E-09	ND		
4,4'-DDE	O	100	ug/kg	2.7E-08	0.0005	5.5E-05	0.01	5.5E-08	0.0004	1.4E-04	1.9E-04
4,4'-DDT	O	70	ug/kg	1.9E-08	0.0005 [3]	3.8E-05	0.01	3.8E-08	0.0004 [3]	9.6E-05	1.3E-04
Dieldrin	O	7.7	ug/kg	2.1E-09	0.00005 [3]	4.2E-05	0.01	4.2E-09	0.000025 [3]	1.7E-04	2.1E-04
Heptachlor	O	3.6	ug/kg	9.9E-10	0.0005	2.0E-06	0.01	2.0E-09	0.00025	7.9E-06	9.8E-06
Heptachlor epoxide	O	3.7	ug/kg	1.0E-09	0.000013	7.8E-05	0.01	2.0E-09	0.0000064	3.2E-04	3.9E-04
MCPA	O	14000	ug/kg	3.8E-06	0.0005	7.7E-03	0.01	7.6E-06	0.00025	3.1E-02	3.8E-02
MCPP	O	34000	ug/kg	9.3E-06	0.001	9.3E-03	0.01	1.9E-05	0.0005	3.7E-02	4.6E-02
Aluminum	I	2520	mg/kg	6.9E-04	1	6.9E-04	0.001	1.4E-04	0.2	6.9E-04	1.4E-03
Antimony	I	1.2	mg/kg	3.3E-07	0.0004	8.2E-04	0.001	6.6E-08	0.00004	1.6E-03	2.5E-03
Barium	I	27.1	mg/kg	7.4E-06	0.07	1.1E-04	0.001	1.5E-06	0.0049	3.0E-04	4.1E-04
Arsenic	I	25.3	mg/kg	6.9E-06	0.0003	2.3E-02	0.001	1.4E-06	0.00029	4.8E-03	2.8E-02
Beryllium	I	0.12	mg/kg	3.3E-08	0.002	1.6E-05	0.001	6.6E-09	0.00002	3.3E-04	3.4E-04
Cadmium	I	3	mg/kg	8.2E-07	0.001	8.2E-04	0.001	1.6E-07	0.0002	8.2E-04	1.6E-03
Chromium	I	30	mg/kg	8.2E-06	0.005	1.6E-03	0.001	1.6E-06	0.00055	3.0E-03	4.6E-03
Copper	I	24.3	mg/kg	6.7E-06	ND		0.001	1.3E-06	ND		
Iron	I	1850	mg/kg	5.1E-04	0.3	1.7E-03	0.001	1.0E-04	0.006	1.7E-02	1.9E-02
Lead	I	179	mg/kg	4.9E-05	ND		0.001	9.8E-06	ND		
Manganese	I	94.6	mg/kg	2.6E-05	0.047	5.5E-04	0.001	5.2E-06	0.0019	2.7E-03	3.3E-03
Silver	I	20.3	mg/kg	5.6E-06	0.005	1.1E-03	0.001	1.1E-06	0.0011	1.0E-03	2.1E-03
Vanadium	I	5.6	mg/kg	1.5E-06	0.007	2.2E-04	0.001	3.1E-07	0.00021	1.5E-03	1.7E-03
					SUMMARY HAZARD INDEX	0.05				0.1	0.2

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from oral RfDs.

ND = no data available.
[3] Value for DDT used as a surrogate.

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TABLE E-6.4

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	0.625	$m^3/hour$	USEPA, 1995
BODY WEIGHT	BW	45	kg	USEPA, 1995
EXPOSURE TIME	ET	4	hours/day	Assumption
EXPOSURE FREQUENCY	EF	45	days/year	Assumption
EXPOSURE DURATION	ED	10	years	USEPA, 1995
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	10	years	USEPA, 1995

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA 1995. Supplemental Guidance to RAGS, Region 4 Bulletins, Bulletin No. 3, November 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$INTAKE = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogenic effects: AT = ED

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TABLE E-6.4

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.81E-10	4.7E-13	3.1	1.5E-12
Aldrin	O	2.3	ug/kg	1.85E-12	1.8E-15	17	3.1E-14
Aroclor-1260	O	55	ug/kg	4.44E-11	4.3E-14	2	8.7E-14
alpha-Chlordane	O	91	ug/kg	7.34E-11	7.2E-14	0.35	2.5E-14
gamma-Chlordane	O	71	ug/kg	5.73E-11	5.6E-14	0.35	2.0E-14
4,4'-DDT	O	70	ug/kg	5.65E-11	5.5E-14	0.34	1.9E-14
Dieldrin	O	7.7	ug/kg	6.21E-12	6.1E-15	16	9.7E-14
Heptachlor	O	3.6	ug/kg	2.90E-12	2.8E-15	4.5	1.3E-14
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	2.9E-15	9.1	2.7E-14
Arsenic	I	25.3	mg/kg	2.04E-08	2.0E-11	15	3.0E-10
Beryllium	I	0.12	mg/kg	9.68E-11	9.5E-14	8.4	8.0E-13
Cadmium	I	3	mg/kg	2.42E-09	2.4E-12	6.3	1.5E-11
Lead	I	179	mg/kg	1.44E-07	1.4E-10	ND	
						SUMMARY CANCER RISK	3E-10

NE = not evaluated.

TABLE E-6.4

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.34E-10	1.6E-12	ND	
Benzo(a)pyrene	O	290	ug/kg	2.34E-10	1.6E-12	ND	
Benzo(b)fluoranthene	O	310	ug/kg	2.50E-10	1.7E-12	ND	
Benzo(k)fluoranthene	O	310	ug/kg	2.50E-10	1.7E-12	ND	
Chrysene	O	300	ug/kg	2.42E-10	1.7E-12	ND	
Dibenz(a,h)anthracene	O	260	ug/kg	2.10E-10	1.4E-12	ND	
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	2.10E-10	1.4E-12	ND	
Aldrin	O	2.3	ug/kg	1.85E-12	1.3E-14	0.000015	8.5E-10
Aroclor-1260	O	55	ug/kg	4.44E-11	3.0E-13	0.000018	1.7E-08
alpha-Chlordane	O	91	ug/kg	7.34E-11	5.0E-13	0.0004	1.3E-09
gamma-Chlordane	O	71	ug/kg	5.73E-11	3.9E-13	0.0004	9.8E-10
4,4'-DDD	O	15	ug/kg	1.21E-11	8.3E-14	0.0004 [1]	2.1E-10
4,4'-DDE	O	100	ug/kg	8.06E-11	5.5E-13	0.0004 [1]	1.4E-09
4,4'-DDT	O	70	ug/kg	5.65E-11	3.9E-13	0.0004	9.7E-10
Dieldrin	O	7.7	ug/kg	6.21E-12	4.3E-14	0.000025	1.7E-09
Heptachlor	I	3.6	mg/kg	2.90E-09	2.0E-11	0.00025	8.0E-08
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	2.0E-14	0.0000064	3.2E-09
MCPA	O	14000	ug/kg	1.13E-08	7.7E-11	0.00025	3.1E-07
MCPP	O	34000	ug/kg	2.74E-08	1.9E-10	0.0005	3.8E-07
Aluminum	I	2520	mg/kg	2.03E-06	1.4E-08	0.2	7.0E-08
Antimony	I	1.2	mg/kg	9.68E-10	6.6E-12	0.00004	1.7E-07
Arsenic	I	70	mg/kg	5.65E-08	3.9E-10	0.00029	1.3E-06
Barium	I	27.1	mg/kg	2.19E-08	1.5E-10	0.0001	1.5E-06
Beryllium	I	0.12	mg/kg	9.68E-11	6.6E-13	0.00002	3.3E-08
Cadmium	I	3	mg/kg	2.42E-09	1.7E-11	0.0002	8.3E-08
Chromium	I	30	mg/kg	2.42E-08	1.7E-10	0.00055	3.0E-07
Copper	I	24.3	mg/kg	1.96E-08	1.3E-10	ND	
Iron	I	1850	mg/kg	1.49E-06	1.0E-08	0.006	1.7E-06
Lead	I	179	mg/kg	1.44E-07	9.9E-10	ND	
Manganese	I	94.6	mg/kg	7.63E-08	5.2E-10	0.000014	3.7E-05
Silver	I	20.3	mg/kg	1.64E-08	1.1E-10	0.0011	1.0E-07
Silver	I	5.6	mg/kg	4.52E-09	3.1E-11	0.00021	1.5E-07
				SUMMARY HAZARD INDEX			4E-05

[1] RfD for DDT used as a surrogate.
ND = no data available.

TABLE E-6.5

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1992
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1992
ABSORPTION FRACTION	ABS	chemical-specific	unitless	Assumption
SURFACE AREA EXPOSED	SA	5,750	cm^2	USEPA, 1992
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year [1]	Assumption
EXPOSURE DURATION	ED	25	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1995

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; 1/92.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.5

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	1.2E-08	7.3	9.1E-08	0.01	1.4E-08	8	1.1E-07	2.1E-07
Aldrin	O	2.3	ug/kg	4.8E-11	17	8.2E-10	0.01	5.5E-11	34	1.9E-09	2.7E-09
Aroclor-1260	O	55	ug/kg	1.2E-09	2	2.3E-09	0.01	1.3E-09	2.2	2.9E-09	5.2E-09
alpha-Chlordane	O	91	ug/kg	1.9E-09	0.35	6.7E-10	0.01	2.2E-09	0.44	9.7E-10	1.6E-09
gamma-Chlordane	O	71	ug/kg	1.5E-09	0.35	5.2E-10	0.01	1.7E-09	0.44	7.5E-10	1.3E-09
4,4'-DDD	O	15	ug/kg	3.1E-10	0.24	7.5E-11	0.01	3.6E-10	0.3	1.1E-10	1.8E-10
4,4'-DDE	O	100	ug/kg	2.1E-09	0.34	7.1E-10	0.01	2.4E-09	0.43	1.0E-09	1.7E-09
4,4'-DDT	O	70	ug/kg	1.5E-09	0.34	5.0E-10	0.01	1.7E-09	0.43	7.3E-10	1.2E-09
Dieldrin	O	7.7	ug/kg	1.6E-10	16	2.6E-09	0.01	1.9E-10	32	5.9E-09	8.5E-09
Heptachlor	O	3.6	ug/kg	7.5E-11	4.5	3.4E-10	0.01	8.7E-11	9.2	8.0E-10	1.1E-09
Heptachlor epoxide	O	3.7	ug/kg	7.8E-11	9.1	7.1E-10	0.01	8.9E-11	19	1.7E-09	2.4E-09
Arsenic	I	25.3	mg/kg	5.3E-07	1.5	8.0E-07	0.001	6.1E-08	1.5	9.2E-08	8.9E-07
Beryllium	I	0.12	mg/kg	2.5E-09	4.3	1.1E-08	0.001	2.9E-10	430	1.2E-07	1.4E-07
Lead	I	179	mg/kg	3.8E-06	ND		0.001	4.3E-07	ND		
SUMMARY CANCER RISK						9E-07				3E-07	1E-06

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

TABLE E-6.5

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	1.7E-08	ND		0.01	2.0E-08	ND		
Benzo(a)pyrene	O	290	ug/kg	1.7E-08	ND		0.01	2.0E-08	ND		
Benzo(b)fluoranthene	O	310	ug/kg	1.8E-08	ND		0.01	2.1E-08	ND		
Benzo(k)fluoranthene	O	310	ug/kg	1.8E-08	ND		0.01	2.1E-08	ND		
Chrysene	O	300	ug/kg	1.8E-08	ND		0.01	2.0E-08	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	1.5E-08	ND		0.01	1.8E-08	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	1.5E-08	ND		0.01	1.8E-08	ND		
Aldrin	O	2.3	ug/kg	1.4E-10	0.00003	4.5E-06	0.01	1.6E-10	0.000015	1.0E-05	1.5E-05
Aroclor-1260	O	55	ug/kg	3.2E-09	0.00002	1.6E-04	0.01	3.7E-09	0.000018	2.1E-04	3.7E-04
alpha-Chlordane	O	91	ug/kg	5.3E-09	0.0005	1.1E-05	0.01	6.1E-09	0.0004	1.5E-05	2.6E-05
gamma-Chlordane	O	71	ug/kg	4.2E-09	0.0005	8.3E-06	0.01	4.8E-09	0.0004	1.2E-05	2.0E-05
4,4'-DDD	O	15	ug/kg	8.8E-10	0.0005 [3]	1.8E-06	0.01	1.0E-09	0.0004 [3]	2.5E-06	4.3E-06
4,4'-DDE	O	100	ug/kg	5.9E-09	0.0005 [3]	1.2E-05	0.01	6.8E-09	0.0004 [3]	1.7E-05	2.9E-05
4,4'-DDT	O	70	ug/kg	4.1E-09	0.0005	8.2E-06	0.01	4.7E-09	0.0004	1.2E-05	2.0E-05
Dieldrin	O	7.7	ug/kg	4.5E-10	0.00005	9.0E-06	0.01	5.2E-10	0.000025	2.1E-05	3.0E-05
Heptachlor	O	3.6	ug/kg	2.1E-10	0.0005	4.2E-07	0.01	2.4E-10	0.00025	9.7E-07	1.4E-06
Heptachlor epoxide	O	3.7	ug/kg	2.2E-10	0.000013	1.7E-05	0.01	2.5E-10	0.0000064	3.9E-05	5.6E-05
MCPA	O	14000	ug/kg	8.2E-07	0.0005	1.6E-03	0.01	9.5E-07	0.00025	3.8E-03	5.4E-03
MCPP	O	34000	ug/kg	2.0E-06	0.001	2.0E-03	0.01	2.3E-06	0.0005	4.6E-03	6.6E-03
Aluminum	I	2520	mg/kg	1.5E-04	1	1.5E-04	0.001	1.7E-05	0.2	8.5E-05	2.3E-04
Barium	I	27.1	mg/kg	1.6E-06	0.07	2.3E-05	0.001	1.8E-07	0.0049	3.7E-05	6.0E-05
Arsenic	I	25.3	mg/kg	1.5E-06	0.0003	5.0E-03	0.001	1.7E-07	0.00029	5.9E-04	5.5E-03
Beryllium	I	0.12	mg/kg	7.0E-09	0.002	3.5E-06	0.001	8.1E-10	0.00002	4.1E-05	4.4E-05
Cadmium	I	3.	mg/kg	1.8E-07	0.001	1.8E-04	0.001	2.0E-08	0.0002	1.0E-04	2.8E-04
Chromium	I	30	mg/kg	1.8E-06	0.005	3.5E-04	0.001	2.0E-07	0.00055	3.7E-04	7.2E-04
Copper	I	24.3	mg/kg	1.4E-06	ND		0.001	1.6E-07	ND		
Iron	I	1850	mg/kg	1.1E-04	0.3	3.6E-04	0.001	1.2E-05	0.006	2.1E-03	2.4E-03
Lead	I	179	mg/kg	1.1E-05	ND		0.001	1.2E-06	ND		
Manganese	I	94.6	mg/kg	5.6E-06	0.047	1.2E-04	0.001	6.4E-07	0.0019	3.4E-04	4.5E-04
Silver	I	20.3	mg/kg	1.2E-06	0.005	2.4E-04	0.001	1.4E-07	0.0011	1.2E-04	3.6E-04
Vanadium	I	5.6	mg/kg	3.3E-07	0.007	4.7E-05	0.001	3.8E-08	0.00021	1.8E-04	2.3E-04
SUMMARY HAZARD INDEX						0.01				0.01	0.02

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

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2/12/99

TABLE E-6.6

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	2.5	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	30	days/year	Assumption
EXPOSURE DURATION	ED	25	years	USEPA, 1995
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1995

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Bulletin No. 3, November 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.6

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.81E-10	4.0E-12	3.1	1.2E-11
Aldrin	O	2.3	ug/kg	1.85E-12	1.6E-14	17	2.6E-13
Aroclor-1260	O	55	ug/kg	4.44E-11	3.7E-13	2	7.4E-13
alpha-Chlordane	O	91	ug/kg	7.34E-11	6.2E-13	0.35	2.2E-13
gamma-Chlordane	O	71	ug/kg	5.73E-11	4.8E-13	0.35	1.7E-13
4,4'-DDT	O	70	ug/kg	5.65E-11	4.7E-13	0.34	1.6E-13
Dieldrin	O	7.7	ug/kg	6.21E-12	5.2E-14	16	8.3E-13
Heptachlor	O	3.6	ug/kg	2.90E-12	2.4E-14	4.5	1.1E-13
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	2.5E-14	9.1	2.3E-13
Arsenic	I	25.3	mg/kg	2.04E-08	1.7E-10	15	2.6E-09
Beryllium	I	0.12	mg/kg	9.68E-11	8.1E-13	8.4	6.8E-12
Cadmium	I	3	mg/kg	2.42E-09	2.0E-11	6.3	1.3E-10
Lead	I	179	mg/kg	1.44E-07	1.2E-09	ND	
SUMMARY CANCER RISK							3E-09

NE = not evaluated.

TABLE E-6.6

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.34E-10	5.5E-12	ND	
Benzo(a)pyrene	O	290	ug/kg	2.34E-10	5.5E-12	ND	
Benzo(b)fluoranthene	O	310	ug/kg	2.50E-10	5.9E-12	ND	
Benzo(k)fluoranthene	O	310	ug/kg	2.50E-10	5.9E-12	ND	
Chrysene	O	300	ug/kg	2.42E-10	5.7E-12	ND	
Dibenz(a,h)anthracene	O	260	ug/kg	2.10E-10	4.9E-12	ND	
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	2.10E-10	4.9E-12	ND	
Aldrin	O	2.3	ug/kg	1.85E-12	4.4E-14	0.000015	2.9E-09
Aroclor-1260	O	55	ug/kg	4.44E-11	1.0E-12	0.000018	5.8E-08
alpha-Chlordane	O	91	ug/kg	7.34E-11	1.7E-12	0.0004	4.3E-09
gamma-Chlordane	O	71	ug/kg	5.73E-11	1.3E-12	0.0004	3.4E-09
4,4'-DDD	O	15	ug/kg	1.21E-11	2.8E-13	0.0004 [1]	7.1E-10
4,4'-DDE	O	100	ug/kg	8.06E-11	1.9E-12	0.0004 [1]	4.7E-09
4,4'-DDT	O	70	ug/kg	5.65E-11	1.3E-12	0.0004	3.3E-09
Dieldrin	O	7.7	ug/kg	6.21E-12	1.5E-13	0.000025	5.8E-09
Heptachlor	I	3.6	mg/kg	2.90E-09	6.8E-11	0.00025	2.7E-07
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	7.0E-14	0.0000064	1.1E-08
MCPA	O	14000	ug/kg	1.13E-08	2.7E-10	0.00025	1.1E-06
MCPP	O	34000	ug/kg	2.74E-08	6.4E-10	0.0005	1.3E-06
Aluminum	I	2520	mg/kg	2.03E-06	4.8E-08	0.2	2.4E-07
Antimony	I	1.2	mg/kg	9.68E-10	2.3E-11	0.00004	5.7E-07
Arsenic	I	70	mg/kg	5.65E-08	1.3E-09	0.00029	4.6E-06
Barium	I	27.1	mg/kg	2.19E-08	5.1E-10	0.0001	5.1E-06
Beryllium	I	0.12	mg/kg	9.68E-11	2.3E-12	0.00002	1.1E-07
Cadmium	I	3	mg/kg	2.42E-09	5.7E-11	0.0002	2.8E-07
Chromium	I	30	mg/kg	2.42E-08	5.7E-10	0.00055	1.0E-06
Copper	I	24.3	mg/kg	1.96E-08	4.6E-10	ND	
Iron	I	1850	mg/kg	1.49E-06	3.5E-08	0.006	5.8E-06
Lead	I	179	mg/kg	1.44E-07	3.4E-09	ND	
Manganese	I	94.6	mg/kg	7.63E-08	1.8E-09	0.000014	1.3E-04
Silver	I	20.3	mg/kg	1.64E-08	3.8E-10	0.0011	3.5E-07
Vanadium	I	5.6	mg/kg	4.52E-09	1.1E-10	0.00021	5.1E-07
						SUMMARY HAZARD INDEX	1E-04

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.7

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1995
ABSORPTION FRACTION	ABS_d	chemical-specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,750	cm^2	USEPA, 1992
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	350	days/year [1]	USEPA, 1991
EXPOSURE DURATION	ED	24	years	USEPA, 1995
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	24	years	USEPA, 1995

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects, AT = ED.

TABLE E-6.7

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	2.8E-07	7.3	2.0E-06	0.01	1.6E-07	8	1.3E-06	3.3E-06
Aldrin	O	2.3	ug/kg	1.1E-09	17	1.8E-08	0.01	6.2E-10	34	2.1E-08	3.9E-08
Aroclor-1260	O	55	ug/kg	2.6E-08	2	5.2E-08	0.01	1.5E-08	2.2	3.3E-08	8.4E-08
alpha-Chlordane	O	91	ug/kg	4.3E-08	0.35	1.5E-08	0.01	2.5E-08	0.44	1.1E-08	2.6E-08
gamma-Chlordane	O	71	ug/kg	3.3E-08	0.35	1.2E-08	0.01	1.9E-08	0.44	8.4E-09	2.0E-08
4,4'-DDD	O	15	ug/kg	7.0E-09	0.24	1.7E-09	0.01	4.1E-09	0.3	1.2E-09	2.9E-09
4,4'-DDE	O	100	ug/kg	4.7E-08	0.34	1.6E-08	0.01	2.7E-08	0.43	1.2E-08	2.8E-08
4,4'-DDT	O	70	ug/kg	3.3E-08	0.34	1.1E-08	0.01	1.9E-08	0.43	8.1E-09	1.9E-08
Dieldrin	O	7.7	ug/kg	3.6E-09	16	5.8E-08	0.01	2.1E-09	32	6.7E-08	1.2E-07
Heptachlor epoxide	O	3.7	ug/kg	1.7E-09	9.1	1.6E-08	0.01	1.0E-09	19	1.9E-08	3.5E-08
Heptachlor	O	3.6	ug/kg	1.7E-09	4.5	7.6E-09	0.01	9.7E-10	9.2	8.9E-09	1.7E-08
Arsenic	I	25.3	mg/kg	1.2E-05	1.5	1.8E-05	0.001	6.8E-07	1.5	1.0E-06	1.9E-05
Beryllium	I	0.12	mg/kg	5.6E-08	4.3	2.4E-07	0.001	3.2E-09	430	1.4E-06	1.6E-06
Lead	I	179	mg/kg	8.4E-05	ND		0.001	4.8E-06	ND		
SUMMARY CANCER RISK						2E-05				4E-06	2E-05

[1]Relative potency factors were applied to the CSFs for carcinogenic PAHs. Relative potency factors are derived in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," USEPA, 1993.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[3] Calculated from oral CSFs.
ND = no data available.

TABLE E-6.7

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	4.0E-07	ND		0.01	2.3E-07	ND		
Benzo(a)pyrene	O	290	ug/kg	4.0E-07	ND		0.01	2.3E-07	ND		
Benzo(b)fluoranthene	O	310	ug/kg	4.2E-07	ND		0.01	2.4E-07	ND		
Benzo(k)fluoranthene	O	310	ug/kg	4.2E-07	ND		0.01	2.4E-07	ND		
Chrysene	O	300	ug/kg	4.1E-07	ND		0.01	2.4E-07	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	3.6E-07	ND		0.01	2.0E-07	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	3.6E-07	ND		0.01	2.0E-07	ND		
Aldrin	O	2.3	ug/kg	3.2E-09	0.00003	1.1E-04	0.01	1.8E-09	0.000015	1.2E-04	2.3E-04
Aroclor-1260	O	55	ug/kg	7.5E-08	0.00002	3.8E-03	0.01	4.3E-08	0.000018	2.4E-03	6.2E-03
alpha-Chlordane	O	91	ug/kg	1.2E-07	0.0005	2.5E-04	0.01	7.2E-08	0.0004	1.8E-04	4.3E-04
gamma-Chlordane	O	71	ug/kg	9.7E-08	0.0005	1.9E-04	0.01	5.6E-08	0.0004	1.4E-04	3.3E-04
4,4'-DDT	O	70	ug/kg	9.6E-08	0.0005	1.9E-04	0.01	5.5E-08	0.0004	1.4E-04	3.3E-04
4,4'-DDD	O	15	ug/kg	2.1E-08	0.0005 [3]	4.1E-05	0.01	1.2E-08	0.0004 [3]	3.0E-05	7.1E-05
4,4'-DDE	O	100	ug/kg	1.4E-07	0.0005 [3]	2.7E-04	0.01	7.9E-08	0.0004 [3]	2.0E-04	4.7E-04
Dieldrin	O	7.7	ug/kg	1.1E-08	0.00005	2.1E-04	0.01	6.1E-09	0.000025	2.4E-04	4.5E-04
Heptachlor epoxide	O	3.7	ug/kg	5.1E-09	0.000013	3.9E-04	0.01	2.9E-09	0.0000064	4.6E-04	8.5E-04
Heptachlor	O	3.6	ug/kg	4.9E-09	0.0005	9.9E-06	0.01	2.8E-09	0.00025	1.1E-05	2.1E-05
MCPA	O	14000	ug/kg	1.9E-05	0.0005	3.8E-02	0.01	1.1E-05	0.00025	4.4E-02	8.2E-02
MCPP	O	34000	ug/kg	4.7E-05	0.001	4.7E-02	0.01	2.7E-05	0.0005	5.4E-02	1.0E-01
Aluminum	I	2520	mg/kg	3.5E-03	1	3.5E-03	0.001	2.0E-04	0.2	9.9E-04	4.4E-03
Antimony	I	1.2	mg/kg	1.6E-06	0.0004	4.1E-03	0.001	9.5E-08	0.00004	2.4E-03	6.5E-03
Arsenic	I	25.3	mg/kg	3.5E-05	0.0003	1.2E-01	0.001	2.0E-06	0.00029	6.9E-03	1.2E-01
Barium	I	27.1	mg/kg	3.7E-05	0.07	5.3E-04	0.001	2.1E-06	0.0049	4.4E-04	9.7E-04
Beryllium	I	0.12	mg/kg	1.6E-07	0.002	8.2E-05	0.001	9.5E-09	0.00002	4.7E-04	5.5E-04
Cadmium	I	3	mg/kg	4.1E-06	0.001	4.1E-03	0.001	2.4E-07	0.0002	1.2E-03	5.3E-03
Chromium	I	30	mg/kg	4.1E-05	0.005	8.2E-03	0.001	2.4E-06	0.00055	4.3E-03	1.3E-02
Copper	I	24.3	mg/kg	3.3E-05	ND		0.001	1.9E-06	ND		
Iron	I	1850	mg/kg	2.5E-03	0.3	8.4E-03	0.001	1.5E-04	0.006	2.4E-02	3.3E-02
Lead	I	179	mg/kg	2.5E-04	ND		0.001	1.4E-05	ND		
Manganese	I	94.6	mg/kg	1.3E-04	0.047	2.8E-03	0.001	7.5E-06	0.0019	3.9E-03	6.7E-03
Silver	I	20.3	mg/kg	2.8E-05	0.005	5.6E-03	0.001	1.6E-06	0.0011	1.5E-03	7.0E-03
Vanadium	I	5.6	mg/kg	7.7E-06	0.007	1.1E-03	0.001	4.4E-07	0.00021	2.1E-03	3.2E-03
SUMMARY HAZARD INDEX						0.2				0.1	0.4

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November, 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.

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TABLE E-6.8

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	0.833	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	24	hours/day	Assumption
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1995
EXPOSURE DURATION	ED	24	years	USEPA, 1995
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	24	years	USEPA, 1995

[1] PEF has been derived in the PEF Appendix to this report.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE E-6.8

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)-1	CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.81E-10	4.5E-11	3.1	**1.4E-10**
Aldrin	O	2.3	ug/kg	1.85E-12	1.7E-13	17	**3.0E-12**
Aroclor-1260	O	55	ug/kg	4.44E-11	4.2E-12	2	**8.3E-12**
alpha-Chlordane	O	91	ug/kg	7.34E-11	6.9E-12	0.35	**2.4E-12**
gamma-Chlordane	O	71	ug/kg	5.73E-11	5.4E-12	0.35	**1.9E-12**
4,4'-DDT	O	70	ug/kg	5.65E-11	5.3E-12	0.34	**1.8E-12**
Dieldrin	O	7.7	ug/kg	6.21E-12	5.8E-13	16	**9.3E-12**
Heptachlor	O	3.6	ug/kg	2.90E-12	2.7E-13	4.5	**1.2E-12**
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	2.8E-13	9.1	**2.5E-12**
Arsenic	I	25.3	mg/kg	2.04E-08	1.9E-09	15	**2.9E-08**
Beryllium	I	0.12	mg/kg	9.68E-11	9.1E-12	8.4	**7.6E-11**
Cadmium	I	3	mg/kg	2.42E-09	2.3E-10	6.3	**1.4E-09**
Lead	I	179	mg/kg	1.44E-07	1.4E-08	ND	
				SUMMARY CANCER RISK			**3E-08**

ND = no data available.

TABLE E-6.8

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.34E-10	6.4E-11	ND	
Benzo(a)pyrene	O	290	ug/kg	2.34E-10	6.4E-11	ND	
Benzo(b)fluoranthene	O	310	ug/kg	2.50E-10	6.8E-11	ND	
Benzo(k)fluoranthene	O	310	ug/kg	2.50E-10	6.8E-11	ND	
Chrysene	O	300	ug/kg	2.42E-10	6.6E-11	ND	
Dibenz(a,h)anthracene	O	260	ug/kg	2.10E-10	5.7E-11	ND	
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	2.10E-10	5.7E-11	ND	
Aldrin	O	2.3	ug/kg	1.85E-12	5.1E-13	0.000015	**3.4E-08**
Aroclor-1260	O	55	ug/kg	4.44E-11	1.2E-11	0.000018	**6.7E-07**
alpha-Chlordane	O	91	ug/kg	7.34E-11	2.0E-11	0.0004	**5.0E-08**
gamma-Chlordane	O	71	ug/kg	5.73E-11	1.6E-11	0.0004	**3.9E-08**
4,4'-DDD	O	15	ug/kg	1.21E-11	3.3E-12	0.0004 [1]	**8.3E-09**
4,4'-DDE	O	100	ug/kg	8.06E-11	2.2E-11	0.0004 [1]	**5.5E-08**
4,4'-DDT	O	70	ug/kg	5.65E-11	1.5E-11	0.0004	**3.9E-08**
Dieldrin	O	7.7	ug/kg	6.21E-12	1.7E-12	0.000025	**6.8E-08**
Heptachlor	O	3.6	ug/kg	2.90E-12	8.0E-13	0.00025	**3.2E-09**
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	8.2E-13	0.0000064	**1.3E-07**
MCPA	O	14000	ug/kg	1.13E-08	3.1E-09	0.00025	**1.2E-05**
MCPP	O	34000	ug/kg	2.74E-08	7.5E-09	0.0005	**1.5E-05**
Aluminum	I	2520	mg/kg	2.03E-06	5.6E-07	0.2	**2.8E-06**
Antimony	I	1.2	mg/kg	9.68E-10	2.7E-10	0.00004	**6.6E-06**
Arsenic	I	70	mg/kg	5.65E-08	1.5E-08	0.00029	**5.3E-05**
Barium	I	27.1	mg/kg	2.19E-08	6.0E-09	0.0001	**6.0E-05**
Beryllium	I	0.12	mg/kg	9.68E-11	2.7E-11	0.00002	**1.3E-06**
Cadmium	I	3	mg/kg	2.42E-09	6.6E-10	0.0002	**3.3E-06**
Chromium	I	30	mg/kg	2.42E-08	6.6E-09	0.00055	**1.2E-05**
Copper	I	24.3	mg/kg	1.96E-08	5.4E-09	ND	
Iron	I	1850	mg/kg	1.49E-06	4.1E-07	0.006	**6.8E-05**
Lead	I	179	mg/kg	1.44E-07	4.0E-08	ND	
Manganese	I	94.6	mg/kg	7.63E-08	2.1E-08	0.000014	**1.5E-03**
Silver	I	20.3	mg/kg	1.64E-08	4.5E-09	0.0011	**4.1E-06**
Vanadium	I	5.6	mg/kg	4.52E-09	1.2E-09	0.00021	**5.9E-06**
						SUMMARY HAZARD INDEX	**2E-03**

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.9

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	200	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1995
AGE-SPECIFIC SURFACE AREA	SA	age-specific	cm^2	USEPA, 1989
ABSORPTION FRACTION	ABS	chemical-specific	unitless	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
BODY WEIGHT	BW	15	kg	USEPA, 1991
AGE-SPECIFIC BODY WEIGHT	BW	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	350	days/year [1]	USEPA, 1995
EXPOSURE DURATION	ED	6	years	USEPA, 1995
AGE-SPECIFIC EXPOSURE DURATION	ED	age-specific	years	Assumption
SURFACE AREA	SA	1928	cm^2	USEPA, 1997
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1995

[1] Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.

USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1992b. USEPA Region IV Guidance Memorandum, February 10, 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.
USEPA, 1997. Exposure Factors Handbook;EPA/600/P-95/002Fa; August 1997.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = (DA_{event} \times EF / AT \times 365\ days/year) \times SA_{soil/adj}$$

Where:

$SA_{soil/adj}$ = SUM (SA x ED / BW)

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED.

TABLE E-6.9

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF (mg/kg-day)$^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] (mg/kg-day)$^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	6.5E-07	7.3	4.8E-06	0.01	1.6E-07	8	1.3E-06	6.0E-06
Aldrin	O	2.3	ug/kg	2.5E-09	17	4.3E-08	0.01	6.1E-10	34	2.1E-08	6.4E-08
Aroclor-1260	O	55	ug/kg	6.0E-08	2	1.2E-07	0.01	1.5E-08	2.2	3.2E-08	1.5E-07
alpha-Chlordane	O	91	ug/kg	1.0E-07	0.35	3.5E-08	0.01	2.4E-08	0.44	1.1E-08	4.5E-08
gamma-Chlordane	O	71	ug/kg	7.8E-08	0.35	2.7E-08	0.01	1.9E-08	0.44	8.3E-09	3.5E-08
4,4'-DDD	O	15	ug/kg	1.6E-08	0.24	3.9E-09	0.01	4.0E-09	0.3	1.2E-09	5.1E-09
4,4'-DDE	O	100	ug/kg	1.1E-07	0.34	3.7E-08	0.01	2.6E-08	0.43	1.1E-08	4.9E-08
4,4'-DDT	O	70	ug/kg	7.7E-08	0.34	2.6E-08	0.01	1.8E-08	0.43	7.9E-09	3.4E-08
Dieldrin	O	7.7	ug/kg	8.4E-09	16	1.4E-07	0.01	2.0E-09	32	6.5E-08	2.0E-07
Heptachlor	O	3.6	ug/kg	3.9E-09	4.5	1.8E-08	0.01	9.5E-10	9.2	8.7E-09	2.7E-08
Heptachlor epoxide	O	3.7	ug/kg	4.1E-09	9.1	3.7E-08	0.01	9.8E-10	19	1.9E-08	5.5E-08
Arsenic	I	25.3	mg/kg	2.8E-05	1.5	4.2E-05	0.001	6.7E-07	1.5	1.0E-06	4.3E-05
Beryllium	I	0.12	mg/kg	1.3E-07	4.3	5.7E-07	0.001	3.2E-09	430	1.4E-06	1.9E-06
Lead	I	179	mg/kg	2.0E-04	ND		0.001	4.7E-06	ND		
				SUMMARY CANCER RISK		5E-05				4E-06	5E-05

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
ND = no data.

TABLE E-6.9

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	3.7E-06	ND		0.01	8.9E-07	ND		
Benzo(a)pyrene	O	290	ug/kg	3.7E-06	ND		0.01	8.9E-07	ND		
Benzo(b)fluoranthene	O	310	ug/kg	4.0E-06	ND		0.01	9.6E-07	ND		
Benzo(k)fluoranthene	O	310	ug/kg	4.0E-06	ND		0.01	9.6E-07	ND		
Chrysene	O	300	ug/kg	3.8E-06	ND		0.01	9.2E-07	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	3.3E-06	ND		0.01	8.0E-07	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	3.3E-06	ND		0.01	8.0E-07	ND		
Aldrin	O	2.3	ug/kg	2.9E-08	0.00003	9.8E-04	0.01	7.1E-09	0.000015	4.7E-04	1.5E-03
Aroclor-1260	O	55	ug/kg	7.0E-07	0.00002	3.5E-02	0.01	1.7E-07	0.000018	9.4E-03	4.5E-02
alpha-Chlordane	O	91	ug/kg	1.2E-06	0.0005	2.3E-03	0.01	2.8E-07	0.0004	7.0E-04	3.0E-03
gamma-Chlordane	O	71	ug/kg	9.1E-07	0.0005	1.8E-03	0.01	2.2E-07	0.0004	5.5E-04	2.4E-03
4,4'-DDD	O	15	ug/kg	1.9E-07	0.0005 [3]	3.8E-04	0.01	4.6E-08	0.0004 [3]	1.2E-04	5.0E-04
4,4'-DDE	O	100	ug/kg	1.3E-06	0.0005 [3]	2.6E-03	0.01	3.1E-07	0.0004 [3]	7.7E-04	3.3E-03
4,4'-DDT	O	70	ug/kg	8.9E-07	0.0005	1.8E-03	0.01	2.2E-07	0.0004	5.4E-04	2.3E-03
Dieldrin	O	7.7	ug/kg	9.8E-08	0.00005	2.0E-03	0.01	2.4E-08	0.000025	9.5E-04	2.9E-03
Heptachlor	O	3.6	ug/kg	4.6E-08	0.0005	9.2E-05	0.01	1.1E-08	0.00025	4.4E-05	1.4E-04
Heptachlor epoxide	O	3.7	ug/kg	4.7E-08	0.000013	3.6E-03	0.01	1.1E-08	0.0000064	1.8E-03	5.4E-03
MCPA	O	14000	ug/kg	1.8E-04	0.0005	3.6E-01	0.01	4.3E-05	0.00025	1.7E-01	5.3E-01
MCPP	O	34000	ug/kg	4.3E-04	0.001	4.3E-01	0.01	1.0E-04	0.0005	2.1E-01	6.4E-01
Aluminum	I	2520	mg/kg	3.2E-02	1	3.2E-02	0.001	7.8E-04	0.2	3.9E-03	3.6E-02
Antimony	I	1.2	mg/kg	1.5E-05	0.0004	3.8E-02	0.001	3.7E-07	0.00004	9.2E-03	4.8E-02
Barium	I	27.1	mg/kg	3.5E-04	0.07	4.9E-03	0.001	8.4E-06	0.0049	1.7E-03	6.7E-03
Arsenic	I	25.3	mg/kg	3.2E-04	0.0003	1.1E+00	0.001	7.8E-06	0.00029	2.7E-02	1.1E+00
Beryllium	I	0.12	mg/kg	1.5E-06	0.002	7.7E-04	0.001	3.7E-08	0.00002	1.8E-03	2.6E-03
Cadmium	I	3	mg/kg	3.8E-05	0.001	3.8E-02	0.001	9.2E-07	0.0002	4.6E-03	4.3E-02
Chromium	I	30	mg/kg	3.8E-04	0.005	7.7E-02	0.001	9.2E-06	0.00055	1.7E-02	9.4E-02
Copper	I	24.3	mg/kg	3.1E-04	ND		0.001	7.5E-06	ND		
Iron	I	1850	mg/kg	2.4E-02	0.3	7.9E-02	0.001	5.7E-04	0.006	9.5E-02	1.7E-01
Lead	I	179	mg/kg	2.3E-03	ND		0.001	5.5E-05	ND		
Manganese	I	94.6	mg/kg	1.2E-03	0.047	2.6E-02	0.001	2.9E-05	0.0019	1.5E-02	4.1E-02
Silver	I	20.3	mg/kg	2.6E-04	0.005	5.2E-02	0.001	6.3E-06	0.0011	5.7E-03	5.8E-02
Vanadium	I	5.6	mg/kg	7.2E-05	0.007	1.0E-02	0.001	1.7E-06	0.00021	8.2E-03	1.8E-02
					SUMMARY HAZARD INDEX	2.3				0.6	2.9

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

TABLE E-6.10

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION IN AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	0.625	$m^3/hour$	USEPA, 1995
BODY WEIGHT	BW	15	kg	USEPA, 1991
EXPOSURE TIME	ET	24	hours/day	Assumption
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	6	years	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1991

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Bulletin No. 3, November 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE E-6.10

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)-1	CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.81E-10	4.0E-11	3.1	1.2E-10
Aldrin	O	2.3	ug/kg	1.85E-12	1.5E-13	17	2.6E-12
Aroclor-1260	O	55	ug/kg	4.44E-11	3.6E-12	2	7.3E-12
alpha-Chlordane	O	91	ug/kg	7.34E-11	6.0E-12	0.35	2.1E-12
gamma-Chlordane	O	71	ug/kg	5.73E-11	4.7E-12	0.35	1.6E-12
4,4'-DDT	O	70	ug/kg	5.65E-11	4.6E-12	0.34	1.6E-12
Dieldrin	O	7.7	ug/kg	6.21E-12	5.1E-13	16	8.2E-12
Heptachlor	O	3.6	ug/kg	2.90E-12	2.4E-13	4.5	1.1E-12
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	2.5E-13	9.1	2.2E-12
Arsenic	I	25.3	mg/kg	2.04E-08	1.7E-09	15	2.5E-08
Beryllium	I	0.12	mg/kg	9.68E-11	8.0E-12	8.4	6.7E-11
Cadmium	I	3	mg/kg	2.42E-09	2.0E-10	6.3	1.3E-09
Lead	I	179	mg/kg	1.44E-07	1.2E-08	ND	
						SUMMARY CANCER RISK	3E-08

NE = not evaluated.

TABLE E-6.10

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.34E-10	2.2E-10	ND	
Benzo(a)pyrene	O	290	ug/kg	2.34E-10	2.2E-10	ND	
Benzo(b)fluoranthene	O	310	ug/kg	2.50E-10	2.4E-10	ND	
Benzo(k)fluoranthene	O	310	ug/kg	2.50E-10	2.4E-10	ND	
Chrysene	O	300	ug/kg	2.42E-10	2.3E-10	ND	
Dibenz(a,h)anthracene	O	260	ug/kg	2.10E-10	2.0E-10	ND	
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	2.10E-10	2.0E-10	ND	
Aldrin	O	2.3	ug/kg	1.85E-12	1.8E-12	0.000015	1.2E-07
Aroclor-1260	O	55	ug/kg	4.44E-11	4.3E-11	0.000018	2.4E-06
alpha-Chlordane	O	91	ug/kg	7.34E-11	7.0E-11	0.0004	1.8E-07
gamma-Chlordane	O	71	ug/kg	5.73E-11	5.5E-11	0.0004	1.4E-07
4,4'-DDD	O	15	ug/kg	1.21E-11	1.2E-11	0.0004 [1]	2.9E-08
4,4'-DDE	O	100	ug/kg	8.06E-11	7.7E-11	0.0004 [1]	1.9E-07
4,4'-DDT	O	70	ug/kg	5.65E-11	5.4E-11	0.0004	1.4E-07
Dieldrin	O	7.7	ug/kg	6.21E-12	6.0E-12	0.000025	2.4E-07
Heptachlor	I	3.6	mg/kg	2.90E-09	2.8E-09	0.00025	1.1E-05
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	2.9E-12	0.0000064	4.5E-07
MCPA	O	14000	ug/kg	1.13E-08	1.1E-08	0.00025	4.3E-05
MCPP	O	34000	ug/kg	2.74E-08	2.6E-08	0.0005	5.3E-05
Aluminum	I	2520	mg/kg	2.03E-06	1.9E-06	0.2	9.7E-06
Antimony	I	1.2	mg/kg	9.68E-10	9.3E-10	0.00004	2.3E-05
Arsenic	I	70	mg/kg	5.65E-08	5.4E-08	0.00029	1.9E-04
Barium	I	27.1	mg/kg	2.19E-08	2.1E-08	0.0001	2.1E-04
Beryllium	I	0.12	mg/kg	9.68E-11	9.3E-11	0.00002	4.6E-06
Cadmium	I	3	mg/kg	2.42E-09	2.3E-09	0.0002	1.2E-05
Chromium	I	30	mg/kg	2.42E-08	2.3E-08	0.00055	4.2E-05
Copper	I	24.3	mg/kg	1.96E-08	1.9E-08	ND	
Iron	I	1850	mg/kg	1.49E-06	1.4E-06	0.006	2.4E-04
Lead	I	179	mg/kg	1.44E-07	1.4E-07	ND	
Manganese	I	94.6	mg/kg	7.63E-08	7.3E-08	0.000014	5.2E-03
Silver	I	20.3	mg/kg	1.64E-08	1.6E-08	0.0011	1.4E-05
Silver	I	5.6	mg/kg	4.52E-09	4.3E-09	0.00021	2.1E-05
				SUMMARY HAZARD INDEX			6E-03

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.11

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992
ABSORPTION FRACTION	ABS	chemical-specific	unitless	Assumption
SURFACE AREA EXPOSED	SA	2,300	cm²	USEPA, 1992
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm²-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	250	days/year [1]	Assumption
EXPOSURE DURATION	ED	25	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1995

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; 1/92.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.11

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF (mg/kg-day)$^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] (mg/kg-day)$^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	1.0E-07	7.3	7.6E-07	0.01	4.8E-08	8	3.8E-07	1.1E-06
Aldrin	O	2.3	ug/kg	4.0E-10	17	6.8E-09	0.01	1.8E-10	34	6.3E-09	1.3E-08
Aroclor-1260	O	55	ug/kg	9.6E-09	2	1.9E-08	0.01	4.4E-09	2.2	9.7E-09	2.9E-08
alpha-Chlordane	O	91	ug/kg	1.6E-08	0.35	5.6E-09	0.01	7.3E-09	0.44	3.2E-09	8.8E-09
gamma-Chlordane	O	71	ug/kg	1.2E-08	0.35	4.3E-09	0.01	5.7E-09	0.44	2.5E-09	6.9E-09
4,4'-DDD	O	15	ug/kg	2.6E-09	0.24	6.3E-10	0.01	1.2E-09	0.3	3.6E-10	9.9E-10
4,4'-DDE	O	100	ug/kg	1.7E-08	0.34	5.9E-09	0.01	8.0E-09	0.43	3.5E-09	9.4E-09
4,4'-DDT	O	70	ug/kg	1.2E-08	0.34	4.2E-09	0.01	5.6E-09	0.43	2.4E-09	6.6E-09
Dieldrin	O	7.7	ug/kg	1.3E-09	16	2.2E-08	0.01	6.2E-10	32	2.0E-08	4.1E-08
Heptachlor	O	3.6	ug/kg	6.3E-10	4.5	2.8E-09	0.01	2.9E-10	9.2	2.7E-09	5.5E-09
Heptachlor epoxide	O	3.7	ug/kg	6.5E-10	9.1	5.9E-09	0.01	3.0E-10	19	5.7E-09	1.2E-08
Arsenic	I	25.3	mg/kg	4.4E-06	1.5	6.6E-06	0.001	2.0E-07	1.5	3.1E-07	6.9E-06
Beryllium	I	0.12	mg/kg	2.1E-08	4.3	9.0E-08	0.001	9.6E-10	430	4.1E-07	5.0E-07
Lead	I	179	mg/kg	3.1E-05	ND		0.001	1.4E-06	ND		
			SUMMARY CANCER RISK			8E-06				1E-06	9E-06

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

TABLE E-6.11

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	1.4E-07	ND		0.01	6.5E-08	ND		
Benzo(a)pyrene	O	290	ug/kg	1.4E-07	ND		0.01	6.5E-08	ND		
Benzo(b)fluoranthene	O	310	ug/kg	1.5E-07	ND		0.01	7.0E-08	ND		
Benzo(k)fluoranthene	O	310	ug/kg	1.5E-07	ND		0.01	7.0E-08	ND		
Chrysene	O	300	ug/kg	1.5E-07	ND		0.01	6.8E-08	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	1.3E-07	ND		0.01	5.9E-08	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	1.3E-07	ND		0.01	5.9E-08	ND		
Aldrin	O	2.3	ug/kg	1.1E-09	0.00003	3.8E-05	0.01	5.2E-10	0.000015	3.5E-05	7.2E-05
Aroclor-1260	O	55	ug/kg	2.7E-08	0.00002	1.3E-03	0.01	1.2E-08	0.000018	6.9E-04	2.0E-03
alpha-Chlordane	O	91	ug/kg	4.5E-08	0.0005	8.9E-05	0.01	2.0E-08	0.0004	5.1E-05	1.4E-04
gamma-Chlordane	O	71	ug/kg	3.5E-08	0.0005	6.9E-05	0.01	1.6E-08	0.0004	4.0E-05	1.1E-04
4,4'-DDD	O	15	ug/kg	7.3E-09	0.0005 [3]	1.5E-05	0.01	3.4E-09	0.0004 [3]	8.4E-06	2.3E-05
4,4'-DDE	O	100	ug/kg	4.9E-08	0.0005 [3]	9.8E-05	0.01	2.3E-08	0.0004 [3]	5.6E-05	1.5E-04
4,4'-DDT	O	70	ug/kg	3.4E-08	0.0005	6.8E-05	0.01	1.6E-08	0.0004	3.9E-05	1.1E-04
Dieldrin	O	7.7	ug/kg	3.8E-09	0.00005	7.5E-05	0.01	1.7E-09	0.000025	6.9E-05	1.4E-04
Heptachlor	O	3.6	ug/kg	1.8E-09	0.0005	3.5E-06	0.01	8.1E-10	0.00025	3.2E-06	6.8E-06
Heptachlor epoxide	O	3.7	ug/kg	1.8E-09	0.000013	1.4E-04	0.01	8.3E-10	0.0000064	1.3E-04	2.7E-04
MCPA	O	14000	ug/kg	6.8E-06	0.0005	1.4E-02	0.01	3.2E-06	0.00025	1.3E-02	2.6E-02
MCPP	O	34000	ug/kg	1.7E-05	0.001	1.7E-02	0.01	7.7E-06	0.0005	1.5E-02	3.2E-02
Aluminum	I	2520	mg/kg	1.2E-03	1	1.2E-03	0.001	5.7E-05	0.2	2.8E-04	1.5E-03
Barium	I	27.1	mg/kg	1.3E-05	0.07	1.9E-04	0.001	6.1E-07	0.0049	1.2E-04	3.1E-04
Arsenic	I	25.3	mg/kg	1.2E-05	0.0003	4.1E-02	0.001	5.7E-07	0.00029	2.0E-03	4.3E-02
Beryllium	I	0.12	mg/kg	5.9E-08	0.002	2.9E-05	0.001	2.7E-09	0.00002	1.4E-04	1.6E-04
Cadmium	I	3	mg/kg	1.5E-06	0.001	1.5E-03	0.001	6.8E-08	0.00002	3.4E-03	4.8E-03
Chromium	I	30	mg/kg	1.5E-05	0.005	2.9E-03	0.001	6.8E-07	0.00055	1.2E-03	4.2E-03
Copper	I	24.3	mg/kg	1.2E-05	ND		0.001	5.5E-07	ND		
Iron	I	1850	mg/kg	9.1E-04	0.3	3.0E-03	0.001	4.2E-05	0.006	6.9E-03	1.0E-02
Lead	I	179	mg/kg	8.8E-05	ND		0.001	4.0E-06	ND		
Manganese	I	94.6	mg/kg	4.6E-05	0.047	9.8E-04	0.001	2.1E-06	0.0019	1.1E-03	2.1E-03
Silver	I	20.3	mg/kg	9.9E-06	0.005	2.0E-03	0.001	4.6E-07	0.0011	4.2E-04	2.4E-03
Vanadium	I	5.6	mg/kg	2.7E-06	0.007	3.9E-04	0.001	1.3E-07	0.00021	6.0E-04	9.9E-04
					SUMMARY HAZARD INDEX	0.09				0.05	0.1

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

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2/12/99

TABLE E-6.12

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	2.5	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	250	days/year	Assumption
EXPOSURE DURATION	ED	25	years	USEPA, 1995
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1995

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Bulletin No. 3, November 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ \text{days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogenic effects, AT = ED.

TABLE E-6.12

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.81E-10	3.4E-11	3.1	1.0E-10
Aldrin	O	2.3	ug/kg	1.85E-12	1.3E-13	17	2.2E-12
Aroclor-1260	O	55	ug/kg	4.44E-11	3.1E-12	2	6.2E-12
alpha-Chlordane	O	91	ug/kg	7.34E-11	5.1E-12	0.35	1.8E-12
gamma-Chlordane	O	71	ug/kg	5.73E-11	4.0E-12	0.35	1.4E-12
4,4'-DDT	O	70	ug/kg	5.65E-11	3.9E-12	0.34	1.3E-12
Dieldrin	O	7.7	ug/kg	6.21E-12	4.3E-13	16	6.9E-12
Heptachlor	O	3.6	ug/kg	2.90E-12	2.0E-13	4.5	9.1E-13
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	2.1E-13	9.1	1.9E-12
Arsenic	I	25.3	mg/kg	2.04E-08	1.4E-09	15	2.1E-08
Beryllium	I	0.12	mg/kg	9.68E-11	6.8E-12	8.4	5.7E-11
Cadmium	I	3	mg/kg	2.42E-09	1.7E-10	6.3	1.1E-09
Lead	I	179	mg/kg	1.44E-07	1.0E-08	ND	
				SUMMARY CANCER RISK			2E-08

NE = not evaluated.

TABLE E-6.12

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.34E-10	4.6E-11	ND	
Benzo(a)pyrene	O	290	ug/kg	2.34E-10	4.6E-11	ND	
Benzo(b)fluoranthene	O	310	ug/kg	2.50E-10	4.9E-11	ND	
Benzo(k)fluoranthene	O	310	ug/kg	2.50E-10	4.9E-11	ND	
Chrysene	O	300	ug/kg	2.42E-10	4.7E-11	ND	
Dibenz(a,h)anthracene	O	260	ug/kg	2.10E-10	4.1E-11	ND	
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	2.10E-10	4.1E-11	ND	
Aldrin	O	2.3	ug/kg	1.85E-12	3.6E-13	0.000015	2.4E-08
Aroclor-1260	O	55	ug/kg	4.44E-11	8.7E-12	0.000018	4.8E-07
alpha-Chlordane	O	91	ug/kg	7.34E-11	1.4E-11	0.0004	3.6E-08
gamma-Chlordane	O	71	ug/kg	5.73E-11	1.1E-11	0.0004	2.8E-08
4,4'-DDD	O	15	ug/kg	1.21E-11	2.4E-12	0.0004 [1]	5.9E-09
4,4'-DDE	O	100	ug/kg	8.06E-11	1.6E-11	0.0004 [1]	3.9E-08
4,4'-DDT	O	70	ug/kg	5.65E-11	1.1E-11	0.0004	2.8E-08
Dieldrin	O	7.7	ug/kg	6.21E-12	1.2E-12	0.000025	4.9E-08
Heptachlor	I	3.6	mg/kg	2.90E-09	5.7E-10	0.00025	2.3E-06
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	5.8E-13	0.0000064	9.1E-08
MCPA	O	14000	ug/kg	1.13E-08	2.2E-09	0.00025	8.8E-06
MCPP	O	34000	ug/kg	2.74E-08	5.4E-09	0.0005	1.1E-05
Aluminum	I	2520	mg/kg	2.03E-06	4.0E-07	0.2	2.0E-06
Antimony	I	1.2	mg/kg	9.68E-10	1.9E-10	0.00004	4.7E-06
Arsenic	I	70	mg/kg	5.65E-08	1.1E-08	0.00029	3.8E-05
Barium	I	27.1	mg/kg	2.19E-08	4.3E-09	0.0001	4.3E-05
Beryllium	I	0.12	mg/kg	9.68E-11	1.9E-11	0.00002	9.5E-07
Cadmium	I	3	mg/kg	2.42E-09	4.7E-10	0.0002	2.4E-06
Chromium	I	30	mg/kg	2.42E-08	4.7E-09	0.00055	8.6E-06
Copper	I	24.3	mg/kg	1.96E-08	3.8E-09	ND	
Iron	I	1850	mg/kg	1.49E-06	2.9E-07	0.006	4.9E-05
Lead	I	179	mg/kg	1.44E-07	2.8E-08	ND	
Manganese	I	94.6	mg/kg	7.63E-08	1.5E-08	0.000014	1.1E-03
Silver	I	20.3	mg/kg	1.64E-08	3.2E-09	0.0011	2.9E-06
Vanadium	I	5.6	mg/kg	4.52E-09	8.8E-10	0.00021	4.2E-06
				SUMMARY HAZARD INDEX			1E-03

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.13

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	480	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1992
ABSORPTION FRACTION	ABS	chemical-specific	unitless	Assumption
SURFACE AREA EXPOSED	SA	5,750	cm²	USEPA, 1992
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm²-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year [1]	Assumption
EXPOSURE DURATION	ED	1	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	1	years	USEPA, 1991

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; 1/92.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.13

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.8E-09	7.3	3.5E-08	0.01	5.7E-10	8	4.6E-09	4.0E-08
Aldrin	O	2.3	ug/kg	1.9E-11	17	3.1E-10	0.01	2.2E-12	34	7.5E-11	3.9E-10
Aroclor-1260	O	55	ug/kg	4.4E-10	2	8.9E-10	0.01	5.3E-11	2.2	1.2E-10	1.0E-09
alpha-Chlordane	O	91	ug/kg	7.3E-10	0.35	2.6E-10	0.01	8.8E-11	0.44	3.9E-11	3.0E-10
gamma-Chlordane	O	71	ug/kg	5.7E-10	0.35	2.0E-10	0.01	6.8E-11	0.44	3.0E-11	2.3E-10
4,4'-DDD	O	15	ug/kg	1.2E-10	0.24	2.9E-11	0.01	1.4E-11	0.3	4.3E-12	3.3E-11
4,4'-DDE	O	100	ug/kg	8.1E-10	0.34	2.7E-10	0.01	9.6E-11	0.43	4.1E-11	3.2E-10
4,4'-DDT	O	70	ug/kg	5.6E-10	0.34	1.9E-10	0.01	6.8E-11	0.43	2.9E-11	2.2E-10
Dieldrin	O	7.7	ug/kg	6.2E-11	16	9.9E-10	0.01	7.4E-12	32	2.4E-10	1.2E-09
Heptachlor	O	3.6	ug/kg	2.9E-11	4.5	1.3E-10	0.01	3.5E-12	9.2	3.2E-11	1.6E-10
Heptachlor epoxide	O	3.7	ug/kg	3.0E-11	9.1	2.7E-10	0.01	3.6E-12	19	6.8E-11	3.4E-10
Arsenic	I	25.3	mg/kg	2.0E-07	1.5	3.1E-07	0.001	2.4E-09	1.5	3.7E-09	3.1E-07
Beryllium	I	0.12	mg/kg	9.7E-10	4.3	4.2E-09	0.001	1.2E-11	430	5.0E-09	9.1E-09
Lead	I	179	mg/kg	1.4E-06	ND		0.001	1.7E-08	ND		
SUMMARY CANCER RISK						3E-07				1E-08	4E-07

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

TABLE E-6.13

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	1.6E-07	ND		0.01	2.0E-08	ND		
Benzo(a)pyrene	O	290	ug/kg	1.6E-07	ND		0.01	2.0E-08	ND		
Benzo(b)fluoranthene	O	310	ug/kg	1.7E-07	ND		0.01	2.1E-08	ND		
Benzo(k)fluoranthene	O	310	ug/kg	1.7E-07	ND		0.01	2.1E-08	ND		
Chrysene	O	300	ug/kg	1.7E-07	ND		0.01	2.0E-08	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	1.5E-07	ND		0.01	1.8E-08	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	1.5E-07	ND		0.01	1.8E-08	ND		
Aldrin	O	2.3	ug/kg	1.3E-09	0.00003	4.3E-05	0.01	1.6E-10	0.000015	1.0E-05	5.4E-05
Aroclor-1260	O	55	ug/kg	3.1E-08	0.00002	1.5E-03	0.01	3.7E-09	0.000018	2.1E-04	1.8E-03
alpha-Chlordane	O	91	ug/kg	5.1E-08	0.0005	1.0E-04	0.01	6.1E-09	0.0004	1.5E-05	1.2E-04
gamma-Chlordane	O	71	ug/kg	4.0E-08	0.0005	8.0E-05	0.01	4.8E-09	0.0004	1.2E-05	9.2E-05
4,4'-DDD	O	15	ug/kg	8.5E-09	0.0005 [3]	1.7E-05	0.01	1.0E-09	0.0004 [3]	2.5E-06	1.9E-05
4,4'-DDE	O	100	ug/kg	5.6E-08	0.0005 [3]	1.1E-04	0.01	6.8E-09	0.0004 [3]	1.7E-05	1.3E-04
4,4'-DDT	O	70	ug/kg	3.9E-08	0.0005	7.9E-05	0.01	4.7E-09	0.0004	1.2E-05	9.1E-05
Phenanthrene[4]	O	7.7	ug/kg	4.3E-09	0.3	1.4E-08	0.01	5.2E-10	0.6	8.7E-10	1.5E-08
Heptachlor	O	3.6	ug/kg	2.0E-09	0.0005	4.1E-06	0.01	2.4E-10	0.00025	9.7E-07	5.0E-06
Heptachlor epoxide	O	3.7	ug/kg	2.1E-09	0.3	7.0E-09	0.01	2.5E-10	0.6	4.2E-10	7.4E-09
MCPA	O	14000	ug/kg	7.9E-06	0.00005	1.6E-01	0.01	9.5E-07	0.00025	3.8E-03	1.6E-01
MCPP	O	34000	ug/kg	1.9E-05	0.001	1.9E-02	0.01	2.3E-06	0.0005	4.6E-03	2.4E-02
Aluminum	I	2520	mg/kg	1.4E-03	1	1.4E-03	0.001	1.7E-05	0.2	8.5E-05	1.5E-03
Barium	I	27.1	mg/kg	1.5E-05	0.07	2.2E-04	0.001	1.8E-07	0.0049	3.7E-05	2.6E-04
Arsenic	I	25.3	mg/kg	1.4E-05	0.0003	4.8E-02	0.001	1.7E-07	0.00029	5.9E-04	4.8E-02
Beryllium	I	0.12	mg/kg	6.8E-08	0.002	3.4E-05	0.001	8.1E-10	0.00002	4.1E-05	7.4E-05
Cadmium	I	3	mg/kg	1.7E-06	0.001	1.7E-03	0.001	2.0E-08	0.0002	1.0E-04	1.8E-03
Chromium	I	30	mg/kg	1.7E-05	0.02	8.5E-04	0.001	2.0E-07	0.02	1.0E-05	8.6E-04
Copper	I	24.3	mg/kg	1.4E-05	ND		0.001	1.6E-07	ND		
Iron	I	1850	mg/kg	1.0E-03	0.3	3.5E-03	0.001	1.2E-05	0.006	2.1E-03	5.6E-03
Lead	I	179	mg/kg	1.0E-04	ND		0.001	1.2E-06	ND		
Manganese	I	94.6	mg/kg	5.3E-05	0.047	1.1E-03	0.001	6.4E-07	0.0019	3.4E-04	1.5E-03
Silver	I	20.3	mg/kg	1.1E-05	0.005	2.3E-03	0.001	1.4E-07	0.0011	1.2E-04	2.4E-03
Vanadium	I	5.6	mg/kg	3.2E-06	0.007	4.5E-04	0.001	3.8E-08	0.00021	1.8E-04	6.3E-04
SUMMARY HAZARD INDEX						0.2				0.01	0.3

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
[3] Value for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.14

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	2.5	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	30	days/year	Assumption
EXPOSURE DURATION	ED	1	years	Assumption
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	1	years	USEPA, 1991

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

'HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CA x IR x ET x EF x ED}}{\text{BW x AT x 365 days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogens, AT = ED.

TABLE E-6.14

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.81E-10	1.6E-13	3.1	5.0E-13
Aldrin	O	2.3	ug/kg	1.85E-12	6.2E-16	17	1.1E-14
Aroclor-1260	O	55	ug/kg	4.44E-11	1.5E-14	2	3.0E-14
alpha-Chlordane	O	91	ug/kg	7.34E-11	2.5E-14	0.35	8.6E-15
gamma-Chlordane	O	71	ug/kg	5.73E-11	1.9E-14	0.35	6.7E-15
4,4'-DDT	O	70	ug/kg	5.65E-11	1.9E-14	0.34	6.4E-15
Dieldrin	O	7.7	ug/kg	6.21E-12	2.1E-15	16	3.3E-14
Heptachlor	O	3.6	ug/kg	2.90E-12	9.7E-16	4.5	4.4E-15
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	1.0E-15	9.1	9.1E-15
Arsenic	I	25.3	mg/kg	2.04E-08	6.8E-12	15	1.0E-10
Beryllium	I	0.12	mg/kg	9.68E-11	3.2E-14	8.4	2.7E-13
Cadmium	I	3	mg/kg	2.42E-09	8.1E-13	6.3	5.1E-12
Lead	I	179	mg/kg	1.44E-07	4.8E-11	ND	
SUMMARY CANCER RISK							1E-10

NE = not evaluated.

TABLE E-6.14

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.34E-10	5.5E-12	ND	
Benzo(a)pyrene	O	290	ug/kg	2.34E-10	5.5E-12	ND	
Benzo(b)fluoranthene	O	310	ug/kg	2.50E-10	5.9E-12	ND	
Benzo(k)fluoranthene	O	310	ug/kg	2.50E-10	5.9E-12	ND	
Chrysene	O	300	ug/kg	2.42E-10	5.7E-12	ND	
Dibenz(a,h)anthracene	O	260	ug/kg	2.10E-10	4.9E-12	ND	
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	2.10E-10	4.9E-12	ND	
Aldrin	O	2.3	ug/kg	1.85E-12	4.4E-14	0.000015	2.9E-09
Aroclor-1260	O	55	ug/kg	4.44E-11	1.0E-12	0.000018	5.8E-08
alpha-Chlordane	O	91	ug/kg	7.34E-11	1.7E-12	0.0004	4.3E-09
gamma-Chlordane	O	71	ug/kg	5.73E-11	1.3E-12	0.0004	3.4E-09
4,4'-DDD	O	15	ug/kg	1.21E-11	2.8E-13	0.0004 [1]	7.1E-10
4,4'-DDE	O	100	ug/kg	8.06E-11	1.9E-12	0.0004 [1]	4.7E-09
4,4'-DDT	O	70	ug/kg	5.65E-11	1.3E-12	0.0004	3.3E-09
Dieldrin	O	7.7	ug/kg	6.21E-12	1.5E-13	0.000025	5.8E-09
Heptachlor	I	3.6	mg/kg	2.90E-09	6.8E-11	0.00025	2.7E-07
Heptachlor epoxide	O	3.7	ug/kg	2.98E-12	7.0E-14	0.0000064	1.1E-08
MCPA	O	14000	ug/kg	1.13E-08	2.7E-10	0.00025	1.1E-06
MCPP	O	34000	ug/kg	2.74E-08	6.4E-10	0.0005	1.3E-06
Aluminum	I	2520	mg/kg	2.03E-06	4.8E-08	0.2	2.4E-07
Antimony	I	1.2	mg/kg	9.68E-10	2.3E-11	0.00004	5.7E-07
Arsenic	I	70	mg/kg	5.65E-08	1.3E-09	0.00029	4.6E-06
Barium	I	27.1	mg/kg	2.19E-08	5.1E-10	0.0001	5.1E-06
Beryllium	I	0.12	mg/kg	9.68E-11	2.3E-12	0.00002	1.1E-07
Cadmium	I	3	mg/kg	2.42E-09	5.7E-11	0.0002	2.8E-07
Chromium	I	30	mg/kg	2.42E-08	5.7E-10	0.00055	1.0E-06
Copper	I	24.3	mg/kg	1.96E-08	4.6E-10	ND	
Iron	I	1850	mg/kg	1.49E-06	3.5E-08	0.006	5.8E-06
Lead	I	179	mg/kg	1.44E-07	3.4E-09	ND	
Manganese	I	94.6	mg/kg	7.63E-08	1.8E-09	0.000014	1.3E-04
Silver	I	20.3	mg/kg	1.64E-08	3.8E-10	0.0011	3.5E-07
Vanadium	I	5.6	mg/kg	4.52E-09	1.1E-10	0.00021	5.1E-07
				SUMMARY HAZARD INDEX			1E-04

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.15

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES)
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical-specific	ug/liter	
INGESTION RATE	IR	2	liters/day	USEPA, 1991
BODY WEIGHT	BW	70	kg	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	24	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	24	years	USEPA, 1991

USEPA, 1991 Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CW \times IR \times EF \times ED \times CF}{BW \times AT \times 365 \text{ days/year}}$$

Note: For noncarcinogenic effects, AT = ED.

CARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
Dieldrin	0.02	UG/LITER	1.9E-07	16	3.0E-06
Arsenic	144	UG/LITER	1.4E-03	1.5	2.0E-03
			TOTAL CANCER RISK		2E-03

ND = No Data.

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT INGESTION
Naphthalene	5	UG/LITER	1.4E-04	0.04	3.4E-03
Dieldrin	0.02	UG/LITER	5.5E-07	0.00005	1.1E-02
MCPA	284	UG/LITER	7.8E-03	0.0005	1.6E+01
MCPP	435	UG/LITER	1.2E-02	0.001	1.2E+01
Aluminum	319	UG/LITER	8.7E-03	1	8.7E-03
Arsenic	144	UG/LITER	3.9E-03	0.0003	1.3E+01
Iron	362	UG/LITER	9.9E-03	0.3	3.3E-02
Manganese	28.9	UG/LITER	7.9E-04	0.02	4.0E-02
			TOTAL HAZARD INDEX		41

ND = no data available.

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TABLE E-6.16

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES)
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical-specific	ug/liter	
INGESTION RATE	IR	1	liters/day	USEPA, 1991
BODY WEIGHT	BW	15	kg	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	6	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CW x IR x EF x ED x CF}}{\text{BW x AT x 365 days/year}}$$

Note: For noncarcinogenic effects, AT = ED.

CARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
Dieldrin	0.02	UG/LITER	1.1E-07	16	1.8E-06
Arsenic	144	UG/LITER	7.9E-04	1.5	1.2E-03
			TOTAL CANCER RISK		1E-03

ND = No Data.

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT INGESTION
Naphthalene	5	UG/LITER	3.2E-04	0.04	8.0E-03
Dieldrin	0.02	UG/LITER	1.3E-06	0.00005	2.6E-02
MCPA	284	UG/LITER	1.8E-02	0.0005	3.6E+01
MCPP	435	UG/LITER	2.8E-02	0.001	2.8E+01
Aluminum	319	UG/LITER	2.0E-02	1	2.0E-02
Arsenic	144	UG/LITER	9.2E-03	0.0003	3.1E+01
Iron	362	UG/LITER	2.3E-02	0.3	7.7E-02
Manganese	28.9	UG/LITER	1.8E-03	0.02	9.2E-02
			TOTAL HAZARD INDEX		95

ND = no data available.

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TABLE E-6.17

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER - RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm^2-event	USEPA, 1992a
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,000	cm^2	USEPA, 1992b
DOSE ABSORBED PER EVENT	DAevent	chemical specific	mg/cm^2-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-06	kg/mg	inorganics
	CF	1.00E-09	kg/ug	organics
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year [1]	Assumption
EXPOSURE DURATION	ED	7	years	USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	7	years	USEPA, 1992a

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.

USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DAevent = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects: AT = ED

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TABLE E-6.17

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER - RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	3.5E-09	7.3	2.6E-08	0.01	7.0E-10	8	5.6E-09	3.1E-08
Aldrin	O	2.3	ug/kg	1.4E-11	17	2.3E-10	0.01	2.7E-12	34	9.2E-11	3.2E-10
Aroclor-1260	O	55	ug/kg	3.2E-10	2	6.5E-10	0.01	6.5E-11	2.2	1.4E-10	7.9E-10
alpha-Chlordane	O	91	ug/kg	5.3E-10	0.35	1.9E-10	0.01	1.1E-10	0.44	4.7E-11	2.3E-10
gamma-Chlordane	O	71	ug/kg	4.2E-10	0.35	1.5E-10	0.01	8.3E-11	0.44	3.7E-11	1.8E-10
4,4'-DDD	O	15	ug/kg	8.8E-14	0.24	2.1E-14	0.01	1.8E-14	0.3	5.3E-15	2.6E-14
4,4'-DDE	O	100	ug/kg	5.9E-13	0.34	2.0E-13	0.01	1.2E-13	0.43	5.0E-14	2.5E-13
4,4'-DDT	O	70	ug/kg	4.1E-10	0.34	1.4E-10	0.01	8.2E-11	0.43	3.5E-11	1.8E-10
Dieldrin	O	7.7	ug/kg	4.5E-11	16	7.2E-10	0.01	9.0E-12	32	2.9E-10	1.0E-09
Heptachlor	O	3.6	ug/kg	2.1E-11	4.5	9.5E-11	0.01	4.2E-12	9.2	3.9E-11	1.3E-10
Heptachlor epoxide	O	3.7	ug/kg	2.2E-11	9.1	2.0E-10	0.01	4.3E-12	19	8.3E-11	2.8E-10
Arsenic	I	25.3	mg/kg	1.5E-07	1.5	2.2E-07	0.001	3.0E-09	1.5	4.5E-09	2.3E-07
Beryllium	I	0.12	mg/kg	7.0E-10	4.3	3.0E-09	0.001	1.4E-11	430	6.1E-09	9.1E-09
Lead	I	179	mg/kg	1.1E-06	ND		0.001	2.1E-08	ND		
SUMMARY CANCER RISK						3E-07				2E-08	3E-07

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

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TABLE E-6.17

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER - RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	1.7E-08	ND		0.01	3.4E-09	ND		
Benzo(a)pyrene	O	290	ug/kg	1.7E-08	ND		0.01	3.4E-09	ND		
Benzo(b)fluoranthene	O	310	ug/kg	1.8E-08	ND		0.01	3.6E-09	ND		
Benzo(k)fluoranthene	O	310	ug/kg	1.8E-08	ND		0.01	3.6E-09	ND		
Chrysene	O	300	ug/kg	1.8E-08	ND		0.01	3.5E-09	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	1.5E-08	ND		0.01	3.1E-09	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	1.5E-08	ND		0.01	3.1E-09	ND		
Aldrin	O	2.3	ug/kg	1.4E-10	0.00003	4.5E-06	0.01	2.7E-11	0.000015	1.8E-06	6.3E-06
Aroclor-1260	O	55	ug/kg	3.2E-09	0.00002	1.6E-04	0.01	6.5E-10	0.000018	3.6E-05	2.0E-04
alpha-Chlordane	O	91	ug/kg	5.3E-09	0.0005	1.1E-05	0.01	1.1E-09	0.0004	2.7E-06	1.3E-05
gamma-Chlordane	O	71	ug/kg	4.2E-09	0.0005	8.3E-06	0.01	8.3E-10	0.0004	2.1E-06	1.0E-05
4,4'-DDD	O	15	ug/kg	8.8E-10	0.0005 [3]	1.8E-06	0.01	1.8E-10	0.0001 [3]	1.8E-06	3.5E-06
4,4'-DDE	O	100	ug/kg	5.9E-09	0.0005 [3]	1.2E-05	0.01	1.2E-09	0.0001 [3]	1.2E-05	2.3E-05
4,4'-DDT	O	70	ug/kg	4.1E-09	0.0005	8.2E-06	0.01	8.2E-10	0.0001	8.2E-06	1.6E-05
Dieldrin	O	7.7	ug/kg	4.5E-10	0.00005	9.0E-06	0.01	9.0E-11	0.000025	3.6E-06	1.3E-05
Heptachlor	O	3.6	ug/kg	2.1E-10	0.0005	4.2E-07	0.01	4.2E-11	0.00025	1.7E-07	5.9E-07
Heptachlor epoxide	O	3.7	ug/kg	2.2E-10	0.000013	1.7E-05	0.01	4.3E-11	0.0000064	6.8E-06	2.3E-05
MCPA	O	14000	ug/kg	8.2E-07	0.0005	1.6E-03	0.01	1.6E-07	0.00025	6.6E-04	2.3E-03
MCPP	O	34000	ug/kg	2.0E-06	0.001	2.0E-03	0.01	4.0E-07	0.0005	8.0E-04	2.8E-03
Aluminum	I	2520	mg/kg	1.5E-04	1	1.5E-04	0.001	3.0E-06	0.2	1.5E-05	1.6E-04
Antimony	I	1.2	mg/kg	7.0E-08	0.0004	1.8E-04	0.001	1.4E-09	0.00004	3.5E-05	2.1E-04
Barium	I	27.1	mg/kg	1.6E-06	0.07	2.3E-05	0.001	3.2E-08	0.0049	6.5E-06	2.9E-05
Arsenic	I	25.3	mg/kg	1.5E-06	0.0003	5.0E-03	0.001	3.0E-08	0.00029	1.0E-04	5.1E-03
Beryllium	I	0.12	mg/kg	7.0E-09	0.002	3.5E-06	0.001	1.4E-10	0.00002	7.0E-06	1.1E-05
Cadmium	I	3	mg/kg	1.8E-07	0.001	1.8E-04	0.001	3.5E-09	0.0002	1.8E-05	1.9E-04
Chromium	I	30	mg/kg	1.8E-06	0.005	3.5E-04	0.001	3.5E-08	0.00055	6.4E-05	4.2E-04
Copper	I	24.3	mg/kg	1.4E-06	ND		0.001	2.9E-08	ND		
Iron	I	1850	mg/kg	1.1E-04	0.3	3.6E-04	0.001	2.2E-06	0.006	3.6E-04	7.2E-04
Lead	I	179	mg/kg	1.1E-05	ND		0.001	2.1E-07	ND		
Manganese	I	94.6	mg/kg	5.6E-06	0.047	1.2E-04	0.001	1.1E-07	0.0019	5.8E-05	1.8E-04
Silver	I	20.3	mg/kg	1.2E-06	0.005	2.4E-04	0.001	2.4E-08	0.0011	2.2E-05	2.6E-04
Vanadium	I	5.6	mg/kg	3.3E-07	0.007	4.7E-05	0.001	6.6E-09	0.00021	3.1E-05	7.8E-05
					SUMMARY HAZARD INDEX	0.01				0.002	0.01

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.18

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm²-event	USEPA, 1992a
AGE-SPECIFIC SURFACE AREA	SA_i	age-specific	cm²	USEPA, 1989
ABSORPTION FRACTION	ABS_d	chemical-specific	unitless	USEPA, 1995
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganics
	CF	1.00E-09	kg/mg	Organics
BODY WEIGHT	BW	45	kg	USEPA, 1995
AGE-SPECIFIC BODY WEIGHT	BW_i	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	30	days/year [1]	Assumption
EXPOSURE DURATION	ED	2	years	USEPA, 1992a
AGE-SPECIFIC EXPOSURE DURATION	ED_i	age-specific	years	Assumption
SURFACE AREA	SA	4429	cm²	USEPA, 1997
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm²-event	Per USEPA, 1992b
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	2	years	USEPA, 1992a

[1] Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.
[2] In estimating the dermally absorbed dose for children age 7 through 16, the time-weighted, bodyweight normalized surface area exposed is calculated from surface area, exposure duration, and body weight for each of 10 age periods, age 7 through 16, per USEPA, 1992.

USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.
USEPA, 1997. Exposure Factors Handbook;EPA/600/P-95/002Fa; August 1997.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = AT \times 365\ days/year) \times SA_{soil/adj}$$

Where:

$SA_{soil/adj}$ = SUM $(SA_i \times ED_i / BW_i)$

DA_{event} = CS x AF x ABS_d x CF

Note: For noncarcinogenic effects: AT = ED.

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TABLE E-6.18

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	1.6E-09	7.3	1.1E-08	0.01	6.2E-09	8	5.0E-08	6.1E-08
Aldrin	O	2.3	ug/kg	6.0E-12	17	1.0E-10	0.01	2.4E-11	34	8.1E-10	9.2E-10
Aroclor-1260	O	55	ug/kg	1.4E-10	2	2.9E-10	0.01	5.7E-10	2.2	1.3E-09	1.5E-09
alpha-Chlordane	O	91	ug/kg	2.4E-10	0.35	8.3E-11	0.01	9.5E-10	0.44	4.2E-10	5.0E-10
gamma-Chlordane	O	71	ug/kg	1.9E-10	0.35	6.5E-11	0.01	7.4E-10	0.44	3.2E-10	3.9E-10
4,4'-DDD	O	15	ug/kg	3.9E-11	0.24	9.4E-12	0.01	1.6E-10	0.3	4.7E-11	5.6E-11
4,4'-DDE	O	100	ug/kg	2.6E-10	0.34	8.9E-11	0.01	1.0E-09	0.43	4.5E-10	5.4E-10
4,4'-DDT	O	70	ug/kg	1.8E-10	0.34	6.2E-11	0.01	7.3E-10	0.43	3.1E-10	3.8E-10
Dieldrin	O	7.7	ug/kg	2.0E-11	16	3.2E-10	0.01	8.0E-11	32	2.6E-09	2.9E-09
Heptachlor	O	3.6	ug/kg	9.4E-12	4.5	4.2E-11	0.01	3.7E-11	9.2	3.4E-10	3.9E-10
Heptachlor epoxide	O	3.7	ug/kg	9.7E-12	9.1	8.8E-11	0.01	3.8E-11	19	7.3E-10	8.2E-10
Arsenic	I	25.3	mg/kg	6.6E-08	1.5	9.9E-08	0.001	2.6E-08	1.5	3.9E-08	1.4E-07
Beryllium	I	0.12	mg/kg	3.1E-10	4.3	1.3E-09	0.001	1.2E-10	430	5.4E-08	5.5E-08
Lead	I	179	mg/kg	4.7E-07	ND		0.001	1.9E-07	ND		
					SUMMARY CANCER RISK	1E-07				1E-07	3E-07

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
ND = no data.

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TABLE E-6.18

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.6E-08	ND		0.01	1.1E-07	ND		
Benzo(a)pyrene	O	290	ug/kg	2.6E-08	ND		0.01	1.1E-07	ND		
Benzo(b)fluoranthene	O	310	ug/kg	2.8E-08	ND		0.01	1.1E-07	ND		
Benzo(k)fluoranthene	O	310	ug/kg	2.8E-08	ND		0.01	1.1E-07	ND		
Chrysene	O	300	ug/kg	2.7E-08	ND		0.01	1.1E-07	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	2.4E-08	ND		0.01	9.5E-08	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	2.4E-08	ND		0.01	9.5E-08	ND		
Aldrin	O	2.3	ug/kg	2.1E-10	0.00003	7.0E-06	0.01	8.4E-10	0.000015	5.6E-05	6.3E-05
Aroclor-1260	O	55	ug/kg	5.0E-09	0.00002	2.5E-04	0.01	2.0E-08	0.000018	1.1E-03	1.4E-03
alpha-Chlordane	O	91	ug/kg	8.3E-09	0.0005	1.7E-05	0.01	3.3E-08	0.0004	8.3E-05	9.9E-05
gamma-Chlordane	O	71	ug/kg	6.5E-09	0.0005	1.3E-05	0.01	2.6E-08	0.0004	6.5E-05	7.8E-05
4,4'-DDD	O	15	ug/kg	1.4E-09	0.0005 [3]	2.7E-06	0.01	5.5E-09	0.0001 [3]	5.5E-05	5.7E-05
4,4'-DDE	O	100	ug/kg	9.1E-09	0.0005 [3]	1.8E-05	0.01	3.6E-08	0.0001 [3]	3.6E-04	3.8E-04
4,4'-DDT	O	70	ug/kg	6.4E-09	0.0005	1.3E-05	0.01	2.5E-08	0.0001	2.5E-04	2.7E-04
Dieldrin	O	7.7	ug/kg	7.0E-10	0.00005	1.4E-05	0.01	2.8E-09	0.000025	1.1E-04	1.3E-04
Heptachlor	O	3.6	ug/kg	3.3E-10	0.0005	6.6E-07	0.01	1.3E-09	0.00025	5.2E-06	5.9E-06
Heptachlor epoxide	O	3.7	ug/kg	3.4E-10	0.000013	2.6E-05	0.01	1.3E-09	0.0000064	2.1E-04	2.4E-04
MCPA	O	14000	ug/kg	1.3E-06	0.0005	2.6E-03	0.01	5.1E-06	0.00025	2.0E-02	2.3E-02
MCPP	O	34000	ug/kg	3.1E-06	0.001	3.1E-03	0.01	1.2E-05	0.0005	2.5E-02	2.8E-02
Aluminum	I	2520	mg/kg	2.3E-04	1	2.3E-04	0.001	9.2E-05	0.2	4.6E-04	6.9E-04
Antimony	I	1.2	mg/kg	1.1E-07	0.0004	2.7E-04	0.001	4.4E-08	0.00004	1.1E-03	1.4E-03
Barium	I	27.1	mg/kg	2.5E-06	0.07	3.5E-05	0.001	9.9E-07	0.0049	2.0E-04	2.4E-04
Arsenic	I	25.3	mg/kg	2.3E-06	0.0003	7.7E-03	0.001	9.2E-07	0.00029	3.2E-03	1.1E-02
Beryllium	I	0.12	mg/kg	1.1E-08	0.002	5.5E-06	0.001	4.4E-09	0.00002	2.2E-04	2.2E-04
Cadmium	I	3	mg/kg	2.7E-07	0.001	2.7E-04	0.001	1.1E-07	0.0002	5.5E-04	8.2E-04
Chromium	I	30	mg/kg	2.7E-06	0.005	5.5E-04	0.001	1.1E-06	0.00055	2.0E-03	2.5E-03
Copper	I	24.3	mg/kg	2.2E-06	ND		0.001	8.8E-07	ND		
Iron	I	1850	mg/kg	1.7E-04	0.3	5.6E-04	0.001	6.7E-05	0.006	1.1E-02	1.2E-02
Lead	I	179	mg/kg	1.6E-05	ND		0.001	6.5E-06	ND		
Manganese	I	94.6	mg/kg	8.6E-06	0.047	1.8E-04	0.001	3.4E-06	0.0019	1.8E-03	2.0E-03
Silver	I	20.3	mg/kg	1.9E-06	0.005	3.7E-04	0.001	7.4E-07	0.0011	6.7E-04	1.0E-03
Vanadium	I	5.6	mg/kg	5.1E-07	0.007	7.3E-05	0.001	2.0E-07	0.00021	9.7E-04	1.0E-03
					SUMMARY HAZARD INDEX	0.02				0.07	0.09

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

TABLE E-6.19

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm^2-event	USEPA, 1992a
ABSORPTION FRACTION	ABS_d	chemical-specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,000	cm^2	USEPA, 1992b
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	350	days/year [1]	USEPA, 1991
EXPOSURE DURATION	ED	7	years	USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	7	years	USEPA, 1992a

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"*; OSWER Directive 9285.6-03.

USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.

USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects, AT = ED.

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TABLE E-6.19

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] (mg/kg-day)$^{-1}$	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] (mg/kg-day)$^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.1E-08	7.3	3.0E-07	0.01	8.2E-09	8	6.5E-08	3.6E-07
Aldrin	O	2.3	ug/kg	1.6E-10	17	2.7E-09	0.01	3.2E-11	34	1.1E-09	3.7E-09
Aroclor-1260	O	55	ug/kg	3.8E-09	2	7.5E-09	0.01	7.5E-10	2.2	1.7E-09	9.2E-09
alpha-Chlordane	O	91	ug/kg	6.2E-09	0.35	2.2E-09	0.01	1.2E-09	0.44	5.5E-10	2.7E-09
gamma-Chlordane	O	71	ug/kg	4.9E-09	0.35	1.7E-09	0.01	9.7E-10	0.44	4.3E-10	2.1E-09
4,4'-DDD	O	15	ug/kg	1.0E-09	0.24	2.5E-10	0.01	2.1E-10	0.3	6.2E-11	3.1E-10
4,4'-DDE	O	100	ug/kg	6.8E-09	0.34	2.3E-09	0.01	1.4E-09	0.43	5.9E-10	2.9E-09
4,4'-DDT	O	70	ug/kg	4.8E-09	0.34	1.6E-09	0.01	9.6E-10	0.43	4.1E-10	2.0E-09
Dieldrin	O	7.7	ug/kg	5.3E-10	16	8.4E-09	0.01	1.1E-10	32	3.4E-09	1.2E-08
Heptachlor epoxide	O	3.7	ug/kg	2.5E-10	9.1	2.3E-09	0.01	5.1E-11	19	9.6E-10	3.3E-09
Heptachlor	O	3.6	ug/kg	2.5E-10	4.5	1.1E-09	0.01	4.9E-11	9.2	4.5E-10	1.6E-09
Arsenic	I	25.3	mg/kg	1.7E-06	1.5	2.6E-06	0.001	3.5E-08	1.5	5.2E-08	2.7E-06
Beryllium	I	0.12	mg/kg	8.2E-09	4.3	3.5E-08	0.001	1.6E-10	430	7.1E-08	1.1E-07
Lead	I	179	mg/kg	1.2E-05	ND		0.001	2.5E-07	ND		
SUMMARY CANCER RISK						3E-06				2E-07	3E-06

[1]Relative potency factors were applied to the CSFs for carcinogenic PAHs. Relative potency factors are derived in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," USEPA, 1993.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[3] Calculated from oral CSFs.
ND = no data available.

TABLE E-6.19

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	2.0E-07	ND		0.01	4.0E-08	ND		
Benzo(a)pyrene	O	290	ug/kg	2.0E-07	ND		0.01	4.0E-08	ND		
Benzo(b)fluoranthene	O	310	ug/kg	2.1E-07	ND		0.01	4.2E-08	ND		
Benzo(k)fluoranthene	O	310	ug/kg	2.1E-07	ND		0.01	4.2E-08	ND		
Chrysene	O	300	ug/kg	2.1E-07	ND		0.01	4.1E-08	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	1.8E-07	ND		0.01	3.6E-08	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	1.8E-07	ND		0.01	3.6E-08	ND		
Aldrin	O	2.3	ug/kg	1.6E-09	0.00003	5.3E-05	0.01	3.2E-10	0.000015	2.1E-05	7.4E-05
Aroclor-1260	O	55	ug/kg	3.8E-08	0.00002	1.9E-03	0.01	7.5E-09	0.000018	4.2E-04	2.3E-03
alpha-Chlordane	O	91	ug/kg	6.2E-08	0.0005	1.2E-04	0.01	1.2E-08	0.0004	3.1E-05	1.6E-04
gamma-Chlordane	O	71	ug/kg	4.9E-08	0.0005	9.7E-05	0.01	9.7E-09	0.0004	2.4E-05	1.2E-04
4,4'-DDT	O	70	ug/kg	4.8E-08	0.0005	9.6E-05	0.01	9.6E-09	0.0001	9.6E-05	1.9E-04
4,4'-DDD	O	15	ug/kg	1.0E-08	0.0005 [3]	2.1E-05	0.01	2.1E-09	0.0001 [3]	2.1E-05	4.1E-05
4,4'-DDE	O	100	ug/kg	6.8E-08	0.0005 [3]	1.4E-04	0.01	1.4E-08	0.0001 [3]	1.4E-04	2.7E-04
Dieldrin	O	7.7	ug/kg	5.3E-09	0.00005	1.1E-04	0.01	1.1E-09	0.000025	4.2E-05	1.5E-04
Heptachlor epoxide	O	3.7	ug/kg	2.5E-09	0.000013	1.9E-04	0.01	5.1E-10	0.0000064	7.9E-05	2.7E-04
Heptachlor	O	3.6	ug/kg	2.5E-09	0.0005	4.9E-06	0.01	4.9E-10	0.00025	2.0E-06	6.9E-06
MCPA	O	14000	ug/kg	9.6E-06	0.0005	1.9E-02	0.01	1.9E-06	0.00025	7.7E-03	2.7E-02
MCPP	O	34000	ug/kg	2.3E-05	0.001	2.3E-02	0.01	4.7E-06	0.0005	9.3E-03	3.3E-02
Aluminum	I	2520	mg/kg	1.7E-03	1	1.7E-03	0.001	3.5E-05	0.2	1.7E-04	1.9E-03
Antimony	I	1.2	mg/kg	8.2E-07	0.0004	2.1E-03	0.001	1.6E-08	0.00004	4.1E-04	2.5E-03
Arsenic	I	25.3	mg/kg	1.7E-05	0.0003	5.8E-02	0.001	3.5E-07	0.00029	1.2E-03	5.9E-02
Barium	I	27.1	mg/kg	1.9E-05	0.07	2.7E-04	0.001	3.7E-07	0.0049	7.6E-05	3.4E-04
Beryllium	I	0.12	mg/kg	8.2E-08	0.002	4.1E-05	0.001	1.6E-09	0.00002	8.2E-05	1.2E-04
Cadmium	I	3	mg/kg	2.1E-06	0.001	2.1E-03	0.001	4.1E-08	0.0002	2.1E-04	2.3E-03
Chromium	I	30	mg/kg	2.1E-05	0.005	4.1E-03	0.001	4.1E-07	0.00055	7.5E-04	4.9E-03
Copper	I	24.3	mg/kg	1.7E-05	ND		0.001	3.3E-07	ND		
Iron	I	1850	mg/kg	1.3E-03	0.3	4.2E-03	0.001	2.5E-05	0.006	4.2E-03	8.4E-03
Lead	I	179	mg/kg	1.2E-04	ND		0.001	2.5E-06	ND		
Manganese	I	94.6	mg/kg	6.5E-05	0.047	1.4E-03	0.001	1.3E-06	0.0019	6.8E-04	2.1E-03
Silver	I	20.3	mg/kg	1.4E-05	0.005	2.8E-03	0.001	2.8E-07	0.0011	2.5E-04	3.0E-03
Vanadium	I	5.6	mg/kg	3.8E-06	0.007	5.5E-04	0.001	7.7E-08	0.00021	3.7E-04	9.1E-04
SUMMARY HAZARD INDEX						0.1				0.03	0.1

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November, 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.

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TABLE E-6.20

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm²-event	USEPA, 1992a
AGE-SPECIFIC SURFACE AREA	SA	age-specific	cm²	USEPA, 1989
ABSORPTION FRACTION	ABS	chemical-specific	unitless	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
BODY WEIGHT	BW	15	kg	USEPA, 1991
AGE-SPECIFIC BODY WEIGHT	BW	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	350	days/year [1]	USEPA, 1995
EXPOSURE DURATION	ED	2	years	USEPA, 1992a
AGE-SPECIFIC EXPOSURE DURATION	ED	age-specific	years	Assumption
SURFACE AREA	SA	1928	cm^2	USEPA, 1997
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992b
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	2	years	USEPA, 1992a

[1] Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.

[2] In estimating the dermally absorbed dose for children age1 through 6, the time-weighted, bodyweight normalized surface area exposed is calculated from surface area, exposure duration, and body weight for each of 6 age periods, age 1 through 6, per USEPA, 1992.

USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.
USEPA, 1997. Exposure Factors Handbook;EPA/600/P-95/002Fa; August 1997.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = (DA_{event} \times EF / AT \times 365\ days/year) \times SA_{soil/adj}$$

Where:

$SA_{soil/adj}$ = SUM (SA x ED / BW)

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED.

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TABLE E-6.20

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	1.1E-07	7.3	7.9E-07	0.01	3.1E-08	8	2.5E-07	1.0E-06
Aldrin	O	2.3	ug/kg	4.2E-10	17	7.1E-09	0.01	1.2E-10	34	4.1E-09	1.1E-08
Aroclor-1260	O	55	ug/kg	1.0E-08	2	2.0E-08	0.01	2.9E-09	2.2	6.4E-09	2.6E-08
alpha-Chlordane	O	91	ug/kg	1.7E-08	0.35	5.8E-09	0.01	4.8E-09	0.44	2.1E-09	7.9E-09
gamma-Chlordane	O	71	ug/kg	1.3E-08	0.35	4.5E-09	0.01	3.8E-09	0.44	1.7E-09	6.2E-09
4,4'-DDD	O	15	ug/kg	2.7E-09	0.24	6.6E-10	0.01	7.9E-10	0.3	2.4E-10	9.0E-10
4,4'-DDE	O	100	ug/kg	1.8E-08	0.34	6.2E-09	0.01	5.3E-09	0.43	2.3E-09	8.5E-09
4,4'-DDT	O	70	ug/kg	1.3E-08	0.34	4.3E-09	0.01	3.7E-09	0.43	1.6E-09	5.9E-09
Dieldrin	O	7.7	ug/kg	1.4E-09	16	2.3E-08	0.01	4.1E-10	32	1.3E-08	3.6E-08
Heptachlor	O	3.6	ug/kg	6.6E-10	4.5	3.0E-09	0.01	1.9E-10	9.2	1.7E-09	4.7E-09
Heptachlor epoxide	O	3.7	ug/kg	6.8E-10	9.1	6.1E-09	0.01	2.0E-10	19	3.7E-09	9.9E-09
Arsenic	I	25.3	mg/kg	4.6E-06	1.5	6.9E-06	0.001	1.3E-07	1.5	2.0E-07	7.1E-06
Beryllium	I	0.12	mg/kg	2.2E-08	4.3	9.4E-08	0.001	6.3E-10	430	2.7E-07	3.7E-07
Lead	I	179	mg/kg	3.3E-05	ND		0.001	9.5E-07	ND		
					SUMMARY CANCER RISK	8E-06				8E-07	9E-06

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
ND = no data.

TABLE E-6.20

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	1.9E-06	ND		0.01	5.4E-07	ND		
Benzo(a)pyrene	O	290	ug/kg	1.9E-06	ND		0.01	5.4E-07	ND		
Benzo(b)fluoranthene	O	310	ug/kg	2.0E-06	ND		0.01	5.7E-07	ND		
Benzo(k)fluoranthene	O	310	ug/kg	2.0E-06	ND		0.01	5.7E-07	ND		
Chrysene	O	300	ug/kg	1.9E-06	ND		0.01	5.5E-07	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	1.7E-06	ND		0.01	4.8E-07	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	1.7E-06	ND		0.01	4.8E-07	ND		
Aldrin	O	2.3	ug/kg	1.5E-08	0.00003	4.9E-04	0.01	4.3E-09	0.000015	2.8E-04	7.7E-04
Aroclor-1260	O	55	ug/kg	3.5E-07	0.00002	1.8E-02	0.01	1.0E-07	0.000018	5.6E-03	2.3E-02
alpha-Chlordane	O	91	ug/kg	5.8E-07	0.0005	1.2E-03	0.01	1.7E-07	0.0004	4.2E-04	1.6E-03
gamma-Chlordane	O	71	ug/kg	4.5E-07	0.0005	9.1E-04	0.01	1.3E-07	0.0004	3.3E-04	1.2E-03
4,4'-DDD	O	15	ug/kg	9.6E-08	0.0005 [3]	1.9E-04	0.01	2.8E-08	0.0001 [3]	2.8E-04	4.7E-04
4,4'-DDE	O	100	ug/kg	6.4E-07	0.0005 [3]	1.3E-03	0.01	1.8E-07	0.0001 [3]	1.8E-03	3.1E-03
4,4'-DDT	O	70	ug/kg	4.5E-07	0.0005	8.9E-04	0.01	1.3E-07	0.0001	1.3E-03	2.2E-03
Dieldrin	O	7.7	ug/kg	4.9E-08	0.00005	9.8E-04	0.01	1.4E-08	0.000025	5.7E-04	1.6E-03
Heptachlor	O	3.6	ug/kg	2.3E-08	0.0005	4.6E-05	0.01	6.7E-09	0.00025	2.7E-05	7.3E-05
Heptachlor epoxide	O	3.7	ug/kg	2.4E-08	0.000013	1.8E-03	0.01	6.8E-09	0.0000064	1.1E-03	2.9E-03
MCPA	O	14000	ug/kg	8.9E-05	0.0005	1.8E-01	0.01	2.6E-05	0.00025	1.0E-01	2.8E-01
MCPP	O	34000	ug/kg	2.2E-04	0.001	2.2E-01	0.01	6.3E-05	0.0005	1.3E-01	3.4E-01
Aluminum	I	2520	mg/kg	1.6E-02	1	1.6E-02	0.001	4.7E-04	0.2	2.3E-03	1.8E-02
Antimony	I	1.2	mg/kg	7.7E-06	0.0004	1.9E-02	0.001	2.2E-07	0.00004	5.5E-03	2.5E-02
Barium	I	27.1	mg/kg	1.7E-04	0.07	2.5E-03	0.001	5.0E-06	0.0049	1.0E-03	3.5E-03
Arsenic	I	25.3	mg/kg	1.6E-04	0.0003	5.4E-01	0.001	4.7E-06	0.00029	1.6E-02	5.6E-01
Beryllium	I	0.12	mg/kg	7.7E-07	0.002	3.8E-04	0.001	2.2E-08	0.00002	1.1E-03	1.5E-03
Cadmium	I	3	mg/kg	1.9E-05	0.001	1.9E-02	0.001	5.5E-07	0.0002	2.8E-03	2.2E-02
Chromium	I	30	mg/kg	1.9E-04	0.005	3.8E-02	0.001	5.5E-06	0.00055	1.0E-02	4.8E-02
Copper	I	24.3	mg/kg	1.6E-04	ND		0.001	4.5E-06	ND		
Iron	I	1850	mg/kg	1.2E-02	0.3	3.9E-02	0.001	3.4E-04	0.006	5.7E-02	9.6E-02
Lead	I	179	mg/kg	1.1E-03	ND		0.001	3.3E-05	ND		
Manganese	I	94.6	mg/kg	6.0E-04	0.047	1.3E-02	0.001	1.7E-05	0.0019	9.2E-03	2.2E-02
Silver	I	20.3	mg/kg	1.3E-04	0.005	2.6E-02	0.001	3.8E-06	0.0011	3.4E-03	2.9E-02
Vanadium	I	5.6	mg/kg	3.6E-05	0.007	5.1E-03	0.001	1.0E-06	0.00021	4.9E-03	1.0E-02
					SUMMARY HAZARD INDEX	1.1				0.4	1.5

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.21

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm^2-event	USEPA, 1992a
ABSORPTION FRACTION	ABS	chemical-specific	unitless	Assumption
SURFACE AREA EXPOSED	SA	2,300	cm^2	USEPA, 1992b
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	250	days/year [1]	Assumption
EXPOSURE DURATION	ED	9	years	USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	9	years	USEPA, 1992a

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED

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TABLE E-6.21

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	3.7E-08	7.3	2.7E-07	0.01	3.4E-09	8	2.8E-08	3.0E-07
Aldrin	O	2.3	ug/kg	1.4E-10	17	2.5E-09	0.01	1.3E-11	34	4.5E-10	2.9E-09
Aroclor-1260	O	55	ug/kg	3.5E-09	2	6.9E-09	0.01	3.2E-10	2.2	7.0E-10	7.6E-09
alpha-Chlordane	O	91	ug/kg	5.7E-09	0.35	2.0E-09	0.01	5.3E-10	0.44	2.3E-10	2.2E-09
gamma-Chlordane	O	71	ug/kg	4.5E-09	0.35	1.6E-09	0.01	4.1E-10	0.44	1.8E-10	1.7E-09
4,4'-DDD	O	15	ug/kg	9.4E-10	0.24	2.3E-10	0.01	8.7E-11	0.3	2.6E-11	2.5E-10
4,4'-DDE	O	100	ug/kg	6.3E-09	0.34	2.1E-09	0.01	5.8E-10	0.43	2.5E-10	2.4E-09
4,4'-DDT	O	70	ug/kg	4.4E-09	0.34	1.5E-09	0.01	4.1E-10	0.43	1.7E-10	1.7E-09
Dieldrin	O	7.7	ug/kg	4.8E-10	16	7.7E-09	0.01	4.5E-11	32	1.4E-09	9.2E-09
Heptachlor	O	3.6	ug/kg	2.3E-10	4.5	1.0E-09	0.01	2.1E-11	9.2	1.9E-10	1.2E-09
Heptachlor epoxide	O	3.7	ug/kg	2.3E-10	9.1	2.1E-09	0.01	2.1E-11	19	4.1E-10	2.5E-09
Arsenic	I	25.3	mg/kg	1.6E-06	1.5	2.4E-06	0.001	1.5E-08	1.5	2.2E-08	2.4E-06
Beryllium	I	0.12	mg/kg	7.5E-09	4.3	3.2E-08	0.001	6.9E-11	430	3.0E-08	6.2E-08
Lead	I	179	mg/kg	1.1E-05	ND		0.001	1.0E-07	ND		
SUMMARY CANCER RISK						3E-06				8E-08	3E-06

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

TABLE E-6.21

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	1.4E-07	ND		0.01	1.3E-08	ND		
Benzo(a)pyrene	O	290	ug/kg	1.4E-07	ND		0.01	1.3E-08	ND		
Benzo(b)fluoranthene	O	310	ug/kg	1.5E-07	ND		0.01	1.4E-08	ND		
Benzo(k)fluoranthene	O	310	ug/kg	1.5E-07	ND		0.01	1.4E-08	ND		
Chrysene	O	300	ug/kg	1.5E-07	ND		0.01	1.4E-08	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	1.3E-07	ND		0.01	1.2E-08	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	1.3E-07	ND		0.01	1.2E-08	ND		
Aldrin	O	2.3	ug/kg	1.1E-09	0.00003	3.8E-05	0.01	1.0E-10	0.000015	6.9E-06	4.4E-05
Aroclor-1260	O	55	ug/kg	2.7E-08	0.00002	1.3E-03	0.01	2.5E-09	0.000018	1.4E-04	1.5E-03
alpha-Chlordane	O	91	ug/kg	4.5E-08	0.0005	8.9E-05	0.01	4.1E-09	0.0004	1.0E-05	9.9E-05
gamma-Chlordane	O	71	ug/kg	3.5E-08	0.0005	6.9E-05	0.01	3.2E-09	0.0004	8.0E-06	7.7E-05
4,4'-DDD	O	15	ug/kg	7.3E-09	0.0005 [3]	1.5E-05	0.01	6.8E-10	0.0001 [3]	6.8E-06	2.1E-05
4,4'-DDE	O	100	ug/kg	4.9E-08	0.0005 [3]	9.8E-05	0.01	4.5E-09	0.0001 [3]	4.5E-05	1.4E-04
4,4'-DDT	O	70	ug/kg	3.4E-08	0.0005	6.8E-05	0.01	3.2E-09	0.0001	3.2E-05	1.0E-04
Dieldrin	O	7.7	ug/kg	3.8E-09	0.00005	7.5E-05	0.01	3.5E-10	0.000025	1.4E-05	8.9E-05
Heptachlor	O	3.6	ug/kg	1.8E-09	0.0005	3.5E-06	0.01	1.6E-10	0.00025	6.5E-07	4.2E-06
Heptachlor epoxide	O	3.7	ug/kg	1.8E-09	0.000013	1.4E-04	0.01	1.7E-10	0.0000064	2.6E-05	1.7E-04
MCPA	O	14000	ug/kg	6.8E-06	0.0005	1.4E-02	0.01	6.3E-07	0.00025	2.5E-03	1.6E-02
MCPP	O	34000	ug/kg	1.7E-05	0.001	1.7E-02	0.01	1.5E-06	0.0005	3.1E-03	2.0E-02
Aluminum	I	2520	mg/kg	1.2E-03	1	1.2E-03	0.001	1.1E-05	0.2	5.7E-05	1.3E-03
Barium	I	27.1	mg/kg	1.3E-05	0.07	1.9E-04	0.001	1.2E-07	0.0049	2.5E-05	2.1E-04
Arsenic	I	25.3	mg/kg	1.2E-05	0.0003	4.1E-02	0.001	1.1E-07	0.00029	3.9E-04	4.2E-02
Beryllium	I	0.12	mg/kg	5.9E-08	0.002	2.9E-05	0.001	5.4E-10	0.00002	2.7E-05	5.6E-05
Cadmium	I	3	mg/kg	1.5E-06	0.001	1.5E-03	0.001	1.4E-08	0.0002	6.8E-05	1.5E-03
Chromium	I	30	mg/kg	1.5E-05	0.005	2.9E-03	0.001	1.4E-07	0.00055	2.5E-04	3.2E-03
Copper	I	24.3	mg/kg	1.2E-05	ND		0.001	1.1E-07	ND		
Iron	I	1850	mg/kg	9.1E-04	0.3	3.0E-03	0.001	8.3E-06	0.006	1.4E-03	4.4E-03
Lead	I	179	mg/kg	8.8E-05	ND		0.001	8.1E-07	ND		
Manganese	I	94.6	mg/kg	4.6E-05	0.047	9.8E-04	0.001	4.3E-07	0.0019	2.2E-04	1.2E-03
Silver	I	20.3	mg/kg	9.9E-06	0.005	2.0E-03	0.001	9.1E-08	0.0011	8.3E-05	2.1E-03
Vanadium	I	5.6	mg/kg	2.7E-06	0.007	3.9E-04	0.001	2.5E-08	0.00021	1.2E-04	5.1E-04
SUMMARY HAZARD INDEX						0.09				0.009	0.1

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.22

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1992
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm^2-event	USEPA, 1992a
ABSORPTION FRACTION	ABS	chemical-specific	unitless	Assumption
SURFACE AREA EXPOSED	SA	5,750	cm^2	USEPA, 1992b
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year [1]	Assumption
EXPOSURE DURATION	ED	9	years	USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	9	years	USEPA, 1992a

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED

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TABLE E-6.22

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Benzo(a)pyrene Equivalents	O	596	ug/kg	4.5E-09	7.3	3.3E-08	0.01	1.0E-09	8	8.3E-09	4.1E-08
Aldrin	O	2.3	ug/kg	1.7E-11	17	3.0E-10	0.01	4.0E-12	34	1.4E-10	4.3E-10
Aroclor-1260	O	55	ug/kg	4.2E-10	2	8.3E-10	0.01	9.5E-11	2.2	2.1E-10	1.0E-09
alpha-Chlordane	O	91	ug/kg	6.9E-10	0.35	2.4E-10	0.01	1.6E-10	0.44	7.0E-11	3.1E-10
gamma-Chlordane	O	71	ug/kg	5.4E-10	0.35	1.9E-10	0.01	1.2E-10	0.44	5.4E-11	2.4E-10
4,4'-DDD	O	15	ug/kg	1.1E-10	0.24	2.7E-11	0.01	2.6E-11	0.3	7.8E-12	3.5E-11
4,4'-DDE	O	100	ug/kg	7.5E-10	0.34	2.6E-10	0.01	1.7E-10	0.43	7.5E-11	3.3E-10
4,4'-DDT	O	70	ug/kg	5.3E-10	0.34	1.8E-10	0.01	1.2E-10	0.43	5.2E-11	2.3E-10
Dieldrin	O	7.7	ug/kg	5.8E-11	16	9.3E-10	0.01	1.3E-11	32	4.3E-10	1.4E-09
Heptachlor	O	3.6	ug/kg	2.7E-11	4.5	1.2E-10	0.01	6.2E-12	9.2	5.7E-11	1.8E-10
Heptachlor epoxide	O	3.7	ug/kg	2.8E-11	9.1	2.5E-10	0.01	6.4E-12	19	1.2E-10	3.8E-10
Arsenic	I	25.3	mg/kg	1.9E-07	1.5	2.9E-07	0.001	4.4E-09	1.5	6.6E-09	2.9E-07
Beryllium	I	0.12	mg/kg	9.1E-10	4.3	3.9E-09	0.001	2.1E-11	430	9.0E-09	1.3E-08
Lead	I	179	mg/kg	1.4E-06	ND		0.001	3.1E-08	ND		
SUMMARY CANCER RISK						3E-07				3E-08	4E-07

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

TABLE E-6.22

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL - CENTRAL TENDENCY
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
Benzo(a)anthracene	O	290	ug/kg	1.7E-08	ND		0.01	3.9E-09	ND		
Benzo(a)pyrene	O	290	ug/kg	1.7E-08	ND		0.01	3.9E-09	ND		
Benzo(b)fluoranthene	O	310	ug/kg	1.8E-08	ND		0.01	4.2E-09	ND		
Benzo(k)fluoranthene	O	310	ug/kg	1.8E-08	ND		0.01	4.2E-09	ND		
Chrysene	O	300	ug/kg	1.8E-08	ND		0.01	4.1E-09	ND		
Dibenz(a,h)anthracene	O	260	ug/kg	1.5E-08	ND		0.01	3.5E-09	ND		
Indeno(1,2,3-cd)pyrene	O	260	ug/kg	1.5E-08	ND		0.01	3.5E-09	ND		
Aldrin	O	2.3	ug/kg	1.4E-10	0.00003	4.5E-06	0.01	3.1E-11	0.000015	2.1E-06	6.6E-06
Aroclor-1260	O	55	ug/kg	3.2E-09	0.00002	1.6E-04	0.01	7.4E-10	0.000018	4.1E-05	2.0E-04
alpha-Chlordane	O	91	ug/kg	5.3E-09	0.0005	1.1E-05	0.01	1.2E-09	0.0004	3.1E-06	1.4E-05
gamma-Chlordane	O	71	ug/kg	4.2E-09	0.0005	8.3E-06	0.01	9.6E-10	0.0004	2.4E-06	1.1E-05
4,4'-DDD	O	15	ug/kg	8.8E-10	0.0005 [3]	1.8E-06	0.01	2.0E-10	0.0001 [3]	2.0E-06	3.8E-06
4,4'-DDE	O	100	ug/kg	5.9E-09	0.0005 [3]	1.2E-05	0.01	1.4E-09	0.0001 [3]	1.4E-05	2.5E-05
4,4'-DDT	O	70	ug/kg	4.1E-09	0.0005	8.2E-06	0.01	9.5E-10	0.0001	9.5E-06	1.8E-05
Dieldrin	O	7.7	ug/kg	4.5E-10	0.00005	9.0E-06	0.01	1.0E-10	0.000025	4.2E-06	1.3E-05
Heptachlor	O	3.6	ug/kg	2.1E-10	0.0005	4.2E-07	0.01	4.9E-11	0.00025	1.9E-07	6.2E-07
Heptachlor epoxide	O	3.7	ug/kg	2.2E-10	0.000013	1.7E-05	0.01	5.0E-11	0.0000064	7.8E-06	2.5E-05
MCPA	O	14000	ug/kg	8.2E-07	0.0005	1.6E-03	0.01	1.9E-07	0.00025	7.6E-04	2.4E-03
MCPP	O	34000	ug/kg	2.0E-06	0.001	2.0E-03	0.01	4.6E-07	0.0005	9.2E-04	2.9E-03
Aluminum	I	2520	mg/kg	1.5E-04	1	1.5E-04	0.001	3.4E-06	0.2	1.7E-05	1.6E-04
Barium	I	27.1	mg/kg	1.6E-06	0.07	2.3E-05	0.001	3.7E-08	0.0049	7.5E-06	3.0E-05
Arsenic	I	25.3	mg/kg	1.5E-06	0.0003	5.0E-03	0.001	3.4E-08	0.00029	1.2E-04	5.1E-03
Beryllium	I	0.12	mg/kg	7.0E-09	0.002	3.5E-06	0.001	1.6E-10	0.00002	8.1E-06	1.2E-05
Cadmium	I	3	mg/kg	1.8E-07	0.001	1.8E-04	0.001	4.1E-09	0.0002	2.0E-05	2.0E-04
Chromium	I	30	mg/kg	1.8E-06	0.005	3.5E-04	0.001	4.1E-08	0.00055	7.4E-05	4.3E-04
Copper	I	24.3	mg/kg	1.4E-06	ND		0.001	3.3E-08	ND		
Iron	I	1850	mg/kg	1.1E-04	0.3	3.6E-04	0.001	2.5E-06	0.006	4.2E-04	7.8E-04
Lead	I	179	mg/kg	1.1E-05	ND		0.001	2.4E-07	ND		
Manganese	I	94.6	mg/kg	5.6E-06	0.047	1.2E-04	0.001	1.3E-07	0.0019	6.7E-05	1.9E-04
Silver	I	20.3	mg/kg	1.2E-06	0.005	2.4E-04	0.001	2.7E-08	0.0011	2.5E-05	2.6E-04
Vanadium	I	5.6	mg/kg	3.3E-07	0.007	4.7E-05	0.001	7.6E-09	0.00021	3.6E-05	8.3E-05
SUMMARY HAZARD INDEX						0.01				0.003	0.01

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.22

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical-specific	ug/liter	
INGESTION RATE	IR	1.4	liters/day	USEPA, 1992
BODY WEIGHT	BW	70	kg	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	7	years	USEPA, 1992
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	7	years	USEPA, 1992

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CW x IR x EF x ED x CF}}{\text{BW x AT x 365 days/year}}$$

Note: For noncarcinogenic effects, AT = ED.

CARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
Dieldrin	0.02	UG/LITER	3.8E-08	16	6.1E-07
Arsenic	144	UG/LITER	2.8E-04	1.5	4.1E-04
			TOTAL CANCER RISK		4E-04

ND = No Data.

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT INGESTION
Naphthalene	5	UG/LITER	9.6E-05	0.04	2.4E-03
Dieldrin	0.02	UG/LITER	3.8E-07	0.00005	7.7E-03
MCPA	284	UG/LITER	5.4E-03	0.0005	1.1E+01
MCPP	435	UG/LITER	8.3E-03	0.001	8.3E+00
Aluminum	319	UG/LITER	6.1E-03	1	
Arsenic	144	UG/LITER	2.8E-03	0.0003	9.2E+00
Iron	362	UG/LITER	6.9E-03	0.3	2.3E-02
Manganese	28.9	UG/LITER	5.5E-04	0.047	1.2E-02
			TOTAL HAZARD INDEX		28

ND = no data available.

TABLE E-6.23

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 8

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical-specific	ug/liter	
INGESTION RATE	IR	0.7	liters/day	USEPA, 1992
BODY WEIGHT	BW	15	kg	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	2	years	USEPA, 1992
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	2	years	USEPA, 1992

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CW x IR x EF x ED x CF}}{\text{BW x AT x 365 days/year}}$$

Note: For noncarcinogenic effects, AT = ED.

CARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION 0.02	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
Dieldrin	0.02	UG/LITER	2.6E-08	16	4.1E-07
Arsenic	144	UG/LITER	1.8E-04	1.5	2.8E-04
			TOTAL CANCER RISK		3E-04

ND = No Data.

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT INGESTION
Naphthalene	5	UG/LITER	2.2E-04	0.04	5.6E-03
Dieldrin	0.02	UG/LITER	8.9E-07	0.00005	1.8E-02
MCPA	284	UG/LITER	1.3E-02	0.0005	2.5E+01
MCPP	435	UG/LITER	1.9E-02	0.001	1.9E+01
Aluminum	319	UG/LITER	1.4E-02	1	1.4E-02
Arsenic	144	UG/LITER	6.4E-03	0.0003	2.1E+01
Iron	362	UG/LITER	1.6E-02	0.3	5.4E-02
Manganese	28.9	UG/LITER	1.3E-03	0.047	2.8E-02
			TOTAL HAZARD INDEX		66

ND = no data available.

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TABLE E-6.24

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONALUSER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1995
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,750	cm^2	USEPA, 1992
DOSE ABSORBED PER EVENT	DAevent	chemical specific	mg/cm^2-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-06	kg/mg	inorganics
	CF	1.00E-09	kg/ug	organics
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	45	days/year [1]	Assumption
EXPOSURE DURATION	ED	20	years	USEPA, 1995
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	20	years	USEPA, 1995

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; 1/92.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DAevent = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects: AT = ED

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TABLE E-6.24

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONALUSER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	8.6E-10	16	1.4E-08	0.01	4.9E-10	32	1.6E-08	2.9E-08
alpha-Chlordane	O	4600	ug/kg	2.3E-07	0.35	8.1E-08	0.01	1.3E-07	0.44	5.9E-08	1.4E-07
gamma-Chlordane	O	5100	ug/kg	2.6E-07	0.35	9.0E-08	0.01	1.5E-07	0.44	6.5E-08	1.5E-07
4,4'-DDD	O	3100	ug/kg	1.6E-07	0.24	3.7E-08	0.01	9.0E-08	0.3	2.7E-08	6.4E-08
4,4'-DDE	O	450	ug/kg	2.3E-08	0.34	7.7E-09	0.01	1.3E-08	0.43	5.6E-09	1.3E-08
4,4'-DDT	O	370	ug/kg	1.9E-08	0.34	6.3E-09	0.01	1.1E-08	0.43	4.6E-09	1.1E-08
Arsenic	I	2.8	mg/kg	1.4E-07	1.5	2.1E-07	0.001	8.1E-09	1.5	1.2E-08	2.2E-07
Beryllium	I	0.25	mg/kg	1.3E-08	4.3	5.4E-08	0.001	7.2E-10	430	3.1E-07	3.7E-07
SUMMARY CANCER RISK						5E-07				5E-07	1E-06

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

TABLE E-6.24

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONALUSER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	8.1E-07	0.0005	1.6E-03	0.01	4.7E-07	0.0004	1.2E-03	2.8E-03
gamma-Chlordane	O	5100	ug/kg	9.0E-07	0.0005	1.8E-03	0.01	5.2E-07	0.0004	1.3E-03	3.1E-03
Dieldrin	O	17	ug/kg	3.0E-09	0.00005	6.0E-05	0.01	1.7E-09	0.000025	6.9E-05	1.3E-04
4,4'-DDD	O	3100	ug/kg	5.5E-07	0.0005[3]	1.1E-03	0.01	3.1E-07	0.0004[3]	7.8E-04	1.9E-03
4,4'-DDE	O	450	ug/kg	7.9E-08	0.0005[3]	1.6E-04	0.01	4.6E-08	0.0004[3]	1.1E-04	2.7E-04
4,4'-DDT	O	370	ug/kg	6.5E-08	0.0005	1.3E-04	0.01	3.7E-08	0.0004	9.4E-05	2.2E-04
MCPA	O	17000	ug/kg	3.0E-06	0.0005	6.0E-03	0.01	1.7E-06	0.00025	6.9E-03	1.3E-02
MCPP	O	54000	ug/kg	9.5E-06	0.001	9.5E-03	0.01	5.5E-06	0.0005	1.1E-02	2.0E-02
Aluminum	I	5540	mg/kg	9.8E-04	1	9.8E-04	0.001	5.6E-05	0.2	2.8E-04	1.3E-03
Antimony	I	0.5	mg/kg	8.8E-08	0.0004	2.2E-04	0.001	5.1E-09	0.00004	1.3E-04	3.5E-04
Arsenic	I	2.8	mg/kg	4.9E-07	0.0003	1.6E-03	0.001	2.8E-08	0.00029	9.8E-05	1.7E-03
Beryllium	I	0.25	mg/kg	4.4E-08	0.002	2.2E-05	0.001	2.5E-09	0.00002	1.3E-04	1.5E-04
Copper	I	15.2	mg/kg	2.7E-06	0.04	6.7E-05	0.001	1.5E-07	ND		6.7E-05
Silver	I	0.87	mg/kg	1.5E-07	0.005	3.1E-05	0.001	8.8E-09	0.0011	8.0E-06	3.9E-05
SUMMARY HAZARD INDEX						0.02				0.02	0.05

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available. Note: all chemicals with ND were assessed as a carcinogen with the exception of lead.

TABLE E-6.25

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	0.833	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	4	hours/day	Assumption
EXPOSURE FREQUENCY	EF	45	days/year	Assumption
EXPOSURE DURATION	ED	20	years	Assumption
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	20	years	USEPA, 1991

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogenic effects, AT = ED

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TABLE E-6.25

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK
alpha-Chlordane	O	4600	ug/kg	3.71E-09	6.2E-12	0.35	2.2E-12
gamma-Chlordane	O	5100	ug/kg	4.11E-09	6.9E-12	0.35	2.4E-12
Dieldrin	O	17	ug/kg	1.37E-11	2.3E-14	16	3.7E-13
4,4'-DDT	O	370	ug/kg	2.98E-10	5.0E-13	0.34	1.7E-13
Arsenic	I	2.8	mg/kg	2.26E-09	3.8E-12	15	5.7E-11
Beryllium	I	0.25	mg/kg	2.02E-10	3.4E-13	8.4	2.8E-12
						SUMMARY CANCER RISK	6E-11

NE = not evaluated.

TABLE E-6.25

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	3.71E-09	2.2E-11	0.0004	5.4E-08
gamma-Chlordane	O	5100	ug/kg	4.11E-09	2.4E-11	0.0004	6.0E-08
Dieldrin	O	17	ug/kg	1.37E-11	8.0E-14	0.000025	3.2E-09
4,4'-DDD	O	3100	ug/kg	2.50E-09	1.5E-11	0.0004 [1]	3.7E-08
4,4'-DDE	O	450	ug/kg	3.63E-10	2.1E-12	0.0004 [1]	5.3E-09
4,4'-DDT	O	370	ug/kg	2.98E-10	1.8E-12	0.0004	4.4E-09
MCPA	O	17000	ug/kg	1.37E-08	8.0E-11	0.00025	3.2E-07
MCPP	O	54000	ug/kg	4.35E-08	2.6E-10	0.0005	5.1E-07
Aluminum	I	5540	mg/kg	4.47E-06	2.6E-08	0.2	1.3E-07
Antimony	I	0.5	mg/kg	4.03E-10	2.4E-12	0.00004	5.9E-08
Arsenic	I	2.8	mg/kg	2.26E-09	1.3E-11	0.00029	4.6E-08
Beryllium	I	0.25	mg/kg	2.02E-10	1.2E-12	0.00002	5.9E-08
Copper	I	15.2	mg/kg	1.23E-08	7.2E-11	ND	
Silver	I	0.87	mg/kg	7.02E-10	4.1E-12	0.0011	3.7E-09
						SUMMARY HAZARD INDEX	1E-06

[1] RfD for DDT used as a surrogate.
ND = no data available.

TABLE E-6.26

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1991
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1995
AGE-SPECIFIC SURFACE AREA	SA_i	age-specific	cm²	USEPA, 1992
ABSORPTION FRACTION	ABS_d	chemical-specific	unitless	USEPA, 1995
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganics
	CF	1.00E-09	kg/mg	Organics
BODY WEIGHT	BW	45	kg	USEPA, 1995
AGE-SPECIFIC BODY WEIGHT	BW_i	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	45	days/year [1]	Assumption
EXPOSURE DURATION	ED	10	years	USEPA, 1995
AGE-SPECIFIC EXPOSURE DURATION	ED_i	age-specific	years	Assumption
SURFACE AREA	SA	4429	cm²	USEPA, 1997
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm²-event	Per USEPA, 1992
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	10	years	USEPA, 1995

[1] Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.
USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992 and
USEPA, 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Bulletin No. 3, November 1995.
USEPA, 1997. Exposure Factors Handbook;EPA/600/P-95/002Fa; August 1997.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = AT \times 365\ days/year) \times SA_{soil/adj}$$

Where:

$SA_{soil/adj}$ = SUM $(SA_i \times ED_i / BW_i)$

DA_{event} = CS x AF x ABS_d x CF

Note: For noncarcinogenic effects: AT = ED.

TABLE E-6.26

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [1,3] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	6.7E-10	16	1.1E-08	0.01	1.3E-09	32	4.2E-08	5.3E-08
alpha-Chlordane	O	4600	ug/kg	1.8E-07	0.35	6.3E-08	0.01	3.6E-07	0.44	1.6E-07	2.2E-07
gamma-Chlordane	O	5100	ug/kg	2.0E-07	0.35	7.0E-08	0.01	4.0E-07	0.44	1.8E-07	2.4E-07
4,4'-DDD	O	3100	ug/kg	1.2E-07	0.24	2.9E-08	0.01	2.4E-07	0.3	7.3E-08	1.0E-07
4,4'-DDE	O	450	ug/kg	1.8E-08	0.34	6.0E-09	0.01	3.5E-08	0.43	1.5E-08	2.1E-08
4,4'-DDT	O	370	ug/kg	1.4E-08	0.34	4.9E-09	0.01	2.9E-08	0.43	1.2E-08	1.7E-08
Arsenic	I	2.8	mg/kg	1.1E-07	1.5	1.6E-07	0.001	2.2E-08	1.5	3.3E-08	2.0E-07
Beryllium	I	0.25	mg/kg	9.8E-09	4.3	4.2E-08	0.001	2.0E-09	430	8.4E-07	8.8E-07
					SUMMARY CANCER RISK	4E-07				1E-06	2E-06

[1] Relative potency factors were applied to the CSFs for carcinogenic PAHs. Relative potency factors are derived in "Provisional Guidance for Quantitative Risk Assessment for Polycyclic Aromatic Hydrocarbons," USEPA, 1993.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[3] Calculated from oral CSFs.
ND = no data.

TABLE E-6.26

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	1.3E-06	0.0005	2.5E-03	0.01	2.5E-06	0.0004	6.3E-03	8.8E-03
gamma-Chlordane	O	5100	ug/kg	1.4E-06	0.0005	2.8E-03	0.01	2.8E-06	0.0004	7.0E-03	9.8E-03
Dieldrin	O	17	ug/kg	4.7E-09	0.00005	9.3E-05	0.01	9.3E-09	0.000025	3.7E-04	4.6E-04
4,4'-DDD	O	3100	ug/kg	8.5E-07	0.0005[3]	1.7E-03	0.01	1.7E-06	0.0004[3]	4.2E-03	5.9E-03
4,4'-DDE	O	450	ug/kg	1.2E-07	0.0005[3]	2.5E-04	0.01	2.5E-07	0.0004[3]	6.1E-04	8.6E-04
4,4'-DDT	O	370	ug/kg	1.0E-07	0.0005	2.0E-04	0.01	2.0E-07	0.0004	5.1E-04	7.1E-04
MCPA	O	17000	ug/kg	4.7E-06	0.0005	9.3E-03	0.01	9.3E-06	0.00025	3.7E-02	4.6E-02
MCPP	O	54000	ug/kg	1.5E-05	0.001	1.5E-02	0.01	2.9E-05	0.0005	5.9E-02	7.4E-02
Aluminum	I	5540	mg/kg	1.5E-03	1	1.5E-03	0.001	3.0E-04	0.2	1.5E-03	3.0E-03
Antimony	I	0.5	mg/kg	1.4E-07	0.0004	3.4E-04	0.001	2.7E-08	0.00004	6.8E-04	1.0E-03
Arsenic	I	2.8	mg/kg	7.7E-07	0.0003	2.6E-03	0.001	1.5E-07	0.00029	5.3E-04	3.1E-03
Beryllium	I	0.25	mg/kg	6.8E-08	0.002	3.4E-05	0.001	1.4E-08	0.00002	6.8E-04	7.2E-04
Copper	I	15.2	mg/kg	4.2E-06	0.04	1.0E-04	0.001	8.3E-07	ND		1.0E-04
Silver	I	0.87	mg/kg	2.4E-07	0.005	4.8E-05	0.001	4.8E-08	0.0011	4.3E-05	9.1E-05
SUMMARY HAZARD INDEX						0.04				0.1	0.2

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.
ND = no data available. Note: all chemicals with ND were assessed as a carcinogen with the exception of lead.

TABLE E-6.27

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TREPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	0.625	$m^3/hour$	USEPA, 1995
BODY WEIGHT	BW	45	kg	USEPA, 1995
EXPOSURE TIME	ET	4	hours/day	Assumption
EXPOSURE FREQUENCY	EF	45	days/year	Assumption
EXPOSURE DURATION	ED	10	years	USEPA, 1995
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	10	years	USEPA, 1995

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA 1995. Supplemental Guidance to RAGS, Region 4 Bulletins, Bulletin No. 3, November 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogenic effects: AT = ED

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TABLE E-6.27

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TREPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
alpha-Chlordane	O	4600	ug/kg	3.71E-09	3.6E-12	0.35	1.3E-12
gamma-Chlordane	O	5100	ug/kg	4.11E-09	4.0E-12	0.35	1.4E-12
Dieldrin	O	17	ug/kg	1.37E-11	1.3E-14	16	2.1E-13
4,4'-DDT	O	370	ug/kg	2.98E-10	2.9E-13	0.34	9.9E-14
Arsenic	I	2.8	mg/kg	2.26E-09	2.2E-12	15	3.3E-11
Beryllium	I	0.25	mg/kg	2.02E-10	2.0E-13	8.4	1.7E-12
						SUMMARY CANCER RISK	4E-11

NE = not evaluated.

TABLE E-6.27

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - ADOLESCENT TREPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	3.71E-09	2.5E-11	0.0004	6.4E-08
gamma-Chlordane	O	5100	ug/kg	4.11E-09	2.8E-11	0.0004	7.0E-08
Dieldrin	O	17	ug/kg	1.37E-11	9.4E-14	0.000025	3.8E-09
4,4'-DDD	O	3100	ug/kg	2.50E-09	1.7E-11	0.0004 [1]	4.3E-08
4,4'-DDE	O	450	ug/kg	3.63E-10	2.5E-12	0.0004 [1]	6.2E-09
4,4'-DDT	O	370	ug/kg	2.98E-10	2.0E-12	0.0004	5.1E-09
MCPA	O	17000	ug/kg	1.37E-08	9.4E-11	0.00025	3.8E-07
MCPP	O	54000	ug/kg	4.35E-08	3.0E-10	0.0005	6.0E-07
Aluminum	I	5540	mg/kg	4.47E-06	3.1E-08	0.2	1.5E-07
Antimony	I	0.5	mg/kg	4.03E-10	2.8E-12	0.00004	6.9E-08
Arsenic	I	2.8	mg/kg	2.26E-09	1.5E-11	0.00029	5.3E-08
Beryllium	I	0.25	mg/kg	2.02E-10	1.4E-12	0.00002	6.9E-08
Copper	I	15.2	mg/kg	1.23E-08	8.4E-11	ND	
Silver	I	0.87	mg/kg	7.02E-10	4.8E-12	0.0011	4.4E-09
						SUMMARY HAZARD INDEX	2E-06

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.28

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1992
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm²-event	USEPA, 1995
ABSORPTION FRACTION	ABS	chemical-specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,750	cm²	USEPA, 1992
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm²-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year [1]	USEPA, 1991
EXPOSURE DURATION	ED	25	years	USEPA, 1995
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1995

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; 1/92.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED

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TABLE E-6.28

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	3.6E-10	16	5.7E-09	0.01	4.1E-10	32	1.3E-08	1.9E-08
alpha-Chlordane	O	4600	ug/kg	9.6E-08	0.35	3.4E-08	0.01	1.1E-07	0.44	4.9E-08	8.3E-08
gamma-Chlordane	O	5100	ug/kg	1.1E-07	0.35	3.7E-08	0.01	1.2E-07	0.44	5.4E-08	9.2E-08
4,4'-DDD	O	3100	ug/kg	6.5E-08	0.24	1.6E-08	0.01	7.5E-08	0.3	2.2E-08	3.8E-08
4,4'-DDE	O	450	ug/kg	9.4E-09	0.34	3.2E-09	0.01	1.1E-08	0.43	4.7E-09	7.9E-09
4,4'-DDT	O	370	ug/kg	7.8E-09	0.34	2.6E-09	0.01	8.9E-09	0.43	3.8E-09	6.5E-09
Arsenic	I	2.8	mg/kg	5.9E-08	1.5	8.8E-08	0.001	6.8E-09	1.5	1.0E-08	9.8E-08
Beryllium	I	0.25	mg/kg	5.2E-09	4.3	2.3E-08	0.001	6.0E-10	430	2.6E-07	2.8E-07
SUMMARY CANCER RISK						2E-07				4E-07	6E-07

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
NE = not evaluated.

TABLE E-6.28

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	2.7E-07	0.0005	5.4E-04	0.01	3.1E-07	0.0004	7.8E-04	1.3E-03
gamma-Chlordane	O	5100	ug/kg	3.0E-07	0.0005	6.0E-04	0.01	3.4E-07	0.0004	8.6E-04	1.5E-03
Dieldrin	O	17	ug/kg	1.0E-09	0.00005	2.0E-05	0.01	1.1E-09	0.000025	4.6E-05	6.6E-05
4,4'-DDD	O	3100	ug/kg	1.8E-07	0.0005[3]	3.6E-04	0.01	2.1E-07	0.0004[3]	5.2E-04	8.9E-04
4,4'-DDE	O	450	ug/kg	2.6E-08	0.0005[3]	5.3E-05	0.01	3.0E-08	0.0004[3]	7.6E-05	1.3E-04
4,4'-DDT	O	370	ug/kg	2.2E-08	0.0005	4.3E-05	0.01	2.5E-08	0.0004	6.2E-05	1.1E-04
MCPA	O	17000	ug/kg	1.0E-06	0.0005	2.0E-03	0.01	1.1E-06	0.00025	4.6E-03	6.6E-03
MCPP	O	54000	ug/kg	3.2E-06	0.001	3.2E-03	0.01	3.6E-06	0.0005	7.3E-03	1.0E-02
Aluminum	I	5540	mg/kg	3.3E-04	1	3.3E-04	0.001	3.7E-05	0.2	1.9E-04	5.1E-04
Antimony	I	0.5	mg/kg	2.9E-08	0.0004	7.3E-05	0.001	3.4E-09	0.00004	8.4E-05	1.6E-04
Arsenic	I	2.8	mg/kg	1.6E-07	0.0003	5.5E-04	0.001	1.9E-08	0.00029	6.5E-05	6.1E-04
Beryllium	I	0.25	mg/kg	1.5E-08	0.002	7.3E-06	0.001	1.7E-09	0.00002	8.4E-05	9.2E-05
Copper	I	15.2	mg/kg	8.9E-07	0.04	2.2E-05	0.001	1.0E-07	ND		2.2E-05
Silver	I	0.87	mg/kg	5.1E-08	0.005	1.0E-05	0.001	5.9E-09	0.0011	5.3E-06	1.6E-05
SUMMARY HAZARD INDEX						0.008				0.01	0.02

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.

TABLE E-6.29

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	2.5	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	30	days/year	Assumption
EXPOSURE DURATION	ED	25	years	USEPA, 1995
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1995

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Bulletin No. 3, November 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.29

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
alpha-Chlordane	O	4600	ug/kg	3.71E-09	3.1E-11	0.35	1.1E-11
gamma-Chlordane	O	5100	ug/kg	4.11E-09	3.4E-11	0.35	1.2E-11
Dieldrin	O	17	ug/kg	1.37E-11	1.1E-13	16	1.8E-12
4,4'-DDT	O	370	ug/kg	2.98E-10	2.5E-12	0.34	8.5E-13
Arsenic	I	2.8	mg/kg	2.26E-09	1.9E-11	15	2.8E-10
Beryllium	I	0.25	mg/kg	2.02E-10	1.7E-12	8.4	1.4E-11
SUMMARY CANCER RISK							3E-10

NE = not evaluated.

TABLE E-6.29

INHALATION OF PARTICULATES - SURFACE SOIL
CURRENT AND FUTURE LAND USE - SITE MAINTENANCE WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	3.71E-09	8.7E-11	0.0004	2.2E-07
gamma-Chlordane	O	5100	ug/kg	4.11E-09	9.7E-11	0.0004	2.4E-07
Dieldrin	O	17	ug/kg	1.37E-11	3.2E-13	0.000025	1.3E-08
4,4'-DDD	O	3100	ug/kg	2.50E-09	5.9E-11	0.0004 [1]	1.5E-07
4,4'-DDE	O	450	ug/kg	3.63E-10	8.5E-12	0.0004 [1]	2.1E-08
4,4'-DDT	O	370	ug/kg	2.98E-10	7.0E-12	0.0004	1.8E-08
MCPA	O	17000	ug/kg	1.37E-08	3.2E-10	0.00025	1.3E-06
MCPP	O	54000	ug/kg	4.35E-08	1.0E-09	0.0005	2.0E-06
Aluminum	I	5540	mg/kg	4.47E-06	1.0E-07	0.2	5.2E-07
Antimony	I	0.5	mg/kg	4.03E-10	9.5E-12	0.00004	2.4E-07
Arsenic	I	2.8	mg/kg	2.26E-09	5.3E-11	0.00029	1.8E-07
Beryllium	I	0.25	mg/kg	2.02E-10	4.7E-12	0.00002	2.4E-07
Copper	I	15.2	mg/kg	1.23E-08	2.9E-10	ND	
Silver	I	0.87	mg/kg	7.02E-10	1.6E-11	0.0011	1.5E-08
						SUMMARY HAZARD INDEX	5E-06

[1] RfD for DDT used as a surrogate.
ND = no data available.

TABLE E-6.30

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1995
ABSORPTION FRACTION	ABS_d	chemical-specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,750	cm^2	USEPA, 1992
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	350	days/year [1]	USEPA, 1991
EXPOSURE DURATION	ED	24	years	USEPA, 1995
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	24	years	USEPA, 1995

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DA_{event} = CS \times AF \times ABS_d \times CF$$

Note: For noncarcinogenic effects, AT = ED.

TABLE E-6.30

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	8.0E-09	16	1.3E-07	0.01	4.6E-09	32	1.5E-07	2.7E-07
alpha-Chlordane	O	4600	ug/kg	2.2E-06	0.35	7.6E-07	0.01	1.2E-06	0.44	5.5E-07	1.3E-06
gamma-Chlordane	O	5100	ug/kg	2.4E-06	0.35	8.4E-07	0.01	1.4E-06	0.44	6.1E-07	1.4E-06
4,4'-DDD	O	3100	ug/kg	1.5E-06	0.24	3.5E-07	0.01	8.4E-07	0.3	2.5E-07	6.0E-07
4,4'-DDE	O	450	ug/kg	2.1E-07	0.34	7.2E-08	0.01	1.2E-07	0.43	5.2E-08	1.2E-07
4,4'-DDT	O	370	ug/kg	1.7E-07	0.34	5.9E-08	0.01	1.0E-07	0.43	4.3E-08	1.0E-07
Arsenic	I	2.8	mg/kg	1.3E-06	1.5	2.0E-06	0.001	7.6E-08	1.5	1.1E-07	2.1E-06
Beryllium	I	0.25	mg/kg	1.2E-07	4.3	5.0E-07	0.001	6.8E-09	430	2.9E-06	3.4E-06
SUMMARY CANCER RISK						5E-06				5E-06	9E-06

[1]Relative potency factors were applied to the CSFs for carcinogenic PAHs. Relative potency factors are derived in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," USEPA, 1993.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[3] Calculated from oral CSFs.
ND = no data available.

TABLE E-6.30

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	6.3E-06	0.0005	1.3E-02	0.01	3.6E-06	0.0004	9.1E-03	2.2E-02
gamma-Chlordane	O	5100	ug/kg	7.0E-06	0.0005	1.4E-02	0.01	4.0E-06	0.0004	1.0E-02	2.4E-02
Dieldrin	O	17	ug/kg	2.3E-08	0.00005	4.7E-04	0.01	1.3E-08	0.000025	5.4E-04	1.0E-03
4,4'-DDD	O	3100	ug/kg	4.2E-06	0.0005[3]	8.5E-03	0.01	2.4E-06	0.0004[3]	6.1E-03	1.5E-02
4,4'-DDE	O	450	ug/kg	6.2E-07	0.0005[3]	1.2E-03	0.01	3.5E-07	0.0004[3]	8.9E-04	2.1E-03
4,4'-DDT	O	370	ug/kg	5.1E-07	0.0005	1.0E-03	0.01	2.9E-07	0.0004	7.3E-04	1.7E-03
MCPA	O	17000	ug/kg	2.3E-05	0.0005	4.7E-02	0.01	1.3E-05	0.00025	5.4E-02	1.0E-01
MCPP	O	54000	ug/kg	7.4E-05	0.001	7.4E-02	0.01	4.3E-05	0.0005	8.5E-02	1.6E-01
Aluminum	I	5540	mg/kg	7.6E-03	1	7.6E-03	0.001	4.4E-04	0.2	2.2E-03	9.8E-03
Antimony	I	0.5	mg/kg	6.8E-07	0.0004	1.7E-03	0.001	3.9E-08	0.00004	9.8E-04	2.7E-03
Arsenic	I	2.8	mg/kg	3.8E-06	0.0003	1.3E-02	0.001	2.2E-07	0.00029	7.6E-04	1.4E-02
Beryllium	I	0.25	mg/kg	3.4E-07	0.002	1.7E-04	0.001	2.0E-08	0.00002	9.8E-04	1.2E-03
Copper	I	15.2	mg/kg	2.1E-05	0.04	5.2E-04	0.001	1.2E-06	ND		5.2E-04
Silver	I	0.87	mg/kg	1.2E-06	0.005	2.4E-04	0.001	6.9E-08	0.0011	6.2E-05	3.0E-04
SUMMARY HAZARD INDEX						0.2				0.2	0.4

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November, 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.

TABLE E-6.31

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	0.833	$m^3/hour$	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	24	hours/day	Assumption
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1995
EXPOSURE DURATION	ED	24	years	USEPA, 1995
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	24	years	USEPA, 1995

[1] PEF has been derived in the PEF Appendix to this report.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE E-6.31

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)-1	CANCER RISK
alpha-Chlordane	O	4600	ug/kg	3.71E-09	3.5E-10	0.35	**1.2E-10**
gamma-Chlordane	O	5100	ug/kg	4.11E-09	3.9E-10	0.35	**1.4E-10**
4,4'-DDT	O	370	ug/kg	2.98E-10	2.8E-11	0.34	**9.5E-12**
Dieldrin	O	17	ug/kg	1.37E-11	1.3E-12	16	**2.1E-11**
Arsenic	I	2.8	mg/kg	2.26E-09	2.1E-10	15	**3.2E-09**
Beryllium	I	0.25	mg/kg	2.02E-10	1.9E-11	8.4	**1.6E-10**
				SUMMARY CANCER RISK			**4E-09**

ND = no data available.

TABLE E-6.31

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	3.71E-09	1.0E-09	0.0004	**2.5E-06**
gamma-Chlordane	O	5100	ug/kg	4.11E-09	1.1E-09	0.0004	**2.8E-06**
Dieldrin	O	17	ug/kg	1.37E-11	3.8E-12	0.000025	**1.5E-07**
4,4'-DDD	O	3100	ug/kg	2.50E-09	6.8E-10	0.0004 [1]	**1.7E-06**
4,4'-DDE	O	450	ug/kg	3.63E-10	9.9E-11	0.0004 [1]	**2.5E-07**
4,4'-DDT	O	370	ug/kg	2.98E-10	8.2E-11	0.0004	**2.0E-07**
MCPA	O	17000	ug/kg	1.37E-08	3.8E-09	0.00025	**1.5E-05**
MCPP	O	54000	ug/kg	4.35E-08	1.2E-08	0.0005	**2.4E-05**
Aluminum	I	5540	mg/kg	4.47E-06	1.2E-06	0.2	**6.1E-06**
Antimony	I	0.5	mg/kg	4.03E-10	1.1E-10	0.00004	**2.8E-06**
Arsenic	I	2.8	mg/kg	2.26E-09	6.2E-10	0.00029	**2.1E-06**
Beryllium	I	0.25	mg/kg	2.02E-10	5.5E-11	0.00002	**2.8E-06**
Copper	I	15.2	mg/kg	1.23E-08	3.4E-09	ND	
Silver	I	0.87	mg/kg	7.02E-10	1.9E-10	0.0011	**1.7E-07**
						SUMMARY HAZARD INDEX	**6E-05**

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.32

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	200	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1995
AGE-SPECIFIC SURFACE AREA	SA	age-specific	cm^2	USEPA, 1992
ABSORPTION FRACTION	ABS	chemical-specific	unitless	USEPA, 1995
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
BODY WEIGHT	BW	15	kg	USEPA, 1991
AGE-SPECIFIC BODY WEIGHT	BW	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	350	days/year [1]	USEPA, 1995
EXPOSURE DURATION	ED	6	years	USEPA, 1995
AGE-SPECIFIC EXPOSURE DURATION	ED	age-specific	years	Assumption
SURFACE AREA	SA	1928	cm^2	USEPA, 1997
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1995

[1] Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.

USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.
USEPA, 1997. Exposure Factors Handbook;EPA/600/P-95/002Fa; August 1997.

EQUATIONS

$$\text{CANCER RISK} = \text{INTAKE (mg/kg-day)} \times \text{CANCER SLOPE FACTOR (mg/kg-day)}^{-1}$$

$$\text{HAZARD QUOTIENT} = \text{INTAKE (mg/kg-day)} / \text{REFERENCE DOSE (mg/kg-day)}$$

$$\text{INTAKE}_{\text{INGESTION}} = \frac{\text{CS} \times \text{IR} \times \text{FI} \times \text{CF} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT} \times 365 \text{ days/yr}}$$

$$\text{INTAKE}_{\text{DERMAL}} = (\text{DA}_{event} \times \text{EF} / \text{AT} \times 365 \text{ days/year}) \times \text{SA}_{soil/adj}$$

Where:

$$\text{SA}_{soil/adj} = \text{SUM (SA} \times \text{ED / BW)}$$

$$\text{DA}_{event} = \text{CS} \times \text{AF} \times \text{ABS} \times \text{CF}$$

Note: For noncarcinogenic effects, AT = ED.

TABLE E-6.32

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] (mg/kg-day)$^{-1}$	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [1, 3] (mg/kg-day)$^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	1.9E-08	16	3.0E-07	0.01	4.5E-09	32	1.4E-07	4.4E-07
alpha-Chlordane	O	4600	ug/kg	5.0E-06	0.35	1.8E-06	0.01	1.2E-06	0.44	5.3E-07	2.3E-06
gamma-Chlordane	O	5100	ug/kg	5.6E-06	0.35	2.0E-06	0.01	1.3E-06	0.44	5.9E-07	2.5E-06
4,4'-DDD	O	3100	ug/kg	3.4E-06	0.24	8.2E-07	0.01	8.2E-07	0.3	2.5E-07	1.1E-06
4,4'-DDE	O	450	ug/kg	4.9E-07	0.34	1.7E-07	0.01	1.2E-07	0.43	5.1E-08	2.2E-07
4,4'-DDT	O	370	ug/kg	4.1E-07	0.34	1.4E-07	0.01	9.8E-08	0.43	4.2E-08	1.8E-07
Arsenic	I	2.8	mg/kg	3.1E-06	1.5	4.6E-06	0.001	7.4E-08	1.5	1.1E-07	4.7E-06
Beryllium	I	0.25	mg/kg	2.7E-07	4.3	1.2E-06	0.001	6.6E-09	430	2.8E-06	4.0E-06
					SUMMARY CANCER RISK	1E-05				5E-06	2E-05

[1] Relative potency factors were applied to the CSFs of carcinogenic PAHs. Relative potency factors are derived in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," USEPA, 1993.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[3] Calculated from oral CSFs.
ND = no data.

TABLE E-6.32

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	5.9E-05	0.0005	1.2E-01	0.01	1.4E-05	0.0004	3.5E-02	1.5E-01
gamma-Chlordane	O	5100	ug/kg	6.5E-05	0.0005	1.3E-01	0.01	1.6E-05	0.0004	3.9E-02	1.7E-01
Dieldrin	O	17	ug/kg	2.2E-07	0.00005	4.3E-03	0.01	5.2E-08	0.000025	2.1E-03	6.4E-03
4,4'-DDD	O	3100	ug/kg	4.0E-05	0.0005[3]	7.9E-02	0.01	9.6E-06	0.0004[3]	2.4E-02	1.0E-01
4,4'-DDE	O	450	ug/kg	5.8E-06	0.0005[3]	1.2E-02	0.01	1.4E-06	0.0004[3]	3.5E-03	1.5E-02
4,4'-DDT	O	370	ug/kg	4.7E-06	0.0005	9.5E-03	0.01	1.1E-06	0.0004	2.9E-03	1.2E-02
MCPA	O	17000	ug/kg	2.2E-04	0.0005	4.3E-01	0.01	5.2E-05	0.00025	2.1E-01	6.4E-01
MCPP	O	54000	ug/kg	6.9E-04	0.001	6.9E-01	0.01	1.7E-04	0.0005	3.3E-01	1.0E+00
Aluminum	I	5540	mg/kg	7.1E-02	1	7.1E-02	0.001	1.7E-03	0.2	8.5E-03	7.9E-02
Antimony	I	0.5	mg/kg	6.4E-06	0.0004	1.6E-02	0.001	1.5E-07	0.00004	3.9E-03	2.0E-02
Arsenic	I	2.8	mg/kg	3.6E-05	0.0003	1.2E-01	0.001	8.6E-07	0.00029	3.0E-03	1.2E-01
Beryllium	I	0.25	mg/kg	3.2E-06	0.002	1.6E-03	0.001	7.7E-08	0.00002	3.9E-03	5.4E-03
Copper	I	15.2	mg/kg	1.9E-04	0.04	4.9E-03	0.001	4.7E-06	ND		4.9E-03
Silver	I	0.87	mg/kg	1.1E-05	0.005	2.2E-03	0.001	2.7E-07	0.0011	2.4E-04	2.5E-03
					SUMMARY HAZARD INDEX	1.7				0.7	2.4

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.

TABLE E-6.33

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION IN AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	0.625	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	15	kg	USEPA, 1991
EXPOSURE TIME	ET	24	hours/day	Assumption
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	6	years	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1991

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Bulletin No. 3, November 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{CA \times IR \times ET \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

CA = C x CF x (1/PEF)

Note:

For noncarcinogenic effects: AT = ED

TABLE E-6.33

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)-1	CANCER RISK
alpha-Chlordane	O	4600	ug/kg	3.71E-09	3.0E-10	0.35	1.1E-10
gamma-Chlordane	O	5100	ug/kg	4.11E-09	3.4E-10	0.35	1.2E-10
Dieldrin	O	17	ug/kg	1.37E-11	1.1E-12	16	1.8E-11
4,4'-DDT	O	370	ug/kg	2.98E-10	2.5E-11	0.34	8.3E-12
Arsenic	I	2.8	mg/kg	2.26E-09	1.9E-10	15	2.8E-09
Beryllium	I	0.25	mg/kg	2.02E-10	1.7E-11	8.4	1.4E-10
						SUMMARY CANCER RISK	3E-09

NE = not evaluated.

TABLE E-6.33

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	3.71E-09	3.6E-09	0.0004	8.9E-06
gamma-Chlordane	O	5100	ug/kg	4.11E-09	3.9E-09	0.0004	9.9E-06
Dieldrin	O	17	ug/kg	1.37E-11	1.3E-11	0.000025	5.3E-07
4,4'-DDD	O	3100	ug/kg	2.50E-09	2.4E-09	0.0004 [1]	6.0E-06
4,4'-DDE	O	450	ug/kg	3.63E-10	3.5E-10	0.0004 [1]	8.7E-07
4,4'-DDT	O	370	ug/kg	2.98E-10	2.9E-10	0.0004	7.2E-07
MCPA	O	17000	ug/kg	1.37E-08	1.3E-08	0.00025	5.3E-05
MCPP	O	54000	ug/kg	4.35E-08	4.2E-08	0.0005	8.4E-05
Aluminum	I	5540	mg/kg	4.47E-06	4.3E-06	0.2	2.1E-05
Antimony	I	0.5	mg/kg	4.03E-10	3.9E-10	0.00004	9.7E-06
Arsenic	I	2.8	mg/kg	2.26E-09	2.2E-09	0.00029	7.5E-06
Beryllium	I	0.25	mg/kg	2.02E-10	1.9E-10	0.00002	9.7E-06
Copper	I	15.2	mg/kg	1.23E-08	1.2E-08	ND	
Silver	I	0.87	mg/kg	7.02E-10	6.7E-10	0.0011	6.1E-07
						SUMMARY HAZARD INDEX	2E-04

[1] RfD for DDT used as a surrogate.
ND = no data available.

TABLE E-6.34

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1995
ABSORPTION FRACTION	ABS	chemical-specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	2,300	cm^2	USEPA, 1992
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	250	days/year [1]	USEPA, 1991
EXPOSURE DURATION	ED	25	years	USEPA, 1995
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1995

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; 1/92.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DA_{event} \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.34

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	3.0E-09	16	4.8E-08	0.01	1.4E-09	32	4.4E-08	9.1E-08
alpha-Chlordane	O	4600	ug/kg	8.0E-07	0.35	2.8E-07	0.01	3.7E-07	0.44	1.6E-07	4.4E-07
gamma-Chlordane	O	5100	ug/kg	8.9E-07	0.35	3.1E-07	0.01	4.1E-07	0.44	1.8E-07	4.9E-07
4,4'-DDD	O	3100	ug/kg	5.4E-07	0.24	1.3E-07	0.01	2.5E-07	0.3	7.5E-08	2.0E-07
4,4'-DDE	O	450	ug/kg	7.9E-08	0.34	2.7E-08	0.01	3.6E-08	0.43	1.6E-08	4.2E-08
4,4'-DDT	O	370	ug/kg	6.5E-08	0.34	2.2E-08	0.01	3.0E-08	0.43	1.3E-08	3.5E-08
Arsenic	I	2.8	mg/kg	4.9E-07	1.5	7.3E-07	0.001	2.3E-08	1.5	3.4E-08	7.7E-07
Beryllium	I	0.25	mg/kg	4.4E-08	4.3	1.9E-07	0.001	2.0E-09	430	8.6E-07	1.1E-06
SUMMARY CANCER RISK						2E-06				1E-06	3E-06

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
NE = not evaluated.

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TABLE E-6.34

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	2.3E-06	0.0005	4.5E-03	0.01	1.0E-06	0.0004	2.6E-03	7.1E-03
gamma-Chlordane	O	5100	ug/kg	2.5E-06	0.0005	5.0E-03	0.01	1.1E-06	0.0004	2.9E-03	7.9E-03
Dieldrin	O	17	ug/kg	8.3E-09	0.00005	1.7E-04	0.01	3.8E-09	0.000025	1.5E-04	3.2E-04
4,4'-DDD	O	3100	ug/kg	1.5E-06	0.0005[3]	3.0E-03	0.01	7.0E-07	0.0004[3]	1.7E-03	4.8E-03
4,4'-DDE	O	450	ug/kg	2.2E-07	0.0005[3]	4.4E-04	0.01	1.0E-07	0.0004[3]	2.5E-04	6.9E-04
4,4'-DDT	O	370	ug/kg	1.8E-07	0.0005	3.6E-04	0.01	8.3E-08	0.0004	2.1E-04	5.7E-04
MCPA	O	17000	ug/kg	8.3E-06	0.0005	1.7E-02	0.01	3.8E-06	0.00025	1.5E-02	3.2E-02
MCPP	O	54000	ug/kg	2.6E-05	0.001	2.6E-02	0.01	1.2E-05	0.0005	2.4E-02	5.1E-02
Aluminum	I	5540	mg/kg	2.7E-03	1	2.7E-03	0.001	1.2E-04	0.2	6.2E-04	3.3E-03
Antimony	I	0.5	mg/kg	2.4E-07	0.0004	6.1E-04	0.001	1.1E-08	0.00004	2.8E-04	8.9E-04
Arsenic	I	2.8	mg/kg	1.4E-06	0.0003	4.6E-03	0.001	6.3E-08	0.00029	2.2E-04	4.8E-03
Beryllium	I	0.25	mg/kg	1.2E-07	0.002	6.1E-05	0.001	5.6E-09	0.00002	2.8E-04	3.4E-04
Copper	I	15.2	mg/kg	7.4E-06	0.04	1.9E-04	0.001	3.4E-07	ND		1.9E-04
Silver	I	0.87	mg/kg	4.3E-07	0.005	8.5E-05	0.001	2.0E-08	0.0011	1.8E-05	1.0E-04
					SUMMARY HAZARD INDEX	0.06				0.05	0.1

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.

TABLE E-6.35

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	2.5	$m^3/hour$	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	250	days/year	Assumption
EXPOSURE DURATION	ED	25	years	USEPA, 1995
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	25	years	USEPA, 1995

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1995. *Supplemental Guidance to RAGS: Region 4 Bulletins*, Bulletin No. 3, November 1995.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CA x IR x ET x EF x ED}}{\text{BW x AT x 365 days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogenic effects, AT = ED.

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TABLE E-6.35

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
alpha-Chlordane	O	4600	ug/kg	3.71E-09	2.6E-10	0.35	9.1E-11
gamma-Chlordane	O	5100	ug/kg	4.11E-09	2.9E-10	0.35	1.0E-10
Dieldrin	O	17	ug/kg	1.37E-11	9.6E-13	16	1.5E-11
4,4'-DDT	O	370	ug/kg	2.98E-10	2.1E-11	0.34	7.1E-12
Arsenic	I	2.8	mg/kg	2.26E-09	1.6E-10	15	2.4E-09
Beryllium	I	0.25	mg/kg	2.02E-10	1.4E-11	8.4	1.2E-10
SUMMARY CANCER RISK							3E-09

NE = not evaluated.

TABLE E-6.35

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	3.71E-09	7.3E-10	0.0004	1.8E-06
gamma-Chlordane	O	5100	ug/kg	4.11E-09	8.0E-10	0.0004	2.0E-06
Dieldrin	O	17	ug/kg	1.37E-11	2.7E-12	0.000025	1.1E-07
4,4'-DDD	O	3100	ug/kg	2.50E-09	4.9E-10	0.0004 [1]	1.2E-06
4,4'-DDE	O	450	ug/kg	3.63E-10	7.1E-11	0.0004 [1]	1.8E-07
4,4'-DDT	O	370	ug/kg	2.98E-10	5.8E-11	0.0004	1.5E-07
MCPA	O	17000	ug/kg	1.37E-08	2.7E-09	0.00025	1.1E-05
MCPP	O	54000	ug/kg	4.35E-08	8.5E-09	0.0005	1.7E-05
Aluminum	I	5540	mg/kg	4.47E-06	8.7E-07	0.2	4.4E-06
Antimony	I	0.5	mg/kg	4.03E-10	7.9E-11	0.00004	2.0E-06
Arsenic	I	2.8	mg/kg	2.26E-09	4.4E-10	0.00029	1.5E-06
Beryllium	I	0.25	mg/kg	2.02E-10	3.9E-11	0.00002	2.0E-06
Copper	I	15.2	mg/kg	1.23E-08	2.4E-09	ND	
Silver	I	0.87	mg/kg	7.02E-10	1.4E-10	0.0011	1.2E-07
						SUMMARY HAZARD INDEX	4E-05

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.36

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	480	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	1	mg/cm^2-event	USEPA, 1995
ABSORPTION FRACTION	ABS	chemical-specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,750	cm^2	USEPA, 1992
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year [1]	USEPA, 1991
EXPOSURE DURATION	ED	1	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	1	years	USEPA, 1991

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; 1/92.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$$DA_{event} = CS \times AF \times ABS \times CF$$

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.36

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	1.4E-10	16	2.2E-09	0.01	1.6E-11	32	5.2E-10	2.7E-09
alpha-Chlordane	O	4600	ug/kg	3.7E-08	0.35	1.3E-08	0.01	4.4E-09	0.44	2.0E-09	1.5E-08
gamma-Chlordane	O	5100	ug/kg	4.1E-08	0.35	1.4E-08	0.01	4.9E-09	0.44	2.2E-09	1.7E-08
4,4'-DDD	O	3100	ug/kg	2.5E-08	0.24	6.0E-09	0.01	3.0E-09	0.3	9.0E-10	6.9E-09
4,4'-DDE	O	450	ug/kg	3.6E-09	0.34	1.2E-09	0.01	4.3E-10	0.43	1.9E-10	1.4E-09
4,4'-DDT	O	370	ug/kg	3.0E-09	0.34	1.0E-09	0.01	3.6E-10	0.43	1.5E-10	1.2E-09
Arsenic	I	2.8	mg/kg	2.3E-08	1.5	3.4E-08	0.001	2.7E-10	1.5	4.1E-10	3.4E-08
Beryllium	I	0.25	mg/kg	2.0E-09	4.3	8.7E-09	0.001	2.4E-11	430	1.0E-08	1.9E-08
SUMMARY CANCER RISK						8E-08				2E-08	1E-07

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
NE = not evaluated.

TABLE E-6.36

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	2.6E-06	0.0005	5.2E-03	0.01	3.1E-07	0.0004	7.8E-04	6.0E-03
gamma-Chlordane	O	5100	ug/kg	2.9E-06	0.0005	5.7E-03	0.01	3.4E-07	0.0004	8.6E-04	6.6E-03
Dieldrin	O	17	ug/kg	9.6E-09	0.00005	1.9E-04	0.01	1.1E-09	0.000025	4.6E-05	2.4E-04
4,4'-DDD	O	3100	ug/kg	1.7E-06	0.0005[3]	3.5E-03	0.01	2.1E-07	0.0004[3]	5.2E-04	4.0E-03
4,4'-DDE	O	450	ug/kg	2.5E-07	0.0005[3]	5.1E-04	0.01	3.0E-08	0.0004[3]	7.6E-05	5.8E-04
4,4'-DDT	O	370	ug/kg	2.1E-07	0.0005	4.2E-04	0.01	2.5E-08	0.0004	6.2E-05	4.8E-04
MCPA	O	17000	ug/kg	9.6E-06	0.0005	1.9E-02	0.01	1.1E-06	0.00025	4.6E-03	2.4E-02
MCPP	O	54000	ug/kg	3.0E-05	0.001	3.0E-02	0.01	3.6E-06	0.0005	7.3E-03	3.8E-02
Aluminum	I	5540	mg/kg	3.1E-03	1	3.1E-03	0.001	3.7E-05	0.2	1.9E-04	3.3E-03
Antimony	I	0.5	mg/kg	2.8E-07	0.0004	7.0E-04	0.001	3.4E-09	0.00004	8.4E-05	7.9E-04
Arsenic	I	2.8	mg/kg	1.6E-06	0.0003	5.3E-03	0.001	1.9E-08	0.00029	6.5E-05	5.3E-03
Beryllium	I	0.25	mg/kg	1.4E-07	0.002	7.0E-05	0.001	1.7E-09	0.00002	8.4E-05	1.5E-04
Copper	I	15.2	mg/kg	8.6E-06	0.04	2.1E-04	0.001	1.0E-07	ND		2.1E-04
Silver	I	0.87	mg/kg	4.9E-07	0.005	9.8E-05	0.001	5.9E-09	0.0011	5.3E-06	1.0E-04
SUMMARY HAZARD INDEX						0.07				0.01	0.09

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value for DDT used as a surrogate.

TABLE E-6.37

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
SOIL CONCENTRATION	C	chemical-specific	chemical-specific	
PART. EMISSION FACTOR	PEF	1.24E+09	m^3/kg	default [1]
CONCENTRATION AIR	CA	chemical-specific	mg/m^3	
INHALATION RATE	IR	2.5	m^3/hour	USEPA, 1995
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE TIME	ET	8	hours/day	Assumption
EXPOSURE FREQUENCY	EF	30	days/year	Assumption
EXPOSURE DURATION	ED	1	years	Assumption
CONVERSION FACTOR	CF	0.001	mg/ug	Organics only
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	1	years	USEPA, 1991

[1] PEF has been derived in the PEF Appendix to this report.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors; OSWER Directive 9285.6-03.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x INHALATION CANCER SLOPE FACTOR (mg/kg-day)$^{-1}$

'HAZARD QUOTIENT = INTAKE (mg/kg-day) / INHALATION REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CA x IR x ET x EF x ED}}{\text{BW x AT x 365 days/yr}}$$

Where:

CA = C x CF x (1/PEF)

Note: For noncarcinogens, AT = ED.

TABLE E-6.37

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION CSF (mg/kg-day)^-1	CANCER RISK
alpha-Chlordane	O	4600	ug/kg	3.71E-09	1.2E-12	0.35	4.4E-13
gamma-Chlordane	O	5100	ug/kg	4.11E-09	1.4E-12	0.35	4.8E-13
Dieldrin	O	17	ug/kg	1.37E-11	4.6E-15	16	7.4E-14
4,4'-DDT	O	370	ug/kg	2.98E-10	1.0E-13	0.34	3.4E-14
Arsenic	I	2.8	mg/kg	2.26E-09	7.6E-13	15	1.1E-11
Beryllium	I	0.25	mg/kg	2.02E-10	6.8E-14	8.4	5.7E-13
						SUMMARY CANCER RISK	1E-11

NE = not evaluated.

TABLE E-6.37

INHALATION OF PARTICULATES - SURFACE SOIL
FUTURE LAND USE - EXCAVATION WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	AIR CONCENTRATION (mg/m³)	INTAKE (mg/kg-day)	INHALATION RfD (mg/kg-day)	HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	3.71E-09	8.7E-11	0.0004	2.2E-07
gamma-Chlordane	O	5100	ug/kg	4.11E-09	9.7E-11	0.0004	2.4E-07
Dieldrin	O	17	ug/kg	1.37E-11	3.2E-13	0.000025	1.3E-08
4,4'-DDD	O	3100	ug/kg	2.50E-09	5.9E-11	0.0004 [1]	1.5E-07
4,4'-DDE	O	450	ug/kg	3.63E-10	8.5E-12	0.0004 [1]	2.1E-08
4,4'-DDT	O	370	ug/kg	2.98E-10	7.0E-12	0.0004	1.8E-08
MCPA	O	17000	ug/kg	1.37E-08	3.2E-10	0.00025	1.3E-06
MCPP	O	54000	ug/kg	4.35E-08	1.0E-09	0.0005	2.0E-06
Aluminum	I	5540	mg/kg	4.47E-06	1.0E-07	0.2	5.2E-07
Antimony	I	0.5	mg/kg	4.03E-10	9.5E-12	0.00004	2.4E-07
Arsenic	I	2.8	mg/kg	2.26E-09	5.3E-11	0.00029	1.8E-07
Beryllium	I	0.25	mg/kg	2.02E-10	4.7E-12	0.00002	2.4E-07
Copper	I	15.2	mg/kg	1.23E-08	2.9E-10	ND	
Silver	I	0.87	mg/kg	7.02E-10	1.6E-11	0.0011	1.5E-08
SUMMARY HAZARD INDEX							5E-06

[1] RfD for DDT used as a surrogate.
ND = no data available.

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TABLE E-6.38

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES)
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical-specific	ug/liter	
INGESTION RATE	IR	2	liters/day	USEPA, 1991
BODY WEIGHT	BW	70	kg	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	24	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	24	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CW x IR x EF x ED x CF}}{\text{BW x AT x 365 days/year}}$$

Note: For noncarcinogenic effects, AT = ED.

CARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
alpha-BHC	0.184	UG/LITER	1.7E-06	6.3	1.1E-05
gamma-BHC	0.132	UG/LITER	1.2E-06	1.3	1.6E-06
Aldrin	0.029	UG/LITER	2.7E-07	17	4.6E-06
gamma-Chlordane	0.154	UG/LITER	1.4E-06	0.35	5.1E-07
Dieldrin	0.01	UG/LITER	9.4E-08	16	1.5E-06
Heptachlor epoxide	0.04	UG/LITER	3.8E-07	9.1	3.4E-06
Arsenic	94	UG/LITER	8.8E-04	1.5	1.3E-03
			TOTAL CANCER RISK		1E-03

ND = No Data.

TABLE E-6.38

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES)
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT INGESTION
2,4-Dichlorophenol	37	UG/LITER	1.0E-03	0.003	3.4E-01
Naphthalene	5.7	UG/LITER	1.6E-04	0.02	7.8E-03
alpha-BHC	0.184	UG/LITER	5.0E-06	ND	
delta-BHC	0.07	UG/LITER	1.9E-06	ND	
gamma-BHC	0.132	UG/LITER	3.6E-06	0.0003	1.2E-02
Aldrin	0.029	UG/LITER	7.9E-07	0.00003	2.6E-02
gamma-chlordane	0.154	UG/LITER	4.2E-06	0.0005	8.4E-03
Dieldrin	0.01	UG/LITER	2.7E-07	0.00005	5.5E-03
Heptachlor epoxide	0.04	UG/LITER	1.1E-06	0.000013	8.4E-02
2,4-D	19	UG/LITER	5.2E-04	0.01	5.2E-02
MCPA	1282	UG/LITER	3.5E-02	0.0005	7.0E+01
MCPP	1181	UG/LITER	3.2E-02	0.001	3.2E+01
Arsenic	94	UG/LITER	2.6E-03	0.0003	8.6E+00
Iron	752	UG/LITER	2.1E-02	0.3	6.9E-02
Manganese	25	UG/LITER	6.8E-04	0.02	3.4E-02
			TOTAL HAZARD INDEX		112

ND = no data available.

TABLE E-6.39

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES)
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical-specific	ug/liter	
INGESTION RATE	IR	1	liters/day	USEPA, 1991
BODY WEIGHT	BW	15	kg	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	6	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	6	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CW x IR x EF x ED x CF}}{\text{BW x AT x 365 days/year}}$$

Note: For noncarcinogenic effects, AT = ED.

CARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
alpha-BHC	0.184	UG/LITER	1.0E-06	6.3	6.4E-06
gamma-BHC	0.132	UG/LITER	7.2E-07	1.3	9.4E-07
Aldrin	0.029	UG/LITER	1.6E-07	17	2.7E-06
gamma-Chlordane	0.154	UG/LITER	8.4E-07	0.35	3.0E-07
Dieldrin	0.01	UG/LITER	5.5E-08	16	8.8E-07
Heptachlor epoxide	0.04	UG/LITER	2.2E-07	9.1	2.0E-06
Arsenic	94	UG/LITER	5.2E-04	1.5	7.7E-04
			TOTAL CANCER RISK		8E-04

ND = No Data.

TABLE E-6.39

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES)
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT INGESTION
2,4-Dichlorophenol	37	UG/LITER	2.4E-03	0.003	7.9E-01
Naphthalene	5.7	UG/LITER	3.6E-04	0.02	1.8E-02
alpha-BHC	0.184	UG/LITER	1.2E-05	ND	
delta-BHC	0.07	UG/LITER	4.5E-06	ND	
gamma-BHC	0.132	UG/LITER	8.4E-06	0.0003	2.8E-02
Aldrin	0.029	UG/LITER	1.9E-06	0.00003	6.2E-02
gamma-Chlordane	0.154	UG/LITER	9.8E-06	0.0005	2.0E-02
Dieldrin	0.01	UG/LITER	6.4E-07	0.00005	1.3E-02
Heptachlor epoxide	0.04	UG/LITER	2.6E-06	0.000013	2.0E-01
2,4-D	19	UG/LITER	1.2E-03	0.01	1.2E-01
MCPA	1282	UG/LITER	8.2E-02	0.0005	1.6E+02
MCPP	1181	UG/LITER	7.5E-02	0.001	7.5E+01
Arsenic	94	UG/LITER	6.0E-03	0.0003	2.0E+01
Iron	752	UG/LITER	4.8E-02	0.3	1.6E-01
Manganese	25	UG/LITER	1.6E-03	0.02	8.0E-02
				TOTAL HAZARD INDEX	261

ND = no data available.

TABLE E-6.40

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm²-event	USEPA, 1992a
ABSORPTION FRACTION	ABS_d	chemical specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,000	cm²	USEPA, 1992b
DOSE ABSORBED PER EVENT	DAevent	chemical specific	mg/cm²-event	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-06	kg/mg	inorganics
	CF	1.00E-09	kg/ug	organics
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year [1]	Assumption
EXPOSURE DURATION	ED	7	years	USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	7	years	USEPA, 1992a

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{CS \times DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

$DA_{event} = CS \times AF \times ABS_d \times CF$

Note: For noncarcinogenic effects: AT = ED

TABLE E-6.40

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg		16				32		
alpha-Chlordane	O	4600	ug/kg	2.7E-08	0.35	9.5E-09	0.01	5.4E-09	0.44	2.4E-09	1.2E-08
gamma-Chlordane	O	5100	ug/kg	3.0E-08	0.35	1.0E-08	0.01	6.0E-09	0.44	2.6E-09	1.3E-08
4,4'-DDD	O	3100	ug/kg	1.8E-08	0.24	4.4E-09	0.01	3.6E-09	0.3	1.1E-09	5.5E-09
4,4'-DDE	O	450	ug/kg	2.6E-09	0.34	9.0E-10	0.01	5.3E-10	0.43	2.3E-10	1.1E-09
4,4'-DDT	O	370	ug/kg	2.2E-09	0.34	7.4E-10	0.01	4.3E-10	0.43	1.9E-10	9.3E-10
Arsenic	I	2.8	mg/kg	1.6E-08	1.5	2.5E-08	0.001	3.3E-10	1.5	4.9E-10	2.5E-08
Beryllium	I	0.25	mg/kg	1.5E-09	4.3	6.3E-09	0.001	2.9E-11	430	1.3E-08	1.9E-08
SUMMARY CANCER RISK						6E-08				2E-08	8E-08

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.

TABLE E-6.40

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
CURRENT AND FUTURE LAND USE - ADULT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	2.7E-07	0.0005	5.4E-04	0.01	5.4E-08	0.0004	1.4E-04	6.8E-04
gamma-Chlordane	O	5100	ug/kg	3.0E-07	0.0005	6.0E-04	0.01	6.0E-08	0.0004	1.5E-04	7.5E-04
Dieldrin	O	17	ug/kg	1.0E-09	0.00005	2.0E-05	0.01	2.0E-10	0.000025	8.0E-06	2.8E-05
4,4'-DDD	O	3100	ug/kg	1.8E-07	0.0005 [3]	3.6E-04	0.01	3.6E-08	0.0001 [3]	3.6E-04	7.3E-04
4,4'-DDE	O	450	ug/kg	2.6E-08	0.0005 [3]	5.3E-05	0.01	5.3E-09	0.0001 [3]	5.3E-05	1.1E-04
4,4'-DDT	O	370	ug/kg	2.2E-08	0.0005	4.3E-05	0.01	4.3E-09	0.0001	4.3E-05	8.7E-05
MCPA	O	17000	ug/kg	1.0E-06	0.0005	2.0E-03	0.01	2.0E-07	0.00025	8.0E-04	2.8E-03
MCPP	O	54000	ug/kg	3.2E-06	0.001	3.2E-03	0.01	6.3E-07	0.0005	1.3E-03	4.4E-03
Aluminum	I	5540	mg/kg	3.3E-04	1	3.3E-04	0.001	6.5E-06	0.2	3.3E-05	3.6E-04
Antimony	I	0.5	mg/kg	2.9E-08	0.0004	7.3E-05	0.001	5.9E-10	0.00004	1.5E-05	8.8E-05
Arsenic	I	2.8	mg/kg	1.6E-07	0.0003	5.5E-04	0.001	3.3E-09	0.00029	1.1E-05	5.6E-04
Beryllium	I	0.25	mg/kg	1.5E-08	0.002	7.3E-06	0.001	2.9E-10	0.00002	1.5E-05	2.2E-05
Copper	I	15.2	mg/kg	8.9E-07	0.04	2.2E-05	0.001	1.8E-08	ND		2.2E-05
Silver	I	0.87	mg/kg	5.1E-08	0.005	1.0E-05	0.001	1.0E-09	0.0011	9.3E-07	1.1E-05
SUMMARY HAZARD INDEX						0.008				0.003	0.01

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value from DDT used as a surrogate.
ND = no data available. Note: all chemicals with ND were assessed as a carcinogen with the exception of lead.

TABLE E-6.41

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm²-event	USEPA, 1992a
AGE-SPECIFIC SURFACE AREA	SA_i	age-specific	cm²	USEPA, 1989
ABSORPTION FRACTION	ABS_d	chemical-specific	unitless	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganics
	CF	1.00E-09	kg/ug	Organics
BODY WEIGHT	BW	45	kg	USEPA, 1995
AGE-SPECIFIC BODY WEIGHT	BW_i	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	30	days/year [1]	Assumption
EXPOSURE DURATION	ED	2	years	USEPA, 1992a
AGE-SPECIFIC EXPOSURE DURATION	ED_i	age-specific	years	Assumption
AGE-WEIGHTED SURFACE AREA [2]	$SA_{soil/adj}$	4429	cm²-year/kg	USEPA, 1992b
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm²-event	USEPA, 1992b
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	2	years	USEPA, 1992a

[1] Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.
[2] In estimating the dermally absorbed dose for children age 7 through 16, the time-weighted, bodyweight normalized surface area exposed is calculated from surface area, exposure duration, and body weight for each of 10 age periods, age 7 through 16, per USEPA, 1992.

USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS: Region 4 Bulletins, Bulletin No. 3, November 1995.
USEPA, 1997. Exposure Factors Handbook;EPA/600/P-95/002Fa; August 1997.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = (DA_{event} \times EF / AT \times 365\ days/year) \times SA_{soil/adj}$$

Where:

$SA_{soil/adj}$ = SUM $(SA_i \times ED_i / BW_i)$

DA_{event} = CS x AF x ABS_d x CF

Note: For noncarcinogenic effects: AT = ED.

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TABLE E-6.41

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [1,3] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	4.4E-11	16	7.1E-10	0.01	1.8E-10	32	5.7E-09	6.4E-09
alpha-Chlordane	O	4600	ug/kg	1.2E-08	0.35	4.2E-09	0.01	4.8E-08	0.44	2.1E-08	2.5E-08
gamma-Chlordane	O	5100	ug/kg	1.3E-08	0.35	4.7E-09	0.01	5.3E-08	0.44	2.3E-08	2.8E-08
4,4'-DDD	O	3100	ug/kg	8.1E-09	0.24	1.9E-09	0.01	3.2E-08	0.3	9.7E-09	1.2E-08
4,4'-DDE	O	450	ug/kg	1.2E-09	0.34	4.0E-10	0.01	4.7E-09	0.43	2.0E-09	2.4E-09
4,4'-DDT	O	370	ug/kg	9.7E-10	0.34	3.3E-10	0.01	3.8E-09	0.43	1.7E-09	2.0E-09
Arsenic	I	2.8	mg/kg	7.3E-09	1.5	1.1E-08	0.001	2.9E-09	1.5	4.4E-09	1.5E-08
Beryllium	I	0.25	mg/kg	6.5E-10	4.3	2.8E-09	0.001	2.6E-10	430	1.1E-07	1.1E-07
					SUMMARY CANCER RISK	3E-08				2E-07	3E-07

[1] Relative potency factors were applied to the CSFs for carcinogenic PAHs. Relative potency factors are derived in "Provisional Guidance for Quantitative Risk Assessment for Polycyclic Aromatic Hydrocarbons," USEPA, 1993.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[3] Calculated from oral CSFs.
ND = no data.

TABLE E-6.41

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
CURRENT AND FUTURE LAND USE - ADOLESCENT TRESPASSER / RECREATIONAL USER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	4.2E-07	0.0005	8.4E-04	0.01	1.7E-06	0.0004	4.2E-03	5.0E-03
gamma-Chlordane	O	5100	ug/kg	4.7E-07	0.0005	9.3E-04	0.01	1.9E-06	0.0004	4.6E-03	5.6E-03
Dieldrin	O	17	ug/kg	1.6E-09	0.00005	3.1E-05	0.01	6.2E-09	0.000025	2.5E-04	2.8E-04
4,4'-DDD	O	3100	ug/kg	2.8E-07	0.0005 [3]	5.7E-04	0.01	1.1E-06	0.0001 [3]	1.1E-02	1.2E-02
4,4'-DDE	O	450	ug/kg	4.1E-08	0.0005 [3]	8.2E-05	0.01	1.6E-07	0.0001 [3]	1.6E-03	1.7E-03
4,4'-DDT	O	370	ug/kg	3.4E-08	0.0005	6.8E-05	0.01	1.3E-07	0.0001	1.3E-03	1.4E-03
MCPA	O	17000	ug/kg	1.6E-06	0.0005	3.1E-03	0.01	6.2E-06	0.00025	2.5E-02	2.8E-02
MCPP	O	54000	ug/kg	4.9E-06	0.001	4.9E-03	0.01	2.0E-05	0.0005	3.9E-02	4.4E-02
Aluminum	I	5540	mg/kg	5.1E-04	1	5.1E-04	0.001	2.0E-04	0.2	1.0E-03	1.5E-03
Antimony	I	0.5	mg/kg	4.6E-08	0.0004	1.1E-04	0.001	1.8E-08	0.00004	4.6E-04	5.7E-04
Arsenic	I	2.8	mg/kg	2.6E-07	0.0003	8.5E-04	0.001	1.0E-07	0.00029	3.5E-04	1.2E-03
Beryllium	I	0.25	mg/kg	2.3E-08	0.002	1.1E-05	0.001	9.1E-09	0.00002	4.6E-04	4.7E-04
Copper	I	15.2	mg/kg	1.4E-06	0.04	3.5E-05	0.001	5.5E-07	ND		3.5E-05
Silver	I	0.87	mg/kg	7.9E-08	0.005	1.6E-05	0.001	3.2E-08	0.0011	2.9E-05	4.5E-05
					SUMMARY HAZARD INDEX	0.01				0.09	0.1

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (February 10, 1992).
[2] Calculated from oral RfDs.
[3] Value from DDT used as a surrogate.
ND = no data available. Note: all chemicals with ND were assessed as a carcinogen with the exception of lead.

TABLE E-6.42

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm^2-event	USEPA, 1992a
ABSORPTION FRACTION	ABS_d	chemical-specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	5,000	cm^2	USEPA, 1992b
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	350	days/year [1]	Assumption
EXPOSURE DURATION	ED	7	years	USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	7	years	USEPA, 1992a

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.

USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.

USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS_d x CF

Note: For noncarcinogenic effects, AT = ED.

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TABLE E-6.42

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [3] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	1.2E-09	16	1.9E-08	0.01	2.3E-10	32	7.5E-09	2.6E-08
alpha-Chlordane	O	4600	ug/kg	3.2E-07	0.35	1.1E-07	0.01	6.3E-08	0.44	2.8E-08	1.4E-07
gamma-Chlordane	O	5100	ug/kg	3.5E-07	0.35	1.2E-07	0.01	7.0E-08	0.44	3.1E-08	1.5E-07
4,4'-DDD	O	3100	ug/kg	2.1E-07	0.24	5.1E-08	0.01	4.2E-08	0.3	1.3E-08	6.4E-08
4,4'-DDT	O	370	ug/kg	2.5E-08	0.34	8.6E-09	0.01	5.1E-09	0.43	2.2E-09	1.1E-08
4,4'-DDE	O	450	ug/kg	3.1E-08	0.34	1.0E-08	0.01	6.2E-09	0.43	2.7E-09	1.3E-08
Arsenic	I	2.8	mg/kg	1.9E-07	1.5	2.9E-07	0.001	3.8E-09	1.5	5.8E-09	2.9E-07
Beryllium	I	0.25	mg/kg	1.7E-08	4.3	7.4E-08	0.001	3.4E-10	430	1.5E-07	2.2E-07
SUMMARY CANCER RISK						8E-07				3E-07	1E-06

[1]Relative potency factors were applied to the CSFs for carcinogenic PAHs. Relative potency factors are derived in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," USEPA, 1993.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[3] Calculated from oral CSFs.
ND = no data available.

TABLE E-6.42

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	3.2E-06	0.0005	6.3E-03	0.01	6.3E-07	0.0004	1.6E-03	7.9E-03
gamma-Chlordane	O	5100	ug/kg	3.5E-06	0.0005	7.0E-03	0.01	7.0E-07	0.0004	1.7E-03	8.7E-03
Dieldrin	O	17	ug/kg	1.2E-08	0.00005	2.3E-04	0.01	2.3E-09	0.000025	9.3E-05	3.3E-04
4,4'-DDD	O	3100	ug/kg	2.1E-06	0.0005 [3]	4.2E-03	0.01	4.2E-07	0.0001 [3]	4.2E-03	8.5E-03
4,4'-DDE	O	450	ug/kg	3.1E-07	0.0005 [3]	6.2E-04	0.01	6.2E-08	0.0001 [3]	6.2E-04	1.2E-03
4,4'-DDT	O	370	ug/kg	2.5E-07	0.0005	5.1E-04	0.01	5.1E-08	0.0001	5.1E-04	1.0E-03
MCPA	O	17000	ug/kg	1.2E-05	0.0005	2.3E-02	0.01	2.3E-06	0.00025	9.3E-03	3.3E-02
MCPP	O	54000	ug/kg	3.7E-05	0.001	3.7E-02	0.01	7.4E-06	0.0005	1.5E-02	5.2E-02
Aluminum	I	5540	mg/kg	3.8E-03	1	3.8E-03	0.001	7.6E-05	0.2	3.8E-04	4.2E-03
Antimony	I	0.5	mg/kg	3.4E-07	0.0004	8.6E-04	0.001	6.8E-09	0.00004	1.7E-04	1.0E-03
Arsenic	I	2.8	mg/kg	1.9E-06	0.0003	6.4E-03	0.001	3.8E-08	0.00029	1.3E-04	6.5E-03
Beryllium	I	0.25	mg/kg	1.7E-07	0.002	8.6E-05	0.001	3.4E-09	0.00002	1.7E-04	2.6E-04
Copper	I	15.2	mg/kg	1.0E-05	0.04	2.6E-04	0.001	2.1E-07	ND		2.6E-04
Silver	I	0.87	mg/kg	6.0E-07	0.005	1.2E-04	0.001	1.2E-08	0.0011	1.1E-05	1.3E-04
SUMMARY HAZARD INDEX						0.09				0.03	0.1

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November, 1995).
[2] Calculated from oral RfDs.
[3] Value from DDT used as a surrogate.

TABLE E-6.43

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	100	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm²-event	USEPA, 1992a
AGE-SPECIFIC SURFACE AREA	SA	age-specific	cm²	USEPA, 1989
ABSORPTION FRACTION	ABS	chemical-specific	unitless	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
BODY WEIGHT	BW	15	kg	USEPA, 1991
AGE-SPECIFIC BODY WEIGHT	BW	age-specific	kg	USEPA, 1989
EXPOSURE FREQUENCY	EF	350	days/year [1]	USEPA, 1995
EXPOSURE DURATION	ED	2	years	USEPA, 1992a
AGE-SPECIFIC EXPOSURE DURATION	ED	age-specific	years	Assumption
SURFACE AREA	SA	1928	cm^2	USEPA, 1997
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm^2-event	USEPA, 1992b
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	2	years	USEPA, 1992a

[1] Units for exposure frequency are in events/year in the calculation of the dermally absorbed dose.

USEPA, 1989. Exposure Factors Handbook;EPA/600/8-89/043; May 1989.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
USEPA, 1992b. *Dermal Exposure Assessment: Principles and Applications*; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.
USEPA, 1997. Exposure Factors Handbook;EPA/600/P-95/002Fa; August 1997.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = (DA_{event} \times EF / AT \times 365\ days/year) \times SA_{soil/adj}$$

Where:

$SA_{soil/adj}$ = SUM (SA x ED / BW)

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED.

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TABLE E-6.43

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF [1] $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [2]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [1, 3] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg		16	0.0E+00	0.01	9.0E-10	32		
alpha-Chlordane	O	4600	ug/kg	8.4E-07	0.35	2.9E-07	0.01	2.4E-07	0.44	1.1E-07	4.0E-07
gamma-Chlordane	O	5100	ug/kg	9.3E-07	0.35	3.3E-07	0.01	2.7E-07	0.44	1.2E-07	4.4E-07
4,4'-DDD	O	3100	ug/kg	5.7E-07	0.24	1.4E-07	0.01	1.6E-07	0.3	4.9E-08	1.9E-07
4,4'-DDE	O	450	ug/kg	8.2E-08	0.34	2.8E-08	0.01	2.4E-08	0.43	1.0E-08	3.8E-08
4,4'-DDT	O	370	ug/kg	6.8E-08	0.34	2.3E-08	0.01	2.0E-08	0.43	8.4E-09	3.1E-08
Arsenic	I	2.8	mg/kg	5.1E-07	1.5	7.7E-07	0.001	1.5E-08	1.5	2.2E-08	7.9E-07
Beryllium	I	0.25	mg/kg	4.6E-08	4.3	2.0E-07	0.001	1.3E-09	430	5.7E-07	7.6E-07
					SUMMARY CANCER RISK	2E-06				1E-06	3E-06

[1] Relative potency factors were applied to the CSFs of carcinogenic PAHs. Relative potency factors are derived in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," USEPA, 1993.
[2] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[3] Calculated from oral CSFs.
ND = no data.

TABLE E-6.43

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	2.9E-05	0.0005	5.9E-02	0.01	8.5E-06	0.0004	2.1E-02	8.0E-02
gamma-Chlordane	O	5100	ug/kg	3.3E-05	0.0005	6.5E-02	0.01	9.4E-06	0.0004	2.4E-02	8.9E-02
Dieldrin	O	17	ug/kg	1.1E-07	0.00005	2.2E-03	0.01	3.1E-08	0.000025	1.3E-03	3.4E-03
4,4'-DDD	O	3100	ug/kg	2.0E-05	0.0005 [3]	4.0E-02	0.01	5.7E-06	0.0001 [3]	5.7E-02	9.7E-02
4,4'-DDE	O	450	ug/kg	2.9E-06	0.0005 [3]	5.8E-03	0.01	8.3E-07	0.0001 [3]	8.3E-03	1.4E-02
4,4'-DDT	O	370	ug/kg	2.4E-06	0.0005	4.7E-03	0.01	6.8E-07	0.0001	6.8E-03	1.2E-02
MCPA	O	17000	ug/kg	1.1E-04	0.0005	2.2E-01	0.01	3.1E-05	0.00025	1.3E-01	3.4E-01
MCPP	O	54000	ug/kg	3.5E-04	0.001	3.5E-01	0.01	1.0E-04	0.0005	2.0E-01	5.4E-01
Aluminum	I	5540	mg/kg	3.5E-02	1	3.5E-02	0.001	1.0E-03	0.2	5.1E-03	4.1E-02
Antimony	I	0.5	mg/kg	3.2E-06	0.0004	8.0E-03	0.001	9.2E-08	0.00004	2.3E-03	1.0E-02
Arsenic	I	2.8	mg/kg	1.8E-05	0.0003	6.0E-02	0.001	5.2E-07	0.00029	1.8E-03	6.1E-02
Beryllium	I	0.25	mg/kg	1.6E-06	0.002	8.0E-04	0.001	4.6E-08	0.00002	2.3E-03	3.1E-03
Copper	I	15.2	mg/kg	9.7E-05	0.04	2.4E-03	0.001	2.8E-06	ND		2.4E-03
Silver	I	0.87	mg/kg	5.6E-06	0.005	1.1E-03	0.001	1.6E-07	0.0011	1.5E-04	1.3E-03
					SUMMARY HAZARD INDEX	0.8				0.5	1.3

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value from DDT used as a surrogate.

TABLE E-6.44

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION SOIL	CS	chemical-specific	chemical-specific	
INGESTION RATE	IR	50	mg/day	USEPA, 1995
FRACTION INGESTED	FI	100%	unitless	Assumption
ADHERENCE FACTOR	AF	0.2	mg/cm²-event	USEPA, 1992a
ABSORPTION FRACTION	ABS	chemical-specific	unitless	USEPA, 1995
SURFACE AREA EXPOSED	SA	2,300	cm²	USEPA, 1992b
DOSE ABSORBED PER EVENT	DA_{event}	chemical-specific	mg/cm²-event	USEPA, 1992b
CONVERSION FACTOR	CF	1.00E-09	kg/ug	Organic conversion
CONVERSION FACTOR	CF	1.00E-06	kg/mg	Inorganic conversion
BODY WEIGHT	BW	70	kg	USEPA, 1991
EXPOSURE FREQUENCY	EF	30	days/year [1]	USEPA, 1995
EXPOSURE DURATION	ED	9	years	USEPA, 1992a
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	9	years	USEPA, 1992a

[1] Units for exposure frequency are events/year in the calculation of the dermally absorbed dose.
USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.
USEPA, 1992a. Region 6 Memorandum: Central Tendency and RME Exposure Parameters.
USEPA, 1992b. Dermal Exposure Assessment: Principles and Applications; EPA/600/8-91/011B; January 1992.
USEPA, 1995. Supplemental Guidance to RAGS : Region IV, Human Health Risk Assessment Bulletin No. 3.

EQUATIONS

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR $(mg/kg\text{-}day)^{-1}$

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$INTAKE_{-INGESTION} = \frac{CS \times IR \times FI \times CF \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

$$INTAKE_{-DERMAL} = \frac{DAevent \times SA \times EF \times ED}{BW \times AT \times 365\ days/yr}$$

Where:

DA_{event} = CS x AF x ABS x CF

Note: For noncarcinogenic effects, AT = ED

TABLE E-6.44

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

CARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL CSF $(mg/kg\text{-}day)^{-1}$	CANCER RISK INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL CSF [2] $(mg/kg\text{-}day)^{-1}$	CANCER RISK DERMAL	TOTAL CANCER RISK
Dieldrin	O	17	ug/kg	1.3E-10	16				32		
alpha-Chlordane	O	4600	ug/kg	3.5E-08	0.35	1.2E-08	0.01	3.2E-09	0.44	1.4E-09	1.4E-08
gamma-Chlordane	O	5100	ug/kg	3.8E-08	0.35	1.3E-08	0.01	3.5E-09	0.44	1.6E-09	1.5E-08
4,4'-DDD	O	3100	ug/kg	2.3E-08	0.24	5.6E-09	0.01	2.2E-09	0.3	6.5E-10	6.3E-09
4,4'-DDE	O	450	ug/kg	3.4E-09	0.34	1.2E-09	0.01	3.1E-10	0.43	1.3E-10	1.3E-09
4,4'-DDT	O	370	ug/kg	2.8E-09	0.34	9.5E-10	0.01	2.6E-10	0.43	1.1E-10	1.1E-09
Arsenic	I	2.8	mg/kg	2.1E-08	1.5	3.2E-08	0.001	1.9E-10	1.5	2.9E-10	3.2E-08
Beryllium	I	0.25	mg/kg	1.9E-09	4.3	8.1E-09	0.001	1.7E-11	430	7.5E-09	1.6E-08
SUMMARY CANCER RISK						8E-08				2E-08	1E-07

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral CSFs.
NE = not evaluated.

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TABLE E-6.44

DIRECT CONTACT WITH AND INCIDENTAL INGESTION OF SURFACE SOIL (CENTRAL TENDENCY)
FUTURE LAND USE - COMMERCIAL WORKER
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	INORGANIC OR ORGANIC I/O	SOIL CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	ORAL RfD (mg/kg-day)	HAZARD QUOTIENT INGESTION	DERMAL ABS [1]	INTAKE DERMAL (mg/kg-day)	DERMAL RfD [2] (mg/kg-day)	HAZARD QUOTIENT DERMAL	TOTAL HAZARD QUOTIENT
alpha-Chlordane	O	4600	ug/kg	2.7E-07	0.0005	5.4E-04	0.01	2.5E-08	0.0004	6.2E-05	6.0E-04
gamma-Chlordane	O	5100	ug/kg	3.0E-07	0.0005	6.0E-04	0.01	2.8E-08	0.0004	6.9E-05	6.7E-04
Dieldrin	O	17	ug/kg	1.0E-09	0.00005	2.0E-05	0.01	9.2E-11	0.000025	3.7E-06	2.4E-05
4,4'-DDD	O	3100	ug/kg	1.8E-07	0.0005 [3]	3.6E-04	0.01	1.7E-08	0.0001 [3]	1.7E-04	5.3E-04
4,4'-DDE	O	450	ug/kg	2.6E-08	0.0005 [3]	5.3E-05	0.01	2.4E-09	0.0001 [3]	2.4E-05	7.7E-05
4,4'-DDT	O	370	ug/kg	2.2E-08	0.0005	4.3E-05	0.01	2.0E-09	0.0001	2.0E-05	6.3E-05
MCPA	O	17000	ug/kg	1.0E-06	0.0005	2.0E-03	0.01	9.2E-08	0.00025	3.7E-04	2.4E-03
MCPP	O	54000	ug/kg	3.2E-06	0.001	3.2E-03	0.01	2.9E-07	0.0005	5.8E-04	3.8E-03
Aluminum	I	5540	mg/kg	3.3E-04	1	3.3E-04	0.001	3.0E-06	0.2	1.5E-05	3.4E-04
Antimony	I	0.5	mg/kg	2.9E-08	0.0004	7.3E-05	0.001	2.7E-10	0.00004	6.8E-06	8.0E-05
Arsenic	I	2.8	mg/kg	1.6E-07	0.0003	5.5E-04	0.001	1.5E-09	0.00029	5.2E-06	5.5E-04
Beryllium	I	0.25	mg/kg	1.5E-08	0.002	7.3E-06	0.001	1.4E-10	0.00002	6.8E-06	1.4E-05
Copper	I	15.2	mg/kg	8.9E-07	0.04	2.2E-05	0.001	8.2E-09	ND		2.2E-05
Silver	I	0.87	mg/kg	5.1E-08	0.005	1.0E-05	0.001	4.7E-10	0.0011	4.3E-07	1.1E-05
SUMMARY HAZARD INDEX						0.008				0.001	0.009

[1] USEPA Region IV guidance specifies absorption factors of 1% for organics and 0.1% for inorganics (November 1995).
[2] Calculated from oral RfDs.
[3] Value from DDT used as a surrogate.

TABLE E-6.45

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical-specific	ug/liter	
INGESTION RATE	IR	1.4	liters/day	USEPA, 1991
BODY WEIGHT	BW	70	kg	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	7	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	7	years	USEPA, 1991

USEPA, 1991. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CW x IR x EF x ED x CF}}{\text{BW x AT x 365 days/year}}$$

Note: For noncarcinogenic effects, AT = ED.

CARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
alpha-BHC	0.184	UG/LITER	3.5E-07	6.3	2.2E-06
gamma-BHC	0.132	UG/LITER	2.5E-07	1.3	3.3E-07
Aldrin	0.029	UG/LITER	5.6E-08	17	9.5E-07
gamma-Chlordane	0.154	UG/LITER	3.0E-07	0.35	1.0E-07
Dieldrin	0.01	UG/LITER	1.9E-08	16	3.1E-07
Heptachlor epoxide	0.04	UG/LITER	7.7E-08	9.1	7.0E-07
Arsenic	94	UG/LITER	1.8E-04	1.5	2.7E-04
			TOTAL CANCER RISK		3E-04

ND = No Data.

TABLE E-6.45

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
FUTURE LAND USE - ADULT RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT INGESTION
2,4-Dichlorophenol	37	UG/LITER	7.1E-04	0.003	2.4E-01
Naphthalene	5.7	UG/LITER	1.1E-04	0.02	5.5E-03
alpha-BHC	0.184	UG/LITER	3.5E-06	ND	
delta-BHC	0.07	UG/LITER	1.3E-06	ND	
gamma-BHC	0.132	UG/LITER	2.5E-06	0.0003	8.4E-03
Aldrin	0.029	UG/LITER	5.6E-07	0.00003	1.9E-02
gamma-chlordane	0.154	UG/LITER	3.0E-06	0.0005	5.9E-03
Dieldrin	0.01	UG/LITER	1.9E-07	0.00005	3.8E-03
Heptachlor epoxide	0.04	UG/LITER	7.7E-07	0.000013	5.9E-02
2,4-D	19	UG/LITER	3.6E-04	0.01	3.6E-02
MCPA	1282	UG/LITER	2.5E-02	0.0005	4.9E+01
MCPP	1181	UG/LITER	2.3E-02	0.001	2.3E+01
Arsenic	94	UG/LITER	1.8E-03	0.0003	6.0E+00
Iron	752	UG/LITER	1.4E-02	0.3	4.8E-02
Manganese	25	UG/LITER	4.8E-04	0.02	2.4E-02
			TOTAL HAZARD INDEX		78

ND = no data available.

TABLE E-6.46

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

EXPOSURE PARAMETERS

PARAMETER	SYMBOL	VALUE	UNITS	SOURCE
CONCENTRATION WATER	CW	chemical-specific	ug/liter	
INGESTION RATE	IR	0.7	liters/day	USEPA, 1991
BODY WEIGHT	BW	15	kg	USEPA, 1991
CONVERSION FACTOR	CF	0.001	mg/ug	
EXPOSURE FREQUENCY	EF	350	days/year	USEPA, 1991
EXPOSURE DURATION	ED	2	years	USEPA, 1991
AVERAGING TIME				
CANCER	AT	70	years	USEPA, 1991
NONCANCER	AT	2	years	USEPA, 1991

USEPA, 1991. *Human Health Evaluation Manual, Supplemental Guidance:* "Standard Default Exposure Factors"; OSWER Directive 9285.6-03.

CANCER RISK = INTAKE (mg/kg-day) x CANCER SLOPE FACTOR (mg/kg-day)-1

HAZARD QUOTIENT = INTAKE (mg/kg-day) / REFERENCE DOSE (mg/kg-day)

$$\text{INTAKE} = \frac{\text{CW x IR x EF x ED x CF}}{\text{BW x AT x 365 days/year}}$$

Note: For noncarcinogenic effects, AT = ED.

CARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	CANCER SLOPE FACTOR (mg/kg-day)^-1	CANCER RISK INGESTION
alpha-BHC	0.184	UG/LITER	2.4E-07	6.3	1.5E-06
gamma-BHC	0.132	UG/LITER	1.7E-07	1.3	2.2E-07
Aldrin	0.029	UG/LITER	3.7E-08	17	6.3E-07
gamma-Chlordane	0.154	UG/LITER	2.0E-07	0.35	6.9E-08
Dieldrin	0.01	UG/LITER	1.3E-08	16	2.0E-07
Heptachlor epoxide	0.04	UG/LITER	5.1E-08	9.1	4.7E-07
Arsenic	94	UG/LITER	1.2E-04	1.5	1.8E-04
			TOTAL CANCER RISK		2E-04

ND = No Data.

TABLE E-6.46

INGESTION OF GROUNDWATER AS DRINKING WATER (UNFILTERED SAMPLES) - CENTRAL TENDENCY
FUTURE LAND USE - CHILD RESIDENT
NTC ORLANDO
OPERABLE UNIT 3
STUDY AREA 9

NONCARCINOGENIC EFFECTS

COMPOUND	WATER CONCENTRATION	UNITS	INTAKE INGESTION (mg/kg-day)	REFERENCE DOSE (mg/kg-day)	HAZARD QUOTIENT INGESTION
2,4-Dichlorophenol	37	UG/LITER	1.7E-03	0.003	5.5E-01
Naphthalene	5.7	UG/LITER	2.6E-04	0.02	1.3E-02
alpha-BHC	0.184	UG/LITER	8.2E-06	0.00	
delta-BHC	0.07	UG/LITER	3.1E-06	ND	
gamma-BHC	0.132	UG/LITER	5.9E-06	0.0003	2.0E-02
Aldrin	0.029	UG/LITER	1.3E-06	0.00003	4.3E-02
gamma-Chlordane	0.154	UG/LITER	6.9E-06	0.0005	1.4E-02
Dieldrin	0.01	UG/LITER	4.5E-07	0.00005	8.9E-03
Heptachlor epoxide	0.04	UG/LITER	1.8E-06	0.000013	1.4E-01
2,4-D	19	UG/LITER	8.5E-04	0.01	8.5E-02
MCPA	1282	UG/LITER	5.7E-02	0.0005	1.1E+02
MCPP	1181	UG/LITER	5.3E-02	0.001	5.3E+01
Arsenic	94	UG/LITER	4.2E-03	0.0003	1.4E+01
Iron	752	UG/LITER	3.4E-02	0.3	1.1E-01
Manganese	25	UG/LITER	1.1E-03	0.02	5.6E-02
				TOTAL HAZARD INDEX	183

ND = no data available.

APPENDIX E-7

DERMAL ABSORPTION FROM SOIL

ABSORBED DOSE CALCULATION - DERMAL EXPOSURE TO SOIL

The absorbed dose is calculated per the USEPA *Dermal Exposure Assessment: Principles and Applications*, Interim Report, January 1992. The calculation of the estimated dermally absorbed dose per unit area per event is:

$$DA_{event} = C_{soil} \times AF \times ABS \times CF$$

where:

DA_{event} = Dose absorbed per unit area per event (mg/cm^2-event)
C_{soil} = Contaminant concentration in soil (mg/kg)
AF = Adherence factor of soil to skin (mg/cm^2-event)
ABS = Absorption fraction (dimensionless)
CF = Units conversion factor (10^{-6} kg/mg)

Dermally absorbed dose for use in risk calculations is derived generally (for adults who are no longer growing) as follows:

$$DA_{adult} = DA_{event} \times EF \times ED \times SA / BW \times AT$$

For children, to account for changing surface areas and bodyweights, the dermally absorbed dose is calculated as follows:

$$DA_{child} = (DA_{event} \times EF / AT) \sum_{i=m}^{n} (SA_i \times ED_i / BW_i)$$

where:

EF = Exposure frequency (events/year)
AT = Averaging time (days). For noncarcinogenic effects, AT = ED, and for carcinogenic effects AT = 70 years or 25,550 days.
SA_i = Surface area exposed at age i (cm^2)
ED_i = Exposure duration at age i (years)
BW_i = Bodyweight at age i (kg)

For the typical case, USEPA recommends SA for head and hands only and for the "reasonable worst case," the SA of the head, hands, forearms, and lower legs as the SA available for contact with soil. USEPA simplifies these assumptions by saying that 25 percent of the total body surface area would be available for soil contact. For adults, using 50th and 95th percentile whole body SA values, the default SA values are 5000 cm^2 and 5800 cm^2 (Table E-7.1). Per FDEP, the SA for children is calculated using the average of the surface area available for contact for males

and females (hands, one-half of the arms, one-half of the legs). For children aged 1 through 6, the SA value is 1,869 cm^2; for adolescents aged 7 through 18, the value is 4,429 cm^2 (Table E-7.2).

REFERENCES

USEPA, 1989, Exposure Factors Handbook; Office of Health and Environmental Assessment, Washington, DC; EPA/600/8-89/043; 1989.

USEPA, 1992, Dermal Exposure Assessment: Principles and Applications; Office of Health and Environmental Assessment, Washington, DC; EPA/600/8-91/011F; 1992.

USEPA, 1994, Supplemental Guidance to RAGS: Region IV Bulletin (Draft), Bulletin Vol. 1 No. 1; March 1994.

USEPA, 1997, Exposure Factors Handbook; Office of Research and Development, Washington, DC; EPA/600/P-95/002Fa; 1997.

Table E-7.1
Exposure Parameters for Dermal Contact With Soil

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Age	Total Surface Area (cm^2)		SA Available for Soil Contact (cm^2) (.25 x Total Surface Area)		Body Weight (kg)			Derivation of DAevent (Dose absorbed/unit area/ event)	
	Male 50th Percentile[1]	Male 95th Percentile[1]	Male 50th Percentile	Male 95th Percentile	Male 50th Percentile[2]	Female 50th Percentile[2]	Average of Male and Female	50th Percen-tile	95th Percentile
1<23	5398	6104	1350	1526	11.5	10.5	11	122.7	138.7
2<3	6030	6820	1508	1705	13.4	12.6	13	116.0	131.2
3<4	6640	7640	1660	1910	15.3	14.6	14.95	111.0	127.8
4<5	7310	8450	1828	2113	17.4	16.4	16.9	108.1	125.0
5<6	7930	9180	1983	2295	19.3	18.8	19.05	104.1	120.5
6<7	8660	10600	2165	2650	21.9	21	21.45	100.9	123.5
7<8	9360	11100	2340	2775	24.4	23.5	23.95	97.7	115.9
8<9	10000	12400	2500	3100	27.3	27.3	27.3	91.6	113.6
9<10	10700	12900	2675	3225	29.7	29.6	29.65	90.2	108.8
10<11	11800	14800	2950	3700	34.5	34.3	34.4	85.8	107.6
11<12	12300	16000	3075	4000	36.4	40	38.2	80.5	104.7
12<13	13400	17600	3350	4400	42.1	45.2	43.65	76.7	100.8
13<14	14700	18100	3675	4525	47.7	48.6	48.15	76.3	94.0
14<15	16100	19100	4025	4775	55.5	52.8	54.15	74.3	88.2
15<16	17000	20200	4250	5050	60.2	53.9	57.05	74.5	88.5
16<17	17600	21600	4400	5400	63.6	55.3	59.45	74.0	90.8
17<18	18000	20900	4500	5225	65.7	58.3	62	72.6	84.3
18<75	20000	23000	5000	5750	75.9	61.5	68.7	72.8	83.7
							Child - 6 years old (Sum ages 1<7)	662.8	766.7
							Child from 2 to 8 years (Sum ages 2<8)	637.8	743.8
							Child from 6 to 16 years (Sum ages 6<17)	922.6	1136.3
							Adult - 24 years old (18<75 multiplied by 24)	1746.7	2008.7
							Adult - 30 years old (Sum Child+ Adult)	2409.5	2775.4

[1] USEPA, 1989. Exposure Factors Handbook. EPA/600/8-89/043 (Table 4B-3)
[2] USEPA, 1989. Exposure Factors Handbook. EPA/600/8-89/043 (Table 5A-3)
[3] SAs based on equation SA = K x BW(2/3). K is calculated from age 2<3 data.

Table E-7.2
Exposure Parameters for Dermal Contact With Soil

Remedial Investigation
Operable Unit 3, Study Areas 8 and 9
Naval Training Center Orlando
Orlando, Florida

Age	Total Body Surface Area 95th percentile values (cm2) [1]		½ Arms Percent of Total Body Surface Area [2]	Hands Percent of Total Body Surface Area [2]	½ Legs Percent of Total Body Surface Area [2]	Sum of ½ arms, ½ hands, and ½ legs by age group (cm^2)
	Males	Females				
1-2	ND [4]	ND [4]	6.50	5.68	11.55	1584
2-3	6820	6530	5.90	5.30	11.60	1522
3-4	7640	7370	7.20	6.07	13.40	2002
4-5	8450	8200	7.00	5.70	13.90	2214
5-6	9180	9520	ND [5]	ND [5]	ND [5]	2320
					Average for Child Ages 1- 6	1869
6-7	10600	10300	6.55	4.71	13.55	2593
7-8	11100	11300	ND [6]	ND [6]	ND [6]	2890
8-9	12400	11800	ND [6]	ND [6]	ND [6]	3122
9-10	12900	14100	6.15	5.30	14.35	3483
10-11	14800	14300	ND [7]	ND [7]	ND [7]	4000
11-12	16000	16200	ND [7]	ND [7]	ND [7]	4426
12-13	17600	17000	6.85	5.39	15.25	4756
13-14	18100	18600	6.05	5.11	16.00	4984
14-15	19100	18800	ND [8]	ND [8]	ND [8]	5501
15-16	20200	18300	ND [8]	ND [8]	ND [8]	5588
16-17	21600	19100	6.55	5.68	16.80	5908
17-18	20900	19400	8.75	5.13	15.40	5900
					Average for Child Ages 7- 18	4429

Notes:
[1] Table 6-6 and 6-7 Exposure Factors Handbook. USEPA, 1997.
[2] Table 6-8 Exposure Factors Handbook. USEPA, 1997.
[3] Mean value of male and female surface areas for hands, 1/2 arm, and 1/2 leg values.
[4] The values for surface area of 1-2 year old children are not available; therefore, the 2-3 year age surface are used as a conservative estimate.
[5] Value for percentage of total surface area is not available for age group 5-6; therefore, the 6-7 age group percentages were used as a conservative estimate.
[6] Value for percentage of total surface area is not available for age group 7-8 and 8-9; therefore, the 9-10 age group percentages were used as a conservative estimate.
[7] Value for percentage of total surface area is not available for age group 10-11 and 11-12; therefore, the 12-13 age group percentages were used as a conservative estimate.
[8] Value for percentage of total surface area is not available for age group 14-15 and 15-16; therefore, the 16-17 age group percentages were used as a conservative estimate.

APPENDIX E-8

DOSE-RESPONSE VALUES

TAB. 8.1
ORAL DOSE-RESPONSE DATA
FOR CARCINOGENIC EFFECTS

Compound	Chemical Group	Weight of Evidence	Oral Slope Factor $(mg/kg/day)^{-1}$		Test Species	Study Type	Tumor Type	Source
ACID EXTRACTABLE COMPOUNDS								
2,4-Dichlorophenol	A	ND						
BASE NEUTRAL COMPOUNDS								
2-Methylnaphthalene	B	ND						
Benzo(a)anthracene	B	B2	7.3E+00	**				IRIS
Benzo(a)pyrene	B	B2	7.3E+00		Mouse	Oral-diet	Forestomach	IRIS
Benzo(b)fluoranthene	B	B2	7.3E+00	**				IRIS
Benzo(k)fluoranthene	B	B2	7.3E+00	**				IRIS
Chrysene	B	B2	7.3E+00	**				IRIS
Dibenz(a,h)anthracene	B	B2	7.3E+00	**				IRIS
Indeno(1,2,3-cd)pyrene	B	B2	7.3E+00	**				IRIS
Naphthalene	B, V	D						IRIS
INORGANICS/METALS								
Aluminum	I/M	ND						
Antimony	I/M	ND						
Arsenic	I/M	A	1.5E+00		Human	Oral-DW	Skin	IRIS
Barium	I/M	ND						
Beryllium	I/M	B2	4.3E+00		Rat	Oral-DW	Total	IRIS
Cadmium	I/M	B1	ND					IRIS
Chromium III	I/M	ND						
Chromium VI	I/M	ND						
Copper	I/M	D						
Iron	I/M	ND						
Lead	I/M	B2	ND					IRIS
Manganese	I/M	D						IRIS
Silver	I/M	D						IRIS
Vanadium	I/M	ND						
PESTICIDES/PCBs								
4,4'-DDD	P	B2	2.4E-01		Mouse	Oral-diet	Liver	IRIS
4,4'-DDE	P	B2	3.4E-01		Mouse/hamster	Oral-diet	Liver	IRIS
4,4'-DDT	P	B2	3.4E-01		Mouse/rat	Oral-diet	Liver	IRIS
Aldrin	P	B2	1.7E+01		Mouse	Oral-diet	Liver	IRIS
alpha-BHC	P	B2	6.3E+00		Mouse/rat	Oral-diet	Liver	IRIS
Chlordane (alpha & gamma isomers)	P	B2	3.5E-01	*	Mouse	Oral-diet	Liver	IRIS
delta-BHC	P	D						IRIS
Dieldrin	P	B2	1.6E+01		Mouse	Oral-diet	Liver	IRIS
Heptachlor	P	B2	4.5E+00		Mouse	Oral-diet	Liver	IRIS
Heptachlor Epoxide	P	B2	9.1E+00		Mouse	Oral-diet	Liver	IRIS
Lindane (gamma-BHC)	P	B2-C	1.3E+00		Mouse	Oral-diet	Liver	HEAST
Polychlorinated Biphenyls (PCBs)	P	B2	See Below	***	Rat	Oral-diet	Liver	IRIS
high risk and persistence-central estimate	P		1.0E+00					
high risk and persistence-upper bound	P		2.0E+00					
low risk and persistence-central estimate	P		3.0E-01					
low risk and persistence-upper bound	P		4.0E-01					

TABLE E-8.1
ORAL DOSE-RESPONSE DATA
FOR CARCINOGENIC EFFECTS

Compound	Chemical Group	Weight of Evidence	Oral Slope Factor $(mg/kg/day)^{-1}$	Test Species	Study Type	Tumor Type	Source
lowest risk and persistence-central estimate	P		4.0E-02				
lowest risk and persistence-upper bound	P		7.0E-02				
HERBICIDES							
2,4-D	H	D					
MCPA	H	D					
MCPP	H	D					

NOTES:
ND - Not determined/No data
DW - Drinking water
mg - milligram
kg - kilogram
IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
NCEA - National Center for Environmental Assessment

Sources:
IRIS as of 1/98
HEAST, 1997
NCEA, date varies.

Chemical Groups:
A - Acid extractable
B - Base neutral extractable
I/M - Inorganic/Metal
H - Herbicide
P - Pesticide
V - Volatile
W - Waste

+ - Based on IRIS for 2,4-; 2,6-Dinitrotoluene mixture
* - The value for chlordane is used as surrogate for the isomers.
** - Slope Factor for Benzo(a)Pyrene used for other carcinogenic PAHs. EPCs for other PAHs should be adjusted for B(a)P equivalent concentrations using toxicity equivalency factors: 1.0 [benzo(a)pyrene]; 1.0: [dibenz(a,h)anthracene]; 0.1 [benzo(a)anthracene, benzo(b)flouoranthene, indeno(1,2,3-c,d)pyrene]; 0.01 [benzo(k)fluoranthene]; 0.001 [chrysene].
*** Slope factors are applicable to Aroclors 1016, 1248, 1254, and 1260.

Weight of Evidence (Route-Specific):
A - Human carcinogen
B - Probable human carcinogen
  B1 - limited evidence of cancer in humans
  B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans
C - Possible human carcinogen
D - Not classifiable as to human carcinogenicity
E - Evidence of lack of carcinogenicity to humans

W1 = Value was withdrawn from HEAST in FY 1992 update
W2 = Value of 1.1E-02 was withdrawn from HEAST in FY 1992 update

N1 = An NCEA provisional regional support value has been provided in response to a specific request.

TABLE E-8.2
DERMAL DOSE-RESPONSE DATA
FOR CARCINOGENIC EFFECTS

Compound	CHEMICAL SOURCE	Weight of Evidence	ORAL SLOPE FACTOR $(mg/kg/day)^{-1}$		ORAL ABSORPTION EFFICIENCY	REFERENCE	DERMAL SLOPE FACTOR $(mg/kg/day)^{-1}$
ACID EXTRACTABLE COMPOUNDS							
2,4-Dichlorophenol	A	ND					ND
BASE NEUTRAL COMPOUNDS							
2-Methylnaphthalene	B	ND					ND
Benzo(a)anthracene	B	B2	7.3E+00	**	91%	[4]	8.0E+00
Benzo(a)pyrene	B	B2	7.3E+00		91%	Hecht et al., 1979	8.0E+00
Benzo(b)fluoranthene	B	B2	7.3E+00	**	91%	[4]	8.0E+00
Benzo(k)fluoranthene	B	B2	7.3E+00	**	91%	[4]	8.0E+00
Chrysene	B	B2	7.3E+00	**	91%	[4]	8.0E+00
Dibenz(a,h)anthracene	B	B2	7.3E+00	**	91%	[4]	8.0E+00
Indeno(1,2,3-cd)pyrene	B	B2	7.3E+00	**	91%	[4]	8.0E+00
Naphthalene	B, V	D			100%	Chang, 1943	ND
INORGANICS/METALS							
Aluminum	I/M	ND			20%	USEPA, 1995	ND
Antimony	I/M	ND			10%	ATSDR, 1991	ND
Arsenic	I/M	A	1.5E+00		98%	Vahter, 1983	1.5E+00
Barium	I/M	ND			7%	ATSDR, 1991	ND
Beryllium	I/M	B2	4.3E+00		1%	Owen, 1990	4.3E+02
Cadmium (food)	I/M	B1	ND		1%	McLellan et al., 1978	ND
Cadmium (water)	I/M	B1	ND				ND
Chromium III	I/M	ND					ND
Chromium VI	I/M	ND			11%	Ogawa, 1976	ND
Copper	I/M	D					ND
Iron	I/M	D			2%	Goyer, 1991	ND
Lead	I/M	B2	ND				ND
Manganese (drinking water)	I/M	D			4%	ATSDR, 1991	ND
Manganese (food)	I/M	C					ND
Manganese (soil)	I/M	D			4%	ATSDR, 1991	ND
Silver	I/M	ND			21%	MacIntyre et al., 1978	ND
Vanadium	I/M	D			3%	ATSDR, 1991	ND
PESTICIDES/PCBs							
4,4'-DDD	P	B2	2.4E-01		80%	ATSDR, 1991	3.0E-01
4,4'-DDE	P	B2	3.4E-01		80%	ATSDR, 1991	4.3E-01
4,4'-DDT	P	B2	3.4E-01		80%	ATSDR, 1991	4.3E-01
Aldrin	P	B2	1.7E+01		50%	USEPA, 1995	3.4E+01
alpha-BHC	P	B2	6.3E+00				
Chlordane (alpha & gamma isomers)	P	B2	3.5E-01	*	80%	Ohno et al., 1986	4.4E-01
delta-BHC	P	D					ND
Dieldrin	P	B2	1.6E+01		50%	USEPA, 1995	3.2E+01
Heptachlor	P	B2	4.5E+00		49%	ATSDR, 1991	9.2E+00
Heptachlor Epoxide	P	B2	9.1E+00		49%	[8]	1.9E+01
Lindane (gamma-BHC)	P	B2-C	1.3E+00				
Polychlorinated Biphenyl (PCBs)	P	B2	See Below	***		Albro & Fishbein, 1972	
high risk and persistence-central estimate	P		1.0E+00		90%		1.1E+00
high risk and persistence-upper bound	P		2.0E+00		90%		2.2E+00

TABLE E-8.2
DERMAL DOSE-RESPONSE DATA
FOR CARCINOGENIC EFFECTS

Compound	CHEMICAL SOURCE	Weight of Evidence	ORAL SLOPE FACTOR $(mg/kg/day)^{-1}$	ORAL ABSORPTION EFFICIENCY	REFERENCE	DERMAL SLOPE FACTOR $(mg/kg/day)^{-1}$
low risk and persistence-central estimate	P		3.0E-01	90%		3.3E-01
low risk and persistence-upper bound	P		4.0E-01	90%		4.4E-01
lowest risk and persistence-central estimate	P		4.0E-02	90%		4.4E-02
lowest risk and persistence-upper bound	P		7.0E-02	90%		7.8E-02
HERBICIDES						
2,4-D	H	D				
MCPA	H	D				
MCPP	H	D				

NOTES:
ND - Not determined/No data
DW - Drinking water
mg - milligram
kg - kilogram
IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
NCEA - National Center for Environmental Assessment

Sources:
IRIS as of 1/98
HEAST, 1997
NCEA, date varies.

Chemical Groups:
A - Acid extractable
B - Base neutral extractable
I/M - Inorganic/Metal
H - Herbicide
P - Pesticide
V - Volatile
W - Waste

Weight of Evidence (Route-Specific):
A - Human carcinogen
B - Probable human carcinogen
B1 - limited evidence of cancer in humans
B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans
C - Possible human carcinogen
D - Not classifiable as to human carcinogenicity
E - Evidence of lack of carcinogenicity to humans

USEPA, 1995: Chemicals without specific information on absorbtion efficiency are assigned default values as follows: VOCs: 80%; SVOCs and pesticides: 50%; Inorganics: 20%.
[1] Dose-response value is based on absobed dose; no adjustment is necessary.
[2] Value for 1,1-dichloroethene used as surrogate, based on structural analogy.
[3] Value for phenol used as surrogate.
[4] Value for benzo(a)pyrene used for all PAHs without specific values.
[5] Value for bis(2-ethylhexyl)phthalate used for all phthalate esters, based on structrual analogy.
[6] Value for DDT used for DDD and DDE, based on structrual analogy.
[7] Value used for all endosulfan compounds, based on structrual analogy.
[8] Value for heptachlor used for heptachlor epoxide, based on structrual analogy.

+ - Based on IRIS for 2,4-; 2,6-Dinitrotoluene mixture
* - The value for chlordane is used as surrogate for the isomers.
** - Slope Factor for Benzo(a)Pyrene used for other carcinogenic PAHs. EPCs for other PAHs should be adjusted for B(a)P equivalent concentrations using toxicity equivalency factors: 1.0 [benzo(a)pyrene]; 1.0: [dibenz(a,h)anthracene]; 0.1 [benzo(a)anthracene, benzo(b)flouoranthene, indeno(1,2,3-c,d)pyrene]; 0.01 [benzo(k)fluoranthene]; 0.001 [chrysene].

*** Slope factors are applicable to Aroclors 1016, 1248, 1254, and 1260.

W1 = Value was withdrawn from HEAST in FY 1992 update
W2 = Value of 1.1E-02 was withdrawn from HEAST in FY 1992 update

N1 = An NCEA provisional regional support value has been provided in response to a specific request.

TAB. 3.3
INHALATION DOSE-RESPONSE DATA
FOR CARCINOGENIC EFFECTS

Compound	Chemical Group	Weight of Evidence	Inhalation Slope Factor* $(mg/kg/day)^{-1}$	Unit Risk $(\mu g/m^3)^{-1}$	Test Species	Study Type	Tumor Type	Source
ACID EXTRACTABLE COMPOUNDS								
2,4-Dichlorophenol	A	ND						
BASE NEUTRAL COMPOUNDS								
2-Methylnaphthalene	B	ND						
Benzo(a)anthracene	B	B2	3.1E+00 ***	8.8E-04 ***				USEPA,1995
Benzo(a)pyrene	B	B2	3.1E+00 (W2)	8.8E-04				USEPA,1995
Benzo(b)fluoranthene	B	B2	3.1E+00 ***	8.8E-04 ***				USEPA,1995
Benzo(k)fluoranthene	B	B2	3.1E+00 ***	8.8E-04 ***				USEPA,1995
Chrysene	B	B2	3.1E+00 ***	8.8E-04 ***				USEPA,1995
Dibenz(a,h)anthracene	B	B2	3.1E+00 ***	8.8E-04 ***				USEPA,1995
Indeno(1,2,3-cd)pyrene	B	B2	3.1E+00 ***	8.8E-04 ***				USEPA,1995
Naphthalene	B, V	D						IRIS
INORGANICS/METALS								
Aluminum	I/M	ND						
Antimony	I/M	ND						
Arsenic	I/M	A	1.5E+01 (W1)	4.3E-03	Human	Inhalation	Lung	IRIS
Barium	I/M	ND						
Beryllium	I/M	B2	8.4E+00	2.4E-03	Human	Inhalation	Lung	IRIS
Cadmium	I/M	B1	6.3E+00 c	1.8E-03	Human	Inhalation	Lung	IRIS
Chromium III	I/M	ND						
Chromium VI	I/M	A	4.1E+01	1.2E-02	Human	Inhalation	Lung	IRIS
Copper	I/M	D						
Iron	I/M	ND						
Lead	I/M	B2	ND	ND				IRIS
Manganese	I/M	D						IRIS
Silver	I/M	D						IRIS
Vanadium	I/M	ND						
PESTICIDES/PCBs								
4,4'-DDD	P	ND	2.4E-01	ND				IRIS
4,4'-DDE	P	ND	3.4E-01	ND				IRIS
4,4'-DDT	P	B2	3.4E-01	9.7E-05	Mouse	Oral-diet	Liver	IRIS
Aldrin	P	B2	1.7E+01	4.9E-03	Mouse	Oral-diet	Liver	IRIS
alpha-BHC	P	B2	6.3E+00	1.8E-03	Mouse	Oral-diet	Liver	IRIS
Chlordane (alpha & gamma isomers)	P	B2	3.5E-01 +	1.0E-04	Mouse	Oral-diet	Liver	IRIS
delta-BHC	P	D						IRIS
Dieldrin	P	B2	1.6E+01	4.6E-03	Mouse	Oral-diet	Liver	IRIS
Heptachlor	P	B2	4.5E+00	1.3E-03	Mouse	Oral-diet	Liver	IRIS
Heptachlor Epoxide	P	B2	9.1E+00	2.6E-03	Mouse	Oral-gavage	Liver	IRIS
Lindane (gamma-BHC)	P	B2-C	1.4E+00 0.92 [1]	ND				IRIS
Polychlorinated Biphenyls (PCBs)	P	B2	See Below **		Rat	Oral-diet	Liver	IRIS
high risk and persistence-central estimate	P		1.0E+00					

TABLE E-8.3
INHALATION DOSE-RESPONSE DATA
FOR CARCINOGENIC EFFECTS

Compound	Chemical Group	Weight of Evidence	Inhalation Slope Factor* $(mg/kg/day)^{-1}$	Unit Risk $(\mu g/m^3)^{-1}$	Test Species	Study Type	Tumor Type	Source
high risk and persistence-upper bound	P		2.0E+00					
low risk and persistence-central estimate	P		3.0E-01					
low risk and persistence-upper bound	P		4.0E-01					
lowest risk and persistence-central estimate	P		4.0E-02					
lowest risk and persistence-upper bound	P		7.0E-02					
HERBICIDES								
2,4-D	H	D						
MCPA	H	D						
MCPP	H	D						

NOTES:
ND - Not determined/No data
DW - Drinking water
µg - microgram
mg - milligram
kg - kilogram
IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
NCEA - National Center for Environmental Assessment

Sources:
IRIS as of 1/98
HEAST, 1997 (including July updates)
NCEA from USEPA Region III Risk Based Concentrations, January - June, 1996.
USEPA, 1995. USEPA Region IV Human Health Risk Assessment Bulletin #2, November, 1995.

* - Source of slope factor is HEAST, 1995 unless otherwise noted.
c - Calculated by ABB-ES from unit risk [slope = ((unit risk x 70 kg)/20 m^3/day) x 1000 ug/mg]
** Slope factors are applicable to Aroclors 1016, 1248, 1254, and 1260.
** - Slope Factor for Benzo(a)Pyrene used for other carcinogenic PAHs. EPCs for other PAHs should be adjusted for B(a)P equivalent concentrations using toxicity equivalency factors: 1.0 [benzo(a)pyrene]; 1.0: [dibenz(a,h)anthracene]; 0.1 [benzo(a)anthracene, benzo(b)flouoranthene, indeno(1,2,3-c,d)pyrene]; 0.01 [benzo(k)fluoranthene]; 0.001 [chrysene].
+ - Value for chlordane used for alpha- and gamma- isomers.

W1 = Value was withdrawn from HEAST in FY 1997 update
W2 = Value of 6.1E+00 was withdrawn from HEAST in FY 1993 update
W3 = Value was withdrawn from HEAST in FY 1992 update

N1 = An NCEA provisional regional support value has been provided in response to a specific request.

Chemical Groups:
A - Acid extractable
B - Base neutral extractable
I/M - Inorganic/Metal
P - Pesticide
V - Volatile
W - Waste
H- Herbicide

Weight of Evidence (Route-Specific):
A - Human carcinogen
B - Probable human carcinogen
B1 - limited evidence of cancer in humans
B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans
C - Possible human carcinogen
D - Not classifiable as to human carcinogenicity
E - Evidence of lack of carcinogenicity to humans

TABLE 3.4
ORAL DOSE-RESPONSE DATA
FOR NONCARCINOGENIC EFFECTS

Compound	CHEMICAL SOURCE	CHRONIC ORAL RfD (mg/kg-day)		SUBCHRONIC ORAL RfD[1] (mg/kg-day)		STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE
ACID EXTRACTABLE COMPOUNDS											
2,4-Dichlorophenol	A	3.0E-03		3.0E-03		Oral-DW	Low	Altered immune function	Rat	100 H,A	IRIS
BASE NEUTRAL COMPOUNDS											
2-Methylnaphthalene	B	ND		ND							
Benzo(a)anthracene	B	ND		ND							IRIS
Benzo(a)pyrene	B	ND		ND							IRIS
Benzo(b)fluoranthene	B	ND		ND							IRIS
Benzo(k)fluoranthene	B	ND		ND							IRIS
Chrysene	B	ND		ND							IRIS
Dibenz(a,h)anthracene	B	ND		ND							IRIS
Indeno(1,2,3-cd)pyrene	B	ND		ND							IRIS
Naphthalene	B, V	4.0E-02	(W2)	4.0E-02	(W2)	Oral-gavage	ND	Decreased body weight	Rat	1000	HEAST
INORGANICS/METALS											
Aluminum	I/M	1.0E+00	(N1)	ND							NCEA
Antimony	I/M	4.0E-04		4.0E-04		Oral-DW	Low	Reduced lifespan	Rat	1,000 H,A,L	IRIS
Arsenic	I/M	3.0E-04		3.0E-04		Oral-DW	Medium	Keratosis and hyperpigmentation	Human	3 H	IRIS
Barium	I/M	7.0E-02		7.0E-02		Oral-DW	Medium	Increased blood pressure	Human	3 H	IRIS
Beryllium	I/M	2.0E-03		2.0E-03		Oral-DW	Low	No effects observed	Rat	100 H,A	IRIS
Cadmium (food)	I/M	1.0E-03		ND		Oral-diet	High	Proteinuria	Human	10 H	IRIS
Cadmium (water)	I/M	5.0E-04		ND		Oral-DW	High	Proteinuria	Human	10 H	IRIS
Chromium III	I/M	1.0E+00		1.0E+00		Oral-diet	Low	No effects observed	Rat	100 H,A; 10 M	IRIS
Chromium VI	I/M	5.0E-03		2.0E-02		Oral-DW	Low	No effects observed	Rat	500 H,A,S	IRIS
Copper	I/M	(H2)		ND							NCEA
Iron	I/M	3.0E-01	(N1)	ND							NCEA
Lead	I/M	ND		ND							
Manganese (drinking water)	I/M	4.7E-02	!	ND						1,3 M	IRIS
Manganese (food)	I/M	1.4E-01		1.4E-01		Oral-diet	Medium	No effects observed	Human	1, 1 M	IRIS
Manganese (soil)	I/M	4.7E-02	!!	ND						1, 1 M	IRIS
Silver	I/M	5.0E-03		5.0E-03		Intravenous	Low	Argyria	Human	3 H	IRIS
Vanadium	I/M	7.0E-03		7.0E-03		Oral-DW	Low	No effects observed	Rat	100 H,A	HEAST
PESTICIDES/PCBs											
4,4'-DDD	P	ND		ND							IRIS
4,4'-DDE	P	ND		ND							IRIS
4,4'-DDT	P	5.0E-04		5.0E-04		Oral-diet	Medium	Liver lesions	Rat	100 H,A	IRIS
Aldrin	P	3.0E-05		3.0E-05		Oral-diet	Medium	Liver lesions	Rat	1,000 H,A,L	IRIS
alpha-BHC	P	ND		ND							
Chlordane (alpha & gamma isomers)	P	5.0E-04		ND		Oral-diet	Medium	Hepatic necrosis	Mouse	300 H,A,D	IRIS
delta-BHC	P	ND		ND							
Dieldrin	P	5.0E-05		5.0E-05		Oral-diet	Medium	Liver lesions	Rat	100 H,A	IRIS
Heptachlor	P	5.0E-04		5.0E-04		Oral-diet	Low	Increased liver weight	Rat	300 H,A	IRIS
Heptachlor Epoxide	P	1.3E-05		1.3E-05		Oral-diet	Low	Increased liver weight	Dog	1,000 H,A,N	IRIS
Lindane (gamma-BHC)	P	3.0E-04		3.0E-03		Oral-diet	Medium	Liver and kidney toxicity	Rat	1,000 H,A,S	IRIS
Polychlorinated Biphenyl (PCBs)	P	2.0E-05	***	5.0E-05	***	Oral-diet	Medium	Immunotoxicity	Monkey	300 H,A,S	IRIS
HERBICIDES											
2,4-D	H	1.0E-02		ND		Oral-diet	Medium	Hematologic, hepatic and renal toxicity	Rat	100 H, A	IRIS
MCPA	H	5.0E-04		ND		Oral-diet	Medium	Kidney and liver toxicity	Dog	300 H, A, S	IRIS
MCPP	H	1.0E-03		ND		Oral-diet	Medium	Increased absolute and relative kidney weight	Rat	3000 H, A, S	IRIS

NOTES:

TABLE E-8.4
ORAL DOSE-RESPONSE DATA
FOR NONCARCINOGENIC EFFECTS

Compound	CHEMICAL SOURCE	CHRONIC ORAL RfD (mg/kg-day)	SUBCHRONIC ORAL RfD[1] (mg/kg-day)	STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE

ND - No data available
W - RfD withdrawn from IRIS/HEAST
mg - milligram
kg - kilogram
DW - Drinking Water
IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
NCEA - National Center for Environmental Assessment (formerly ECAO)

Uncertainty factors:
H - variation in human sensitivity
A - animal to human extrapolation
S - extrapolation from subchronic to chronic NOAEL
L - extrapolation from LOAEL to NOAEL
N - NOEL not attained
D - Lack of supporting data
M - additional modifying factor

SOURCES:
IRIS as of 1/98; chronic RfDs
HEAST, FY 1997; chronic and subchronic RfDs
NCEA; RfDs
USEPA, 1995. USEPA Region IV Human Health Risk Assessment Bulletin #2, November, 1995; RfDs.
MADEP, 1997. Revisions to the Massachusetts Contigency Plan, 10/31/97

CHEMICAL GROUPS:
A - Acid extractable
B - Base neutral extractable
I/M - Inorganic/Metal
P - Pesticide
V - Volatile
W - Waste
X - Other

[1] - Source for all subchronic RfDs is HEAST (1997) if chronic RfD is from IRIS or HEAST (1997), unless otherwise indicated.
[2] TPH dose-response assessment performed using values developed by Massachusetts Department of Environmental Protection, per USEPA, 1995.
* RfD for pyrene used for the aromatics EPH and VPH fractions, per MADEP 1997
***RfD for Aroclor 1254 used as surrogate
~RfD for Endosulfan used as surrogate
~~ RfD for Endrin used as surrogate
! RfD for manganese in food divided by modifying factor of 3, as recommended in IRIS
!! RfD for manganese in food divided by modifying factor of 3, as recommended in IRIS
' Value for chlordane used for alpha- and gamma- isomers.
* RfD for pyrene used for the aromatics EPH and VPH fractions, per MADEP 1997
@ Value for n-hexane used as surrogate, per MADEP, 1997
@@ Value based on n-hexane, per MADEP, 1997

(H1) A drinking water standard for ammonia of 34 mg/L is available; RfD has not been calculated from this standard.
(H2) A drinking water standard for copper of 1.3 mg/L is available; RfD has not been calculated from this standard.

W1 = Value was withdrawn from HEAST in FY 1993 update
W2 = Value was withdrawn from HEAST in FY 1992 supplement #2 update
W3 = Value was withdrawn from HEAST in FY 1997 update

N1 = An NCEA provisional regional support value has been provided in response to a specific request.
N2 = An NCEA provisional regional support value of 5E-02 has been published in Region III RBC Table
N3 = An NCEA provisional regional support value of 1E-02 has been published in Region III RBC Table
N4 = An NCEA provisional regional support value of 5E-03 has been published in Region III RBC Table
USEPA Region III Risk Based Concentrations, March 17, 1997.

TABLE E-8.5
DERMAL DOSE-RESPONSE DATA
FOR NONCARCINOGENIC EFFECTS

Compound	CHEMICAL SOURCE	CHRONIC ORAL RfD (mg/kg-day)		SUBCHRONIC ORAL RfD[1] (mg/kg-day)		ORAL ABSORPTION EFFICIENCY	REFERENCE	CHRONIC DERMAL RfD (mg/kg-day)	SUBCHRONIC DERMAL RfD (mg/kg-day)
ACID EXTRACTABLE COMPOUNDS									
2,4-Dichlorophenol	A	3.0E-03		3.0E-03					
BASE NEUTRAL COMPOUNDS									
2-Methylnaphthalene	B	ND		ND				ND	ND
Benzo(a)anthracene	B	ND		ND		91%	[6]	ND	ND
Benzo(a)pyrene	B	ND		ND		91%	Hecht et al., 1979	ND	ND
Benzo(b)fluoranthene	B	ND		ND		91%	[6]	ND	ND
Benzo(k)fluoranthene	B	ND		ND		91%	[6]	ND	ND
Chrysene	B	ND		ND		91%	[6]	ND	ND
Dibenz(a,h)anthracene	B	ND		ND		91%	[6]	ND	ND
Indeno(1,2,3-cd)pyrene	B	ND		ND		91%	[6]	ND	ND
Naphthalene	B, V	4.0E-02	(W2)	4.0E-02	(W2)	100%	Chang, 1943	4.0E-02	4.0E-02
INORGANICS/METALS									
Aluminum	I/M	1.0E+00	(N1)	ND		20%	USEPA, 1995	2.0E-01	ND
Antimony	I/M	4.0E-04		4.0E-04		10%	ATSDR, 1991	4.0E-05	4.0E-05
Arsenic	I/M	3.0E-04		3.0E-04		98%	Vahter, 1983	2.9E-04	2.9E-04
Barium	I/M	7.0E-02		7.0E-02		7%	ATSDR, 1991	4.9E-03	4.9E-03
Beryllium	I/M	2.0E-03		2.0E-03		1%	Owen, 1990	2.0E-05	2.0E-05
Cadmium (food)	I/M	1.0E-03		ND		20%	USEPA, 1995	2.0E-04	ND
Cadmium (water)	I/M	5.0E-04		ND					
Chromium III	I/M	1.0E+00		1.0E+00					
Chromium VI	I/M	5.0E-03		2.0E-02		11%	Ogawa, 1976	5.5E-04	2.2E-03
Copper	I/M	(H2)		ND					
Iron	I/M	3.0E-01	(N1)	ND		2%	Goyer, 1991	6.0E-03	ND
Lead	I/M	ND		ND				ND	ND
Manganese (drinking water)	I/M	4.7E-02	!	ND		4%	ATSDR, 1991	1.9E-03	ND
Manganese (food)	I/M	1.4E-01		1.4E-01				ND	ND
Manganese (soil)	I/M	4.7E-02	!!	ND		4%	ATSDR, 1991	1.9E-03	ND
Silver	I/M	5.0E-03		5.0E-03		21%	MacIntyre et al., 1978	1.1E-03	1.1E-03
Vanadium	I/M	7.0E-03		7.0E-03		3%	ATSDR, 1991	2.1E-04	2.1E-04
PESTICIDES/PCBs									
4,4'-DDD	P	ND		ND				ND	ND
4,4'-DDE	P	ND		ND				ND	ND
4,4'-DDT	P	5.0E-04		5.0E-04		80%	ATSDR, 1991	4.0E-04	4.0E-04
Aldrin	P	3.0E-05		3.0E-05		50%	USEPA, 1995	1.5E-05	1.5E-05
alpha-BHC	P	ND		ND					
Chlordane (alpha & gamma isomers)	P	5.0E-04		ND		80%	Ohno et al., 1986	4.0E-04	ND
delta-BHC	P	ND		ND				ND	ND
Dieldrin	P	5.0E-05		5.0E-05		50%	USEPA, 1995	2.5E-05	2.5E-05
Heptachlor	P	5.0E-04		5.0E-04		49%	ATSDR, 1991	2.5E-04	2.5E-04
Heptachlor Epoxide	P	1.3E-05		1.3E-05		49%	[10]	6.4E-06	6.4E-06
Lindane (gamma-BHC)	P	3.0E-04		3.0E-03					
Polychlorinated Biphenyl (PCBs)	P	2.0E-05	***	5.0E-05	***	90%	Albro & Fishbein, 1972	1.8E-05	4.5E-05

TABLE E-8.5
DERMAL DOSE-RESPONSE DATA
FOR NONCARCINOGENIC EFFECTS

Compound	CHEMICAL SOURCE	CHRONIC ORAL RfD (mg/kg-day)	SUBCHRONIC ORAL RfD[1] (mg/kg-day)	ORAL ABSORPTION EFFICIENCY	REFERENCE	CHRONIC DERMAL RfD (mg/kg-day)	SUBCHRONIC DERMAL RfD (mg/kg-day)
HERBICIDES							
2,4-D	H	1.0E-02	ND	50%	USEPA, 1995	5.0E-03	ND
MCPA	H	5.0E-04	ND	50%	USEPA, 1995	2.5E-04	ND
MCPP	H	1.0E-03	ND	50%	USEPA, 1995	5.0E-04	ND

NOTES:
ND - No data available
W - RfD withdrawn from IRIS/HEAST
mg - milligram
kg - kilogram
DW - Drinking Water
IRIS - Integrated Risk Information System
HEAST - Health Effects Assessment Summary Tables
NCEA - National Center for Environmental Assessment (formerly ECAO)

Uncertainty factors:
H - variation in human sensitivity
A - animal to human extrapolation
S - extrapolation from subchronic to chronic NOAEL
L - extrapolation from LOAEL to NOAEL
N - NOEL not attained
D - Lack of supporting data
M - additional modifying factor

SOURCES:
IRIS as of 1/98; chronic RfDs
HEAST, FY 1997; chronic and subchronic RfDs
NCEA; RfDs
USEPA, 1995. USEPA Region IV Human Health Risk Assessment Bulletin # 2, November, 1995; RfDs.
MADEP, 1997. Revisions to the Massachusetts Contigency Plan, 10/31/97

CHEMICAL GROUPS:
A - Acid extractable
B - Base neutral extractable
I/M - Inorganic/Metal
P - Pesticide
V - Volatile
W - Waste
X - Other

USEPA, 1995: Chemicals without specific information on absorbtion efficiency are assigned default values as follows: VOCs: 80%; SVOCs and pesticides: 50%; Inorganics: 20%.
[1] - Source for all subchronic RfDs is HEAST (1997) if chronic RfD is from IRIS or HEAST (1997), unless otherwise indicated.
[2] TPH dose-response assessment performed using values developed by Massachusetts Department of Environmental Protection, per USEPA, 1995.
[3] Dose-response value is based on absobed dose; no adjustment is necessary.
[4] Value for 1,1-dichloroethene used as surrogate, based on structural analogy.
[5] Value for phenol used as surrogate.
[6] Value for benzo(a)pyrene used for all PAHs without specific values.
[7] Value for bis(2-ethylhexyl)phthalate used for all phthalate esters, based on structrual analogy.
[8] Value for DDT used for DDD and DDE, based on structrual analogy.
[9] Value used for all endosulfan compounds, based on structrual analogy.
[10] Value for heptachlor used for heptachlor epoxide, based on structrual analogy.
* RfD for pyrene used for the aromatics EPH and VPH fractions, per MADEP 1997
***RfD for Aroclor 1254 used as surrogate
~RfD for Endosulfan used as surrogate
~~ RfD for Endrin used as surrogate
! RfD for manganese in food divided by modifying factor of 3, as recommended in IRIS
!! RfD for manganese in food divided by modifying factor of 3, as recommended in IRIS
' Value for chlordane used for alpha- and gamma- isomers.
* RfD for pyrene used for the aromatics EPH and VPH fractions, per MADEP 1997
@ Value for n-hexane used as surrogate, per MADEP, 1997
@@ Value based on n-hexane, per MADEP, 1997

(H1) A drinking water standard for ammonia of 34 mg/L is available; RfD has not been calculated from this standard.
(H2) A drinking water standard for copper of 1.3 mg/L is available; RfD has not been calculated from this standard.

W1 = Value was withdrawn from HEAST in FY 1993 update
W2 = Value was withdrawn from HEAST in FY 1992 supplement #2 update
W3 = Value was withdrawn from HEAST in FY 1997 update

N1 = An NCEA provisional regional support value has been provided in response to a specific request.
N2 = An NCEA provisional regional support value of 5E-02 has been published in Region III RBC Table
N3 = An NCEA provisional regional support value of 1E-02 has been published in Region III RBC Table
N4 = An NCEA provisional regional support value of 5E-03 has been published in Region III RBC Table
USEPA Region III Risk Based Concentrations, March 17, 1997.

TAL .6

INHALATION DOSE-RESPONSE DATA
FOR NONCARCINOGENIC EFFECTS

COMPOUND	CHEMICAL GROUP	CHRONIC INHALATION RfC (mg/m[3])	GI ABSORPTION %	CHRONIC INHALATION RfD[2] (mg/kg-day)	SUBCHRONIC INHALATION RfD[2] (mg/kg-day)	STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE
ACID EXTRACTABLE											
2,4-Dichlorophenol	A	ND		ND	ND						
BASE NEUTRAL COMPOUNDS											
2-Methylnaphthalene	B	ND		ND	ND						
Benzo(a)anthracene	B	ND	91%	ND	ND						
Benzo(a)pyrene	B	ND	91%	ND	ND						
Benzo(b)fluoranthene	B	ND	91%	ND	ND						
Benzo(k)fluoranthene	B	ND	91%	ND	ND						
Chrysene	B	ND	91%	ND	ND						
Dibenz(a,h)anthracene	B	ND	91%	ND	ND						
Indeno(1,2,3-cd)pyrene	B	ND	91%	ND	ND						
Naphthalene	B, V	ND	100%	4.0E-02	ND						
INORGANICS/METALS											
Aluminum	I/M	ND	20%	2.0E-01 [6]	ND						
Antimony	I/M	ND	10%	4.0E-05 [6]	ND						
Arsenic	I/M	ND	98%	2.9E-04 [6]	ND						
Barium	I/M	5.0E-04	7%	1.0E-04	1.0E-04	Inhalation	Low	Fetotoxicity	Rat	1,000 H,A,S	HEAST
Beryllium	I/M	ND	1%	2.0E-05 [6]	ND						
Cadmium	I/M	ND	20%	2.0E-04 [6]	ND						
Chromium III	I/M	ND		ND	ND						
Chromium VI	I/M	ND	11%	5.5E-04 [6]	ND						
Copper	I/M	ND		ND	ND						
Iron	I/M	ND	2%	6.0E-03	ND						
Lead	I/M	ND		ND	ND						
Manganese	I/M	5.0E-05	4%	1.4E-05 [2]	ND	Inhalation	Medium	Neurobehavioral impairment	Human	1,000 H,L,D	IRIS
Silver	I/M	ND	21%	1.1E-03 [6]	ND						
Vanadium	I/M	ND	3%	2.1E-04 [6]	ND						
PESTICIDES/PCBs											
4,4'-DDD	P	ND	80%	ND	ND						
4,4'-DDE	P	ND	80%	ND	ND						
4,4'-DDT	P	ND	80%	4.0E-04 [6]	ND						
Aldrin	P	ND	50%	1.5E-05 [6]	ND						
alpha-BHC	P	ND		ND	ND						
Chlordane (alpha & gamma isomers)	P	ND	80%	4.0E-04 [6]	ND	Inhalation	Low	Hepatic effects	Rat	1,000 H,A,S,D	IRIS
delta-BHC	P	ND		ND	ND						
Dieldrin	P	ND	50%	2.5E-05 [6]	ND						
Heptachlor	P	ND	49%	2.5E-04 [6]	ND						
Heptachlor Epoxide	P	ND	49%	6.4E-06 [6]	ND						
Lindane (gamma-BHC)	P	ND		ND	ND						
Polychlorinated Biphenyls (PCBs)	P	ND	90%	1.8E-05 [6]	ND						
HERBICIDES											
2,4-D	H	ND	50%	5.0E-03	ND						
MCPA	H	ND	50%	2.5E-04 [6]	ND						
MCPP	H	ND	50%	5.0E-04 [6]	ND						

NOTES:
ND - No data available
W - RfD withdrawn from IRIS/HEAST
mg - milligram
kg - kilogram
µg - microgram
DW - Drinking Water
IRIS - Integrated Risk Information System

[1] Source of all subchronic RfCs is HEAST (1997)
[2] - RfD calculated by ABB-ES from RfC as follows, per USEPA, 1995:
RfD (mg/kg-d) = RfC (mg/m[3])/ 70 kg x 20 m[3]/d, unless otherwise indicated
[3] - HEAST Table 2: Alternate Methods; RfD calculated from RfC by HEAST
[4] - There is a National Ambient Air Quality Standard for lead of 1.5 µg/m[3] averaged over three months
[5] TPH dose-response assessment performed using values developed by Massachusetts Department of Environmental
[6] The Inhalation RfD is calculated using the equation given by FDEP Oral RfD * GI absorption.

TABLE E-8.6
INHALATION DOSE-RESPONSE DATA
FOR NONCARCINOGENIC EFFECTS

COMPOUND	CHEMICAL GROUP	CHRONIC INHALATION RfC (mg/m[3])	GI ABSORPTION %	CHRONIC INHALATION RfD[2] (mg/kg-day)	SUBCHRONIC INHALATION RfD[2] (mg/kg-day)	STUDY TYPE	CONFIDENCE LEVEL	CRITICAL EFFECT	TEST ANIMAL	UNCERTAINTY FACTOR	SOURCE

HEAST - Health Effects Assessment Summary Tables
NCEA - National Center for Environmental Assessment

SOURCES:
IRIS as of 1/98; chronic RfCs
HEAST, FY 1997; chronic and subchronic RfCs and RfDs
USEPA, 1995. USEPA Region IV Human Health Risk Assessment Bulletin #2, November, 1995; RfDs.
MADEP, 1997. Revisions to the Massachusetts Contigency Plan, 10/31/97

Chemical Group:
A - Acid extractable
B - Base neutral extractable
I/M - Inorganic/Metal
P - Pesticide
V - Volatile
W - Waste
X - Other

Protection, per USEPA, 1995.
~Value for napthalene is used as surrogate for C10-C22 aromatics fraction, per MADEP, 1997.
~~ Value for xylenes used as surrogate. For the C9-C10 aromatics VPH fraction, the value represents 20% of the xylene RfC, per MADEP, 1997.
@@ Value for n-hexane used as surrogate, par MADEP 1997
@@@ Value based on n-hexane, per MADEP 1997

W1 = Value was withdrawn from HEAST in FY 1993 update
W2 = Value was withdrawn from HEAST in FY 1993 update
W3 = Value was withdrawn from HEAST in FY 1992 supplement #2 update
W4 = Value was withdrawn from HEAST in FY 1993 supplement #2 update
W5 = Value was withdrawn from HEAST in FY 1993 update

APPENDIX E-9

TOXICITY PROFILES

2,4-Dichlorophenol. The major identifiable sources of chlorophenols are food and drinking water. Chlorophenol levels in the ambient atmosphere have not been measured. No toxic effects have been attributed to the low concentrations of chlorophenols typical of most non-occupational exposures. However, undesirable organoleptic effects are produced by chlorophenols at very low concentrations. Worker exposure is a major concern in industries in which chlorophenols are used extensively, as respiratory and dermal absorption of these compounds results in measurable levels in the blood and urine of exposed workers. In the manufacture of chlorophenols, clinical symptoms associated with exposure include eye, nose, and airway irritation, dermatitis, chloracne, and porphyria. Abnormal liver function tests, changes in brain wave activity, and slowed visual reaction time have been reported in association with high-level exposure.

Reference:
IPCS International Programme on Chemical Safety Environmental Health Criteria 93 Chlorophenols Other Than Pentachlorophenol World Health Organization , Geneva, 1989

2,4-Dichlorophenoxyacetic acid (2,4-D). 2,4-D as a salt and ester is the most commonly known chemical used as a herbicide. 2,4-D is used in agriculture for control of broad-leaf weeds and in control of woody plants along highways and utilities rights of way. 2,4-D exerts its herbicidal action by acting as growth hormones in plants. 2,4-D has no hormonal action in animals but their mechanism of toxic action is poorly understood. Patients suffering from acute exposure to 2,4-D have suffered from profound muscular weakness. The chlorophenoxy herbicides have produced contact dermatitis in humans.

Reference:
Goyer, R.A., 1991. Toxic Effects of Metals. In: Casarett and Doull's Toxicology: The Basic Science of Poisons, 3rd edition. Eds. C.D. Klaassen, M.O. Amdur and J. Doull. Macmillan Publishing Co. N.Y.

2-Methyl-4-chlorophenoxyacetic acid (MCPA) and 2-(2-Methyl-4-chloropephenoxy)propionic acid (MCPP). MCPA and MCPP are commonly used hormone-type herbicides. MCPA and MCPP are selectively used on small grains, rice, peas, grassland, sugar cane, tree crops, turf and noncrop areas for control of many annual and perennial broadleaf weeds. MCPA and MCPP mechanisms of toxicity are poorly understood.

Reference:
Meister, Richard T., editor, 1994. Farm Chemicals Handbook; Meister Publishing Company, OH.

Aluminum. Aluminum occurs naturally in the soil and makes up approximately 8 percent of the earth's crust. Higher soil concentrations are associated with industries that burn coal and aluminum mining and smelting. Human exposures to aluminum may occur through ingestion of foods grown in soil that contains aluminum and use of antacids, antiperspirants, and other drug store items. Aluminum in antiperspirants can cause skin rashes in some people. Factory workers who inhale large amounts of aluminum dust may develop lung problems. Aluminum has caused lower birth weights in some animals. Studies have shown that aluminum accumulates in the brains of people with Alzheimer's disease. However, any causal link between aluminum exposure and this disease is yet to be demonstrated. Both human epidemiological studies and animal experiments strongly suggest that aluminum is not a carcinogen.

References:
Agency for Toxic Substances and Disease Registry (ATSDR), 1989. "Toxicological Profile for Aluminum"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1989.

Antimony. Antimony enters the environment during the mining and processing of its ores and other related compounds. Small amounts of antimony are also released into the environment by incinerators and coal burning power plants. Antimony will strongly adhere to soil that contains iron, manganese, or aluminum. Antimony was used for medicinal purposes to treat people infected with parasites. However, chronic exposure can cause eye, skin, and lung

irritation, as well as heart problems, vomiting and diarrhea. The oral RfD, based on an oral drinking water study in rats, showed changes in glucose and cholesterol metabolism. Antimony has not been evaluated by the USEPA for evidence of human carcinogenic potential.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Antimony"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

Aroclors. Aroclors (polychlorinated biphenyls [PCBs]) are organic compounds composed of two chlorinated aromatic rings. The amount of chlorination of the rings determines the specific structure, or congener, of the aroclor and, subsequently, the specific chemical, physical, and toxicological properties. The excellent dielectric properties, thermal stability, and nonflamability of aroclors have made them ideal for use in electrical transformers and capacitors. Therefore, they have been used in these applications extensively in the past. Humans may be exposed to aroclors when an aroclor-containing electrical component burns or is dismantled. Although the production of aroclors in the U.S. was banned in 1977, aroclors do not readily breakdown, and they may still be present in older electrical equipment, and environmental media.

Following dermal exposure, aroclors have caused a skin rash called chloracne. Aroclors have also produced developmental defects in humans, which have mainly consisted of behavioral abnormalities. These effects have also been observed in animals. Epidemiological studies on occupationally-exposed humans do not conclusively link exposure to aroclors with an increased incidence of cancer. However, chronic oral exposure to aroclors has produced liver cancer in laboratory animals. The potency of the carcinogenic action of aroclors appears to increase as the chlorination of the aroclors increases. Although cancer in laboratory animals has only been conclusively demonstrated for aroclors with the highest percent chlorination (aroclors-1260 and 1254), the USEPA has classified all aroclor congeners as B2, probable human carcinogens.

References:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Arsenic. Arsenic has been used in pesticide formulations and has industrial uses in tanneries, as well as the glass and wine making industries. Toxicity depends on its chemical form. Arsenic is an irritant of the skin, mucous membranes, and gastrointestinal tract. Symptoms of acute toxicity include vomiting, diarrhea, convulsions, and a severe drop in blood pressure. Subchronic effects include hyperpigmentation, sensory-motor polyneuropathy, persistent headache, and lethargy. Chronic oral exposure has caused skin lesions, peripheral vascular disease, and peripheral neuropathy. The USEPA has classified arsenic in Group A, human carcinogen, based on increased incidence of lung cancer in occupational studies.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for Arsenic"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1992.

Barium. Barium is used in paints, soap, paper, rubber, and in the manufacture of glass. Some compounds of barium have been used as insecticides. Acute exposure to barium through ingestion can cause gastroenteritis, muscular paralysis, as well as cardiovascular effects. Chronic inhalation of barium containing dust can cause a reversible, benign pneumoconiosis. There is no evidence for carcinogenicity for barium.

References:
Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

Benzo(a)anthracene. Benzo(a)anthracene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Benzo(a)anthracene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. It is also product of pyrolysis in tobacco smoke.

Benzo(a)anthracene has produced skin tumors in laboratory animals after dermal application. Benzo(a)anthracene produced mutations in bacteria and in mammalian cells, and transformed mammalian cells in culture. Although there are no human data that specifically link exposure to benzo(a)anthracene to human cancers, benzo(a)anthracene is a component of mixtures that have been associated with human cancer. As such, benzo(a)anthracene has been classified by USEPA as a B2, probable human carcinogen.

References:
MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Benzo(a)pyrene. Benzo(a)pyrene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. They are ubiquitous in nature and are also man made. Benzo(a)pyrene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. Human data demonstrating a causal relationship linking benzo(a)pyrene to carcinogenicity are lacking. However, multiple animal studies in many species demonstrate benzo(a)pyrene to be carcinogenic following administration by a variety of routes. The mechanism through which benzo(a)pyrene elicits its carcinogenic potential is well understood. Benzo(a)pyrene has produced positive results in numerous genotoxicity assays. Benzo(a)pyrene has been classified by the EPA as a B2, probable human carcinogen.

References:
ATSDR, 1989. Toxicological Profile for Polycyclic Aromatic Hydrocarbons. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1989.

Clayton, George D. and Florence E. Clayton, editors, 1981. Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition; John Wiley & Sons; New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

Benzo(b)fluoranthene. Benzo(b)fluoranthene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Benzo(b)fluoranthene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material.

Although there are no human data that specifically link exposure to benzo(b)fluoranthene to human cancers, benzo(b)fluoranthene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Benzo(b)fluoranthene produced tumors in mice after lung implantation, intraperitoneal, or subcutaneous injection, and skin painting. Benzo(b)fluoranthene has produced positive results in several genotoxicity assays. It has been classified as a B2, probable human carcinogen, by the USEPA.

References:

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Benzo(k)fluoranthene. Benzo(k)fluoranthene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Benzo(k)fluoranthene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material.

Although there are no human data that specifically link exposure to benzo(k)fluoranthene to human cancers, benzo(k)fluoranthene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Benzo(k)fluoranthene produced tumors after lung implantation in mice and when administered with a promoting agent in skin-painting studies. Benzo(k)fluoranthene is mutagenic in bacteria. Benzo(k)fluoranthene has been classified by USEPA as a B2, probable human carcinogen.

References:
MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Beryllium. Beryllium is a trace element that is obtained by extraction from mineral ores. Most beryllium is contributed to the environment by the burning of fossil fuels that contain beryllium ore. Beryllium is generally incorporated into alloy metals that are used in jet engine parts and electrical components. Pure beryllium metal is used in parts for aircraft brakes, nuclear weapons, nuclear reactors, and precision instruments.

Available data on beryllium suggest that it is most toxic to the lung. Acute inhalation exposures to high concentrations of beryllium in the air can cause chemical pneumonitis, the symptoms of which include cough, shortness of breath, and fatigue. These symptoms can persist and even worsen after exposure to beryllium has been discontinued. Chronic inhalation exposures to low concentrations of beryllium can produce chronic beryllium disease, which results in inhibited breathing efficiency. Inhalation of beryllium has been shown to produce lung cancer in animals, and an increased incidence of lung cancer has been demonstrated in workers who are exposed to beryllium in the air. Therefore beryllium has been classified by the USEPA as a B2, probable human carcinogen.

References:
Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Beryllium"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

Cadmium. Cadmium is commonly used in electroplating and galvanizing due to its non-corrosive properties. It is a local respiratory tract irritant following exposure to cadmium dust or fumes. Acute exposure to cadmium dust/fumes may produce an acute chemical pneumonitis. Acute, oral exposure to cadmium results in nausea, vomiting, salivation, abdominal pain, cramps, and diarrhea. Chronic exposure to cadmium results in osteomalacia and osteoporosis (Itai-Itai disease) secondary to renal damage. The USEPA has classified cadmium as a B1 carcinogen via inhalation based on epidemiological data from Japan and China.

References:
Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

alpha- and gamma-Chlordane. A mixture of the alpha and gamma isomers of chlordane constitute the technical-grade chemical, a chlorinated pesticide, which was extensively used in agriculture to control insects, and as a termite proofing agent, until its registry cancellation in 1988. Chlordane may persist in soils for up to 20 years, and readily bioaccumulates in the food chain. Humans may be exposed to chlordane through contact with soil, where it was intentionally applied for pest control reasons, and through consumption of contaminated agricultural products.

Chlordane is absorbed well through all routes, and is stored in body fat, where it may persist for long periods of time. Toxic effects from chlordane exposure result from its metabolites, which can bind to cellular macromolecules causing cellular disfunction, rather than the parent compound. Chlordane induces its own metabolism to toxic metabolites and, therefore, organs containing high metabolizing enzyme activities such as the liver, are at risk. Chlordane produces hepatotoxicity in animals and humans. Additionally, chlordane produces nervous system toxicity, which may include dizziness, nausea, muscle tremors, and the induction of grand mal seizures. Additionally, chlordane is a developmental and reproductive toxicant in animals. Exposure to chlordane has not been positively associated with cancer in humans, and animal evidence is equivocal. However, animal data suggest that chlordane may act as a tumor promotor. For this reason, the USPEA has place chlordane in weight-of-evidence group B2, probable human carcinogen.

References:
Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for Chlordane"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1992.

Chromium. Chromium has been used in plating for corrosion resistance and decorative purposes, in the manufacture of alloys, and in printing, dying, and photography. The toxicity of chromium depends upon its valence state. Hexavalent chromium is more toxic via inhalation than trivalent chromium. The effects of inhalation exposure to hexavalent chromium include ulcers of the upper respiratory tract, nasal inflammation, perforation of the nasal septa and lung cancer. Most trivalent chromium compounds are inactive in short-term genotoxicity assays. Trivalent chromium compounds have not been found to be carcinogenic by any route of exposure. There is epidemiological evidence of an association between chromium and lung cancer. The USEPA has classified hexavalent chromium as an Class A, human carcinogen, by the inhalation route.

References:
Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

Integrated Risk Information System (IRIS), 1993. United States Environmental Protection Agency.

Chrysene. Chrysene is one of the polycyclic aromatic hydrocarbons (PAH) compounds which are formed during the combustion of organic material. Although there are no human data that specifically link exposure to chrysene to human cancers, chrysene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Chrysene produced chromosomal abnormalities in hamsters and mouse germ cells after gavage exposure, positive responses in bacterial gene mutation assays, and transformed mammalian cells exposed in culture. Due to its similarities with benzo(a)pyrene and other carcinogenic PAHs, chrysene has been classified as a B2, probable human carcinogen.

References:
MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Copper. Copper is widely distributed in nature and is an essential element. Copper deficiency is characterized by anemia. Copper is used for medicinal purposes as an emetic and an astringent. Acute exposure to copper ingestion

causes vomiting, hematesis, hypotension, coma, and jaundice. Chronic exposure of children to elevated concentrations of copper causes liver cirrhosis. Copper is not believed to be a human carcinogen.

References:
Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

DDD, DDE, DDT. DDT was one of the most highly used insecticides, and is now ubiquitous in the environment. It was used extensively in World War II to control lice (applied directly to human skin), and later used as an agricultural insecticide and as a public health tool to control insects that spread typhus and malaria. DDD and DDE were contained as impurities in DDT, and are also primary metabolites of DDT, and share similar toxicological properties. DDT, DDD, and DDE are highly persistent in the environment, and thus tend to bioconcentrate in the food chain. This, combined with its toxicological properties, has been attributed to the decline in population of several predatory bird species.

DDT is absorbed to a minor extent via inhalation and dermal routes, and to a large extent by the oral route. Exposure to humans is likely greatest through ingestion of mucous that was contaminated with DDT that had been inhaled. DDT is absorbed into the lymphatic system and distributed to fats throughout the body. In both humans and animals, DDT acts as a CNS stimulant by interfering with the movement of ions within neurons. DDT acts as an estrogenic compound in animals, and this has been attributed to numerous adverse reproductive effects observed in animals exposed to DDT. DDT also causes liver hypertrophy, hepatocyte degeneration, and induces the enzyme cytochrome P450, which can effect the metabolism of other xenobiotics. There is no conclusive evidence of DDT-induced carcinogenicity in humans. However, DDT has produced liver tumors in laboratory animals. DDD, DDE, and DDT have, therefore, been placed in USEPA's weight of evidence group B2, probable human carcinogen.

References:
Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for DDD, DDE, and DDT"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1992.

Dibenz(a,h)anthracene. Dibenz(a,h)anthracene is one of the polycyclic aromatic hydrocarbons (PAH) compounds which are formed during the combustion of organic material. This compound is found in tobacco smoke, food, and industrial emissions. Although there are no human data that specifically link exposure to dibenz(a,h)anthracene to human cancers, dibenz(a,h)anthracene is a component of mixtures that have been associated with human cancer. These include coal tar, soots, coke oven emissions and cigarette smoke. Dibenz(a,h)anthracene is metabolized similarly to benzo(a)pyrene, and has produced skin tumors in laboratory animals following dermal exposure. Dibenz(a,h)anthracene has also been shown to be mutagenic, producing DNA damage in human cell cultures. Due to its similarities with benzo(a)pyrene and other carcinogenic PAHs, dibenz(a,h)anthracene has been classified as a B2, probable human carcinogen.

MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Dieldrin (and Aldrin). Dieldrin is a man-made chlorinated insecticide that was widely used in agriculture, and for termite-proofing of wooden building material and residential dwellings, until it was banned for use in the U.S. in 1974. However, it is highly persistent in the environment and bioaccumulates in terrestrial and aquatic food chains. This, combined with extensive past use, has made dieldrin ubiquitous in the environment. Humans may be exposed to dieldrin from consumption of animal and agricultural products exposed to contaminated soil and from exposure associated with the use of dieldrin as a termite-proofing agent.

Exposure to high levels of dieldrin has been associated with central nervous system excitation that resulted in convulsions, and renal toxicity. Long-term low-level exposure to dieldrin has also been associated with occasional cases of nervous system intoxication. In addition, hepatic degeneration, immunosuppression, and possible reproductive/developmental toxicity have been observed in laboratory animals exposed to dieldrin. Chronic oral exposure to dieldrin has produced liver cancer in laboratory mice and rats. Epidemiological investigations have been of insufficient quality to assess dieldrin carcinogenicity in humans. Based on animal data, the USEPA has placed dieldrin into group B2, probable human carcinogen.

References

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Aldrin/Dieldrin"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1991.

Heptachlor and Heptachlor epoxide. Heptachlor is an insecticide that was used extensively between 1953 and 1974 as a soil and seed treatment to control ants, worms, and other agricultural pests, and as a residential termite-proofing agent. Heptachlor is highly persistent in the environment and can biomagnify through the food chain. Therefore, humans may be exposed to heptachlor by ingesting agricultural products that were exposed to soil that was once treated with heptachlor, or by drinking water or ingesting fish that are contaminated with heptachlor that leached from soil.

In humans and animals, heptachlor is rapidly metabolized to heptachlor epoxide, which is a more toxic and more persistent compound. Exposure to heptachlor has been associated with nervous system excitation, including irritability, salivation, muscle tremors, and convulsions in humans and animals. Heptachlor produces moderate to severe liver toxicity and liver cancer in laboratory animals. Available evidence suggests that heptachlor is a tumor promotor. However, epidemiological studies on humans are insufficient to determine if heptachlor is a human carcinogen. Therefore, the USEPA has placed heptachlor into weight-of-evidence group B2, probable human carcinogen.

References:

Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Heptachlor/Heptachlor epoxide"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1991.

Alpha-, beta-, delta-, and gamma-Hexachlorocyclohexane (HCH or BHC). Technical grade hexachlorocyclohexane, which contained a mixture of the alpha, beta, delta, and gamma isomers, was used as an insecticide that was applied to fruit until 1983, when use of technical-grade BHC as an insecticide was restricted by the USEPA. The gamma isomer of BHC is still used as an agricultural and medicinal insecticide.

Exposure to the beta and delta isomers of BHC has generally been through exposure to technical-grade BHC. Exposure to technical-grade BHC in humans has produced neurotoxic effects, including seizures and convulsions. However, available evidence suggests that both the beta and delta isomers are neurotoxic in animals. Additionally, the beta and delta isomers have been associated with renal toxicity and reproductive toxicity in laboratory animals. Beta BHC produced liver cancer in laboratory animals, but delta BHC did not. No epidemiological studies on humans have been conducted. Based on animal data, the USEPA has placed beta-BHC in weight-of-evidence group B2, probable human carcinogen, and delta-BHC in group D, inadequate evidence for human carcinogenicity.

References

Agency for Toxic Substances and Disease Registry (ATSDR), 1992. "Toxicological Profile for alpha-, beta-, gamma-, and delta-Hexachlorocyclohexane"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October 1992.

Indeno(1,2,3-cd)pyrene. Indeno(1,2,3-c,d)pyrene is one of the polycyclic aromatic hydrocarbons (PAH) compounds which are formed during the combustion of organic material and is a component of cigarette smoke and smoke stack emissions. No carcinogenicity data specifically for indeno(1,2,3-c,d)pyrene are available in humans, however, toxic

effects are attributable to mixtures of PAHs. Animal studies indicate that indeno(1,2,3-c,d)pyrene can induce skin tumors in mice, and may have some immunosuppressive effects. In mammalian cell cultures, indeno(1,2,3-c,d)pyrene was found to be genotoxic. It has been classified by the USEPA as a B2 carcinogen.

References:
MADEP, 1992. "Risk Assessment Shortform Residential Exposure Scenario, Version 1.6"; Policy #WSC/ORS-142-92; Office of Research and Standards and the Bureau of Waste Site Cleanup, Boston, MA; September 1992.

Iron. Iron is a metal that is required for a variety of physiological functions such as heme biosynthesis, oxidative phosphorylation and mixed-function oxidase-mediated metabolic reactions. Only divalent forms of iron are absorbed. As absorption occurs, divalent iron is biochemically converted to trivalent iron, the biologically active form. Under normal conditions, absorbed dietary iron is complexed to hemoglobin and transported to the liver for storage until needed for physiological reactions. The balance of iron is regulated only by the amount of dietary intake and the degree of intestinal absorption. Intestinal absorption tends to be low (2 - 15%) except during periods of increased iron need when absorption efficiency increases dramatically.

Acute iron toxicity has been well characterized following the accidental ingestion of iron-containing preparations by children. Shortly after ingestion, the corrosive effects of iron cause vomiting and diarrhea, often bloody. Later signs include shock, metabolic acidosis, seizures, liver and/or kidney failure, coma, and death. Chronic iron overload manifests as disturbances in liver function, diabetes mellitus, and endocrine and cardiovascular effects. Inhalation of iron containing dust or fumes in occupational settings may result in deposition of iron particles in the lungs leading to interstitial fibrosis. Autopsies of hematite miners noted an increase in lung cancer. However, the etiology of the lung cancer may be related to factors other than iron exposure such as cigarette, silica or PAH exposures.

References:
Aisen, P., Cohen, G. and Kang, J.O., 1990. Iron Toxicosis. Int. Rev. Exp. Pathol. 31:1-46.

Goyer, R.A., 1991. Toxic Effects of Metals. In: Casarett and Doull's Toxicology: The Basic Science of Poisons, 3rd edition. Eds. C.D. Klaassen, M.O. Amdur and J. Doull. Macmillan Publishing Co. N.Y.

Lead. Lead is used as a component in storage batteries and was widely used in gasoline and paints. It is the most ubiquitous toxic metal in the environment. The most serious effects of chronic exposure are encephalopathy, renal damage, and changes in the hematopoietic system, which is the most sensitive indicator of lead exposure. Peripheral nerve dysfunction is observed in adults at blood lead levels of 30 to 50 mg/dL-blood. The nervous systems of children are reported to be affected at levels of 15 mg/dL-blood (Benignus and others, 1981). Chronic lead exposure by workers through inhalation has resulted in statistically significant increases in tumors. Oral exposures of lead salts in animals has been shown to increase tumor formation.

References:
Amdur, Mary O., John Doull, Curtis D. Klaassen, 1991. Toxicology: The Basic Science of Poisons, 4th edition; Pergamon Press, Inc. New York.

Benignus, V.A., Otto, D.A., Muller, K.E., Seiple, K.J., 1981. "Effects of Age and Body Lead Burden on CNS Function in Young Children. II:EEG Spectra." Electroencephalograph. Clin. Neurophysiol. 52:240-248.

Manganese. Manganese is a naturally occurring substance found in many types of rock. It does not generally occur in the environment as the pure metal, rather, it is found combined with other chemicals such as sulfur, oxygen, and chlorine. Manganese is mixed with iron to make various types of steel. Manganese is a component of some ceramics, pesticides, fertilizers, and in nutritional supplements. In small doses manganese is beneficial to human health. Manganese miners and steelworkers exposed to elevated concentrations of manganese have evidenced mental and emotional disturbances, and slow and clumsy body movements. Target organs of manganese are the lung and CNS. When

inhaled, manganese dust can also cause lung irritation. EPA has classified manganese as a Class D, not classifiable as to human carcinogenicity.

References:
Agency for Toxic Substances and Disease Registry (ATSDR), 1991. "Toxicological Profile for Manganese"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, February 1991.

Naphthalene. Naphthalene is a member of the polycyclic aromatic hydrocarbons (PAH) class of compounds which contain two or more aromatic rings. PAHs are ubiquitous in nature and are also manmade. Naphthalene occurs naturally in coal tar, crude oil, and is formed from incomplete combustion of organic material. It is also product of pyrolysis in tobacco smoke. Naphthalene is used for the production of phthalic anhydride, which is used for the production of plasticizers. Naphthalene is also used in moth balls, for the production of the insecticide carbaryl, and in numerous resins, dyes, pharmaceuticals, and other organic materials.

Naphthalene is absorbed through the inhalation, oral, and dermal routes, and appears to be more toxic to humans than laboratory animals. The principal toxic effect of naphthalene in humans and animals is hemolysis of red blood cells, which can lead to anemia, decreased oxygen carrying capacity, and jaundice. Humans pre-disposed to anemia, such as those with G6DP enzyme deficiency, may be particularly sensitive to naphthalene toxicity. Exposure to naphthalene has also been correlated with increased risk of cataract formation. Animal studies were negative for naphthalene reproductive toxicity. Although no human epidemiological data are available for assessing naphthalene carcinogenicity, animal data investigating naphthalene toxicity are equivocal. The USEPA has placed naphthalene in weight-of-evidence Group D, not classifiable as to human carcinogenicity.

References:
Agency for Toxic Substances and Disease Registry (ATSDR), 1990. "Toxicological Profile for Naphthalene"; Agency for Toxic Substances and Disease Registry, U.S. Public Health Service. October, 1990.

Silver. Silver is used in photographic processes, electrical products, batteries, paints, dental amalgam, and in medical supplies for burn treatment. Studies in humans and animals indicate that silver is absorbed readily via inhalation and oral exposure, and distributes widely throughout the body. As is the case with many metals, occupational exposure to silver dusts can produce respiratory irritation. However, the most profound effect from long term exposure to silver is a gray to blue-gray discoloration of the skin (argyria). Although this condition has not been associated with any other adverse effects, it is irreversible and can result from all routes of chronic exposures to silver. No data were located regarding cancer in humans or animals following inhalation, oral, or dermal exposures.

References:

ATSDR, 1989. Toxicological Profile for Silver. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1989

Vanadium. Vanadium is widely, but sparsely, distributed in the earth's crust and in the environment. It is invaluable as an alloying agent with steel; ferrovanadium alloys are used in high-stress applications such as bearings, jet engines, and cutting tools. Human and animal studies indicate that vanadium is readily absorbed from the lungs and poorly absorbed from the gastrointestinal tract. It distributes primarily to the bone and kidney. Vanadium is a respiratory irritant. Inhalation of vanadium dusts in both animals and occupationally-exposed workers induces mild to moderate respiratory irritation. The effects are reversible and subside when exposure is discontinued. No studies were located regarding cancer in humans or animals following inhalation, oral, or dermal exposures. However, vanadium has been found to induce DNA damage in human cell cultures, suggesting that vanadium may have the potential to be genotoxic to humans.

References:

ATSDR, 1990. Toxicological Profile for Vanadium. Agency for Toxic Substances and Disease Registry, U.S. Public Health Service, October, 1990.

EXTOXNET

Extension Toxicology Network

Pesticide Information Profiles

A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Oregon State University, the University of Idaho, and the University of California at Davis and the Institute for Environmental Toxicology, Michigan State University. Major support and funding was provided by the USDA/Extension Service/National Agricultural Pesticide Impact Assessment Program.

EXTOXNET primary files maintained and archived at Oregon State University

Revised June 1996

MCPA

Trade and Other Names: Trade or other names for MCPA or products containing it include: Agritox, Agroxone, Agrozone, Agsco MXL, Banlene, Blesal MC, Bordermaster, Cambilene, Cheyenne, Chimac Oxy, Chiptox, Class MCPA, Cornox Plus, Dakota, Ded-Weed, Empal, Envoy, Gordon's Amine, Kilsem, Legumex, Malerbane, Mayclene, MCP, Mephanac, Midox, Phenoxylene, Rhomene, Rhonox, Sanaphen-M, Shamrox, Selectyl, Tiller, U 46 M-Fluid, Vacate, Weed-Rhap, and Zhelan.

Regulatory Status: MCPA is a slightly toxic compound in EPA toxicity class III, and is a General Use Pesticide (GUP). Labels for products containing MCPA must carry the Signal Word DANGER due to its potential to cause severe eye irritation.

Chemical Class: phenoxy compound

Introduction: MCPA is a systemic postemergence phenoxy herbicide used to control annual and perennial weeds (including thistle and dock) in cereals, flax, rice, vines, peas, potatoes, grasslands, forestry applications, and on rights-of-way. This herbicide is very compatible with many other compounds and may be used in formulation with many other products, including bentazone, bromoxynil, 2,4-D, dicamba, fenoxaprop, MCPB, mecoprop, thifensulfuron, and tribenuron.

NOTE: As with some of the other phenoxy herbicides, MCPA is an acid, but is often formulated as a salt (e.g. dimethylamine salt) or an ester (e.g. isooctyl ester). Unless otherwise indicated, this document will refer to the acid form.

Formulation: This herbicide is very compatible with many other compounds, and may be used in formulation with many other products, including bentazone, bromoxynil, 2,4-D, dicamba, fenoxaprop, MCPB, mecoprop, thifensulfuron, and tribenuron.

Toxicological Effects:

- **Acute toxicity:** MCPA acid is slightly toxic via ingestion, with reported oral LD50 values for

the technical product in rats ranging from 700 mg/kg to 1160 mg/kg [5,6] and ranging in mice from 550 to 800 mg/kg [5,6]. It is slightly toxic via the dermal route as well, with reported dermal LD50 values ranging from greater than 1000 mg/kg in rats to greater than 4000 mg/kg in rabbits [5,6]. Symptoms in humans from very high acute exposure could include slurred speech, twitching, jerking and spasms, drooling, low blood pressure, and unconsciousness [1].

- **Chronic toxicity:** Dietary levels of approximately 50 mg/kg/day and 125 mg/kg/day over 7 months caused reduced feeding rates and retarded growth rates in rats [1]. White blood cell counts and ratios were not affected, but some reductions in red blood cell counts and hemoglobin did appear to be associated with exposure to MCPA at oral dose levels of approximately 20 mg/kg/day. In the same study, oral doses of approximately 5 mg/kg/day caused increased relative kidney weights, and oral doses of approximately 20 mg/kg/day caused increased relative liver weights [1]. Another study in rats showed no effects on kidney or liver weights over an unspecified period at oral doses of 60 mg/kg/day, but oral doses of 150 mg/kg/day did cause reversible increases in these weights over a course of 3 months [1]. Very high dermal doses of 500 mg/kg/day caused reduced body weight, and even higher dermal doses of 1000 and 2000 mg/kg/day resulted in increased mortality and observable changes in liver, kidney, spleen, and thymus tissue [1].
- **Reproductive effects:** A two-generation rat study at doses of up to 15 mg/kg/day affected reproductive function. Even smaller amounts of the compound were toxic to the fetuses. Dogs receiving relatively small amounts of MCPA (8 and 16 mg/kg) for 13 weeks showed adverse sperm and testes changes [8]. It is unlikely that humans will experience these effects under normal exposure conditions.
- **Teratogenic effects:** Offspring of pregnant rats fed low to moderate doses of MCPA (20 to 125 mg/kg) on days 6 to 15 of gestation, had no birth defects. However, when the ethyl ester form of MCPA was fed to pregnant rats (2 to 100 mg/kg/day on days 8 to 15 of gestation), cleft palate, heart defect, and kidney anomalies were observed in the offspring [7]. Mice fed 5 to 100 mg/kg/day of MCPA on days 6 to 15 showed significantly reduced fetal weight and delayed bone development at the highest dose [24]. Teratogenic effects in humans are unlikely at expected exposure levels.
- **Mutagenic effects:** MCPA is reportedly weakly mutagenic to bone marrow and ovarian cells of hamsters, but negative results were reported for other mutagenic tests [38]. It was negative in a bacterial test system (both with and without metabolic activation), negative in spot tests, and negative in host-mediated tests [1]. It produced no detectable increase in chromosomal aberrations in house flies [4]. Some irregularities occurred in gene transfer during cell division in brewers yeast, although at levels which caused massive cell death [1]. It appears that the compound poses little or no mutagenic risk.
- **Carcinogenic effects:** All of the available evidence on MCPA indicates that the compound does not cause cancer [1]. Forestry and agricultural workers occupationally exposed to MCPA in Sweden did not show increased cancer incidence [39].
- **Organ toxicity:** Target organs identified in animal studies include the liver, kidneys, spleen. and thymus. Farm worker exposure has resulted in reversible anemia, muscular weakness, digestive problems, and slight liver damage [1].

- **Fate in humans and animals:** MCPA is rapidly absorbed and eliminated from mammalian systems [1]. Rats eliminated nearly all of a single oral dose within 24 hours, mostly though urine with little or no metabolism [1,6]. In another rat study, three quarters of the dose was eliminated within 2 days. All was gone by the 8 days [1]. Humans excreted about half of a 5 mg dose in the urine within a few days. No residues were found after day 5 [1]. Cattle and sheep

fed low to moderate doses of MCPA in the diet for 2 weeks showed no residues from levels less than about 18 mg/kg [1]. The major **metabolite of MCPA is 2-methyl-4-chlorophenol in the free** and conjugated form, which is formed in the liver [38].

Ecological Effects:

- **Effects on birds:** MCPA is moderately toxic to wildfowl; the LD50 of MCPA in bobwhite quail is 377 mg/kg [5,6].
- **Effects on aquatic organisms:** MCPA is only slightly toxic to freshwater fish, with reported LC50 values ranging from 117 [5] to 232 mg/L in rainbow trout [6]. MCPA is practically nontoxic to freshwater invertebrates, and estuarine and marine organisms.
- **Effects on other organisms:** It is nontoxic to bees, with a reported oral LD50 of 104 ug/bee [5,6].

Environmental Fate:

- **Breakdown in soil and groundwater:** MCPA and its formulations are rapidly degraded by soil microorganisms and it has low persistence, with a reported field half-life of 14 days to 1 month, depending on soil moisture and soil organic matter [21]. Decreased soil moisture and microbial activity, as well as increased soil organic matter, will prolong the field half-life for MCPA [12]. With less than 10% organic matter in soil, the compound is degraded in 1 day and, with greater than 10% levels in soil, it takes 3 to 9 days to degrade. The half-life is 5 to 6 days in slightly acidic to slightly alkaline soils [12]. MCPA readily leaches in most soils, but its mobility decreases with increasing organic matter [12]. MCPA and its formulations show little affinity for soil.
- **Breakdown in water:** It is relatively stable to light breakdown [5], but can be rapidly browken down by microorganisms. In sterilized water, it takes about 5 weeks for half of the compound to degrade due to the action of sunlight. In rice paddy water, however, MCPA is almost totally degraded by aquatic microorganisms in under 2 weeks [12].
- **Breakdown in vegetation:** MCPA is readily absorbed and translocated in most plants [5]. It works by concentrating in the actively growing regions of a plant (meristematic tissue), where it interferes with protein synthesis, cell division, and ultimately the growth of non-resistant plants [7]. It is actively broken down in plants, the major metabolite being 2-methyl-4-chlorophenol [5].

Physical Properties:

- **Appearance:** Pure MCPA occurs as colorless crystals [6].
- **Chemical Name:** (4-chloro-2-methylphenoxy)acetic acid [6]
- **CAS Number:** 94-74-6
- **Molecular Weight:** 200.62
- **Water Solubility:** 825 mg/L @ 25 C (acid) [5]
- **Solubility in Other Solvents:** v.s. in ether, ethanol, toluene, xylene; s. in methanol [6]
- **Melting Point:** 118-119 C [6]
- **Vapor Pressure:** 0.2 mPa @ 20 C [6]
- **Partition Coefficient:** Not Available

- **Adsorption Coefficient:** MPCA acid, 100; MCPA salts, 20 (estimated); MCPA ester, 1000 (estimated) [21]

Exposure Guidelines:

- **ADI:** Not Available
- **MCL:** Not Available
- **RfD:** 0.0005 mg/kg/day [31]
- **PEL:** Not Available
- **HA:** 0.01 mg/L (lifetime) [38]
- **TLV:** Not Available

Basic Manufacturer:

Gilmore, Inc.
5501 Murray Road
Memphis, TN 38119-3703

- **Phone:** 901-761-5870
- **Emergency:** Not Available

References:

References for the information in this PIP can be found in Reference List Number 7

DISCLAIMER: The information in this profile does not in any way replace or supersede the information on the pesticide product labeling or other regulatory requirements. Please refer to the pesticide product labeling.

EXTOXNET

Extension Toxicology Network

Pesticide Information Profiles

A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Oregon State University, the University of Idaho, and the University of California at Davis and the Institute for Environmental Toxicology, Michigan State University. Major support and funding was provided by the USDA/Extension Service/National Agricultural Pesticide Impact Assessment Program.

EXTOXNET primary files maintained and archived at Oregon State University

Revised 9/95.

MECOPROP

TRADE OR OTHER NAMES: Mecoprop is commonly called MCPP. Trade names include Kilprop, Mecopar, Triester-II, Mecomin-D, Triamine-II (with MCPA and 2.4-DP), Triplet (with 2,4-D and dicamba), TriPower (with MCPA and dicamba), Trimec (with 2,4-D and dicamba), Trimec-Encore (with MCPA and dicamba), and U46 KV Fluid (41, 43).

REGULATORY STATUS: Mecoprop is a general use pesticide (GUP).

INTRODUCTION: Mecoprop is a selective, hormone-type phenoxy herbicide. It is applied postemergence and is used on ornamentals and sports turf, for forest site preparation, and on drainage ditch banks for selective control of surface creeping broadleaf weeds such as clovers, chickweed, lambsquarters, ivy, plantain and others. It is also used on wheat, barley, and oats (41, 43). Mecoprop is absorbed by plant leaves and translocated to the roots. It affects enzyme activity and plant growth (6). It acts relatively slowly requiring three to four weeks for control (43). The U.S. EPA has classified mecoprop as toxicity class III- slightly toxic. Products containing mecoprop bear the Signal Word "Caution" (41). It is available as a liquid concentrate, granules, and is sprayed on fertilizer pellets to produce weed and feed products (45).

TOXICOLOGICAL EFFECTS

- **Acute Toxicity:** Mecoprop has a low acute toxicity to test animals. The LD50, the oral dose that kills half of the test animals, is 930 -1210 mg/kg for rats and 650 mg/kg for mice (41, 43, 44). The LD50 for rats exposed dermally is greater than 4000 mg/kg (41, 40). Mecoprop is irritating to skin and eyes. It causes redness and swelling and can cause cloudy vision (46). The concentration in air which kills half of the test animals, the LC50 (4 hours) for rats, is greater than 12.5 mg/l air (6).
- **Chronic Toxicity:** No information is currently available.
- **Reproductive Effects:** No information is currently available.
- **Teratogenic Effects:** Mecoprop is a teratogen in rats at moderate to high doses. Oral doses of 125 mg/kg/day of MCPP in pregnant rats from days 6 to 15 of gestation caused increased intra-uterine deaths, decreased body lengths, and an increased incidence of delayed or absent

bone formation in offspring. Mecoprop is not teratogenic in rabbits (45).

- **Mutagenic Effects:** Studies show that mecoprop may be mutagenic at very high doses. Tests of mecoprop on four strains of salmonella and on s. colelicolor showed no mutagenic effects (43). However, MCPP caused an increase in sister chromatid exchange after single oral doses of 470 and 3,800 mg/kg in Chinese hamsters (45).
- **Carcinogenic Effects:** A study of people employed in the manufacture of phenoxy herbicides including mecoprop showed an association between these herbicides and cancer of soft tissues and non-Hodgkin's lymphoma (47). However, other data do not support this conclusion (49). Thus, it is not clear if occupational exposures to phenoxy herbicides can cause cancer.
- **Organ Toxicity:** Oral doses of 9 mg/kg/day to female rats and 27 mg/kg/day to male rats cause kidney damage (45).
- **Fate in Humans and Animals:** Mecoprop is eliminated unchanged in the urine of mammals(6).

ECOLOGICAL EFFECTS

- **Effects on Birds:** Mecoprop is practically non-toxic to birds. The LC50 is greater than 5,620 ppm for mallard ducks and 5,000 ppm for bobwhite quail (45). The LD50 (oral) is 740 mg/kg for Japanese quail and 700 mg/kg for bobwhite quail (6).
- **Effects on Aquatic Organisms:** Mecoprop is virtually non-toxic to fish. Available data indicate a low potential of mecoprop to bioaccumulate in fish (45). The LC50 (96 hours) is 124 ppm for rainbow trout and greater than 100 ppm for bluegill sunfish (6, 45).
- **Effects on Other Animals (Nontarget species):** Mecoprop is not toxic to bees (41).

ENVIRONMENTAL FATE

- **Breakdown of Chemical in Soil and Groundwater:** The duration of mecoprop's residual activity in soil is about two months. Adsorption of mecoprop increases with an increase in organic matter in the soil. Unaged MCPP and its salt forms are very mobile in a variety of soils (6). Because of this high mobility, it may potentially leach into groundwater (45). However, in general, phenoxy herbicides such as MCPP are not sufficiently persistent to reach groundwater (45).
- **Breakdown of Chemical in Surface Water:** No information is currently available.
- **Breakdown of Chemical in Vegetation:** No information is currently available.

PHYSICAL PROPERTIES AND GUIDELINES

It exists as a mixture of two optically active isomers of which one, the R+ form, mecoprop-p is herbicidally active (6). It is stable to heat, hydrolysis, reduction, and oxidation. It is acidic. Solutions of the salts of mecoprop are stable for several years under normal storage conditions. In cooler temperatures, the salt may crystallize out of solution but will re-dissolve on warming (41, 45).

Physical Properties: Properties are of the acid form unless otherwise noted.

- **Appearance:**Mecoprop is an odorless, white to light brown crystalline solid.
- **Chemical Name:** 2-(4-chloro-2-methyl phenoxy) propionic acid
- **CAS Number:** 7085-19-0 (acid) 1929-86-8 (potassium salt) 1432-14-0 (diethanolamine salt) 28473-03-2 (isooctyl ester)

- **Molecular Weight:** 214.6
- **Water Solubility:** all forms are very soluble in water at 20 degrees C (6)Soluble in acetone, alcohol, benzene, diethyl ether, and ethyl acetate (6)
- **Solubility in Other Solvents:** In acetone, diethyl ether, ethanol > 1000
- **Melting Point:** 94-95 degrees C (6)
- **Vapor Pressure:** 0.31 mPa (20 degrees C)
- **Partition Coefficient:** 1.26 at pH 7 (6)
- **Adsorption Coefficient:** Not Available

Exposure Guidelines: Guidelines are for the acid form unless otherwise noted.

- **ADI:** Not Available
- **MCL**: Not Available
- **RfD:** 1 x 10 to the minus 3 mg/kg/day (48)
- **PEL:** Not Available
- **HA**: Not Available
- **TLV**: Not Available

BASIC MANUFACTURER:

PBI/Gordon
P.O. Box 4090
1217 W. 12th Street
Kansas City, MO 64101

- **Telephone:** 816-421-4070

REFERENCES

References for the information in this PIP can be found in Reference List Number 7

DISCLAIMER: The information in this profile does not in any way replace or supersede the information on the pesticide product label/ing or other regulatory requirements. Please refer to the pesticide product label/ing.

APPENDIX F

VEGETATION OBSERVED AT OU 3 DURING THE OCTOBER 1997 HABITAT SURVEY

Appendix F
Vegetation observed at OU3 and OU4 during the October 1997 Habitat Survey

Scientific Name	Common Name	OU 3 [a]		OU 4 [a]	Vegetative Type
		SA 8	SA 9	Wooded Area	
Acer rubrum	Red maple	d	d		wetland canopy
Albizia julibrissin	Mimosa; silk tree			o	substratum
Ambrosia artemissifolia	Ragweed			c	ground
Andropogon virginicus	Broom sedge			o	emergent wetland
Andropogon glomeratus	Broom sedge			o	upland
Axonopus spp.	Carpet grass	o	o	o	ground
Baccharis hamilifolia	Groundsel tree		o		substratum
Bidens frondosa	Beggar's tick	c	c	o	substratum
Blechnum serrulatum	Swamp fern			d	wetland substratum
Boehmeria cylindrica	False nettle			c	substratum
Buyla nodiflora??	Grapeweed	c	c	c	ground
Callicarpa americana	Beautyberry			c	substratum
Campsis radicans	Trumpet vine	o			substratum - vine
Carex spp.	Sedges			c	emergent wetland
Carica papaya	Papaya	c	c		substratum
Cenchrus sp.	Sandspur			o	ground
Chamaesyce hypercifolia	Spurge			o	substratum
Cinnamomum camphora	Camphor tree		r		canopy
Citrus sp.	Citrus tree			r	canopy
Cladium jamaicense	Saw grass			d	emergent wetland
Colocasia escoleuta	Wild toro	d	d	d	wetland substratum
Commelina diffusa	Asiatic dayflower		o		ground
Crotalaria sp.	Rattlebox				substratum
Cyperus haspan	Sedge			d	emergent wetland
Cyperus pseudovegetus	Sedge			o	emergent wetland
Desmodium spp.	Beggar's lice			o	substratum
Digitaria spp.	Crabgrass	c	c	c	ground
Dioscorea bulbifera	Air yam			o	substratum
Eleocharis sp.	Spike rush			o	emergent wetland
Elodea canadensis	Elodea			o	emergent wetland
Enterolobium cyclocarpum	Ear tree		o		canopy
Eupatorium capillifolium	Dog fennel	c	c	c	substratum
Gordonia lasianathus	Loblolly bay	c	c	c	wetland canopy
Habenaria repens	Water-spider orchid			o	emergent wetland
Hygrophila lacustris	Lake hygrophila			o	emergent wetland
Hydrocotyle sp.	Water pennywort	o	o	c	ground (upland and wetland)
Hypericum sp.	Hypericum			o	emergent wetland
Ilex myrtifolia	Myrtle-leaf holly			c	substratum
Ilex opaca	American holly	o	o		substratum
Ilex vomitoria	Yaupon	o	o		substratum
Ipomoea sp.	Morning Glory			c	canopy-vine
Juncus spp.	Rushes			d	emergent wetland
Lantana camara	Lantana			c	substratum

Lonicera spp.	Trumpet honeysuckle			c	substratum
Ludwigia leptocarpa	Ludwigia	d	d	d	substratum
Ludwigia peruviana	Primrose willow	d	d	d	substratum
Lyonia lucida	Fetterbush			o	substratum
Magnolia grandiflora	Magnolia			o	canopy
Magnolia virginiana	Sweet bay	d	o	o	canopy
Melaleuca quinquenervia	Punk tree; bottle-brush	o			canopy
Melia azedarach	Chinaberry			r	substratum
Mikania scandens	Climbing hempweed			o	wetland substratum-vine
Morus alba	White mulberry			o	substratum
Myrica cerifera	Bayberry; wax myrtle	d	d	d	substratum
Nuphar luteum orbiculatum	Yellow cow lily			d	floating wetland
Nymphaea ordorata	Fragrant white water lily			d	floating wetland
Nyssa sylvatica	Black gum; sourgum			o	canopy
Oenothera laciniata	Evening primrose			d	substratum
Osmunda cinnomomea	Cinnamon fern	o	o	d	wetland substratum
Osmunda regalis	Royal fern	o	o	d	wetland substratum
Panicum spp.	Panic grass	c	c	c	ground
Paspalum spp.	Paspalum grass	c	c	o	ground
Passiflora incarnata	Passion flower			o	substratum
Parthenocissus quinquefolia	Virginia creeper			d	canopy - vine
Persea borbonia	Red bay	d	o	o	wetland canopy
Persea palustris	Swamp red bay	d	o	o	wetland canopy
Phragmites australis	Common reed			d	emergent wetland
Phytolacca americana	Pokeweed	o	o		ground
Pinus elliottii	Slash pine	o	o	o	canopy
Pinus palustris	Longleaf pine			o	canopy
Pinus serotina	Pond pine	o	o	o	wetland canopy
Poinsettia heterophylla	Painted leaf	c	c	c	substratum
Pontederia cordata	Pickerel weed			d	emergent wetland
Polygonum punctatum	Knotweed			o	emergent wetland
Pteridium aquilinum	Bracken fern			o	wetland substratum
Quercus hemisphaerica	Laurel oak			c	canopy
Quercus myrtifolia	Myrtle oak			c	canopy
Quercus phellos	Willow oak			c	canopy
Rhexia mariana	Pale meadow beauty			o	substratum
Rhus copallina	Winged sumac			c	substratum
Sabal minor	Dwarf palmetto			c	substratum
Sabal palmetto	Cabbage Palm	o	o	c	substratum
Salix nigra	Black willow			o	wetland canopy
Salvinia rotundifolia	water fern; water spangles			c	floating wetland
Sambucus simpsonii	Florida elder	d	d	d	substatum
Sapium sebiferum	Chinese tallow tree	o			substratum
Schinus terebinthifolius	Brazilian Pepper	d	d	d	canopy
Scirpus sp.	Sedge			o	emergent wetland
Senecio aureus	Hawkweed	o	o	o	ground
Serenoa repens	Saw palmetto			o	substratum
Smilax bona-nox	Bullbriar; greenbriar	o	o	o	substratum
Taxodium distichum	Bald cypress	r	r		wetland canopy

helypteris palustris	Marsh fern	o	o	d	wetland substratum
Tillandsia setacea	Bromeliad	o	o		epiphyte
Tillandsia usneoides	Spanish moss	c	c	c	epiphyte
Tradescantia ohiensis	Spiderwort			o	ground
Typha domingensis	Cattail			d	emergent wetland
Verbena brasiliensis	Verbena			o	ground
Vitis rotundifolia	Muscadine Grape	c	c	d	canopy - vine
Woodwardia aerolata	Netted chain fern			c	wetland substratum
Woodwardia virginica	Virginia chain fern	o			wetland substratum
Xanthosma sagittifolium	Elephant ear	o			substratum
Xyris fimbriata	Yellow-eyed grass			o	ground
Yucca sp.	Yucca filamentosa	r			substratum

NOTES:
[a] d = dominant; c = common; o = occasional; r = rare

APPENDIX G

SUPPORTING ECOLOGICAL RISK ASSESSMENT INFORMATION AND SPREADSHEETS

Table G-1
Summary of Bioaccumulation Data

Remedial Investigation Repot
NTC Orlando, OU 3
Orlando, Florida

Analyte	log K_{ow} [b]		Bioaccumulation Factor [a]				
			Invertebrate [c]	Plant - Fruit [d]	Plant - Seeds [e]	Mammal [f]	Bird [g]
SEMIVOLATILES							
2-Methylnaphthalene	3.86 [h]	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Acenaphthylene	4.1	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Benzo(a)anthracene	5.7	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Benzo(a)pyrene	6	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Benzo(b)fluoranthene	6.1	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Benzo(g,h,i)perylene	6.6	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Benzo(k)fluoranthene	6.1	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Chrysene	5.7	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Di-n-butylphthalate	5.2	5.2	5.0E-02	7.6E-03	3.4E-02	3.0E-01	NA
Dibenz(a,h)anthracene	6.5	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Fluoranthene	4.95	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Indeno(1,2,3-cd)pyrene	4.9	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Phenanthrene	4.5	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
Pyrene	9.2	5.7	5.0E-02	3.9E-03	1.8E-02	2.4E-01	NA
bis(2-Ethylhexyl)phthalate	5.1	5.2	5.0E-02	7.6E-03	3.4E-02	3.0E-01	NA
Pesticides/PCBs							
4,4'-DDD	6		3.3E+00 [i]	1.0E-02 [j]	1.0E-02 [j]	1.2E+00 [k]	2.9E+00 [l]
4,4'-DDE	5.7		1.7E+00 [i]	1.0E-02 [j]	1.0E-02 [j]	1.2E+00 [k]	2.9E+00 [l]
4,4'-DDT	6.4		5.7E-01 [i]	1.0E-02 [j]	1.0E-02 [j]	1.2E+00 [k]	2.9E+00 [l]
Aroclor-1260	7.1		5.8E+00 [m]	1.2E-01 [n]	1.2E-01 [n]	3.8E+00 [o]	3.2E-01 [p]
drin	5.6		4.5E-03 [q]	7.2E-01 [q]	7.2E-01 [q]	1.8E-03 [r]	5.9E-01 [r]
ptachlor epoxide	5.4		1.0E+00 [s]	5.9E-03	2.6E-02	3.5E-01 [t]	1.4E+00 [t]
alpha-Chlordane	5.5		1.6E+00 [u]	5.1E-03	2.3E-02	5.5E-01 [v]	1.8E+00 [w]
gamma-Chlordane	5.5		1.6E+00 [s]	5.1E-03	2.3E-02	5.5E-01 [v]	1.8E+00 [w]
INORGANICS							
Aluminum	NA		7.5E-02 [x]	8.0E-04 [y]	8.0E-04 [y]	7.5E-02 [z]	NA
Antimony	NA		5.0E-02 [x]	4.0E-02 [y]	4.0E-02 [y]	5.0E-02 [z]	NA
Arsenic	NA		6.6E-03 [aa]	3.0E-01 [ab]	3.0E-01 [ab]	1.0E-01 [z]	NA
Beryllium	NA		5.0E-02 [x]	2.0E-03 [y]	2.0E-03 [y]	5.0E-02 [ac]	NA
Cadmium	NA		1.4E+00 [ad]	3.3E+01 [ae]	3.3E+01 [ae]	2.1E+00 [z]	NA
Chromium	NA		1.6E-01 [m]	1.5E-03 [y]	1.5E-03 [y]	2.8E-01 [z]	NA
Copper	NA		1.6E-01 [m]	7.8E-01 [af]	7.8E-01 [af]	6.0E-01 [z]	NA
Lead	NA		7.8E-02 [ag]	0.0E+00 [ae]	0.0E+00 [ae]	1.5E-02 [z]	NA
Manganese	NA		2.0E-02 [x]	5.0E-02 [y]	5.0E-02 [y]	2.0E-02 [z]	NA
Mercury	NA		6.8E-02 [ah]	1.8E-01 [y]	1.8E-01 [y]	1.0E-02 [ai]	NA
Selenium	NA		7.6E-01 [x]	9.0E-03 [ai]	9.0E-03 [ai]	7.5E-01 [z]	NA
Silver	NA		1.5E-01 [x]	8.0E-02 [y]	8.0E-02 [y]	1.5E-01 [z]	NA
Vanadium	NA		1.3E-01 [x]	1.1E-03 [y]	1.1E-03 [y]	1.3E-01 [z]	NA
Zinc	NA		1.8E+00 [ak]	6.1E-01 [af]	6.1E-01 [af]	2.1E+00 [z]	NA
HERBICIDES							
2,4,5-TP (Silvex)	3.86		1.5E-01 [x]	1.1E-03	2.1E-01	1.5E-01 [al]	NA
2,4,5-T	3.26		1.5E-01 [x]	4.3E-03	4.6E-01	1.5E-01 [al]	NA
2,4-D	2.80		1.5E-01 [x]	1.2E-02	8.4E-01	1.5E-01 [al]	NA
2,4-DB	3.60		1.5E-01 [x]	1.9E-03	2.9E-01	1.5E-01 [al]	NA
Dalapon	1.68		1.5E-01 [x]	1.6E-01	3.7E+00	1.5E-01 [al]	NA
Dichloroprop	3.03		1.5E-01 [x]	7.2E-03	6.2E-01	1.5E-01 [al]	NA
Dinoseb	3.70		1.5E-01 [x]	1.5E-03	2.5E-01	1.5E-01 [al]	NA
MCPA	2.52		1.5E-01 [x]	2.3E-02	1.2E+00	1.5E-01 [al]	NA
CPP	2.94		1.5E-01 [x]	8.9E-03	7.0E-01	1.5E-01 [al]	NA

NOTES:
[a] Units for bioaccumulation factors (BAFs) are mg/kg fresh wt tissue over mg/kg dry wt soil for invertebrates and plants, and mg/kg fresh wt tissue over mg/kg fresh wt. food for small mammals and small birds.

[b] Log Kow values are from the Superfund Chemical Data Matrix (USEPA, 1993a), unless otherwise noted. Log Kow values for classes of semivolatile compounds were averaged to provide an average BAF value. Compounds were grouped accordingly: PAHs (5.7) and phthalates (5.2).

[c] Average of earthworm BAFs for SVOCs (Beyer, 1990) converted from dry weight to wet weight assuming earthworm is 80% water, unless otherwise noted.

[d] Plant BAF calclulated using the following equation presented by Travis and Arms (1988) unless otherwise noted: log (Plant Uptake Factor) = 1.588-0.578 (log Kow). Converted from dry weight to wet weight plant concentration assuming 80% water content of fruit and leafy vegetables.

[e] Plant BAF calclulated using the following equation presented by Travis and Arms (1988) unless otherwise noted: log (Plant Uptake Factor) = 1.588-0.578 (log Kow). Converted from dry weight to wet weight plant concentration assuming 10% water content of seeds.

[f] Calculated using the following equation in Travis and Arms (1988) for semivolatile organic analytes with log K_{ows} >5: log BTF (biotransfer factor) = log K_{ow} - 7.6; result multiplied by average ingestion rates for non-lactating and lactating test animals to convert from BTFs to BAFs, and divided by a factor of 0.2 to convert from dry feed to fresh feed. When no literature values were available, BAFs were calculated for pesticides and PCBs, regardless of the log Kow due to the tendancy of these lipophylic compounds to bioaccumulate.

[g] Bioaccumulation data are generally lacking for birds. As a result, the estimated avian body doses may underestimate actual exposures (see uncertainty section).

[h] ATSDR, 1993 (Toxicological Profile for Naphthalene.)

[i] Geometric means of 4,4'-DDT [Davis (1968), Davis & Harrison (1966), Wheatley & Hardman (1968), Bailey et al. (1970), Cramp & Olney (1967), and Beyer & Gish (1980)], 4,4'-DDE [Davis (1968), Davis & Harrison (1966), Cramp & Olney (1967), Collett & Harrison (1968), Hunt & Sacho (1969), Bailey et al. (1970), Dimond et al. (1970), Gish (1970), and Beyer & Gish (1980)] reported for earthworms. Dry soil concentrations calculated assuming 10% moisture content in sandy-loam soils (Donahue et al., 1977).

[j] Geometric mean of 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE BAFs (fresh wt/dry wt) reported for roots (carrot, potato, sugar beet), grains (corn oats), and legumes (alfalfa) derived from USEPA (1985a). In cases where the tissue results were reported as dry weight, data were converted from dry weight to wet-weight per values provided by Suter (1993).

[k] BAF for shrews and voles calculated using measured concentrations of DDT in stomach content and in whole body (Forsyth & Petrie, 1984).

[l] Whole-body pheasant BAF for 4,4'-DDT presented in USEPA (1985); derived from Kenaga (1973).

[m] BCF for earthworms from Diercxsens et al. (1985).

[n] Arithmetic mean BAF for corn, leaves, carrots, beets, sugarbeets, radishes, and soybeans (tops, roots, and whole plants) from USEPA (1985) and Webber et al., (1983).

[o] BAF calculated from discussion in Eisler (1986) stating that Aroclor-1254 residues in subcutaneous fat of adult minks were up to 38 times dietary levels. Converted to whole body concentrations assuming 10% lipid content.

[p] BAF calculated from data presented in Eisler (1986). Kestrels fed 33 mg PCB/kg diet for 62-69 days accumulated 107 mg PCB/kg lipid weight in muscle. Assuming muscle is 10% lipid content, the muscle concentration is approximately 10.7 mg/kg.

[q] Gish (1970).

[r] Values from Garten & Trabalka (1983). The endrin value for dogs was used for mammals and the value for poultry was used for birds.

[s] Geometric mean of reported BAFs for earthworms (Gish, 1970) converted from dry weight to wet weight assuming 80% water composition of earthworms.

[t] BAFs from Garten & Trabalka (1983) were converted from (mg/kg of fat)/(mg/kg of diet) to (mg/kg fresh wt.)/(mg/kg diet) by multiplying the value by an assumed fat content of 10%. Cow and poultry values were used for heptachlor epoxide.

[u] Value for gamma-Chlordane used as a surrogate.

[v] BAF calculated from data presented in Eisler (1990). Rats fed 20 mg/kg diet technical chlordane (equivalent to 3.6 mg/kg diet cis- and trans-chlordane) for 350 days accumulated 20 mg/kg in lipids. Assuming 10% lipid content, the whole body concentration is approximately 2 mg/kg.

[w] BAF calculated from data presented in Eisler (1990). Red-winged blackbirds fed 10 mg/kg diet technical chlordane (equivalent to 1.8 mg/kg diet cis- and trans-chlordane) for 84 days accumulated 1.8 mg/kg wet weight whole body residue.

[x] Prey-specific value not available; value shown is small mammal BAF for this chemical.

[y] Value from Baes *et al.* (1984) for leafy portions of plants multiplied by 0.2 to represent 80% water composition of plants.

[z] Value derived from biotransfer factors (BTFs), presented in Baes *et al.* (1984) for uptake into cattle. BTF converted to BAF by multiplying by food ingestion rate of 50 kg/day wet weight.

[aa] Average of values for industrial soils from Beyer and Cromartie (1987) multiplied by 0.2 to represent 80% water composition in earthworms.

[ab] Average of BAF values reported from Wang et al. (1984), Sheppard et al. (1985), and Merry et al. (1986).

[ac] Mean of values reported for Sorex araneus in MacFadyen (1980).

[ad] Mean of values reported for soil invertebrates in MacFadyen (1980) converted from dry weight to wet weight.

[ae] Mammal value for copper and plant value for cadmium from Levine et al. (1989). Lead does not accumulate in plant tissue; therefore, a BAF of zero was assigned.

[af] Median of values reported from Levine *et al.* (1989).

[ag] Geometric mean of BAF values (fresh dry wts.) for worms and woodlice (USEPA, 1985b). Fresh weight tissue concentrations calculated assuming 80% body water content.

[ah] Uptake value (fresh wt./dry wt.) for earthworms from USEPA (1985b) sludge document. Fresh weight tissue concentrations calculated assuming 80% body water content.

[ai] USEPA, 1985b.

[aj] Based on reported ratio of selenium in plant tissue and iron fly ash amended soil (Stoewsand et al., 1978).

[ak] BCF for earthworms from Diercxsens *et al.* (1985).

[al] BAFs for analytes with log Kows <5 are assumed to be 0.15 because they are unlikely to bioaccumulate in animal tissue (Maughan, 1993).

NA = Not Available

Table G-2
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Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kgBW-day			Sublethal RTV mg/kgBW-day			Reference
					Oral LD50	LOAEL	RTV [a]	LOAEL	NOAEL	RTV [a]	
SEMIVOLATILE ORGANIC COMPOUNDS											
Acenaphthylene	Rat	Oral (chronic)	40 days	Physiological changes				600			USEPA, 1984a
Benzo(a)anthracene	Rodents	Oral (chronic)	NS	Carcinogenicity				2			Eisler, 1987a
Benzo(a)pyrene	Rat	Oral (chronic)	Pregnancy	Sterility in offspring				40			USEPA, 1984b
(surrogate for dibenz(a,h)-	Rat	Oral (chronic)	3.5 months	Reproductive				50			USEPA, 1984b
anthracene)	Mouse	Oral	Multi-generational	Decreased fertility of F1 progeny; decreased F2 litter size				10 [b]		10	MacKenzie and Angevine, 1981
	Mouse	Oral (subchronic)	6 months	Mortality		120 [b]	12				ATSDR, 1993b
Benzo(b)fluoranthene and Benzo(k)fluoranthene	Rodents	Oral (chronic)	NS	Carcinogenicity				40			Eisler, 1987a
Benzo(g,h,i)perylene	Rodents	Oral (chronic)	NS	Carcinogenicity				99			Eisler, 1987a
Chrysene	Rodents	Oral (chronic)	NS	Carcinogenicity				99			Eisler, 1987a
Di-n-butylphthalate	Rat	Oral (subchronic)	48 days	Reproductive effects				125		12.5	ATSDR, 1989a
	Rat	Oral (chronic)	1 year	Mortality		600	60				
bis(2-Ethylhexyl)phthalate	Rat	Oral LD_{50}	NR	Mortality	30,600						RTECS, 1993
	Rat	Oral	NR	Reproductive effects				7,140			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				35		3.5	RTECS, 1993
	Rat	Oral	NR	Reproductive effects				6,000			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				17,200			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				10,000			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				9,766			RTECS, 1993
	Mouse	Oral LD_{50}	NR	Mortality	30,000						RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				78,880			RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				4,200			RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				50			RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				1,000			RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				2,040			RTECS, 1993
	Rabbit	Oral LD_{50}	NR	Mortality	34,000						RTECS, 1993
	Guinea pig	Oral LD_{50}	NR	Mortality	26,000						RTECS, 1993
	Guinea pig	Oral	NR	Reproductive effects				20,000			RTECS, 1993
	Mammal	Oral	NR	Reproductive effects				20,000			RTECS, 1993
	Mammal	Oral	NR	Reproductive effects				509,000			RTECS, 1993
	Mouse	Oral LD_{50}		Mortality	800		160				RTECS, 1993
	Mouse	Oral (subchronic)	13 weeks	Renal effects				125			RTECS, 1993
Fluoranthene	Rat	Oral LD_{50}	NR	Mortality	2,000		400				RTECS, 1994
	Mouse	Oral (subchronic)	90 days	Nephropathy; clinical and pathological effects				250	125		IRIS, 1990
Indeno(1,2,3-cd)pyrene	Rodents	Oral (chronic)	NS	Carcinogenicity				72			Eisler, 1987a
2-Methylnaphthalene	Rat	Oral LD_{50}		Mortality	1,630		326				NIOSH, 1985
Phenanthrene	Mouse	Oral LD_{50}	NR	Mortality	700		140				RTECS, 1994
	Mouse	Oral (subchronic)	6 months	Increased liver weight				120			IRIS, 1993
Pyrene	Rat	Oral LD_{50}	NR	Mortality	2,700						RTECS, 1993 and NIOSH, 1985
	Mouse	Oral LD_{50}	NR	Mortality	800		160				RTECS, 1993 and NIOSH, 1985
	Mouse	Oral (chronic)	13 weeks	Renal effects				125	75		IRIS, 1990
PESTICIDES/PCBs											
4,4'-DDE	Rat	Oral LD_{50}	NR	Mortality	800						RTECS, 1993
	Mouse	Oral LD_{50}	NR	Mortality	700		140				RTECS, 1993
	Hamster	Oral LD_{50}	NR	Mortality	>5,000						RTECS, 1993
	Mallard	Oral	NR	Eggshell thinning				2.91			USEPA, 1993
	Mallard	Oral	2 years	Reproductive; embryo mortality, crackedeggs				0.58			USEPA, 1993
	Kestrel	Oral	NR	Eggshell thinning				0.39		0.039	USEPA, 1993
4,4'-DDT (surrogate for	Rat	Oral LD_{50}	NR	Mortality	87		17.4				RTECS, 1993
4,4'-DDD)	Rat	Oral LD_{50}		Mortality	100						USEPA, 1985a
	Rat	Oral	NR	Reproductive				112			RTECS, 1993
	Rat	Oral	NR	Reproductive				100			RTECS, 1993
	Rat	Oral	NR	Reproductive				430			RTECS, 1993
	Rat	Oral	NR	Reproductive				1,890			RTECS, 1993
	Rat	Oral	NR	Reproductive				250			RTECS, 1993
	Rat	Oral	NR	Reproductive				50			RTECS, 1993

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					Oral LD50	LOAEL	RTV [a]	LOAEL	NOAEL	RTV [a]	
	Rat	Oral (chronic)	3 generations	Reproductive				0.2		0.02	IRIS, 1991
	Rat	Oral	2 years	Reproductive				2.5			USEPA, 1993c
	Mouse	Oral LD50	NR	Mortality	135						RTECS, 1993
	Mouse	Oral LD50		Mortality	200						USEPA, 1985a
	Mouse	Oral	NR	Reproductive				504			RTECS, 1993
	Mouse	Oral	NR	Reproductive				81			RTECS, 1993
	Mouse	Oral	NR	Reproductive				124			RTECS, 1993
	Mouse	Oral	NR	Reproductive				148			RTECS, 1993
	Rabbit	Oral LD50	NR	Mortality	250						RTECS, 1993
	Rabbit	Oral	NR	Reproductive				150			RTECS, 1993
	Guinea pig	Oral LD50	NR	Mortality	150						RTECS, 1993
	Hamster	Oral LD50	NR	Mortality	>5,000						RTECS, 1993
	Dog	Oral LD50	NR	Mortality	150						USEPA, 1985a
	Dog	Oral LD50		Mortality	60						RTECS, 1993
	Dog	Oral	NR	Reproductive				3,540			RTECS, 1993
	Monkey	Oral LD50	NR	Mortality	200						USEPA, 1985a
	Chicken	Oral (subchronic)	10 weeks	Decreased reproductive success; toxic symptoms				91.4 [c]			USFWS, 1984
	Rock dove	Oral LD50		Mortality	4,000						Longcore and Stendell, 1977
	Black duck	Oral (chronic)	2 years	Reduced eggshell thickness				0.14 [c]			USFWS, 1984
	Mallard	Oral LD50		Mortality	2,240						Longcore and Stendell, 1977
	Mallard	Oral (subchronic)	96 days	Reduced eggshell thickness				2.8			USEPA, 1993b
	Mallard	Oral	NR	Eggshell thinning				1.16			USEPA, 1993b
	Mallard	Oral	NR	Eggshell thinning				2.91			USEPA, 1993b
	Mallard	Oral	2 years	Reproductive				1.45			USEPA, 1993b
	California quail	Oral LD50		Mortality	595		119				USFWS, 1984
	Japanese quail	Oral LD50		Mortality	841						USFWS, 1984
	Pheasant	Oral LD50		Mortality	1,334						USFWS, 1984
	Sandhill crane	Oral LD50		Mortality	1,200						USFWS, 1984
	Kestrel	Oral (chronic)	7 wk - 1 yr	Reduced eggshell thickness				0.56a			USEPA, 1985a
	Kestrel	Oral (chronic)	1 year	Reduced eggshell thickness				0.16a			Wiemeyer, et al., 1986
	Barn owl	Oral (chronic)	2 years	Reduced eggshell thickness				0.14 [c]		0.014	Longcore and Stendell, 1977
Aroclor-1260	Rat	Oral LD50	NR	Mortality	1,315						RTECS, 1993
	Rat	Oral LD50	NR	Mortality	500		100				Eisler, 1986
	Rat	Oral LD50	NR	Mortality	1,300		260				Eisler, 1986
	Rat	Oral	NR	Reproductive effects				1,674			RTECS, 1993
	Rat	Oral (chronic)	2 generations	Reduced litter size				7.6			USEPA, 1985c
	Rat	Oral (subchronic)	9 weeks	Fetal mortality; maternal toxicity				6.4		0.64	ATSDR, 1987
	Mouse	Oral	NR	Reproductive effects				74			RTECS, 1993
	Mink	Oral LD50	NR	Mortality	4,000						Eisler, 1986
	Mink	Oral LD50	NR	Mortality	3,000						Eisler, 1986
	Mink	Oral LD50	NR	Mortality	750						Eisler, 1986
	Mink	Oral (subchronic)	4 months	Impaired reproduction				0.0075			Newell, A.J. et al., 1987
	Bobwhite	Oral LD50	8 days	Mortality	80		16				Eisler, 1986
	Mallard	Oral LD50	8 days	Mortality	111						Eisler, 1986
	Dog	Oral LD50	NR	Mortality	65						Allen, J.R., et al., 1979
Endrin	Mouse	Oral (chronic)	80 weeks	Mortality		0.53	0.53				ATSDR, 1990
	Dog	Oral (chronic)	19 months	Decreased weight gain				0.1			USEPA, 1985a
	Rat	Single oral dose	NR	Mortality	3						Sax, N.I., 1984
	Bird	Single oral dose	NR	Mortality	1.8		0.36				Sax, N.I., 1984
Heptachlor (used as a surrogate for Heptachlor epoxide)	Dog	Oral (chronic)	60 weeks	Increased liver to body weight ratio				0.013			IRIS, 1993
	Rat	Oral (chronic)	2 years	Increased liver to body weight ratio				0.25			IRIS, 1993
	Rat	Oral (chronic)	1 generation	Increased pup death				0.35		0.035	IRIS, 1993
	Cat	Oral (chronic)	2 years	Increased liver weight				0.15			USEPA, 1987
	Rat	Single oral dose	NR	Mortality	40		8				Sax, N.I., 1984
gamma-Chlordane (surrogate for alpha-Chlordane)	Rat	Oral LD50	NR	Mortality	283						RTECS, 1993
	Rat	Oral LD50		Mortality	430						Allen et al., 1979
	Rat	Oral LD50		Mortality	335						Allen et al., 1979
	Rabbit	Oral LD50		Mortality	300						Allen et al., 1979
	Rabbit	Oral LD50		Mortality	100		20				Allen et al., 1979
	Dog	Oral LD50		Mortality	200						Allen et al., 1979

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Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kgBW-day Oral LD50	Lethal RTV mg/kgBW-day LOAEL	Lethal RTV mg/kgBW-day RTV [a]	Sublethal RTV mg/kgBW-day LOAEL	Sublethal RTV mg/kgBW-day NOAEL	Sublethal RTV mg/kgBW-day RTV [a]	Reference
	Goat	Oral LD_{50}		Mortality	180						Allen et al., 1979
	Rat	Oral(subchronic)	Multi-generational	Decreased fertility				16		1.6	ATSDR, 1992
	Japanese quail	Oral LD_{50}	5 days	Mortality	35						Hill et al., 1975
	Bobwhite	Oral LD_{50}	5 days	Mortality	29						Hill et al., 1975
	Mallard	Oral LD_{50}	5 days	Mortality	62						Hill et al., 1975
	Pheasant	Oral LD_{50}		Mortality	24		4.8				USFWS, 1984
	Mouse	Oral (chronic)	2 years	Hepatocelluar hypertrophy and necrosis				0.47			ATSDR, 1992
	Mouse	Oral (chronic)	30 months	Regional liver hypertrophy (females)				0.273	0.055		ATSDR, 1992
	Dog	Oral (chronic)	2 years	Histologic changes				0.375			USEPA, 1988a
	Young chicken	Chronic	4 week	Egg hatchability and growth					0.031 [c]	0.031	Eisler, 1990
INORGANIC ANALYTES											
Aluminum	Mouse	Oral (chronic)	2-3 generations	Reduced body weight gain of newborns				425			NIOSH, 1985
	Rat	Oral (subchronic)	15 days	Reduced growth				100		10	Bernuzzi, V., et al., 1989
	Rat	Oral LD_{50}	NR	Mortality	3700		740				Sax, N.I., 1984
Antimony	Rat	Oral	NR	Mortality	16,714		3,343				ATSDR, 1991a
	Rat	Oral (chronic)	NR	Longevity; blood glucose; cholesterol				0.35			IRIS, 1993
	Rat	Oral (subchronic)	24 weeks	Decreased RBC, swelling of hepatic cords				41.8			ATSDR, 1991
Arsenic	Rat	Oral	NR	Reproductive effects				0.61			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				0.58		0.058	RTECS, 1993
	Rat	Oral LD_{50}	NR	Mortality	763						RTECS, 1993
	Mouse	Oral LD_{50}	NR	Mortality	145		29				RTECS, 1993
	Mallard	Oral LD_{50}	NR	Mortality	323						Eisler, 1988 a
	Cowbird	*Oral LD_{50}*	*11 days*	*Mortality*	18.1		3.62				Eisler, 1988 a
	Young chicken	Oral	56 days	Egg production					1	1	Hermeyer, 1977
Beryllium	Rat	Oral LD_{50}	NR	Mortality	10		2				USEPA, 1985d
	Rat	Oral (chronic)	NR	Increase in lung sacromas				0.22			USEPA, 1985d
	Rat	Oral (chronic)	3.2 years	Respiratory, cardiopulmonary, hematological, and hepatic effects				0.85		0.085	ATSDR, 1991b
Cadmium	Rat	Oral	NR	Reproductive effects				155			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				220			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				21.5		2.15	RTECS, 1993
	Rat	Oral	NR	Reproductive effects				23			RTECS, 1993
	Rat	Oral LD_{50}		Mortality	250						Eisler, 1985
	Rat	Oral LD_{50}	NR	Mortality	225						RTECS, 1993
	Mouse	Oral LD_{50}	NR	Mortality	890						RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				448			RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				1700			RTECS, 1993
	Guinea pig	Oral LD_{50}	NR	Mortality	150		30				Eisler, 1985
	Mallard	Oral (subchronic)	90 days	Egg production suppressed				10		1	Eisler, 1985
Chromium	Japanese quail	Oral LD_{50}	5 days	Mortality	126		25.2				Hill and Camardese, 1986
	Rat	Oral (subchronic)	90 days	Histopathologic and reproductive effects					1400	1400	Ivankovic and Preussman, 1975
	Black Duck	Oral (subchronic)	5 months	Reproductive effects					200	200	Outridge and Scheuhammer, 1993
	Rat	Oral LD_{50}		Mortality	200		40				ATSDR, 1991c
Copper	Rat	Single oral dose		Reproductive effects				152			NIOSH, 1985 and RTECS, 1993
	Rat	Oral LD_{50}	NR	Mortality	940		188				Sax, 1984
	Mouse	Oral (chronic)	30 days	Decreased litter sizes with teratogenic effects				100		10	Lecyk, 1980
Lead	Rat	Oral	NR	Reproductive effects				790			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				1,140			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				520			RTECS, 1993
	Rat	Oral	NR	Reproductive effects				1,100			RTECS, 1993
	Calf	Oral LD_{50}	NR	Mortality	220						Eisler, 1988b
	Rat	Oral (subchronic)	12-14 days	Decreased fetal body weight				2.5			McClain and Becker, 1972
	Mouse	Oral	NR	Reproductive effects				1,120			RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				6,300			RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				300			RTECS, 1993
	Mouse	Oral	NR	Reproductive effects				4,800			RTECS, 1993
	Domestic animal	Oral	NR	Reproductive effects				662			RTECS, 1993
	Mammal	Oral	NR	Reproductive effects				2,118			RTECS, 1993
	Kestrel	Diet	NR	Decreased egg laying fertility; decreased egg					4.61 [c]	4.61	Eisler, 1988b

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Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kgBW-day Oral LD50	Lethal RTV mg/kgBW-day LOAEL	Lethal RTV mg/kgBW-day RTV [a]	Sublethal RTV mg/kgBW-day LOAEL	Sublethal RTV mg/kgBW-day NOAEL	Sublethal RTV mg/kgBW-day RTV [a]	Reference
				shell thickness							
	Kestrel nestlings	Oral	10 days	Reduced growth and brain weight; abnormal development				125			Eisler, 1988b
	Japanese quail	Oral LD_{50}	5 days	Mortality	24,752						Hill and Camardese, 1986
	Rat	Oral (chronic)	2 generations	Developmental effects					7	7	Kimmel et al., 1980 and Grant et al., 1980
	Guinea pig	Oral LD_{50}		Mortality	300		60				Sax, 1984
	Rock dove	Oral (chronic)	NS	Kidney pathology; learning deficiences				6.25			Anders et al., 1982 and Dietz et al., 1979
	Rock dove	Oral LD_{50}		Mortality	375		75				Kendall and Scanlon, 1985
Manganese	Mouse	Oral (subchronic)	90 days	Delayed growth of testes				140			ATSDR, 1990b
	Mouse	Oral (chronic)	103 weeks	Mortality				4050			ATSDR, 1990b
	Rat	Oral LD_{50}	NR	Mortality	410						ATSDR, 1990b
	Rat	Oral LD_{50}	20 days	Mortality	225		45				ATSDR, 1990b
	Rat	Oral (subchronic)	20 days	Decreased litter weight during gestation					620	620	ATSDR, 1990b
	Rat	Oral (chronic)	103 weeks	Mortality				930			ATSDR, 1990b
	Guinea pig	Oral LD_{50}	NR	Mortality	400						USEPA, 1984c
	Monkey	Oral (chronic)	18 months	Weakness, rigidity				25			ATSDR, 1990b
	Rodents/livestock	Oral (subchronic)	10 days - 2 months	Decreased growth rate				100			Cunningham et al., 1966
	Mouse	Oral (subchronic)	180 days	NOAEL for mortality		2300	2300				Gianutsos and Murray, 1982
Mercury	Mouse	Oral LD_{50}		Mortality	22						NIOSH, 1985
	Mouse	Oral (subchronic)	Day 6-17 (gest)	Stillbirths and neonatal death				4			Suzuki, 1979
	Rat	Oral (subchronic)	Day 6-14 (gest)	Retarded fetus growth				4			Suzuki, 1979
organomercury	Rat	Oral (chronic)	NR	Reduced fertility				0.5		0.05	Eisler, 1987b
	Rat	Oral LD_{50}		Mortality	18		3.6				NIOSH, 1985
organomercury	Pig	Oral (subchronic)	Pregnancy	High incidence of stillbirths				0.5		0.05	Eisler, 1987b
organomercury	Mule deer	Oral LD_{50}		Mortality	17.9						Eisler, 1987b
organomercury	River otter	Oral LD_{50}		Mortality	2						Eisler, 1987b
organomercury	Mink	Oral LD_{50}		Mortality	1						Eisler, 1987b
organomercury	Dog	Oral (subchronic)	Pregnancy	High incidence of stillbirths				0.1			Eisler, 1987b
methylmercury	House sparrow	Oral LD_{50}		Mortality	12.6						Eisler, 1987b
ethylmercury	Rock dove	Oral LD_{50}		Mortality	22.8						Fimreite, 1979
	Chicken	Oral LD_{50}		Mortality	20						Fimreite, 1979
	Bantam chicken	Oral LD_{50}		Mortality	190						Eisler, 1987b
ethylmercury	Prairie chicken	Oral LD_{50}		Mortality	11.5						Eisler, 1987b
ethylmercury	Chukar	Oral LD_{50}		Mortality	26.9						Eisler, 1987b
methylmercury	Coturnix	Oral LD_{50}		Mortality	11						Eisler, 1987b
	Mallard	Oral	NR	Reproduction, behavior				0.064		0.0064	USEPA, 1993c
methylmercury	Black duck	Oral (subchronic)	28 weeks	Reproduction inhibited				0.22 [b]			Eisler, 1987b
methylmercury	Fulvous whistling du	Oral LD_{50}		Mortality	37.8						Eisler, 1987b
methylmercury	Northern bobwhite	Oral LD_{50}		Mortality	23.8						Eisler, 1987b
methylmercury	Bobwhite quail	Oral LD_{50}	5 days	Mortality	523						Hill et al., 1975
	Japanese quail	Oral LD_{50}		Mortality	14.4						Eisler, 1987b
ethylmercury	Gray partridge	Oral LD_{50}		Mortality	17.6						Eisler, 1987b
organomercury	Gray pheasant	Oral (subchronic)	30 days	Reduced reproductive ability				0.64			Eisler, 1987b
methylmercury	Ring-necked pheasan	Oral LD_{50}		Mortality	11.5		2.3				Eisler, 1987b
	Mouse	Oral (subchronic)	50 days	Embryotoxicity and teratogenicity				0.9			Suzuki, 1979
Selenium	Rat	Oral LD_{50}	NR	Mortality	6700						RTECS, 1994
	Rat	Oral LD_{50}	NR	Mortality	138		27.6				Sax, N.I., 1984
	Mouse	Oral	NR	Reproductive effects				134		13.4	RTECS, 1994
	Mallard	Oral (subchronic)	3 months	Reduced hatchability				1.75			Eisler, 1985b
	Rat	Oral (chronic)	2 years	Decrease in breeding				0.2			ATSDR, 1988
	Rat	Oral (chronic)	NS	Histological changes in heart and kidney				0.045			Eisler, 1985b
	Japanese quail	Oral (chronic)	NS	Reduced egg hatching				0.6			Eisler, 1985b
	Mallard	Oral (subchronic)	3 months	NOAEL for teratogenic effects					0.36		Eisler, 1985b
	Horse	Oral LD_{50}		MLD	3.3						Eisler, 1985b
	Mallard	Oral	6 weeks	Increased mortality		3	0.3				Heinz, G.H., et al., 1988
	Black-crowned night heron	Oral	NR	NOAEL for egg hatchability					0.61	0.61	Smith, R.M., et al., 1976

Table G-2
Ingestion Toxicity Information for Wildlife

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Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kgBW-day Oral LD50	Lethal RTV mg/kgBW-day LOAEL	Lethal RTV mg/kgBW-day RTV [a]	Sublethal RTV mg/kgBW-day LOAEL	Sublethal RTV mg/kgBW-day NOAEL	Sublethal RTV mg/kgBW-day RTV [a]	Reference
Silver	Mouse	Intraperitoneal (acute)		Mortality	34		6.8				NIOSH, 1985
	Rat	Oral (chronic)	37 week	Weight gain				222.2			ATSDR, 1990c
	Mouse	Oral (chronic)	125 days	Hypoactivity				18.1		1.81	ATSDR, 1990c
Vanadium	Japanese quail	Oral LD_{50}	5 days	Mortality	96		19.2				Hill, E.F., et al., 1986
	Mouse	Gavage LD50	One time	Mortality	31		6.2				ATSDR, 1990d
	Rat	Oral (subchronic)	2 months	Hypertension				15			Susic, D., et al., 1986
	Rat	Oral (subchronic)	35 days	Development effects					8.4	8.4	Domingo, J.L., et al., 1986
	Chicken	Oral (subchronic)	6 weeks	Decrease in egglaying				11		1.1	Berg, L.R., et al., 1963
Zinc	Rat	Oral LD_{50}		Mortality	2,510		502				RTECS, 1993
	Rat	Oral	Gestation	Fetal resorptions in 4 to 20% of population				200		20	Shlicker and Cox, 1968
	Ferret	Oral	3-13 days	Mortality and gastrointestinal effects		390					Straube et al., 1980
	Rat	Oral (subchronic)	NR	Kidney toxicity				160			Llobet, et al., 1988
HERBICIDES											
2,4,5-TP	Mouse	Oral	day 12-15 gest.	Reproductive				1617		162	Sax, 1984
	Rat	Oral LD_{50}	NR	Mortality	650		130				Sax, 1984
	Mallard	Oral LD_{50}	NR	Mortality	2000		400				Hudson et al., 1984
2,4,5-T	Rat	Oral	6-10 day gest.	Reproductive				500			Sax, 1984
	Rat	Oral	NR	NR				714			Sax, 1984
	Rat	Oral	6-15 day gest.	Reproductive				215			Sax, 1984
	Rat	Oral	6-15 day gest.	Reproductive				800			Sax, 1984
	Mouse	Oral	6-14 day gest.	Teratogenic				135			Sax, 1984
	Mouse	Oral	10 days	NR				6250			Sax, 1984
	Mouse	Oral	6-15 day gest.	Reproductive				450			Sax, 1984
	Mouse	Oral	6-15 day gest.	Reproductive				600			Sax, 1984
	Hamster	Oral	6-10 day gest.	Teratogenic				500			Sax, 1984
	Hamster	Oral	7-11 day gest.	Reproductive				200		20	Sax, 1984
	Hamster	Oral	7-11 day gest.	Reproductive				500			Sax, 1984
	Hamster	Oral LD_{50}	NR	Mortality	425						Sax, 1984
	Rat	Oral LD_{50}	NR	Mortality	820						Sax, 1984
	Rat	Oral LD_{50}	NR	Mortality	300		60				Sax, 1984
	Mouse	Oral LD_{50}	NR	Mortality	389						Sax, 1984
	Dog	Oral LD_{50}	NR	Mortality	100						Sax, 1984
	Guinea pig	Oral LD_{50}	NR	Mortality	381						Sax, 1984
	Chicken	Oral LD_{50}	NR	Mortality	310		62				Sax, 1984
	Mallard	Oral LD_{50}	NR	Mortality	2000						Hudson et al., 1984
	Pheasant	Oral LD_{50}	NR	Mortality	500						Hudson et al., 1984
2,4-D	Pheasant	Oral LD_{50}	NR	Mortality	472		94.4				USDA, 1984
	Mallard	Oral LD_{50}	NR	Mortality	2025						USDA, 1984
	Chicken	Oral	10 days	Reduced weight gain					100	100	USDA, 1984
	Rat	Oral	30 days	No adverse effect					1000		USDA, 1984
	Mouse	Oral	3-12 weeks	No adverse effect					93	93	USDA, 1984
	Dog	Oral LD_{50}	NR	Mortality	100						USDA, 1984
	Sheep	Oral	NR	LOAEL		250					USDA, 1984
	Pig	Oral	NR	LOAEL		50					USDA, 1984
	Chicken	Oral LD_{50}	NR	Mortality	380						USDA, 1984
	Sheep	Oral	481 days	Weight loss						100	USDA, 1984
	Rat	Oral	6-15 days	Reproductive effects				150			USDA, 1984
	Rat	Oral	6-15 days	Reproductive effects				142			USDA, 1984
	Rat	Oral	113 days	No adverse effect					15		USDA, 1984
	Rat	Oral	NR	Depressed growth				50			USDA, 1984
	Rat	Oral	30 days	No adverse effect					400		USDA, 1984
	Guinea Pig	Oral	12 days	No adverse effect					100		USDA, 1984
	Mouse	Oral	21 days	No adverse effect					93		USDA, 1984
	Rat	Oral	300 days	No adverse effect					300		USDA, 1984
	Rat	Oral	7-14 day gest.	Reproductive effects				400			Sax, 1984
	Mouse	Oral	6-14 day gest.	Reproductive effects				900			Sax, 1984
	Hamster	Oral	7-14 day gest.	Reproductive effects				200			Sax, 1984
	Rat	Oral	6-15 day gest.	Reproductive effects				1000			Sax, 1984
	Mouse	Oral	11-14 day gest.	Reproductive effects				707			Sax, 1984

Table G-2
Ingestion Toxicity Information for Wildlife

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Chemical	Test Species	Test Type	Duration	Effect	Lethal RTV mg/kgBW-day			Sublethal RTV mg/kgBW-day			Reference
					Oral LD50	LOAEL	RTV [a]	LOAEL	NOAEL	RTV [a]	
	Rat	Oral LD50	NR	Mortality	370						Sax, 1984
	Mouse	Oral LD50	NR	Mortality	368		73.6				Sax, 1984
	Dog	Oral LD50	NR	Mortality	100						Sax, 1984
	Rabbit	Oral LD50	NR	Mortality		800					Sax, 1984
	Guinea pig	Oral LD50	NR	Mortality	469						Sax, 1984
	Hamster	Oral LD50	NR	Mortality	500						Sax, 1984
	Chicken	Oral LD50	NR	Mortality	541						Hudson et al., 1984
	Japanese quail	Oral LD50	NR	Mortality	668						Hudson et al., 1984
	Rock dove	Oral LD50	NR	Mortality	668						Sax, 1984
2,4-DB	Rat	Oral LD50	NR	Mortality	700		140				USEPA, 1984
Dalapon	Rat	Oral	97 days	Mortality		1150	115				USEPA, 1984
	Rat	Oral	97 days	Reproductive effects					300		USEPA, 1984
	Rat	Oral	97 days	NOAEL					115	115	USEPA, 1984
	Rat	Oral LD50	NR	Mortality	9300						USEPA, 1984
	Rabbit	Oral LD50	97 days	Mortality	2140						USEPA, 1984
	Rat	Oral	6-15 day gest.	Reproductive effects					1000		USEPA, 1984
	Japanese quail	Oral	5 days	Mortality - NOAEL			5000				USEPA, 1984
	Pheasant	Oral	5 days	Mortality - NOAEL			5000				USEPA, 1984
	Mallard	Oral	5 days	Mortality - NOAEL			5000				USEPA, 1984
	Chicken	Oral LD50	NR	Mortality	5660						USEPA, 1984
	Chicken	Oral	10 days	Reduced weight gain				250		25	USEPA, 1984
	Rat	Oral	3 generations	Reproductive					300		USEPA, 1984
Dichloroprop	Rat	Oral LD50	NR	Mortality	800						Sax, 1984
	Mouse	Oral LD50	NR	Mortality	400		80				
Dinoseb	Rat	Oral LD50	NR	Mortality	58		11.6				Verschueren, 1983
	Mallard	Oral LD50	NR	Mortality	27						Hudson et al., 1984
	Pheasant	Oral LD50	NR	Mortality	26.4		5.28				Hudson et al., 1984
MCPA	Rat	Oral LD50	NR	Mortality	700						Sax, 1984
	Mouse	Oral LD50	NR	Mortality	550						Sax, 1984
	Rat	Oral LD50	NR	Mortality	500		100				Verschueren, 1983
MCPP	Rat	Oral LD50	NR	Mortality	650						Sax, 1984
	Mouse	Oral LD50	NR	Mortality	650		130				Sax, 1984

Notes:
LD50 = Dose resulting in 50% mortality in test population
BW = Body weight
LOAEL = Lowest Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NR = Not reported
[a] Selected RTVs are boxed. Lethal and sublethal RTVs are chosen based on the data hierarchy discussed in Section 7.5.1.
[b] With the exception of fluoranthene, phenanthrene, and pyrene, the value for benzo(a)pyrene was chosen as a surrogate for all PAHs. Chemical-specific toxicity studies for ecologically significant endpoints are lacking for other PAHs.
The sublethal RTV for benzo(a)pyrene is equal to the LOAEL value because the toxicity test is multi-generational.
[c] Converted to dose per kilogram body weight by multiplying by ingestion and dividing by body weight. Body weights for birds obtained from Dunning, 1984.
Ingestion rates were calculated using the following regression equation (for all birds) from USEPA, 1993b: Food Ingestion (kg/day) = 0.00582 * Body Weight$^{0.651}$ (kg). Ingestion rates for the chicken from NRC, 1984 (pg. 13).

Table G-3
RTVs Selected for Ecological Risk Assessment [a]
Units (mg/kgBW/day)

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Compound	Small Mammal [b]		Small Bird [c]		Predatory Bird [d]	
	Lethal	Sublethal	Lethal	Sublethal	Lethal	Sublethal
Semivolatile Organic Compounds						
2-Methylnaphthalene	326					
Acenaphthylene	12 [e]	10 [e]				
Benzo(a)anthrancene	12 [e]	10 [e]				
Benzo(a)pyrene	12 [e]	10 [e]				
Benzo(b)fluoranthene	12 [e]	10 [e]				
Benzo(g,h,i)perylene	12 [e]	10 [e]				
Benzo(k)fluoranthene	12 [e]	10 [e]				
Chrysene	12 [e]	10 [e]				
Di-n-butylphthalate	60	12.5				
Dibenz(a,h)anthracene	12 [e]	10 [e]				
Fluoranthene	400	10 [e]				
Indeno(1,2,3-cd)pyrene	12 [e]	10 [e]				
Phenanthrene	140	10 [e]				
Pyrene	160	10 [e]				
bis(2-Ethylhexyl)phthalate	160	3.5				
Pesticides/PCBs						
4,4'-DDD	17.4 [f]	0.02 [f]	119 [f]	0.014 [f]	119 [f]	0.014 [f]
4,4'-DDE	140	0.02 [f]	119 [f]	0.039	119 [f]	0.039
4,4'-DDT	17.4	0.02	119	0.014	119	0.014
Aroclor-1260	100	0.64	16		16	
Endrin	0.53	0.02 [f]	119 [f]	0.014 [f]	119 [f]	0.014 [f]
Heptachlor epoxide	8	0.035	0.36	0.014 [f]	0.36	0.014 [f]
alpha-Chlordane	20	1.6	4.8	0.031	4.8	0.031
gamma-Chlordane	20	1.6	4.8	0.031	4.8	0.031
Inorganic Compounds						
Aluminum	740	10				
Antimony	3343					
Arsenic	29	0.058	3.62	1	3.62	1
Beryllium	2	0.085				
Cadmium	30	2.15		1		1
Chromium	40	1400	25.2	200	25.2	200
Copper	188	10				
Lead	60	7	75	4.61	75	4.61
Manganese	2300	620				
Mercury	3.6	0.05	2.3	0.0064	2.3	0.0064
Selenium	27.6	13.4	0.3	0.61	0.3	0.61
Silver	6.8	1.81				
Vanadium	6.2	8.4	19.2	1.1	19.2	1.1
Zinc	502	20				
Herbicides						
2,4,5-TP (Silvex)	130	162	400		400	
2,4,5-T	60	20	62		62	
2,4-D	73.6	93	94.4	100	94.4	100
2,4-DB	140					
Dalapon	115	115	5000	25	5000	25
Dichloroprop	80					
Dinoseb	11.6		5.28		5.28	
MCPA	100					
MCPP	130					

Notes:
[a] Lethal and sublethal RTVs correspond to the boxed values presented in Table G-2.
[b] These RTVs represent chemical concentrations that are not anticipated to result in adverse effects for the cotton mouse.
[c] These RTVs represent chemical concentrations that are not anticipated to result in adverse effects for the mourning dove.
[d] These RTVs represent chemical concentrations that are not anticipated to result in adverse effects for the great-horned owl. When no data were available, the small bird values were used as a surrogate.
[e] The value for benzo(a)pyrene was used as a surrogate.
[f] The value for 4,4'-DDT was used as a surrogate.

Table G-4
Summary of Toxicity Data for Plant Receptors

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Chemical	Reference	RTV in soil [a] (mg/kg)	RTV in solution [a] (mg/L)
SEMI-VOLATILE ORGANICS	Hulzebos *et al.*, 1993 [c]	25	0.1
Acenaphthene		25 [d]	0.1 [d]
Acenaphthylene		25 [d]	0.1 [d]
Anthracene		25 [d]	0.1 [d]
Benzo(a)anthracene		25 [d]	0.1 [d]
Benzo(a)pyrene		25 [d]	0.1 [d]
Benzo(b)fluoranthene		25 [d]	0.1 [d]
Benzo(g,h,i)perylene		25 [d]	0.1 [d]
Benzo(k)fluoranthene		200 [e]	25 [f]
Butylbenzylphthalate		25 [d]	0.1 [d]
Chrysene		25 [d]	0.1 [d]
Dibenz(a,h)anthracene	Will and Suter, 1994	200	25 [f]
Di-n-butylphthalate	Hulzebos *et al.*, 1993 [c]	>1,000	>S_w
bis(2-Ethylhexyl)phthalate		25 [d]	0.1 [d]
Fluoranthene		25 [d]	0.1 [d]
Fluorene		25 [d]	0.1 [d]
Indeno(1,2,3-cd)pyrene		NA	NA
Isophorone		25 [d]	0.1 [d]
2-Methylnaphthalene	Hulzebos *et al.*, 1993 [c]	100	13
Naphthalene		NA	NA
4-Nitroaniline		25 [d]	0.1 [d]
Phenanthrene	Hulzebos *et al.*, 1993 [c]	79	20
Phenol		25 [d]	0.1 [d]
Pyrene	Hulzebos *et al.*, 1993 [c]	53	2.4
2,4-Dichlorophenol	Hulzebos *et al.*, 1993 [c]	100	23
2-Methylphenol		100 [g]	23 [g]
4-Methylphenol			
PESTICIDES/PCBs	Will and Suter, 1994	40	NA
Aroclors		12.5 [h]	NA
Chlordanes		12.5 [h]	NA
4,4'-DDD		12.5 [h]	NA
4,4'-DDE	Eno & Everett, 1958	12.5	NA
4,4'-DDT		12.5 [h]	NA
Dieldrin		12.5 [h]	NA
Endrin	Hulzebos *et al.*, 1993 [c]	>1000	>S_w
Endosulfan I		12.5 [h]	NA
Endrin aldehyde		12.5 [h]	NA
Heptachlor epoxide		NA	NA
BHCs			
INORGANICS	Will and Suter, 1994	50	0.2
Aluminum	Will and Suter, 1994	5	NA
Antimony	Will and Suter, 1994	10	0.001
Arsenic	Will and Suter, 1994	500	NA
Barium	Will and Suter, 1994	10	0.5
Beryllium	Will and Suter, 1994	3	0.05
Cadmium	Will and Suter, 1994	1	0.05
Chromium	Will and Suter, 1994	20	0.06
Cobalt	Will and Suter, 1994	100	0.03
Copper	Will and Suter, 1994	NA	10
Iron	Will and Suter, 1994	50	0.02
Lead	Will and Suter, 1994	500	4
Manganese	Will and Suter, 1994	0.3	0.004
Mercury	Will and Suter, 1994	1	0.7
Selenium	Will and Suter, 1994	2	0.1
Silver	Will and Suter, 1994	2	0.5
Vanadium	Will and Suter, 1994	50	0.4
Zinc			
HERBICIDES		4.75 [i]	100 [i]
2,4,5-TP (Silvex)		4.75 [i]	100 [i]
2,4,5-T	USDA, 1984	4.75 [j]	100
2,4-D		4.75 [i]	100 [i]
2,4-DB		4.75 [i]	100 [i]
Dalapon		4.75 [i]	100 [i]
Dichloroprop		4.75 [i]	100 [i]
Dinoseb		NA	100 [i]
MCPA		NA	100 [i]
MCPP			

Notes:
[a] RTVs in soil are equal to chemical concentrations in soil that are not expected to result in adverse effects to plants. RTVs in solution are equal to chemical concentrations in groundwater that are not expected to result in adverse effects to plants.
[b] Value for toluene used as a surrogate
[c] Values represent 14-day growth EC$_{50}$s for *Lactuca sativa* in soil, or 16- to 21-day growth EC$_{50}$ for *L. sativa* in solution.
[d] Value for acenaphthene used as a surrogate.
[e] Value for di-n-butylphthalate used as a surrogate
[f] Value for diethylphthalate used as a surrogate.
[g] Value for 2-Methylphenol used as a surrogate.
[h] Value for 4,4'-DDT used as a surrogate.
[i] Value for 2,4-D used as a surrogate.
[j] RTV was converted from an application rate assuming a 15 cm thick plow layer, no accumulation from historical applications, and even uniform distribution during application (USEPA, 1985e).
NA = Not Available
S_w = Water solubility

Summary of Toxicity Data for Terrestrial/Palustrine Invertebrates

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Chemical	Test Type	Test Duration	Test Species	Chemical Concentration (mg/kg)	Effect	RTV (mg/kg)	Reference
SEMIVOLATILE ORGANIC COMPOUNDS							
Acenaphthylene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(a)anthracene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(a)pyrene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(b and k)fluoranthene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Benzo(g,h,i)perylene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Chrysene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Dibenz(a,h)anthracene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Di-n-butylphthalate	Soil Test	14 day	4 test species	2,390	LC_{50}	478 [b]	Neuhauser et al., 1986.
bis(2-Ethylhexyl)phthalate	Soil Test	14 day	4 test species	2,390	LC_{50}	478 [b]	Neuhauser et al., 1986.
Fluoranthene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Indeno(1,2,3-cd)pyrene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
2-Methylnaphthalene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Phenanthrene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
Pyrene	Soil Test	14 day	*E. foetida*	173	LC_{50}	34 [a]	Neuhauser et al., 1985.
PESTICIDES/PCBs							
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA
Heptaclor epoxide	Soil Test		*P. posthuma*		LC_{50}	6.4 [c]	
4,4'-DDD	Soil Test	NS	NS	60	58% mortality	12 [d]	U.S. EPA, 1985a
4,4'-DDE	Soil Test	NS	NS	60	58% mortality	12 [d]	U.S. EPA, 1985a
4,4'-DDT	Soil Test	NS	NS	60	58% mortality	12 [d]	U.S. EPA, 1985a
INORGANIC ANALYTES							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	Soil Test	14 day	*E. foetida*	100	0 % mortality	100	Bouche et al., 1987
Arsenic	Soil Test	14 day	*E. foetida*	200	100 % mortality		Bouche et al., 1987
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	Soil Test	14 day	*E. foetida*	900	0 % mortality		Bouche et al., 1987
Cadmium	Soil Test	14 day	*E. foetida*	2,700	100 % mortality		Bouche et al., 1987
Cadmium	Soil Test	14 day	*E. foetida*	1,000 [e]	LC_{50}		van Gestel and van Dis, 1988
Cadmium	Soil Test	20 week	*E. foetida*	50 [f]	Decrease in cocoon production	50 [d]	Malecki et al., 1982
Cadmium	Soil Test	2 week	*E. foetida*	1,843	LC_{50}		Neuhauser et al., 1985
Chromium (III)	Soil Test	8 week	*E. foetida*	250	Reproduction 50% inhibited	50	Molnar et al., 1989
Copper	Soil Test	14 day	*E. foetida*	10	0 % mortality		Bouche et al., 1987
Copper	Soil Test	14 day	*E. foetida*	30	20 % mortality	30	Bouche et al., 1987
Copper	Soil Test	20 week	*E. foetida*	2,000 [f]	Decrease in cocoon production		Malecki et al., 1982
Copper	Soil Test	2 week	*E. foetida*	643	LC_{50}		Neuhauser et al., 1985
Lead	Soil Test	20 week	*E. foetida*	5,000 [f]	Decrease in cocoon production		Malecki et al., 1982
Lead	Soil Test	2 week	*E. foetida*	5,941	LC_{50}	1,190 [d]	Neuhauser et al., 1985
Manganese	NA	NA	NA	NA	NA	NA	NA
Mercury	Soil Test	14 day	*E. foetida*	36	0 % mortality	36	Bouche et al., 1987

Table G-5
Summary of Toxicity Data for Terrestrial and Palustrine Invertebrates

Remedial Investigation Report
NTC Orlando, OU 3
Orlando, Florida

Chemical	Test Type	Test Duration	Test Species	Chemical Concentration (mg/kg)	Effect	RTV (mg/kg)	Reference
Mercury	Soil Test	14 day	*E. foetida*	216	60 % mortality		Bouche et al., 1987
Selenium	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	Soil Test	20 week	*E. foetida*	5,000 [f]	Decrease in cocoon production		Malecki et al., 1982
Zinc	Soil Test	2 week	*E. foetida*	662	LC_{50}	130 [d]	Neuhauser et al., 1985
HERBICIDES							
2,4,5-TP (Silvex)	Soil Test	7-day	*A. caliginosa*	10	Reduced growth	10 [g]	Hartley, M.J., 1982
2,4,5-T	Soil Test	NA	Oligochaete	100	LC_{50}	20 [d]	Anderson et.al., 1992
2,4-D	Soil Test	14-day	*E. foetida*	100	Decrease in cocoon production		Assink and VanDenbrink,1986
	Soil Test	7-day	*A. caliginosa*	10	Reduced growth	10	Hartley, M.J., 1982
2,4-DB	Soil Test	7-day	*A. caliginosa*	10	Reduced growth	10 [g]	Hartley, M.J., 1982
Dalapon	Soil Test	7-day	*A. caliginosa*	10	Reduced growth	10 [g]	Hartley, M.J., 1982
Dichloroprop	Soil Test	7-day	*A. caliginosa*	10	Reduced growth	10 [g]	Hartley, M.J., 1982
Dinoseb	Soil Test	7-day	*A. caliginosa*	10	Reduced growth	10 [g]	Hartley, M.J., 1982
MCPA	NA	NA	NA	NA	NA	NA	NA
MCPP	NA	NA	NA	NA	NA	NA	NA

NOTES:

[a] Equal to the lowest LC_{50} in each chemical class, multiplied by a safety factor of 0.2, as described in text. Value for 4-nitrophenol used for phenolic compounds. Value for fluorene used for PAHs. Value for carbaryl used for aromatic hydrocarbons.

[b] Mean of LC_{50}s for four test species (*A. teberculata, E. foetida, E. eugeniae*, and *P. excavatus*) from artificial soil tests; values used for a whole chemical class are multiplied by a factor of 0.2 (Neuhauser et al., 1986). Value for dimethylphthalate used for phthalates.

[c] Value for heptachlor used as a surrogate.

[d] Conservative factor of 0.2 applied to endpoint; resultant value should be protective of 99.9% of the exposued population from acute effects (USEPA, 1986a).

[e] LC_{50} value for soil at pH = 7.0; LC_{50} = 320 ug/g - 560 ug/g for soil pH = 4.1

[f] Acetate salt

[g] Value for 2,4-D used as surrogate.

NA = Not available

NS = Not stated

Table G-6
Exposure Parameters and Assumptions for Terrestrial Receptors [a]
Study Area 8
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

Representative Wildlife Species		Percent Prey in Diet: Inverts	Plants	Small Mammals	Small Birds	Soil	Home Range (acres)	ED [b]	Site Foraging Frequency [c]	Food Ingestion Rate (kg/day)	Body Weight (kg)
Cotton mouse	(Small herb. mammal)	10%	88%	0%	0%	2%	0.147	1	1.00E+00	0.0029	0.04
Mourning dove	(Small omn. mammal)	1%	94%	0%	0%	5%	5	1	1.32E-01	0.0154	0.13
American robin	(Insectivorous bird)	40%	55%	0%	0%	5%	2	1	3.30E-01	0.011	0.0745
Loggerhead shrike	(Carnivorous bird)	14%	0%	70%	15%	1%	18.7	1	3.53E-02	0.0079	0.047

NOTES:

SITE AREA:	0.7 acres

[a] Documentation of exposure parameters presented in: Table 7-5.

[b] ED = Exposure Duration (percentage of year receptor is expected to be found at study area). ED is assumed to be 1 for this risk assessment.

[c] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)). SFF is assumed to be 1 for lethal exposure scenario.

Table G-7
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Reasonable Maximum Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 8
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

EXPOSURE CONCENTRATION DATA		ESTIMATED CONTAMINANT CONCENTRATIONS IN PRIMARY FOOD ITEMS						BAF VALUES FOR OTHER FOOD ITEMS	
ANALYTE	REASONABLE MAXIMUM EXPOSURE CONCENTRATION (mg/kg)	Invert BAF [a]	Concentration in Invertebrate Tissue [b] (mg/kg)	Fruit / Leafy Vegetable BAF [a]	Concentration in Plant Tissue [c] (mg/kg)	Seed BAF [a]	Concentration in Seeds [c] (mg/kg)	Small Mammal BAF [a]	Small Bird BAF [a]
Acenaphthylene	1.4E-01	5.0E-02	7.0E-03	3.9E-03	5.5E-04	1.8E-02	2.5E-03	2.4E-01	NA
Benzo(a)anthracene	2.9E-01	5.0E-02	1.5E-02	3.9E-03	1.1E-03	1.8E-02	5.1E-03	2.4E-01	NA
Benzo(a)pyrene	2.9E-01	5.0E-02	1.5E-02	3.9E-03	1.1E-03	1.8E-02	5.2E-03	2.4E-01	NA
Benzo(b)fluoranthene	3.1E-01	5.0E-02	1.6E-02	3.9E-03	1.2E-03	1.8E-02	5.5E-03	2.4E-01	NA
Benzo(g,h,i)perylene	2.6E-01	5.0E-02	1.3E-02	3.9E-03	1.0E-03	1.8E-02	4.6E-03	2.4E-01	NA
Benzo(k)fluoranthene	3.1E-01	5.0E-02	1.5E-02	3.9E-03	1.2E-03	1.8E-02	5.4E-03	2.4E-01	NA
Chrysene	3.0E-01	5.0E-02	1.5E-02	3.9E-03	1.2E-03	1.8E-02	5.3E-03	2.4E-01	NA
Di-n-butylphthalate	2.1E-01	5.0E-02	1.1E-02	7.6E-03	1.6E-03	3.4E-02	7.2E-03	3.0E-01	NA
Dibenz(a,h)anthracene	2.6E-01	5.0E-02	1.3E-02	3.9E-03	1.0E-03	1.8E-02	4.6E-03	2.4E-01	NA
Fluoranthene	3.1E-01	5.0E-02	1.6E-02	3.9E-03	1.2E-03	1.8E-02	5.5E-03	2.4E-01	NA
Indeno(1,2,3-cd)pyrene	2.6E-01	5.0E-02	1.3E-02	3.9E-03	1.0E-03	1.8E-02	4.6E-03	2.4E-01	NA
Phenanthrene	1.3E-01	5.0E-02	6.5E-03	3.9E-03	5.1E-04	1.8E-02	2.3E-03	2.4E-01	NA
Pyrene	3.2E-01	5.0E-02	1.6E-02	3.9E-03	1.2E-03	1.8E-02	5.8E-03	2.4E-01	NA
bis(2-Ethylhexyl)phthalate	2.7E-01	5.0E-02	1.4E-02	7.6E-03	2.1E-03	3.4E-02	9.3E-03	3.0E-01	NA
4,4'-DDD	1.5E-02	3.3E+00	4.8E-02	1.0E-02	1.5E-04	1.0E-02	1.5E-04	1.2E+00	2.9E+00
4,4'-DDE	1.0E-01	1.7E+00	1.7E-01	1.0E-02	1.0E-03	1.0E-02	1.0E-03	1.2E+00	2.9E+00
4,4'-DDT	7.0E-02	5.7E-01	4.0E-02	1.0E-02	7.0E-04	1.0E-02	7.0E-04	1.2E+00	2.9E+00
Aroclor-1260	5.5E-02	5.8E+00	3.2E-01	1.2E-01	6.6E-03	1.2E-01	6.6E-03	3.8E+00	3.2E-01
Endrin	4.9E-03	4.5E-03	2.2E-05	7.2E-01	3.5E-03	7.2E-01	3.5E-03	1.8E-03	5.9E-01
Heptaclor epoxide	3.7E-03	1.0E+00	3.7E-03	5.9E-03	2.2E-05	2.6E-02	9.7E-05	3.5E-01	1.4E+00
alpha-Chlordane	9.1E-02	1.6E+00	1.5E-01	5.1E-03	4.6E-04	2.3E-02	2.1E-03	5.5E-01	1.8E+00
gamma-Chlordane	7.1E-02	1.6E+00	1.1E-01	5.1E-03	3.6E-04	2.3E-02	1.6E-03	5.5E-01	1.8E+00
Aluminum	2.5E+03	7.5E-02	1.9E+02	8.0E-04	2.0E+00	8.0E-04	2.0E+00	7.5E-02	NA
Antimony	1.2E+00	5.0E-02	6.0E-02	4.0E-02	4.8E-02	4.0E-02	4.8E-02	5.0E-02	NA
Arsenic	2.5E+01	6.6E-03	1.7E-01	3.0E-01	7.6E+00	3.0E-01	7.6E+00	1.0E-01	NA
Beryllium	1.2E-01	5.0E-02	6.0E-03	2.0E-03	2.4E-04	2.0E-03	2.4E-04	5.0E-02	NA
Cadmium	3.0E+00	1.4E+00	4.2E+00	3.3E+01	9.9E+01	3.3E+01	9.9E+01	2.1E+00	NA
Chromium	3.0E+01	1.6E-01	4.8E+00	1.5E-03	4.5E-02	1.5E-03	4.5E-02	2.8E-01	NA
Copper	2.4E+01	1.6E-01	3.9E+00	7.8E-01	1.9E+01	7.8E-01	1.9E+01	6.0E-01	NA
Lead	1.8E+02	7.8E-02	1.4E+01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-02	NA
Manganese	9.5E+01	2.0E-02	1.9E+00	5.0E-02	4.7E+00	5.0E-02	4.7E+00	2.0E-02	NA
Mercury	3.0E-01	6.8E-02	2.0E-02	1.8E-01	5.4E-02	1.8E-01	5.4E-02	1.0E-02	NA
Selenium	8.5E-01	7.6E-01	6.5E-01	9.0E-03	7.7E-03	9.0E-03	7.7E-03	7.5E-01	NA
Silver	2.0E+01	1.5E-01	3.0E+00	8.0E-02	1.6E+00	8.0E-02	1.6E+00	1.5E-01	NA
Vanadium	5.6E+00	1.3E-01	7.3E-01	1.1E-03	6.2E-03	1.1E-03	6.2E-03	1.3E-01	NA
Zinc	3.7E+02	1.8E+00	6.6E+02	6.1E-01	2.3E+02	6.1E-01	2.3E+02	2.1E+00	NA
2,4,5-TP (Silvex)	2.1E-03	1.5E-01	3.2E-04	1.1E-03	2.3E-06	2.1E-01	4.3E-04	1.5E-01	NA
2,4,5-T	2.5E-03	1.5E-01	3.8E-04	4.3E-03	1.1E-05	4.6E-01	1.1E-03	1.5E-01	NA
2,4-D	1.2E-02	1.5E-01	1.8E-03	1.2E-02	1.4E-04	8.4E-01	9.8E-03	1.5E-01	NA
2,4-DB	4.8E-02	1.5E-01	7.2E-03	1.9E-03	9.1E-05	2.9E-01	1.4E-02	1.5E-01	NA
Dalapon	2.0E-02	1.5E-01	3.0E-03	1.6E-01	3.2E-03	3.7E+00	7.6E-02	1.5E-01	NA
Dichloroprop	1.7E-02	1.5E-01	2.6E-03	7.2E-03	1.2E-04	6.2E-01	1.1E-02	1.5E-01	NA
Dinoseb	6.6E-03	1.5E-01	9.9E-04	1.5E-03	9.9E-06	2.5E-01	1.7E-03	1.5E-01	NA
MCPA	1.4E+01	1.5E-01	2.1E+00	2.3E-02	3.2E-01	1.2E-01	1.7E+00	1.5E-01	NA
MCPP	3.4E+01	1.5E-01	5.0E+00	8.9E-03	3.0E-01	7.0E-01	2.3E+01	1.5E-01	NA

ECPC = Ecological Chemical of Potential Concern
RME = Reasonable Maximum Exposure
[a] Bioaccumulation data presented in: Appendix G, Table G-1

[b] ECPC concentrations in invertebrate tissue equals the invertebrate BAF multiplied by the RME soil concentration of the contaminant.
[c] ECPC concentrations in plant tissue equals the plant BAF multiplied by the RME soil concentration of the contaminant.

Table G-7
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Reasonable Maximum Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 8
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

ANALYTE	*Cotton mouse*	*Mourning dove*	*American robin*	*Loggerhead shrike*
Acenaphthylene	4.1E-04	1.5E-04	4.9E-04	2.0E-05
Benzo(a)anthracene	8.5E-04	3.0E-04	1.0E-03	4.1E-05
Benzo(a)pyrene	8.6E-04	3.1E-04	1.0E-03	4.1E-05
Benzo(b)fluoranthene	9.2E-04	3.3E-04	1.1E-03	4.4E-05
Benzo(g,h,i)perylene	7.6E-04	2.7E-04	9.1E-04	3.7E-05
Benzo(k)fluoranthene	9.0E-04	3.2E-04	1.1E-03	4.3E-05
Chrysene	8.8E-04	3.1E-04	1.1E-03	4.2E-05
Di-n-butylphthalate	8.4E-04	2.7E-04	7.6E-04	3.6E-05
Dibenz(a,h)anthracene	7.5E-04	2.7E-04	9.0E-04	3.6E-05
Fluoranthene	9.2E-04	3.3E-04	1.1E-03	4.4E-05
Indeno(1,2,3-cd)pyrene	7.6E-04	2.7E-04	9.1E-04	3.7E-05
Phenanthrene	3.8E-04	1.4E-04	4.6E-04	1.8E-05
Pyrene	9.3E-04	3.3E-04	1.1E-03	4.5E-05
bis(2-Ethylhexyl)phthalate	1.1E-03	3.5E-04	9.8E-04	4.6E-05
4,4'-DDD	3.8E-04	2.1E-05	9.8E-04	6.7E-05
4,4'-DDE	1.5E-03	1.2E-04	3.6E-03	2.5E-04
4,4'-DDT	4.4E-04	7.1E-05	9.7E-04	6.7E-05
Aroclor-1260	2.8E-03	1.9E-04	6.5E-03	8.7E-04
Endrin	2.3E-04	5.6E-05	1.1E-04	3.3E-07
Heptaclor epoxide	3.8E-05	4.9E-06	8.2E-05	4.1E-06
alpha-Chlordane	1.3E-03	1.2E-04	3.1E-03	1.7E-04
gamma-Chlordane	1.0E-03	9.7E-05	2.4E-03	1.3E-04
Aluminum	5.1E+00	2.0E+00	9.9E+00	3.3E-01
Antimony	5.2E-03	1.7E-03	5.4E-03	1.4E-04
Arsenic	5.2E-01	1.3E-01	2.7E-01	4.6E-03
Beryllium	2.3E-04	9.8E-05	4.2E-04	1.3E-05
Cadmium	6.4E+00	1.5E+00	2.7E+00	7.7E-01
Chromium	8.1E-02	2.5E-02	1.7E-01	7.1E-03
Copper	1.3E+00	3.0E-01	6.4E-01	4.8E-02
Lead	3.6E-01	1.4E-01	7.1E-01	2.3E-02
Manganese	4.5E-01	1.4E-01	3.9E-01	7.7E-03
Mercury	4.0E-03	1.0E-03	2.6E-03	3.7E-05
Selenium	6.4E-03	8.8E-04	1.5E-02	8.6E-04
Silver	1.6E-01	4.0E-02	1.5E-01	5.1E-03
Vanadium	1.4E-02	4.6E-03	2.8E-02	1.0E-03
Zinc	2.0E+01	3.7E+00	2.0E+01	2.9E+00
2,4,5-TP (Silvex)	3.3E-05	8.0E-06	1.1E-05	6.7E-07
2,4,5-T	7.9E-05	1.9E-05	1.4E-05	1.1E-06
2,4-D	6.6E-04	1.5E-04	6.6E-05	7.8E-06
2,4-DB	1.0E-03	2.4E-04	2.6E-04	1.7E-05
Dalapon	4.9E-03	1.1E-03	2.0E-04	4.6E-05
Dichloroprop	7.2E-04	1.7E-04	9.5E-05	9.3E-06
Dinoseb	1.2E-04	3.0E-05	3.6E-05	2.3E-06
MCPA	1.4E-01	3.6E-02	8.4E-02	3.8E-03
MCPP	1.6E+00	3.7E-01	1.9E-01	2.0E-02

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight.

Table G-8
Risk from Potential Lethal Effects for Terrestrial Receptors from Reasonable Maximum Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 8
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

ANALYTE	Cotton mouse			Mourning dove			American robin			Loggerhead shrike		
	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ
Acenaphthylene	7.8E-04	1.2E+01	6.5E-05	1.5E-04	NA	0.0E+00	4.9E-04	NA	0.0E+00	2.0E-05	NA	0.0E+00
Benzo(a)anthracene	1.6E-03	1.2E+01	1.4E-04	3.0E-04	NA	0.0E+00	1.0E-03	NA	0.0E+00	4.1E-05	NA	0.0E+00
Benzo(a)pyrene	1.6E-03	1.2E+01	1.4E-04	3.1E-04	NA	0.0E+00	1.0E-03	NA	0.0E+00	4.1E-05	NA	0.0E+00
Benzo(b)fluoranthene	1.8E-03	1.2E+01	1.5E-04	3.3E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.4E-05	NA	0.0E+00
Benzo(g,h,i)perylene	1.5E-03	1.2E+01	1.2E-04	2.7E-04	NA	0.0E+00	9.1E-04	NA	0.0E+00	3.7E-05	NA	0.0E+00
Benzo(k)fluoranthene	1.7E-03	1.2E+01	1.4E-04	3.2E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.3E-05	NA	0.0E+00
Chrysene	1.7E-03	1.2E+01	1.4E-04	3.1E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.2E-05	NA	0.0E+00
Di-n-butylphthalate	1.6E-03	6.0E+01	2.7E-05	2.7E-04	NA	0.0E+00	7.6E-04	NA	0.0E+00	3.6E-05	NA	0.0E+00
Dibenz(a,h)anthracene	1.4E-03	1.2E+01	1.2E-04	2.7E-04	NA	0.0E+00	9.0E-04	NA	0.0E+00	3.6E-05	NA	0.0E+00
Fluoranthene	1.8E-03	4.0E+02	4.4E-06	3.3E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.4E-05	NA	0.0E+00
Indeno(1,2,3-cd)pyrene	1.5E-03	1.2E+01	1.2E-04	2.7E-04	NA	0.0E+00	9.1E-04	NA	0.0E+00	3.7E-05	NA	0.0E+00
Phenanthrene	7.3E-04	1.4E+02	5.2E-06	1.4E-04	NA	0.0E+00	4.6E-04	NA	0.0E+00	1.8E-05	NA	0.0E+00
Pyrene	1.8E-03	1.6E+02	1.1E-05	3.3E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.5E-05	NA	0.0E+00
bis(2-Ethylhexyl)phthalate	2.1E-03	1.6E+02	1.3E-05	3.5E-04	NA	0.0E+00	9.8E-04	NA	0.0E+00	4.6E-05	NA	0.0E+00
4,4'-DDD	7.2E-04	1.7E+01	4.2E-05	2.1E-05	1.2E+02	1.8E-07	9.8E-04	1.2E+02	8.2E-06	6.7E-06	1.2E+02	5.6E-07
4,4'-DDE	2.8E-03	1.4E+02	2.0E-05	1.2E-04	1.2E+02	1.0E-06	3.6E-03	1.2E+02	3.0E-05	2.5E-04	1.2E+02	2.1E-06
4,4'-DDT	8.3E-04	1.7E+01	4.8E-05	7.1E-05	1.2E+02	6.0E-07	9.7E-04	1.2E+02	8.1E-06	6.7E-05	1.2E+02	5.7E-07
Aroclor-1260	5.3E-03	1.0E+02	5.3E-05	1.9E-04	1.6E+01	1.2E-05	6.5E-03	1.6E+01	4.1E-04	8.7E-04	1.6E+01	5.5E-05
Endrin	4.4E-04	5.3E-01	8.4E-04	5.6E-05	1.2E+02	4.7E-07	1.1E-04	1.2E+02	9.0E-07	3.3E-07	1.2E+02	2.8E-09
Heptaclor epoxide	7.3E-05	8.0E+00	9.1E-06	4.9E-06	3.6E-01	1.4E-05	8.2E-05	3.6E-01	2.3E-04	4.1E-06	3.6E-01	1.1E-05
alpha-Chlordane	2.5E-03	2.0E+01	1.3E-04	1.2E-04	4.8E+00	2.6E-05	3.1E-03	4.8E+00	6.4E-04	1.7E-04	4.8E+00	3.5E-05
gamma-Chlordane	2.0E-03	2.0E+01	9.8E-05	9.7E-05	4.8E+00	2.0E-05	2.4E-03	4.8E+00	5.0E-04	1.3E-04	4.8E+00	2.7E-05
Aluminum	9.8E+00	7.4E+02	1.3E-02	2.0E+00	NA	0.0E+00	9.9E+00	NA	0.0E+00	3.3E-01	NA	
Antimony	1.0E-02	3.3E+03	3.0E-06	1.7E-03	NA	0.0E+00	5.4E-03	NA	0.0E+00	1.4E-04	NA	
Arsenic	9.9E-01	2.9E+01	3.4E-02	1.3E-01	3.6E+00	3.6E-02	2.7E-01	3.6E+00	7.4E-02	4.6E-03	3.6E+00	1.3E-03
Beryllium	4.4E-04	2.0E+00	2.2E-04	9.8E-05	NA	0.0E+00	4.2E-04	NA	0.0E+00	1.3E-05	NA	
Cadmium	1.2E+01	3.0E+01	4.0E-01	1.5E+00	NA	0.0E+00	2.7E+00	NA	0.0E+00	7.7E-01	NA	
Chromium	1.5E-01	4.0E+01	3.9E-03	2.5E-02	2.5E+01	9.9E-04	1.7E-01	2.5E+01	6.7E-03	7.1E-03	2.5E+01	2.8E-04
Copper	2.4E+00	1.9E+02	1.3E-02	3.0E-01	NA	0.0E+00	6.4E-01	NA	0.0E+00	4.8E-02	NA	
Lead	6.9E-01	6.0E+01	1.1E-02	1.4E-01	7.5E+01	1.9E-03	7.1E-01	7.5E+01	9.4E-03	2.3E-02	7.5E+01	3.0E-04
Manganese	8.6E-01	2.3E+03	3.7E-04	1.4E-01	NA	0.0E+00	3.9E-01	NA	0.0E+00	7.7E-03	NA	
Mercury	7.7E-03	3.6E+00	2.1E-03	1.0E-03	2.3E+00	4.5E-04	2.6E-03	2.3E+00	1.1E-03	3.7E-05	2.3E+00	1.6E-05
Selenium	1.2E-02	2.8E+01	4.4E-04	8.8E-04	3.0E-01	2.9E-03	1.5E-02	3.0E-01	5.0E-02	8.6E-04	3.0E-01	2.9E-03
Silver	3.0E-01	6.8E+00	4.3E-02	4.0E-02	NA	0.0E+00	1.5E-01	NA	0.0E+00	5.1E-03	NA	
Vanadium	2.6E-02	6.2E+00	4.2E-03	4.6E-03	1.9E+01	2.4E-04	2.8E-02	1.9E+01	1.5E-03	1.0E-03	1.9E+01	5.4E-05
Zinc	3.8E+01	5.0E+02	7.5E-02	3.7E+00	NA	0.0E+00	2.0E+01	NA	0.0E+00	2.9E+00	NA	
2,4,5-TP (Silvex)	6.2E-05	1.3E+02	4.8E-07	8.0E-06	4.0E+02	2.0E-08	1.1E-05	4.0E+02	2.8E-08	6.7E-07	4.0E+02	1.7E-09
2,4,5-T	1.5E-04	6.0E+01	2.5E-06	1.9E-05	6.2E+01	3.0E-07	1.4E-05	6.2E+01	2.2E-07	1.1E-06	6.2E+01	1.8E-08
2,4-D	1.2E-03	7.4E+01	1.7E-05	1.5E-04	9.4E+01	1.6E-06	6.6E-05	9.4E+01	7.0E-07	7.8E-06	9.4E+01	8.2E-08
2,4-DB	1.9E-03	1.4E+02	1.4E-05	2.4E-04	NA	0.0E+00	2.6E-04	NA	0.0E+00	1.7E-05	NA	
Dalapon	9.3E-03	1.2E+02	8.1E-05	1.1E-03	5.0E+03	2.3E-07	2.0E-04	5.0E+03	3.9E-08	4.6E-05	5.0E+03	9.1E-09
Dichloroprop	1.4E-03	8.0E+01	1.7E-05	1.7E-04	NA	0.0E+00	9.5E-05	NA	0.0E+00	9.3E-06	NA	
Dinoseb	2.3E-04	1.2E+01	2.0E-05	3.0E-05	5.3E+00	5.7E-06	3.6E-05	5.3E+00	6.7E-06	2.3E-06	5.3E+00	4.3E-07
MCPA	2.8E-01	1.0E+02	2.8E-03	3.6E-02	NA	0.0E+00	8.4E-02	NA	0.0E+00	3.8E-03	NA	
MCPP	3.0E+00	1.3E+02	2.3E-02	3.7E-01	NA	0.0E+00	1.9E-01	NA	0.0E+00	2.0E-02	NA	
SUMMARY HAZARD INDEX			6.3E-01			4.3E-02			1.4E-01			4.9E-03

PDE = Potential Dietary Exposure (mg/kgBW/day) RTV = Reference Toxicity Value (mg/kgBW/day) HQ = Hazard Quotient (calculated by dividing PDE by RTV)

Table G-9
Risk from Potential Sublethal Effects for Terrestrial Receptors from Reasonable Maximum Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 8
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

ANALYTE	Cotton mouse			Mourning dove			American robin			Loggerhead shrike		
	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ
Acenaphthylene	4.1E-04	1.0E+01	4.1E-05	1.5E-04	NA	0.0E+00	4.9E-04	NA	0.0E+00	2.0E-05	NA	0.0E+00
Benzo(a)anthracene	8.5E-04	1.0E+01	8.5E-05	3.0E-04	NA	0.0E+00	1.0E-03	NA	0.0E+00	4.1E-05	NA	0.0E+00
Benzo(a)pyrene	8.6E-04	1.0E+01	8.6E-05	3.1E-04	NA	0.0E+00	1.0E-03	NA	0.0E+00	4.1E-05	NA	0.0E+00
Benzo(b)fluoranthene	9.2E-04	1.0E+01	9.2E-05	3.3E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.4E-05	NA	0.0E+00
Benzo(g,h,i)perylene	7.6E-04	1.0E+01	7.6E-05	2.7E-04	NA	0.0E+00	9.1E-04	NA	0.0E+00	3.7E-05	NA	0.0E+00
Benzo(k)fluoranthene	9.0E-04	1.0E+01	9.0E-05	3.2E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.3E-05	NA	0.0E+00
Chrysene	8.8E-04	1.0E+01	8.8E-05	3.1E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.2E-05	NA	0.0E+00
Di-n-butylphthalate	8.4E-04	1.3E+01	6.7E-05	2.7E-04	NA	0.0E+00	7.6E-04	NA	0.0E+00	3.6E-05	NA	0.0E+00
Dibenz(a,h)anthracene	7.5E-04	1.0E+01	7.5E-05	2.7E-04	NA	0.0E+00	9.0E-04	NA	0.0E+00	3.6E-05	NA	0.0E+00
Fluoranthene	9.2E-04	1.0E+01	9.2E-05	3.3E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.4E-05	NA	0.0E+00
Indeno(1,2,3-cd)pyrene	7.6E-04	1.0E+01	7.6E-05	2.7E-04	NA	0.0E+00	9.1E-04	NA	0.0E+00	3.7E-05	NA	0.0E+00
Phenanthrene	3.8E-04	1.0E+01	3.8E-05	1.4E-04	NA	0.0E+00	4.6E-04	NA	0.0E+00	1.8E-05	NA	0.0E+00
Pyrene	9.3E-04	1.0E+01	9.3E-05	3.3E-04	NA	0.0E+00	1.1E-03	NA	0.0E+00	4.5E-05	NA	0.0E+00
bis(2-Ethylhexyl)phthalate	1.1E-03	3.5E+00	3.1E-04	3.5E-04	NA	0.0E+00	9.8E-04	NA	0.0E+00	4.6E-05	NA	0.0E+00
4,4'-DDD	3.8E-04	2.0E-02	1.9E-02	2.1E-05	1.4E-02	1.5E-03	9.8E-04	1.4E-02	7.0E-02	6.7E-05	1.4E-02	4.8E-03
4,4'-DDE	1.5E-03	2.0E-02	7.3E-02	1.2E-04	3.9E-02	3.1E-03	3.6E-03	3.9E-02	9.3E-02	2.5E-04	3.9E-02	6.4E-03
4,4'-DDT	4.4E-04	2.0E-02	2.2E-02	7.1E-05	1.4E-02	5.1E-03	9.7E-04	1.4E-02	6.9E-02	6.7E-05	1.4E-02	4.8E-03
Aroclor-1260	2.8E-03	6.4E-01	4.4E-03	1.9E-04	NA	0.0E+00	6.5E-03	NA	0.0E+00	8.7E-04	NA	0.0E+00
Endrin	2.3E-04	2.0E-02	1.2E-02	5.6E-05	1.4E-02	4.0E-03	1.1E-04	1.4E-02	7.6E-03	3.3E-07	1.4E-02	2.4E-05
Heptaclor epoxide	3.8E-05	3.5E-02	1.1E-03	4.9E-06	1.4E-02	3.5E-04	8.2E-05	1.4E-02	5.8E-03	4.1E-06	1.4E-02	2.9E-04
alpha-Chlordane	1.3E-03	1.6E+00	8.2E-04	1.2E-04	3.1E-02	4.0E-03	3.1E-03	3.1E-02	9.9E-02	1.7E-04	3.1E-02	5.4E-03
gamma-Chlordane	1.0E-03	1.6E+00	6.4E-04	9.7E-05	3.1E-02	3.1E-03	2.4E-03	3.1E-02	7.7E-02	1.3E-04	3.1E-02	4.2E-03
Aluminum	5.1E+00	1.0E+01	5.1E-01	2.0E+00	NA	0.0E+00	9.9E+00	NA	0.0E+00	3.3E-01	NA	0.0E+00
Antimony	5.2E-03	NA	0.0E+00	1.7E-03	NA	0.0E+00	5.4E-03	NA	0.0E+00	1.4E-04	NA	0.0E+00
Arsenic	5.2E-01	5.8E-02	9.0E+00	1.3E-01	1.0E+00	1.3E-01	2.7E-01	1.0E+00	2.7E-01	4.6E-03	1.0E+00	4.6E-03
Beryllium	2.3E-04	8.5E-02	2.7E-03	9.8E-05	NA	0.0E+00	4.2E-04	NA	0.0E+00	1.3E-05	NA	0.0E+00
Cadmium	6.4E+00	2.2E+00	3.0E+00	1.5E+00	1.0E+00	1.5E+00	2.7E+00	1.0E+00	2.7E+00	7.7E-01	1.0E+00	7.7E-01
Chromium	8.1E-02	1.4E+03	5.8E-05	2.5E-02	2.0E+02	1.2E-04	1.7E-01	2.0E+02	8.4E-04	7.1E-03	2.0E+02	3.5E-05
Copper	1.3E+00	1.0E+01	1.3E-01	3.0E-01	NA	0.0E+00	6.4E-01	NA	0.0E+00	4.8E-02	NA	0.0E+00
Lead	3.6E-01	7.0E+00	5.2E-02	1.4E-01	4.6E+00	3.1E-02	7.1E-01	4.6E+00	1.5E-01	2.3E-02	4.6E+00	4.9E-03
Manganese	4.5E-01	6.2E+02	7.3E-04	1.4E-01	NA	0.0E+00	3.9E-01	NA	0.0E+00	7.7E-03	NA	0.0E+00
Mercury	4.0E-03	5.0E-02	8.1E-02	1.0E-03	6.4E-03	1.6E-01	2.6E-03	6.4E-03	4.0E-01	3.7E-05	6.4E-03	5.8E-03
Selenium	6.4E-03	1.3E+01	4.8E-04	8.8E-04	6.1E-01	1.4E-03	1.5E-02	6.1E-01	2.4E-02	8.6E-04	6.1E-01	1.4E-03
Silver	1.6E-01	1.8E+00	8.6E-02	4.0E-02	NA	0.0E+00	1.5E-01	NA	0.0E+00	5.1E-03	NA	0.0E+00
Vanadium	1.4E-02	8.4E+00	1.6E-03	4.6E-03	1.1E+00	4.2E-03	2.8E-02	1.1E+00	2.5E-02	1.0E-03	1.1E+00	9.5E-04
Zinc	2.0E+01	2.0E+01	9.9E-01	3.7E+00	NA	0.0E+00	2.0E+01	NA	0.0E+00	2.9E+00	NA	0.0E+00
2,4,5-TP (Silvex)	3.3E-05	1.6E+02	2.0E-07	8.0E-06	NA	0.0E+00	1.1E-05	NA	0.0E+00	6.7E-07	NA	0.0E+00
2,4,5-T	7.9E-05	2.0E+01	3.9E-06	1.9E-05	NA	0.0E+00	1.4E-05	NA	0.0E+00	1.1E-06	NA	0.0E+00
2,4-D	6.6E-04	9.3E+01	7.1E-06	1.5E-04	1.0E+02	1.5E-06	6.6E-05	1.0E+02	6.6E-07	7.8E-06	1.0E+02	7.8E-08
2,4-DB	1.0E-03	NA	0.0E+00	2.4E-04	NA	0.0E+00	2.6E-04	NA	0.0E+00	1.7E-05	NA	0.0E+00
Dalapon	4.9E-03	1.2E+02	4.2E-05	1.1E-03	2.5E+01	4.5E-05	2.0E-04	2.5E+01	7.8E-06	4.6E-05	2.5E+01	1.8E-06
Dichloroprop	7.2E-04	NA	0.0E+00	1.7E-04	NA	0.0E+00	9.5E-05	NA	0.0E+00	9.3E-06	NA	0.0E+00
Dinoseb	1.2E-04	NA	0.0E+00	3.0E-05	NA	0.0E+00	3.6E-05	NA	0.0E+00	2.3E-06	NA	0.0E+00
MCPA	1.4E-01	NA	0.0E+00	3.6E-02	NA	0.0E+00	8.4E-02	NA	0.0E+00	3.8E-03	NA	0.0E+00
MCPP	1.6E+00	NA	0.0E+00	3.7E-01	NA	0.0E+00	1.9E-01	NA	0.0E+00	2.0E-02	NA	0.0E+00
SUMMARY HAZARD INDEX			1.4E+01			1.6E+00			4.0E+00			8.1E-01

PDE = Potential Dietary Exposure (mg/kgBW/day) RTV = Reference Toxicity Value (mg/kgBW/day) HQ = Hazard Quotient (calculated by dividing PDE by RTV)

Table G-10
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Central Tendency Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 8
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

EXPOSURE CONCENTRATION DATA		ESTIMATED CONTAMINANT CONCENTRATIONS IN PRIMARY FOOD ITEMS						BAF VALUES FOR OTHER FOOD ITEMS	
ANALYTE	CENTRAL TENDENCY EXPOSURE CONCENTRATION (mg/kg)	Invert BAF [a]	Concentration in Invertebrate Tissue [b] (mg/kg)	Fruit / Leafy Vegetable BAF [a]	Concentration in Plant Tissue [c] (mg/kg)	Seed BAF [a]	Concentration in Seeds [c] (mg/kg)	Small Mammal BAF [a]	Small Bird BAF [a]
Acenaphthylene	1.4E-01	5.0E-02	7.0E-03	3.9E-03	5.5E-04	1.8E-02	2.5E-03	2.4E-01	NA
Benzo(a)anthracene	2.4E-01	5.0E-02	1.2E-02	3.9E-03	9.2E-04	1.8E-02	4.1E-03	2.4E-01	NA
Benzo(a)pyrene	2.4E-01	5.0E-02	1.2E-02	3.9E-03	9.4E-04	1.8E-02	4.2E-03	2.4E-01	NA
Benzo(b)fluoranthene	2.9E-01	5.0E-02	1.4E-02	3.9E-03	1.1E-03	1.8E-02	5.0E-03	2.4E-01	NA
Benzo(g,h,i)perylene	2.3E-01	5.0E-02	1.1E-02	3.9E-03	8.8E-04	1.8E-02	4.0E-03	2.4E-01	NA
Benzo(k)fluoranthene	2.8E-01	5.0E-02	1.4E-02	3.9E-03	1.1E-03	1.8E-02	5.0E-03	2.4E-01	NA
Chrysene	2.5E-01	5.0E-02	1.3E-02	3.9E-03	9.8E-04	1.8E-02	4.4E-03	2.4E-01	NA
Di-n-butylphthalate	2.1E-01	5.0E-02	1.1E-02	7.6E-03	1.6E-03	3.4E-02	7.2E-03	3.0E-01	NA
Dibenz(a,h)anthracene	2.3E-01	5.0E-02	1.2E-02	3.9E-03	9.0E-04	1.8E-02	4.1E-03	2.4E-01	NA
Fluoranthene	2.7E-01	5.0E-02	1.3E-02	3.9E-03	1.0E-03	1.8E-02	4.7E-03	2.4E-01	NA
Indeno(1,2,3-cd)pyrene	2.3E-01	5.0E-02	1.2E-02	3.9E-03	9.0E-04	1.8E-02	4.1E-03	2.4E-01	NA
Phenanthrene	1.3E-01	5.0E-02	6.5E-03	3.9E-03	5.1E-04	1.8E-02	2.3E-03	2.4E-01	NA
Pyrene	2.7E-01	5.0E-02	1.4E-02	3.9E-03	1.1E-03	1.8E-02	4.8E-03	3.0E-01	NA
bis(2-Ethylhexyl)phthalate	2.2E-01	5.0E-02	1.1E-02	7.6E-03	1.7E-03	3.4E-02	7.7E-03	1.2E+00	2.9E+00
4,4'-DDD	1.5E-02	3.3E+00	4.8E-02	1.0E-02	1.5E-04	1.0E-02	1.5E-04	1.2E+00	2.9E+00
4,4'-DDE	6.1E-02	1.7E+00	1.0E-01	1.0E-02	6.1E-04	1.0E-02	6.1E-04	1.2E+00	2.9E+00
4,4'-DDT	7.0E-02	5.7E-01	4.0E-02	1.0E-02	7.0E-04	1.0E-02	7.0E-04	3.8E+00	3.2E-01
Aroclor-1260	5.0E-02	5.8E+00	2.9E-01	1.2E-01	6.0E-03	1.2E-01	6.0E-03	1.8E-03	5.9E-01
Endrin	4.9E-03	4.5E-03	2.2E-05	7.2E-01	3.5E-03	7.2E-01	3.5E-03	3.5E-01	1.4E+00
Heptachlor epoxide	3.7E-03	1.0E+00	3.7E-03	5.9E-03	2.2E-05	2.6E-02	9.7E-05	5.5E-01	1.8E+00
alpha-Chlordane	8.6E-02	1.6E+00	1.4E-01	5.1E-03	4.4E-04	2.3E-02	2.0E-03	5.5E-01	1.8E+00
gamma-Chlordane	7.0E-02	1.6E+00	1.1E-01	5.1E-03	3.6E-04	2.3E-02	1.6E-03	7.5E-02	NA
Aluminum	1.4E+03	7.5E-02	1.0E+02	8.0E-04	1.1E+00	8.0E-04	1.1E+00	5.0E-02	NA
Antimony	1.2E+00	5.0E-02	6.0E-02	4.0E-02	4.8E-02	4.0E-02	4.8E-02	1.0E-01	NA
Arsenic	1.2E+01	6.6E-03	8.1E-02	3.0E-01	3.7E+00	3.0E-01	3.7E+00	5.0E-02	NA
Beryllium	1.1E-01	5.0E-02	5.5E-03	2.0E-03	2.2E-04	2.0E-03	2.2E-04	2.1E+00	NA
Cadmium	1.0E+00	1.4E+00	1.4E+00	3.3E+01	3.3E+01	3.3E+01	3.3E+01	2.8E-01	NA
Chromium	2.0E+01	1.6E-01	3.2E+00	1.5E-03	3.0E-02	1.5E-03	3.0E-02	6.0E-01	NA
Copper	1.4E+01	1.6E-01	2.3E+00	7.8E-01	1.1E+01	7.8E-01	1.1E+01	1.5E-02	NA
Lead	9.7E+01	7.8E-02	7.6E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.0E-02	NA
Manganese	3.8E+01	2.0E-02	7.7E-01	5.0E-02	1.9E+00	5.0E-02	1.9E+00	1.0E-02	NA
Mercury	2.2E-01	6.8E-02	1.5E-02	1.8E-01	4.0E-02	1.8E-01	4.0E-02	7.5E-01	NA
Selenium	7.9E-01	7.6E-01	6.0E-01	9.0E-03	7.1E-03	9.0E-03	7.1E-03	1.5E-01	NA
Silver	8.8E+00	1.5E-01	1.3E+00	8.0E-02	7.0E-01	8.0E-02	7.0E-01	1.3E-01	NA
Vanadium	3.2E+00	1.3E-01	4.2E-01	1.1E-03	3.5E-03	1.1E-03	3.5E-03	2.1E+00	NA
Zinc	1.2E+02	1.8E+00	2.2E+02	6.1E-01	7.4E+01	6.1E-01	7.4E+01	1.5E-01	NA
2,4,5-TP (Silvex)	1.9E-03	1.5E-01	2.9E-04	1.1E-03	2.1E-06	2.1E-01	3.9E-04	1.5E-01	NA
2,4,5-T	2.4E-03	1.5E-01	3.6E-04	4.3E-03	1.0E-05	4.6E-01	1.1E-03	1.5E-01	NA
2,4-D	9.1E-03	1.5E-01	1.4E-03	1.2E-02	1.1E-04	6.4E-01	7.6E-03	1.5E-01	NA
2,4-DB	3.7E-02	1.5E-01	5.5E-03	1.9E-03	7.0E-05	2.9E-01	1.1E-02	1.5E-01	NA
Dalapon	1.8E-02	1.5E-01	2.7E-03	1.6E-01	2.9E-03	3.7E+00	6.8E-02	1.5E-01	NA
Dichloroprop	1.5E-02	1.5E-01	2.2E-03	7.2E-03	1.1E-04	6.2E-01	9.2E-03	1.5E-01	NA
Dinoseb	6.6E-03	1.5E-01	9.9E-04	1.5E-03	9.9E-06	2.5E-01	1.7E-03	1.5E-01	NA
MCPA	4.3E+00	1.5E-01	6.4E-01	2.3E-02	9.8E-02	1.2E-01	5.2E-01	1.5E-01	NA
MCPP	8.2E+00	1.5E-01	1.2E+00	8.9E-03	7.3E-02	7.0E-01	5.7E+00	1.5E-01	NA

ECPC = Ecological Chemical of Potential Concern
RME = Reasonable Maximum Exposure
[a] Bioaccumulation data presented in: *Appendix G, Table G-1*

[b] ECPC concentrations in invertebrate tissue equals the invertebrate BAF multiplied by the RME soil concentration of the contaminant.
[c] ECPC concentrations in plant tissue equals the plant BAF multiplied by the RME soil concentration of the contaminant.

Table G-10
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Central Tendency Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 8
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

ANALYTE	*Cotton mouse*	*Mourning dove*	*American robin*	*Loggerhead shrike*
Acenaphthylene	4.1E-04	1.5E-04	4.9E-04	2.0E-05
Benzo(a)anthracene	6.9E-04	2.5E-04	8.3E-04	3.3E-05
Benzo(a)pyrene	7.1E-04	2.5E-04	8.5E-04	3.4E-05
Benzo(b)fluoranthene	8.4E-04	3.0E-04	1.0E-03	4.0E-05
Benzo(g,h,i)perylene	6.6E-04	2.4E-04	7.9E-04	3.2E-05
Benzo(k)fluoranthene	8.3E-04	3.0E-04	9.9E-04	4.0E-05
Chrysene	7.3E-04	2.6E-04	8.8E-04	3.5E-05
Di-n-butylphthalate	8.4E-04	2.7E-04	7.6E-04	3.6E-05
Dibenz(a,h)anthracene	6.8E-04	2.4E-04	8.2E-04	3.3E-05
Fluoranthene	7.8E-04	2.8E-04	9.4E-04	3.8E-05
Indeno(1,2,3-cd)pyrene	6.8E-04	2.4E-04	8.2E-04	3.3E-05
Phenanthrene	3.8E-04	1.4E-04	4.6E-04	1.8E-05
Pyrene	7.9E-04	2.8E-04	9.5E-04	3.8E-05
bis(2-Ethylhexyl)phthalate	9.0E-04	2.9E-04	8.1E-04	3.8E-05
4,4'-DDD	3.8E-04	2.1E-05	9.8E-04	6.7E-05
4,4'-DDE	8.8E-04	7.3E-05	2.2E-03	1.5E-04
4,4'-DDT	4.4E-04	7.1E-05	9.7E-04	6.7E-05
Aroclor-1260	2.5E-03	1.7E-04	5.9E-03	8.0E-04
Endrin	2.3E-04	5.6E-05	1.1E-04	3.3E-07
Heptaclor epoxide	3.8E-05	4.9E-06	8.2E-05	4.1E-06
alpha-Chlordane	1.2E-03	1.2E-04	2.9E-03	1.6E-04
gamma-Chlordane	1.0E-03	9.6E-05	2.4E-03	1.3E-04
Aluminum	2.8E+00	1.1E+00	5.4E+00	1.8E-01
Antimony	5.2E-03	1.7E-03	5.4E-03	1.4E-04
Arsenic	2.5E-01	6.3E-02	1.3E-01	2.2E-03
Beryllium	2.1E-04	9.0E-05	3.8E-04	1.2E-05
Cadmium	2.1E+00	4.9E-01	9.1E-01	2.6E-01
Chromium	5.5E-02	1.7E-02	1.1E-01	4.8E-03
Copper	7.5E-01	1.8E-01	3.8E-01	2.8E-02
Lead	2.0E-01	7.7E-02	3.8E-01	1.2E-02
Manganese	1.8E-01	5.8E-02	1.6E-01	3.1E-03
Mercury	3.0E-03	7.6E-04	1.9E-03	2.7E-05
Selenium	6.0E-03	8.2E-04	1.4E-02	8.0E-04
Silver	6.7E-02	1.7E-02	6.6E-02	2.2E-03
Vanadium	7.9E-03	2.6E-03	1.6E-02	5.9E-04
Zinc	6.5E+00	1.2E+00	6.6E+00	9.7E-01
2,4,5-TP (Silvex)	3.0E-05	7.3E-06	1.0E-05	6.0E-07
2,4,5-T	7.6E-05	1.8E-05	1.3E-05	1.1E-06
2,4-D	5.1E-04	1.2E-04	5.2E-05	6.1E-06
2,4-DB	7.7E-04	1.9E-04	2.0E-04	1.3E-05
Dalapon	4.4E-03	1.0E-03	1.8E-04	4.1E-05
Dichloroprop	6.3E-04	1.5E-04	8.3E-05	8.1E-06
Dinoseb	1.2E-04	3.0E-05	3.6E-05	2.3E-06
MCPA	4.4E-02	1.1E-02	2.6E-02	1.2E-03
MCPP	3.9E-01	9.1E-02	4.6E-02	4.8E-03

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight.

Table G-11
Risk from Potential Sublethal Effects for Terrestrial Receptors from Central Tendency Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 8
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

ANALYTE	Cotton mouse			Mourning dove			American robin			Loggerhead shrike		
	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ
Acenaphthylene	4.1E-04	1.0E+01	4.1E-05	1.5E-04	NA	0.0E+00	4.9E-04	NA	0.0E+00	2.0E-05	NA	0.0E+00
Benzo(a)anthracene	6.9E-04	1.0E+01	6.9E-05	2.5E-04	NA	0.0E+00	8.3E-04	NA	0.0E+00	3.3E-05	NA	0.0E+00
Benzo(a)pyrene	7.1E-04	1.0E+01	7.1E-05	2.5E-04	NA	0.0E+00	8.5E-04	NA	0.0E+00	3.4E-05	NA	0.0E+00
Benzo(b)fluoranthene	8.4E-04	1.0E+01	8.4E-05	3.0E-04	NA	0.0E+00	1.0E-03	NA	0.0E+00	4.0E-05	NA	0.0E+00
Benzo(g,h,i)perylene	6.6E-04	1.0E+01	6.6E-05	2.4E-04	NA	0.0E+00	7.9E-04	NA	0.0E+00	3.2E-05	NA	0.0E+00
Benzo(k)fluoranthene	8.3E-04	1.0E+01	8.3E-05	3.0E-04	NA	0.0E+00	9.9E-04	NA	0.0E+00	4.0E-05	NA	0.0E+00
Chrysene	7.3E-04	1.0E+01	7.3E-05	2.6E-04	NA	0.0E+00	8.8E-04	NA	0.0E+00	3.5E-05	NA	0.0E+00
Di-n-butylphthalate	6.4E-04	1.3E+01	6.7E-05	2.7E-04	NA	0.0E+00	7.6E-04	NA	0.0E+00	3.6E-05	NA	0.0E+00
Dibenz(a,h)anthracene	6.8E-04	1.0E+01	6.8E-05	2.4E-04	NA	0.0E+00	8.2E-04	NA	0.0E+00	3.3E-05	NA	0.0E+00
Fluoranthene	7.8E-04	1.0E+01	7.8E-05	2.8E-04	NA	0.0E+00	9.4E-04	NA	0.0E+00	3.8E-05	NA	0.0E+00
Indeno(1,2,3-cd)pyrene	6.8E-04	1.0E+01	6.8E-05	2.4E-04	NA	0.0E+00	8.2E-04	NA	0.0E+00	3.3E-05	NA	0.0E+00
Phenanthrene	3.8E-04	1.0E+01	3.8E-05	1.4E-04	NA	0.0E+00	4.6E-04	NA	0.0E+00	1.8E-05	NA	0.0E+00
Pyrene	7.9E-04	1.0E+01	7.9E-05	2.8E-04	NA	0.0E+00	9.5E-04	NA	0.0E+00	3.8E-05	NA	0.0E+00
bis(2-Ethylhexyl)phthalate	9.0E-04	3.5E+00	2.6E-04	2.9E-04	NA	0.0E+00	8.1E-04	NA	0.0E+00	3.8E-05	NA	0.0E+00
4,4'-DDD	3.8E-04	2.0E-02	1.9E-02	2.1E-05	1.4E-02	1.5E-03	9.8E-04	1.4E-02	7.0E-02	6.7E-05	1.4E-02	4.8E-03
4,4'-DDE	8.8E-04	2.0E-02	4.4E-02	7.3E-05	3.9E-02	1.9E-03	2.2E-03	3.9E-02	5.6E-02	1.5E-04	3.9E-02	3.9E-03
4,4'-DDT	4.4E-04	2.0E-02	2.2E-02	7.1E-05	1.4E-02	5.1E-03	9.7E-04	1.4E-02	6.9E-02	6.7E-05	1.4E-02	4.8E-03
Aroclor-1260	2.5E-03	6.4E-01	4.0E-03	1.7E-04	NA	0.0E+00	5.9E-03	NA	0.0E+00	8.0E-04	NA	0.0E+00
Endrin	2.3E-04	2.0E-02	1.2E-02	5.6E-05	1.4E-02	4.0E-03	1.1E-04	1.4E-02	7.6E-03	3.3E-07	1.4E-02	2.4E-05
Heptaclor epoxide	3.8E-05	3.5E-02	1.1E-03	4.9E-06	1.4E-02	3.5E-04	8.2E-05	1.4E-02	5.8E-03	4.1E-06	1.4E-02	2.9E-04
alpha-Chlordane	1.2E-03	1.6E+00	7.8E-04	1.2E-04	3.1E-02	3.8E-03	2.9E-03	3.1E-02	9.4E-02	1.6E-04	3.1E-02	5.1E-03
gamma-Chlordane	1.0E-03	1.6E+00	6.3E-04	9.6E-05	3.1E-02	3.1E-03	2.4E-03	3.1E-02	7.6E-02	1.3E-04	3.1E-02	4.2E-03
Aluminum	2.8E+00	1.0E+01	2.8E-01	1.1E+00	NA	0.0E+00	5.4E+00	NA	0.0E+00	1.8E-01	NA	0.0E+00
Antimony	5.2E-03	NA	0.0E+00	1.7E-03	NA	0.0E+00	5.4E-03	NA	0.0E+00	1.4E-04	NA	0.0E+00
Arsenic	2.5E-01	5.8E-02	4.3E+00	6.3E-02	1.0E+00	6.3E-02	1.3E-01	1.0E+00	1.3E-01	2.2E-03	1.0E+00	2.2E-03
Beryllium	2.1E-04	8.5E-02	2.5E-03	9.0E-05	NA	0.0E+00	3.8E-04	NA	0.0E+00	1.2E-05	NA	0.0E+00
Cadmium	2.1E+00	2.2E+00	9.8E-01	4.9E-01	1.0E+00	4.9E-01	9.1E-01	1.0E+00	9.1E-01	2.6E-01	1.0E+00	2.6E-01
Chromium	5.5E-02	1.4E+03	3.9E-05	1.7E-02	2.0E+02	8.4E-05	1.1E-01	2.0E+02	5.7E-04	4.8E-03	2.0E+02	2.4E-05
Copper	7.5E-01	1.0E+01	7.5E-02	1.8E-01	NA	0.0E+00	3.8E-01	NA	0.0E+00	2.8E-02	NA	0.0E+00
Lead	2.0E-01	7.0E+00	2.8E-02	7.7E-02	4.6E+00	1.7E-02	3.8E-01	4.6E+00	8.3E-02	1.2E-02	4.6E+00	2.6E-03
Manganese	1.8E-01	6.2E+02	3.0E-04	5.8E-02	NA	0.0E+00	1.6E-01	NA	0.0E+00	3.1E-03	NA	0.0E+00
Mercury	3.0E-03	5.0E-02	5.9E-02	7.6E-04	6.4E-03	1.2E-01	1.9E-03	6.4E-03	3.0E-01	2.7E-05	6.4E-03	4.2E-03
Selenium	6.0E-03	1.3E+01	4.4E-04	8.2E-04	6.1E-01	1.3E-03	1.4E-02	6.1E-01	2.3E-02	6.0E-04	6.1E-01	1.3E-03
Silver	6.7E-02	1.8E+00	3.7E-02	1.7E-02	NA	0.0E+00	6.6E-02	NA	0.0E+00	2.2E-03	NA	0.0E+00
Vanadium	7.9E-03	8.4E+00	9.4E-04	2.6E-03	1.1E+00	2.4E-03	1.6E-02	1.1E+00	1.5E-02	5.9E-04	1.1E+00	5.4E-04
Zinc	6.5E+00	2.0E+01	3.3E-01	1.2E+00	NA	0.0E+00	6.6E+00	NA	0.0E+00	9.7E-01	NA	0.0E+00
2,4,5-TP (Silvex)	3.0E-05	NA	0.0E+00	7.3E-06	NA	0.0E+00	1.0E-05	NA	0.0E+00	6.0E-07	NA	0.0E+00
2,4,5-T	7.6E-05	NA	0.0E+00	1.8E-05	NA	0.0E+00	1.3E-05	NA	0.0E+00	1.1E-06	NA	0.0E+00
2,4-D	5.1E-04	9.3E+01	5.5E-06	1.2E-04	1.0E+02	1.2E-06	5.2E-05	1.0E+02	5.2E-07	6.1E-06	1.0E+02	6.1E-08
2,4-DB	7.7E-04	NA	0.0E+00	1.9E-04	NA	0.0E+00	2.0E-04	NA	0.0E+00	1.3E-05	NA	0.0E+00
Dalapon	4.4E-03	1.2E+02	3.8E-05	1.0E-03	2.5E+01	4.0E-05	1.8E-04	2.5E+01	7.0E-06	4.1E-05	2.5E+01	1.6E-06
Dichloroprop	6.3E-04	NA	0.0E+00	1.5E-04	NA	0.0E+00	8.3E-05	NA	0.0E+00	8.1E-06	NA	0.0E+00
Dinoseb	1.2E-04	NA	0.0E+00	3.0E-05	NA	0.0E+00	3.6E-05	NA	0.0E+00	2.3E-06	NA	0.0E+00
MCPA	4.4E-02	NA	0.0E+00	1.1E-02	NA	0.0E+00	2.6E-02	NA	0.0E+00	1.2E-03	NA	0.0E+00
MCPP	3.9E-01	NA	0.0E+00	9.1E-02	NA	0.0E+00	4.6E-02	NA	0.0E+00	4.8E-03	NA	0.0E+00
SUMMARY HAZARD INDEX			6.2E+00			7.1E-01			1.8E+00			2.9E-01

PDE = Potential Dietary Exposure (mg/kgBW/day) RTV = Reference Toxicity Value (mg/kgBW/day) HQ = Hazard Quotient (calculated by dividing PDE by RTV)

Table G-12
Exposure Parameters and Assumptions for Terrestrial Receptors [a]
Study Area 9
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

Representative Wildlife Species		Percent Prey in Diet: Inverts	Plants	Small Mammals	Small Birds	Soil	Home Range (acres)	ED [b]	Site Foraging Frequency [c]	Food Ingestion Rate (kg/day)	Body Weight (kg)
Cotton mouse	(Small herb. mammal)	10%	88%	0%	0%	2%	0.147	1	1.00E+00	0.0029	0.04
Mourning dove	(Small omn. mammal)	1%	94%	0%	0%	5%	5	1	2.50E-01	0.0154	0.13
American robin	(Insectivorous bird)	40%	55%	0%	0%	5%	2	1	6.25E-01	0.011	0.0745
Loggerhead shrike	(Carnivorous bird)	14%	0%	70%	15%	1%	18.7	1	6.68E-02	0.0079	0.047

NOTES:

SITE AREA:	1.3 acres

[a] Documentation of exposure parameters presented in: Table 7-5.
[b] ED = Exposure Duration (percentage of year receptor is expected to be found at study area). ED is assumed to be 1 for this risk assessment.
[c] SFF = Site Foraging Frequency (calculated by dividing site area by receptor home range (cannot exceed 1.0)). SFF is assumed to be 1 for lethal exposure scenario.

Table G-13
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Reasonable Maximum Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 9
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]				
ANALYTE	*Cotton mouse*	*Mourning dove*	*American robin*	*Loggerhead shrike*
2-Methylnaphthalene	2.3E-04	1.5E-04	5.1E-04	2.1E-05
bis(2-Ethylhexyl)phthalate	8.8E-04	5.4E-04	1.5E-03	7.1E-05
4,4'-DDD	8.1E-02	8.5E-03	3.9E-01	2.7E-02
4,4'-DDE	6.4E-03	1.0E-03	3.0E-02	2.1E-03
4,4'-DDT	2.3E-03	7.1E-04	9.7E-03	6.7E-04
alpha-Chlordane	6.7E-02	1.2E-02	2.9E-01	1.6E-02
gamma-Chlordane	7.4E-02	1.3E-02	3.3E-01	1.8E-02
Aluminum	1.1E+01	8.5E+00	4.1E+01	1.4E+00
Antimony	2.2E-03	1.3E-03	4.2E-03	1.1E-04
Arsenic	5.8E-02	2.8E-02	5.6E-02	9.7E-04
Beryllium	4.9E-04	3.9E-04	1.6E-03	5.0E-05
Copper	8.0E-01	3.5E-01	7.6E-01	5.7E-02
Lead	7.7E-02	5.7E-02	2.9E-01	9.1E-03
Manganese	3.6E-01	2.2E-01	5.9E-01	1.2E-02
Selenium	5.7E-03	1.5E-03	2.5E-02	1.4E-03
Silver	6.6E-03	3.3E-03	1.2E-02	4.1E-04
Vanadium	1.3E-02	7.9E-03	4.8E-02	1.8E-03
2,4-D	1.3E-03	6.0E-04	2.6E-04	3.0E-05
2,4-DB	4.8E-04	2.2E-04	2.4E-04	1.6E-05
Dalapon	5.1E-03	2.2E-03	3.9E-04	9.0E-05
Dichloroprop	6.0E-04	2.7E-04	1.5E-04	1.5E-05
Dinoseb	3.4E-04	1.5E-04	1.8E-04	1.2E-05
MCPA	1.8E-01	8.4E-02	1.9E-01	8.9E-03
MCPP	2.5E+00	1.1E+00	5.7E-01	6.0E-02

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight.

Table G-13
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Reasonable Maximum Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 9
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

EXPOSURE CONCENTRATION DATA		ESTIMATED CONTAMINANT CONCENTRATIONS IN PRIMARY FOOD ITEMS						BAF VALUES FOR OTHER FOOD ITEMS	
ANALYTE	REASONABLE MAXIMUM EXPOSURE CONCENTRATION (mg/kg)	Invert BAF [a]	Concentration in Invertebrate Tissue [b] (mg/kg)	Fruit / Leafy Vegetable BAF [a]	Concentration in Plant Tissue [c] (mg/kg)	Seed BAF [a]	Concentration in Seeds [c] (mg/kg)	Small Mammal BAF [a]	Small Bird BAF [a]
2-Methylnaphthalene	7.7E-02	5.0E-02	3.9E-03	3.9E-03	3.0E-04	1.8E-02	1.4E-03	2.4E-01	NA
bis(2-Ethylhexyl)phthalate	2.2E-01	5.0E-02	1.1E-02	7.6E-03	1.7E-03	3.4E-02	7.6E-03	3.0E-01	NA
4,4'-DDD	3.1E+00	3.3E+00	1.0E+01	1.0E-02	3.1E-02	1.0E-02	3.1E-02	1.2E+00	2.9E+00
4,4'-DDE	4.6E-01	1.7E+00	7.6E-01	1.0E-02	4.5E-03	1.0E-02	4.5E-03	1.2E+00	2.9E+00
4,4'-DDT	3.7E-01	5.7E-01	2.1E-01	1.0E-02	3.7E-03	1.0E-02	3.7E-03	1.2E+00	2.9E+00
alpha-Chlordane	4.6E+00	1.6E+00	7.4E+00	5.1E-03	2.3E-02	2.3E-02	1.1E-01	5.5E-01	1.8E+00
gamma-Chlordane	5.1E+00	1.6E+00	8.2E+00	5.1E-03	2.6E-02	2.3E-02	1.2E-01	5.5E-01	1.8E+00
Aluminum	5.5E+03	7.5E-02	4.2E+02	8.0E-04	4.4E+00	8.0E-04	4.4E+00	7.5E-02	NA
Antimony	5.0E-01	5.0E-02	2.5E-02	4.0E-02	2.0E-02	4.0E-02	2.0E-02	5.0E-02	NA
Arsenic	2.8E+00	6.6E-03	1.8E-02	3.0E-01	8.4E-01	3.0E-01	8.4E-01	1.0E-01	NA
Beryllium	2.5E-01	5.0E-02	1.3E-02	2.0E-03	5.0E-04	2.0E-03	5.0E-04	5.0E-02	NA
Copper	1.5E+01	1.6E-01	2.4E+00	7.8E-01	1.2E+01	7.8E-01	1.2E+01	6.0E-01	NA
Lead	3.8E+01	7.8E-02	3.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-02	NA
Manganese	7.5E+01	2.0E-02	1.5E+00	5.0E-02	3.8E+00	5.0E-02	3.8E+00	2.0E-02	NA
Selenium	7.5E-01	7.6E-01	5.7E-01	9.0E-03	6.8E-03	9.0E-03	6.8E-03	7.5E-01	NA
Silver	8.7E-01	1.5E-01	1.3E-01	8.0E-02	7.0E-02	8.0E-02	7.0E-02	1.5E-01	NA
Vanadium	5.1E+00	1.3E-01	6.6E-01	1.1E-03	5.6E-03	1.1E-03	5.6E-03	1.3E-01	NA
2,4-D	2.4E-02	1.5E-01	3.6E-03	1.2E-02	2.9E-04	8.4E-01	2.0E-02	1.5E-01	NA
2,4-DB	2.3E-02	1.5E-01	3.5E-03	1.9E-03	4.4E-05	2.9E-01	6.7E-03	1.5E-01	NA
Dalapon	2.1E-02	1.5E-01	3.2E-03	1.6E-01	3.4E-03	3.7E+00	7.8E-02	1.5E-01	NA
Dichloroprop	1.4E-02	1.5E-01	2.2E-03	7.2E-03	1.0E-04	6.2E-01	8.9E-03	1.5E-01	NA
Dinoseb	1.8E-02	1.5E-01	2.7E-03	1.5E-03	2.7E-05	2.5E-01	4.6E-03	1.5E-01	NA
MCPA	1.7E+01	1.5E-01	2.6E+00	2.3E-02	3.9E-01	1.2E-01	2.1E+00	1.5E-01	NA
MCPP	5.4E+01	1.5E-01	8.0E+00	8.9E-03	4.8E-01	7.0E-01	3.7E+01	1.5E-01	NA

ECPC = Ecological Chemical of Potential Concern
RME = Reasonable Maximum Exposure
[a] Bioaccumulation data presented in: Appendix G, Table G-1

[b] ECPC concentrations in invertebrate tissue equals the invertebrate BAF multiplied by the RME soil concentration of the contaminant.
[c] ECPC concentrations in plant tissue equals the plant BAF multiplied by the RME soil concentration of the contaminant.

Table G-14
Risk from Potential Lethal Effects for Terrestrial Receptors from Reasonable Maximum Exposure Concentrations of COPCs in Food and Surface Soil
Study Area 9
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

ANALYTE	Cotton mouse			Mourning dove			American robin			Loggerhead shrike		
	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ
2-Methylnaphthalene	2.3E-04	3.3E+02	6.9E-07	1.5E-04	NA	0.0E+00	5.1E-04	NA	0.0E+00	2.1E-05	NA	0.0E+00
bis(2-Ethylhexyl)phthalate	8.8E-04	1.6E+02	5.5E-06	5.4E-04	NA	0.0E+00	1.5E-03	NA	0.0E+00	7.1E-05	NA	0.0E+00
4,4'-DDD	8.1E-02	1.7E+01	4.7E-03	8.5E-03	1.2E+02	7.1E-05	3.9E-01	1.2E+02	3.3E-03	2.7E-02	1.2E+02	2.3E-04
4,4'-DDE	6.4E-03	1.4E+02	4.6E-05	1.0E-03	1.2E+02	8.5E-06	3.0E-02	1.2E+02	2.5E-04	2.1E-03	1.2E+02	1.7E-05
4,4'-DDT	2.3E-03	1.7E+01	1.4E-04	7.1E-04	1.2E+02	6.0E-06	9.7E-03	1.2E+02	8.1E-05	6.7E-04	1.2E+02	5.6E-06
alpha-Chlordane	6.7E-02	2.0E+01	3.3E-03	1.2E-02	4.8E+00	2.5E-03	2.9E-01	4.8E+00	6.1E-02	1.6E-02	4.8E+00	3.3E-03
gamma-Chlordane	7.4E-02	2.0E+01	3.7E-03	1.3E-02	4.8E+00	2.8E-03	3.3E-01	4.8E+00	6.8E-02	1.8E-02	4.8E+00	3.7E-03
Aluminum	1.1E+01	7.4E+02	1.5E-02	8.5E+00	NA	0.0E+00	4.1E+01	NA	0.0E+00	1.4E+00	NA	0.0E+00
Antimony	2.2E-03	3.3E+03	6.5E-07	1.3E-03	NA	0.0E+00	4.2E-03	NA	0.0E+00	1.1E-04	NA	0.0E+00
Arsenic	5.8E-02	2.9E+01	2.0E-03	2.8E-02	3.6E+00	7.6E-03	5.6E-02	3.6E+00	1.6E-02	9.7E-04	3.6E+00	2.7E-04
Beryllium	4.9E-04	2.0E+00	2.4E-04	3.9E-04	NA	0.0E+00	1.6E-03	NA	0.0E+00	5.0E-05	NA	0.0E+00
Copper	8.0E-01	1.9E+02	4.2E-03	3.5E-01	NA	0.0E+00	7.6E-01	NA	0.0E+00	5.7E-02	NA	0.0E+00
Lead	7.7E-02	6.0E+01	1.3E-03	5.7E-02	7.5E+01	7.6E-04	2.9E-01	7.5E+01	3.8E-03	9.1E-03	7.5E+01	1.2E-04
Manganese	3.6E-01	2.3E+03	1.6E-04	2.2E-01	NA	0.0E+00	5.9E-01	NA	0.0E+00	1.2E-02	NA	0.0E+00
Selenium	5.7E-03	2.8E+01	2.0E-04	1.5E-03	3.0E-01	4.9E-03	2.5E-02	3.0E-01	8.3E-02	1.4E-03	3.0E-01	4.8E-03
Silver	6.6E-03	6.8E+00	9.8E-04	3.3E-03	NA	0.0E+00	1.2E-02	NA	0.0E+00	4.1E-04	NA	0.0E+00
Vanadium	1.3E-02	6.2E+00	2.0E-03	7.9E-03	1.9E+01	4.1E-04	4.8E-02	1.9E+01	2.5E-03	1.8E-03	1.9E+01	9.3E-05
2,4-D	1.3E-03	7.4E+01	1.8E-05	6.0E-04	9.4E+01	6.3E-06	2.6E-04	9.4E+01	2.7E-06	3.0E-05	9.4E+01	3.2E-07
2,4-DB	4.8E-04	1.4E+02	3.5E-06	2.2E-04	NA	0.0E+00	2.4E-04	NA	0.0E+00	1.6E-05	NA	0.0E+00
Dalapon	5.1E-03	1.2E+02	4.4E-05	2.2E-03	5.0E+03	4.4E-07	3.9E-04	5.0E+03	7.7E-08	9.0E-05	5.0E+03	1.8E-08
Dichloroprop	6.0E-04	8.0E+01	7.6E-06	2.7E-04	NA	0.0E+00	1.5E-04	NA	0.0E+00	1.5E-05	NA	0.0E+00
Dinoseb	3.4E-04	1.2E+01	2.9E-05	1.5E-04	5.3E+00	2.9E-05	1.8E-04	5.3E+00	3.5E-05	1.2E-05	5.3E+00	2.2E-06
MCPA	1.8E-01	1.0E+02	1.8E-03	8.4E-02	NA	0.0E+00	1.9E-01	NA	0.0E+00	8.9E-03	NA	0.0E+00
MCPP	2.5E+00	1.3E+02	1.9E-02	1.1E+00	NA	0.0E+00	5.7E-01	NA	0.0E+00	6.0E-02	NA	0.0E+00
SUMMARY HAZARD INDEX			6.0E-02			1.9E-02			2.4E-01			1.3E-02

PDE = Potential Dietary Exposure (mg/kgBW/day) RTV = Reference Toxicity Value (mg/kgBW/day) HQ = Hazard Quotient (calculated by dividing PDE by RTV)

Table G-15
Risk from Potential Sublethal Effects for Terrestrial Receptors from Reasonable Maximum Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 9
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

ANALYTE	Cotton mouse			Mourning dove			American robin			Loggerhead shrike		
	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ
2-Methylnaphthalene	2.3E-04	NA	0.0E+00	1.5E 04	NA	0.0E+00	5.1E-04	NA	0.0E+00	2.1E-05	NA	0.0E+00
bis(2-Ethylhexyl)phthalate	8.8E-04	3.5E+00	2.5E-04	5.4E-04	NA	0.0E+00	1.5E-03	NA	0.0E+00	7.1E-05	NA	0.0E+00
4,4'-DDD	8.1E-02	2.0E-02	4.0E+00	8.5E-03	1.4E-02	6.1E-01	3.9E-01	1.4E-02	2.8E+01	2.7E-02	1.4E-02	1.9E+00
4,4'-DDE	6.4E-03	2.0E-02	3.2E-01	1.0E-03	3.9E-02	2.6E-02	3.0E-02	3.9E-02	7.8E-01	2.1E-03	3.9E-02	5.3E-02
4,4'-DDT	2.3E-03	2.0E-02	1.1E-01	7.1E-04	1.4E-02	5.1E-02	9.7E-03	1.4E-02	6.9E-01	6.7E-04	1.4E-02	4.8E-02
alpha-Chlordane	6.7E-02	1.6E+00	4.2E-02	1.2E-02	3.1E-02	3.9E-01	2.9E-01	3.1E-02	9.5E+00	1.6E-02	3.1E-02	5.2E-01
gamma-Chlordane	7.4E-02	1.6E+00	4.6E-02	1.3E-02	3.1E-02	4.3E-01	3.3E-01	3.1E-02	1.1E+01	1.8E-02	3.1E-02	5.8E-01
Aluminum	1.1E+01	1.0E+01	1.1E+00	8.5E+00	NA	0.0E+00	4.1E+01	NA	0.0E+00	1.4E+00	NA	0.0E+00
Antimony	2.2E-03	NA	0.0E+00	1.3E-03	NA	0.0E+00	4.2E-03	NA	0.0E+00	1.1E-04	NA	0.0E+00
Arsenic	5.8E-02	5.8E-02	1.0E+00	2.8E-02	1.0E+00	2.8E-02	5.6E-02	1.0E+00	5.6E-02	9.7E-04	1.0E+00	9.7E-04
Beryllium	4.9E-04	8.5E-02	5.7E-03	3.9E-04	NA	0.0E+00	1.6E-03	NA	0.0E+00	5.0E-05	NA	0.0E+00
Copper	8.0E-01	1.0E+01	8.0E-02	3.5E-01	NA	0.0E+00	7.6E-01	NA	0.0E+00	5.7E-02	NA	0.0E+00
Lead	7.7E-02	7.0E+00	1.1E-02	5.7E-02	7.5E+02	7.6E-05	2.9E-01	7.5E+02	3.8E-04	9.1E-03	7.5E+02	1.2E-05
Manganese	3.6E-01	6.2E+02	5.8E-04	2.2E-01	NA	0.0E+00	5.9E-01	NA	0.0E+00	1.2E-02	NA	0.0E+00
Selenium	5.7E-03	1.3E+01	4.2E-04	1.5E-03	6.1E-01	2.4E-03	2.5E-02	6.1E-01	4.1E-02	1.4E-03	6.1E-01	2.4E-03
Silver	6.6E-03	1.8E+00	3.7E-03	3.3E-03	NA	0.0E+00	1.2E-02	NA	0.0E+00	4.1E-04	NA	0.0E+00
Vanadium	1.3E-02	8.4E+00	1.5E-03	7.9E-03	1.1E+00	7.2E-03	4.8E-02	1.1E+00	4.4E-02	1.8E-03	1.1E+00	1.6E-03
2,4-D	1.3E-03	9.3E+01	1.4E-05	6.0E-04	1.0E+02	6.0E-06	2.6E-04	1.0E+02	2.6E-06	3.0E-05	1.0E+02	3.0E-07
2,4-DB	4.8E-04	NA	0.0E+00	2.2E-04	NA	0.0E+00	2.4E-04	NA	0.0E+00	1.6E-05	NA	0.0E+00
Dalapon	5.1E-03	1.2E+02	4.4E-05	2.2E-03	2.5E+01	8.9E-05	3.9E-04	2.5E+01	1.5E-05	9.0E-05	2.5E+01	3.6E-06
Dichloroprop	6.0E-04	NA	0.0E+00	2.7E-04	NA	0.0E+00	1.5E-04	NA	0.0E+00	1.5E-05	NA	0.0E+00
Dinoseb	3.4E-04	NA	0.0E+00	1.5E-04	NA	0.0E+00	1.8E-04	NA	0.0E+00	1.2E-05	NA	0.0E+00
MCPA	1.8E-01	NA	0.0E+00	8.4E-02	NA	0.0E+00	1.9E-01	NA	0.0E+00	8.9E-03	NA	0.0E+00
MCPP	2.5E+00	NA	0.0E+00	1.1E+00	NA	0.0E+00	5.7E-01	NA	0.0E+00	6.0E-02	NA	0.0E+00
SUMMARY HAZARD INDEX			6.8E+00			1.5E+00			5.0E+01			3.1E+00

PDE = Potential Dietary Exposure (mg/kgBW/day) RTV = Reference Toxicity Value (mg/kgBW/day) HQ = Hazard Quotient (calculated by dividing PDE by RTV)

Table G-16
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Central Tendency Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 9
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

EXPOSURE CONCENTRATION DATA		ESTIMATED CONTAMINANT CONCENTRATIONS IN PRIMARY FOOD ITEMS						BAF VALUES FOR OTHER FOOD ITEMS	
ANALYTE	CENTRAL TENDENCY EXPOSURE CONCENTRATION (mg/kg)	Invert BAF [a]	Concentration in Invertebrate Tissue [b] (mg/kg)	Fruit / Leafy Vegetable BAF [a]	Concentration in Plant Tissue [c] (mg/kg)	Seed BAF [a]	Concentration in Seeds [c] (mg/kg)	Small Mammal BAF [a]	Small Bird BAF [a]
2-Methylnaphthalene	7.7E-02	5.0E-02	3.9E-03	3.9E-03	3.0E-04	1.8E-02	1.4E-03	2.4E-01	NA
bis(2-Ethylhexyl)phthalate	1.8E-01	5.0E-02	8.9E-03	7.6E-03	1.4E-03	3.4E-02	6.1E-03	3.0E-01	NA
4,4'-DDD	8.6E-01	3.3E+00	2.8E+00	1.0E-02	8.6E-03	1.0E-02	8.6E-03	1.2E+00	2.9E+00
4,4'-DDE	8.9E-02	1.7E+00	1.5E-01	1.0E-02	8.9E-04	1.0E-02	8.9E-04	1.2E+00	2.9E+00
4,4'-DDT	3.0E-01	5.7E-01	1.7E-01	1.0E-02	3.0E-03	1.0E-02	3.0E-03	1.2E+00	2.9E+00
alpha-Chlordane	3.8E-01	1.6E+00	6.0E-01	5.1E-03	1.9E-03	2.3E-02	8.7E-03	5.5E-01	1.8E+00
gamma-Chlordane	3.9E-01	1.6E+00	6.3E-01	5.1E-03	2.0E-03	2.3E-02	9.0E-03	5.5E-01	1.8E+00
Aluminum	1.6E+03	7.5E-02	1.2E+02	8.0E-04	1.3E+00	8.0E-04	1.3E+00	7.5E-02	NA
Antimony	4.8E-01	5.0E-02	2.4E-02	4.0E-02	1.9E-02	4.0E-02	1.9E-02	5.0E-02	NA
Arsenic	2.3E+00	6.6E-03	1.5E-02	3.0E-01	6.9E-01	3.0E-01	6.9E-01	1.0E-01	NA
Beryllium	1.2E-01	5.0E-02	6.0E-03	2.0E-03	2.4E-04	2.0E-03	2.4E-04	5.0E-02	NA
Copper	6.6E+00	1.6E-01	1.1E+00	7.8E-01	5.1E+00	7.8E-01	5.1E+00	6.0E-01	NA
Lead	1.5E+01	7.8E-02	1.2E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.5E-02	NA
Manganese	1.9E+01	2.0E-02	3.7E-01	5.0E-02	9.4E-01	5.0E-02	9.4E-01	2.0E-02	NA
Selenium	7.0E-01	7.6E-01	5.3E-01	9.0E-03	6.3E-03	9.0E-03	6.3E-03	7.5E-01	NA
Silver	8.7E-01	1.5E-01	1.3E-01	8.0E-02	7.0E-02	8.0E-02	7.0E-02	1.5E-01	NA
Vanadium	1.8E+00	1.3E-01	2.3E-01	1.1E-03	2.0E-03	1.1E-03	2.0E-03	1.3E-01	NA
2,4-D	9.0E-03	1.5E-01	1.4E-03	1.2E-02	1.1E-04	8.4E-01	7.6E-03	1.5E-01	NA
2,4-DB	1.7E-02	1.5E-01	2.6E-03	1.9E-03	3.3E-05	2.9E-01	5.0E-03	1.5E-01	NA
Dalapon	1.8E-02	1.5E-01	2.7E-03	1.6E-01	2.9E-03	3.7E+00	6.8E-02	1.5E-01	NA
Dichloroprop	1.1E-02	1.5E-01	1.7E-03	7.2E-03	7.9E-05	6.2E-01	6.8E-03	1.5E-01	NA
Dinoseb	1.8E-02	1.5E-01	2.7E-03	1.5E-03	2.7E-05	2.5E-01	4.6E-03	1.5E-01	NA
MCPA	6.2E+00	1.5E-01	9.3E-01	2.3E-02	1.4E-01	1.2E-01	7.5E-01	1.5E-01	NA
MCPP	1.1E+01	1.5E-01	1.7E+00	8.9E-03	9.9E-02	7.0E-01	7.8E+00	1.5E-01	NA

ECPC = Ecological Chemical of Potential Concern
RME = Reasonable Maximum Exposure
[a] Bioaccumulation data presented in: Appendix G, Table G-1

[b] ECPC concentrations in invertebrate tissue equals the invertebrate BAF multiplied by the RME soil concentration of the contaminant.
[c] ECPC concentrations in plant tissue equals the plant BAF multiplied by the RME soil concentration of the contaminant.

Table G-16
Estimated Chronic Exposure to Terrestrial Receptors from Ingestion of Central Tendency Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 9
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

POTENTIAL DIETARY EXPOSURE (mg/kgBW/day) [d]

ANALYTE	*Cotton mouse*	*Mourning dove*	*American robin*	*Loggerhead shrike*
2-Methylnaphthalene	2.3E-04	1.5E-04	5.1E-04	2.1E-05
bis(2-Ethylhexyl)phthalate	7.1E-04	4.4E-04	1.2E-03	5.7E-05
4,4'-DDD	2.2E-02	2.3E-03	1.1E-01	7.4E-03
4,4'-DDE	1.3E-03	2.0E-04	6.0E-03	4.1E-04
4,4'-DDT	1.9E-03	5.8E-04	7.9E-03	5.5E-04
alpha-Chlordane	5.5E-03	9.8E-04	2.4E-02	1.3E-03
gamma-Chlordane	5.7E-03	1.0E-03	2.5E-02	1.4E-03
Aluminum	3.3E+00	2.5E+00	1.2E+01	4.0E-01
Antimony	2.1E-03	1.3E-03	4.1E-03	1.0E-04
Arsenic	4.7E-02	2.3E-02	4.6E-02	8.0E-04
Beryllium	2.3E-04	1.9E-04	7.9E-04	2.4E-05
Copper	3.5E-01	1.5E-01	3.3E-01	2.5E-02
Lead	3.0E-02	2.2E-02	1.1E-01	3.5E-03
Manganese	8.9E-02	5.4E-02	1.5E-01	2.9E-03
Selenium	5.3E-03	1.4E-03	2.3E-02	1.3E-03
Silver	6.6E-03	3.3E-03	1.2E-02	4.1E-04
Vanadium	4.4E-03	2.8E-03	1.7E-02	6.3E-04
2,4-D	5.0E-04	2.2E-04	9.7E-05	1.1E-05
2,4-DB	3.6E-04	1.7E-04	1.8E-04	1.2E-05
Dalapon	4.4E-03	1.9E-03	3.3E-04	7.8E-05
Dichloroprop	4.6E-04	2.1E-04	1.2E-04	1.1E-05
Dinoseb	3.4E-04	1.5E-04	1.8E-04	1.2E-05
MCPA	6.4E-02	3.0E-02	7.0E-02	3.2E-03
MCPP	5.3E-01	2.3E-01	1.2E-01	1.2E-02

[d] Calculated by summing the products of individual prey type concentrations and percent in diet, multiplying by the ingestion rate, and dividing by body weight.

Table G-17
Risk from Potential Sublethal Effects for Terrestrial Receptors from Central Tendency Exposure Concentrations of ECPCs in Food and Surface Soil
Study Area 9
Remedial Investigation Report, OU 3
Naval Training Center Orlando, Orlando, Florida

ANALYTE	*Cotton mouse*			*Mourning dove*			*American robin*			*Loggerhead shrike*		
	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ	PDE	RTV	HQ
2-Methylnaphthalene	2.3E-04	NA	0.0E+00	1.5E-04	NA	0.0E+00	5.1E-04	NA	0.0E+00	2.1E-05	NA	0.0E+00
bis(2-Ethylhexyl)phthalate	7.1E-04	3.5E+00	2.0E-04	4.4E-04	NA	0.0E+00	1.2E-03	NA	0.0E+00	5.7E-05	NA	0.0E+00
4,4'-DDD	2.2E-02	2.0E-02	1.1E+00	2.3E-03	1.4E-02	1.7E-01	1.1E-01	1.4E-02	7.8E+00	7.4E-03	1.4E-02	5.3E-01
4,4'-DDE	1.3E-03	2.0E-02	6.4E-02	2.0E-04	3.9E-02	5.2E-03	6.0E-03	3.9E-02	1.5E-01	4.1E-04	3.9E-02	1.1E-02
4,4'-DDT	1.9E-03	2.0E-02	9.4E-02	5.8E-04	1.4E-02	4.2E-02	7.9E-03	1.4E-02	5.6E-01	5.5E-04	1.4E-02	3.9E-02
alpha-Chlordane	5.5E-03	1.6E+00	3.4E-03	9.8E-04	3.1E-02	3.2E-02	2.4E-02	3.1E-02	7.8E-01	1.3E-03	3.1E-02	4.3E-02
gamma-Chlordane	5.7E-03	1.6E+00	3.5E-03	1.0E-03	3.1E-02	3.3E-02	2.5E-02	3.1E-02	8.1E-01	1.4E-03	3.1E-02	4.4E-02
Aluminum	3.3E+00	1.0E+01	3.3E-01	2.5E+00	NA	0.0E+00	1.2E+01	NA	0.0E+00	4.0E-01	NA	0.0E+00
Antimony	2.1E-03	NA	0.0E+00	1.3E-03	NA	0.0E+00	4.1E-03	NA	0.0E+00	1.0E-04	NA	0.0E+00
Arsenic	4.7E-02	5.8E-02	8.2E-01	2.3E-02	1.0E+00	2.3E-02	4.6E-02	1.0E+00	4.6E-02	8.0E-04	1.0E+00	8.0E-04
Beryllium	2.3E-04	8.5E-02	2.7E-03	1.9E-04	NA	0.0E+00	7.9E-04	NA	0.0E+00	2.4E-05	NA	0.0E+00
Copper	3.5E-01	1.0E+01	3.5E-02	1.5E-01	NA	0.0E+00	3.3E-01	NA	0.0E+00	2.5E-02	NA	0.0E+00
Lead	3.0E-02	7.0E+00	4.3E-03	2.2E-02	7.5E+02	2.9E-05	1.1E-01	7.5E+02	1.5E-04	3.5E-03	7.5E+02	4.7E-06
Manganese	8.9E-02	6.2E+02	1.4E-04	5.4E-02	NA	0.0E+00	1.5E-01	NA	0.0E+00	2.9E-03	NA	0.0E+00
Selenium	5.3E-03	1.3E+01	3.9E-04	1.4E-03	6.1E-01	2.2E-03	2.3E-02	6.1E-01	3.8E-02	1.3E-03	6.1E-01	2.2E-03
Silver	6.6E-03	1.8E+00	3.7E-03	3.3E-03	NA	0.0E+00	1.2E-02	NA	0.0E+00	4.1E-04	NA	0.0E+00
Vanadium	4.4E-03	8.4E+00	5.3E-04	2.8E-03	1.1E+00	2.5E-03	1.7E-02	1.1E+00	1.5E-02	6.3E-04	1.1E+00	5.8E-04
2,4-D	5.0E-04	9.3E+01	5.4E-06	2.2E-04	1.0E+02	2.2E-06	9.7E-05	1.0E+02	9.7E-07	1.1E-05	1.0E+02	1.1E-07
2,4-DB	3.6E-04	NA	0.0E+00	1.7E-04	NA	0.0E+00	1.8E-04	NA	0.0E+00	1.2E-05	NA	0.0E+00
Dalapon	4.4E-03	1.2E+02	3.8E-05	1.9E-03	2.5E+01	7.7E-05	3.3E-04	2.5E+01	1.3E-05	7.8E-05	2.5E+01	3.1E-06
Dichloroprop	4.6E-04	NA	0.0E+00	2.1E-04	NA	0.0E+00	1.2E-04	NA	0.0E+00	1.1E-05	NA	0.0E+00
Dinoseb	3.4E-04	NA	0.0E+00	1.5E-04	NA	0.0E+00	1.8E-04	NA	0.0E+00	1.2E-05	NA	0.0E+00
MCPA	6.4E-02	NA	0.0E+00	3.0E-02	NA	0.0E+00	7.0E-02	NA	0.0E+00	3.2E-03	NA	0.0E+00
MCPP	5.3E-01	NA	0.0E+00	2.3E-01	NA	0.0E+00	1.2E-01	NA	0.0E+00	1.2E-02	NA	0.0E+00
SUMMARY HAZARD INDEX			2.5E+00			1.6E-01			1.0E+01			6.7E-01

PDE = Potential Dietary Exposure (mg/kgBW/day) RTV = Reference Toxicity Value (mg/kgBW/day) HQ = Hazard Quotient (calculated by dividing PDE by RTV)

APPENDIX H

GROUNDWATER TOXICITY TESTING REPORT

FILE

Aquatec Biological Sciences

Ecology | Environmental Toxicology | Natural Resource Assessments | Microbiology

March 11, 1998

Anita Pease
ABB Environmental Services
2120 Washington Boulevard, Suite 300
Arlington, Virginia 22204

Dear Ms. Pease:

Enclosed please find the results of screening-level chronic toxicity tests (Final Report) conducted on three groundwater samples (NTC Orlando) received at Aquatec Biological Sciences on 19 and 20 February 1998. This report has been revised to include comparisons to the reference station. We have also enclosed a diskette containing an electronic copy of the report (1652F.doc) and cover letter (03-11-98.doc).

If you have any additional comments or questions regarding the report or data package, please contact me or Dr. Philip C. Downey. We look forward to the opportunity to work with you again.

Sincerely,

John Williams
Manager, Environmental Toxicology
03-11-98.doc

75 Green Mountain Drive, South Burlington, Vt. 05403 Tel: 802.860.1638 Fax: 802.658.3189

Results of the *Ceriodaphnia dubia* Survival and Reproduction and *Pimephales promelas*, Larval Survival and Growth Toxicity Tests BTR 1652 & 1654 Final Report

Prepared for:
ABB Environmental Services
2590 Executive Center Circle East
Tallahassee, Florida

Prepared by:
Aquatec Biological Sciences
75 Green Mountain Drive
South Burlington, Vermont

March 1998

Aquatec Biological Sciences

Ecology | Environmental Toxicology | Natural Resource Assessments | Microbiology

BTR: **1652 & 1654**

PROJECT: **98017**

I have reviewed this data package, which was completed under my supervision. This data package is complete, and to the best of my ability, accurately reflects the conditions and the results of the reported tests.

John W. Williams
Toxicity Laboratory Manager

3/11/98
Date

I have reviewed and discussed this data package with the responsible laboratory manager. Based on this review, the data package was, to the best of my knowledge and belief, conducted in accordance with established company quality assurance procedures.

Brian D. Moffat
Quality Assurance Officer

3/11/98
Date

75 Green Mountain Drive, South Burlington, Vt. 05403 Tel: 802.860.1633 Fax: 802.658.3169

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EXECUTIVE SUMMARY

Results of Screening Chronic Toxicity Tests on
NTC Orlando, Florida Groundwater Samples
Conducted February 1998

Laboratory Test ID	Client Sample ID	Species	Acute 48-h Survival (%)	Chronic End of Test Survival (%)	Reproduction (Avg. no. neonates per female)
Lab Control 1	-	*Ceriodaphnia dubia*	100	100	32.7
4918	08G01601	*Ceriodaphnia dubia*	100	100	33.9
Lab Control 2	-	*Ceriodaphnia dubia*	100	100	46.7
4922	08G01801	*Ceriodaphnia dubia*	100	100	50
4923	08G01303	*Ceriodaphnia dubia*	100	100	34.1*

* Indicates a statistically significant reduction relative to the concurrent Laboratory Control (P<0.05). Reductions in survival or reproduction of *Ceriodaphnia dubia* in samples 4922 and 4923 relative to the reference sample 4918 were not observed (direct observation).

Laboratory Test ID	Client Sample ID	Species	Acute 48-h Survival (%)	Chronic End of Test Survival (%)	Growth (Avg. dry wt.) (mg)
Lab Control 1	-	*Pimephales promelas*	100	93	0.43
4918	08G01601	*Pimephales promelas*	100	90	0.46
Lab Control 2	-	*Pimephales promelas*	100	98	0.49
4922	08G01801	*Pimephales promelas*	100	98	0.47
4923	08G01303	*Pimephales promelas*	100	95	0.44*

* Indicates a statistically significant reduction relative to the concurrent Laboratory Control (P<0.05). Reductions in survival or growth of *Pimephales promelas* in samples 4922 and 4923 relative to the reference sample 4918 were not observed (direct observation and statistical analysis).

INTRODUCTION:

Samples were received for toxicity testing at Aquatec Biological Sciences of 75 Green Mountain Drive, South Burlington, Vermont. The results of the following tests are reported:

Client:	ABB Environmental Services
Permit Number:	Not applicable
Facility:	NTC Orlando (Groundwater)
Initial Sampling Date:	2/18/98 (sample 4918) and 2/19/98 (samples 4922 and 4923)
Tests Conducted:	Daphnid, *Ceriodaphnia dubia*, Survival and Reproduction
	Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth

METHODS:

The procedures followed in conducting these toxicity tests were based on methods described by the USEPA (EPA 600/4-89/001) as indicated in Table 1 and Table 2. Sample 4918 (08G01601) was received on 19 February 1998. Toxicity tests for this sample were initiated on 19 February 1998 with concurrent Laboratory Controls. Samples 4922 (08G01801) and 4923 (08G01303) were received on 20 February 1998. Toxicity tests for these samples were initiated on 20 February 1998 with concurrent Laboratory Controls.

Statistical analysis or organism responses was performed by comparing the sample toxicity test results with the concurrent Laboratory Control for each species. Comparisons of the responses observed in samples 4922 (08G01801) and 4923 (08G01303) were also compared to sample 4918 (08G01601) by direct observation or by statistical analysis.

PROTOCOL DEVIATIONS:

Protocol deviations were not encountered.

RESULTS:

Statistical summaries for the *Ceriodaphnia dubia* and the *Pimephales promelas* chronic toxicity tests are located in Appendix A.

- Sample 4918 (08G01601) did not exhibit acute or chronic toxicity relative to the Laboratory Control for *Ceriodaphnia dubia* or *Pimephales promelas*.
- Sample 4922 (08G01801) did not exhibit acute or chronic toxicity when compared to the Laboratory Control or to reference sample 4918 (08G01601) for *Ceriodaphnia dubia* or *Pimephales promelas*.
- Sample 4923 (08G01301) exhibited chronic toxicity for *Ceriodaphnia dubia* (reduction in reproduction) and *Pimephales promelas* (reduction in growth) when compared to the Laboratory Controls. Sample 4923 (08G01301) did not exhibit chronic toxicity for *Ceriodaphnia dubia* or *Pimephales promelas* when this sample was compared to the reference sample 4918 (08G01601).

QUALITY ASSURANCE:

Standard reference toxicant (SRT) tests were conducted for each test species. The resulting LC50 value for *Ceriodaphnia dubia* and *Pimephales promelas* were within control chart limits and were therfore deemed acceptable.

Table 1: Test conditions for the cladoceran (*Ceriodaphnia dubia*) survival and reproduction toxicity test.

ASSOCIATED PROTOCOL: EPA 1994. *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms.* (EPA/600/4-89/001).

1. Test type:	Static, daily renewal
2. Test temperature:	25 ± 1°C
3. Light quality:	Ambient laboratory illumination
4. Photoperiod:	16 hr. light, 8 hr. dark
5. Test chamber size:	30 mL
6. Test solution volume:	15 - 20 mL
7. Renewal of test solutions:	Daily
8. Age of test organism:	Less than 24 hr.; and all released within an 8 hr. period of each other
9. Number of neonates per test chamber:	1
10. Number of replicate test chambers per treatment:	10
11. Number of neonates per test concentration:	10
12. Feeding regime:	Feed 0.1 ml each of YTC and algal suspension per exposure chamber daily.
13. Aeration:	None
14. Control water:	Moderately hard synthetic water (prepared using deionized water and reagent grade chemicals).

Table 1. Test conditions for the cladoceran (*Ceriodaphnia dubia*) survival and reproduction toxicity test (continued).

15. Test concentrations:	One (100 %)
16. Dilution factor:	None
17. Test duration:	Until 60% of control females have three broods
18. Monitoring:	Daily temperature, dissolved oxygen, pH, and conductivity on old and renewal water. Hardness and alkalinity on Control and 100% sample. Biological monitoring (survival, number of neonates) daily
19. Effects measured:	Survival and reproduction
20. Toxicity endpoints:	A-NOEC (Acute-No-Observed-Effect-Concentration) – the highest concentration of effluent which causes no observable adverse effects on the test organisms (i.e., not statistically different from the controls) measured at 48 hours. C-NOEC (Chronic-No-Observed-Effect-Concentration) - the highest concentration of effluent which causes no observable adverse effects on the test organisms (i.e., not statistically different from the controls)
21. Analysis method:	EPA flowchart (EPA/600/4-89/001) using TOXIS Version 2.5 (©1993, 1994 EcoAnalysis, Inc.)
22. Test acceptability:	80% or greater survival and an average of 15 or more young/female in the control solutions. At least 60% of surviving females in controls must have produced third brood
23. Reference toxicant test:	Sodium chloride 48-h LC50

Table 2. Test conditions for the fathead minnow (*Pimephales promelas*) 7-day larval survival and growth toxicity test.

ASSOCIATED PROTOCOL: EPA 1994. *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms.* (EPA/600/4-89/001).

1. Test type:	Static, daily renewal
2. Test temperature:	25 ± 1°C
3. Light quality:	Ambient laboratory illumination
4. Photoperiod:	16 hr. light, 8 hr. dark
5. Test chamber size:	600 ml
6. Test solution volume:	250 ml/replicate
7. Renewal of test concentrations:	Daily (samples cold-stored between renewals)
8. Age of test organisms:	Newly hatched larvae, 24 hrs. old
9. No. larvae/test chamber and control:	15
10. No. of replicate chambers/ concentration:	4
11. No. of larvae/concentration:	60
12. Feeding regime:	Feed 0.1 ml newly hatched brine shrimp (Artemia) naupli twice daily, 6 hrs. between feedings (at the beginning of the work day prior to renewal, and at the end of the work day following renewal). Not fed on Day 7.
13. Cleaning:	Siphon daily, immediately before test solution renewal
14. Aeration:	None, unless dissoved oxygen drops below 40% of saturation
15. Control water:	Moderately hard synthetic water (prepared using deionized water and reagent grade chemicals.
16. Test concentrations:	One (100 %)

Table 2. Test conditions for the fathead minnow (*Pimephales promelas*) larval survival and growth toxicity test. (continued).

17. Dilution factor:	None
18. Test duration:	7 days
19. Monitoring:	Daily temperature, dissolved oxygen, pH, and conductivity on old and renewal water. Hardness and alkalinity on the Control and 100% sample. Biological monitoring daily (survival counts, removal of dead)
20. Effects measured:	Survival and growth
21. Toxicity endpoints:	A-NOEC (Acute-No-Observed-Effect-Concentration) – the highest concentration of effluent which causes no observable adverse effects on the test organisms (i.e., not statistically different from the controls) measured at 48 hours. C-NOEC (Chronic-No-Observed-Effect-Concentration) - the highest concentration of effluent which causes no observable adverse effects on the test organisms (i.e., not statistically different from the controls)
22. Analysis method:	EPA flowchart (EPA/600/4-89/001) using TOXIS Version 2.5 (©1993, 1994 EcoAnalysis, Inc.) or direct observation
23. Test acceptability:	80% or greater survival in the controls; minimum average dry weight of controls should be0.25 mg
24. Reference toxicant test:	Sodium chloride 48-h LC50

APPENDIX: A

Aquatec Biological Sciences

Test Date: 2/19/98
Sample Date: 2/18/98
Species: Ceriodaphnia dubia
Test Type: Chronic

Test Number: 4918.003
Test Material: Discharge Monitoring Rpt.
Source: NTCORLAND
ABB Tallahassee
NTC Orlando,FLA

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	No transformation	X	0.000	D	10	1.00	0.000	
			X	100.000	D	9	1.00	0.000	
Proportion Alive	7	No transformation	X	0.000	D	10	1.00	0.000	
			X	100.000	D	9	1.00	0.000	
Reproduction		No transformation	X	0.000	D	10	32.70	3.466	
			X	100.000	D	9	33.89	4.859	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	No transformation Fisher Exact	>100.000	>100.000	< 1.00		
Proportion Alive	7	No transformation Fisher Exact	>100.000	>100.000	< 1.00		
Reproduction		No transformation Wilcoxon test with Bonfe	>100.000	>100.000	< 1.00	17.470	3.342

Aquatec Biological Sciences

Test Date: 2/19/98
Sample Date: 2/18/98
Species: Pimephales promelas
Test Type: Chronic

Test Number: 4918.001
Test Material: Discharge Monitoring Rpt.
Source: WTCORLAND
ABB Tallahassee
WTC Orlando,FLA

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	Arc sine sqrt w/ adj.	X	0.000	D	4	1.44	0.000	
			X	100.000	D	4	1.44	0.000	
Proportion Alive	2	No transformation		0.000	D	4	1.00	0.000	
				100.000	D	4	1.00	0.000	
Proportion Alive	7	Arc sine sqrt w/ adj.	X	0.000	D	4	1.31	.100	
			X	100.000	D	4	1.26	.144	
Proportion Alive	7	No transformation		0.000	D	4	.93	.054	
				100.000	D	4	.90	.086	
Weight		No transformation	X	0.000	D	4	.43	.021	
			X	100.000	D	4	.46	.055	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	Arc sine sqrt w/ adj.					
Proportion Alive	7	Arc sine sqrt w/ adj. Wilcoxon test with Bonfe	>100.000	>100.000	< 1.00	.015	.107
Weight		No transformation Wilcoxon test with Bonfe	>100.000	>100.000	< 1.00	.002	.057

Aquatec Biological Sciences

Test Date: 2/20/98
Sample Date: 2/19/98
Species: Ceriodaphnia dubia
Test Type: Chronic

Test Number: 4922.003
Test Material: Discharge Monitoring Rpt.
Source: NTCORLAND
ABB Tallahassee
NTC Orlando,FLA

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	No transformation	X	0.000	D	10	1.00	0.000	
			X	100.000	D	9	1.00	0.000	
Proportion Alive	7	No transformation	X	0.000	D	10	1.00	0.000	
			X	100.000	D	9	1.00	0.000	
Reproduction		No transformation	X	0.000	D	10	46.70	5.187	
			X	100.000	D	9	50.00	2.739	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	No transformation Fisher Exact	>100.000	>100.000	< 1.00		
Proportion Alive	7	No transformation Fisher Exact	>100.000	>100.000	< 1.00		
Reproduction		No transformation Wilcoxon test with Bonfe	>100.000	>100.000	< 1.00	17.771	3.370

Aquatec Biological Sciences

Test Date: 2/20/98
Sample Date: 2/19/98
Species: Pimephales promelas
Test Type: Chronic

Test Number: 4922.001
Test Material: Discharge Monitoring Rpt.
Source: NTCORLAND
ABB Tallahassee
NTC Orlando,FLA

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	Arc sine sqrt w/ adj.	X	0.000	D	4	1.44	0.000	
			X	100.000	D	4	1.44	0.000	
Proportion Alive	2	No transformation		0.000	D	4	1.00	0.000	
				100.000	D	4	1.00	0.000	
Proportion Alive	7	Arc sine sqrt w/ adj.	X	0.000	D	4	1.41	.066	
			X	100.000	D	4	1.41	.066	
Proportion Alive	7	No transformation		0.000	D	4	.98	.033	
				100.000	D	4	.98	.033	
Weight		No transformation	X	0.000	D	4	.49	.034	
			X	100.000	D	4	.47	.021	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	Arc sine sqrt w/ adj.					
Proportion Alive	7	Arc sine sqrt w/ adj. Wilcoxon test with Bonfe	>100.000	>100.000	< 1.00	.004	.036
Weight		No transformation Wilcoxon test with Bonfe	>100.000	>100.000	< 1.00	.001	.038

Aquatec Biological Sciences

Test Date: 2/20/98
Sample Date: 2/19/98
Species: Ceriodaphnia dubia
Test Type: Chronic

Test Number: 4923.003
Test Material: Discharge Monitoring Rpt.
Source: NTCORLAND
ABB Tallahassee
NTC Orlando,FLA

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	No transformation	X	0.000	D	10	1.00	0.000	
			X	100.000	D	10	1.00	0.000	
Proportion Alive	7	No transformation	X	0.000	D	10	1.00	0.000	
			X	100.000	D	10	1.00	0.000	
Reproduction		No transformation	X	0.000	D	10	46.70	5.187	
			X	100.000	D	10	34.10	8.266	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	No transformation Fisher Exact	>100.000	>100.000	< 1.00		
Proportion Alive	7	No transformation Fisher Exact	>100.000	>100.000	< 1.00		
Reproduction		No transformation Wilcoxon test with Bonfe	<100.000	100.000	> 1.00	47.611	5.338

- GROWTH POINT ESTIMATE -

End Point	P	IC	95% CI
Reproduction	IC 25	92.659	62.95 - 99.78
	IC 50		-

Aquatec Biological Sciences

Test Date: 2/20/98
Sample Date: 2/19/98
Species: Pimephales promelas
Test Type: Chronic

Test Number: 4923.001
Test Material: Discharge Monitoring Rpt.
Source: NTCORLAND
ABB Tallahassee
NTC Orlando,FLA

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	2	Arc sine sqrt w/ adj.	X	0.000	D	4	1.44	0.000	
			X	100.000	D	4	1.44	0.000	
Proportion Alive	2	No transformation		0.000	D	4	1.00	0.000	
				100.000	D	4	1.00	0.000	
Proportion Alive	7	Arc sine sqrt w/ adj.	X	0.000	D	4	1.41	.066	
			X	100.000	D	4	1.35	.113	
Proportion Alive	7	No transformation		0.000	D	4	.98	.033	
				100.000	D	4	.95	.060	
Weight		No transformation	X	0.000	D	4	.49	.034	
			X	100.000	D	4	.44	.024	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	2	Arc sine sqrt w/ adj.					
Proportion Alive	7	Arc sine sqrt w/ adj. Wilcoxon test with Bonfe	>100.000	>100.000 <	1.00	.009	.055
Weight		No transformation Wilcoxon test with Bonfe	<100.000	100.000 >	1.00	.001	.040

Aquatec Biological Sciences

Test Date: 2/19/98
Sample Date: 2/18/98
Species: Pimephales promelas
Test Type: Chronic

Test Number: 4918V4923
Test Material: Discharge Monitoring Rpt.
Source: WTCORLAND
ABB Tallahassee
WTC Orlando,FLA

SUMMARY

End Point	Day	Transformation		Conc		#Reps	Mean	StDev	% Surv
Proportion Alive	7	Arc sine sqrt w/ adj.							
		4918	X	0.000	D	4	1.26	.144	
		4923	X	100.000	D	4	1.35	.113	
Proportion Alive	7	No transformation							
				0.000	D	4	.90	.086	
				100.000	D	4	.95	.060	
Weight		No transformation							
			X	0.000	D	4	.46	.055	
			X	100.000	D	4	.44	.024	

X = indicates concentrations used in calculations

- HYPOTHESIS TEST -

End Point	Day	Transformation/Analysis	NOEC	LOEC	TU	MSE	MSD
Proportion Alive	7	Arc sine sqrt w/ adj.					
		Wilcoxon test with Bonfe	>100.000	>100.000	< 1.00	.017	.126
Weight		No transformation					
		Wilcoxon test with Bonfe	>100.000	>100.000	< 1.00	.002	.058

300006B

APPENDIX: B

COMPUCHEM ENVIRONMENTAL
a division of Liberty Analytical Corp

4600 Silicon Drive
Durham, NC 27703
1-800-833-5097

CHAIN-OF-CUSTODY RECORD

No. 6724

Ship to: John Williams
Aquatic Biological Sci.
75 Green Mtn Dr.
S. Burlington VT

Carrier: FEDEX Airbill No: 804072598433

Project Name: NTC ORLANDO OU3

Sampler Name: W.D. OLSON

Sampler Signature: W.D. Olson

Field Point-of-Contact: W.D. OLSON

Telephone No.: (407) 895-8843

Sampling for project complete? Y or (N) (See Note 1)

Project-specific (PS) or Batch (B) QC: NA

BOX #1: 1 Surface Water, 2 Ground Water, 3 Leachate, 4 Rinsate, 5 Soil / Sediment / Sludge, 6 Trip Blank, 7 Oil, 8 Waste, 9 Other

Box #2: A HCl, B HNO_3, C $NaHSO_4$, D $Na_2S_2O_3$, E Ice Only, O Other, N Not Preserved

Box #3: F Filtered, U Unfiltered

Box #4: C CLP 3/90, S SW-846, W CWA 600 series, L Low Conc CLP, R Radiological, T TCLP, O Other

Box #5: H High, M Medium, L Low

SEA# 11077
11078

Sample ID (Organics 9 characters max, Inorganics 6 characters, See Note 2)	Date: Year 19 (90)	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc	No. of Bottles	Use for Lab QC MS or DUP	Organic Analysis: VOA-GC/MS	SV-GC/MS	Pest/PCB-GC	Herb-GC	VOA-GC	Inorganics: Metals	Mercury	Cyanides	Radiologicals	Other: TCLP-TOX	TCLP-TPH	Phenols	Other	Remarks / Comments
08G021601	12/18	12:30	2	E	U		H	3															TOXICITY

Client's Special Instructions:

Lab: Received In Good Condition? Y or N Describe Problems, If Any:

#1 Relinquished By (Sig) W.D. Olson	Date: 12-18	#2 Relinquished By (Sig)	Date	#3 Relinquished By (Sig)	Date	Sample storage time requested? (In days, see Note 1)
Company Name ABB-ES	Time 1530	Company Name	Time	Company Name	Time	
#1 Received By (Sig) Christine Dumas	Date 12/19/90	#2 Received By (Sig)	Date	#3 Received By (Sig)	Date	DESTROY or RETURN data after five years of archival? (Circle choice, see Note 4)
Company Name Aquatic Biol Sci	Time 1000	Company Name	Time	Company Name	Time	

Note (1): If "N" lab will hold samples to await remainder of project maximizing batch size and minimizing QC ratio, if "Y" lab will begin processing batches now. Note (2): If CLP Inorganics diskette required, ID limited to maximum of six characters.

Note (3): Samples stored 60 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five years unless client requests and pays for return of copies, annual storage fee billed in January of year six.

COMPUCHEM ENVIRONMENTAL
a division of Liberty Analytical Corp

4600 Silicon Drive
Durham, NC 27703
1-800-833-5097

No. 01387

CHAIN-OF-CUSTODY RECORD

Ship to: John Williams, Aquatec Biological Sciences, 75 Green Mtn Dr., S. Burlington VT

Carrier: Fedex Airbill No.: 875741 1202

Project Name: NTC ORLANDO 003

Sampler Name: W. D. Olson

Sampler Signature: Willis D. Olson

Field Point of Contact: W. D. Olson

Telephone No.: (407) 895-8845

Sampling for project complete? (Y) or N (See Note 1)

Project-specific (PS) or Batch (B) QC:

BOX #1: 1 Surface Water, 2 Ground Water, 3 Leachate, 4 Hinsate, 5 Soil / Sediment / Sludge, 6 Trip Blank, 7 Oil, 8 Waste, 9 Other ____

Box #2: A HCl, B HNO_3, C $NaHSO_4$, D $Na_2S_2O_3$, E Ice Only, O Other ____, N Not Preserved

Box #3: F Filtered, U Unfiltered

Box #4: C CLP 3/90, S SW 846, W CWA 600-series, L Low Conc CLP, R Radiological, I ICP, O Other ____

Box #5: H High, M Medium, L Low

Sample ID (Organics 9 characters max, Inorganics 6 characters. See Note 2)	Date: Year 19	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered/Unfiltered	Box #4 Method	Box #5 Expect. Conc.	No. of Bottles	Use for Lab QC MS or DUP	Organic Analysis: VOA-GC/MS	SV-GC/MS	Pest/PCB-GC	Herb-GC	VOA-GC	TOX/TOC	Inorganics: Metals	Mercury	Cyanides	Radiologicals	TOC/TOX	O&G/TPH	Phenols	Other	Remarks / Comments
08G01801	2/19	0940	3	E	U		H	3							X									Seal# 11079
08G01303	2/19	1300	2	E	U		H	3							X									11080
																								11060
																								11450

Client's Special Instructions:

Lab: Received in Good Condition? Y or N Describe Problems, If Any:

#1 Relinquished By (Sig) Willis D. Olson	Date 2-19	#2 Relinquished By (Sig) Fed Ex	Date	#3 Relinquished By (Sig)	Date	Sample storage time requested? ____ (In days, see Note 3)
Company Name ABB-ES	Time 1500	Company Name	Time	Company Name	Time	
#1 Received By (Sig) Fed Ex	Date	#2 Received By (Sig) Caroline Mallard	Date 2/20	#3 Received By (Sig)	Date	DESTROY or RETURN data after five years of archival (Circle choice, see Note 4)
Company Name	Time	Company Name Aquatec	Time 0955	Company Name Coolerten 2.3°C	Time	

Note (1): If "Y" [illegible] samples to await remainder of project maximizing batch size and minimizing QC ratio, if "Y" lab will begin [illegible]ssing batches now. Note (2): If CLP Inorganics diskette required, ID limited to maximum of six characters. Note (3): Sa[illegible] d 60 days after date report mailed at no extra charge. Note (4): All lab copies of data destroyed after five [illegible]ess client requests and pays for return of copies, annual storage fee billed in January of year six

APPENDIX: C

3/04/98-12:28 pm TOXIS ANALYSIS SUMMARY

W r Flea

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/19/98	DMR ()	NTCORLAND	EPAF 94	4918.003

Statistics Parameters

PROPORTION

End Point:	PA Proportion Alive		
Analysis:	Fisher Exact	Auto growth select	1 control
Transform:	No transformation		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	0.00	Alpha Normality:	.01
		NOEC:	.05

EC/LC Method: F (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point:	GR Reproduction		
Analysis:	EPA Flowchart	Auto growth select	1 control
Transform:	No transformation		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	0.00	Alpha Normality:	.01
		NOEC:	.05

Calculate IC? Y (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC/LC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
IC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
PROP	0	Analysis completed with no errors
GROW	0	Analysis completed with no errors

/04/98

TOXIS ANALYSIS SUMMARY

eriodaphnia Day2 Day 2

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/19/98	DMR ()	NTCORLAND	EPAF 94	4918.003

Fisher Exact Auto growth select 1 control

Transformation		Prop. Conc	Alive	P
No transformation	X	0.00D	1.00	
	X	100.00D	1.00	1.000

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Fisher Exact

000019

3/05/98

TOXIS ANALYSIS SUMMARY

Ceriodaphnia			Proportion Alive			Day 7
Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/19/98	DMR ()	NTCORLAND	EPAF 94	4918.003

Fisher Exact	Auto growth select	1 control

Transformation		Prop. Conc	Alive	P
No transformation				
	X	0.00D	1.00	
	X	100.00D	1.00	1.000

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Fisher Exact

/05/98

TOXIS ANALYSIS SUMMARY

:eriodaphnia — Reproduction

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/19/98	DMR ()	NTCORLAND	EPAF 94	4918.003

EPA Flowchart Auto growth select 1 control

	Conc	Mean	SD	N	T
Data transformation:		No transformation			
X	0.00D	32.70	3.466	10	
X	100.00D	33.89	4.859	9	-.619

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Wilcoxon w/ Bonf

Bonferroni T Test:	MSE	MSD % Reduction from Control		Critical
	17.469	10.2188		1.74
Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.953828	.863	Yes
Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	1.2187	.26961	Yes

Aquatec Biological Sciences

WATER FLEA DAILY REPORT

TEST NUMBER: 4918.003
TEST DATE: 19-Feb-98
SOURCE: NTCORLAND

(x) Chronic ( ) Acute hours

TEST MATERIAL: DMR ()

Conc	Ctrl	Rep	Cont. #	Daily Reproduction 1	2	3	4	5	6	7	8	9	10
0.00	D	1				4	11	0	15				
0.00	D	2				5	11	0	18				
0.00	D	3				4	0	11	17				
0.00	D	4				4	0	11	14				
0.00	D	5				4	0	12	17				
0.00	D	6				3	0	11	16				
0.00	D	7				4	0	11	16				
0.00	D	8				0	6	12	19				
0.00	D	9				5	0	14	21				
0.00	D	10				3	0	13	15				
100.00	D	1				4	9	0	17				
100.00	D	2				6	0	16	17				
100.00	D	3				5	0	14	17				
100.00	D	4				6	0	11	8				
100.00	D	5				6	0	16	17				
100.00	D	6				3	0	14	14				
100.00	D	7				5	0	10	17				
100.00	D	8				6	0	13	20				
100.00	D	9				6	0	13	15				

Aquatec Biological Sciences

WATER FLEA TEST DATA

Test Number: 4918.003 (x) Chronic ( ) Acute hours
Test Date: 19-Feb-98
Source: NTCORLAND Test Material: DMR ()

Conc	Rep	Cont. No.	Sex	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Total Young	Max Young
0.00 D	1		F	1	1	1	1	1	1	1	1	1.00	30	15
0.00 D	2		F	1	1	1	1	1	1	1	1	1.00	34	18
0.00 D	3		F	1	1	1	1	1	1	1	1	1.00	32	17
0.00 D	4		F	1	1	1	1	1	1	1	1	1.00	29	14
0.00 D	5		F	1	1	1	1	1	1	1	1	1.00	33	17
0.00 D	6		F	1	1	1	1	1	1	1	1	1.00	30	16
0.00 D	7		F	1	1	1	1	1	1	1	1	1.00	31	16
0.00 D	8		F	1	1	1	1	1	1	1	1	1.00	39	19
0.00 D	9		F	1	1	1	1	1	1	1	1	1.00	40	21
0.00 D	10		F	1	1	1	1	1	1	1	1	1.00	31	15
100.00 D	1		F	1	1	1	1	1	1	1	1	1.00	30	17
100.00 D	2		F	1	1	1	1	1	1	1	1	1.00	39	17
100.00 D	3		F	1	1	1	1	1	1	1	1	1.00	36	17
100.00 D	4		F	1	1	1	1	1	1	1	1	1.00	25	11
100.00 D	5		F	1	1	1	1	1	1	1	1	1.00	39	17
100.00 D	6		F	1	1	1	1	1	1	1	1	1.00	31	14
100.00 D	7		F	1	1	1	1	1	1	1	1	1.00	32	17
100.00 D	8		F	1	1	1	1	1	1	1	1	1.00	39	20
100.00 D	9		F	1	1	1	1	1	1	1	1	1.00	34	15

Ceriodaphnia dubia Survival and Reproduction Data (Page 1 of 2)

Client: ABB - Groundwater toxicity screening test (undiluted sample)

Test Description: *C. dubia* modified acute / chronic toxicity Method: EPA/600/4-91/002

Influent (%)	Repl 1	Repl 2	Repl 3	Repl 4	Repl 5	Repl 6	Repl 7	Repl 8	Repl 9	Repl 10	Remarks
Lab Contr	0	0	0	0	0	0	0	0	0	0	Day 0
Sample											
	0	0	0	0	0	0	0	0	0	0	Fed ✓
											Date/time/Init.
											2/19/98 1350
											CM

Lab Contr	0									1	Day 1
Sample	0									1	
											Fed ✓
											Date/time/Init.
											2/20/98 1400 CM

Lab Contr	0	0	0	0	0	0	0	0	0	0	Day 2
Sample	0	0	0	0	0	0	M*	0	0	0	
											Fed ✓
											Date/time/Init.
											2/21/98 1400
											CM

Lab Contr	4	5	4	4	4	3	4	0	5	3	Day 3
Sample	4	6	5	6	6	3	M	5	6	6	
											Fed ✓
											Date/time/Init.
											1455

0=original organism surviving, no young; D=original organism dead; #=# young released; *=lab-induced mortality

Reviewer: _____ Date: 3/6/98

cdchrscr.doc

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

① orange ppt in sample cups unable to find live or dead animal on 2/21/98

000015

Ceriodaphnia dubia Survival and Reproduction Data (Page 2 of 2)

Client: ABB - Groundwater toxicity screening (undiluted sample)

Test Description: *C. dubia* modified acute / chronic toxicity Method: EPA/600/4-91/002

Effluent (%)	Repl 1	Repl 2	Repl 3	Repl 4	Repl 5	Repl 6	Repl 7	Repl 8	Repl 9	Repl 10	Remarks
Lab Contr	11	11	0	0	0	0	0	6	0	0	Day 4
Sample	9	0	0	0	0	0	M	0	0	0	
(4918)											Fed ✓
											Date/time/Init.
											2/23 1420 RC

Lab Contr	0	0	11	11	12	11	11	12	14	13	Day 5
Sample	0	16	14	11	16	14	M	10	13	13	
(4918)											Fed ✓
											Date/time/Init.
											2/24 1440 RC

Lab Contr	15	18	17	14	17	16	16	19	21	15	Day 6
Sample											
(4918)	17	17	17	8	17	14	M	17	20	15	Fed
											Test Terminated
											Date/time/Init.
											2/25/93 1210
											CM

Lab Contr											Day 7
Sample											
(4918)											Fed
											Date/time/Int.

0=original organism surviving, no young; D=original organism dead; ###= young released; *=lab-induced mortality

Reviewer: [illegible] Date: 3/6/93

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

cdchrsc2oc

000015

Initial (Before renewal) Water Chemistry Data

Client: ABB Groundwater toxicity (undiluted sample)

Test Description: *C. dubia* / *P. promelas* modified acute / chronic toxicity screening

	Day:	0	1	2	3	4	5	6
Treatment	Sample:	4918	4918	4918				
Lab Control	pH	7.7	7.7	8.0	8.1	7.9	8.0	7.9
	DO	8.1	8.1	8.0	8.1	8.1	8.2	8.1
	Temp	25.0	25.0	25.0	25.0	25.4	25.4	25.3
	Cond.	260	260	260	260	280	280	250
Rec. Water Control	pH	-	-	-	-	-	-	-
	DO	-	-	-	-	-	-	-
	Temp	-	-	-	-	-	-	-
	Cond.	-	-	-	-	-	-	-
Sample 4918	pH	7.5	7.6	7.9	7.9	7.9	8.0	7.7
	DO	8.3	8.2	8.2	8.0	8.1	8.2	8.2
	Temp	25.2	25.5	24.2	25.7	25.2	25.5	24.5
	Cond.	165	160	165	160	170	170	170
Sample	pH							
	DO							
	Temp							
	Cond.							
Sample	pH							
	DO							
	Temp							
	Cond.							
Sample	pH							
	DO							
	Temp							
	Cond.							
Sample	pH							
	DO							
	Temp							
	Cond.							
	Init./Date	CM 2/19	CM 2/20	CM 2/21	CC 2/22	CC 2/23	CC 2/24	CM 2/25
Remarks								

Reviewer: J Date: 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

dorrinch.doc

Final (After renewal) Water Chemistry Data

Client: ABB - Groundwater toxicity (undiluted sample)

Test Description: *P. promelas* modified acute / chronic toxicity

Treatment	Day:	1	2	3	4	5	6	7
	Sample:							
Lab Control	pH	7.5	7.6	22	25	26	7.4	
	DO	7.2	7.1	25	25	24	7.2	
	Temp	25.0	25.0	25.2	25.9	25.4	24.9	
	Cond.	-	-	-	-	-	-	-
Rec. Water Control	pH	-	-	-	-	-	-	-
	DO	-	-	-	-	-	-	-
	Temp	-	-	-	-	-	-	-
	Cond.	-	-	-	-	-	-	-
Sample 49%	pH	7.5	7.6	22	25	26	7.4	
	DO	7.0	7.1	23	20	22	6.8	
	Temp	24.9	25.3	25.3	26.0	25.1	24.4	
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
	Init./Date	CM 2/20	CM 2/21	CC 2/22	CC 2/23	CC 2/24	CM 2/25	
Remarks								

Reviewer: _____ Date: 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Sample Characterization and Preparation

Client: ABB - Groundwater toxicity

Test Description: *C. dubia / P. promelas* modified acute / chronic toxicity

Sample Identification:

Sample Description	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Sample No.	4918		4922	4923		
Date Rec.	2/19/95		2/20/95	2/20/95		

Sample Characteristics:

Temp. (°C)	6.2		4.5	4.7		
pH	6.5		5.4	5.7		
D.O. (mg/L)	6.3		8.6	9.0		
Cond. (umhos/cm)	110		80	90		
Salinity (o/oo)	—		—	—		
Other:						

Sample Preparation:

Filtration [1]	None		none	none		
Chlorine [2]	—		—	—		
Dechlorine [3]	—		—	—		
Warm (25°C)	✓		✓	✓		
Aeration	✓		✓	✓		
Prepared by (Init./date)	[illegible] 2/19/95		[illegible] 2/20	[illegible] 2/20		

[1] Not required unless indigenous organisms or particulates need removal, 60 um Nitex mesh size (if used) Record "NF" if not filtered.
[2] Record vol. 0.025 N sodium thiosulfate to dechorinate 100 mL sample or record "ND" (not detected).
[3] Record vol. 0.25 N sodium thiosulfate added per gallon effluent or "--" if dechlorination is not required.
NA = Not applicable.

Comments:

Control = Lab MHW = Reconstituted moderately hard water
Collect alkalinity / hardness samples on each new sample and on the concurrent laboratory control.

Reviewer: [illegible] Date: 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

prepscre.doc

ALKALINITY & HARDNESS WORKSHEET

BTR Number: 1652/1654 Project Number: 98017 Analyst: cm

Species: *C. dubia & P. promelas* Analysis Date: 02/17/98

Test Facility: Aquatec Biological Sciences, South Burlington, Vermont

Project Description: ABB Environmental Services

ALKALINITY:

Date	Sample Type	Sample ml	Initial ml	Final ml	Final-Initial(ml)	Factor 1000/Sample	Alkalinity (mg/L)
02/19/98	MHW	25	27.0	28.5	1.5	40	60
02/19/98	4918	25	28.5	30.4	1.9	40	76
02/20/98	4922	50	30.4	31.4	1.0	20	20
02/20/98	4923	50	31.4	32.9	1.5	20	30

HARDNESS:

Date	Sample Type	Sample ml	Initial ml	Final ml	Final-Initial(ml)	Factor 1000/Sample	Hardness (mg/L)
02/19/98	MHW	25	29.9	32.0	2.1	40	84
02/19/98	4918	50	32.0	36.2	4.2	20	84
02/20/98	4922	50	36.2	38.1	1.9	20	38
02/20/98	4923	50	38.1	40.1	2.0	20	40

[illegible] 3/6/98

ALKALINITY AND HARDNESS DATA

TEST FACILITY: Aquatec Biological Sciences, 75 Green Mountain Drive, S. Burlington, VT 05403

BTR NUMBER (S): 1652/1659

TEST SPECIES: C. dubia / P promelas ABB PROJECT: 98017

		ALKALINITY:			HARDNESS:		
		Analyst: CM		Date: 3/04/98	Analyst: CM		Date: 3/06/98
Sample Date:	Sample I.D.	Sample Vol. (ml)	Initial Vol. (ml)	Final Vol. (ml)	Sample Vol. (ml)	Initial Vol. (ml)	Final Vol. (ml)
2/19	MHW	25	27.00	28.50	25	29.96	32.00
2/19	4918	25	28.50	30.40	50	32.00	36.20
2/20	4922	250	30.40	31.40	50	36.20	38.10
		CM					
2/20	4923	250	31.40	32.96	50	38.10	40.10

Reviewer: _____ Date: 3/6/98

Comments: _____

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PROJECT DOCUMENTATION

Client [illegible] Project Description [illegible] screening. BTR [illegible]

Testing Facility Aquatec Biological Sciences: S. Burlington, VT

Description	Date	Time	Init
[illegible] 1630 [illegible] of [illegible]			
[illegible] 0035 - 0055 [illegible]			
[illegible]			
			IEC
[illegible] 0530 collection			
[illegible] 15 cups of [illegible]			

3/6/98

3/04/98-12:39 pm TOXIS ANALYSIS SUMMARY

Water Flea

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/20/98	DMR ()	NTCORLAND	EPAF 94	4922.003

Statistics Parameters

PROPORTION

End Point:	PA Proportion Alive		
Analysis:	Fisher Exact	Auto growth select	1 control
Transform:	No transformation		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	0.00	Alpha Normality:	.01
		NOEC:	.05

EC/LC Method: F (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point:	GR Reproduction		
Analysis:	EPA Flowchart	Auto growth select	1 control
Transform:	No transformation		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	0.00	Alpha Normality:	.01
		NOEC:	.05

Calculate IC? Y (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC/LC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
IC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
PROP	0	Analysis completed with no errors
GROW	0	Analysis completed with no errors

TOXIS ANALYSIS SUMMARY

ciodaphnia		Day2				Day 2
Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/20/98	DMR ()	NTCORLAND	EPAF 94	4922.003

isher Exact	Auto growth select	1 control

ransformation		Prop. Conc	Alive	F
o transformation				
	X	0.00D	1.00	
	X	100.00D	1.00	1.000

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Fisher Exact

3/04/98

TOXIS ANALYSIS SUMMARY

Ceriodaphnia | Proportion Alive | Day 7

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/20/98	DMR ()	NTCORLAND	EPAF 94	4922.003

Fisher Exact | Auto growth select | 1 control

Transformation		Prop. Conc	Alive	P
No transformation	X	0.00D	1.00	
	X	100.00D	1.00	1.000

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Fisher Exact

3/04/98

TOXIS ANALYSIS SUMMARY

Ceriodaphnia — Reproduction

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/20/98	DMR ()	NTCORLAND	EPAF 94	4922.003

EPA Flowchart — Auto growth select — 1 control

	Conc	Mean	SD	N	T	Sum of Ranks	Critical Sum of Ranks
Data transformation: No transformation							
X	0.00D	46.70	5.187	10			
X	100.00D	50.00	2.739	9	-1.704	112.500	69.000

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Wilcoxon w/ Bonf

Bonferroni T Test:	MSE	MSD % Reduction from Control	Critical T	
	17.770	7.21670	1.74	
Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.751013	.863	No
Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	2.4691	.11609	Yes

Aquatec Biological Sciences

WATER FLEA DAILY REPORT

TEST NUMBER: 4922.003
TEST DATE: 20-Feb-98
SOURCE: NTCORLAND

(x) Chronic ( ) Acute hours

TEST MATERIAL: DMR ()

Conc	Ctrl	Rep	Cont. #	Daily Reproduction 1	2	3	4	5	6	7	8	9	10
0.00	D	1				5	11	17	17				
0.00	D	2				6	12	14	17				
0.00	D	3				6	11	15	16				
0.00	D	4				6	11	15	17				
0.00	D	5				4	10	14	16				
0.00	D	6				4	10	15	17				
0.00	D	7				6	12	16	16				
0.00	D	8				6	9	15	18				
0.00	D	9				5	12	16	0				
0.00	D	10				5	14	14	17				
100.00	D	1				6	11	16	20				
100.00	D	2				5	9	14	18				
100.00	D	3				6	11	13	21				
100.00	D	4				4	11	16	19				
100.00	D	5				6	12	16	17				
100.00	D	6				2	8	15	21				
100.00	D	7				6	12	17	18				
100.00	D	8				5	12	15	16				
100.00	D	9				5	13	16	18				

CM 3/6

Aquatec Biological Sciences

WATER FLEA TEST DATA

Test Number: 4922.003 (x) Chronic ( ) Acute hours
Test Date: 20-Feb-98
Source: NTCORLAND Test Material: DMR ()

Conc	Rep	Cont. No.	Sex	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Total Young	Max Young
0.00 D	1		F	1	1	1	1	1	1	1	1	1.00	50	17
0.00 D	2		F	1	1	1	1	1	1	1	1	1.00	49	17
0.00 D	3		F	1	1	1	1	1	1	1	1	1.00	48	16
0.00 D	4		F	1	1	1	1	1	1	1	1	1.00	49	17
0.00 D	5		F	1	1	1	1	1	1	1	1	1.00	44	16
0.00 D	6		F	1	1	1	1	1	1	1	1	1.00	46	17
0.00 D	7		F	1	1	1	1	1	1	1	1	1.00	50	16
0.00 D	8		F	1	1	1	1	1	1	1	1	1.00	48	18
0.00 D	9		F	1	1	1	1	1	1	1	1	1.00	33	16
0.00 D	10		F	1	1	1	1	1	1	1	1	1.00	50	17
100.00 D	1		F	1	1	1	1	1	1	1	1	1.00	53	20
100.00 D	2		F	1	1	1	1	1	1	1	1	1.00	46	18
100.00 D	3		F	1	1	1	1	1	1	1	1	1.00	51	21
100.00 D	4		F	1	1	1	1	1	1	1	1	1.00	50	19
100.00 D	5		F	1	1	1	1	1	1	1	1	1.00	51	17
100.00 D	6		F	1	1	1	1	1	1	1	1	1.00	46	21
100.00 D	7		F	1	1	1	1	1	1	1	1	1.00	53	18
100.00 D	8		F	1	1	1	1	1	1	1	1	1.00	48	16
100.00 D	9		F	1	1	1	1	1	1	1	1	1.00	52	18

3/04/98-12:50 pm

TOXIS ANALYSIS SUMMARY

Water Flea

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/20/98	DMR ()	NTCORLAND	EPAF 94	4923.003

Statistics Parameters

PROPORTION

End Point: PA Proportion Alive
Analysis: Fisher Exact Auto growth select 1 control
Transform: No transformation
Tail: One-tailed, decreasing
Constant: -.01 Variance: .01
Root: 0.00 Alpha Normality: .01
NOEC: .05

EC/LC Method: F (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point: GR Reproduction
Analysis: EPA Flowchart Auto growth select 1 control
Transform: No transformation
Tail: One-tailed, decreasing
Constant: -.01 Variance: .01
Root: 0.00 Alpha Normality: .01
NOEC: .05

Calculate IC? Y (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC/LC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
IC	0	Analysis completed with no errors
PROP	0	Analysis completed with no errors
GROW	0	Analysis completed with no errors

3/04/98

TOXIS ANALYSIS SUMMARY

Ceriodaphnia Day2 Day 2

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/20/98	DMR ()	NTCORLAND	EPAF 94	4923.003

Fisher Exact Auto growth select 1 control

Transformation		Prop. Conc	Alive	P
No transformation				
	X	0.00D	1.00	
	X	100.00D	1.00	1.000

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Fisher Exact

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3/04/98

TOXIS ANALYSIS SUMMARY

Ceriodaphnia | Proportion Alive | Day 7

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/20/98	DMR ()	NTCORLAND	EPAF 94	4923.003

Fisher Exact | Auto growth select | 1 control

Transformation		Prop. Conc	Alive	P
No transformation	X	0.00D	1.00	
	X	100.00D	1.00	1.000

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Fisher Exact

3/04/98

TOXIS ANALYSIS SUMMARY

Ceriodaphnia			Reproduction			
Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	CD	2/20/98	DMR ()	NTCORLAND	EPAF 94	4923.003

EPA Flowchart Auto growth select 1 control

	Conc	Mean	SD	N	T
Data transformation:		No transformation			
X	0.00D	46.70	5.187	10	
X	100.00D	34.10	8.266	10	4.083

NOEC	LOEC	TU	Alpha	Tail	Based on
<100	100	>1	.05	One-sided	Wilcoxon w/ Bonf

Bonferroni T Test:	MSE	MSD % Reduction from Control	Critical	
	47.611	11.4313	1.73	
Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.8933	.868	Yes
Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	1.7885	.1811	Yes

Aquatec Biological Sciences

WATER FLEA DAILY REPORT

TEST NUMBER: 4923.003
TEST DATE: 20-Feb-98
SOURCE: NTCORLAND

(x) Chronic ( ) Acute hours

TEST MATERIAL: DMR ()

Conc	Ctrl	Rep	Cont. #	Daily Reproduction 1	2	3	4	5	6	7	8	9	10
0.00	D	1				5	11	17	17				
0.00	D	2				6	12	14	17				
0.00	D	3				6	11	15	16				
0.00	D	4				6	11	15	17				
0.00	D	5				4	10	14	16				
0.00	D	6				4	10	15	17				
0.00	D	7				6	12	16	16				
0.00	D	8				6	9	15	18				
0.00	D	9				5	12	16	0				
0.00	D	10				5	14	14	17				
100.00	D	1				5	11	18	0				
100.00	D	2				5	9	17	4				
100.00	D	3				5	11	0	6				
100.00	D	4				5	10	12	11				
100.00	D	5				4	12	15	0				
100.00	D	6				5	7	12	15				
100.00	D	7				5	11	18	19				
100.00	D	8				5	12	12	0				
100.00	D	9				5	11	15	0				
100.00	D	10				5	12	12	0				

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Aquatec Biological Sciences

WATER FLEA TEST DATA

Test Number: 4923.003 (x) Chronic ( ) Acute hours
Test Date: 20-Feb-98
Source: NTCORLAND Test Material: DMR ()

Conc	Rep	Cont. No.	Sex	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Total Young	Max Young
0.00 D	1		F	1	1						1	1.00	50	17
0.00 D	2		F	1	1						1	1.00	49	17
0.00 D	3		F	1	1						1	1.00	48	16
0.00 D	4		F	1	1						1	1.00	49	17
0.00 D	5		F	1	1						1	1.00	44	16
0.00 D	6		F	1	1						1	1.00	46	17
0.00 D	7		F	1	1						1	1.00	50	16
0.00 D	8		F	1	1						1	1.00	48	18
0.00 D	9		F	1	1						1	1.00	33	16
0.00 D	10		F	1	1						1	1.00	50	17
100.00 D	1		F	1	1						1	1.00	34	18
100.00 D	2		F	1	1						1	1.00	35	17
100.00 D	3		F	1	1						1	1.00	22	11
100.00 D	4		F	1	1						1	1.00	38	12
100.00 D	5		F	1	1						1	1.00	31	15
100.00 D	6		F	1	1						1	1.00	39	15
100.00 D	7		F	1	1						1	1.00	53	19
100.00 D	8		F	1	1						1	1.00	29	12
100.00 D	9		F	1	1						1	1.00	31	15
100.00 D	10		F	1	1						1	1.00	29	12

Ceriodaphnia dubia Survival and Reproduction Data (Page 1 of 2)

Client: ABB - Groundwater toxicity screening test (undiluted sample)

Test Description: *C. dubia* modified acute / chronic toxicity Method: EPA/600/4-91/002

Effluent (%)	Repl 1	Repl 2	Repl 3	Repl 4	Repl 5	Repl 6	Repl 7	Repl 8	Repl 9	Repl 10	Remarks
Lab Contr	0	0	0	0	0	0	0	0	0	0	Day 0
Sample											
	0	0	0	0	0	0	0	0	0	0	Fed ✓
	0	0	0	0	0	0	0	0	0	0	Initiated from 2/11 [illegible] culture
											Date/time/Init.
											2/20/98 1550
											CM

Lab Contr	0	0	0	0	0	0	0	0	0	0	Day 1
Sample											
4922	0	0	0	0	0	0	0	0	0	0	Fed ✓ CM
4923	0	0	0	0	0	0	0	0	0	0	2/21/98 1410
											Date/time/Init.

Lab Contr	0	—	—	—	—	—	—	—	—	—	Day 2
Sample											
											Fed ✓
4922	0	—	—	—	—	—	—	—	M	0	
4923	0	—	—	—	—	—	—	—	—	—	Date/time/Init.
											2/22/98 1510 CL

Lab Contr	5	6	6	6	4	4	6	6	5	5	Day 3
Sample											
											Fed ✓
4922	6	5	6	4	6	2	6	5	M	5	
4923	5	5	5	5	4	5	5	5	5	5	Date/time/Init.
											2/23 1440 CL

0=original organism surviving, no young; D=original organism dead; ###=young released; *=lab-induced mortality

Reviewer: [signature] Date: 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

cdchrscr.doc

Ceriodaphnia dubia Survival and Reproduction Data (Page 2 of 2)

Client: ABB - Groundwater toxicity screening (undiluted sample)

Test Description: *C. dubia* modified acute / chronic toxicity Method: EPA/600/4-91/002

Effluent (%)	Repl 1	Repl 2	Repl 3	Repl 4	Repl 5	Repl 6	Repl 7	Repl 8	Repl 9	Repl 10	Remarks
Lab Contr	11	12	11	11	10	10	12	9	12	14	Day 4
Sample											
											Fed ✓
4922	11	9	11	11	12	8	12	12	M	13	
4923	11	9	11	10	12	7	11	12	11	12	Date/time/Init.
											2/24 1455 RC

Lab Contr	17	14	15	15	14	15	16	15	16	14	Day 5
Sample											
											Fed ✓
4922	16	14	13	16	16	15	17	15	M	16	
4923	18	17	0	12	15	12	18	12	15	12	Date/time/Init.
											2/25/98 1230
											CM

Lab Contr	17	17	16	17	16	12	16	18	0	17	Day 6
Sample											
											~~Fed~~
4922	20	18	21	19	17	21	18	16	M	18	test terminated
4923	0	4	6	11	O/A	15	19	O/A	O/A	0	Date/time/Init.
											2/26 1040 RC
											A = aborted breed notes

Lab Contr											Day 7
Sample											
											Fed
4922											
4923											Date/time/Init.

0=original organism surviving, no young; D=original organism dead; #=# young released; *=lab-induced mortality

Reviewer: _____ Date: 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

cdchrsc2oc

Initial (Before renewal) Water Chemistry Data

Client: ABB Groundwater toxicity (undiluted sample)

Test Description: *C. dubia* / *P. promelas* modified acute / chronic toxicity screening

Treatment	Day: / Sample:	0	1	2	3	4	5	6
Lab Control	pH	7.7	8.0	8.1	7.9	8.0	7.9	[illegible]
	DO	8.1	8.0	8.1	8.1	8.2	8.1	8.1
	Temp	25.0	25.0	25.0	25.4	25.4	25.3	25.1
	Cond.	260	260	260	280	280	280	280
Rec. Water Control	pH	-	-	-	-	-	-	-
	DO	-	-	-	-	-	-	-
	Temp	-	-	-	-	-	-	-
	Cond.	-	-	-	-	-	-	-
Sample 4927	pH	7.1	7.3	7.3	7.3	7.4	7.3	7.3
	DO	8.3	8.2	8.0	7.9	8.2	8.2	8.2
	Temp	25.5	24.4	25.6	25.2	25.4	24.6	25.2
	Cond.	100	105	100	110	110	110	120
Sample 4923	pH	7.2	7.6	7.5	7.5	7.6	7.5	7.4
	DO	8.3	8.3	8.0	8.1	8.2	8.1	8.2
	Temp	25.5	24.5	25.8	25.2	25.5	24.7	25.2
	Cond.	120	115	120	120	120	120	120
Sample	pH							
	DO							
	Temp							
	Cond.							
Sample	pH							
	DO							
	Temp							
	Cond.							
Sample	pH							
	DO							
	Temp							
	Cond.							
	Init./Date	CM 2-20	CM 2/21	CC 2/22	CC 2/23	CC 2/24	CM 2/25	CC 2/26
Remarks								

Reviewer: [illegible] Date: 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Final (After renewal) Water Chemistry Data

Client: ABB - Groundwater toxicity (undiluted sample)

Test Description: *C. dubia* modified acute / chronic toxicity

Treatment	Day:	1	2	3	4	5	6	7
	Sample:							
Lab Control	pH	7.8	7.8	7.7	7.7	7.7	7.8	
	DO	7.6	7.8	8.1	7.5	7.9	7.8	
	Temp	25.5	25.5	25.1	24.8	24.9	24.6	
	Cond.	-	-	-	-	-	-	-
Rec. Water Control	pH	-	-	-	-	-	-	-
	DO	-	-	-	-	-	-	-
	Temp	-	-	-	-	-	-	-
	Cond.	-	-	-	-	-	-	-
Sample 4922	pH	7.3	7.3	7.2	7.5	7.3	7.1	
	DO	7.6	7.9	8.0	7.5	7.8	7.9	
	Temp	25.7	25.6	25.1	24.8	24.7	24.5	
	Cond.	-	-	-	-	-	-	-
Sample 4923	pH	7.4	7.5	7.4	7.5	7.4	7.4	
	DO	7.6	7.8	8.0	7.5	7.8	7.9	
	Temp	25.9	25.6	25.2	24.9	24.5	24.5	
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
	Init./Date	CM 2/21	KC 2/22	KC 2/23	KC 2/24	CM 2/25	KC 2/26	
Remarks								

Reviewer: _____ Date: 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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PROJECT DOCUMENTATION

Client ABB-ES Project Description [illegible] Screening BTR 1654/1655

Testing Facility Aquatec Biological Sciences: S. Burlington, VT

Description	Date	Time	Init
2/19 1715 2/11 AND broad South [illegible] collected of neonates			IEC
2/20 0000-0020 collections.			
2/11 A SS 25 cons of 8 + neon. kept/feed-w-cdu [illegible]			
2/11 B SS 6 " " " "	"	"	
			IEC

APPENDIX: D

/04/98-11:38 am TOXIS ANALYSIS SUMMARY

i: larvae

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
VTABS	PP	2/19/98	DMR ()	NTCORLAND	EPAF 94	4918.001

Statistics Parameters

PROPORTION

End Point:	PA Proportion Alive		
Analysis:	EPA Flowchart	Auto growth select	1 control
Transform:	Arc sine square root w/ Bartlett adj.		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	-1.00	Alpha Normality:	.01
		NOEC:	.05

EC/LC Method: F (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point:	GW Weight		
Analysis:	EPA Flowchart	Auto growth select	1 control
Transform:	No transformation		
Tail:	One-tailed, decreasing		
Constant:	-.01	Variance:	.01
Root:	0.00	Alpha Normality:	.01
		NOEC:	.05

Calculate IC? Y (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC	912	Chi-square test for heterogeniety significant - proceding to Spearman Karber Analysis
EC/LC	69	Cannot compute Spearman-Karber EC/LC 50
IC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
PROP	0	Analysis completed with no errors
GROW	0	Analysis completed with no errors

)4/98

TOXIS ANALYSIS SUMMARY

sh Larvae — Proportion Alive — Day 7

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	PP	2/19/98	DMR ()	NTCORLAND	EPAF 94	4918.001

PA Flowchart Auto growth select 1 control

	Conc	Mean	SD	N	T
Data transformation:		Arc sine sqrt w/ adj.			
X	0.00D	1.31	.100	4	
X	100.00D	1.26	.144	4	.576
Data transformation:		No transformation			
	0.00D	.93	.054	4	
	100.00D	.90	.086	4	.576

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Wilcoxon w/ Bonf

Bonferroni T Test:	MSE	MSD % Reduction from Control	Critical T	
	.01542	11.4396	1.94	
Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.967067	.749	Yes
Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	.34231	.55849	Yes

3/04/98 TOXIS ANALYSIS SUMMARY

n Larvae			Weight			
Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	PP	2/19/98	DMR ()	NTCORLAND	EPAF 94	4918.001

EPA Flowchart	Auto growth select	1 control

	Conc	Mean	SD	N	T
Data transformation:		No transformation			
X	0.00D	.43	.021	4	
X	100.00D	.46	.055	4	-1.012

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Wilcoxon w/ Bonf

onferroni T Test:	MSE	MSD % Reduction from Control	Critical T
	.00173	13.2407	1.94

Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.902156	.749	Yes

Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	2.1158	.14578	Yes

Aquatec Biological Sciences

FISH TEST DATA

Test Number: 4918.001 (x) Chronic ( ) Acute hours
Test Date: 19-Feb-98
Source: NTCORLAND Test Material: DMR ()

Conc		Rep	Cont. No.	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Weight /Fish
0.00	D	1		15	15						13	.87	.45000
0.00	D	2		15	15						15	1.00	.45000
0.00	D	3		15	15						14	.93	.41133
0.00	D	4		15	15						14	.93	.41667
100.00	D	1		15	15						12	.80	.38400
100.00	D	2		15	15						14	.93	.47200
100.00	D	3		15	15						13	.87	.51400
100.00	D	4		15	15						15	1.00	.47733

Aquatec Biological Sciences

FISH LARVAE TOXICITY TEST

TEST START DATE
February 19, 1998

TEST NUMBER
4918.001

Conc	Rep	Cont. No.	Number Alive Start	1	2	3	4	5	6	7	# Fish	Tare Wgt.	Total Wgt.
0.00	D	1	15		15					13	15	29.85	36.60
0.00	D	2	15		15					15	15	29.00	35.75
0.00	D	3	15		15					14	15	30.33	36.50
0.00	D	4	15		15					14	15	30.07	36.32
100.00	D	1	15		15					12	15	30.88	36.64
100.00	D	2	15		15					14	15	34.08	41.16
100.00	D	3	15		15					13	15	28.79	36.50
100.00	D	4	15		15					15	15	30.66	37.82

Pimephales promelas Survival and Growth Data

Client: ABB - Groundwater toxicity screening (undiluted sample)

Test Description: *P. promelas* Modified Acute / Chronic Survival and Growth Method: EPA/600/4-91/002

Treatment (%)	Survival Data								Growth Data		
Repl	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Initial Boat Wt (mg)	Total Dry Wt (mg)	No. weighed
Lab A	15	15	15	15	14	14	13	[illegible]	[illegible]	[illegible]	[illegible]
Contr B	15	15	15	[illegible]	15	15	15	15	[illegible]	[illegible]	15
C	15	15	15	[illegible]	14	14	14	14	[illegible]	[illegible]	14
D	15	15	15	14	14	14	14	14	[illegible]	[illegible]	14
Rec A	-	-	-	-	-	-	-	-	-	-	-
Contr B	-	-	-	-	-	-	-	-	-	-	-
C	-	-	-	-	-	-	-	-	-	-	-
D	-	-	-	-	-	-	-	-	-	-	-
Sample A	15	15	15	14	12	12	12	12	[illegible]	[illegible]	12
B	15	15	15	15	14	14	14	14	[illegible]	[illegible]	14
C	15	15	15	14	14	14	14	13	[illegible]	[illegible]	13
D	15	15	15	15	15	15	15	15	[illegible]	[illegible]	15
Sample A	15										
B	15										
C	15										
D	15										
Sample A	15										
B	15										
C	15										
D	15										
Sample A	15										
B	15										
C	15										
D	15										
Sample A	15										
B	15										
C	15										
D	15										
									Bal QC	Bal QC	
	CM	CM	CM	CEC	CEC	CE	CM	CEC	20 mg= 19.981	20 mg= 19.976	
I/D/T	2/19 1330	CM 2/20	2/21 1030	2/22 1005	2/23 1200	2/24 [illegible]	2/25 1130	[illegible]	20 mg= 19.981	20 mg= 19.976	
Fed AM	—	CM 0900	CM 0900	0900	0900	0900	0900	Not	Oven T= [illegible]	OvenT= 103	
Fed PM	[illegible]	CM 1630	CM 1650	1005	1550	1700	[illegible]	fec	I/D/T [illegible] 2/26 1205	I/D/T 2/27 [illegible] CM	

I/D/T=Initials/date/time of test solution renewal. Record time/initials when fed.

Reviewed by: [illegible] Date 3/6/93

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

AQUATIC BIO SYSTEMS ABS INC.

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 2/18/98

SPECIES: Pimephales promelas

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 2/18/98

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Mean	Range
TEMPERATURE:	24 °C	--
SALINITY / CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	124 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	85 mg/l	--
pH:	8.1	--

Comments:

Rec'd 2/19/98
T 20.5°C
pH 7.6
DO 11.6

Facility Supervisor

Final (After renewal) Water Chemistry Data

Client: ABB - Groundwater toxicity (undiluted sample)

Test Description: *C. dubia* modified acute / chronic toxicity

Treatment	Day:	1	2	3	4	5	6	7
	Sample:							
Lab Control	pH	7.6	7.8	7.8	7.7	7.7	7.7	7.5
	DO	7.5	7.6	7.9	8.1	7.5	7.9	7.2
	Temp	25.0	25.7	25.4	25.1	24.7	25.0	24.4
	Cond.	-	-	-	-	-	-	-
Rec. Water Control	pH	-	-	-	-	-	-	-
	DO	-	-	-	-	-	-	-
	Temp	-	-	-	-	-	-	-
	Cond.	-	-	-	-	-	-	-
Sample 4913	pH	7.6	7.7	7.8	7.7	7.7	7.7	7.6
	DO	7.5	7.6	7.9	8.2	7.5	7.8	6.7
	Temp	24.0	25.5	25.5	24.8	24.7	24.6	24.4
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
	Init./Date	CM 2/20	CM 2/21	CC 2/22	CC 2/23	CC 2/24	CM 2/25	CC 2/26
Remarks								

Reviewer: _____ Date: 2/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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3/0 98-11:51 am

TOXIS ANALYSIS SUMMARY

fish Larvae

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
VTABS	PP	2/20/98	DMR ()	NTCORLAND	EPAF 94	4922.001

Statistics Parameters

PROPORTION

End Point: PA Proportion Alive
Analysis: EPA Flowchart Auto growth select 1 control
Transform: Arc sine square root w/ Bartlett adj.
Tail: One-tailed, decreasing
Constant: -.01 Variance: .01
Root: -1.00 Alpha Normality: .01
NOEC: .05

EC/LC Method: F (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point: GW Weight
Analysis: EPA Flowchart Auto growth select 1 control
Transform: No transformation
Tail: One-tailed, decreasing
Constant: -.01 Variance: .01
Root: 0.00 Alpha Normality: .01
NOEC: .05

Calculate IC? Y (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC	912	Chi-square test for heterogeniety significant - proceding to Spearman Karber Analysis
EC/LC	69	Cannot compute Spearman-Karber EC/LC 50
IC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
PROP	0	Analysis completed with no errors
GROW	0	Analysis completed with no errors

04/98

TOXIS ANALYSIS SUMMARY

ish Larvae — Proportion Alive — Day 7

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	PP.	2/20/98	DMR ()	NTCORLAND	EPAF 94	4922.001

EPA Flowchart Auto growth select 1 control

	Conc	Mean	SD	N	T	Sum of Ranks	Critical Sum of Ranks
Data transformation:		Arc sine sqrt w/ adj.					
X	0.00D	1.41	.066	4			
X	100.00D	1.41	.066	4	0.000	18.000	11.000
Data transformation:		No transformation					
	0.00D	.98	.033	4			
	100.00D	.98	.033	4	0.000	18.000	11.000

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Wilcoxon w/ Bonf

Bonferroni T Test:	MSE	MSD % Reduction from Control	Critical T	
	.00433	3.73585	1.94	
Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.566231	.749	No
Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	0	1	Yes

TOXIS ANALYSIS SUMMARY

Fish Larvae — Weight

Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	PP	2/20/98	DMR ()	NTCORLAND	EPAF 94	4922.001

EPA Flowchart — Auto growth select — 1 control

	Conc	Mean	SD	N	T
Data transformation:		No transformation			
X	0.00D	.49	.034	4	
X	100.00D	.47	.021	4	.974

NOEC	LOEC	TU	Alpha	Tail	Based on
>100	>100	<1	.05	One-sided	Wilcoxon w/ Bonf

Bonferroni T Test:	MSE	MSD % Reduction from Control	Critical T	
	.00078	7.90557	1.94	
Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.78693	.749	Yes
Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	.60173	.43791	Yes

Aquatec Biological Sciences

FISH TEST DATA

Test Number: 4922.001 (x) Chronic ( ) Acute hours
Test Date: 20-Feb-98
Source: NTCORLAND Test Material: DMR ()

Conc		Rep	Cont. No.	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Weight /Fish
0.00	D	1		15	15						14	.93	.43667
0.00	D	2		15	15						15	1.00	.50933
0.00	D	3		15	15						15	1.00	.49533
0.00	D	4		15	15						15	1.00	.50533
100.00	D	1		15	15						14	.93	.43667
100.00	D	2		15	15						15	1.00	.48000
100.00	D	3		16	16						16	1.00	.47938
100.00	D	4		15	15						15	1.00	.47333

Aquatec Biological Sciences

FISH LARVAE TOXICITY TEST

TEST START DATE
February 20, 1998

TEST NUMBER
4922.001

Conc	Rep	Cont. No.	Number Alive Start	1	2	3	4	5	6	7	# Fish	Tare Wgt.	Total Wgt.
0.00	D	1	15		15					14	15	31.05	37.60
0.00	D	2	15		15					15	15	27.09	34.73
0.00	D	3	15		15					15	15	34.27	41.70
0.00	D	4	15		15					15	15	32.07	39.65
100.00	D	1	15		15					14	15	34.70	41.25
100.00	D	2	15		15					15	15	31.16	38.36
100.00	D	3	16		16					16	16	28.96	36.63
100.00	D	4	15		15					15	15	30.24	37.34

CM 3/00

3/04/98-11:58 am

TOXIS ANALYSIS SUMMARY

Fish Larvae

Lab	Species	Test Date	Test Material	Permit	Protocol	Test Number
VTABS	PP	2/20/98	DMR ()	NTCORLAND	EPAF 94	4923.001

Statistics Parameters

PROPORTION

End Point: PA Proportion Alive
Analysis: EPA Flowchart Auto growth select 1 control
Transform: Arc sine square root w/ Bartlett adj.
Tail: One-tailed, decreasing
Constant: -.01 Variance: .01
Root: -1.00 Alpha Normality: .01
NOEC: .05

EC/LC Method: F (P,S,G,L,N) Superdunnet: 4000

GROWTH

End Point: GW Weight
Analysis: EPA Flowchart Auto growth select 1 control
Transform: No transformation
Tail: One-tailed, decreasing
Constant: -.01 Variance: .01
Root: 0.00 Alpha Normality: .01
NOEC: .05

Calculate IC? Y (Y,N) IC resamples: 120

Errors/Warnings

Type	Number	
EC	912	Chi-square test for heterogeniety significant - proceding to Spearman Karber Analysis
EC/LC	69	Cannot compute Spearman-Karber EC/LC 50
IC	71	No linear interpolation estimate can be calculated - none of the group response means < 100-p % of the control response me
PROP	0	Analysis completed with no errors
GROW	0	Analysis completed with no errors

04

TOXIS ANALYSIS SUMMARY

sh Larvae			Proportion Alive			Day 7
Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	PP	2/20/98	DMR ()	NTCORLAND	EPAF 94	4923.001

PA Flowchart Auto growth select 1 control

	Conc	Mean	SD	N	T
Data transformation:		Arc sine sqrt w/ adj.			
X	0.00D	1.41	.066	4	
X	100.00D	1.35	.113	4	.889
Data transformation:		No transformation			
	0.00D	.98	.033	4	
	100.00D	.95	.060	4	.889

NOEC	LOEC	TU	Alpha	Tail	Based on
100	>100	<1	.05	One-sided	Wilcoxon w/ Bonf

Bonferroni T Test:	MSE	MSD % Reduction from Control	Critical T	
	.00851	5.65406	1.94	
Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.889942	.749	Yes
Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	.70818	.40004	Yes

3/04/98

TOXIS ANALYSIS SUMMARY

Fish Larvae			Weight			
Lab	Species	Date	Test Material	Permit	Protocol	Test Number
VTABS	PP	2/20/98	DMR ()	NTCORLAND	EPAF 94	4923.001

EPA Flowchart	Auto growth select	1 control

	Conc	Mean	SD	N	T
Data transformation:		No transformation			
X	0.00D	.49	.034	4	
X	100.00D	.44	.024	4	2.472

NOEC	LOEC	TU	Alpha	Tail	Based on
<100	100	>1	.05	One-sided	Wilcoxon w/ Bonf

Bonferroni T Test:	MSE	MSD % Reduction from Control	Critical T
	.00085	8.23453	1.94

Shapiro-Wilk Test for Normality:	Alpha	W	Cutoff W	Normal?
	.01	.944092	.749	Yes

Bartlett Test for Equal Variance:	Alpha	B	P(B)	Equal Var?
	.01	.32127	.57084	Yes

Aquatec Biological Sciences

FISH TEST DATA

Test Number: 4923.001 (x) Chronic ( ) Acute hours
Test Date: 20-Feb-98
Source: NTCORLAND Test Material: DMR ()

Conc		Rep	Cont. No.	Start	Daily Survival 1	2	3	4	5	6	End	Prop Alive	Weight /Fish
0.00	D	1		15	15						14	.93	.43667
0.00	D	2		15	15						15	1.00	.50933
0.00	D	3		15	15						15	1.00	.49533
0.00	D	4		15	15						15	1.00	.50533
100.00	D	1		15	15						15	1.00	.46733
100.00	D	2		16	16						14	.88	.42375
100.00	D	3		15	15						14	.93	.43867
100.00	D	4		15	15						15	1.00	.41267

Aquatec Biological Sciences

FISH LARVAE TOXICITY TEST

TEST START DATE
February 20, 1998

TEST NUMBER
4923.001

Conc	Rep	Cont. No.	Number Alive Start	1	2	3	4	5	6	7	# Fish	Tare Wgt.	Total Wgt.
0.00	D	1	15		15					14	15	31.05	37.60
0.00	D	2	15		15					15	15	27.09	34.73
0.00	D	3	15		15					15	15	34.27	41.70
0.00	D	4	15		15					15	15	32.07	39.65
100.00	D	1	15		15					15	15	32.42	39.43
100.00	D	2	16		16					14	16	32.90	39.68
100.00	D	3	15		15					14	15	31.88	38.46
100.00	D	4	15		15					15	15	29.97	36.16

CN

Pimephales promelas Survival and Growth Data

File: ABB - Groundwater toxicity screening (undiluted sample)

Test Description: *P. promelas* Modified Acute / Chronic Survival and Growth — Method: EPA/600/4-91/002

Treatment (%)	Survival Data								Growth Data		
Repl	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Initial Boat Wt (mg)	Total Dry Wt (mg)	No. weighed
Lab A	15	15	15	14	14	14	14	14	31.05	[illegible]	14
Contr B	15	15	1	15	15	15	15	15	27.09	[illegible]	15
C	15	15	1	15	1	15	15	15	34.77	[illegible]	[illegible]
D	15	15	1	15	1	15	15	15	33.07	[illegible]	[illegible]
Rec A	-	-	-	-	-	-	-	-	-	-	-
Contr B	-	-	-	-	-	-	-	-	-	-	-
C	-	-	-	-	-	-	-	-	-	-	-
D	-	-	-	-	-	-	-	-	-	-	-
Sample A	15	15	15	15	14	14	14	14	34.70	41.35	-
4322 B	15	15	15	15	15	15	15	15	31.16	38.36	[illegible]
C	15	16	16	16	16	16	16	16	28.910	36.03	[illegible]
D	15	15	15	15	15	15	15	15	30.24	37.50	-
Sample A	15	15	15	15	15	15	15	15	32.42	30.13	[illegible]
4323 B	15	16	16	16	14	14	14	14	32.96	29.18	14
C	15	15	15	15	15	15	15	14	31.58	38.46	[illegible]
D	15	15	15	15	15	15	15	15	29.97	36.16	[illegible]
Sample A	15										
B	15										
C	15										
D	15										
Sample A	15										
B	15										
C	15										
D	15										
Sample A	15										
B	15										
C	15										
D	15										

									Bal QC	Bal QC
	CM	CM 2/21	[illegible]	[illegible]	[illegible]	CM	[illegible]	CM	20 mg= 19.980	20 mg= [illegible]
I/D/T	[illegible]	CM [illegible]	1425	1305	[illegible]	2/25 1150	[illegible]	[illegible]	20 mg= 19.981	20 mg= 19.9[illegible]
Fed AM	—	0900	0900	0900	0915	0800	[illegible]	Not	Oven T= 103	OvenT= [illegible]
Fed PM	[illegible]	CM 1650	1605	1550	1600	[illegible]	[illegible]	fed	I/D/T [illegible]	I/D/T [illegible]

I/D/T=Initials/date/time of test solution renewal. Record time/initials when fed.

Reviewed by: [illegible] Date 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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Final (After renewal) Water Chemistry Data

Client: ABB - Groundwater toxicity (undiluted sample)

Test Description: *P. promelas* modified acute / chronic toxicity

Treatment	Day:	1	2	3	4	5	6	7
	Sample:							
Lab Control	pH	7.7	7.7	7.5	7.6	7.5	7.6	7.4
	DO	7.4	7.2	7.4	6.8	7.0	6.8	7.0
	Temp	24.6	25.8	25.5	24.9	24.2	24.4	24.7
	Cond.	-	-	-	-	-	-	-
Rec. Water Control	pH	-	-	-	-	-	-	-
	DO	-	-	-	-	-	-	-
	Temp	-	-	-	-	-	-	-
	Cond.	-	-	-	-	-	-	-
Sample 4922	pH	7.2	7.2	7.1	7.1	7.1	6.9	6.9
	DO	6.9	6.9	7.2	6.7	6.9	6.8	6.8
	Temp	24.6	25.5	25.2	25.1	24.0	24.3	24.5
	Cond.	-	-	-	-	-	-	-
Sample 4923	pH	7.4	7.4	7.3	7.3	7.2	7.0	7.0
	DO	6.9	7.1	7.2	6.6	6.9	6.7	6.7
	Temp	24.5	25.1	25.6	24.8	24.0	23.8	24.3
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
Sample	pH							
	DO							
	Temp							
	Cond.	-	-	-	-	-	-	-
	Init./Date	CM 2/21	CE 2/22	CE 2/23	CE 2/24	CM 2/25	CE 2/26	CM 2/27
Remarks								

Reviewer: [illegible] Date: 3/6/98

Laboratory: Aquatec Biological Sciences, South Burlington, Vermont

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1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

AQUATIC BIO SYSTEMS ABS INC.

Toll Free: 800/331-5916
Tel: 970/484-5091 Fax: 970/484-2514

ORGANISM HISTORY

DATE: 2/19/98

SPECIES: Pimephales promelas

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 2/19/98

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Mean	Range
TEMPERATURE:	24°C	--
SALINITY / CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	124 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	85 mg/l	--
pH:	8.1	--

Comments:

Rec'd 2/20/98

T = 17.8°C

pH 7.7

DO 12.3

Elizabeth Johnson

Facility Supervisor

APPENDIX I

ACTION LEVELS/TREATMENT LEVELS

Table I-1
Selected Criteria for Surface Soil

Remedial Investigation and Feasibility Study
Operable Unit 3
Naval Training Center
Orlando, Florida

Analyte[1]	Remedial Goal Options for Surface Soil[2]	Direct Exposure, Residential[3]	Direct Exposure, Industrial[3]	Leachability Based on Groundwater Criteria[3]	Leachability Based on Freshwater Surface Water Criteria[3]	Background Screening Concentration[4]	Selected Soil Criteria[5]
Study Area 8							
Semivolatile Organic Compounds (µg/kg)							
Benzo(a)anthracene	[6]70	1,400	5,200	2,900	400	NA	5,200
Benzo(a)pyrene	[6]70	100	500	7,800	1,200	NA	7,800
Benzo(b)fluoranthene	[6]70	1,400	5,100	9,800	1,500	NA	9,800
Benzo(k)fluoranthene	[6]70	15,000	52,000	25,000	1,500	NA	52,000
Chrysene	[6]70	140,000	510,000	80,000	500	NA	510,000
Dibenz(a,h)anthracene	[6]70	100	500	14,000	2,200	NA	14,000
Indeno(1,2,3-cd)pyrene	[6]70	1,500	5,200	28,000	4,300	NA	28,000
Pesticides and PCBs (µg/kg)							
Aldrin	NA	60	200	10	2,500	NA	2,500
Aroclor-1260	NA	[7]600	[7]2,200	[7]6,200	[7]200	NA	6,200
alpha-Chlordane	NA	[8]1500	[8]5,500	[8]2,050	[8]4	NA	5,500
gamma-Chlordane	NA	[8]1500	[8]5,500	[8]2,050	[8]4	NA	5,500
4,4'-DDD	NA	4,500	17,000	200	6	NA	17,000
4,4'-DDE	NA	3,200	12,000	300	2	NA	12,000
4,4'-DDT	NA	3,200	13,000	2,700	30	NA	13,000
Dieldrin	NA	70	300	5	2	NA	300
Heptachlor	NA	10	20	200	2	NA	200
Heptachlor epoxide	NA	100	400	700	7	NA	700
Herbicides (µg/kg)							
MCPA	3,600	31,000	460,000	20	400	NA	460,000
MCPP	6,500	[9]31,000	[9]460,000	20	[9]400	NA	460,000

See notes at end of table.

Table I-1 (Continued)
Selected Criteria for Surface Soil

Remedial Investigation and Feasibility Study
Operable Unit 3
Naval Training Center
Orlando, Florida

Analyte[1]	Remedial Goal Options for Surface Soil[2]	Direct Exposure, Residential[3]	Direct Exposure, Industrial[3]	Leachability Based on Groundwater Criteria[3]	Leachability Based on Freshwater Surface Water Criteria[3]	Background Screening Concentration[4]	Selected Soil Criteria[5]
Inorganic Analytes (mg/kg)							
Aluminum	NA	72,000	1,000,000	NA	NA	2,090	1,000,000
Antimony	NA	26	240	[10]5	NA	ND	240
Arsenic	[13]0.43/7.2	0.8	3.7	[10]29	NA	1.0	[14]1/7.2
Barium	NA	105	87,000	[10]1,600	NA	8.7	87,000
Beryllium	NA	0.3	1	[10]63	NA	0.09	63
Cadmium	NA	1.5	1,300	[10]8	NA	0.98	1,300
Chromium	NA	[11]290	[11]430	[10,11]38	NA	4.6	430
Copper	NA	9	12,000	NA	NA	4.1	12,000
Iron	1,540	23,000	490,000	NA	NA	712	490,000
Lead	NA	[12]500	[12]920	NA	NA	14.5	920
Manganese	NA	1,600	20,000	NA	NA	8.1	20,000
Silver	NA	390	9,100	[10]34	NA	1.8	9,100
Vanadium	NA	11	7,700	[10]6,000	NA	3.1	7,700
Study Area 8							
Pesticides and PCBs (µg/kg)							
alpha-chlordane	1,400	1,500	5,500	4,100	8	NA	5,500
gamma-chlordane	1,400	1,500	5,500	4,100	8	NA	5,500
4,4'-DDD	2,600	4,500	17,000	200	6	NA	17,000
4,4'-DDE	NA	3,200	12,000	300	2	NA	12,000
4,4'-DDT	NA	3,200	13,000	2,700	30	NA	13,000
Dieldrin	NA	70	300	5	2	NA	300

See notes at end of table.

Table I-1 (Continued)
Selected Criteria for Surface Soil

Remedial Investigation and Feasibility Study
Operable Unit 3
Naval Training Center
Orlando, Florida

Analyte[1]	Remedial Goal Options for Surface Soil[2]	Direct Exposure, Residential[3]	Direct Exposure, Industrial[3]	Leachability Based on Groundwater Criteria[3]	Leachability Based on Freshwater Surface Water Criteria[3]	Background Screening Concentration[4]	Selected Soil Criteria[5]
Herbicides (μg/kg)							
MCPA	9,000	31,000	460,000	20	400	NA	460,000
MCPP	10,400	[9]31,000	[9]460,000	[9]20	[9]400	NA	460,000
Inorganic Analytes (mg/kg)							
Aluminum	NA	72,000	1,000,000	NA	NA	2,090	1,000,000
Antimony	NA	26	240	[10]5	NA	ND	240
Arsenic	0.4	0.8	3.7	[10]29	NA	1.0	[14]1
Beryllium	NA	0.3	1	[10]63	NA	0.09	63
Copper	NA	9	12,000	NA	NA	4.1	12,000
Silver	NA	390	9,100	[10]34	NA	1.8	9,100

See notes at end of table.

Table I-1 (Continued)
Selected Criteria for Surface Soil

Remedial Investigation and Feasibility Study
Operable Unit 3
Naval Training Center
Orlando, Florida

[1] Analytes listed are the chemicals of potential concern as identified in the Remedial Investigation for OU3, NTC, Orlando.
[2] Values for remedial goal options were developed in the human health risk assessment in the Remedial Investigation for OU3, NTC, Orlando. See Appendix A.
[3] Values taken from Florida Soil Cleanup Target Levels, Chapter 62-785, FAC, Brownfields Cleanup Criteria Rule (March 1998).
[4] The background screening concentration is twice the mean of detected concentrations for inorganic analytes. The background concentrations were obtained from the NTC, Orlando Background Sampling Report (ABB-ES, 1995).
[5] The selected criteria for surface soil was determined as the highest of:

- the site-specific, risk based RGO (Appendix A); the Florida SCTL (if available), or the USEPA Region III RBC; or
- the site-specific background concentration of a chemical (for inorganic compounds only).

[6] Value is the remedial goal option value for benzo(a)pyrene equivalents, based on USEPA Region IV Guidance (1995). Please see Table 6-2 *Toxicity Equivalency Factors for Carcinogenic Polynuclear Aromatic Hydrocarbons* and Section 6.1.7 *Remedial Goal Options* in the Remedial Investigation, OU3, NTC, Orlando.
[7] Value is for total Aroclor.
[8] The published Cleanup Target Level is for total isomers. Values listed here represents half of total value.
[9] MCPA used as a surrogate.
[10] The value is derived assuming a soil pH level of 6.8.
[11] Values listed are for hexavalent chromium.
[12] Residential direct exposure value from USEPA *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*. OSWER Directive 9355.4-12 (1994). Residential value is the middle of the USEPA suggested range of 400-600 mg/kg. The industrial direct exposure value was derived using methodologies outlined in USEPA *Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil*, December 1996.
[13] Remedial goal option is shown for residential action level/recreational action level. The value is based on total ELCR = 1×10^{-6}
[14] Selected soil criteria is background concentration for residential scenario and RGO for recreational scenario at SA 8. Selected soil criteria for SA 9 is background concentration.

Notes: Conc. = concentration.
μg/kg = micrograms per kilogram.
DDD = dichlorodiphenyldichloroethane.
DDT = dichlorodiphenyltrichloroethane.
MCPP = 2-methyl-4-chlorophenoxypropionic acid.
PCB = polychlorinated biphenyls.
ND = not detected.
mg/kg = milligrams per kilogram.
DDE = dichlorodiphenyldichloroethlene.
MCPA = 2-methyl-4-chlorophenoxyacetic acid.
NA = not available.

Table I-2
Selected Criteria for Groundwater

Remedial Investigation and Feasibility Study
Operable Unit 3
Naval Training Center
Orlando, Florida

Analyte[1]	Florida MCL[2]	Federal MCL[3]	Florida Groundwater Cleanup Target Levels[4]	Florida Freshwater Surface Water Criteria[5]	Basewide Background Concentration[6]	Selected Groundwater Criteria[7]
Study Area 8						
Semivolatile Organic Compounds (µg/ℓ)						
Naphthalene	NSC	NSC	20	26	NA	20
Pesticides and PCBs (µg/ℓ)						
Dieldrin	NSC	NSC	0.005	[11]0.1	NA	0.005
Herbicides (µg/ℓ)						
MCPA	NSC	NSC	3.5	72	NA	3.5
MCPP	NSC	NSC	7	NA	NA	7
Inorganic Analytes (µg/ℓ)						
Aluminum	[9]200	[8]200	200	13	4,067	4,067
Arsenic	50	50	50	[11]50	5	50
Iron	[9]300	[8]300	300	[11]1,000	1,227	1,227
Manganese	[9]50	[8]50	50	NA	17	50
Study Area 9						
Semivolatile Organic Compounds (µg/ℓ)						
2,4-Dichlorophenol	NSC	NSC	4	13	NA	4
Naphthalene	NSC	NSC	20	26	NA	20
Pesticides and PCBs (µg/ℓ)						
alpha-BHC	NSC	NSC	0.006	0.0116	NA	0.006
delta-BHC	NSC	NSC	2.1	NA	NA	2.1
gamma-BHC	0.2	0.2	0.2	[11]0.08	NA	0.08
Aldrin	NSC	NSC	0.005	[11]3	NA	0.005
gamma-Chlordane	[10]2	[10]2	[10]2	[10,11]0.054	NA	0.054
Dieldrin	NSC	NSC	0.005	[11]0.11	NA	0.005
Heptachlor epoxide	0.2	0.2	0.2	0.002	NA	0.002
Herbicides (µg/ℓ)						
2,4-D	70	70	70	80	NA	70
MCPA	NSC	NSC	3.5	72	NA	3.5
MCPP	NSC	NSC	7	NA	NA	7
Inorganic Compounds (µg/ℓ)						
Arsenic	50	50	50	[11]50	5	50
Iron	[9]300	[8]300	300	[11]1,000	1,227	1,227
Manganese	[9]50	[8]50	50	NA	17	50

See notes at end of table.

Table I-2 (Continued)
Selected Criteria for Groundwater

Remedial Investigation and Feasibility Study
Operable Unit 3
Naval Training Center
Orlando, Florida

[1] Analytes listed are the chemicals of potential concern as identified in the Remedial Investigation for Operable Unit 3, NTC, Orlando.
[2] Florida Standards are taken from Chapters 1 and 2 (Primary and Secondary Standards) of the Florida Department Environmental Protection (FDEP) Groundwater Guidance Concentrations (June 1994).
[3] Federal MCLs are taken from U.S. Environmental Protection Agency (USEPA) Drinking Water Regulations and Health Advisories (October 1996).
[4] Florida Groundwater Cleanup Target Level taken from Chapter 62-785, FAC, Brownfield Cleanup Criteria Rule, (March 1998).
[5] Florida Freshwater Surface Water Criteria taken from Chapter 62-785, FAC, Brownfield Cleanup Criteria Rule, (March 1998).
[6] Basewide background concentrations were developed as part of the RI for Operable Unit 3, Naval Training Station, Orlando.
[7] The selected criteria for groundwater was determined as follows:
For organic chemicals, the selection criteria were established as:
(1) the Florida drinking water standard (if available);
(2) if no Florida drinking water standard existed, then the Federal MCL (if available); and
(3) if (1) or (2) were not applicable, then the Florida GCTL (higher value of the groundwater or surface freshwater values).
For inorganic chemicals, the selection criteria were established as the higher value of:
(1) the criteria selected using the hierarchy as listed for organic chemicals in groundwater; and
(2) the site-specific background concentration.
[8] Value is a Federal secondary MCL.
[9] Value is a Florida secondary MCL.
[10] Value for chlordane used.
[11] The value is based on Chapter 62-302, FAC. If the permissible quantitation limit (PQL) using the most sensitive and currently available technology is higher than the specified criterion, the PQL shall be used.

Notes: MCL = maximum contaminant level.
MCPA = 2-methyl-4-chlorophenoxyacetic acid.
RBC = risk-based concentration.
$\mu g/\ell$ = micrograms per liter.
NA = not available.
NSC = no screening criteria.
MCPP = 2-methyl-4-chlorophenoxypropionic acid.
PCB = polychlorinated biphenyls.
BHC = hexachlorocyclohexane.
2,4-D = 2,4-Dichlorophenoxyacetic acid.

Table I-3
Selected Criteria for Discharge of Treated Groundwater to Surface Water

Remedial Investigation and Feasibility Study
Operable Unit 3
Naval Training Center
Orlando, Florida

Analyte[1]	Florida Surface Water Standard[2]	Federal AWQC[3]	Site-specific Background[4]	Selected Surface Water Criteria[5]
Site 8				
Semivolatile Organic Compounds (µg/ℓ)				
Naphthalene	NA	620	NA	620
Pesticides and PCBs (µg/ℓ)				
Dieldrin	0.0019	0.0019	NA	0.0019
Herbicides (µg/ℓ)				
MCPA	NA	NA	NA	NA
MCPP	NA	NA	NA	NA
Inorganic Analytes (µg/ℓ)				
Aluminum	NA	NA	4,067	4,067
Arsenic	50	[6]190	5	50
Iron	1000	1000	1,227	1,227
Manganese	NA	NA	17	17
Site 9				
Semivolatile Organic Compounds (µg/ℓ)				
2,4-Dichlorophenol	790	365	NA	790
Naphthalene	NA	620	NA	620
Pesticides/PCBs (µg/ℓ)				
alpha-BHC	NA	NA	NA	NA
delta-BHC	NA	NA	NA	NA
gamma-BHC	0.08	0.08	NA	0.08
Aldrin	3	[7]3	NA	3
gamma-Chlordane	[8]0.0043	[8]0.0043	NA	0.0043
Dieldrin	0.0019	0.0019	NA	0.0019
Heptachlor epoxide	NA	0.0038	NA	0.0038
Herbicides (µg/ℓ)				
2,4-D	NA	365	NA	365
MCPA	NA	NA	NA	NA
MCPP	NA	NA	NA	NA
Inorganic Compounds (µg/ℓ)				
Arsenic	50	[6]190	5	50
Iron	1000	1000	1,227	1,227
Manganese	NA	NA	17	17

See notes at end of table.

Table I-3 (Continued)
Selected Criteria for Discharge of Treated Groundwater to Surface Water

Remedial Investigation and Feasibility Study
Operable Unit 3
Naval Training Center
Orlando, Florida

[1] Analytes listed are the chemicals of potential concern as identified in the Remedial Investigation for Operable Unit 3, NTC, Orlando.
[2] Florida Surface Water Standard taken from Chapter 62 (Surface Water Quality Standards) of the Florida Administrative Code (FAC 62-302) Class III Freshwater, December 26, 1996.
[3] Federal Ambient Water Quality Criteria taken from USEPA Office of Water Regulations and Standards (May 1987). Values are based on freshwater, chronic exposure.
[4] Basewide background concentrations were developed as part of the RI for Operable Unit 3, Naval Training Station, Orlando.
[5] The selection criteria for this discharge option are the Florida surface water standards, Florida GCTLs (for freshwater surface water), the Federal AWQC (where a Florida Surface Water Standard was not available), or site-specific background concentrations, whichever was higher.
[6] Value is based on Arsenic III.
[7] Value is the maximum exposure concentration.
[8] Value for Chlordane was used.

Notes: AWQC = Ambient Water Quality Criteria.
$\mu g/\ell$ = micrograms per liter.
MCPA = 2-methyl-4-chlorophenoxyacetic acid.
MCPP = 2-methyl-4-chlorophenoxypropionic acid.
NA = not available.
PCB = polychlorinated biphenyl.
BHC = hexachlorocyclohexane.
2,4-D = 2,4-Dichlorophenoxyacetic acid.

APPENDIX J

ESTIMATED CONCENTRATIONS IN EXTRACTED GROUNDWATER

J-1: Florida Department of Environmental Protection Treatment System Design Contaminant Concentrations

J-2: Estimated Concentrations in Operable Unit 3 Extracted Groundwater

Estimated Concentrations of Chemicals in Extracted Groundwater

Purpose of Estimate. The Feasibility Study (FS) for OU 3 at NTC Orlando includes five alternatives for control of contaminated groundwater. The five alternatives developed can be broken down into two broader categories of treatment: *in situ* and *ex situ*. *In situ* treatment involves treating the groundwater in place (i.e., within the plume). *Ex situ* treatment involves extracting groundwater from the aquifer for treatment. When the groundwater is extracted, the concentration of chemicals in the extracted water determines the type and amount of treatment necessary to meet discharge limitations. To estimate the concentration of chemicals in extracted groundwater, an FDEP modeling was performed.

Description of Modeling. The model used to estimate the concentrations of chemicals in extracted groundwater from OU 3 was the FDEP treatment system design contaminant concentration model (see Attachment A). This FDEP model, initially developed for petroleum contaminated sites, estimates the maximum chemical concentrations in extracted groundwater for remedial design purposes. The model uses the chemical concentrations in monitoring wells to estimate the chemical concentrations in extracted water.

The steps involved in defining how the monitoring and extraction wells overlap are:

(1) The extraction wells were drawn on a figure at SA 8 and 9.

(2) Each monitoring well within the cone of influence of an extraction well was identified. All monitoring wells installed during the RI were within the surficial aquifer with a maximum depth of 30' bls.

(3) All COCs detected in groundwater at OU 3 were listed. The FDEP model was then used to calculate the extracted concentrations for these chemicals. The model uses a weighted-averaging approach to determine the chemical concentration for each chemical at each extraction well.

(4) The concentrations predicted at each extraction well were averaged together (assuming the flow rate was the same for each well) to estimate the total concentration of a chemical in extracted groundwater.

The formula for the weighted average is listed below:

$$Conc = \frac{\frac{C_1}{D_1} + \frac{C_2}{D_2} + \frac{C_3}{D_3} + \frac{C_N}{D_N}}{\frac{1}{D_1} + \frac{1}{D_2} + \frac{1}{D_3} + \frac{1}{D_N}}$$

where: C_N = concentration of a given COC from a given monitoring well.
D_N = distance the monitoring well is from the extraction point.

Based on aquifer characteristics (transmissivity, storativity, thickness), the radius of influence for an extraction well was calculated for SA 8 and 9. The

radius of influence is approximately 250 feet at SA 9 and 60 feet at SA 9. These calculations are shown in Attachment B.

Using the FDEP model, the extracted concentrations for COCs at each recovery well and the average concentration for COCs at each Study Area are shown in Attachment B. The extracted concentrations were used to screen against action/treatment levels in Chapter 10.0 and Appendix B. In summary, the extracted concentrations of COCs are shown below:

Study Area 8	Estimated Extracted Concentration
Aluminum	260 μg/ℓ
Arsenic	134 μg/ℓ
Iron	364 μg/ℓ
MCPA	169 μg/ℓ
MCPP	274 μg/ℓ
Dieldrin	0 μg/ℓ

Study Area 9	Estimated Extracted Concentration
Arsenic	86 μg/ℓ
Iron	820 μg/ℓ
MCPA	1,162 μg/ℓ
MCPP	845 μg/ℓ
2,4-D	20 μg/ℓ
alpha-BHC	0.12 μg/ℓ
gamma-BHC	0.18 μg/ℓ
gamma-Chlordane	0.16 μg/ℓ
Dieldrin	0.01 μg/ℓ
Heptachlor epoxide	0.02 μg/ℓ
2,4-Dichlorophenol	36 μg/ℓ

APPENDIX J-1

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION TREATMENT SYSTEM DESIGN CONTAMINANT CONCENTRATIONS

2.3 Treatment System Design Contaminant Concentrations

The following procedures may be used when establishing the maximum contaminant concentrations at the treatment unit for remedial design purposes. The preferred method is to use data obtained during pumping of the recovery well. A good, conservative rule of thumb is that maximum concentrations observed during pump operation will be less than half of the highest concentrations observed during static conditions. Actual concentrations may be as low as ten percent of the static condition concentrations.

If data are unavailable while pumping, maximum contaminant concentrations at the treatment unit may be estimated by calculating a weighted average of surrounding well contaminant concentrations under static conditions. The weighted average should be based on the inverse of the distances from the recovery well. When selecting well data to be used in the calculations, the following points should be considered:

1. The recovery well should be located near the area of highest concentrations. An exception to this point is when the recovery well is located near the leading edge of the plume. In this case, the highest contaminant levels may not be observed until after the system has operated for some time.

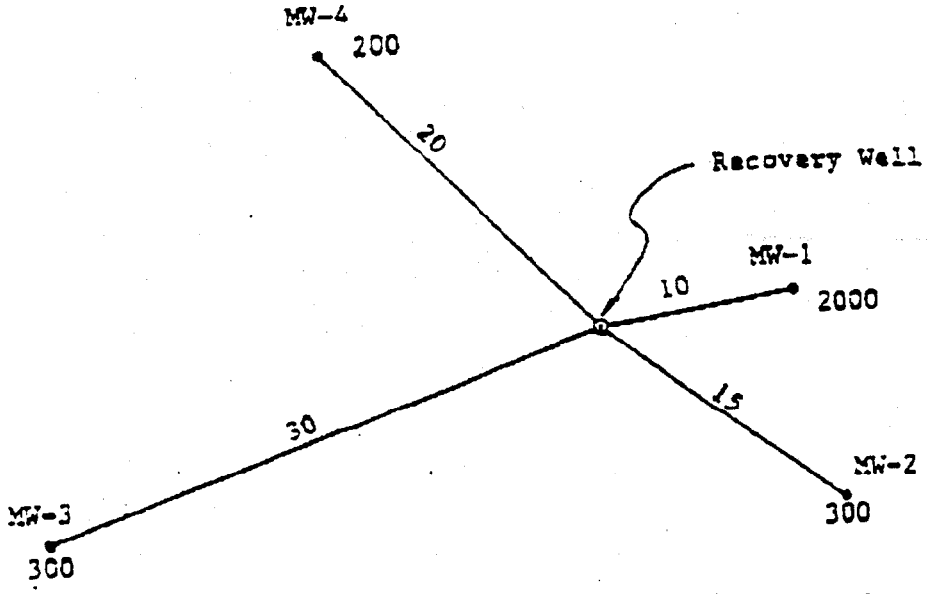
2. Selection of wells must be within the cone of influence of the recovery well.

3. Only wells with data from the same relative depth should be used.

4. Site conditions which might influence the assumption that concentrations decrease with distance must be considered.

For design purposes a 1.25 safety factor is recommended for sizing treatment equipment.

Example Problem: Given the following concentrations, c_n, and distances, d_n, from the recovery point, what is the maximum design concentration, C_{max}?



1. Determine the weighted average concentration at the recovery point by using the following formula.

$$C = \frac{(c_1/d_1 + c_2/d_2 + \ldots + c_n/d_n)}{(1/d_1 + 1/d_2 + \ldots + 1/d_n)}$$

therefore $$C = \frac{(2000/10 + 300/15 + 300/30 + 200/20)}{(1/10 + 1/15 + 1/30 + 1/20)}$$

$$C = 960$$

2. Apply a safety factor of 1.25 to calculate the C_{max} for design purposes.

$$C_{max} = 1.25C = 1200$$

3. The preceding formula may be set up in tabular form to solve for C as follows.

$1/d_n$	$1/d_n$	$\frac{1/d_n}{\Sigma(1/d_n)}$	X	c_n	=	C
1/10	.100	.400		2000		800
1/15	.067	.268		300		80
1/30	.033	.132		300		40
1/20	.050	.200		200		40
Total	.250	1.000		-		960

APPENDIX J-2

ESTIMATED CONCENTRATIONS IN OU 3 EXTRACTED GROUNDWATER

PROJECT	COMP. BY	JOB NO.
Radius of Influence for Extraction Wells at SA 8 & 9	MJR	2546-51
	CHK. BY MBC	DATE 11/12/98

$$R_o = \left(\frac{2.25Tt}{S}\right)^{1/2}$$ where

R_o = radius of influence (ft)

T = aquifer Transmissivity (ft^2/day)

t = max time between rainfall (day)

S = Storativity (unitless)

S = 0.2 (unconfined aquifer)

↑ for pumping well/extraction well

At SA 8:

$$T = bK = (20\,ft)(2.74\,ft/day) = 54.8\,ft^2/day$$

$$\therefore R_o = \left(\frac{2.25(54.8\,ft^2/day)(100\,days)}{0.2}\right)^{1/2}$$

$$\boxed{R_o \cong 250 \text{ feet}}$$

At SA9:

$$T = bK = (20\,ft)(0.14\,ft/day) = 2.8\,ft^2/day$$

$$\therefore R_o = \left(\frac{2.25(2.8\,ft^2/day)(100\,days)}{0.2}\right)^{1/2}$$

$$\boxed{R_o \cong 60 \text{ feet}}$$

The radius of influence can be used to determine which MW's would be captured by a given extraction well to determine the extracted concentration of COCs

(see following Tables)

ABB Environmental Services, Inc.

FORM 00.01 REV. 4/81

PROJECT	COMP. BY	JOB NO.
FDEP Contaminant Concentration Sum's	MRC	2546.5
	CHK. BY MJL	DATE 10/19/99

RW = recovery well

Check of Excel Work sheet's

$$C_{max} = \left(\frac{(C_1/D_1 + C_2/D_2 + \ldots C_n/D_n)}{(1/D_1 + 1/D_2 + \ldots + 1/D_n)} \right)$$

Check: Arsenic @ SA8 @ RW 1

$$\therefore \quad C_{max} = \frac{(0/43 + 57.5/46 + 53/95 + 70.4/60 + 79.9/27 + 223/27)}{(1/43 + 1/46 + 1/95 + 1/60 + 1/27 + 1/27)}$$

$$C_{max} = \frac{(0 + 1.25 + 0.5579 + 1.1733 + 2.9593 + 8.2593)}{(0.02326 + 0.0217 + 0.0105 + 0.0167 + 0.0370 + 0.0370)}$$

$$C_{max} = 14.1998/0.1462 = \boxed{97.1258} \text{ ug/L}$$

$$C_{extracted} = \frac{C_{max}(RW1) + C_{max}(RW2) + \ldots C_{max}(RW_n)}{n}$$

For Arsenic @ SA8:

$$C_{extracted} = \frac{(97.1 + 171.6 + 132.7)}{3} \text{ ug/L}$$

$$\boxed{C_{extracted} = 134 \text{ ug/L}} \leftarrow \text{Arsenic @ SA 8}$$

For Arsenic @ SA9:

$$C_{extracted} = \frac{(44.9 + 126.5)}{2} \text{ ug/L}$$

$$\boxed{C_{extracted} = 86 \text{ ug/L}} \leftarrow \text{Arsenic @ SA 9}$$

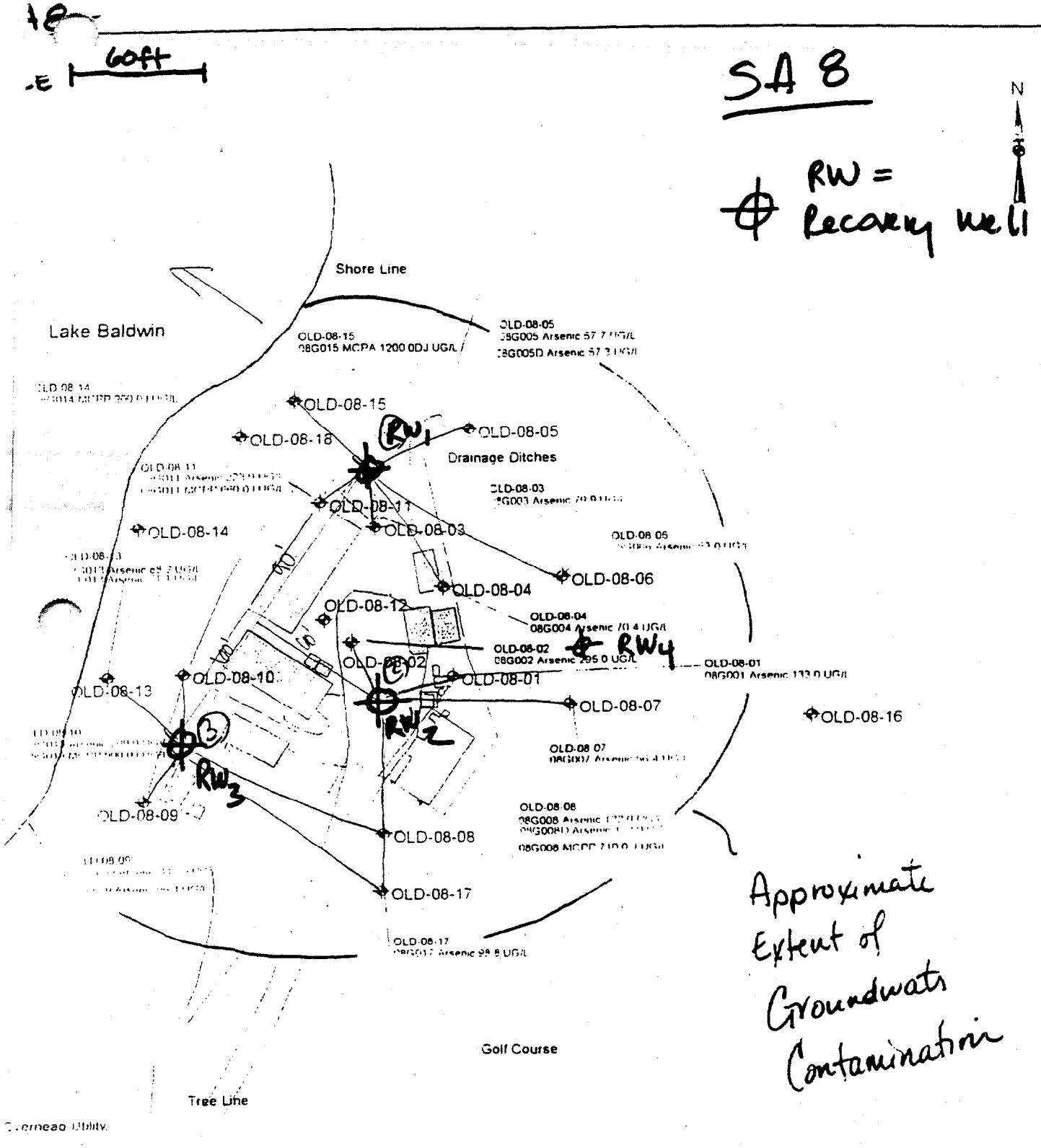


FIGURE C-1
EXTRACTION/RECOVERY WELL CONFIGURATION
AT SA8

FDEP Treatment System Design Contaminant Concentrations
Study Area 8

Recovery Well 1(Northern Recovery Well)

Arsenic

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-15	43	0.0232558	0.159001065	0	0
OLD-08-05	46	0.0217391	0.148631431	57.5	8.5
OLD-08-06	95	0.0105263	0.071968903	53	3.8
OLD-08-04	60	0.0166667	0.113950763	70.4	8.0
OLD-08-03	27	0.037037	0.253223919	79.9	20.2
OLD-08-11	27	0.037037	0.253223919	223	56.5
SUM		0.146262			**97.1**

Iron

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-15	43	0.0232558	0.159001065	498	79.2
OLD-08-05	46	0.0217391	0.148631431	0	0
OLD-08-06	95	0.0105263	0.071968903	198	14.2
OLD-08-04	60	0.0166667	0.113950763	0	0
OLD-08-03	27	0.037037	0.253223919	231	58.5
OLD-08-11	27	0.037037	0.253223919	0	0
SUM		0.146262			**151.9**

MCPA

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-15	43	0.0232558	0.159001065	1200	190.8
OLD-08-05	46	0.0217391	0.148631431	0	0
OLD-08-06	95	0.0105263	0.071968903	0	0
OLD-08-04	60	0.0166667	0.113950763	0	0
OLD-08-03	27	0.037037	0.253223919	640	162.1
OLD-08-11	27	0.037037	0.253223919	0	0
SUM		0.146262			**352.9**

MCPP

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-15	43	0.0232558	0.159001065	0	0
OLD-08-05	46	0.0217391	0.148631431	0	0
OLD-08-06	95	0.0105263	0.071968903	0	0
OLD-08-04	60	0.0166667	0.113950763	0	0
OLD-08-03	27	0.037037	0.253223919	0	0
OLD-08-11	27	0.037037	0.253223919	660	167.1
SUM		0.146262			**167.1**

FDEP Treatment System Design Contaminant Concentrations
Study Area 8

Dieldrin

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-15	43	0.0232558	0.159001065	0	0
OLD-08-05	46	0.0217391	0.148631431	0	0
OLD-08-06	95	0.0105263	0.071968903	0	0
OLD-08-04	60	0.0166667	0.113950763	0	0
OLD-08-03	27	0.037037	0.253223919	0	0
OLD-08-11	27	0.037037	0.253223919	0.02	0.0
SUM		0.146262			**0.01**

Aluminum

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-15	43	0.0232558	0.159001065	1420	225.7815
OLD-08-05	46	0.0217391	0.148631431	0	0
OLD-08-06	95	0.0105263	0.071968903	0	0
OLD-08-04	60	0.0166667	0.113950763	0	0
OLD-08-03	27	0.037037	0.253223919	0	0
OLD-08-11	27	0.037037	0.253223919	0	0.0
SUM		0.146262			**225.8**

Recovery Well 2 (Central Recovery Well)

Arsenic

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-02	28	0.0357143	0.327484732	295	96.6
OLD-08-01	32	0.03125	0.286549141	133	38.1
OLD-08-07	80	0.0125	0.114619656	56.4	6.5
OLD-08-08	57	0.0175439	0.160869693	121	19.5
OLD-08-17	83	0.0120482	0.110476777	98.8	10.9
		0.1090563			**171.6**

Iron

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-02	28	0.0357143	0.327484732	0	0
OLD-08-01	32	0.03125	0.286549141	1460	418.4
OLD-08-07	80	0.0125	0.114619656	529	60.6
OLD-08-08	57	0.0175439	0.160869693	0	0
OLD-08-17	83	0.0120482	0.110476777	0	0
		0.1090563			**479.0**

FDEP Treatment System Design Contaminant Concentrations
Study Area 8

MCPA (Note: OLD-08-17 Not Analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-02	28	0.0357143	0.368157597	0	0
OLD-08-01	32	0.03125	0.322137898	0	0
OLD-08-07	80	0.0125	0.128855159	0	0
OLD-08-08	57	0.0175439	0.180849346	0	0
		0.0970081			**0**

MCPP (Note: OLD-08-17 Not Analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-02	28	0.0357143	0.368157597	0	0
OLD-08-01	32	0.03125	0.322137898	790	254.5
OLD-08-07	80	0.0125	0.128855159	0	0.0
OLD-08-08	57	0.0175439	0.180849346	355	64.2
		0.0970081			**318.7**

Dieldrin (Note: OLD-08-17 Not Analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-02	28	0.0357143	0.368157597	0	0
OLD-08-01	32	0.03125	0.322137898	0	0.0
OLD-08-07	80	0.0125	0.128855159	0	0.0
OLD-08-08	57	0.0175439	0.180849346	0	0.0
		0.0970081			**0.0**

Aluminum

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-02	28	0.0357143	0.327484732	0	0
OLD-08-01	32	0.03125	0.286549141	0	0.0
OLD-08-07	80	0.0125	0.114619656	0	0.0
OLD-08-08	57	0.0175439	0.160869693	0	0
OLD-08-17	83	0.0120482	0.110476777	88.3	9.755099
		0.1090563			**9.8**

FDEP Treatment System Design Contaminant Concentrations
Study Area 8

Recovery Well 3 (SouthWest Recovery Well)

Arsenic

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-13	43	0.0232558	0.211596207	79.7	16.9
OLD-08-10	30	0.0333333	0.303287897	209	63.4
OLD-08-08	94	0.0106383	0.09679401	121	11.7
OLD-08-17	107	0.0093458	0.08503399	98.8	8.4
OLD-08-09	30	0.0333333	0.303287897	106.7	32.4
		0.1099066			**132.7**

Iron

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-13	43	0.0232558	0.211596207	370	78.3
OLD-08-10	30	0.0333333	0.303287897	825	250.2
OLD-08-08	94	0.0106383	0.09679401	0	0
OLD-08-17	107	0.0093458	0.08503399	0	0
OLD-08-09	30	0.0333333	0.303287897	432.5	131.2
		0.1099066			**459.7**

MCPA (Note: OLD-08-17 Not Analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-13	43	0.0232558	0.231261276	660	152.6
OLD-08-10	30	0.0333333	0.331474496	0	0
OLD-08-08	94	0.0106383	0.105789733	0	0
OLD-08-09	30	0.0333333	0.331474496	0	0
		0.1005608			**152.6**

MCPP (Note: OLD-08-17 Not Analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-13	43	0.0232558	0.231261276	0	0
OLD-08-10	30	0.0333333	0.331474496	900	298.3
OLD-08-08	94	0.0106383	0.105789733	355	37.6
OLD-08-09	30	0.0333333	0.331474496	0	0
		0.1005608			**335.9**

FDEP Treatment System Design Contaminant Concentrations
Study Area 8

Dieldrin (Note: OLD-08-17 Not Analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-13	43	0.0232558	0.231261276	0	0
OLD-08-10	30	0.0333333	0.331474496	0	0.0
OLD-08-08	94	0.0106383	0.105789733	0	0.0
OLD-08-09	30	0.0333333	0.331474496	0	0
		0.1005608			**0.0**

Aluminum

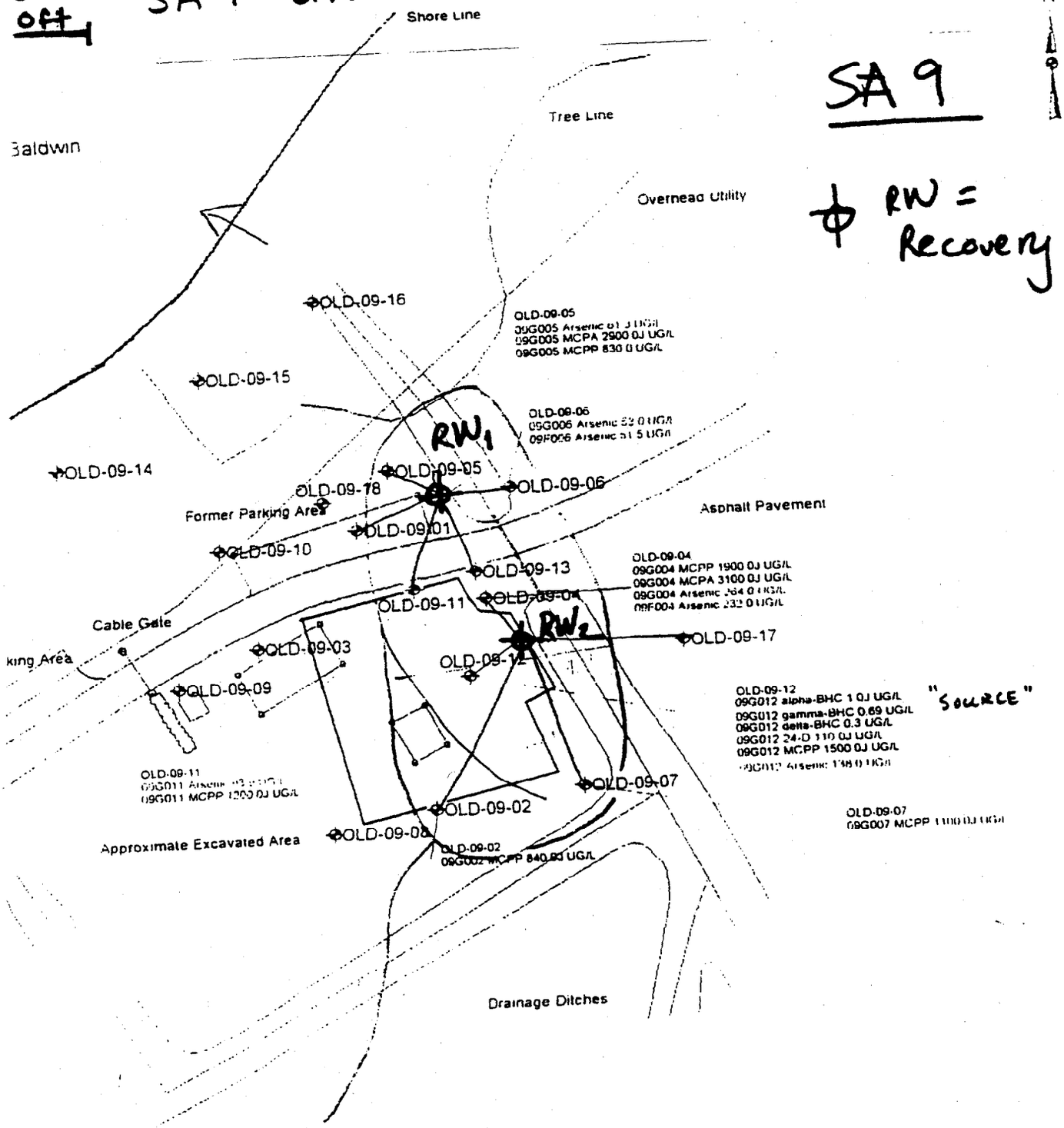
Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-08-13	43	0.0232558	0.211596207	1200	253.9
OLD-08-10	30	0.0333333	0.303287897	614	186.2
OLD-08-08	94	0.0106383	0.09679401	0	0
OLD-08-17	107	0.0093458	0.08503399	88.3	7.508501
OLD-08-09	30	0.0333333	0.303287897	312	94.6
		0.1099066			**542.3**

Estimated Concentration in Extracted Groundwater

Aluminum	259.27
Arsenic	133.79
Iron	363.53
MCPA	168.50
MCPP	273.90
Dieldrin	0.00

$$Conc = \frac{Conc(RW1) + Conc(RW2) + Conc(RW3)}{3}$$

SA 9- GW



"Extent" of Groundwater Contamination

FIGURE C-2
EXTRACTION / RECOVERY WELL CONFIGURATION
AT SA9

FDEP Treatment System Design Contaminant Concentrations
Study Area 9

Recovery Well 1 (Northern Recovery Well)

Arsenic

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	61.3	16.4
OLD-09-06	29	0.034483	0.220848	52.3	11.6
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	93.9	14.7
OLD-09-01	37	0.027027	0.173097	13.2	2.3
		0.156138			**44.9**

Iron

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	188	50.2
OLD-09-06	29	0.034483	0.220848	689	152.2
OLD-09-13	35	0.028571	0.182988	2400	439.2
OLD-09-11	41	0.024390	0.156209	570	89.0
OLD-09-01	37	0.027027	0.173097	391	67.7
		0.156138			**798.2**

MCPA

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	2900	773.9
OLD-09-06	29	0.034483	0.220848	0	0.0
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	0	0.0
OLD-09-01	37	0.027027	0.173097	640	110.8
		0.156138			**884.7**

MCPP

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	830	221.5
OLD-09-06	29	0.034483	0.220848	0	0.0
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	1200	187.5
OLD-09-01	37	0.027027	0.173097	0	0.0
		0.156138			**408.9**

FDEP Treatment System Design Contaminant Concentrations
Study Area 9

alpha-BHC

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	0	0.0
OLD-09-06	29	0.034483	0.220848	0	0.0
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	0.001	0.0
OLD-09-01	37	0.027027	0.173097	0	0.0
		0.156138			**0.0**

gamma-BHC

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	0.01	0.0
OLD-09-06	29	0.034483	0.220848	0	0.0
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	0.03	0.0
OLD-09-01	37	0.027027	0.173097	0	0.0
		0.156138			**0.01**

2,4-Dichlorophenol

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	0	0.0
OLD-09-06	29	0.034483	0.220848	0	0.0
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	0	0.0
OLD-09-01	37	0.027027	0.173097	0	0.0
		0.156138			**0.0**

gamma-Chlordane

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	0.17	0.0
OLD-09-06	29	0.034483	0.220848	0.03	0.0
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	0	0.0
OLD-09-01	37	0.027027	0.173097	0	0.0
		0.156138			**0.1**

FDEP Treatment System Design Contaminant Concentrations
Study Area 9

Dieldrin

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	0	0.0
OLD-09-06	29	0.034483	0.220848	0.1	0.0
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	0	0.0
OLD-09-01	37	0.027027	0.173097	0	0.0
		0.156138			**0.02**

Heptachlor epoxide

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	0	0.0
OLD-09-06	29	0.034483	0.220848	0	0.0
OLD-09-13	35	0.028571	0.182988	0	0.0
OLD-09-11	41	0.024390	0.156209	0.04	0.0
OLD-09-01	37	0.027027	0.173097	0.0	0.0
		0.156138			**0.01**

2,4-D

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-05	24	0.041667	0.266858	0.11	0.0
OLD-09-06	29	0.034483	0.220848	0.9	0.2
OLD-09-13	35	0.028571	0.182988	0.001	0.0
OLD-09-11	41	0.024390	0.156209	1.4	0.2
OLD-09-01	37	0.027027	0.173097	0.002	0.0
		0.156138			**0.45**

FDEP Treatment System Design Contaminant Concentrations
Study Area 9

Recovery Well 2 (Southern Recovery Well)

Arsenic

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.335463	248	83.2
OLD-09-17	63	0.015873	0.127796	4.3	0.5
OLD-09-07	65	0.015385	0.123863	0	0.0
OLD-09-02	78	0.012821	0.103219	0	0.0
OLD-09-12	26	0.038462	0.309658	138	42.7
		0.124206			**126.5**

Iron

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.335463	1335	447.8
OLD-09-17	63	0.015873	0.127796	53.6	6.8
OLD-09-07	65	0.015385	0.123863	1755	217.4
OLD-09-02	78	0.012821	0.103219	0	0.0
OLD-09-12	26	0.038462	0.309658	540	167.2
		0.124206			**839.3**

MCPA

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.335463	3100	1039.9
OLD-09-17	63	0.015873	0.127796	680	86.9
OLD-09-07	65	0.015385	0.123863	0	0.0
OLD-09-02	78	0.012821	0.103219	770	79.5
OLD-09-12	26	0.038462	0.309658	750	232.2
		0.124206			**1438.6**

MCPP

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.335463	1900	637.4
OLD-09-17	63	0.015873	0.127796	0	0.0
OLD-09-07	65	0.015385	0.123863	1100	136.2
OLD-09-02	78	0.012821	0.103219	420	43.4
OLD-09-12	26	0.038462	0.309658	1500	464.5
		0.124206			**1281.5**

FDEP Treatment System Design Contaminant Concentrations
Study Area 9

alpha-BHC (OLD-09-17 not analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.384615	0	0.0
OLD-09-07	65	0.015385	0.142012	0	0.0
OLD-09-02	78	0.012821	0.118343	0	0.0
OLD-09-12	26	0.038462	0.355030	0.69	0.2
		0.108333			**0.2**

gamma-BHC (OLD-09-17 not analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.384615	0.01	0.0
OLD-09-07	65	0.015385	0.142012	0	0.0
OLD-09-02	78	0.012821	0.118343	0	0.0
OLD-09-12	26	0.038462	0.355030	1	0.4
		0.108333			**0.4**

2,4-Dichlorophenol (OLD-09-17 not analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.384615	2	0.8
OLD-09-07	65	0.015385	0.142012	0	0.0
OLD-09-02	78	0.012821	0.118343	0	0.0
OLD-09-12	26	0.038462	0.355030	200	71.0
		0.108333			**71.8**

Heptachlor epoxide (OLD-09-17 not analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.384615	0.1	0.0
OLD-09-07	65	0.015385	0.142012	0	0.0
OLD-09-02	78	0.012821	0.118343	0	0.0
OLD-09-12	26	0.038462	0.355030	0	0.0
		0.108333			**0.04**

FDEP Treatment System Design Contaminant Concentrations
Study Area 9

gamma-Chlordane (OLD-09-17 not analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.384615	0.67	0.3
OLD-09-07	65	0.015385	0.142012	0	0.0
OLD-09-02	78	0.012821	0.118343	0	0.0
OLD-09-12	26	0.038462	0.355030	0.01	0.0
		0.108333			**0.26**

Dieldrin (OLD-09-17 not analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.384615	0	0.0
OLD-09-07	65	0.015385	0.142012	0	0.0
OLD-09-02	78	0.012821	0.118343	0	0.0
OLD-09-12	26	0.038462	0.355030	0	0.0
		0.108333			**0.00**

2,4-D (OLD-09-17 not analyzed)

Reference Well	Distance	1/Distance	(1/dist)/sum(1/dist)	Conc(n) ug/L	Conc
OLD-09-04	24	0.041667	0.384615	0.1	0.0
OLD-09-07	65	0.015385	0.142012	0.005	0.0
OLD-09-02	78	0.012821	0.118343	0	0.0
OLD-09-12	26	0.038462	0.355030	110	39.1
		0.108333			**39.09**

Estimated Concentration in Extracted Groundwater

Arsenic	85.67
Iron	818.76
MCPA	1161.61
MCPP	845.21
2,4-D	19.77
alpha-BHC	0.12
gamma-BHC	0.18
gamma-Chlordane	0.16
Dieldrin	0.01
Heptachlor epoxide	0.02
2,4-Dichlorophenol	35.89

$$C_{extracted} = \frac{Conc(PW_1) + Conc(PW_2)}{2}$$

APPENDIX K

NTC, ORLANDO'S INDUSTRIAL USER DISCHARGE PERMIT

City of Orlando

ENVIRONMENTAL CONTROL SECTION
ENVIRONMENTAL SERVICES DEPARTMENT

5100 L.B. McLEOD ROAD
ORLANDO, FLORIDA 32811

TELEPHONE (407) 246-2664
FAX (407) 246-2886

December 5, 1995

Lt. Commander Catherine A. Ballinger
United States Navy
1350 Grace Hopper Avenue, Suite 010
Orlando, FL 32813

RE: INDUSTRIAL USER DISCHARGE PERMIT

Dear Lt. Commander Ballinger:

Attached is your Industrial User Discharge Permit for your records. Please read over the contents carefully. Any comments previously submitted have been reviewed and considered by the City's Environmental Control Section and Legal Affairs Office. Please submit any further comments or questions you may have within ten (10) working days of the delivery of this Permit.

Very truly yours,

Colan S. Benner

Colan S. Benner
Environmental Supervisor

SB/dma

Attachment

c: Mark Zill
Greg Mudd
File

City of Orlando

ENVIRONMENTAL CONTROL SECTION
ENVIRONMENTAL SERVICES DEPARTMENT

5100 L.B. McLEOD ROAD
ORLANDO, FLORIDA 32811

TELEPHONE (407) 246-2664
FAX (407) 246-2886

December 5, 1995

Lt. Commander Catherine A. Ballinger
United States Navy
1350 Grace Hopper Avenue, Suite 100
Orlando, FL 32813

RE: INDUSTRIAL USER DISCHARGE PERMIT NO. CO67OA

Dear Lt. Commander Ballinger:

This Industrial User Discharge Permit has been prepared on the basis of all available information obtained from correspondence and from the investigation of your industry by the City of Orlando Environmental Services Department personnel.

IT IS IMPORTANT THAT YOU READ THE ENTIRE CONTENTS OF THIS DOCUMENT

The Permit is valid for five (5) years as long as there is compliance with all Permit conditions. The Permit is also subject to renewal and change as stated in Chapter 30 of the City Code.

The Industrial User Permittee shall comply with the City Code of the City of Orlando, Chapter 30, or with the applicable and related state or federal regulations, which ever may be the most stringent. Specific industrial pretreatment conditions are listed under Sections B, C and D.

If you have any questions pertaining to the Permit conditions or the information set forth in this letter, please contact the City's Environmental Control Section at (407) 246-2664 or (407) 246-2213.

Very truly yours,

Thomas L. Lothrop

Thomas L. Lothrop, P.E.
Director, Environmental Services

Colan S. Benner

Colan S. Benner
Environmental Supervisor
Environmental Control Section

TLL/CSB/dma

Save - Conserve water and reduce wastewater

INDUSTRIAL USER DISCHARGE PERMIT

SIGNATURE PAGE

Company Name: UNITED STATES NAVY

Company Address: 1350 Grace Hopper Avenue, Suite 010
Orlando, FL 32813

Consultant Name: Greg Mudd
ABB Environmental Services, Inc.

Consultant Address: 1080 Woodcock Road, Suite 100
Orlando, FL 32803

Permit No.: C067QA

Facility Name: United States Navy (Main Base)

Lt. Commander Catherine A. Ballinger
Name of Representative (typed)

has read and understands this document.

Effective Date: 09/01/95

Expiration Date: 09/01/00

x Cath A Ball 14 December 1995
Signature of Representative

INDUSTRIAL USER DISCHARGE PERMIT

Company Name:	UNITED STATES NAVY
Mailing Address:	1350 Grace Hopper Avenue Suite 010 Orlando, FL 32813
Permit No.:	CO67QA
Facility Name:	United States Navy (Main Base)
Discharge Point:	Sanitary sewer manhole located on west side of Building 7182

The above Industrial User is authorized to discharge industrial wastewater to the City of Orlando's sewerage system in compliance with the City Code, Chapter 30, any applicable provision of federal or state law or regulation, and in accordance with discharge point(s), effluent limitations, monitoring requirements, and other conditions set forth herein.

This Permit is granted in accordance with the application filed in the office of the Environmental Control Section, and in conformity with plans, specifications, and other data submitted to the City in support of the above application.

Effective Date: 09/01/95

Expiration Date: 09/01/00

Thomas L. Lothrop

Thomas L. Lothrop, P.E.
Environmental Services Director

CERTIFICATE OF SERVICE

This is to certify that this NOTICE OF PERMIT was ~~hand delivered~~/mailed by certified mail to the above business on 12/8/95 by Jane A. Lothrop.

Date Signature of Server

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: C067QA
Category: Groundwater Discharge
Expiration Date: 09/01/00

Pursuant to federal, state, and local regulations, the United States Navy (Main Base) (Industrial User) is hereby authorized to discharge industrial sewage into the City of Orlando sewerage system, subject to the conditions set forth in the Permit.

This Permit may be modified by the City of Orlando, or the state, or federal government, or the agencies thereof.

Failure on the part of the Industrial User to fulfill any of the Permit conditions shall be sufficient cause for immediate revocation of this Permit and/or other enforcement action, such as fines, administrative orders and/or suspension of sewer service. This Permit is further subject to termination in accordance with the terms and provisions of the City Code.

ANY ASSIGNMENT OR TRANSFER OF THIS PERMIT SHALL AUTOMATICALLY MAKE IT NULL, VOID, AND OF NO FURTHER EFFECT.

A. **PERMIT CONDITIONS**

1. The Industrial User shall, except as otherwise provided herein, comply with the City Code of the City of Orlando, Chapter 30, or with the applicable and related state or federal regulations, whichever may be the most stringent.

2. The Industrial User shall allow City of Orlando personnel exhibiting proper credentials access to its premises for the purpose of inspection, sampling verification and/or copying of records which are maintained as a result of this Permit or any requirements by state or federal regulations or all of these things. Also, all necessary records required by this Permit shall be retained by the User for a minimum of three (3) years.

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: C067QA
Category: Groundwater Discharge
Expiration Date: 09/01/00

3. The Industrial User shall notify the City of Orlando personnel of changes or modifications to the information provided in their industrial pretreatment permit application such as location, industrial processes, discharges (quantity or quality), or chemical storage procedures.

4. The Industrial User shall notify the City immediately in the event of any occurrence whatsoever that results in discharge to the City's sanitary sewerage system of any wastes or process wastewaters not allowable under this Permit or the City Code. Telephone notification shall be made immediately to the City at (407) 246-2213 (7:00 AM to 12:00 AM) or to the Conserv II Plant at (407) 246-2151 (12:00 AM to 7:00 AM) 7 days a week and, within 5 days, by delivery of a written report to the Director of Environmental Services in care of Environmental Control Section, City of Orlando, 5100 L. B. McLeod Road, Orlando, Florida 32811.

5. The Industrial User shall discharge wastewater only in conformance with the information contained in the permit application on file with the City's Environmental Control Section.

6. The Industrial User's discharge shall conform to the wastewater flows and characteristics listed in Sections B and C below.

7. The Industrial User shall submit a signed report and a signed Statement of Certification (see attached) to the City as further described in Section D below.

8. The Industrial User shall comply with all pretreatment requirements and compliance schedules listed in Section F below (if applicable).

9. The Industrial User shall comply with all federal and state requirements for disposal of hazardous wastes such as sludge from pretreatment. For further information contact the Florida Department of Environmental Protection (FDEP), Solid and Hazardous Waste Section, 2600 Blair Stone Road, Tallahassee, FL 32301. Telephone: (904) 488-0300.

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number CO67QA
Category:Groundwater Discharge
Expiration Date: 09/01/00

B. **GENERAL LIMITATIONS ON WASTEWATER FLOWS AND CHARACTERISTICS**

1. The following limitations and conditions apply to the Industrial User's discharge, until such time as this Section may be modified or revoked.

2. Discharge to the City's sanitary sewerage system shall be limited as follows:
General: Water or wastes that the municipality has identified as likely, either singly or by interaction with other substances, to:

a) harm either the sewerage system or the wastewater treatment process; or
b) be otherwise incompatible with the treatment process; or
c) cause a violation of local, federal, or state discharge permits issued to the City; or
d) adversely affect receiving waters; or
e) endanger life, limb, or public property; or
f) constitute a nuisance; or
g) create a fire or explosion hazard in the Publicly Owned Treatment Works (POTW) or its collection system; or
h) cause corrosive structural damage to the POTW or its collection system; or
i) cause obstruction to the flow in the POTW resulting in interference; or
j) cause any abnormal oxygen demand (BOD, etc.) that will result in interference at the POTW; or
k) create interference with the POTW biological processes or any other process due to excessive heat in such quantities that the temperature at the POTW exceeds 40 degrees Celsius (104 degrees Fahrenheit)

shall not be discharged or caused to be discharged into the City's sanitary sewerage system.

Slug (as defined by the City Code) shall not be discharged into the City's sanitary sewerage system.

Solids or Viscous Substances including but not limited to sand, mud, glass, wood, plastic, rubber, latex, and lime slurries, in quantities or of such size capable of causing obstruction to sewerage flows, or to otherwise interfere with the operation or maintenance of the system, shall not be discharged into the City's sanitary sewerage system.

Fats, Wax, Grease, or Oil, whether emulsified or not, are limited to one hundred (100) mg/l. This also includes substances which may solidify or become viscous at temperatures between thirty-two (32) and one hundred fifty (150) degrees Fahrenheit (zero [0] and sixty-five [65] degrees Celsius).

Concentrated Chemical Solutions shall not be discharged to the City's sanitary sewerage system unless pretreated to acceptable levels.

Dilution to attain specific levels of discharge to municipal sewers, in the absence of industrial or any other type of treatment or pretreatment, is strictly prohibited.

pH shall be not less than 5.5, nor greater than 9.5.

Sludge or deposited solids resulting from an industrial or pretreatment process shall not be discharged into the City's sanitary sewerage system.

Daily Volume of permitted discharge may not be increased beyond fifteen percent (15%) without the Industrial User first securing a formal amendment to this Permit.

Uncontaminated Water, ground, storm, and surface waters; roof runoff; tidewater and subsurface drainage; any water not being metered by Orlando Utilities Commission; or any one of these conditions or any of these conditions in combination shall not be discharged into the City's sanitary sewerage system.

Flammable Substances including but not limited to gasoline, benzene, naphtha, solvent-type material of any sort, alcohol, fuel oil, crude oil, lubricating oils, flammable or explosive liquids, solids or gases, or any oils or greases of hydrocarbon or petroleum origin, shall not be discharged into the City's sanitary sewerage system.

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: CO67QA
Category: Groundwater Discharge
Expiration Date: 09/01/00

3. The wastewater constituents listed below shall at no time be discharged in concentrations which exceed the limitations given:

Constituent (to be limited)	Maximum Concentrations, mg/l
Antimony	1.0
Arsenic	0.25
Barium	10.0
Beryllium	0.25
Biological Oxygen Demand (BOD)	300.0
Boron	1.0
Cadmium	0.26
Chromium (Total)	1.0
Cobalt	0.3
Copper	2.0
Cyanide	0.5
Grease	100.0
Lead	0.4
Lower Explosion Limit (LEL)	less than 5% (of LEL on the meter)
Lithium	0.03
Manganese	1.5
Mercury	0.005
Nickel	0.7
pH*	not less than 5.5 or greater than 9.5
Selenium	0.5
Silver	0.24
Sodium	300.0
Tin	5.0
Zinc	1.0
Total Metals	10.0
Total Phenols	0.5
Total Suspended Solids (TSS)	300.0
Total Toxic Organics (TTO)	2.13

* (pH excursions of 15 minutes or longer are considered pH violations)

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: C067QA
Category: Groundwater Discharge
Expiration Date: 09/01/00

C. SPECIFIC LIMITATIONS ON WASTEWATER FLOW CHARACTERISTICS

(The parameters and limits that apply to your industry are specified below.)

EFFLUENT LIMITS

PARAMETER	DAILY MAXIMUM	4-DAY AVERAGE	MONTHLY AVERAGE	LIMIT	UNITS
LEL	<5%				
LEAD	0.4				mg/l
pH	not less than 5.5, not greater than 9.5 Reference "Additional Provisions", Page 13				

Allowable water flow: 5000 gallons/day.

D. SELF-MONITORING AND REPORTING REQUIREMENTS

Monitoring parameters will include flow plus those specified in the list on the following page, and shall be sampled as indicated by either "Comp" or Grab".

- Composite Sample: A combination of individual samples of water or wastewater taken at selected intervals, generally hourly for some specified period, to minimize the effect of the variability of the individual sample. Individual samples may have equal volume or may be roughly proportioned to the flow at time of sampling.

- Grab Sample: A single sample of wastewater taken at neither set time nor flow.

If sampling performed by a user indicates a violation, the user must notify the Environmental Control Section within twenty-four (24) hours of becoming aware of the violation. The user shall also repeat the sampling and analysis and submit the results of the repeat analysis to the Environmental Control Section within thirty (30) days after becoming aware of the violation. The user is not required to resample if the Environmental Control Section monitors at the user's facility at least once a month, or if the Environmental Control Section samples between the user's initial sampling and when the user receives the results of this sampling.

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: C067QA
Category: Groundwater Discharge
Expiration Date: 09/01/00

Parameter	Sample Type	Monitoring Frequency	Reporting Frequency
Antimony			
Arsenic			
Barium			
Beryllium			
BOD			
Boron			
Cadmium			
Chromium (Total)			
Cobalt			
Copper			
Cyanide			
Grease			
Lead			
LEL			
Lithium			
Manganese			
Mercury			
Nickel			
pH			
Selenium			
Silver			
Sodium			
Tin			
Zinc			
Total Metals			
Total Phenols			
TSS			
TTO			

To comply with Rule 62-625.600 (1) (e), F.A.C., and Chapter 62-160, F.A.C., industrial users must operate in accordance with the sampling and analysis procedures specified in the State of Florida's "Department of Environmental Protection Standard Operating Procedures for Laboratory Operation and Sample Collection Activities," (DEP-QA-001/92), (SOP) dated September 1992.

Reports on wastewater analysis and the amount of hazardous waste produced shall be submitted to the City of Orlando's Environmental Control Section as follows:

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: C067QA
Category: Groundwater Discharge
Expiration Date: 09/01/00

REPORTING FREQUENCY	DUE DATE
Monthly	No later than the 10th of the following month.
Quarterly	No later than April 10, July 10, October 10, or January 10, as applicable.
Semiannually	No later than January 10 or July 10, as applicable.
Annually	No later than January 10.

To validate the report, a Statement of Certification (see attached) must be signed by an authorized company representative and submitted along with a signed copy of the report. Report copies and all monitoring data shall be retained by your company for a minimum of three (3) years or as otherwise specified by the City. All reports shall contain the following:

1. report date, sample date, sample type, sampling point location, time sample taken, sampler's name;
2. date the analysis was performed;
3. who performed the analysis;
4. the analytical method used; and
5. the results of the analysis.

Please see attached sample format or use a format of similar composition.

E. **PENALTY**

Violations of this Permit and/or violations of the City of Orlando's Ordinance are subject to such actions as administrative fines, Administrative Orders and civil/criminal penalties. Penalties may be invoked singularly or plurally or in any combination of these actions as authorized by the City's Ordinance. Any or all enforcement actions may be appealed to the Director of Environmental Services or his designee.

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number C067QA
Category:Groundwater Discharge
Expiration Date: 09/01/00

F. **COMPLIANCE SCHEDULE (for Groundwater Monitoring only)**

All Compliance Schedule milestones must be reported in detail and in writing by the milestone date. Failure to comply with this Permit, the City's Ordinance, compliance meeting procedures, or the date certain, shall be deemed a violation of the provisions of this document, and may be grounds for revocation of the Industrial User's Discharge Permit and for such other actions, penalties, or enforcement, or all or any combination of these things, as may be authorized for violation of the City's Ordinance.

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: C067QA
Category: Groundwater Discharge
Expiration Date: 09/01/00

G. **UNCONTAMINATED COOLING WATER**

Uncontaminated cooling water utilized by the Industrial User shall be permitted to be discharged into the City's sanitary sewerage system provided that:

1. Only metered City water shall be utilized by the Industrial User in its cooling processes (NOTE: Water from any other source may not be discharged into the City's system.);

2. Cooling water shall be directed through and treated by the Industrial User's wastewater treatment unit prior to discharge into the City's sanitary sewerage system; and

3. The total volume of cooling water discharged into the City's sanitary sewerage system shall not exceed three hundred (300) gallons per month.

H. **UNCONTAMINATED INDUSTRIAL PROCESS WATER**

Uncontaminated industrial process water utilized by the Industrial User shall be permitted to be discharged into the City's sanitary sewerage system provided that:

1. The source of the uncontaminated industrial process water is the City's metered water supply system; and

2. The uncontaminated industrial process water shall be discharged either in the Industrial User's sanitary-only sewer or at a point where it would not interfere with the determination of pretreatment compliance.

I. **FEDERAL REGULATIONS**

For applicable federal regulations, see the Code of Federal Regulations, Title 40, Part 403. Should you require a copy, please contact City of Orlando, Environmental Control Section, 5100 L. B. McLeod Road, Orlando, Florida 32811, (407) 246-2664.

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: C067QA
Category: Groundwater Discharge
Expiration Date: 09/01/00

J. ADDITIONAL PROVISIONS

1. THIS PERMIT IS SUBJECT TO REVOCATION SHOULD THE FOLLOWING SEWER BILLING REQUIREMENTS NOT BE ADHERED TO:

   a. Your company hereby agrees that the monthly user fees for disposal of the effluent shall be charged to your company based upon the City's present commercial rate, and at the commercial rate as it may be from time to time amended.

   b. In calculating these fees, the City shall use the actual flows, as submitted to the Environmental Control Section by your company by the tenth (10th) of each successive month. In any month that the reports are not submitted in a timely fashion, the user fee will be based upon twice the maximum allowed flow 5000 (gpd) usage.

2. All discharges shall be batch and require prior written approval from the City of Orlando's Environmental Control Section.

3. All stored groundwater must be properly contained in DOT approved drums.

4. Drums will be approved for discharge on an individual basis. The most recent analytical data available will be used in making each determination.

Permittee:

United States Navy
(Main Base)

INDUSTRIAL USER DISCHARGE PERMIT
Number: CO67QA
Category: Groundwater Discharge
Expiration Date: 09/01/00
Amendment Date: 04/01/97

5. A signed monthly report must be submitted to the City of Orlando's Environmental Control Section semi-annually (see attached sample format).

6. A signed Statement of Certification (see attached) must accompany all semi-annual reports.

APPENDIX L

VOLUME CALCULATIONS OF CONTAMINATED MEDIA

PROJECT	COMP. BY	JOB NO.
NTC ORLANDO OU3 FS	RAN	2540-51
	CHK. BY WAB	DATE 10/19/98

SA 8 - CONTAMINATED SOIL

"RESIDENTIAL TARGET LEVELS = As < 1 ppm"

TWO AREAS - see figure

Assume excavation to 2' (option would be to overexcavate to ~~[illegible]~~ assist in gw cleanup)

Area 1 60' x 60' x 2 ft = 7200 ft³ / 27 cu ft/cu yd = 267 yd³

AREA 2 375 x 315 x 2 = 236,250 ft³/27 = 8,750 yd³

TOTAL = ±9017 yd³

PROJECT	COMP. BY	JOB NO.
ORLANDO OU3 PLANIMETER CALCS VOLUME OF SOIL/CONCENTRATIONS EXCEEDING RECREATIONAL ACTION LEVEL (7.2 mg/kg - arsenic)	MBC	2546.51
	CHK. BY KAW	DATE 10/29/98

On 50 scale, measures 56 ∴ $\frac{50}{x} = \frac{56}{90}$ So.. $x = 80.36$

Scale: $\boxed{1'' = 80.4'}$

80.4
×80.4
$\boxed{6464}$ Factor to convert to ft^2

Planimeter Readings (2)

① 459
② 455 > 4.57

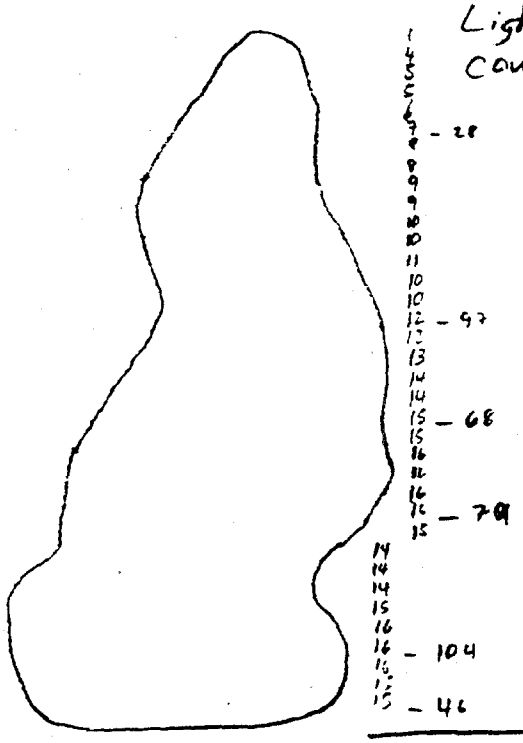
6464
× 4.57
29,540.48

or $\boxed{29,540\ ft^2}$ Answer

≅ 0.68 Acres

Check of work

Light table transfer count boxes



422
×64
$\boxed{27,008}$ check OK.

FORM 00.01 REV. 4/81

ABB Environmental Services, Inc.

2)

PROJECT	COMP. BY	JOB NO.
ORLANDO OU3 PLANIMETER	MSC	2566.51
	CHK. BY MJR	DATE 10/29/98

Convert to volume: 2 ft depth

29,540 ft^2
× 2 ft
59,080 ft^3

convert to Yds: 27 ft^3/yd^3

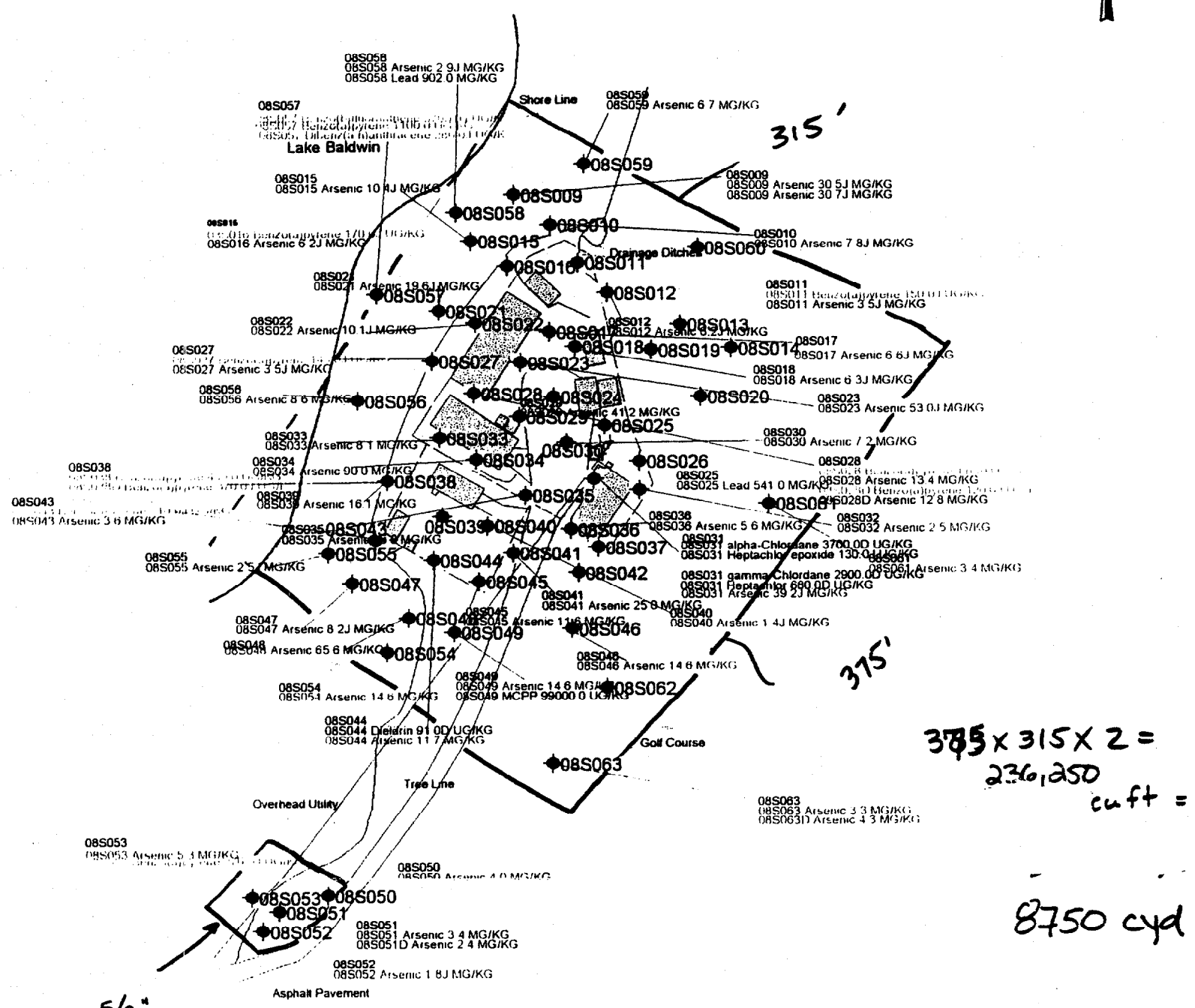
59,080 / 27 = **2,188 yd^3**

and 1.2 Tons/yd^3 So...

2,188 × 1.2 = **2,626 Tons**

SA8 - CONTAMINATED SOIL

SOIL AREAS ABOVE RESIDENTIAL ACTION LEVEL (Arsenic > 1 mg/kg)



375 x 315 x 2 = 236,250 cu ft =

8750 cyd

5/8" square x 90'

56.25' square

x 2' depth

= 6328 cu.ft.

234 cu.yd.

Volumes of Contaminated Soil

Total V = 234 cyd + 8750 cyd

Total Vol ≅ 9,000 cyd

LEGEND

Surface soil sample point

Structure

UG/KG- micrograms per kilogram

MG/KG - milligrams per kilogram

30 0 30 60 Feet

SCALE: 1 INCH = 90 FEET

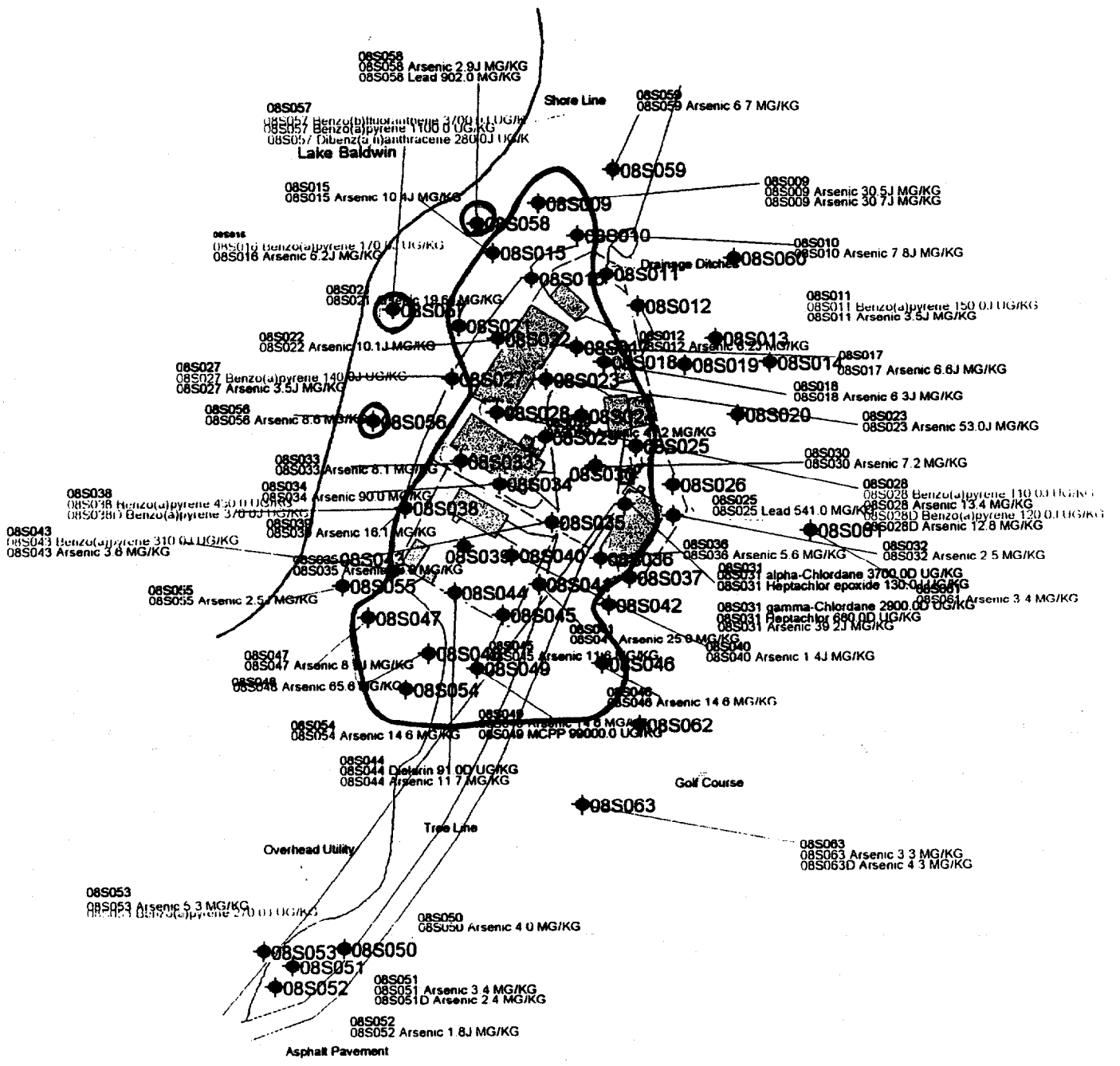
FIGURE 4-1
SURFACE SOIL ANALYTICAL RESULTS
EXCEEDING SCREENING CRITERIA
STUDY AREA 8

REMEDIAL INVESTIGATION
OPERABLE UNIT 3
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

001917R17

SA 8

SOIL AREAS ABOVE RECREATIONAL ACTION LEVEL (Arsenic > 7.2 mg/kg)



LEGEND

Surface soil sample point

Structure

UG/KG- micrograms per kilogram

MG/KG - milligrams per kilogram

30 0 30 60 Feet

SCALE: 1 INCH = 90 FEET

FIGURE 4-1
SURFACE SOIL ANALYTICAL RESULTS
EXCEEDING SCREENING CRITERIA
STUDY AREA 8

REMEDIAL INVESTIGATION
OPERABLE UNIT 3
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

PROJECT	COMP. BY	JOB NO.
NTC Orlando OU3 FS	KAW	
	CHK. BY WAB	DATE 10/19/98

SA 8 - GROUNDWATER (same for residential or recreational)

Assumes essentially no new inputs (upgradient, leaching from soil, etc)

SEE ATTACHED FIGURE

Volume = $\pi r^2 h$

$r = 150$ ft (centered near OLD-08-02)

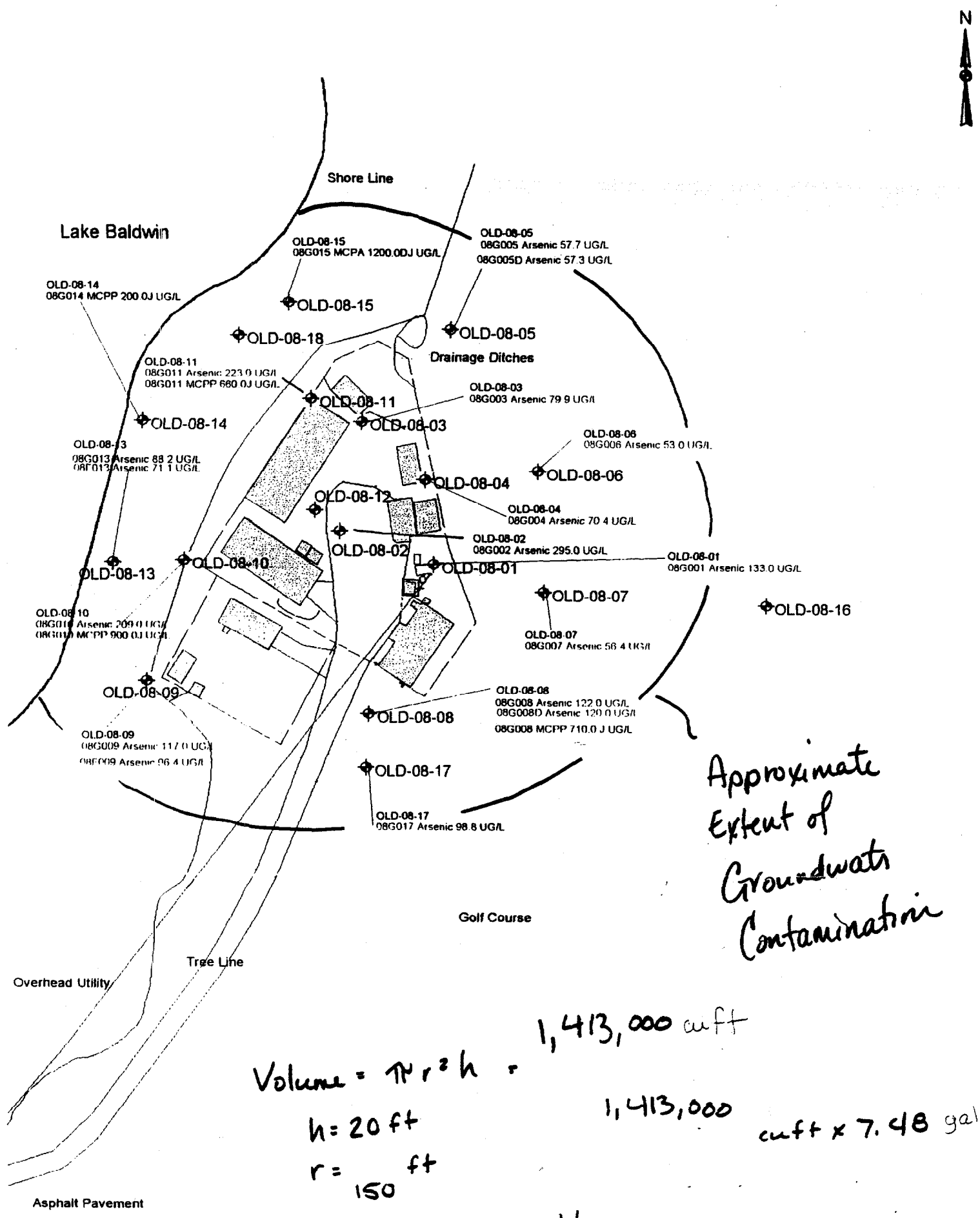
h (depth) = 20 ft. (see assumption for SA 9)

$V = 1,413,000 \text{ ft}^3 \times 7.48$ gal/cuft

porosity = 0.35 (silty sand aquifer)

10,569,240 gal x 0.35 = 3,699,234 gal = ≅ 4 million gal.

SA8 - GROUNDWATER ABOVE ACTION LEVELS (MCLs)



Volume = $\pi r^2 h$ = 1,413,000 cuft

h = 20 ft

r = 150 ft

1,413,000 cuft x 7.48 gal/cuft

$\forall$ = 10,569,240 gal x 0.35 (porosity)

$\forall$ = 3,699,234 gal

$\forall \simeq$ 4 millgal.

LEGEND

- Groundwater well
- Structure

UG/L - micrograms per liter

MG/L - milligrams per liter

20 0 20 40 Feet

SCALE: 1 INCH = 60 FEET

FIGURE 4-3
GROUNDWATER ANALYTICAL RESULTS
EXCEEDING SCREENING CRITERIA
STUDY AREA 8

REMEDIAL INVESTIGATION
OPERABLE UNIT 3
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

A010107

PROJECT	COMP. BY	JOB NO.
NTC Orlando OU3 FS	KAM	02546.51
	CHK. BY WAW	DATE 10/19/98

SA 9 - CONTAMINATED SOIL VOLUME

UPPER & LOWER SEGMENTS - (above & below culvert)

CULVERT LENGTH = 45 ft. (1.5 ft diam pipe)

Assume 3" sediment accumulation

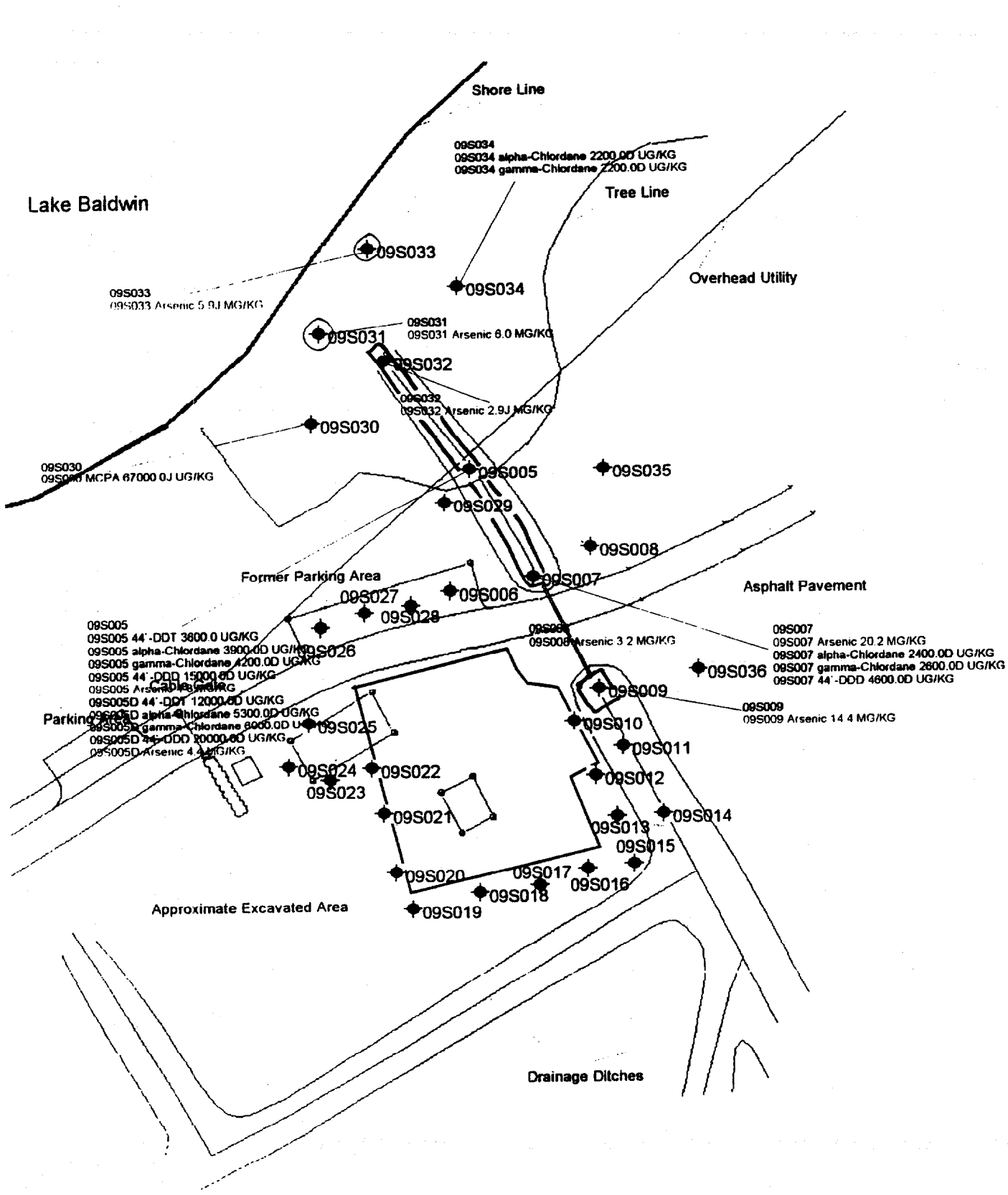
Length of Ditch Segments. = 120 + 15 = 135 ft

Width (ditch floor) = 3 ft

Depth of Excavation = 2 ft

810 cuft / 27 cuft/yd = ~~45~~ 30 cuyd.

SA 9- SOIL AREAS ABOVE RESIDENTIAL ACTION LEVELS (As > 1mg/kg)



LEGEND

Surface soil sample point

Structure

UG/KG- micrograms per kilogram

MG/KG - milligrams per kilogram

20 0 20 40 Feet

SCALE: 1 INCH = 60 FEET

FIGURE 4-2
SURFACE SOIL ANALYTICAL RESULTS
EXCEEDING SCREENING CRITERIA
STUDY AREA 9

REMEDIAL INVESTIGATION
OPERABLE UNIT 3
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

00191D032

PROJECT	COMP. BY	JOB NO.
NTC, Orlando OU3 FS	KAM	02546.51
	CHK. BY	DATE
	WAB	10/19/98

SA 9 - GROUNDWATER

EXTENT OF CONTAMINATION (see figure) DEFINED AS LIMIT OF WELLS w/ EXCEEDANCES OF SCREENING VALUES.

OLD-09-12 - "SOURCE AREA WELL"

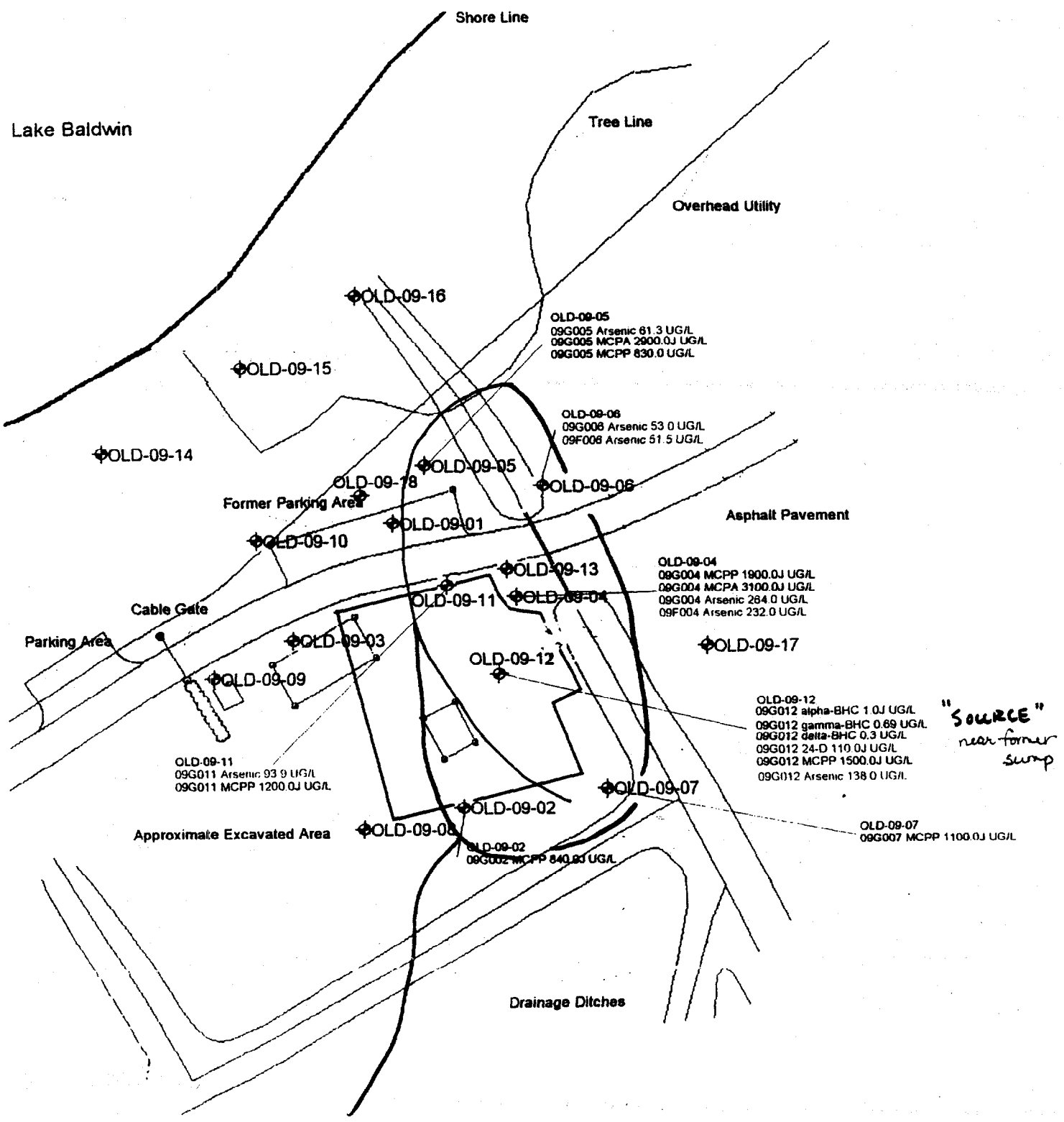
Length = 210 ft
Width = 90 ft
Depth = 20 ft (based on "clean" well screened 19-29 ft)
porosity = 0.35 (assumed for a silty sand aquifer)

378,000 cuft. x 7.48 gal./cuft = 2,827,440 gal.

2,827,440 gal x 0.35 = 989,604 gal. = ~ 1 mil gal

* Reasonable estimate given inputs/outputs; no reason to believe contaminants have extended deeper (increased thickness)

SA 9 - GROUNDWATER ABOVE ACTION LEVELS (MCL)



"Extent" of Groundwater Contamination

LEGEND

Groundwater well

Structure

UG/L - micrograms per liter

MG/L - milligrams per liter

20 0 20 40 Feet

SCALE: 1 INCH = 60 FEET

FIGURE 4-4
GROUNDWATER ANALYTICAL RESULTS
EXCEEDING SCREENING CRITERIA
STUDY AREA 9

REMEDIAL INVESTIGATION
OPERABLE UNIT 3
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

00191D042

APPENDIX M

GROUNDWATER EXTRACTION SYSTEM

GROUNDWATER EXTRACTION SYSTEM

1.0 INTRODUCTION. This appendix presents the proposed extraction system for ex-situ remedial alternatives for groundwater at SA 8 and SA 9 at OU 3. Development of the groundwater extraction system for each study area is discussed in Section 2.0. Section 3.0 presents the batch flush model for the primary COCs at OU 3. Section 4.0 presents the estimated length of time for the extraction system to operate at each study area.

2.0 DEVELOPMENT OF THE GROUNDWATER EXTRACTION SYSTEM. Discussion and calculations contained in this section include a presentation of results for groundwater pathlines for plume capture based on site hydraulic conditions at SAs 8 and 9.

The figures presented in Attachment A (SA 8) and Attachment B (SA 9) and Attachment C (piezometric head contours for SAs 8 and 9) of this appendix were prepared from the RESSQ Pathline Model (i.e, the main particle-tracking module within the USEPA Wellhead Protection Area (WHPA) software package). RESSQ is a two-dimensional model of the flow to (or from) wells pumping (or recharging) in an otherwise uniform regional groundwater flow.

2.1 Capture Zone Flow Patterns.

SA 8: The proposed groundwater extraction system for SA 8 consists of 4 groundwater extraction wells. The pumping rate for each well was determined using the following formula (Driscoll, 1986, Appendix 16-D):

$$Q = \frac{T * S_w}{1500}$$

where:

Q = the pumping rate of the well (gpm)
T = the transmissivity of the aquifer (gpd/ft)
S_w = the aquifer drawdown (ft)

Based on the results of a slug test performed in April 1998 (Draft RI Report, Appendix B, 1998), aquifer transmissivity was taken to be 54.8 ft^2/day (410 gpd/ft), and aquifer drawdown was taken to be 10 ft. The following flow rate should be achievable in the extraction wells at SA 8:

$$Q = \frac{410 gpd/ft * 10 ft}{1500} = 2.73 gpm$$

A flow rate of 2.5 gallons per minute (gpm) for each well was assumed for design purposes. The proposed locations of the extraction wells are shown on Figure M-1.

The first three figures in Attachment A show groundwater flow lines for four recovery wells that are spaced along the SA 8 plume, and are pumping at a rate of 2.5 gpm each. For this analysis, aquifer transmissivity was taken to be 54.8 ft^2/day, aquifer thickness was taken to be 20 ft, aquifer porosity was assumed

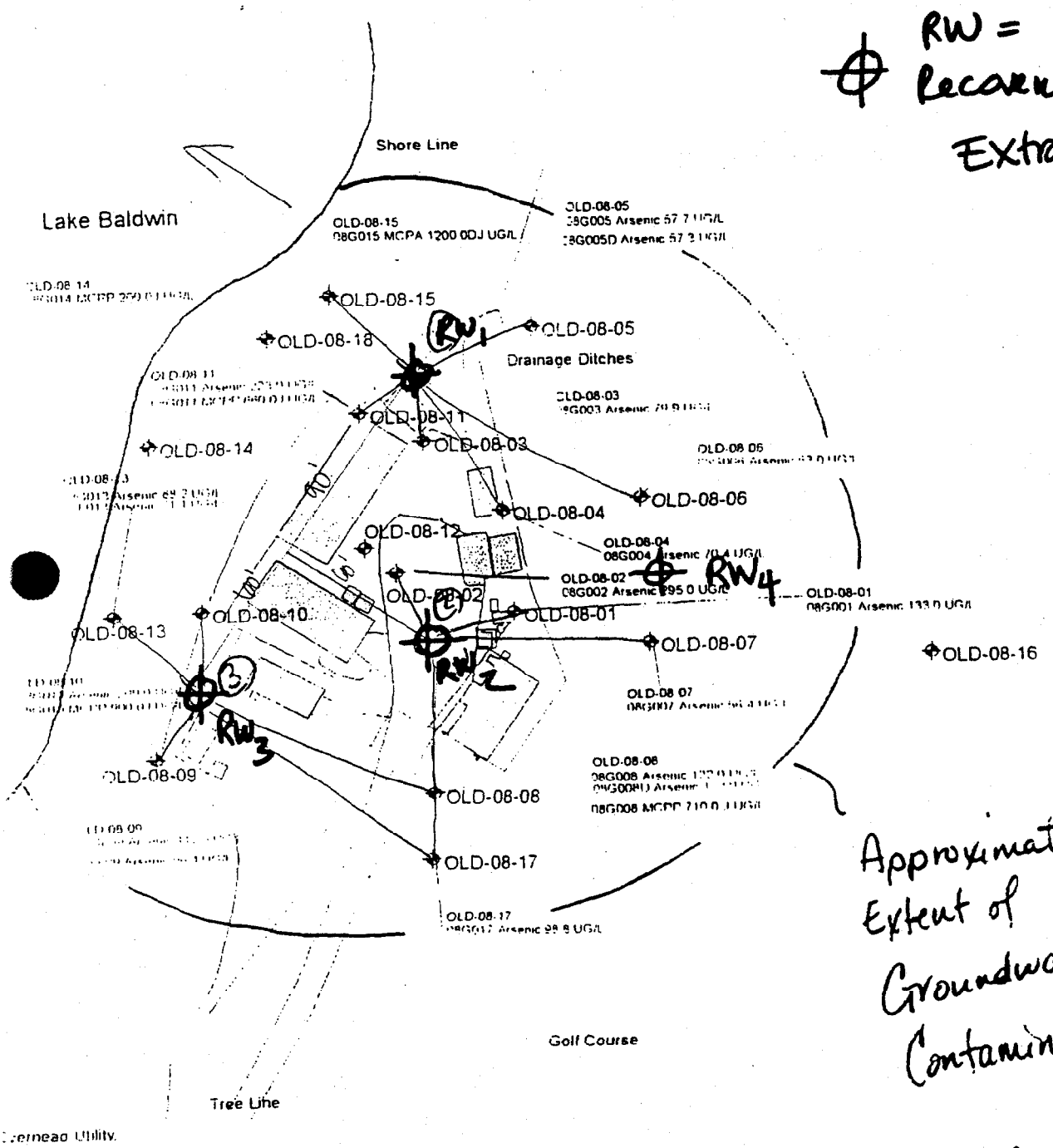
8 -

60ft

SA 8

N

RW = Recovery well / Extraction Well



Approximate Extent of Groundwater Contamination

FIGURE ~~E-1~~ M-1
EXTRACTION WELL CONFIGURATI
AT SA 8

to be 0.35, and the non-pumping water table gradient was taken to be 0.0075 toward the west-northwest (150°). The travel time for the length of the pathlines toward each well is indicated beneath the plot (240, 300, and 400 days). In each figure, the total flow to all four wells is 10 gpm (2.5 gpm each). It can be seen that the entire plume is flushed - at least once - in 400 days when the well pumping rate is 2.5 gpm in each well.

An exception to this is the "stagnation" zones midway between adjacent wells. These stagnation zones could be flushed by converting Extraction Well 2 (refer to Figure M-1) to a recharging rather than discharging well. The last three figures in Attachment A show groundwater flow lines for EW 2, after conversion to an injection well. The travel time for the pathlines around the injection well are plotted for injection times of 120 days, 180 days, and 240 days. This flow pattern would sufficiently flush this stagnation zone in 180 days.

In summary, four recovery wells would be used to extract groundwater until the groundwater plume has been extracted, perhaps to the point where contaminated water exists only in the stagnation zones. At this point, EW 2 would be converted to a recharge well, using clean water to flush out the remaining contamination. Therefore, the entire plume could be sufficiently captured via extraction and stagnation flushing in 580 days (400 days + 180 days).

SA 9: The proposed groundwater extraction system for SA 9 consists of 6 groundwater extraction wells. Based on the results of a slug test performed in April 1998 (Draft RI Report, Appendix B, 1998), aquifer transmissivity at SA 9 was taken to be 2.8 ft^2/day (21 gpd/ft), and aquifer drawdown was taken to be 10 ft. Using the equation described above for flow rates, the 6 extraction wells at SA9 should achieve the pumping rate indicated below:

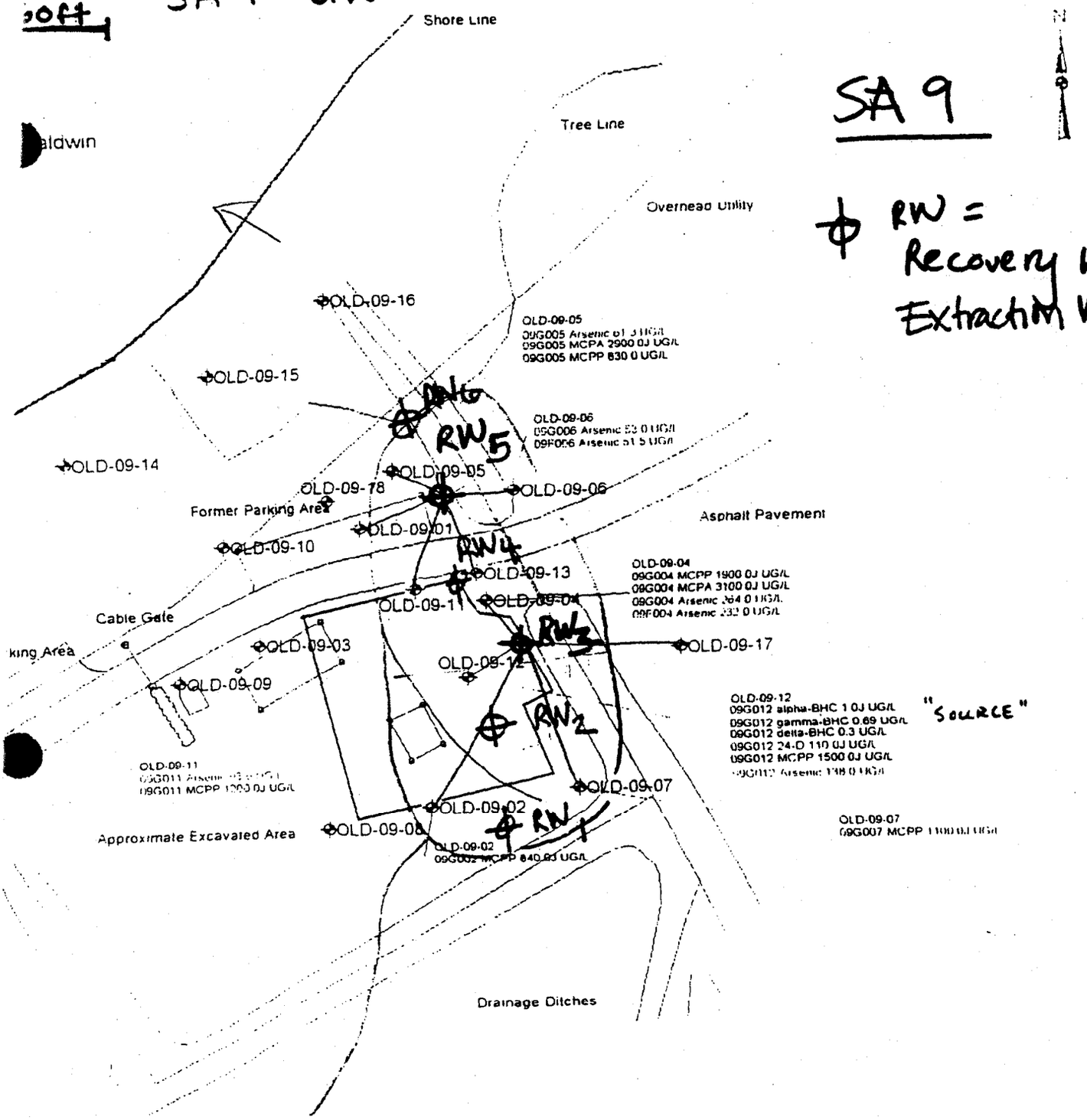
$$Q = \frac{21 gpd/ft * 10 ft}{1500} = 0.14 gpm$$

A pumping rate of 0.25 gallons per minute (gpm) for each well was assumed for design purposes. The proposed locations of the extraction wells are shown on Figure M-2.

The first three figures in Attachment B show groundwater flow lines for six recovery wells that are positioned within the groundwater plume at SA 9, and are pumping at a rate of 0.25 gpm each. For this analysis, aquifer transmissivity was taken to be 2.8 ft^2/day, aquifer thickness was taken to be 20 ft, aquifer porosity was assumed to be 0.35, and the non-pumping water table gradient was taken to be 0.0075 toward the west-northwest (135°). The travel time for the length of the pathlines toward each well is indicated beneath the plot (150, 225, and 300 days). In each figure, the total flow to all six wells is 1.5 gpm (0.25 gpm each). It can be seen that the entire plume is flushed - at least once - in 300 days when the well pumping rate is 0.25 gpm in each well.

An exception to this is the "stagnation" zones midway between the adjacent extraction wells. These stagnation zones could be flushed by converting Extraction Well (EW) 1, EW 3, and EW 5 (refer to Figure F-2), to recharging rather than discharging wells. The last three figures in Attachment A show groundwater flow lines for EW 1, EW 3, and EW 5 after conversion to injection wells. The travel time for the pathlines around the injection wells are plotted

SA 9- GW



"Extent" of Groundwater Contamination

FIGURE ~~E-2~~ M-2
EXTRACTION WELL CONFIGURATION
AT SA 9

for injection times of 90 days, 150 days, and 180 days. This flow pattern would sufficiently flush this stagnation zone in 180 days.

In summary, six recovery wells would be used to extract groundwater at SA 9 until the groundwater plume has been extracted, perhaps to the point where contaminated water exists only in the stagnation zones. At this point, EW 1, EW 3, and EW 5 would be converted to recharge wells, using clean water to flush out the remaining contamination. Therefore, the entire plume could be sufficiently captured via extraction and stagnation flushing in 480 days (300 days + 180 days).

3.0 BATCH FLUSH MODEL FOR CHEMICALS OF CONCERN. This section presents the application of a "batch flush" model that is used to predict the number of pore volumes for flushing to reach action levels in groundwater at OU 3. The batch flush model was used for the 3 primary COCs (arsenic, MCPA, and MCPP) at both SAs to estimate approximate extraction duration for the three groundwater pump and treat alternatives (G-3, G-4, and G-5).

3.1 Batch Flush Model for Arsenic. For arsenic, the inorganic contaminant that defines the plume at both SAs at OU 3, the distribution coefficient (K_d) is taken to be about 4 ml/g (refer to Table M-1). The bulk density of the aquifer soils is about 1.74 g/cc (assuming a specific gravity of 2.67 for silty sand), and the volumetric moisture content of the aquifer is assumed to be 0.3.

SA 8: Using the values above, a retardation coefficient of 24.2 is calculated (see attached calculations sheet). Using this retardation coefficient, and the batch flush model:

$$PV = -R \ln\left(\frac{c_f}{c_i}\right)$$

where:

PV = the number of pore volumes of flushing necessary to reduce the groundwater concentration from some estimated initial concentration, c_i, (refer to Appendix J).

c_f = the final concentration of arsenic (goal is below the GCTL or <50 $\mu g/\ell$)

R = the soil retardation factor

The following number of pore volumes of flushing will result in the contaminant reduction indicated:

$$PV = -24.2 \ln\left(\frac{50 ug/L}{134 ug/L}\right) = 23.9$$

23.9 PVs will cause a reduction the concentration of arsenic from 134 $\mu g/\ell$ to 50 $\mu g/\ell$.

Given the measured plume and the capture pathlines, it can be determined how many years are required to flush arsenic from the aquifer.

SA 9: The retardation coefficient for SA 9 is 24.2 - the same as that for SA 8. Using the batch flush model for SA 9 indicated that the following number of pore volumes of flushing will result in the reduction of arsenic from an estimated initial concentration of 84 $\mu g/\ell$ (see Appendix J) to 50 $\mu g/\ell$:

$$PV = -24.2 \ln\left(\frac{50 ug/L}{84 ug/L}\right) = 13.2$$

13.2 PVs will cause a reduction in the concentration of arsenic from 84 $\mu g/\ell$ to 50 $\mu g/\ell$.

Given the measured plume and the capture pathlines, it can be determined how many years are required to flush arsenic from the aquifer.

3.2 Batch Flush Model for MCPA. For MCPA, an organic contaminant that is co-located with the arsenic plume at both SAs, the distribution coefficient (K_d) is approximately 0.85 ml/g (Source: Toxnet, Hazardous Substance Data Bank). The bulk density of the aquifer soils is about 1.74 g/cc (assuming a specific gravity of 2.67 for silty sand), and the volumetric moisture content of the aquifer is assumed to be 0.3.

SA 8: Using the values above, a retardation coefficient of 5.93 is calculated (see attached calculations sheet). Using this retardation coefficient, and the batch flush model:

$$PV = -R \ln\left(\frac{c_f}{c_i}\right)$$

Where:

PV = the number of pore volumes of flushing necessary to reduce the groundwater concentration from some estimated initial concentration, c_i, (refer to Appendix J).

c_f = the lowest method detection limit (MDL) for MCPA using EPA Method 8151 (see attached MDLs). NOTE: the MDL was used instead of the GCTL because the GCTL for MCPA (3.5 ug/L) is not measurable by any current standard, cost-effective analytical method.

R = the soil retardation factor

The following number of pore volumes of flushing will result in the contaminant reduction indicated:

$$PV = -5.93 \ln\left(\frac{71 ug/L}{169 ug/L}\right) = 5.14$$

5.14 PVs will cause a reduction the concentration of MCPA from 169 $\mu g/\ell$ to 71 $\mu g/\ell$.

Given the measured plume and the capture pathlines, it can be determined how many years are required to flush MCPA from the aquifer.

SA 9: The retardation coefficient for SA 9 is 5.93 - the same as that for SA 8. Using the batch flush model for SA 9 indicated that the following number of pore

volumes of flushing will result in the reduction of MCPA from an estimated initial concentration of 1,162 $\mu g/\ell$ (see Appendix J) to 71 $\mu g/\ell$:

$$PV = -5.93 \ln\left(\frac{71 ug/L}{1162 ug/L}\right) = 16.6$$

16.6 PVs will cause a reduction in the concentration of MCPA from 1162 $\mu g/\ell$ to 71 $\mu g/\ell$.

Given the measured plume and the capture pathlines, it can be determined how many years are required to flush MCPA from the aquifer.

3.3 Batch Flush Model for MCPP. For MCPP, another primary organic contaminant that is co-located with the arsenic plume at both SAs, the distribution coefficient (K_d) is approximately 0.13 ml/g (Source: Toxnet, Hazardous Substance Data Bank). The bulk density of the aquifer soils is about 1.74 g/cc (assuming a specific gravity of 2.67 for silty sand), and the volumetric moisture content of the aquifer is assumed to be 0.3.

SA 8: Using the values above, a retardation coefficient of 1.75 is calculated (see attached calculations sheet). Using this retardation coefficient, and the batch flush model:

$$PV = -R \ln\left(\frac{c_f}{c_i}\right)$$

Where:

PV = the number of pore volumes of flushing necessary to reduce the groundwater concentration from some estimated initial concentration, c_i, (refer to Appendix J).

c_f = the lowest method detection limit (MDL) for MCPP using EPA Method 8151 (see attached MDLs). NOTE: the MDL was used instead of the GCTL because the GCTL for MCPP (7.0 ug/L) is not measurable by any current standard, cost-effective analytical method.

R = the soil retardation factor

The following number of pore volumes of flushing will result in the contaminant reduction indicated:

$$PV = -1.75 \ln\left(\frac{60 ug/L}{274 ug/L}\right) = 2.66$$

2.66 PVs will cause a reduction the concentration of MCPP from 274 $\mu g/\ell$ to 60 $\mu g/\ell$.

Given the measured plume and the capture pathlines, it can be determined how many years are required to flush MCPP from the aquifer.

SA 9: The retardation coefficient for SA 9 is 1.75 - the same as that for SA 8. Using the batch flush model for SA 9 indicated that the following number of pore volumes of flushing will result in the reduction of MCPP from an estimated initial concentration of 845 $\mu g/\ell$ (see Appendix J) to 60 $\mu g/\ell$:

4.63 PVs will cause a reduction in the concentration of MCPP from 845 $\mu g/\ell$ to 60 $\mu g/\ell$.

$$PV = -1.75\ln\left(\frac{60ug/L}{845ug/L}\right) = 4.63$$

Given the measured plume and the capture pathlines, it can be determined how many years are required to flush MCPP from the aquifer.

4.0 ESTIMATED LENGTH OF TIME FOR EXTRACTION SYSTEM TO OPERATE. This section discusses the assumptions and calculations used to estimate the length of time that an extraction system would need to operate at OU 3 in order to extract groundwater above action levels at each SA. The duration of extraction can be estimated as follows:

$$T = t x PV$$

Where:

T = total treatment duration

t = time necessary to extract one pore volume of water from the edges of the plume including stagnation zones (see Section 2.1 and Attachment A).

PV = the number of pore volumes of flushing necessary to reduce the groundwater concentration from some estimated initial concentration.

Using the PVs calculated for each of the primary COCs (arsenic, MCPA, and MCPP), the total treatment duration can be calculated for each of the SAs.

SA 8: The time (t) necessary to extract one pore volume of groundwater at SA 8 is based on the following:

- The 4-well, 10 gpm system discussed in Section 2.1 would be used at the site.
- It would take approximately 400 days (approximately 13 months) for the water from the edges of the plume to reach the proposed extraction wells (see Section 2.1 and Attachment A).
- It would take approximately 180 days (approximately 6 months) to flush out stagnation zones that would form between the pumping wells. (see Section 2.1 and Attachment A).

Therefore, a total of 580 days (approx. 1.59 years) would be required to extract one PV of the plume.

For each of the primary COCs, the estimated treatment duration (T) is as follows:

Study Area 8 - Treatment Duration

	Primary COCs		
	Arsenic	MCPA	MCPP
Pore Volume (PV)	23.9	5.14	2.66
Extraction time per PV (t)	1.59	1.59	1.59
Total Treatment Duration (T)	38 years	8 years	4 years

SA 9: The time (t) necessary to extract one pore volume of groundwater at SA 9 is based on the following:

- The 6-well, 1.5 gpm system discussed in Section 2.1 would be used at the site.
- It would take approximately 300 days (approximately 10 months) for the water from the edges of the plume to reach the proposed extraction wells (see Section 2.1 and Attachment B).
- It would take approximately 180 days (approximately 6 months) to flush out stagnation zones that would form between the pumping wells. (see Section 2.1 and Attachment B).

Therefore, a total of 480 days (approx. 1.32 years) would be required to extract one PV of the plume. For each of the primary COCs, the estimated treatment duration (T) is as follows:

Study Area 9 - Treatment Duration

	Primary COCs		
	Arsenic	MCPA	MCPP
Pore Volume (PV)	13.2	16.6	4.63
Extraction time per PV (t)	1.32	1.32	1.32
Total Treatment Duration (T)	18 years	22 years	6 years

<u>4.1 Estimated Extraction Duration for the Pump and Treat Alternatives</u>. The three groundwater extraction and treatment alternatives include:

- Alternative G-3: Phytoremediation
- Alternative G-4: Extraction, Pretreatment, Discharge to POTW
- Alternative G-5: Extraction, Treatment, Discharge to Surface Water

In general, the most conservative (e.g., longest) treatment duration would be proposed in order to extract the most resistant COCs. Therefore, the most conservative extraction and treatment duration at SA 8 would be 38 years (due to arsenic) and 22 years at SA 9 (due to MCPA). These pumping durations would be used for Alternatives G-3, G-4, and G-5. However, Alternative G-4 is only a pretreatment alternative to remove organic COCs; therefore, the treatment duration would be based on organic COCs while the pumping duration would continue to operate until arsenic is removed. In other words, the treatment system would be shut off but the pumps would continue to operate in order for arsenic to be treated at the Orlando POTW.

In summary, the following treatment and pumping durations for each of the extraction alternatives are as follows:

Treatment and Pumping Duration (years)

Alternative	Study Area 8		Study Area 9	
	Treatment	Pumping	Treatment	Pumping
G-3	38	same as treatment	22	same as treatment
G-4	8	38	22	same as treatment
G-5	38	same as treatment	22	same as treatment

The extraction systems presented for SAs 8 and 9 are rough designs that were developed to be used as an aid to costing extraction alternatives in the FS. The extraction systems were designed to capture all the water within the SA 8 and SA 9 plumes and were not intended to take into account the distribution of contaminants. Therefore, if a pumping system is designed, the well placement and pumping rates will be adjusted to minimize pumping time.

The pumping durations presented in this appendix are estimates. There are many adjustments that could be made during the design phase to optimize the system including:

- adding wells
- adjusting pumping rates
- repositioning wells
- building in variable pumping rates designed to flush out stagnation zones

These may significantly reduce the time required to reach the action levels. However, the extraction system presented in the FS and discussed in this Appendix is considered appropriate for cost estimating purposes.

APPENDIX N

COST ESTIMATES

APPENDIX N

ATTACHMENT A

COST ESTIMATES FOR SOIL CLEANUP TO RECREATION LEVELS

ALTERNATIVE S-1: LIMITED ACTION, STUDY AREA 8 AND 9

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Land Use Controls (LUCs)				
Survey Plat	1	lump sum	$2,000.00	$2,000
Land Use Restriction Fees (Filling, Legal, etc.)	1	lump sum	$2,000.00	$2,000
Land Use Implementation Plan:				
Senior Scientist	30	hrs	$90.00	$2,700
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$300.00	$300
Subtotal				$10,000
Concrete Pad Removal & Disposal				
Laborers (2 men @ 3 days @ 8 hrs/day)	48	hrs	$32.00	$1,536
Backhoe and Operator	2	days	$800.00	$1,600
Front End Loader and Operator	2	days	$800.00	$1,600
Mob/Demob	2	each	$250.00	$500
Micellaneous Tools	1	LS	$300.00	$300
Per Diem (3 men @ 3 days)	9	days	$90.00	$810
Trans and Disposal - Concrete Debris	250	tons	$30.00	$7,500
Subtotal				$13,846
TOTAL DIRECT COSTS				**$23,846**
OPERATION AND MAINTENANCE (O&M) COSTS				
Site Monitoring (annual for 30 years)				
Soil Sampling & Inspection Program				
Associate Scientist	24	hrs	$60.00	$1,440
Technician	24	hrs	$45.00	$1,080
ODCs	1	lump sum	$500.00	$500
Analysis (SA 8 = 1 sample/100' x 100' area + 3 QA/QC = 16 samples; SA 9 = 5 source are + 3 QA/QC)				
TCL SVOCs/pesticides/herbicides	24	samples	$450.00	$10,800
TAL Inorganics	24	samples	$250.00	$6,000
Sediment Samples (SA 8 = 5 samples; SA 9 = 4 samples)				
TCL SVOCs/pesticides/herbicides	9	samples	$450.00	$4,050
TAL Inorganics	9	samples	$250.00	$2,250
Summary Data Report				
Mid-level Engineer	40	hrs	$75.00	$3,000
Senior Scientist	20	hrs	$90.00	$1,800
Associate Engineer	40	hrs	$60.00	$2,400

ALTERNATIVE S-1: LIMITED ACTION, STUDY AREA 8 AND 9

	Quantity	Unit	Unit Cost	Total Cost
ODCs	1	lump sum	$500.00	$500
Subtotal Annual Costs				$33,820
Present Worth of Annual Costs @ i=6%, 30-years				$465,532
Five-year Site Reviews (every 5 years for 30 years)				
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$500.00	$500
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	30	hrs	$75.00	$2,250
ODCs (includes photocopying, etc.)	1	lump sum	$250.00	$250
Five-year Report				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$500.00	$500
Subtotal				$17,780
5-year Review Annualized (@ 6%, n= 5 years)				$4,221
Present Worth of 5-year costs at i=6%, n = 30 years				$58,102
TOTAL O&M COSTS				**$523,634**
TOTAL CAPITAL COSTS AND O&M COSTS				**$547,480**
CONTINGENCY @10 PERCENT				**$54,748**
TOTAL COST OF ALTERNATIVE S-1				**$602,228**

ALTERNATIVE S-2: SOIL COVER, STUDY AREA 8

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Land Use Controls (LUCs) - see Alternative S-1	1	LS	$10,000.00	$10,000
Concrete Removal & Disposal (see S-1)	1	LS	$14,000.00	$14,000
Site Preparation and Mobilization				
Silt fencing	1000	lf	$1.00	$1,000
Signs	20	ea	$50.00	$1,000
Decontamination Pad	1	LS	$1,000.00	$1,000
Storage Trailer	3	mon	$150.00	$450
Office Trailer	3	mon	$300.00	$900
Trailer Delivery, Setup, Removal	1	each	$500.00	$500
Telephone Service	3	mon	$250.00	$750
Electrical Hookup/Power	3	mon	$100.00	$300
Toilet/water cooler service	12	wks	$50.00	$600
Miscellaneous Equipment	1	LS	$2,500.00	$2,500
Equipment (Mob/Demob)				
Front End Loader	2	each	$500.00	$1,000
Dozer	2	each	$500.00	$1,000
Grad-all	2	each	$500.00	$1,000
Dump Truck (15 cyd)	5	each	$250.00	$1,250
Water Truck	1	each	$250.00	$250
Backhoe	1	each	$250.00	$250
Pressure Washer	1	each	$250.00	$250
Equipment	1	LS	$1,200.00	$1,200
General Site Mob/Demob	1	LS	$250.00	$250
Labor (Site Preparation)				
Laborers (3 men @ 5 days @ 10 hrs/day)	18	days	$320.00	$5,760
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
Construct Clean Fill Stockpile Area				
Laborers (3 men @ 3 days @ 10 hrs/day)	9	days	$320.00	$2,880
Loader and Operator	3	days	$700.00	$2,100
Crushed stone/Gravel	160	cyds	$20.00	$3,200
Plastic Sheeting (2 layers - 4 mils per layer)	1950	sy	$0.20	$390
Site Preparation/Mobilization				$32,780
Liner & Soil Cover - 2.1 Acres, 12" thick (3,385 cyds x 1.2 compaction factor = 4,060 cyds)				
Grade Site (2 Dozers and Operators)	10	dy	$1,650.00	$16,500
HDPE Geofabric Liner (furnished and installed)	9680	syds	$5.00	$48,400
Clean Fill Testing - TCLP & Gradation Analysis	10	samples	$950.00	$9,500
Common Fill - 12" layer, Purchase & Haul	4060	cy	$12.00	$48,720
Common Fill - 12" layer, Spread & Compact	4060	cy	$4.00	$16,240
Site Superintendant (4 wks @ 50 hrs/wk)	200	hr	$60.00	$12,000
Liner and Soil Cover				$151,360
Vegetative Support Layer - 2 Acres (1600 cyds x 1.2 compaction factor = 1920cyds)				

ALTERNATIVE S-2: SOIL COVER, STUDY AREA 8

	Quantity	Unit	Unit Cost	Total Cost
Topsoil - 6" layer, Purchase & Haul	1920	cy	$16.00	$30,720
Topsoil - 6" layer, Spread	1920	cy	$4.00	$7,680
Vegetative Support Layer				$38,400
Dust Control				
Water Truck and Driver	2	mon	$6,000.00	$12,000
Dust Control				$12,000
Site Restoration				
Fertilize, Seed, Mulch	2	acres	$2,000.00	$4,000
Demob of equipment	1	LS	$5,000.00	$5,000
Site Restoration				$9,000
TOTAL DIRECT COSTS				**$267,540**
INDIRECT COSTS				
Health and Safety (@3%)				$8,026
Administrative Fees (@3%)				$8,026
Engineering and Design (@10%)				$26,754
Construction Support Services (@10%)				$26,754
TOTAL INDIRECT COSTS				**$69,560**
TOTAL CAPITAL COSTS (DIRECT + INDIRECT)				**$337,100**
OPERATION AND MAINTENANCE COSTS (annual)				
Soil Cover Inspection and Maintenance (Annual for 5 years)				
Replacement of Soil	100	tons	$30.00	$3,000
Dump Truck and Driver	2	dy	$730.00	$1,460
Laborers (2 @ 2 dy @ 8hrs/dy)	32	hr	$32.00	$1,024
Subtotal Cost				$5,484
Present Worth (capitalized @ 6%, 5 years)				$23,099
5-Year Site Reviews (30-year period)				
Present Worth 5-Year Site Review (see S-1)	1	LS	$58,100.00	$58,100
TOTAL O&M COSTS (Annual Monitoring plus 5-Year Reviews)				$81,199
TOTAL CAPITAL COSTS AND O&M COSTS				**$418,299**
CONTINGENCY (@ 10%)				**$41,830**
TOTAL COST OF ALTERNATIVE S-2				**$460,129**

ALTERNATIVE S-3: PHYTOREMEDIATION OF SURFACE SOIL, SA 8 AND SA 9

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Land Use Controls (LUCs) - see Alternative S-1	1	LS	$10,000.00	$10,000
Concrete Debris Disposal (see S-1)	1	LS	$14,000.00	$14,000
A. Site Preparation and Mobilization				
Signs	8	ea	$50.00	$400
Fencing	1350	lf	$3.00	$4,050
Pick-up Truck	1	wk	$90.00	$90
Equipment	1	LS	$1,200.00	$1,200
General Site Mob/Demob	1	LS	$2,000.00	$2,000
A. Subtotal				$7,740
B. Conduct bench scale treatability study				
Mob/Demob to Collect Samples	1	ls	$2,000.00	$2,000
Labor (2 @ 5 dys @ 10 hrs/dy)	100	hr	$45.00	$4,500
Laboratory Analysis: Equipment	4	wk	$1,000.00	$4,000
Laboratory Analysis: Labor (1@40hrs/wk, 4 wks))	160	hr	$75.00	$12,000
B. Subtotal				$22,500
C. Pilot Scale Treatability Tests				
Mob/Demob	1	ls	$2,000.00	$2,000
Labor (2 @ 1 wk @ 40 hrs/wk)	80	hrs	$45.00	$3,600
Loader and Operator	7	dys	$980.00	$6,860
Biologist : Sample, Report (2@ 40 hrs/wk@2wks)	160	hours	$60.00	$9,600
C. Subtotal				$22,060
D. Purchase and Plant Non-Native Species (Assume three crops)				
Mob/Demob	3	ls	$2,000.00	$6,000
Labor (4 @ 2 wk @ 40 hrs/wk @ 3 crops)	960	hrs	$45.00	$43,200
Planting (Purchase and Transport @ 3 crops)	2.1	ac/planting	$10,000.00	$63,000
D. Subtotal				$112,200
E. Harvest and Remove Plants				
Mob/Demob	3	ls	$2,000.00	$6,000
Excavate soil (Backhoe and Operator @ 3 harvests)	15	dy	$1,650.00	$24,750
Site Superintendant (1 wk @ 50 hrs/wk @ 3 harvests)	150	hr	$60.00	$9,000
Foreman (1 wk @ 50 hrs/wk @ 3 harvests)	150	hr	$50.00	$7,500
E. Subtotal				$47,250
F. Transport, Treat and Dispose Rooted plants				
Disposal Costs: 6,000 yds@20lb/yd @ 3 harvests)	180	ton	$400.00	$72,000
Transportation Costs: 6,000 yds@20lb/yd @ 3 harvests	180	ton	$15.00	$2,700
F. Subtotal				$74,700

ALTERNATIVE S-3: PHYTOREMEDIATION OF SURFACE SOIL, SA 8 AND SA 9

	Quantity	Unit	Unit Cost	Total Cost
G. Site Restoration and Demobilization				
Fertilize, Seed, Mulch	2.1	Acres	$2,000.00	$4,200
Remove fencing	1,350	lf	$2.00	$2,700
Demob of equipment	1	LS	$2,500.00	$2,500
G. Subtotal				$9,400
TOTAL DIRECT COSTS				**$305,850**
INDIRECT COSTS				
Health and Safety (@3%)				$9,176
Administrative Fees (@3%)				$9,176
Engineering and Design (@10%)				$30,585
Construction Support Services (@10%)				$30,585
TOTAL INDIRECT COSTS				**$79,521**
TOTAL CAPITAL COSTS				**$385,371**
OPERATION AND MAINTENANCE COSTS (annual)				
Soil Monitoring and Analysis				
Mob/DeMob (Equipment, Labor)	1	LS	$500.00	$500
Labor:				
Scientist	24	hr	$60.00	$1,440
Technican	24	hr	$45.00	$1,080
Analysis - Soil and Sediment				
TCL SVOCs/pesticides/herbicides	33	samples	$450.00	$14,850
TAL Inorganics	33	samples	$250.00	$8,250
Supplies	1	LS	$500.00	$500
Summary Data Report	1	LS	$7,000.00	$7,000
Annual Cost				$33,620
Present Worth of Annual Costs @ i=6%, 5-years				$141,607
Present Worth of 5-year Site Reviews at i=6%, n = 30 years (see S-1)				$58,100
TOTAL O&M COSTS				**$199,707**
TOTAL CAPITAL COSTS AND OPERATION AND MAINTENANCE COSTS				**$585,078**
CONTINGENCY (@ 10%)				**$58,508**
TOTAL COST OF ALTERNATIVE S-3				**$643,586**

ALTERNATIVE S-4: EXCAVATION & ONSITE SOIL WASHING, SA 8 & 9, SURFACE SOIL

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Concrete and Steel Removal & Disposal (see S-1)	1	LS	$14,000.00	$14,000
Treatability Studies (bench-scale/pilot-scale)	1	LS	$20,000.00	$20,000
A. Site Preparation and Mobilization				
Office Trailer	3	mon	$150.00	$450
Storage Trailer	3	mon	$150.00	$450
Trailer Delivery, Setup, Removal	2	each	$300.00	$600
Water Connection - 4" PVC, Furnished & Installed	500	lf	$10.00	$5,000
Electrical Connection: Furnished and Installed	500	lf	$10.00	$5,000
Toilet, water cooler service	3	mon	$150.00	$450
Equipment (Mob/Demob)				
Front End Loader	2	each	$500.00	$1,000
Bulldozer	1	each	$500.00	$500
Dump Truck (15 cyd)	2	each	$250.00	$500
Pickup Truck	1	each	$250.00	$250
Miscellaneous tools and decon equipment	1	LS	$5,000.00	$5,000
Labor (Site Preparation)				
Laborers (3 men @ 5 days @ 10 hrs/day)	15	days	$320.00	$4,800
Electrician (2 men @ 5 days @ 10 hrs/day)	10	days	$420.00	$4,200
Carpenter (2 men @ 5 days @ 10 hrs/day)	10	days	$420.00	$4,200
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
A. Site Preparation				$35,400
B. Construct Soil Staging Area and Berm Construction (20' x 80')				
Labor (3 @ 3 dys @ 10 hrs/dy)	9	days	$320.00	$2,880
Loader and Operator	3	days	$700.00	$2,100
Crushed stone/Gravel	22	cyds	$20.00	$440
Plastic Sheeting (2 layers - 6 mil thick per layer)	3200	sf	$0.20	$640
B. Excavated Soil Staging Area				$6,060
C. Treated Soil Staging Area and Berm Construction (40' x 80')				
Labor (3 @ 5 dys @ 10 hrs/dy)	15	days	$320.00	$4,800
Loader and Operator	6	days	$700.00	$4,200
Crushed stone/Gravel	42	cyds	$20.00	$840
Plastic Sheeting (2 layers - 6 mil thick per layer)	6400	sf	$0.20	$1,280
C. Treated Soil Staging Area				$11,120

ALTERNATIVE S-4: EXCAVATION & ONSITE SOIL WASHING, SA 8 & 9, SURFACE SOIL

	Quantity	Unit	Unit Cost	Total Cost
D. Excavate and Stockpile Soil (6,770 cyds x 1.2 = 8,100 tons @ 300 tons/day)				
Excavate soil (Front End Loader and Operator)	27	days	$700.00	$18,900
Load, Haul, and Stockpile @ Staging Area (Dump Truck w/O	27	days	$650.00	$17,550
Laborer (1 @ 10 hrs/dy)	27	days	$320.00	$8,640
Foreman/Superintendent (1 @ 10 hrs/dy)	27	days	$500.00	$13,500
D. Excavate and Stockpile Soil				$58,590
E. Soil Washing Process (Onsite)				
Arsenic and PAH Contaminated Soil	8100	tons	$90.00	$729,000
E. Excavate and Stockpile Soil				$729,000
F. Sampling and Analysis of Excavated Soil (8,100 tons = 6,700 cyds)				
Supplies	1	LS	$5,000.00	$5,000
a) Pretreatment (1 composite sample/200 tons)				
Sample Collection (1 Field Scientist @ 8hrs/day for 20 days)	20	days	$360.00	$7,200
TCL SVOCs (Pest, Herb), TAL Inorganics	40	samples	$700.00	$28,000
b) After Treatment (confirmatory sampling 1 sample/200 tons)				
Sample Collection (1 Field Scientist @ 8hrs/day for 20 days)	20	days	$360.00	$7,200
TCL SVOCs (Pest, Herb), TAL Inorganics	40	samples	$700.00	$28,000
F. Sampling and Analysis of Excavated Soil				$75,400
G. Backfill Excavation with Treated Soil				
Load, Haul, and Backfill Excavation Area (Dump Truck w/Op)	27	days	$650.00	$17,550
Backfill and Compact Soil (Front End Loader and Operator)	27	days	$700.00	$18,900
Laborers (1 @ 10 hrs/dy)	27	days	$320.00	$8,640
Foreman/Superintendent (1 @ 10 hrs/dy)	27	days	$500.00	$13,500
G. Backfill Excavation with Treated Soil				$58,590
H. Site Restoration and Demobilization				
Fertilize, Seed, Mulch	3	Acres	$2,000	$5,600
Demob of equipment	1	LS	$10,000	$10,000
H. Site restoration and Demobilization				$15,600
TOTAL DIRECT COSTS				**$1,023,760**
Cost per ton ($/ton):				**$126**

ALTERNATIVE S-4: EXCAVATION & ONSITE SOIL WASHING, SA 8 & 9, SURFACE SOIL

	Quantity	Unit	Unit Cost	Total Cost
INDIRECT COSTS				
Health and Safety (@3%)				$30,713
Administrative Fees (@3%)				$30,713
Engineering and Design (@10%)				$102,376
Construction Support Services (@10%)				$102,376
TOTAL INDIRECT COSTS				**$266,178**
TOTAL CAPITAL COSTS (Direct + Indirect Cost)				**$1,289,938**
OPERATION AND MAINTENANCE COSTS (annual, 5 year period)				
Five Year Site Reviews				
Present Worth 5year Site Review (see S-1, n = 30 years)				$58,100
TOTAL O&M COSTS				**$58,100**
TOTAL CAPITAL COSTS AND O&M COSTS				**$1,348,038**
CONTINGENCY (@ 10%)				**$134,804**
TOTAL COST OF ALTERNATIVE S-4				**$1,482,841**
Cost per ton ($/ton):				**$183**

ALTERNATIVE S-5: EXCAVATION and OFFSITE DISPOSAL, SA 8 & 9

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Concrete Removal & Disposal (see S-1)	1	LS	$14,000.00	$14,000
Site Preparation				
Silt fencing	1000	lf	$1.00	$1,000
Storage Trailer	1	mon	$150.00	$150
Trailer Delivery, Setup, Removal	1	each	$300.00	$300
Toilet, water cooler service	3	mon	$150.00	$450
Equipment (Mob/Demob)				
Front End Loader	2	each	$500.00	$1,000
Bulldozer	1	each	$500.00	$500
Backhoe	1	each	$500.00	$500
Dump Truck (15 cyd)	3	each	$250.00	$750
Miscellaneous tools and decon equipment	1	LS	$5,000.00	$5,000
Decon Pad and Berm Construction (40' x 20')				
Crushed stone/Gravel	20	cyds	$20.00	$400
Plastic Sheeting (2 layers - 6 mil thick)	180	sy	$0.20	$36
Water Trailer (5,000 gallon capacity)	2	mon	$1,200.00	$2,400
Electrical Generator (50 kW)	2	mon	$530.00	$1,060
Electrical power	60	days	$82.00	$4,920
Labor (Site Preparation)				
Laborers (3 men @ 5 days @ 10 hrs/day)	18	days	$320.00	$5,760
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
Construct Excavated Soil Stockpile Area 200' x 50')				
Laborers (3 men @ 3 days @ 10 hrs/day)	9	days	$320.00	$2,880
Loader and Operator	3	days	$700.00	$2,100
Crushed stone/Gravel	185	cyds	$20.00	$3,700
Plastic Sheeting (2 layers - 4 mils per layer)	2250	sy	$0.20	$450
Site Preparation				$36,356
Excavate, Stockpile, and Load Soil (6,770 cyds @ 500 cyds/day)				
Excavate soil (Front End Loader and Op)	14	days	$700.00	$9,800
Stockpile soil (Front End Loader and Op)	14	days	$700.00	$9,800
Load Soil (Front End Loader w/Op)	14	days	$700.00	$9,800
Laborer (2 @ 10 hrs/dy)	28	days	$320.00	$8,960
Foreman/Superintendent (1 @ 10 hrs/dy)	14	days	$500.00	$7,000
Excavate and Stockpile Soil				$45,360
Sampling & Analysis (Confirmatory Sampling & Waste Characterization)				
Sampling Plan				
Mid-level Engineer	40	hrs	$75.00	$3,000
Senior Scientist	20	hrs	$90.00	$1,800
ODCs	1	LS	$500.00	$500
Confirmatory Samples (SA 8 = 1 composite/100' x 100' area = 13 samples; SA 9 = 5 samples)				
Labor:				
Associate Scientist	16	hrs	$60.00	$960
Technician	16	hrs	$45.00	$720

ALTERNATIVE S-5: EXCAVATION and OFFSITE DISPOSAL, SA 8 & 9

	Quantity	Unit	Unit Cost	Total Cost
ODCs	1	LS	$2,000.00	$2,000
Analysis (TCL Organics and TAL Inorganics)				
TCL SVOCs/pesticides/herbicides	18	samples	$450.00	$8,100
TAL Inorganics	18	samples	$250.00	$4,500
Waste Characterization (1 composite sample/200 cyds @ 6,770 cyds = 34 samples)				
Labor:				
Associate Scientist	24	hrs	$60.00	$1,440
Technician	24	hrs	$45.00	$1,080
ODCs	1	LS	$2,000.00	$2,000
Analyses:				
Haz Waste Characteristics - Full Suite:				
TCLP - Metals, VOCs, SVOCs, Ps/Hs)	34	samples	$650.00	$22,100
Sampling & Analysis				$48,200
Off-site Transport and Landfill Disposal (SA 8: 6,770 cyds = 8,100 tons)				
SA 8: RCRA Subtitle D (Solid Waste)				
Transportation & Disposal	8100	tons	$30.00	$243,000
SA 9: RCRA Subtitle C (Hazardous Waste)				
Transportation & Disposal	40	tons	$300.00	$12,000
Transport and Landfill Disposal				$255,000
Cost per ton ($/ton):				$31
Backfill Excavation with Clean Fill (2' thick x 1.2 bulk factor = 8,100 cyds) and Topsoil (6" thick)				
Clean Fill - Purchase, Haul (20 miles R/T)	8,100	cyds	$12.00	$97,200
Spread and Compact - Dozer	8,100	cyds	$4.00	$32,400
Topsoil - Purchase, Haul (20 miles R/T)	1,675	cyds	$16.00	$26,800
Spread - Dozer	1,675	cyds	$4.00	$6,700
Backfill Excavation with Clean Fill and Topsoil				$129,600
Site Restoration				
Fertilize, Seed, Mulch	2	Acres	$2,000	$4,000
Demob of equipment	1	LS	$5,000	$5,000
Site Restoration				$9,000
TOTAL DIRECT COSTS				**$537,516**
INDIRECT COSTS				
Health and Safety (@3%)				$16,125
Administrative, Legal, and Permitting Fees (@3%)				$16,125
Engineering and Design (@0% - Not Applicable)				$0
Construction Support Services (@0% - Not Applicable)				$0
TOTAL INDIRECT COSTS				**$32,251**
TOTAL CAPITAL COSTS				**$569,767**
OPERATION AND MAINTENANCE COSTS				
Present Worth 5-Year Site Review (see S-1)	1	LS	$58,100.00	$58,100

ALTERNATIVE S-5: EXCAVATION and OFFSITE DISPOSAL, SA 8 & 9

	Quantity	Unit	Unit Cost	Total Cost
TOTAL O&M COSTS (5-Year Review)				$58,100
TOTAL CAPITAL COSTS AND O&M COSTS				$627,867
CONTINGENCY (@ 10%)				$62,787
TOTAL COST OF ALTERNATIVE S-5				$690,654
Cost per ton ($/ton):				$85

ALTERNATIVE G-1: LIMITED ACTION, STUDY AREA 8 AND 9

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions				
Survey Plat	1	lump sum	$2,000.00	$2,000
GW Use Restriction Fees (Filling, Legal, etc.)	1	lump sum	$2,000.00	$2,000
Land Use Implementation Plan:				
Senior Scientist	30	hrs	$90.00	$2,700
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$300.00	$300
Subtotal				$10,000
TOTAL DIRECT COSTS				**$10,000**
OPERATION AND MAINTENANCE (O&M) COSTS				
GW Monitoring (annual for 30 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA @ 2 SAs = 26 samples				
Associate Scientist	50	hrs	$60.00	$3,000
Technician	50	hrs	$45.00	$2,250
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL SVOCs/pesticides/herbicides	26	samples	$600.00	$15,600
TAL Inorganics	26	samples	$250.00	$6,500
Summary Data Report				
Mid-level Engineer	40	hrs	$75.00	$3,000
Senior Scientist	20	hrs	$90.00	$1,800
Associate Engineer	40	hrs	$60.00	$2,400
ODCs	1	lump sum	$950.00	$950
Subtotal Annual Costs				$36,000
5-Year GW Monitoring (every 5 years for 30 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA @ 2 SAs = 26 samples				
Labor - included in annual monitoring				
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics	26	samples	$800.00	$20,800
TAL Inorganics	26	samples	$250.00	$6,500
ODCs	1	lump sum	$500.00	$500
Summary Data Report - included in annual monitoring				
Subtotal				$27,800
Annual Cost of 5-year cost @ i=6%, n = 5 yrs				$6,600

ALTERNATIVE G-1: LIMITED ACTION, STUDY AREA 8 AND 9

	Quantity	Unit	Unit Cost	Total Cost
Five-year Site Reviews (every 5 years for 30 years)				
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				$5,598
Annual Costs				$48,198
Present Worth O&M @ i = 6%, n = 30 years				**$663,440**
TOTAL O&M COSTS				**$663,440**
TOTAL CAPITAL COSTS AND O&M COSTS				**$673,440**
CONTINGENCY @10 PERCENT				**$67,344**
TOTAL COST OF ALTERNATIVE G-1				**$740,784**

ALTERNATIVE G-2: PERMEABLE REACTIVE TREATMENT WALL FOR SA 8

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions - SA 8	1	LS	$5,000.00	$5,000
Treatability Studies	1	LS	$15,000.00	$15,000
Site Preparation and Mobilization				
Concrete Removal & Disposal (see S-1)	1	LS	$14,000.00	$14,000
Storage Trailer	2	mon	$150.00	$300
Office Trailer	2	mon	$250.00	$500
Trailer Delivery, Setup, Removal	2	each	$1,000.00	$2,000
Fencing:				
Treatment Area for equip/controls (30' x 30')	120	ft	$10.00	$1,200
Trailer Area (40' x 80')	240	ft	$10.00	$2,400
Gates	2	each	$100.00	$200
Office Equipment Rental	2	mon	$400.00	$800
Utility Connections for trailer, sys equip, controls	1	LS	$20,000.00	$20,000
Toilet/water cooler service	8	wks	$40.00	$320
Miscellaneous Equipment	1	LS	$2,500.00	$2,500
Decon Equipment and Pad:				
Pressure Washer with Water Tank	2	mon	$500.00	$1,000
Plastic Sheeting, Drums, Pumps, Hoses, Supplies	1	LS	$3,000.00	$3,000
Labor (Site Preparation)				
Laborers (2 men @ 5 days @ 10 hrs/day)	10	days	$320.00	$3,200
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
Site Preparation/Mobilization				$54,420
WALL CONSTRUCTION (150' x 10' x 5')				
Construction				
Mob/Demob (trenching and equip)	2	each	$1,500.00	$3,000
Per Diem/Lodging (3 men @ 3 days)	9	days	$100.00	$900
Decontamination	20	hrs	$100.00	$2,000
Misc. Equipment and Supplies	1	LS	$5,000.00	$5,000
Reactive material (iron)	500	ton	$475.00	$237,500
Installation (vendor info)				$100,000
WALL CONSTRUCTION				$348,400
Labor				
3 men @ 4 weeks @ 50 hrs/week	600	hr	$32.00	$19,200
1 Engineer/Foreman @ 4 weeks @ 50 hrs/week	200	hr	$75.00	$15,000
Labor				$34,200
Soil Disposal (280 cyds = 340 tons)				
Sampling & Analysis (Full Suite TCLP)	3	samples	$650.00	$1,950
Soil Transportation & Disposal (Subtitle C)	340	tons	$300.00	$102,000

LTERNATIVE G-2: PERMEABLE REACTIVE TREATMENT WALL FOR SA 8

	Quantity	Unit	Unit Cost	Total Cost
Soil Disposal				$103,950
Site Restoration				
Fertilize, Seed, Mulch	2	Acres	$2,000	$4,000
Demob of equipment	1	LS	$5,000	$5,000
Site Restoration				$9,000
TOTAL DIRECT COSTS				**$569,970**
INDIRECT COSTS				
Health and Safety (@3%)				$17,099
Administrative Fees (@3%)				$17,099
Engineering and Design (@10%)				$56,997
Construction Support Services (@10%)				$56,997
TOTAL INDIRECT COSTS				**$148,192**
TOTAL CAPITAL COSTS				**$718,162**
OPERATION AND MAINTENANCE (O&M) COSTS (annual)				
Treatment System O&M (annual for 30-years)				
System Maintenance (8 hrs/week @ 52 weeks)	416	hrs	$45	$18,720
Wall Material Replacement & Disposal	1	LS	$10,000	$10,000
Miscellaneous Supplies	1	LS	$2,500	$2,500
Total Annual O&M Cost (Treatment System)				$31,220
Present Worth Treatment System (O&M) Costs @ I = 6%, n = 30)				**$429,743**
GW Monitoring O&M (annual for 30 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA = 13 samples				
Associate Scientist	25	hrs	$60.00	$1,500
Technician	25	hrs	$45.00	$1,125
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics (SVOCs/pesticides/herbicides)	13	samples	$800.00	$10,400
TAL Inorganics	13	samples	$250.00	$3,250
Summary Data Report				
Mid-level Engineer	20	hrs	$75.00	$1,500
Senior Scientist	10	hrs	$90.00	$900
Associate Engineer	20	hrs	$60.00	$1,200
ODCs	1	lump sum	$950.00	$950
Subtotal Annual Costs				$21,325

Five-year Site Reviews (every 5 years for 30 years)

ALTERNATIVE G-2: PERMEABLE REACTIVE TREATMENT WALL FOR SA 8

	Quantity	Unit	Unit Cost	Total Cost
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				$5,598
Annual Costs				$26,923
Present Worth O&M @ i = 6%, n = 30 years				**$370,594**
TOTAL O&M COSTS				**$800,337**
TOTAL CAPITAL COSTS AND O&M COSTS				**$1,518,499**
CONTINGENCY @10 PERCENT				**$151,850**
TOTAL COST OF ALTERNATIVE G-2, SA 8				**$1,670,349**

ALTERNATIVE G-2: PERMEABLE REACTIVE TREATMENT WALL FOR SA 9

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions - SA 9	1	LS	$5,000.00	$5,000
Treatability Studies	1	LS	$15,000.00	$15,000
Site Preparation and Mobilization				
Storage Trailer	2	mon	$150.00	$300
Office Trailer	2	mon	$250.00	$500
Trailer Delivery, Setup, Removal	2	each	$1,000.00	$2,000
Fencing:				
Treatment Area for equip/controls (30' x 30')	120	ft	$10.00	$1,200
Trailer Area (40' x 80')	240	ft	$10.00	$2,400
Gates	2	each	$100.00	$200
Office Equipment Rental	2	mon	$400.00	$800
Utility Connections for trailer, sys equip, controls	1	LS	$20,000.00	$20,000
Toilet/water cooler service	8	wks	$40.00	$320
Miscellaneous Equipment	1	LS	$2,500.00	$2,500
Decon Equipment and Pad:				
Pressure Washer with Water Tank	2	mon	$500.00	$1,000
Plastic Sheeting, Drums, Pumps, Hoses, Supplies	1	LS	$3,000.00	$3,000
Labor (Site Preparation)				
Laborers (2 men @ 5 days @ 10 hrs/day)	10	days	$320.00	$3,200
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
Site Preparation/Mobilization				$40,420
WALL CONSTRUCTION (100' x 10' x 5')				
Construction				
Mob/Demob (trenching and equip)	2	each	$1,500.00	$3,000
Per Diem/Lodging (3 men @ 3 days)	9	days	$100.00	$900
Decontamination	20	hrs	$100.00	$2,000
Misc. Equipment and Supplies	1	LS	$4,000.00	$4,000
Reactive material (iron)	400	ton	$475.00	$190,000
Installation				$75,000
WALL CONSTRUCTION				$274,900
Labor				
3 men @ 4 weeks @ 50 hrs/week	600	hr	$32.00	$19,200
1 Engineer/Foreman @ 4 weeks @ 50 hrs/week	200	hr	$75.00	$15,000
Labor				$34,200
Soil Disposal (185 cyds = 225 tons)				
Sampling & Analysis (Full Suite TCLP)	3	samples	$650.00	$1,950
Soil Transportation & Disposal (Subtitle C)	225	tons	$300.00	$67,500

ALTERNATIVE G-2: PERMEABLE REACTIVE TREATMENT WALL FOR SA 9

	Quantity	Unit	Unit Cost	Total Cost
Soil Disposal				$69,450
Site Restoration				
Fertilize, Seed, Mulch	1	Acres	$2,000	$2,000
Demob of equipment	1	LS	$5,000	$5,000
Site Restoration				$7,000
TOTAL DIRECT COSTS				**$445,970**
INDIRECT COSTS				
Health and Safety (@3%)				$13,379
Administrative Fees (@3%)				$13,379
Engineering and Design (@10%)				$44,597
Construction Support Services (@10%)				$44,597
TOTAL INDIRECT COSTS				**$115,952**
TOTAL CAPITAL COSTS				**$561,922**
OPERATION AND MAINTENANCE COSTS (annual)				
Treatment System O&M (annual for 30-years)				
System Maintenance (8 hrs/week @ 52 weeks)	416	hrs	$45	$18,720
Wall Material Replacement & Disposal	1	LS	$10,000	$10,000
Miscellaneous Supplies	1	LS	$2,500	$2,500
Total Annual O&M Cost (Treatment System)				$31,220
Present Worth Treatment System (O&M) Costs @ I = 6%, n = 30)				**$429,743**
GW Monitoring O&M (annual for 30 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA = 13 samples				
Associate Scientist	25	hrs	$60.00	$1,500
Technician	25	hrs	$45.00	$1,125
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics (SVOCs/pesticides/herbicides)	13	samples	$800.00	$10,400
TAL Inorganics	13	samples	$250.00	$3,250
Summary Data Report				
Mid-level Engineer	20	hrs	$75.00	$1,500
Senior Scientist	10	hrs	$90.00	$900
Associate Engineer	20	hrs	$60.00	$1,200
ODCs	1	lump sum	$950.00	$950
Subtotal Annual Costs				$21,325
Five-year Site Reviews (every 5 years for 30 years)				
Meetings (includes travel time)				

LTERNATIVE G-2: PERMEABLE REACTIVE TREATMENT WALL FOR SA 9

	Quantity	Unit	Unit Cost	Total Cost
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				$5,598
Annual Costs				$26,923
Present Worth O&M @ i = 6%, n = 30 years				**$370,594**
TOTAL O&M COSTS				**$800,337**
TOTAL CAPITAL COSTS AND O&M COSTS				**$1,362,259**
CONTINGENCY @10 PERCENT				**$136,226**
TOTAL COST OF ALTERNATIVE G-2, SA 9				**$1,498,485**

ALTERNATIVE G-3: PHYTOREMEDIATION OF GROUNDWATER, SA 8

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions - SA 8	1	LS	$5,000.00	$5,000
Site Preparation and Mobilization				
Concrete Removal & Disposal (see S-1)	1	LS	$14,000.00	$14,000
Signs	8	ea	$50.00	$400
Fencing	1350	lf	$3.00	$4,050
Pick-up Truck	1	wk	$90.00	$90
Equipment	1	LS	$1,200.00	$1,200
General Site Mob/Demob	1	LS	$2,000.00	$2,000
Site Preparation and Mobilization				$21,740
Conduct bench scale treatability study				
Mob/Demob to Collect Samples	1	ls	$1,000.00	$1,000
Labor (1 @ 5 dys @ 10 hrs/dy)	50	hr	$45.00	$2,250
Laboratory Analysis: Equipment	4	wk	$500.00	$2,000
Laboratory Analysis: Labor (1@40hrs/wk, 2 wks)	80	hr	$75.00	$6,000
Conduct bench scale treatability study				$11,250
Pilot Scale Treatability Tests				
Mob/Demob	1	ls	$1,000.00	$1,000
Labor (1 @ 1 wk @ 40 hrs/wk)	40	hrs	$45.00	$1,800
Loader and Operator	2	dys	$980.00	$1,960
Biologist : Sample, Report (1@ 40 hrs/wk@2wks)	80	hours	$60.00	$4,800
Pilot Scale Treatability Tests				$9,560
Groundwater Extraction System (4 wells pumping @ 2.5 gpm each)				
Groundwater Extraction Wells				
Mob/Demob (drillers and equip)	2	each	$1,500.00	$3,000
Well Installation (4 wells @4" ID, PVC, 20' bls)	80	ft	$75.00	$6,000
Extraction Pumps (low flow rate)	4	pumps	$5,000.00	$20,000
Per Diem/Lodging (3 men @ 3 days)	9	days	$100.00	$900
Decontamination	20	hrs	$100.00	$2,000
Misc. Equipment and Supplies	1	LS	$2,000.00	$2,000
Electric Power Supply				
Utility Pole	2	poles	$550.00	$1,100
Power Cable	1000	ft	$10.00	$10,000
Transformer	1	each	$1,500.00	$1,500
Piping and Equipment				
To treatment systems (2" ID, PVC)	300	ft	$20.00	$6,000
To Infilitration Beds (2" ID, PVC)	300	ft	$20.00	$6,000
Flow Meters	4	each	$1,500.00	$6,000
Pressure Gauges	4	each	$250.00	$1,000

ALTERNATIVE G-3: PHYTOREMEDIATION OF GROUNDWATER, SA 8

	Quantity	Unit	Unit Cost	Total Cost
Pressure Relief Valves	4	each	$2,000.00	$8,000
Temperature Gauges	4	each	$500.00	$2,000
Instrumentation Controls	1	LS	$10,000.00	$10,000
Labor				
3 men @ 4 weeks @ 50 hrs/week	600	hr	$32.00	$19,200
1 Engineer/Foreman @ 4 weeks @ 50 hrs/week	200	hr	$75.00	$15,000
Groundwater Extraction System				$119,700
Purchase and Setup of Greenhouses (3)				
Greenhouse (27' X 24' X 10')	3	ls	$11,000.00	$33,000
Labor (4 @ 5 week @ 40 hrs/wk)	800	hr	$45.00	$36,000
Foreman (5 wk @ 50 hrs/wk)	250	hr	$50.00	$12,500
Laminated HDPE liner for planting	1,800	sq ft	$0.25	$450
Gravel	38	cyd	$20.00	$760
Purchase and Setup of Greenhouses				$82,710
Purchase and Plant Selected Species				
Mob/Demob	1	ls	$2,000.00	$2,000
Labor (2 @ 5 week @ 40 hrs/wk)	400	hr	$45.00	$18,000
Plants (Purchase & Transport)	1	ls	$4,000.00	$4,000
Purchase and Plant Selected Species				$24,000
Site Restoration and Demobilization				
Fertilize, Seed, Mulch	2.0	Acres	$2,000.00	$4,000
Remove fencing	1,350	lf	$2.00	$2,700
Demob of equipment	1	LS	$2,500.00	$2,500
Site Restoration and Demobilization				$9,200
TOTAL DIRECT COSTS				**$283,160**
INDIRECT COSTS				
Health and Safety (@3%)				$8,495
Administrative Fees (@3%)				$8,495
Engineering and Design (@10%)				$28,316
Construction Support Services (@10%)				$28,316
TOTAL INDIRECT COSTS				**$73,622**
TOTAL CAPITAL COSTS				**$356,782**

OPERATION AND MAINTENANCE COSTS (annual for pumping duration: 30 years)

Plant removal and replanting

ALTERNATIVE G-3: PHYTOREMEDIATION OF GROUNDWATER, SA 8

	Quantity	Unit	Unit Cost	Total Cost
Labor (4 workers @ 8 hrs/day @ 5 days, 3 event/yr)	480	hrs	$45.00	$21,600
Subtitle C (Hazardous) Disposal of Plants	1	ls	$5,000.00	$5,000
Plants (Purchase & Transport)	1	ls	$4,000.00	$4,000
Plant removal and replanting				$30,600
Utilities				
Groundwater Extraction Pumps	12	mo	$1,000.00	$12,000
Treatment System	12	mo	$500.00	$6,000
System Maintenance				
Labor (1 operators @ 4 hrs/day, 260 days/year)	1040	hrs	$45.00	$46,800
Utilities and System Maintenance				$64,800
Sampling and Monitoring				
Influent Grab Samples (1 per week):				
TCL Organics (SVOCs/pesticides/herbicides)	52	samples	$600.00	$31,200
TAL Inorganics	52	samples	$250.00	$13,000
Effluent Grab Samples (1 per week):				
Full Suite Discharge Requirements	52	samples	$1,500.00	$78,000
Treatment Sampling and Monitoring				$122,200
Total Annual O&M Cost (Treatment System)				$217,600
Present Worth Treatment System (O&M) Costs @ I = 6%, n = 30)				**$2,995,264**
GW Monitoring O&M (annual for 30 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA = 13 samples				
Associate Scientist	25	hrs	$60.00	$1,500
Technician	25	hrs	$45.00	$1,125
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics (SVOCs/pesticides/herbicides)	13	samples	$800.00	$10,400
TAL Inorganics	13	samples	$250.00	$3,250
Summary Data Report				
Mid-level Engineer	20	hrs	$75.00	$1,500
Senior Scientist	10	hrs	$90.00	$900
Associate Engineer	20	hrs	$60.00	$1,200
ODCs	1	lump sum	$950.00	$950
GW Monitoring O&M (annual)				$21,325
Five-year Site Reviews (every 5 years for 30 years)				
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000
Evaluate Data/Curremt Situation				

ALTERNATIVE G-3: PHYTOREMEDIATION OF GROUNDWATER, SA 8

	Quantity	Unit	Unit Cost	Total Cost
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				$5,598
Annual Costs				**$26,923**
Present Worth GW Monitoring (O&M) @ I = 6%, n = 30)				**$370,594**
TOTAL O&M COSTS				**$3,365,858**
TOTAL CAPITAL COSTS AND O&M COSTS				**$3,722,639**
CONTINGENCY @10 PERCENT				**$372,264**
TOTAL COST OF ALTERNATIVE G-3, SA 8				**$4,094,903**

ALTERNATIVE G-3: PHYTOREMEDIATION OF GROUNDWATER, SA 9

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions - SA 9	1	LS	$5,000.00	$5,000
Site Preparation and Mobilization				
Signs	8	ea	$50.00	$400
Fencing	600	lf	$3.00	$1,800
Pick-up Truck	1	wk	$90.00	$90
Equipment	1	LS	$1,200.00	$1,200
General Site Mob/Demob	1	LS	$2,000.00	$2,000
Site Preparation and Mobilization				$5,490
Conduct bench scale treatability study				
Mob/Demob to Collect Samples	1	ls	$1,000.00	$1,000
Labor (1 @ 5 dys @ 10 hrs/dy)	50	hr	$45.00	$2,250
Laboratory Analysis: Equipment	4	wk	$500.00	$2,000
Laboratory Analysis: Labor (1@40hrs/wk, 2 wks)	80	hr	$75.00	$6,000
Conduct bench scale treatability study				$11,250
Pilot Scale Treatability Tests				
Mob/Demob	1	ls	$1,000.00	$1,000
Labor (1 @ 1 wk @ 40 hrs/wk)	40	hrs	$45.00	$1,800
Loader and Operator	2	dys	$980.00	$1,960
Biologist : Sample, Report (1@ 40 hrs/wk@2wks)	80	hours	$60.00	$4,800
Pilot Scale Treatability Tests				$9,560
Groundwater Extraction System (6 wells pumping @ 0.25 gpm each)				
Groundwater Extraction Wells				
Mob/Demob (drillers and equip)	2	each	$1,500.00	$3,000
Well Installation (6 wells @4" ID, PVC, 20' bls)	120	ft	$75.00	$9,000
Extraction Pumps (low flow rate)	6	pumps	$5,000.00	$30,000
Per Diem/Lodging (3 men @ 3 days)	9	days	$100.00	$900
Decontamination	20	hrs	$100.00	$2,000
Misc. Equipment and Supplies	1	LS	$2,000.00	$2,000
Electric Power Supply				
Utility Pole	2	poles	$550.00	$1,100
Power Cable	1000	ft	$10.00	$10,000
Transformer	1	each	$1,500.00	$1,500
Piping and Equipment				
To treatment system (2" ID, PVC)	400	ft	$20.00	$8,000
To Infilitration Beds (2" ID, PVC)	400	ft	$20.00	$8,000
Flow Meters	6	each	$1,500.00	$9,000
Pressure Gauges	6	each	$250.00	$1,500

ALTERNATIVE G-3: PHYTOREMEDIATION OF GROUNDWATER, SA 9

	Quantity	Unit	Unit Cost	Total Cost
Pressure Relief Valves	6	each	$2,000.00	$12,000
Temperature Gauges	6	each	$500.00	$3,000
Instrumentation Controls	1	LS	$10,000.00	$10,000
Labor				
3 men @ 4 weeks @ 50 hrs/week	600	hr	$32.00	$19,200
1 Engineer/Foreman @ 4 weeks @ 50 hrs/week	200	hr	$75.00	$15,000
Groundwater Extraction System				$145,200
Purchase and Setup of Greenhouses (3)				
Greenhouse (27' X 24' X 10')	3	ls	$11,000.00	$33,000
Labor (4 @ 5 week @ 40 hrs/wk)	800	hr	$45.00	$36,000
Foreman (5 wk @ 50 hrs/wk)	250	hr	$50.00	$12,500
Laminated HDPE liner for planting	1,800	sq ft	$0.25	$450
Gravel	38	cyd	$20.00	$760
Purchase and Setup of Greenhouses				$82,710
Purchase and Plant Selected Species				
Mob/Demob	1	ls	$2,000.00	$2,000
Labor (2 @ 5 week @ 40 hrs/wk)	400	hr	$45.00	$18,000
Plants (Purchase & Transport)	1	ls	$4,000.00	$4,000
Purchase and Plant Selected Species				$24,000
Site Restoration and Demobilization				
Fertilize, Seed, Mulch	1.0	Acres	$2,000.00	$2,000
Remove fencing	1,350	lf	$2.00	$2,700
Demob of equipment	1	LS	$2,500.00	$2,500
Site Restoration and Demobilization				$7,200
TOTAL DIRECT COSTS				**$290,410**
INDIRECT COSTS				
Health and Safety (@3%)				$8,712
Administrative Fees (@3%)				$8,712
Engineering and Design (@10%)				$29,041
Construction Support Services (@10%)				$29,041
TOTAL INDIRECT COSTS				**$75,507**
TOTAL CAPITAL COSTS				**$365,917**

OPERATION AND MAINTENANCE COSTS (annual for pumping duration: 22 years)

Plant removal and replanting

ALTERNATIVE G-3: PHYTOREMEDIATION OF GROUNDWATER, SA 9

	Quantity	Unit	Unit Cost	Total Cost
Labor (4 workers @ 8 hrs/day @ 4 days, 3 event/yr)	384	hrs	$45.00	$17,280
Subtitle C (Hazardous) Disposal of Plants	1	ls	$3,500.00	$3,500
Plants (Purchase & Transport)	1	ls	$4,000.00	$4,000
Plant removal and replanting				$24,780
Utilities				
Groundwater Extraction Pumps	12	mo	$750.00	$9,000
Treatment System	12	mo	$500.00	$6,000
System Maintenance				
Labor (1 operators @ 4 hrs/day, 260 days/year)	1040	hrs	$45.00	$46,800
Utilities and System Maintenance				$61,800
Sampling and Monitoring				
Influent Grab Samples (1 per week):				
TCL Organics (SVOCs/pesticides/herbicides)	52	samples	$600.00	$31,200
TAL Inorganics	52	samples	$250.00	$13,000
Effluent Grab Samples (1 per week):				
Full Suite Discharge Requirements	52	samples	$1,500.00	$78,000
Treatment Sampling and Monitoring				$122,200
Total Annual O&M Cost (Treatment System)				$208,780
Present Worth Treatment System (O&M) Costs @ I = 6%, n = 22)				**$2,514,045**
GW Monitoring O&M (annual for 22 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA = 13 samples				
Associate Scientist	25	hrs	$60.00	$1,500
Technician	25	hrs	$45.00	$1,125
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics (SVOCs/pesticides/herbicides)	13	samples	$800.00	$10,400
TAL Inorganics	13	samples	$250.00	$3,250
Summary Data Report				
Mid-level Engineer	20	hrs	$75.00	$1,500
Senior Scientist	10	hrs	$90.00	$900
Associate Engineer	20	hrs	$60.00	$1,200
ODCs	1	lump sum	$950.00	$950
GW Monitoring O&M (annual)				$21,325
Five-year Site Reviews (every 5 years for 20 years)				
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000

ALTERNATIVE G-3: PHYTOREMEDIATION OF GROUNDWATER, SA 9

	Quantity	Unit	Unit Cost	Total Cost
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				**$5,598**
Annual Costs				**$26,923**
Present Worth GW monitor (O&M) @ I = 6%, n = 22)				**$324,195**
TOTAL O&M COSTS				**$2,838,240**
TOTAL CAPITAL COSTS AND O&M COSTS				**$3,204,157**
CONTINGENCY @10 PERCENT				**$320,416**
TOTAL COST OF ALTERNATIVE G-3, SA 9				**$3,524,572**

ALTERNATIVE G-4: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO POTW, SA 8

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions - SA 8	1	LS	$5,000.00	$5,000
Site Preparation and Mobilization				
Storage Trailer	12	mon	$150.00	$1,800
Office Trailer	12	mon	$250.00	$3,000
Trailer Delivery, Setup, Removal	2	each	$1,000.00	$2,000
Fencing:				
Treatment Area for equip/controls (30' x 30')	120	ft	$10.00	$1,200
Trailer Area (40' x 80')	240	ft	$10.00	$2,400
Gates	2	each	$100.00	$200
Office Equipment Rental	12	mon	$1,000.00	$12,000
Utility Connections for trailer, sys equip, controls	1	LS	$20,000.00	$20,000
Toilet/water cooler service	12	wks	$50.00	$600
Miscellaneous Equipment	1	LS	$2,500.00	$2,500
Decon Equipment and Pad:				
Pressure Washer with Water Tank	6	mon	$500.00	$3,000
Plastic Sheeting, Drums, Pumps, Hoses, Supplies	1	LS	$3,000.00	$3,000
Labor (Site Preparation)				
Laborers (2 men @ 5 days @ 10 hrs/day)	10	days	$320.00	$3,200
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
Site Preparation/Mobilization				$57,900
Groundwater Extraction System (4 wells pumping @ 2.5 gpm each)				
Groundwater Extraction Wells				
Mob/Demob (drillers and equip)	2	each	$1,500.00	$3,000
Well Installation (4 wells @4" ID, PVC, 20' bls)	80	ft	$75.00	$6,000
Extraction Pumps (low flow rate)	4	pumps	$5,000.00	$20,000
Per Diem/Lodging (3 men @ 3 days)	9	days	$100.00	$900
Decontamination	20	hrs	$100.00	$2,000
Misc. Equipment and Supplies	1	LS	$2,000.00	$2,000
Electric Power Supply				
Utility Pole	2	poles	$550.00	$1,100
Power Cable	1000	ft	$10.00	$10,000
Transformer	1	each	$1,500.00	$1,500
Piping and Equipment				
To treatment system (2" ID, PVC)	300	ft	$20.00	$6,000
To discharge sewer (2" ID, PVC)	500	ft	$20.00	$10,000
Flow Meters	4	each	$1,500.00	$6,000
Pressure Gauges	4	each	$250.00	$1,000
Pressure Relief Valves	4	each	$2,000.00	$8,000
Temperature Gauges	4	each	$500.00	$2,000
Instrumentation Controls	1	LS	$10,000.00	$10,000
Labor				
3 men @ 4 weeks @ 50 hrs/week	600	hr	$32.00	$19,200
1 Engineer/Foreman @ 4 weeks @ 50 hrs/week	200	hr	$75.00	$15,000
Groundwater Extraction System				$123,700
UV/Oxidation				
UV/OX equipment	1	LS	$75,000.00	$75,000

ALTERNATIVE G-4: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO POTW, SA 8

	Quantity	Unit	Unit Cost	Total Cost
UV/Oxidation				$75,000
Filtration and Carbon Adsorption				
Liquid Phase Carbon Unit (L-500)	1	each	$2,200.00	$2,200
Green Sand Filters (L-170)	2	each	$1,500.00	$3,000
ATS Arsenic Removal System (L-500 ATS)	1	each	$6,200.00	$6,200
Valves, piping, controls, etc.	1	LS	$5,000.00	$5,000
Filtration and Carbon Adsorption				$16,400
TOTAL DIRECT COSTS				**$278,000**
INDIRECT COSTS				
Health and Safety (@3%)				$8,340
Administrative Fees (@3%)				$8,340
Engineering and Design (@10%)				$27,800
Construction Support Services (@10%)				$27,800
TOTAL INDIRECT COSTS				**$72,280**
TOTAL CAPITAL COSTS				**$350,280**
OPERATION AND MAINTENANCE (O&M) COSTS (annual)				
Treatment System O&M (Based on herbicide treatment - annual for 8 years)				
Treatment Chemicals (10 gpm flow rate)				
pH adjustment: 93% sulfuric acid	1	year	$1,250.00	$1,250
Hydrogen peroxide (UV/OX)	1	year	$2,000.00	$2,000
pH adjustment: sodium hydroxide	1	year	$2,000.00	$2,000
Carbon Usage and Sand Filter Replacement				
Carbon (500 lb unit)	6	units	$325.00	$1,950
Green Sand (500 lb unit)	8	units	$375.00	$3,000
ATS Arsenic (700 lb unit)	4	units	$6,125.00	$24,500
Spent Carbon Disposal (9800 lbs x 10 volume factor)	49	tons	$500.00	$24,500
Treatment Chemicals and Spent Carbon				$59,200
Utilities				
Groundwater Extraction Pumps	12	mo	$1,000.00	$12,000
Treatment System	12	mo	$3,000.00	$36,000
System Maintenance				
Labor (1 operators @ 8 hrs/day, 365 days/year)	2920	hrs	$45.00	$131,400
pH Adjustments	12	mo	$500.00	$6,000
UV/OX	12	mo	$500.00	$6,000
Filtration/Carbon Adsorption	12	mo	$500.00	$6,000
Utilites and System Maintenance				$197,400
Sampling and Monitoring				
Influent Grab Samples (1 per week):				
TCL Organics (SVOCs/pesticides/herbicides)	52	samples	$600.00	$31,200
TAL Inorganics	52	samples	$250.00	$13,000
Effluent Grab Samples (1 per week):				

ALTERNATIVE G-4: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO POTW, SA 8

	Quantity	Unit	Unit Cost	Total Cost
Full Suite Discharge Requirements	52	samples	$1,200.00	$62,400
Influent/Effluent Sampling and Monitoring				$106,600
Discharge to POTW (@ 10 gpm)				
Cost per year to discharge water ($3.71/1,000 gallons)	5256	1,000 gal	$3.71	$19,500
Total Annual O&M Cost (Treatment System)				$382,700
Present Worth Treatment System (O&M) Costs @ I = 6%, n = 8 years)				**$2,376,489**
GW Monitoring O&M (annual for 8 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA = 13 samples				
Associate Scientist	25	hrs	$60.00	$1,500
Technician	25	hrs	$45.00	$1,125
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics (SVOCs/pesticides/herbicides)	13	samples	$800.00	$10,400
TAL Inorganics	13	samples	$250.00	$3,250
Summary Data Report				
Mid-level Engineer	20	hrs	$75.00	$1,500
Senior Scientist	10	hrs	$90.00	$900
Associate Engineer	20	hrs	$60.00	$1,200
ODCs	1	lump sum	$950.00	$950
Subtotal Annual Costs				$21,325
Five-year Site Reviews (every 5 years for 10 years)				
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				$5,598
Annual Costs				$26,923
Present Worth O&M @ i = 6%, n = 8 years				**$167,186**
TOTAL O&M COSTS				**$2,543,675**
TOTAL CAPITAL COSTS AND O&M COSTS				**$2,893,955**
CONTINGENCY @10 PERCENT				**$289,395**
TOTAL COST OF ALTERNATIVE G-4, SA 8				**$3,183,350**

ALTERNATIVE G-4: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO POTW, SA 9

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions - SA 9	1	LS	$5,000.00	$5,000
Site Preparation and Mobilization				
Storage Trailer	12	mon	$150.00	$1,800
Office Trailer	12	mon	$250.00	$3,000
Trailer Delivery, Setup, Removal	2	each	$1,000.00	$2,000
Fencing:				
Treatment Area for equip/controls (30' x 30')	120	ft	$10.00	$1,200
Trailer Area (40' x 80')	240	ft	$10.00	$2,400
Gates	2	each	$100.00	$200
Office Equipment Rental	12	mon	$1,000.00	$12,000
Utility Connections for trailer, sys equip, controls	1	LS	$20,000.00	$20,000
Toilet/water cooler service	12	wks	$50.00	$600
Miscellaneous Equipment	1	LS	$2,500.00	$2,500
Decon Equipment and Pad:				
Pressure Washer with Water Tank	6	mon	$500.00	$3,000
Plastic Sheeting, Drums, Pumps, Hoses, Supplies	1	LS	$3,000.00	$3,000
Labor (Site Preparation)				
Laborers (2 men @ 5 days @ 10 hrs/day)	10	days	$320.00	$3,200
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
Site Preparation/Mobilization				$57,900
Groundwater Extraction System (6 wells pumping @ 0.25 gpm each)				
Groundwater Extraction Wells				
Mob/Demob (drillers and equip)	2	each	$1,500.00	$3,000
Well Installation (6 wells @4" ID, PVC, 20' bls)	120	ft	$75.00	$9,000
Extraction Pumps (low flow rate)	6	pumps	$5,000.00	$30,000
Per Diem/Lodging (3 men @ 3 days)	9	days	$100.00	$900
Decontamination	20	hrs	$100.00	$2,000
Misc. Equipment and Supplies	1	LS	$2,000.00	$2,000
Electric Power Supply				
Utility Pole	2	poles	$550.00	$1,100
Power Cable	1000	ft	$10.00	$10,000
Transformer	1	each	$1,500.00	$1,500
Piping and Equipment				
To treatment system (2" ID, PVC)	300	ft	$20.00	$6,000
To discharge sewer (2" ID, PVC)	500	ft	$20.00	$10,000
Flow Meters	6	each	$1,500.00	$9,000
Pressure Gauges	6	each	$250.00	$1,500
Pressure Relief Valves	6	each	$2,000.00	$12,000
Temperature Gauges	6	each	$500.00	$3,000
Instrumentation Controls	1	LS	$10,000.00	$10,000
Labor				
3 men @ 4 weeks @ 50 hrs/week	600	hr	$32.00	$19,200
1 Engineer/Foreman @ 4 weeks @ 50 hrs/week	200	hr	$75.00	$15,000
Groundwater Extraction System				$145,200
UV/Oxidation equipment				
UV/OX system	1	LS	$75,000.00	$75,000
UV/Oxidation				$75,000
Filtration and Carbon Adsorption				
Liquid Phase Carbon Unit (L-500)	1	each	$2,200.00	$2,200
Green Sand Filter (L-170)	1	each	$1,500.00	$1,500
ATS Arsenic Removal System (L-500 ATS)	1	each	$6,200.00	$6,200

ALTERNATIVE G-4: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO POTW, SA 9

	Quantity	Unit	Unit Cost	Total Cost
Valves, piping, controls, etc.	1	LS	$5,000.00	$5,000
Filtration and Carbon Adsorption				$14,900
TOTAL DIRECT COSTS				**$298,000**
INDIRECT COSTS				
Health and Safety (@3%)				$8,940
Administrative Fees (@3%)				$8,940
Engineering and Design (@10%)				$29,800
Construction Support Services (@10%)				$29,800
TOTAL INDIRECT COSTS				**$77,480**
TOTAL CAPITAL COSTS				**$375,480**
OPERATION AND MAINTENANCE (O&M) COSTS (annual)				
Treatment System O&M (Based on herbicide treatment - annual for 22 years)				
Treatment Chemicals (1.5 gpm flow rate)				
pH adjustment: 93% sulfuric acid	1	year	$500.00	$500
Hydrogen peroxide (UV/OX)	1	year	$1,000.00	$1,000
pH adjustment: sodium hydroxide	1	year	$800.00	$800
Carbon Usage and Sand Filter Replacement				
Carbon (480 lb unit)	9	units	$312.00	$2,808
Green Sand (240 lb unit)	9	units	$180.00	$1,620
ATS Arsenic (240 lb unit)	9	units	$2,100.00	$18,900
Spent Carbon Disposal (8640 lbs x 10 volume factor)	43	tons	$500.00	$21,500
Treatment Chemicals and Spent Carbon				$47,128
System Maintenance				
Labor (1 operators @ 8 hrs/day, 365 days/year)	2920	hrs	$45.00	$131,400
pH adjustments	12	mo	$500.00	$6,000
UV/OX	12	mo	$500.00	$6,000
Filtration/Carbon Adsorption	12	mo	$500.00	$6,000
System Maintenance				$149,400
Sampling and Monitoring				
Influent Grab Samples (1 per week):				
TCL Organics (SVOCs/pesticides/herbicides)	52	samples	$600.00	$31,200
TAL Inorganics	52	samples	$250.00	$13,000
Effluent Grab Samples (1 per week):				
Full Suite Discharge Requirements	52	samples	$1,200.00	$62,400
Influent/Effluent Sampling and Monitoring				$106,600
Discharge to POTW (@ 1.5 gpm)				
Cost per year to discharge water ($3.71/1,000 gallons)	788	1,000 gal	$3.71	$2,923
Total Annual O&M Cost (Treatment System)				$306,051
Present Worth Treatment System (O&M) Costs @ I = 6%, n = 22)				**$3,685,350**
Utilities (annual for 22-year period for herbicide and arsenic removal)				
Groundwater Extraction Pumps	12	mo	$750.00	$9,000
Treatment System	12	mo	$3,000.00	$36,000
Utilities (annual cost)				$45,000
Present Worth Utilities Cost @ i = 6%, n = 22 years				**$541,872**

ALTERNATIVE G-4: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO POTW, SA 9

	Quantity	Unit	Unit Cost	Total Cost
GW Monitoring O&M (annual for 22 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA = 13 samples				
Associate Scientist	25	hrs	$60.00	$1,500
Technician	25	hrs	$45.00	$1,125
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics (SVOCs/pesticides/herbicides)	13	samples	$800.00	$10,400
TAL Inorganics	13	samples	$250.00	$3,250
Summary Data Report				
Mid-level Engineer	20	hrs	$75.00	$1,500
Senior Scientist	10	hrs	$90.00	$900
Associate Engineer	20	hrs	$60.00	$1,200
ODCs	1	lump sum	$950.00	$950
Subtotal Annual Costs				$21,325
Five-year Site Reviews (every 5 years for 22 years)				
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				$5,598
Annual Costs				$26,923
Present Worth O&M @ i = 6%, n = 22 years				**$324,195**
TOTAL O&M COSTS				**$4,551,416**
TOTAL CAPITAL COSTS AND O&M COSTS				**$4,926,896**
CONTINGENCY @10 PERCENT				**$492,690**
TOTAL COST OF ALTERNATIVE G-4, SA 9				**$5,419,586**

ALTERNATIVE G-5: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO SURFACE WATER, SA 8

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions - SA 8	1	LS	$5,000.00	$5,000
Site Preparation and Mobilization				
Storage Trailer	12	mon	$150.00	$1,800
Office Trailer	12	mon	$250.00	$3,000
Trailer Delivery, Setup, Removal	2	each	$1,000.00	$2,000
Fencing:				
Treatment Area for equip/controls (30' x 30')	120	ft	$10.00	$1,200
Trailer Area (40' x 80')	240	ft	$10.00	$2,400
Gates	2	each	$100.00	$200
Office Equipment Rental	12	mon	$1,000.00	$12,000
Utility Connections for trailer, sys equip, controls	1	LS	$20,000.00	$20,000
Toilet/water cooler service	12	wks	$50.00	$600
Miscellaneous Equipment	1	LS	$2,500.00	$2,500
Decon Equipment and Pad:				
Pressure Washer with Water Tank	6	mon	$500.00	$3,000
Plastic Sheeting, Drums, Pumps, Hoses, Supplies	1	LS	$3,000.00	$3,000
Labor (Site Preparation)				
Laborers (2 men @ 5 days @ 10 hrs/day)	10	days	$320.00	$3,200
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
Site Preparation/Mobilization				$57,900
Groundwater Extraction System (4 wells pumping @ 2.5 gpm each)				
Groundwater Extraction Wells				
Mob/Demob (drillers and equip)	2	each	$1,500.00	$3,000
Well Installation (4 wells @4" ID, PVC, 20' bls)	80	ft	$75.00	$6,000
Extraction Pumps (low flow rate)	4	pumps	$5,000.00	$20,000
Per Diem/Lodging (3 men @ 3 days)	9	days	$100.00	$900
Decontamination	20	hrs	$100.00	$2,000
Misc. Equipment and Supplies	1	LS	$2,000.00	$2,000
Electric Power Supply				
Utility Pole	2	poles	$550.00	$1,100
Power Cable	1000	ft	$10.00	$10,000
Transformer	1	each	$1,500.00	$1,500
Piping and Equipment				
To treatment system (2" ID, PVC)	300	ft	$20.00	$6,000
To discharge sewer (2" ID, PVC)	500	ft	$20.00	$10,000
Flow Meters	4	each	$1,500.00	$6,000
Pressure Gauges	4	each	$250.00	$1,000
Pressure Relief Valves	4	each	$2,000.00	$8,000
Temperature Gauges	4	each	$500.00	$2,000
Instrumentation Controls	1	LS	$10,000.00	$10,000
Labor				
3 men @ 4 weeks @ 50 hrs/week	600	hr	$32.00	$19,200
1 Engineer/Foreman @ 4 weeks @ 50 hrs/week	200	hr	$75.00	$15,000

ALTERNATIVE G-5: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO SURFACE WATER, SA 8

	Quantity	Unit	Unit Cost	Total Cost
Groundwater Extraction System				$123,700
Chemical Precipitation				
Equalization Tank (1,000 gal)	1	each	$3,500.00	$3,500
Adjustable Flow Feed pump	1	each	$2,000.00	$2,000
Rapid Mixer	1	each	$1,500.00	$1,500
Adjustable Flow Reagent Pump	1	each	$2,000.00	$2,000
Reagent Tank (HDPE Tank)	1	each	$4,000.00	$4,000
Installation Kit (tubing, valves, adaptors, power cord, etc.)	1	kit	$1,000.00	$1,000
Start-up Kit (ion electrodes,filter bags, pH electrodes,etc.)	1	kit	$1,400.00	$1,400
Spare Parts Kit (spare elctrodes, pump,and valve repair kit, co	1	kit	$1,000.00	$1,000
Chemical Precipitation				$16,400
Flocculation/Clarification				
Clarifier Tank with slow mixer	1	LS	$75,000.00	$75,000
Polymer Addition (feed pump and polymer)	1	LS	$10,000.00	$10,000
Sludge Handling				
Sludge Pump	1	each	$2,000.00	$2,000
Sludge Thickener	1	each	$12,500.00	$12,500
Day Tank	1	each	$4,000.00	$4,000
Mixer	1	each	$1,000.00	$1,000
Sludge Press	1	each	$20,000.00	$20,000
Feed Pump	1	each	$1,500.00	$1,500
Sludge Tank Platform	1	LS	$2,500.00	$2,500
Flocculation/Clarification				$128,500
Diffused Aeration Tank				
Aeration Tank	1	each	$50,000.00	$50,000
Oxygen Tank	1	each	$15,000.00	$15,000
Pumps, Controls, Valves, etc	1	LS	$5,000.00	$5,000
Vapor Collection System	1	each	$15,000.00	$15,000
Diffused Aeration Tank				$85,000
Filtration and Carbon Adsorption				
Liquid Phase Carbon Unit (L-500)	1	each	$2,200.00	$2,200
Green Sand Filters (L-170)	2	each	$1,500.00	$3,000
ATS Arsenic Removal System (L-500 ATS)	1	each	$6,200.00	$6,200
Valves, piping, controls, etc.	1	LS	$5,000.00	$5,000
Filtration and Carbon Adsorption				$16,400
TOTAL DIRECT COSTS				**$432,900**
INDIRECT COSTS				
Health and Safety (@3%)				$12,987
Administrative Fees (@3%)				$12,987
Engineering and Design (@10%)				$43,290
Construction Support Services (@10%)				$43,290

ALTERNATIVE G-5: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO SURFACE WATER, SA 8

	Quantity	Unit	Unit Cost	Total Cost
TOTAL INDIRECT COSTS				**$112,554**
TOTAL CAPITAL COSTS				**$545,454**
OPERATION AND MAINTENANCE (O&M) COSTS (annual)				
Treatment System O&M (annual for 30 years)				
Treatment Chemicals (10 gpm flow rate)				
Chemical Precipitation (40% ferric chloride)	1	year	$2,500.00	$2,500
pH adjustment: Lime	1	year	$2,000.00	$2,000
pH adjustment: 93% sulfuric acid	1	year	$1,250.00	$1,250
Anionic Polymer	1	year	$2,500.00	$2,500
Carbon Usage and Sand Filter Replacement				
Carbon (500 lb unit)	6	units	$325.00	$1,950
Green Sand (500 lb unit)	8	units	$375.00	$3,000
ATS Arsenic (700 lb unit)	4	units	$6,125.00	$24,500
Spent Carbon Disposal (9800 lbs x 10 volume factor)	49	tons	$500.00	$24,500
Sludge Management & Disposal (Hazardous Waste)				
Trans & Disposal - metals contaminated sludge	120	tons	$500.00	$60,000
Pesticide Contaminated Sludge	120	tons	$500.00	$60,000
Treatment Chemicals and Sludge Mgt				$182,200
Utilities				
Groundwater Extraction Pumps	12	mo	$1,000.00	$12,000
Treatment System	12	mo	$2,000.00	$24,000
System Maintenance				
Labor (1 operators @ 8 hrs/day, 365 days/year)	2920	hrs	$45.00	$131,400
Chemical Precipitation	12	mo	$500.00	$6,000
Clarificifcation	12	mo	$500.00	$6,000
Aeration System	12	mo	$500.00	$6,000
Filtration/Carbon Adsorption	12	mo	$500.00	$6,000
Utilites and System Maintenance				$191,400
Influent/Effluent Sampling and Monitoring				
Influent Grab Samples (1 per week):				
TCL Organics (SVOCs/pesticides/herbicides)	52	samples	$600.00	$31,200
TAL Inorganics	52	samples	$250.00	$13,000
Effluent Grab Samples (1 per week):				
Full Suite Discharge Requirements	52	samples	$1,200.00	$62,400
Influent/Effluent Sampling and Monitoring				$106,600
Total Annual O&M Cost (Treatment System)				$480,200
Present Worth Treatment System (O&M) Costs @ i = 6%, n = 30)				**$6,609,953**

ALTERNATIVE G-5: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO SURFACE WATER, SA 8

	Quantity	Unit	Unit Cost	Total Cost
GW Monitoring O&M (annual for 30 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA = 13 samples				
Associate Scientist	25	hrs	$60.00	$1,500
Technician	25	hrs	$45.00	$1,125
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics (SVOCs/pesticides/herbicides)	13	samples	$800.00	$10,400
TAL Inorganics	13	samples	$250.00	$3,250
Summary Data Report				
Mid-level Engineer	20	hrs	$75.00	$1,500
Senior Scientist	10	hrs	$90.00	$900
Associate Engineer	20	hrs	$60.00	$1,200
ODCs	1	lump sum	$950.00	$950
Subtotal Annual Costs				$21,325
Five-year Site Reviews (every 5 years for 30 years)				
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				$5,598
Annual Costs				$26,923
Present Worth O&M @ i = 6%, n = 30 years				**$370,594**
TOTAL O&M COSTS				**$6,980,547**
TOTAL CAPITAL COSTS AND O&M COSTS				**$7,526,001**
CONTINGENCY @10 PERCENT				**$752,600**
TOTAL COST OF ALTERNATIVE G-5, SA 8				**$8,278,601**

ALTERNATIVE G-5: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO SURFACE WATER, SA 9

	Quantity	Unit	Unit Cost	Total Cost
DIRECT COSTS				
Groundwater Use Restrictions - SA 9	1	LS	$5,000.00	$5,000
Site Preparation and Mobilization				
Storage Trailer	12	mon	$150.00	$1,800
Office Trailer	12	mon	$250.00	$3,000
Trailer Delivery, Setup, Removal	2	each	$1,000.00	$2,000
Fencing:				
Treatment Area for equip/controls (30' x 30')	120	ft	$10.00	$1,200
Trailer Area (40' x 80')	240	ft	$10.00	$2,400
Gates	2	each	$100.00	$200
Office Equipment Rental	12	mon	$1,000.00	$12,000
Utility Connections for trailer, sys equip, controls	1	LS	$20,000.00	$20,000
Toilet/water cooler service	12	wks	$50.00	$600
Miscellaneous Equipment	1	LS	$2,500.00	$2,500
Decon Equipment and Pad:				
Pressure Washer with Water Tank	6	mon	$500.00	$3,000
Plastic Sheeting, Drums, Pumps, Hoses, Supplies	1	LS	$3,000.00	$3,000
Labor (Site Preparation)				
Laborers (2 men @ 5 days @ 10 hrs/day)	10	days	$320.00	$3,200
Foreman/Superintendent (1 man @ 10 hrs/day)	5	days	$600.00	$3,000
Site Preparation/Mobilization				$57,900
Groundwater Extraction System (6 wells pumping @ 0.25 gpm each)				
Groundwater Extraction Wells				
Mob/Demob (drillers and equip)	2	each	$1,500.00	$3,000
Well Installation (6 wells @4" ID, PVC, 20' bls)	120	ft	$75.00	$9,000
Extraction Pumps (low flow rate)	6	pumps	$5,000.00	$30,000
Per Diem/Lodging (3 men @ 3 days)	9	days	$100.00	$900
Decontamination	20	hrs	$100.00	$2,000
Misc. Equipment and Supplies	1	LS	$2,000.00	$2,000
Electric Power Supply				
Utility Pole	2	poles	$550.00	$1,100
Power Cable	1000	ft	$10.00	$10,000
Transformer	1	each	$1,500.00	$1,500
Piping and Equipment				
To treatment system (2" ID, PVC)	300	ft	$20.00	$6,000
To discharge sewer (2" ID, PVC)	500	ft	$20.00	$10,000
Flow Meters	6	each	$1,500.00	$9,000
Pressure Gauges	6	each	$250.00	$1,500
Pressure Relief Valves	6	each	$2,000.00	$12,000
Temperature Gauges	6	each	$500.00	$3,000
Instrumentation Controls	1	LS	$10,000.00	$10,000
Labor				
3 men @ 4 weeks @ 50 hrs/week	600	hr	$32.00	$19,200
1 Engineer/Foreman @ 4 weeks @ 50 hrs/week	200	hr	$75.00	$15,000

ALTERNATIVE G-5: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO SURFACE WATER, SA 9

	Quantity	Unit	Unit Cost	Total Cost
Groundwater Extraction System				$145,200
Chemical Precipitation				
Equalization Tank (1,000 gal)	1	each	$3,500.00	$3,500
Adjustable Flow Feed pump	1	each	$2,000.00	$2,000
Rapid Mixer	1	each	$1,500.00	$1,500
Adjustable Flow Reagent Pump	1	each	$2,000.00	$2,000
Reagent Tank (HDPE Tank)	1	each	$4,000.00	$4,000
Installation Kit (tubing, valves, adaptors, power cord, etc.)	1	kit	$1,000.00	$1,000
Start-up Kit (ion electrodes,filter bags, pH electrodes,etc.)	1	kit	$1,400.00	$1,400
Spare Parts Kit (spare elctrodes, pump,and valve repair kit,	1	kit	$1,000.00	$1,000
Chemical Precipitation				$16,400
Flocculation/Clarification				
Clarifier Tank with slow mixer	1	LS	$75,000.00	$75,000
Polymer Addition (feed pump and polymer)	1	LS	$10,000.00	$10,000
Sludge Handling				
Sludge Pump	1	each	$2,000.00	$2,000
Sludge Thickener	1	each	$12,500.00	$12,500
Day Tank	1	each	$4,000.00	$4,000
Mixer	1	each	$1,000.00	$1,000
Sludge Press	1	each	$20,000.00	$20,000
Feed Pump	1	each	$1,500.00	$1,500
Sludge Tank Platform	1	LS	$2,500.00	$2,500
Flocculation/Clarification				$128,500
Diffused Aeration Tank				
Aeration Tank	1	each	$50,000.00	$50,000
Oxygen Tank	1	each	$15,000.00	$15,000
Pumps, Controls, Valves, etc	1	LS	$5,000.00	$5,000
Vapor Collection System	1	each	$15,000.00	$15,000
Diffused Aeration Tank				$85,000
Filtration and Carbon Adsorption				
Liquid Phase Carbon Unit (L-500)	1	each	$2,200.00	$2,200
Green Sand Filter (L-170)	1	each	$1,500.00	$1,500
ATS Arsenic Removal System (L-500 ATS)	1	each	$6,200.00	$6,200
Valves, piping, controls, etc.	1	LS	$5,000.00	$5,000
Filtration and Carbon Adsorption				$14,900
TOTAL DIRECT COSTS				**$452,900**
INDIRECT COSTS				
Health and Safety (@3%)				$13,587
Administrative Fees (@3%)				$13,587
Engineering and Design (@10%)				$45,290
Construction Support Services (@10%)				$45,290

ALTERNATIVE G-5: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO SURFACE WATER, SA 9

	Quantity	Unit	Unit Cost	Total Cost
TOTAL INDIRECT COSTS				**$117,754**
TOTAL CAPITAL COSTS				**$570,654**
OPERATION AND MAINTENANCE (O&M) COSTS (annual)				
Treatment System O&M (annual for 22 years)				
Treatment Chemicals (1.5 gpm flow rate)				
Chemical Precipitation (40% ferric chloride)	1	year	$1,000.00	$1,000
pH adjustment: Lime	1	year	$800.00	$800
pH adjustment: 93% sulfuric acid	1	year	$500.00	$500
Anionic Polymer	1	year	$1,000.00	$1,000
Carbon Usage and Sand Filter Replacement				
Carbon (480 lb unit)	9	units	$312.00	$2,808
Green Sand (240 lb unit)	9	units	$180.00	$1,620
ATS Arsenic (240 lb unit)	9	units	$2,100.00	$18,900
Spent Carbon Disposal (8640 lbs x 10 volume factor)	43	tons	$500.00	$21,500
Sludge Management & Disposal (Hazardous Waste)				
Trans & Disposal - metals contaminated sludge	50	tons	$500.00	$25,000
Pesticide Contaminated Sludge	50	tons	$500.00	$25,000
Treatment Chemicals and Sludge Mgt				$98,128
Utilities				
Groundwater Extraction Pumps	12	mo	$750.00	$9,000
Treatment System	12	mo	$2,000.00	$24,000
System Maintenance				
Labor (1 operators @ 8 hrs/day, 365 days/year)	2920	hrs	$45.00	$131,400
Chemical Precipitation	12	mo	$500.00	$6,000
Clarificifcation	12	mo	$500.00	$6,000
Aeration System	12	mo	$500.00	$6,000
Filtration/Carbon Adsorption	12	mo	$500.00	$6,000
Utilites and System Maintenance				$188,400
Sampling and Monitoring				
Influent Grab Samples (1 per week):				
TCL Organics (SVOCs/pesticides/herbicides)	52	samples	$600.00	$31,200
TAL Inorganics	52	samples	$250.00	$13,000
Effluent Grab Samples (1 per week):				
Full Suite Discharge Requirements	52	samples	$1,200.00	$62,400
Influent/Effluent Sampling and Monitoring				$106,600
Total Annual O&M Cost (Treatment System)				$393,128
Present Worth Treatment System (O&M) Costs @ I = 6%, n = 22)				**$4,733,890**

ALTERNATIVE G-5: GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE TO SURFACE WATER, SA 9

	Quantity	Unit	Unit Cost	Total Cost
GW Monitoring O&M (annual for 22 years)				
GW Sampling & Monitoring Program: 9 wells + 4 QA/QC samples per SA = 13 samples				
Associate Scientist	25	hrs	$60.00	$1,500
Technician	25	hrs	$45.00	$1,125
ODCs (PPE, sampling equip, expendibles)	1	lump sum	$500.00	$500
Analysis (TCL Organics and TAL Inorganics)				
TCL Organics (SVOCs/pesticides/herbicides)	13	samples	$800.00	$10,400
TAL Inorganics	13	samples	$250.00	$3,250
Summary Data Report				
Mid-level Engineer	20	hrs	$75.00	$1,500
Senior Scientist	10	hrs	$90.00	$900
Associate Engineer	20	hrs	$60.00	$1,200
ODCs	1	lump sum	$950.00	$950
Subtotal Annual Costs				$21,325
Five-year Site Reviews (every 5 years for 20 years)				
Meetings (includes travel time)				
Senior Scientist	32	hrs	$90.00	$2,880
Mid-level Engineer	32	hrs	$75.00	$2,400
ODCs (includes per diem and rental car)	1	lump sum	$1,000.00	$1,000
Evaluate Data/Curremt Situation				
Senior Scientist	20	hrs	$90.00	$1,800
Mid-level Engineer	40	hrs	$75.00	$3,000
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Five-year Report				
Senior Scientist	40	hrs	$90.00	$3,600
Mid-level Engineer	60	hrs	$75.00	$4,500
Associate Engineer	40	hrs	$60.00	$2,400
ODCs (includes photocopying, etc.)	1	lump sum	$1,000.00	$1,000
Subtotal				$23,580
Annual Cost of 5-year costs at i=6%, n = 5 yrs				$5,598
Annual Costs				$26,923
Present Worth O&M @ i = 6%, n = 22 years				**$324,195**
TOTAL O&M COSTS				**$5,058,085**
TOTAL CAPITAL COSTS AND O&M COSTS				**$5,628,739**
CONTINGENCY @10 PERCENT				**$562,874**
TOTAL COST OF ALTERNATIVE G-5, SA 9				**$6,191,613**

APPENDIX O

COST BACKUP AND VENDOR INFORMATION

Technology
Overview Report

TO-96-03

GWRTAC SERIES

Phytoremediation

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Technologies Analysis Center

October 1996

Prepared For:

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FOREWORD

About GWRTAC

The Ground-Water Remediation Technologies Analysis Center (GWRTAC) is a national environmental technology transfer center that provides information on the use of innovative technologies to clean-up contaminated groundwater.

Established in 1995, GWRTAC is operated by the National Environmental Technology Applications Center (NETAC) in association with the University of Pittsburgh's Environmental Engineering Program through a Cooperative Agreement with the U.S. Environmental Protection Agency's (EPA) Technology Innovation Office (TIO). NETAC is an operating unit of the Center for Hazardous Materials Research and focuses on accelerating the development and commercial use of new environmental technologies.

GWRTAC wishes to acknowledge the support and encouragement received for the completion of this report from the EPA TIO.

About "O" Series Reports

This report is one of the GWRTAC "O" Series of reports developed by GWRTAC to provide a general overview and introduction to a groundwater-related remediation technology. These overview reports are intended to provide a basic orientation to the technology. They contain information gathered from a range of currently available sources, including project documents, reports, periodicals, Internet searches, and personal communication with involved parties. No attempts are made to independently confirm or peer review the resources used.

Disclaimer

GWRTAC makes no warranties, express or implied, including without limitation, warranty for completeness, accuracy, or usefulness of the information, warranties as to the merchantability, or fitness for a particular purpose. Moreover, the listing of any technology, corporation, company, person, of facility in this report does not constitute endorsement, approval, or recommendation by GWRTAC, NETAC, or the EPA.

ABSTRACT

This technology summary report provides a brief overview of an environmental remediation technology, including an introduction to its general principles, reported applicability and utilization, and cited advantages/disadvantages. Also provided are locations of, and information about, organizations conducting research related to phytoremediation (Appendix A) and other references compiled during preparation of this report (Appendix B). This report is provided for informational purposes only and is not intended as a state-of-the-art peer reviewed analysis of this technology. Information used in the preparation of this report was gathered from periodicals, through Internet searches, and in some cases, from personal communications with involved parties. No attempt was made to confirm the veracity of interpretations and/or representations made in any information resource used. In addition, listing of any technology, corporation, company, person, or facility does not constitute endorsement, approval, or recommendation by the National Environmental Technology Applications Center (NETAC).

Phytoremediation uses plants to cleanup contaminated soil and groundwater, taking advantage of plants' natural abilities to take up, accumulate, and/or degrade constituents of their soil and water environments. Results of research and development into phytoremediation processes and techniques report it to be applicable to a broad range of contaminants including numerous metals and radionuclides, various organic compounds (such as chlorinated solvents, BTEX, PCBs, PAHs, pesticides/insecticides, explosives, nutrients, and surfactants. According to information reviewed, general site conditions best suited for potential use of phytoremediation include large areas of low to moderate surface soil (0 to 3 feet) contamination or large volumes of water with low-level contamination subject to low (stringent) treatment standards. Depth to groundwater for *in situ* treatment is limited to about 10 feet, but *ex situ* treatment in constructed troughs or wetlands has also been investigated.

There are five basic types of phytoremediation techniques: 1) *rhizofiltration*, a water remediation technique involving the uptake of contaminants by plant roots; 2) *phytoextraction*, a soil technique involving uptake from soil, 3) *phytotransformation*, applicable to both soil and water, involving the degradation of contaminants through plant metabolism, 4) *phyto-stimulation* or *plant-assisted bioremediation*, also used for both soil and water, which involves the stimulation of microbial biodegradation through the activities of plants in the root zone, and 5) *phytostabilization*, using plants to reduce the mobility and migration potential of contaminants in soil.

Major advantages reported for phytoremediation as compared to traditional remediation technologies include the possibility of generating less secondary wastes, minimal associated environmental disturbance, and the ability to leave soils in place and in a usable condition following treatment. Cited disadvantages include the long lengths of time required (usually several growing seasons), depth limitations (3 feet for soil and 10 feet for groundwater), and the possibility of contaminant entrance into the food chain through animal consumption of plant material.

This document was prepared for distribution by the Ground-water Remediation Technologies Analysis Center (GWRTAC). GWRTAC is being operated by NETAC, under a Cooperative Agreement with the United States Environmental Protection Agency's (EPA) Technology Innovation Office (TIO).

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1.0 INTRODUCTION

Phytoremediation, the use of plants to remediate environmental media, is being pursued as a new approach for the cleanup of contaminated soils and waters, including groundwater. Plant-*assisted* bioremediation, sometimes referred to as a type of phytoremediation, involves the interaction of plant roots and the microorganisms associated with these root systems to remediate soils containing elevated concentrations of organic compounds. These techniques could provide cost-effective methods of remediating soils and groundwater contaminated with metals, radionuclides, and various types of organics, with fewer secondary wastes and less environmental impact than would be generated using traditional remediation methods.

All plants extract necessary nutrients, including metals, from their soil and water environments. Some plants, called hyperaccumulators, have the ability to store large amounts of metals, even some metals that do not appear to be required for plant functioning. In addition, plants can take up various organic chemicals from environmental media and degrade or otherwise process them for use in their physiological processes.

Phytoremediation technologies are in the early stages of development, with laboratory research and limited field trials being conducted to determine processes and refine methods. Additional research, including genetic engineering, is being conducted to improve the natural capabilities of plants to perform remediation functions and to investigate other plants with potential phytoremediation applications (2, 3, 11, 17).

2.0 APPLICABILITY

2.1 CONTAMINANTS

Contaminants that have been remediated in laboratory and/or field studies using phytoremediation or plant-assisted bioremediation include:

- Heavy metals (Cd, Cr(VI), Pb, Co, Cu, Pb, Ni, Se, Zn)
- Radionuclides (Cs, Sr, Ur)
- Chlorinated solvents (TCE, PCE)
- Petroleum hydrocarbons (BTEX)
- Polychlorinated biphenyls (PCBs)
- Polynuclear aromatic hydrocarbons (PAHs)
- Chlorinated pesticides
- Organophosphate insecticides (e.g., parathion)
- Explosives (TNT, DNT, TNB, RDX, HMX)
- Nutrients (nitrate, ammonium, phosphate)
- Surfactants.

2.2 SITE CONDITIONS

Phytoremediation and plant-assisted bioremediation are most effective if *soil contamination is limited to within 3 feet of the surface*, and if *groundwater is within 10 feet of the surface* (4, 17). These technologies are applicable to sites with low to moderate soil contamination over large areas, and to sites with large volumes of groundwater with low levels of contamination that have to be cleaned to low (strict) standards (3, 6, 15).

3.0 METHODOLOGY

3.1 PROCESSES OF PHYTOREMEDIATION

Phytoremediation is based on certain natural processes carried out by plants including:

- Uptake of metals and certain organic compounds (i.e., moderately water soluble, log K_{ow}=0.5 to 3, such as BTEX) from soil and water;
- Accumulation or processing of these chemicals via lignification, volatilization, metabolization, mineralization (transformation into CO_2 and water);
- Use of enzymes to breakdown complex organic molecules into simpler molecules (ultimately CO_2 and water);
- Increasing the carbon and oxygen content of soil around roots (and so promoting microbial/ fungal activity) through release of chemicals (exudates) and decay of root tissue;
- Capture of groundwater (even contaminated groundwater) and utilization for plant processes (17, 19, 20).

3.2 TYPES OF PHYTOREMEDIATION

Several classification schemes were found relating to the types of phytoremediation, the most common of which is presented below.

- ***Rhizofiltration***, the absorption, concentration, and precipitation of heavy metals by plant roots;
- ***Phytoextraction,*** the extraction and accumulation of contaminants in harvestable plant tissues including roots and surface shoots;
- ***Phytotransformation***, the degradation of complex organic molecules to simple molecules and the incorporation of these molecules into plant tissues;
- ***Phytostimulation*** or ***plant-assisted bioremediation***, the stimulation of microbial and fungal degradation by release of exudates/enzymes into the root zone (rhizosphere);
- ***Phytostabilization***, involving absorption and precipitation of contaminants, principally metals, by plants, reducing their mobility and preventing their migration to groundwater (leaching) or air (wind transport), or entry into the food chain (4, 16, 19).

In addition, ***groundwater migration*** can be affected through the use of deep-rooted trees such as poplars to capture groundwater and retard contaminant migration. The trees utilize the water and then transpire it, potentially depressing the local water table. If enough trees are utilizing groundwater in a limited area, the water table maybe be depressed "up to the equivalent of 3 feet of rainfall per year" in semiarid areas. Through the capturing process of trees, contaminated groundwater that

would have migrated downgradient is held in the root zone of the poplars, where degradation can occur through plant processes (phytoremediation) and plant-assisted bioremediation (phytostimulation) (4, 20).

3.3 HARVESTING/DISPOSAL OF PLANT MATERIAL

Once plants have accumulated waste materials, plant shoots can be harvested and roots removed, with disposal or subsequent processing methods dependent on the toxicity of the end products of in-plant organic chemical processing and the storage locations and relative concentrations of contaminants within plant tissue.

If organic contaminants are degraded to harmless compounds, disposal may not be required. If significant accumulation takes place only in roots, then only these tissues must be disposed of or processed. The most commonly mentioned process for dealing with metals-enriched plant material is *controlled incineration*, which results in ash with a high metals content. It is hoped that an economically feasible method of metals recovery from this ash will be developed, further reducing the environmental impacts of this technology. Radiologically-contaminated plant material could be vitrified as with other radioactive wastes. Conventional disposal methods such as landfilling may also be possible in some instances. Preliminary information indicates that wood from trees that have taken up/degraded TCE, and contain metabolites of TCE, can be used for pulp (7).

Other methods of plant tissue treatment currently under investigation include:

- Sun, heat, and air drying
- Composting
- Pressing and compacting
- Leaching (6, 9, 14, 16).

3.4 IMPLEMENTATION

Phytoremediation techniques are still being tested, in stages ranging from lab- to field-scale. Current research includes:

- Lab studies to investigate the processes behind phytoremediation;
- Screening studies to find suitable plants for further investigation;
- Bench- and pilot-scale testing of promising plant species;
- Limited and full-scale field trials.

3.5 GROUNDWATER REMEDIATION METHODS

3.5.1 Rhizofiltration

Surface water rhizofiltration may be conducted *in situ*, with plants being grown directly in the contaminated water body. If groundwater is located within the rhizosphere (root zone), rhizofiltration of groundwater can also be *in situ*. Alternately, rhizofiltration may involve the pumping of contaminated groundwater into troughs filled with the large root systems of appropriate plant species. The large surface areas provided by these root systems allow for efficient absorption of metals from the contaminated groundwater into root tissues.

In addition to removal through absorption, metals are also removed from groundwater through precipitation caused by exudates (liquids released from plant tissues). These precipitates are filtered from the groundwater after it passes through the plant troughs and before treated water is removed from the process loop. Roots are harvested, and depending on the species of plant used, shoots may be transplanted to grow new roots. Plants can be replaced in the system to ensure constant operation results.

Rhizofiltration using sunflowers has been used in the remediation of radionuclides from surface water near Chernobyl (strontium and cesium) and in water using a rhizofiltration system, as described above, at a DOE facility in Ohio (3, 6, 9, 16, 20).

3.5.2 Phytotransformation

Surface water remediation via phytotransformation can be accomplished *in situ* in ponds or wetlands. In addition, groundwater can be remediated using phytotransformation *in situ* if the water table is within the zone tapped by deep-rooted plants such as poplars or *ex situ* by pumping water to troughs or constructed wetlands containing appropriate plants. In the phytotransformation process, plants take up organic contaminants and degrade them to less toxic or non-toxic compounds (2, 3, 15, 17, 19, 20) .

This technique is being tested on explosives-contaminated groundwater (TNT and RDX) at Milan Army Ammunition Plant in Tennessee by the U. S. Army Corps of Engineers Waterways Experimental Station (WES) (2, 3, 16, 17). In addition, an Environmental Security Technology Certification Program (ESTCP) project is testing the ability of trees with roots tapping groundwater to degrade TCE and hydrazine present in the aquifer (8). The U.S. Air Force is planning to evaluate phytoremediation through field studies followed by cell cultures and bio-chamber studies (7).

3.5.3 Plant-Assisted Bioremediation

This technique involves the installation of appropriate plants in areas in which near-surface bioremediation is being conducted. The plants provide carbonaceous material from liquids released from roots and through the decay of root tissue. In addition, oxygen released from the root systems of these plants increases the oxygen content in the bioremediation area. These additions to the soil as a result of plant activity increase the rates of microbial activity and thus the rates of contaminant degradation. The above-mentioned ESTCP project also involves study of the beneficial effects of plant roots on the rate on *in situ* bioremediation by microorganisms (2, 4, 8, 10, 17, 19, 20).

3.6 SOIL REMEDIATION METHODS

3.6.1 Phytoextraction

This process involves the removal of metals, radionuclides, and certain organic compounds (i.e., petroleum hydrocarbons) by direct uptake into plant tissue. Implementation of a phytoextraction program involves the planting of one or more species that are hyperaccumulators of the contaminants of concern. Amendments (i.e., fertilizer, water, etc.) may be required, as determined from preliminary field testing, to ensure successful plant growth. Lengths of time before harvesting the plants are also determined from preliminary testing, and after this period of time, plant tissue is removed and, if necessary, a new crop of plants are planted. Although testing has focused on single plants,

several species may be used at a site, either at the same time or subsequently, to remove more than one contaminant (11, 14, 16, 17).

Characteristics of plants able to perform phytoextraction include:

- Ability to accumulate and tolerate high concentrations of metals in harvestable tissue;
- Rapid growth rate;
- High biomass production (This results in more metal removed per planting) (2, 11, 16).

DOE field trials involving phytoextraction of metals and radionuclides from soils are being conducted in association with Cornell University, at sites in Montana and Idaho (3). Also, a study is being conducted by the University of Iowa and Kansas State University, in association with the Hazardous Substance Research Center (HSRC) at Kansas State, to determine the efficiency of poplars to take up and accumulate arsenic and cadmium in soils (17).

3.6.2 Phytostabilization

Phytostabilization, as stated above, is the use of certain plant species to absorb and precipitate contaminants, generally metals, reducing their bioavailablity, and so reducing the potential for human exposure to these contaminants. This technique can be used to re-establish a vegetative cover at sites where natural vegetation is lacking due to high metals concentrations in surface soils or physical disturbances to surficial materials. Metal-tolerant species can be used to restore vegetation to the sites, thereby decreasing the potential migration of contamination through wind erosion and transport of exposed surface soils and leaching of soil contamination to groundwater (erosion and leaching are common in unvegetated areas).

Characteristics of plants appropriate for phytostabilization at a particular site include:

- Tolerance to high levels of the contaminant(s) of concern;
- High production of root biomass able to immobilize these contaminants through uptake, precipitation, or reduction;
- Retention of applicable contaminants in roots, as opposed to transfer to shoots, to avoid special handling and disposal of shoots (2, 3, 13, 15, 17).

Phytostabilization field studies are being conducted at the University of Iowa and Kansas State University, in conjunction with the HSRC at Kansas State. These tests involve the revegetation of a mine tailings site in Kansas containing, elevated levels of cadmium, lead, and zinc, to reduce wind and water erosion (1).

3.6.3 Plant-Assisted Bioremediation

Techniques for soil remediation using plant-assisted bioremediation are the same for the groundwater application described above. This technique is being tested at a Chevron site in Ogden, Utah using alfalfa to address fuel contamination (4) and at the University of Iowa using poplar trees to address atrazine contamination (12).

4.0 TECHNOLOGY PERFORMANCE

4.1 GENERAL

Use of phytoremediation is currently limited to research activities and limited field testing. While several recent and on-going applications have reportedly been successful in lowering contaminant concentrations, full-scale remediation projects have not been completed and regulatory approval is not yet in place. Reported results show some potential for practical applications of these techniques to achieve remedial objectives and regulatory approval; however "at least two or three more years of field tests are necessary to validate the initial, small-scale field tests." (2).

Specific methodologies for application to contaminated sites have standardized, but general principles have been established. The general steps followed in the design and implementation of a phytoremediation project, for any of the techniques, include:

- Site characterization, including determination of soil and water chemistry/conditions, climate, and contaminant distribution;
- Treatability studies to determine rates of remediation and appropriate plant species, density of planting, location, etc.;
- Preliminary field testing at the site to monitor results and refine design parameters;
- Full-scale remediation;
- Disposition of resulting affected plant material (15).

4.2 COST INFORMATION

Current estimates of costs for phytoremediation vary widely, and little information was found as to the conditions on which the estimates were based. A cost estimate for phytoextraction included $10,000 per acre for planting, with total remediation costs, including maintenance, monitoring, verification testing, etc. estimated at $60,000 to $100,000 per acre (17, 20). Another estimate placed costs at approximately $80 per cubic yard of contaminated soil (2). Removing radionuclide contamination from water using sunflowers was estimated to cost "from $2 to $6 per thousand gallons of water treated, including waste disposal and capital costs" (5).

5.0 TECHNOLOGY ADVANTAGES

The advantages of the various types of phytoremediation are outlined in Table 1 below.

TABLE 1. ADVANTAGES OF TYPES OF PHYTOREMEDIATION

ADVANTAGE	RHIZO-FILTRATION	PHYTO-EXTRACTION	PHYTO-STABILIZATION	MIGRATION CONTROL
Can be performed with minimal envirnomental disturbance	X	X	X	X
Applicable to broad range of contaminants, including many metals with limited alternative options	X	X	X	X
Possibly less secondary air and/or water wastes generated than traditional methods	X	X	X	X
Organic pollutants may be degraded to CO_2 and H_2O, removing, as opposed to transferring, environmental toxicity	X	X		
Cost-effective for large volumes of water having low concentrations of contaminants to low (stringent) standards	X			
Topsoil is left in a usable condition and may be reclaimed for agricultural use		X		
Soil can be left at site after contaminants are removed, rather than having to be disposed or isolated		X		
Cost-effective for large areas having low to moerately contaminated surface soils		X		
Reduces volume of contaminated material to be landfilled or incinerated*		X		
Can achieve remediation goals without using toxic chemicals		X		
Reduce the risk of exposure (during clean-up) by limiting direct contac with contaminated soils			X	
Plant uptake of contaminated ground-water can prevent off-site migration				

*Example: "Removing heavy-metal contaminated soil from two and a half acres to a depth of about 18 inches creates about 5,000 tons of soil that must be disposed of in a hazardous waste landfill. In contrast, plants that take up the metal are burned and leave a residue of between 25 and 30 tons of ash to be disposed of."

6.0 TECHNOLOGY LIMITATIONS

Possible disadvantages associated with all phytoremediation/plant-assisted remediation techniques include:

- Long length of time required for remediation (usually more than one growing season);
- Treatment is generally limited to soils at less than 3 feet from the surface and groundwater within 10 feet of the surface;
- Climatic or hydrologic conditions (e.g., flooding, drought) may restrict the rate of growth of types of plants that can be utilized;
- Ground surface at the site may have to be modified to prevent flooding or erosion;
- Contaminants may still enter the food chain through animals/insects that eat plant material containing contaminants;
- Soil amendments may be required, including chelating agents to facilitate plant uptake by breaking bonds binding contaminants to soil particles.

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APPENDIX A

RESEARCH LOCATIONS/INFORMATION

Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL, 60439. Dr. Ray Hinchman, (708) 252-3391, Fax: (708) 252-6407, E-mail: hinchman@anl.gov, Christina Negri, (708) 252-9662, Fax: (708) 252-9281, E-mail:negri@qmgate.anl.gov

"Biomining" the Soil to Remove Heavy Metals. Research at Argonne is focused on enhancing phytoremediation rates through irrigation, fertilization, alteration of chemical/physical soil conditions, and/or use of non-toxic chelating agents. The use of electrokinetics to deliver chelating agents and control metals movement in soil is also being studied at Argonne. (Project brief: http://www.anl.gov/LabDB/Current/Ext/H603-text.002.html)

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Environmental Security Technology Certification Program (ESTCP)

Two ESTCP FY95 projects involve phytoremediation. One involves the use of plants to remove munitions contamination from groundwater using an *ex situ* (constructed wetland) application of phytoremediation at Milan Army Ammunitions Plant, Tennessee. Also, a project using deep-rooted trees to degrade TCE and hydrazine in groundwater and to prevent off-site migration of these contaminants is being conducted through ESTCP. (Project summary: http://www.acq.osd.mil/ens/ESTCPProjSum.html)

Great Plains/Rocky Mountain Regional Center, Hazardous Substance Research Center (HSRC)

The following research briefs from HSRC's Great Plains/Rocky Mountain Center can be found at http://www.engg.ksu.edu/HSRC/Annual.Research.html#92-05:

- The Use of Poplar Trees in Remediating Heavy Metal Contaminated Sites
- Metals Soil Pollution and Vegetative Remediation
- Acid Processing Metalliferous Waste Reclamation by Material Reprocessing and Vegetative Stabilization
- Fate and Transport of Heavy Metals and Radionuclides in Soil: The Impacts of Vegetation
- Vegetative Interceptor Zones for Containment of Heavy Metal Pollutants
- Riparian Poplar Tree Buffer Impact on Non-point Source Surface Water Contamination: A Paired Agricultural Watershed Study
- The Use of Vegetation to Enhance Bioremediation of Surface Soils Contaminated with Pesticide Wastes
- Uptake of BTEX Compounds and Metabolites by Hybrid Poplar Trees in Hazardous Waste Remediation
- Plant Assisted Remediation of Soil and Ground Water Contaminated by Hazardous Organic Substances: Experimental and Modeling Studies
- Development of a Systematic Methodology for Optimally Designing Vegetative Systems for Remediating Contaminated Soil and Ground Water

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Rutgers University, Cook College, AgBiotech Center[1] and Department of Environmental Sciences[2], P. O. Box 231, New Brunswick, NJ, 08903-0231. Point of Contact: Ilya Raskin, (908) 932-8734, Fax: (908) 932-6535, E-mail: Raskin@mbcl.rutgers.edu

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This consortium is conducting research to advance phytoremediation techniques for use in soils, sediments, and groundwater contaminated with munitions (TNT, DNT, TNB, RDX, and HMX) and chlorinated solvents (TCE and PCE). Filed experiments, conducted with Auburn University and the Air Force Armstrong Lab at Tyndall AFB, have shown phytoremediation to reduce TNT levels in soils to acceptable cleanup levels. (Newsletter entries: http://www.wes.army.mil.serdp/newsletter/95oct.html and http://wwel.wes.army.neal/el/newsfeb96.html)

United States Department of Agriculture; Agricultural Research Service; Beltsville Agricultural Research Center; Natural Resources Institute

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On-going research in Dr. Milton P. Gordon's laboratory, also involving the College of Forestry and Department of Microbiology at University of Washington, focuses on inserting bacterial genes into plants to enable the plants to remediate various xenobiotics in the environment. (Information about Dr. Gordon's work: http://www.fhcrc.org/~mcb/htm/gordomp.htm)

APPENDIX B

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The Applied Technologies Newsletter for Superfund Removals & Remedial Actions & RCRA Corrective Action

ABOUT THIS ISSUE

This issue highlights phytoremediation and other biological processes for hazardous site remediation.

Biosolids and Fly Ash Used to Restore the Bunker Hill Superfund Site

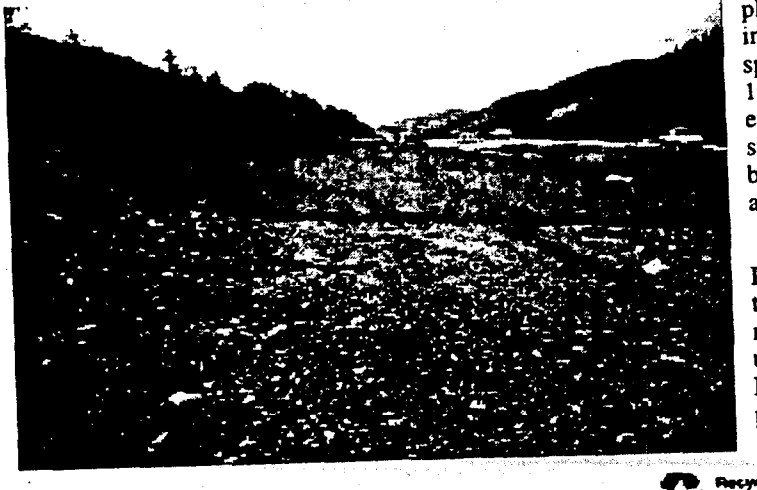
by Sally Brown, Ph.D., U.S. Department of Agriculture, Agricultural Research Service

Application of a remediation mixture of municipal biosolids, wood ash, and log yard wood waste is proving highly effective in reducing erosion, correcting soil pH, and supporting a self-sustaining vegetative cover at the Bunker Hill, ID, Superfund site. In addition, levels of zinc, cadmium, and copper in vegetation are within normal ranges (less than 300 ppm zinc, 0.5-5 ppm cadmium, and 6-30 ppm copper) for plants growing on the treated areas. Revegetation of more than 1,000 acres on this site is a problem due to deficiencies of certain nutrients as well as toxic levels of other elements. In the past, these areas were incapable of supporting any vegetation.

Experts from the U.S. Department of Agriculture, University of Washington, University of Idaho, the Northwest Biosolids Management Association, Washington Water Power, and EPA are collaborating in this effort to re-establish native plant communities and reduce contaminant levels in this severely disturbed area. Direct visual comparison of one of the treated areas with the project control plot is shown below. [Additional photographs are shown in the Internet version of this newsletter.]

The Bunker Hill site, located in the Coeur d'Alene River Basin, is the second largest Superfund site in the nation. Zinc and lead mining/smelting was conducted in the area for over 60 years, resulting in soils with extremely high metal concentrations, low pH levels, high susceptibility to erosion, low microbial growth levels, and low water-holding capacity. Earlier restoration efforts involving the construction of terraces (on slopes exceeding 50 percent) and addition of limestone and fertilizers were not successful in establishing a vegetative cover. Demonstration and pilot-scale plots were installed in the spring and fall of 1997 in order to evaluate the success of biosolid/fly ash applications.

Treated Area in Bunker Hill Site, Idaho



Local sources of the application materials were used exclusively. Biosolids provided by three

Recycled/Recyclable

different municipal areas (Biosolids 1, 2, and 3) were mixed with a 1:1 (by volume) blend of wood ash from local power generators and log yard wood waste from a nearby railroad company. Biosolids were mixed and applied at a rate of 25 and 50 dry tons/acre (t/a). Ash was applied at a constant rate of 100 wet t/a to provide 22 t/a calcium carbonate equivalent. The log yard wood waste was added at a fixed volume ratio of 1:5. Prior to surface application (at a rate of 30 pounds/acre), a seeding mixture of grasses and legumes was added to the biosolids/ash amendment mixture. This mixture formed a highly adhesive product that could remain on the eroded hillsides, while simultaneously permitting seedling emergence and increasing water permeability.

Two months after treatment of two to three acre test plots, increased levels of highly diverse microbial populations were observed in soils directly below the treated surface. No microbial activity was detected on control soils. Samples taken from plants six months after initial application of each of the three biosolid mixtures indicate reduced levels of toxic metals and increased levels of soil nutrients (as shown in Figure 1). These data indicate that the amendment re-establishes normal concentration levels of these metals, whereby the metals are neither nutritionally deficient or toxic.

In the fall of 1997, a second phase of the study was initiated to determine the effectiveness of different locally available residual materials, compare ratios of different amendments, determine the most effective seeding time, and predict long-term fate of restoration efforts. Four different biosolids were used, in addition to three different wood ashes, two composts, one type of pulp and paper sludge, and log yard waste. No movement of material from the test plots has occurred, despite several erosive weather events.

Full germination of grasses and legumes is expected by this spring. An additional study, to cover approximately 20 acres, is slated to be established at Bunker Hill or a similar site this summer. The study will focus on development of steep slope application technology, and will establish a long-term ecological research station to monitor the effects of this technology on native biota. A manual of practice for these and similar restoration methods used around the nation will be developed. For additional information, contact Dr. Sally Brown (U.S. Department of Agriculture, Agricultural Research Service) at 301-504-9230.

Long-Term Phytoremediation of Organic Soil Pollutants

by John S. Fletcher, Ph.D., University of Oklahoma, and Sunil I. Shah, Union Carbide Corp.

Research at a former industrial sludge lagoon is underway to evaluate phytoremediation of recalcitrant organic compounds on a time scale that is realistic for slow natural processes. University of Oklahoma researchers are working with Union Carbide at a Texas site to determine how a mixture of contaminants has influenced ecological events over time and, in turn, how an evolving plant-microbe community has influenced the fate (degradation and/or immobilization) of the contaminants. Results indicate that chemicals in the study area, in combination with natural environmental stresses (i.e., periodic drought) over a 15-year period have screened for plant species capable of growing under the combined influence of both chemical and natural environmental stresses.

The study area comprises one acre that was taken out of use as an industrial sludge lagoon and drained approximately 20 years ago, leaving high levels of polyaromatic hydrocarbons (PAHs) (as high as 20,000 ppm, total) and BTEX compounds (benzene, toluene, ethylbenzene, and xylenes) in the sludge. Since then, the entire site has been revegetated as a result of natural processes starting with seed dispersal from mature vegetation growing in the vicinity of the basin. A healthy, biodiverse community of 51 different plant species is growing on the site now [as shown in the photograph provided in the Internet version of this newsletter].

Researchers compared the density of seed-donor plants growing within a 1,200-meter radius of the sludge basin with vegetation in the basin, finding the composition of the basin plant community does not reflect nearby seed-donor populations (Figure 2). Most notable is the prominence of mulberry and the absence of Chinese tallow and willow in the basin. These differences are attributed to natural screening processes whereby the current plant populations have proved to be more capable of growth in the existing chemical and environmental conditions of the basin. In earlier laboratory screening studies on rhizosphere enhancement of microbial degradation, mulberry was identified as the potentially most influential species among the 17 plants tested under similar conditions.

Figure 1. Average Elemental Concentrations in Plants

	Zinc (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Phosphorus (g/kg)	Potassium (g/kg)
Control Plot	215	0.4	3.9	590	10
Biosolid 1	150	2.3	11.4	3,800	38
Biosolid 2	108	0.6	9.9	6,830	26
Biosolid 3	59	0.9	13.8	6,110	25

Figure 2. Comparison of Dominant Vegetation

	In Sludge Basin*	Radius of Basin*
Morus rubra (mulberry tree)	36.2	5.0
Cyndon dactylon (Bermuda grass)	18.9	9.0
Helianthus annuus (sunflower)	9.4	2.0
Celtis laevigata (sugarberry tree)	2.8	7.0
Salix nigra (willow tree)	0	2.0
Baccharis halimifolia (Baccharis bush)	1.9	25.0
Sapium sebiferum (Chinese tallow tree)	0	27.0
Total percent	**85.3**	**97.8**

* Percent relative coverage/abundance

Field data collected at the sludge basin indicate that the concentration of PAHs in the top two feet of material beneath mature mulberry trees is only 10-20% of the concentration originally deposited in the sludge. The concentration of contaminants in the lower root zone (2-4 feet) of mulberry averages about 50% of that present in sludge beneath the root zone. PAH-degrading bacteria have been isolated from the rhizosphere, but not from the non-rooted sludge material at 6-foot depths. These data indicate that mulberry seems to have the capacity for sustained growth in PAH/BETX-contaminated sludge under natural conditions, and that its root zone fosters the degradation of industrial contaminants presumably by substrate release and increased soil aeration during root turnover.

Additional field and laboratory tests are underway to evaluate mulberry's phytoremediation potential and to develop ecologically sound and safe phytoremediation strategies for sustained, long-term (15-20 years) degradation of recalcitrant pollutants at hazardous waste sites. Contact Dr. John Fletcher (University of Oklahoma, Department of Botany and Microbiology) at 405-325-3174 or Sunil I Shah (Union Carbide Corporation) at 304-747-5234 for more information.

Phytoremediation of Selenium-Laden Soils

by Gary Bañuelos, Ph.D., U.S. Department of Agriculture, Agricultural Research Service

The U.S. Department of Agriculture (USDA) is conducting two large-scale field studies in areas of central California where intense agricultural use of the land has resulted in potentially toxic levels of naturally-occurring selenium in soils. USDA study results indicate that *Brassica* species (such as mustard and canola) can be used to hyperaccumulate and volatilize soluble selenium in soil. Field data also show that phytoremediation may provide a practical and economically viable method for reducing the selenium load discharge into effluent in irrigated regions of central California. Other western states with extensive shale deposits, where increased irrigation of agricultural lands is increasing selenium solubilization, may benefit from this approach.

Under greenhouse conditions, researchers found that selenium concentrations fell by nearly 50% after a period of 3-4 months, with tissue concentrations of selenium reaching levels as high as 600 ppm in dry plant material. After four years of crop rotations at one of the California study sites with *Brassica* species, kenaf, and tall fescue, total soil concentrations of selenium fell by 25% from levels of 1.5-2.0 ppm. Concentrations of soluble boron, which is often found in conjunction with selenium and also potentially toxic to plants in high concentrations, fell by nearly 20% from levels of 5-15 ppm. New eucalyptus trees subsequently were replanted at this site and intercropped with tall fescue, which continues to manage the level of selenium to a safe level predominantly through plant volatilization.

On the second study site, poor-quality ground water with high salinity, boron, and selenium is used as irrigation water on *Brassica* species planted for phytoremediation. Following two years of research, *Brassica* species now are used in crop rotation with other agronomic crops, such as sugar beets and wheat, to maintain low selenium levels whenever poor quality water is used for irrigation. Additionally, minimizing the buildup of soil selenium allows for effective leaching of salts such as boron out of the soil profile. The planting of *Brassica*, itself, provides opportunities for the production of oil as an agronomic crop and for animal forage (pending regulatory approval).

This approach to phytoremediation relies upon combination of *Brassica* with other plants, such as alfalfa or grasses, that primarily volatilize selenium. In general, USDA recommends consideration of certain factors before implementing phytoremediation, including: (1) soil salinity and high concentrations of toxic elements; (2) the presence of competitive ions affecting chemical uptake; (3) adverse climatic conditions; (4) water management strategies that produce little effluent; (5)unwanted plant consumption by wildlife and insects; (6) plant destruction/utilization; and (7) stakeholder acceptance.

These studies were precipitated, in part, by the bioconcentration and apparent toxicity of selenium found in the wetland food chain at Kesterson National Wildlife Refuge in central California. Researchers identified high rates of embryo deformities and mortalities in aquatic birds resulting from agricultural drainage to the refuge. The USDA estimates that more than 500,000 acres of soil in central

California possibly are susceptible to producing selenium-laden effluent. For more information, contact Gary Bañuelos (USDA, Agricultural Research Service) at 209-453-3100.

Biodegradation of De-Icing Fluids

by Charles A. Bleckmann, Ph.D., Air Force Institute of Technology

Investigations conducted by the U.S. Air Force Institute of Technology (AFIT), Wright-Patterson Air Force Base, OH, have shown that a component of aircraft de-icing fluids—propylene glycol—readily degrades in both high clay and sandy soil systems. As the primary components of commercial aircraft de-icing fluids, both propylene glycol and ethylene glycol commonly are detected in streams receiving runoff from airports. Their degradation creates a high oxygen demand capable of disrupting receiving streams. Collection and subsequent treatment of spent fluids by land application may be considered a remediation technique.

In soil test systems, AFIT researchers measured oxygen consumption and carbon dioxide production (the process of respirometry) involved in propylene glycol degradation. Respirometry served as a sensitive measure of biological activity in the laboratory environment, and was used to compare the activity of experimental controls. Propylene glycol concentrations of 3,800-11,400 mg/kg degraded (at 30°C) in 28 days by 20-28% in clay soils, and by 2-6% in sandy soils, without the addition of nutrients. De-icing agent additives such as the corrosion inhibitor tolyltriazole showed little degradation.

Contact Capt. Laura Johnson or Lt. AnnMarie Halterman-O'Malley (AFIT) at 937-255-3636 for more information on these studies, or Dr. Charles Bleckmann (AFIT) at 937-255-3636 (phone) or cbleckma@afit.af.mil (e-mail) on other site remediation research conducted by the AFIT Department of Engineering and Environmental Management.

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New Phytoremediation Bibliography Now Available

The *Phytoremediation Bibliography*, recently developed by the EPA Phytoremediation Handbook Team in conjunction with the Remediation Technology Development Forum's Phytoremediation Action Team, is a comprehensive reference list containing available abstracts and over 1,100 citations on phytoremediation or closely related subjects. The bibliography will be updated quarterly to include additional abstracts and references for peer-reviewed journal articles, conference presentations and posters, book excerpts, and newspaper or magazine articles. Bibliography searches may be conducted on-line from the RTDF Internet site www.rtdf.org/phytodoc.htm.

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EPA TECH TRENDS

Using the Environment to Clean the Environment

Using plants to solve our environmental problems? The concept of phytoremediation is almost too simple, too obvious. But an ever-increasing flood of data from scientific research is showing that the tools we need to combat contamination may already exist in the very environment we are trying to protect.

Chad Sumner

Over the past two years, phytoremediation has received increasing attention in industry publications, EPA documents, international conferences, and innovative technology proposals. However, the sudden explosion of the field has left many questions unanswered. How do phytoremediation technologies work? How do they compare to conventional and other innovative technologies? What are their advantages? Their limitations? When should phytoremediation be used? How do the various phytoremediation technologies differ from each other, and what are the applications of each? Where has phytoremediation been applied and what were the results? This article will summarize what we now know about phytoremediation and outline the questions yet unanswered.

Not as Novel as You May Think

Plant-based remediation systems can be traced as far back as the 17th century in what is now

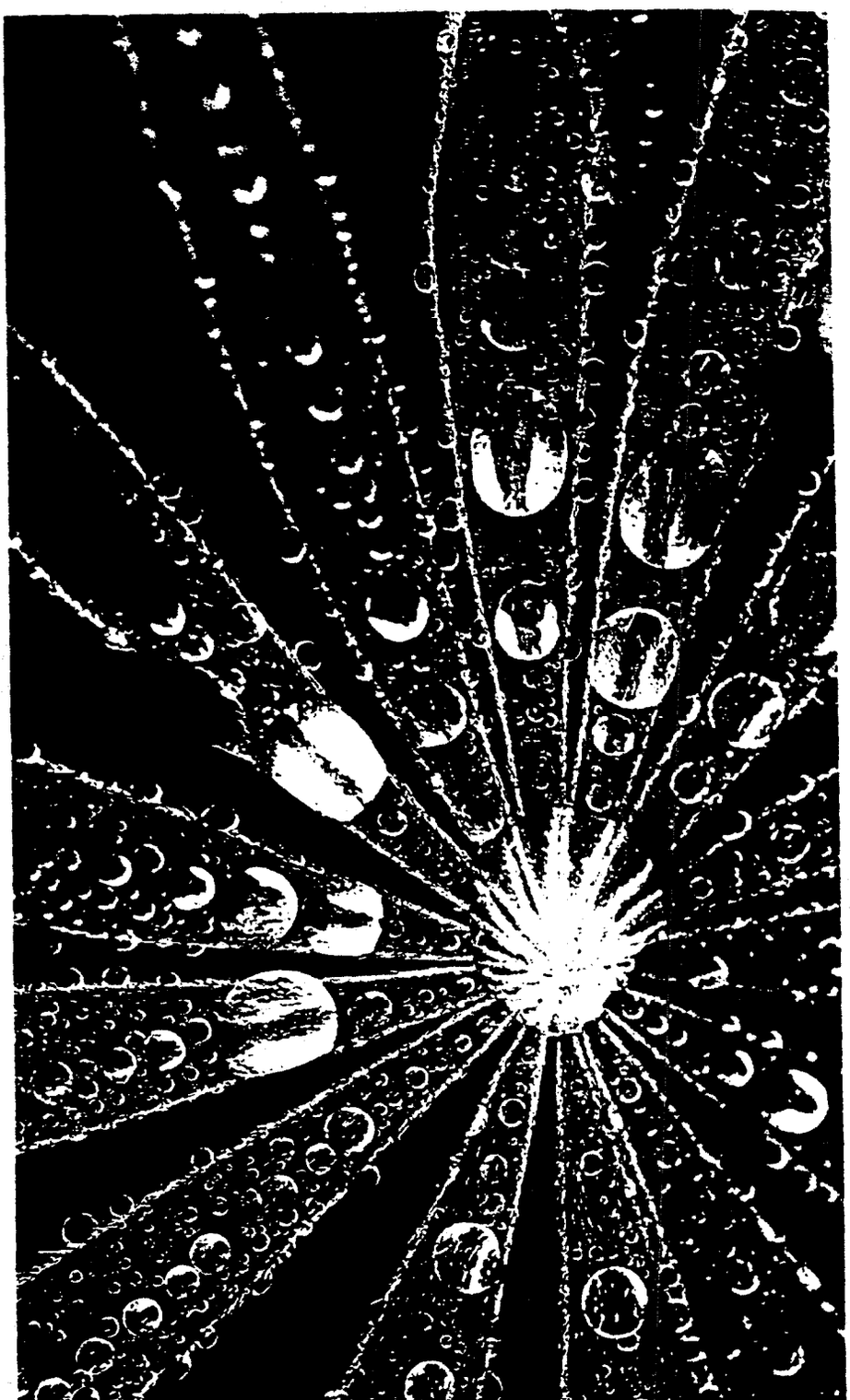


Photo by F. Krahmer, Natural Selection

Germany. Here, existing wetlands were used to treat municipal sewage and wastewater (Cunningham et al, 1996). Beginning in the 1970s, constructed wetlands were used to treat acidic mine drainage, agricultural runoff, industrial waste, and urban runoff. These early wetland systems were predicated on naturally occurring plant populations that demonstrated a capacity to treat waste. Very little was understood about the plant physiology and processes involved.

Today modern scientific techniques and a deeper understanding of plant processes are allowing scientists to develop plants specifically for phytoremediation. Biochemical assays and immunoassays can identify native plant species capable of degrading a particular contaminant. Sophisticated selective propagation techniques are used to enhance plant traits that contribute to phytoremediation (e.g. extensive root structures, rapid growth, and increased enzyme production). State-of-the-art genetic engineering practices are employed to create plants capable of treating contaminants that are toxic or unable to be metabolized by native species. Collectively these modern techniques allow scientists to take the place of natural evolution in adapting plants for remediation purposes.

The diversity of environmental contaminants, each with distinct traits and chemical behaviors, requires an equally diverse suite of phytoremediation technologies

What Is Phytoremediation?

Phytoremediation refers to the use of naturally occurring and genetically engineered plants to clean up or contain environmental contaminants. Plants have evolved complex metabolic systems and a variety of enzymes that allow them to prosper in virtually every climate on Earth. Phytoremediation technologies harness these natural systems and plant products to remove, degrade, or stabilize hazardous compounds. The diversity of environmental contaminants, each with distinct traits and chemical behaviors, requires an equally diverse suite of phytoremediation technologies. Phytoremediation technologies fall into three general groups defined by the ultimate fate of the contaminant: (1) contaminants may be extracted from the environment by plant uptake mechanisms; (2) organic contaminants may be degraded by plant enzymes; or (3) contaminants may be stabilized as plant products bind with compounds to form relatively immobile and inert complexes.

Phytoextraction

This subset of phytoremediation relies on plants' ability to take up minerals selectively from soil and water and transport them to their stems and leaves. Plant species have been identified that perform the same function with environmental contaminants. This trait is particularly encouraging for the treatment of heavy metals. Metals stored in the shoots and leaves can be recovered by harvesting and smelting the plants. The smelted material can then be sold as metal ore, partially offsetting remediation costs.

Plant species capable of extracting heavy metals from soil and water may be naturally occurring or genetically engineered. Several species, collectively termed "hyperaccumulators," naturally take up and store elevated levels of heavy metals. Unfortunately, these species tend to grow slowly and produce relatively little biomass. Thus, even with heavy metals making up over 0.1% of their dry weight (EPA, 1997), natural hyperaccumulators may not remove contaminants fast enough to be considered a viable remediation method.

To speed up metal removal by plants, scientists have now engineered high-biomass species with this ability. Richard Meagher, head of the Genetics Department at the University of Georgia and chief scientific officer for PhytoWorks Inc., has engineered patented plant species to treat mercury and organo-mercury contamination. These species now contain modified bacterial genes that neutralize ionic mercury into its harmless metallic form, and separate mercury ions from the organic components. Metallic mercury is readily released by the plants as vapor at concentrations well below environmental standards. Meagher "expect[s] that modifications of these genes will also be effective in treating lead, cadmium, nickel, and copper." These metals, which do not vaporize, could be recovered and reused through smelting of the plant material.

Phytodegradation

Plants can break down hazardous organic contaminants into simple, inert by-products (e.g. water and carbon dioxide). Nutrients required by plants are often bound up in complex molecules. Plants must first "digest" these larger complexes to obtain the nutrients they need. Plants produce unique combinations of enzymes that break down complex organic molecules into a form that is useful to the plant. These enzymes also can degrade organic contaminants. Each enzyme works on specific classes of compounds.

The key to phytodegradation is identifying which plant species produce which enzymes. Laura Carreira, first principal scientist for PhytoWorks has developed a series of proprietary immunoassays that can trace plant enzymes found in the soil back to the plant species that produced them. Individual plants within these species producing large quantities of the enzyme can then be propagated selectively to create "super-degraders." Currently this technology can identify species to treat 64% of the volatile organic compounds (VOCs) and 30% of the semi-volatile organic compounds (SVOCs) occurring at Superfund sites. Carreira expects that a new assay she is developing will allow treatment of 90% of the SVOCs.

Phytostabilization

If a contaminant cannot be extracted or degraded by plants, the final phytoremediation approach is containment or stabilization. Certain plant species, such as poplars and willows, have an exceptionally high water demand, pumping up to 350 gal. (1.325 l) of water per day (Edward Gatliff as referenced by Matso, 1995). A stand of these trees can stabilize soluble or light nonaqueous phase liquid contaminants by creating a cone of depression in the groundwater below the stand. Alternately, some plant products stabilize contaminants by binding with them to form immobile and inert complexes (EPA, 1997). Theoretically, these complexes will remain inert in the soil around the plant.

While stabilization and containment prevent contaminant migration, they are not permanent solutions. In both cases, the contaminant remains in the ground. If the pumping

trees are removed, or if soil conditions change and the inert complexes break down, the contaminant may become mobile or revert to its toxic form. Despite these drawbacks, phytostabilization can be beneficial if used with other methods. Sowing these plants immediately after contamination has been identified will limit contaminant migration until a more comprehensive remediation plan is implemented.

Phytoremediation Strengths

In an industry where margins are shrinking and competition is ever-increasing, the demand for innovative technologies that perform better and more cost-effectively has never been greater. In many cases, phytoremediation fits the bill.

Cost-Effective. Conservative estimates put the cost of phytoremediation at one-third to one-tenth the cost of conventional remediation methods (see Table 1). Up-front capital costs are minimal because there is no new equipment to be purchased and installed; the plants are the machines. Implementation of phytoremediation is very inexpensive, as it draws on techniques developed through centuries of agro-economic development. Operating costs are significantly reduced by plants' unique ability to harness the sun's-free energy and their need for little or no maintenance. Conventional methods also require significant power input and costly equipment that must be inspected and maintained regularly.

Applicable to a Wide Range of Site Conditions. Laboratory studies and pilot field tests suggest that phytoremediation can effectively treat both concentrated and diluted contamination and can be effective within a short time period. At a US Army munitions site, Carreira identified aquatic plant species to treat a pond contaminated with trinitrotoluene (TNT). Initial concentrations of TNT, in excess of 600 mg/L, were reduced to nondetect levels within 10 days (Best, et al, 1997).

More frequently, phytoremediation is seen as a way to treat low levels of contamination spread over larger areas. Even with the extensive planting that would be required over a larger area, total up-front costs are low. Organic contaminants are still destroyed in-situ. Heavy metals are concentrated into plant leaves and stems. This plant material represents as little as 5% of the original mass of contaminated soil (EPA, 1997). Concentrating the metals in plants makes smelting and recovery an economically viable option because the amount of material that must be treated is reduced significantly.

Table 1: Operational Costs for Conventional Remediation Technologies

Technology	Cost
Soil Vapor Extraction	$16 - $40 per ton of soil
Incineration	$200 - $1,000 per ton of soil
Excavation & Disposal	$270 - $460 per ton of soil
Solidification & Stabilization	$50 - $100 per ton of soil
Carbon Adsorption	$1 - $7 per 1,000 gal. of water
UV Oxidation	$1 - $10 per 1,000 gal. of water
Precipitation (heavy metals)	$0.30 - $0.70 per 1,000 gal. of water + $300 per ton for

Permanent Solution. Phytoextraction and phytodegradation destroy organic contaminants and recover heavy metals. Most conventional treatments merely transport the contaminant from one site to another. Furthermore, conventional methods often fall short of complete removal as contaminants are trapped in soil micropores. These micropores represent up to 70% of the soil volume, and may retain large quantities of contamination. Plants, however, can penetrate the micropores to achieve complete cleanup (Edward Gatliff as referenced in Matso, 1995).

Regulatory Approval. In its March 1997 report, "Recent Developments for In Situ Treatment of Metal Contaminated Soil," EPA listed phytoremediation as one of four promising innovative technologies, saying, "Phytoremediation, when fully developed, could result in significant cost savings and in the restoration of numerous sites by a relatively non-invasive, solar-driven, in situ method." EPA also is supporting development and testing of innovative technologies through such initiatives as the Superfund Innovative Treatment Evaluation program. These examples are indicative of a regulatory environment that, in recent years, has become more accepting of innovative technologies, including phytoremediation. In fact, by 1993 "innovative" technologies were being used on Superfund sites more frequently than conventional methods (EPA, 1993).

Federal and state regulators are considering alternative endpoint solutions that only require a site to be "clean enough" for its intended use. Thus, bioavailability emerges as an important measure of how clean a site is, and can determine this outcome. If a contaminant is not available to plants, the most voracious predators of subsurface compounds, it is unlikely to be available to any biological entity. In other words, any contaminants that remain in the soil after phytoremediation are effectively benign.

Public Support. The foremost concern for communities near contaminated sites is that their health and environment be protected. Communities want a nondestructive, aesthetically pleasing solution with little negative impact on the surrounding area. Phytoremediation addresses all of these concerns by using plants indigenous to their environment. In addition, phytoremediation dovetails well with current worldwide trends toward "green" technologies. Using the environment to clean the environment is a very palatable concept for a concerned public.

Useful with Other Technologies. Phytoremediation can be used simultaneously with other remediation methods to accelerate cleanup times and reduce costs (see Table 2). Sites can either be "retrofitted" with phytoremediation if efforts are ongoing, or it can be included in original site action plans. Phytoremediation also may be used as a polishing step in "treatment trains" (processes that sequentially utilize a number of treatment technologies to clean a site). For example, soil

Table 2. Comparison of Costs

Method	Cost/kg	Total Cost
Pump and Treat Only	$10,000	$20 million
Phytoremediation with Pump and Treat	$7,500	$17 million
Phytoremediation Only	$750	$7 million

(net of contractor direct fees and the cost of wetlands construction). As a wetlands-only solution (completely eliminating the pump and treat), savings would exceed $13 million. All-in cost for the removal of a kilogram of contaminant would be as indicated in Table 2.

Erosion Control. In addition to treating the contamination, phytoremediation prevents surface erosion and subsurface migration of the contaminant plume. Plants have long been recognized as essential in preventing soil erosion by wind and surface water runoff. Ironically, one of the first steps in conventional remediation is the removal of all plant life from the site. The result is uninhibited surface erosion and associated contaminant distribution.

Thousands of Treatment Points. The major factor limiting the effectiveness of conventional methods is the slow rate at which contaminants move through the soil to an extraction well or treatment point. Extraction and injection systems generally use fewer than 10 treatment points per site; as a result, contaminants may travel many meters before they are treated. Phytoremediation is far more efficient. Because each plant acts as a treatment system, phytoremediation may employ up to 10,000 treatment points per acre (Scott Cunningham as referenced in Matso, 1995). Thus, the distance a contaminant must travel is reduced from tens of meters to mere centimeters. With phytoremediation, even relatively immobile contaminants can be treated.

Applications in Risk Management. Phytoremediation has many advantages for risk management. As an in-situ technology, phytoremediation reduces the environmental exposure to contaminants associated with excavation and ex-situ treatments. As a permanent solution, phytoremediation eliminates an environmental risk rather than transferring it from one site to another. Treatments requiring the landfilling of contaminants are temporary solutions and may pose latent risks if the landfill is compromised.

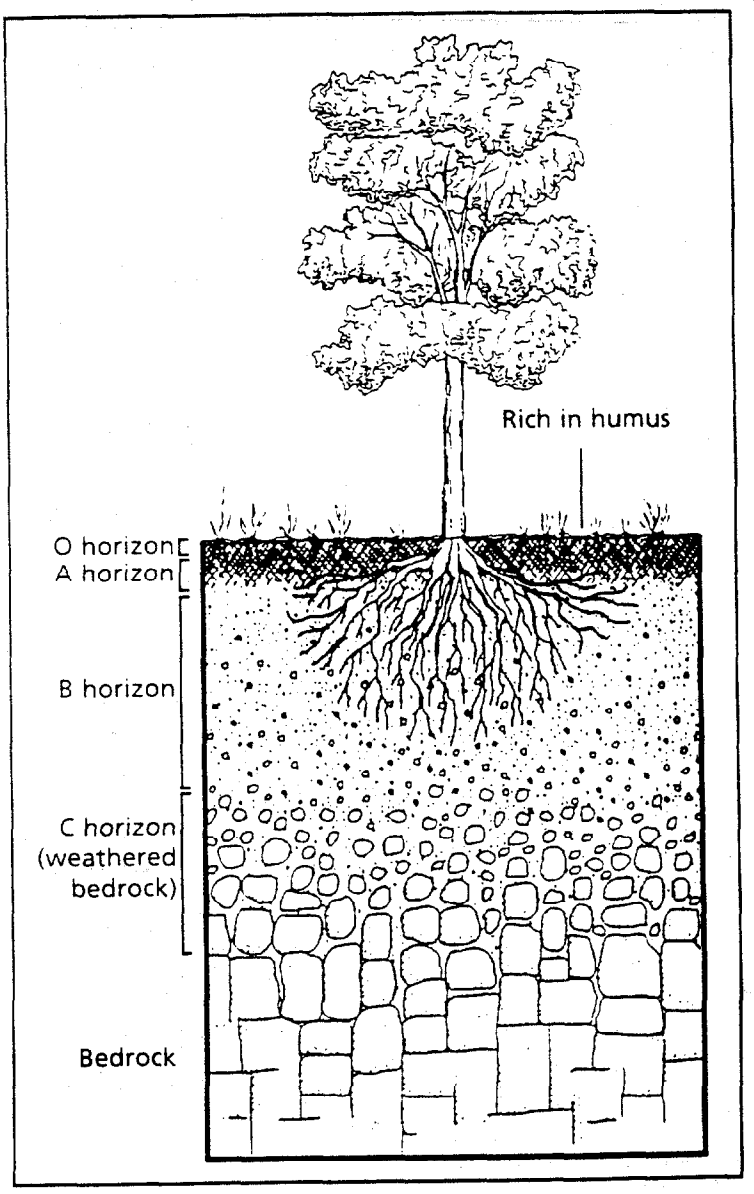
One particularly interesting application of phytoremediation technology is the proactive use of plants at high-risk industrial sites or treatment facilities. By maintaining select plant species in areas that potentially could be contaminated, a powerful remediation tool will already be in place should an accidental release occur.

Limitations of Phytoremediation

While phytoremediation has a number of limitations today, researchers are working to extend and expand the range of conditions in which plant-based systems can operate.

Phytoremediation Is Relatively Untested. Preliminary bench-scale and pilot tests suggest that phytoremediation will be applicable to a wide range of environmental problems, but the number of full-scale environmental applications are limited. However, with the wealth of phytoremediation technologies that are being developed and the interest they have generated among consultants, contractors, and regulators, comprehensive data on

Figure 1.
Soil Horizons with Root Concentrations



Estimated US Markets for Phytoremediation

Today's $3 million to $7 million market could grow to $50 million by 2000 and to $200 million by 2005.

By David I. Glass

The first published estimates of the size of the market for phytoremediation in the US and its potential for growth were presented in June 1997 at International Business Communication's (IBC) Second Annual International Phytoremediation Conference as part of a market and technology workshop specifically commissioned by IBC for this conference held in Seattle, WA.

Current estimates place the US market for phytoremediation at between $3 million and $7 million, of which $2 million to $3 million is attributed to removal of organic contaminants from groundwater and $1 million to $2 million pertain to the removal of heavy metals from soils. Although groundwater phytoremediation, which is conducted mostly using deep-rooted trees to remove large volumes of water from aquifers, is today the largest and best-established segment of the market, estimated markets for metal and radionuclide cleanup are capable of more dramatic growth because of the larger revenue that can be expected per site on such projects. The overall US phytoremediation market might well grow from $24 million to $50 million by 2000 and from $100 million to $200 million by 2005 (see Table).

Among those investigating or currently commercializing phytoremediation are several consulting/engineering firms, about a dozen chemical and oil companies researching the technology for their own sites, and eight small US firms and four European companies developing phytoremediation methods as their sole or primary remediation technology. In addition, numerous university, government, and other nonprofit laboratories are conducting phytoremediation research, as are several key US government agencies. **RM**

Estimated US Markets for Phytoremediation 1997 to 2005 ($US Millions)

	1997	2000	2005
Removal of Organics from Groundwater	2 to 3	6 to 12	20 to 45
Removal of Metals from Soil	1 to 2	10 to 20	40 to 80
Remediation of Radionuclides	0 to 0.5	4 to 10	25 to 50
Metal Removal from Industrial Wastewater	0 to 0.1	1 to 2	3 to 5
Other	0 to 1.4	3 to 6	12 to 20
Microbial Bioremediation (for Comparison)	200 to 250	300 to 500	400 to 700
Total US Phytoremediation Market	3 to 7	4 to 50	100 to 200

David I. Glass, Ph.D. is principal of D. Glass Associates Inc. in Needham, MA.

with extremely high contaminant concentrations may be excavated and then treated ex-situ. Phytoremediation can then be employed to treat the surrounding soils that have lower-level contamination. Such treatment trains have been advocated by EPA as a means to benefit from a series of technologies and to compensate for their respective limitations (EPA, 1993).

Hypothetical Case Study: Superfund Site

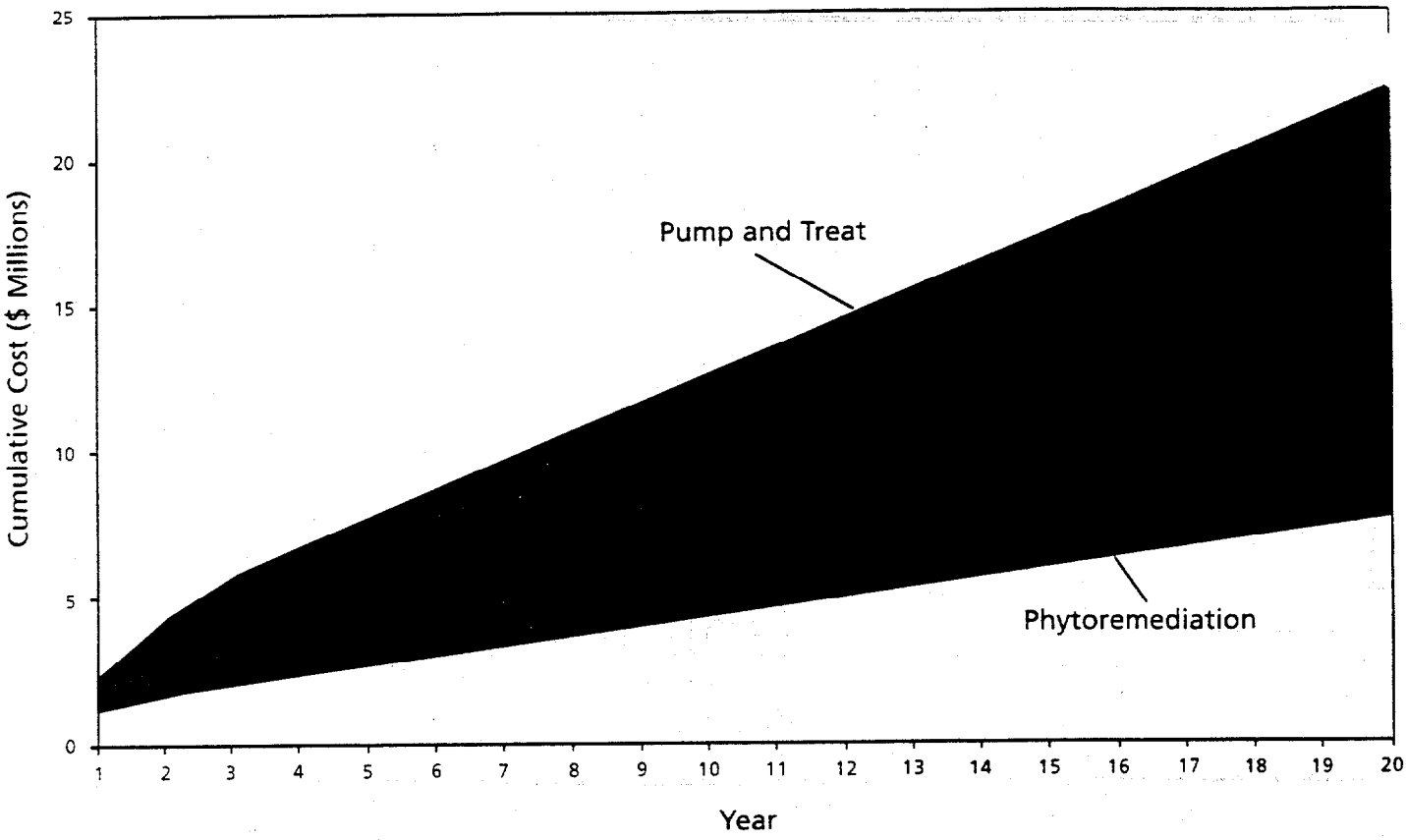
Problem. The site of a former illegal landfill contained over 2,500 drums of chlorinated solvents, BTEX, and a variety of SVOCs accumulated over several decades. The drums were excavated and removed by a remediation company. Groundwater contamination had resulted from years of drum leakage; approximately 4,400 lb. (2,000 kg) of solvent had been dispersed within 2 million gal. (7,570 m^3) of groundwater.

Traditional Technology Used. Environmental contractors designed a pump-and-treat solution. It was expected that this pump and treat would be constructed and installed over five years, and run continuously for 15 to 20 years.

Costs. Capital costs, including system installation and engineering, were $5 million. Operating costs for the 15-year period, including water quality sampling and analysis, water-level monitoring, equipment maintenance, engineering services, and carbon regeneration, were $15 million, resulting in a total project cost of $20 million.

Phytoremediation Solution and Savings. One solution is to construct a wetlands populated with specially selected plants that degrade the contaminants. This solution could be implemented as a stand-alone system or in conjunction with the traditional pump and treat. As a complement to the pump and treat, the wetlands could be installed in just a few months. PhytoWorks estimates that a fully planted 4.3 ac. (1.7 ha) can remediate approximately 110 to 220 lb. (50 to 100 kg) of contaminant per year, thus reducing the time necessary for pump and treat by six years. Savings would be approximately $3 million

Figure 2. Cost Savings Using Phytoremediation



the effectiveness of phytoremediation are not far off.

Root-Depth Limitations. Plant roots are concentrated in the upper soil horizons where essential resources exist. Because of the ability of roots to degrade or extract contaminants selectively, phytoremediation is most effective in the upper soil layers. Scientists suggest that phytoremediation can be effective for mobile contaminants to depths of 33 ft. (10 m). Given phytoremediation's current capabilities, treating immobile contaminants is limited to the first meter of soil (Cunningham, et al, 1996). To extend the effective depth of phytoremediation, scientists are selectively breeding and engineering species with deeper, more extensive root systems (see Figure 1).

Time Factor. Under ideal conditions whereby contaminants are dissolved in surface water, phytoremediation has been completely effective in just days. Contaminated groundwater and soils may take significantly longer to treat with phytoremediation (excavation of soil followed by disposal or ex-situ treatment can be completed in days or weeks). Phytoremediation—though more thorough, less intrusive, and far less expensive—may take several years.

Phytoremediation provides an in-situ and much more cost-effective alternative if groundwater is within the reach of plant roots, but it may not significantly reduce treatment time

The treatment of groundwater presents a very different challenge, and no effective in-situ solutions have been developed. Ex-situ treatments rely on pump-and-treat systems to draw contaminants into treatment systems. Pump-and-treat systems are sufficiently effective in treating mobile contaminants, but may take decades to treat relatively immobile compounds. Phytoremediation provides an in-situ and much more cost-effective alternative if groundwater is within the reach of plant roots, but it may not significantly reduce treatment time (see Figure 2).

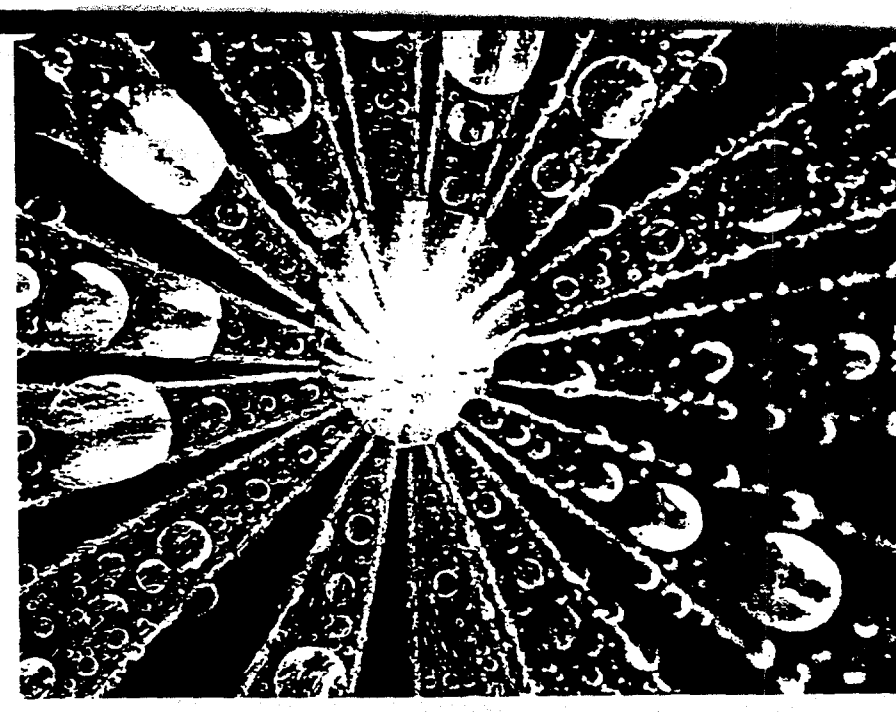
The time requirement for phytoremediation can be offset partially by immediate implementation. After the contaminant is identified, the appropriate plants can be sown to begin and accelerate the cleanup process while further site characterization is conducted. Site characterization, preliminary testing, and site action plan approval may take as long as three years to complete. During this time, phytoremediation can make significant progress in containing and cleaning up the contaminants and may even obviate the need for additional, more costly remedies.

Contaminants May Be Phytotoxic. Certain contaminant concentrations may be toxic to the plants used for phytoremediation. In these cases, phytoremediation clearly is not the first option. However, phytoremediation may still be a great asset to such sites in a treatment train. If a conventional method is used to

reduced contamination to levels that are not toxic to plants, phytoremediation may then be used to complete the job.

Requires Open Area. For phytoremediation to be considered, the contaminated area must be amenable to agriculture (i.e. adequate open space and fertile conditions). The surface area allocated for in-situ phytoremediation of soil and groundwater should cover an area larger than the size of the contaminant plume to achieve containment and complete cleanup. In comparison, area requirements for conventional pump-and-treat methods are no more than the diameter of an extraction well and the size of a treatment unit.

With sound scientific research, collaboration among interested parties, and realistic expectations, phytoremediation will become a widely used, cost-effective method to degrade organic compounds and remove heavy metals from contaminated soils and groundwater.



References

Cunningham, S.D., T.A. Anderson, A.P. Schwab, and F.C. Hsu, "Phytoremediation of Soils Contaminated with Organic Pollutants", *Advances in Agronomy*, 56:55-114, 1996.

Environmental Protection Agency, "Recent Developments for In Situ Treatment of Metal-Contaminated Soils," Document EPA-S 42-R-97-004, 1997.

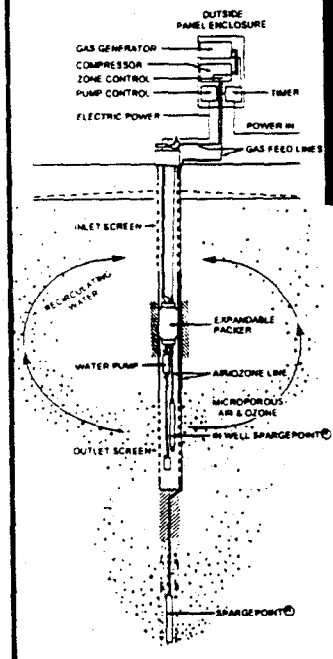
Environmental Protection Agency, "Cleaning Up the Nation's Waste Sites, Market and Technology Trends," Document EPA-542-R-92-012, 1993.

Matso, K., "Mother Nature's Pump and Treat," *Civil Engineering*, pp. 46-49, October 1995.

RM

Richard Sumner *is the marketing coordinator for PhytoWorks Inc., a plant biotechnology company located in Gladwyne, PA.*

KVA C-Sparger™ System*



- Rapid PCE/TCE removal
- *In situ* simultaneous stripping & treatment
- Portability & ease of use
- Low cost

KVA will assist in remediation design.

*Patent pending

KVA at Madaket Place B 12/13
766 Falmouth Rd., Mashpee, MA 02649
Tel: (508) 539-3002 • Fax: (508) 539-3566

Circle #26 on Reader Service Card

A COMPLEX SYSTEM THAT CAN REMEDIATE TCE

Phytoremediation is a promising *new* remediation alternative. But for one firm, it's hardly new. ANS has been implementing phytoremediation since 1988. With twenty five sites in thirteen states, ANS has more experience than any other firm. And through its *TreeMediation®* Program, ANS is the only firm to successfully remediate TCE.

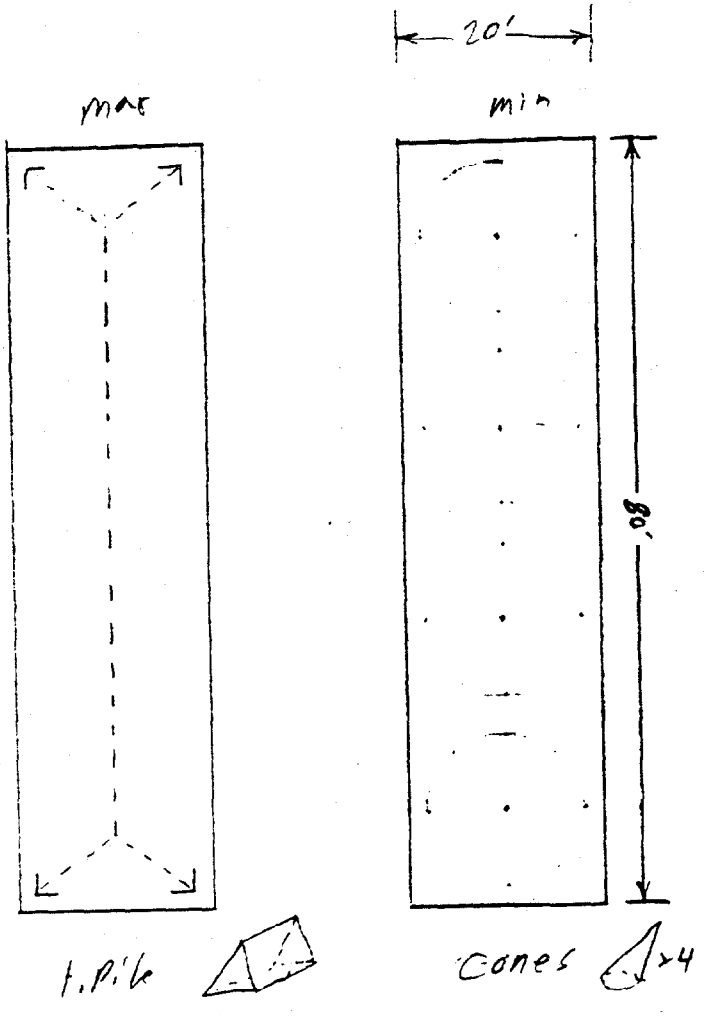
Applied Natural Sciences, Inc.
The TreeMediation® Company

7225 Dixie Hwy, Fairfield OH 45014 – 513-942-6061 ~ email: ans@cinti.net

Circle #35 on Reader Service Card

PROJECT	COMP. BY	JOB NO.
Orlando OU3: S-4 Soil Wash	MJC	3446.51
	CHK. BY	DATE
		10/26/98

Pre treatment Staging



$r = 8'$ $h = 14'$

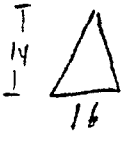
$V = \pi r^2 h / 3$

$V = \pi 8^2 \times 14 / 3 = 938\ ft^3$

or $34.75\ yd^3$

$\times 4 = 139\ yd^3$

OK



$\frac{1}{2} b \times h \times L$

$8 \times 14 \times 75 = 8{,}400\ ft^3$

or $311\ yd^3$ ✓ ~300

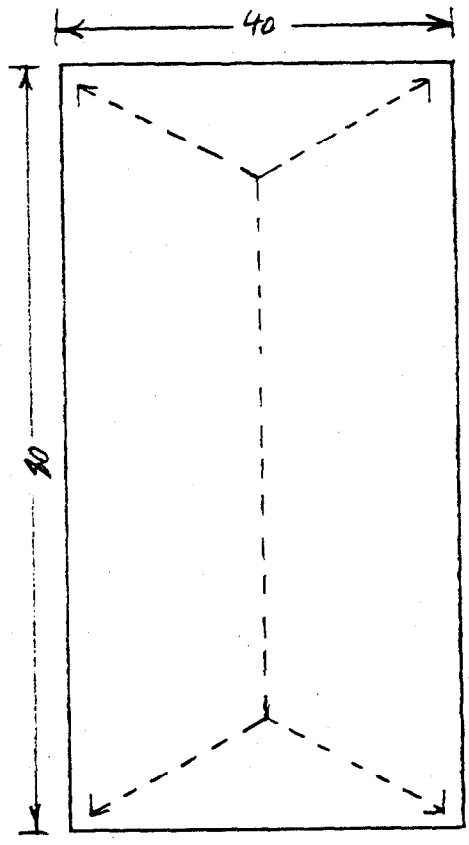
If 300 tons/day for 9000 tons then process is 30 days.

PROJECT	COMP. BY	JOB NO.
Orlando OU3: S-4: Soil Wash	MBE	3046.51
	CHK. BY	DATE 10/26/08

~~expected max hit SA8 ~ 32~~

~~SA9 ~ 7~~

Post treatment



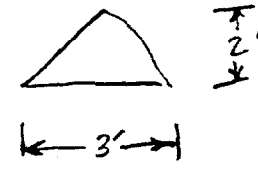
$Pile_{max} = \frac{1}{2} b * h * L$

$Pile_{max} = \frac{1}{2}\ 36 * 30 * 71 = 41{,}040\ ft^3$

or $\boxed{1{,}520\ yd^3}$

~ 5 days of soil Max

Berms



washed so Area

$\frac{1}{2}(3)(2) = 3 * (40 + 80) * 2 =$

$= 720\ ft^3 = \boxed{42\ yd^3}$ Berm

Staging Are

$3 * (20 + 80) * 2 = 600$

$= \boxed{22\ yd^3}$

Small area

240

FORM 00.01 REV. 4/81

ABB Environmental Services, Inc.

BRICE ENVIRONMENTAL SERVICES CORPORATION **BESCORP**

Site Remediation Technologies

3200 Shell Street
P.O. Box 73520
Fairbanks, AK 99707

(907) 456-1955
Fax: (907) 452-5018

Craig Jones

January 24, 1997

Mr. Mike Renga
ABB Environmental Services, Inc.
Arlington, VA

Re: Preliminary Scope of Work and Order-of-Magnitude Cost Estimate for Remediation of 72,300 tons of PAH and Lead Contaminated Soil.

Dear Mr. Renga:

Brice Environmental Services Corporation (Bescorp) has developed a preliminary cost estimate for soil washing activities at Site 15, Naval Air Station, Cecil Field. The treatment costs consider the size of the site, gradation analyses of site soils, and contaminant types and levels.

The data provided indicate a water-based density treatment process may be sufficient for removing lead to concentrations below 500 milligrams per kilogram (mg/kg). The estimated cost for a soil washing process on a project of this scope is approximately $60 to $90 per ton. The price may vary by $30 per ton depending on site conditions, contaminant distribution, and the level of logistical difficulty at the site.

Treatability studies are paramount for delineating process requirements and costs. If density treatment alone proves sufficient, given the nature of the lead contaminant and soil gradation, a process rate of 50 tons-per-hour is feasible. We feel strongly that treatability studies should be performed on material from areas containing PAH contamination for their amenability to soil-washing. While a bioremediation approach is proposed with this letter, space limitations and time constraints may warrant the feasibility of evaluating soil-washing all soils.

In lieu of adequate information regarding the feasibility of soil-washing PAH contaminated soils, we provide costs for bioremediation of the 25,200 ton area containing PAH's and lead, followed by density treatment for lead. Regarding the 22,000 ton area containing PAH contamination only, at this time we propose bioremediation. We estimate bioremediation costs to be approximately $50 - $70/ton depending on material costs and monitoring time requirements. This estimate is for design, materials, management, and maintenance and is exclusive of soil excavation and soil loading.

Scope of Work:

The attached guiding assumptions were assigned to the following tasks to develop the estimated treatment costs:

- Treatability Study / Plant Design / Reporting/Permitting and Fees
- Pad Design and Construction
- Mobilization/Plant Erection/Demobilization
- Soil Processing / Particulate Metal and Metal Concentrate Recycling
- Biocell Design/Construction

Thank you for the opportunity to submit this preliminary treatment cost estimate. These cost figures are based on limited site information and should be regarded as an order-of-magnitude estimate for a project of this scope. Performance of a bench-scale treatability study will further define treatment approach and associated costs. Please call if you have any questions. We look forward to working with you in the future.

Sincerely,

Craig Jones
Project Manager

15:34

SITE 15 REMEDIATION GENERAL ASSUMPTIONS

LEAD-ONLY AREA

1.) For the lead-only area (25,000 tons), we assume paticulate contamination only. A water-based density removal process will be sufficient for treating the soils to the cleanup level for lead.

2.) Trees and brush, along with the layer of detritus will be removed via some physical means.

3.) The contractor will construct a 150' x 150' treatment pad with soil containment bins, perimeter berms and a rainwater collection pond.

4.) 500 mg/kg lead/5 ppm TCLP will be the target soil cleanup standard.

5.) Soils will be placed back on site following treatment. Excavation and backfilling will be provided by others.

6.) A continuous processing rate of 50 tons-per-hour over a 10-hour day/6 days-per-week is attainable with site soils.

7.) Approximately 100 days required for mobilization, erection, processing, and demobilization.

8.) Contractor will arrange project QA/QC oversight, sampling and analysis, and project health and safety.

9.) Local power and water utilities will be available for plant use. Used process water will be discharged to the local wastewater treatment plant following treatment to a lead concentration of 5 mg/L.

10.) Residual PAH's will not confound the metals removal process. Treatment of residual organic contaminants such as PAH's in the process water has not been considered.

11.) No hazardous residuals will be produced. Recovered lead will be recycled and all soil will be acceptable for replacement back on-site.

LEAD AND PAH AREA

1.) Treatment of this material (25,200 tons) will consist of bioremediation followed by soil-washing for removal of particulate lead under the guiding assumptions listed above.

2.) Bio-cell construction consists of site development, liner, piping, and sump installation. Nutrient delivery and air circulation systems will be engineered into the cell design.

PAH AREA

1.) Treatment of this material (22,000 tons) will consist of bioremediation only.

ARCADIS GERAGHTY & MILLER

ARCADIS Geraghty & Miller, Inc.
14497 North Dale Mabry Hwy.
Suite 240
Tampa
Florida 33618
Tel 813 264 3506
Fax 813 962 0867

TELEFAX

ART

To
Michael Cusick

Copies:

Fax:
703 769-8182

Date:
9 October 1998

From:
AuthorName Mike Maun

Total pages:
3

Extension:
813 264 3570

Our ref.:

Subject
Surface Soil Remediation

If you do not receive all pages, please call to let us know as soon as possible.

Please see attached.

THIS MESSAGE IS INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAW.
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ARCADIS GERAGHTY & MILLER

ARCADIS Geraghty & Miller, Inc
14497 North Dale Mabry Hwy
Suite 240
Tampa
Florida 33618
Tel 813 264 3506
Fax 813 962 0867

Michael Cusick
Harding Lawson Associates
2120 Washington Blvd, Suite 300
Arlington, VA 22204

ART

Subject:
Surface Soil Remediation

Tampa,
9 October 1998

Contact:
Michael J Mann, PE

Extension:
813-264-3571

Dear Mike:

Thank you for the opportunity to respond to your requirement for surface soil remediation support in Orlando.

We are proposing to use soil washing for the removal of arsenic as the primary contaminant, but also including other PAHs, pesticides, and herbicides. We understand the volume to be approximately 3,000 tons in two work areas at the project site. The proposed process will include prescreening and wet screening to remove oversize material, separation of the soil matrix using hydrocyclones, treatment of the sand fraction with chemical attritioning and flotation, with consolidation and disposal of the fines concentrate. The plant is a mobile, modular unit that can be easily mobilized to the site and removed upon the completion of the work. The proposed plant has a throughput capacity of 15 tons per hour. Based upon a 10 hour work day, with 80% plant availability, the unit can treat 120 tons per day. The plant will be maintained by us during the project, and we will supply all chemicals and consumables required for the project.

We have assumed that ARCADIS will move the plant to the site, prepare the site, erect the plant, perform excavation and staging activities, operate the plant to produce the required products, provide all support resources, provide the process analytical controls, and then restore the site and demobilize the plant. We have assumed that the residual disposal (assumed to be approximately 5% of the feed mass) will be provided by others. The costs for the items you request are shown on the attached table.

Please fee free to call with questions or comments.

Sincerely,

ARCADIS Geraghty & Miller, Inc.

Michael J. Mann, P.E.
Vice President

Our ref.:
OurRef/hla.doc

ARCADIS GERAGHTY&MILLER

09-Oct-98

Cost Estimate
Surface Soil Remediation

Harding Lawson, Orlando Site

Item	Description	Price
1	Treatability Studies	5,865
2	Design	11,731
3	Mobilization/Site Preparation/Demob	56,308
4	Excavation	30,031
5	Electric, water, power	0
6	Process Equipment	228,752
7	Miscellaneous Equipment	36,366
8	Treatment Process and Operation	148,513
9	Backfill	11,731
10	O&M (Maintenance)	7,039
11	Site Restoration	5,865
	TOTAL	542,200

PROJECT Alternative S-5: Excavation & Offsite Disposal	COMP. BY MTR	JOB NO. 2546-51
	CHK. BY MBC	DATE 10/27/98

① Construct Stockpile / Staging Area

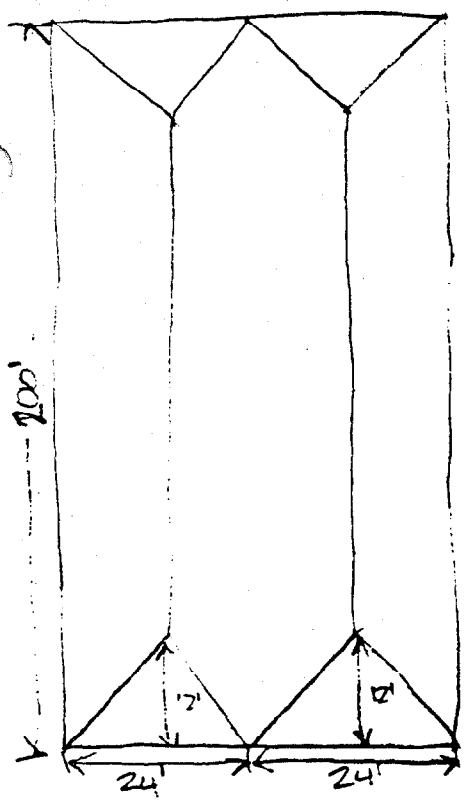
Total Vol of Soil = 9,030 cyds — wetlands (25%)

Net Vol = 6770 cyds

Rate of Excavation ≈ 500 cyd/day

Design stockpile/staging area to hold 4 days worth of soil (2,000 cyds) for sampling/characterization.

Stockpile Vol = 2,000 cyds



$A_{strip} = \frac{1}{2} b \cdot h = \frac{1}{2}(24')(12') = 144\,ft^2$

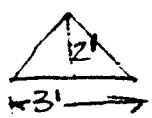
$V_{strip} = A \cdot L = (144\,ft^2)(200\,ft) = 28{,}800\,ft^3$

Total $V = V_{strip} \times 2$ strips $= 57{,}600\,ft^3$

$V = 2{,}133$ cyds.

Therefore, stockpile (200' x 50')

② Determine Berm Vol'l Needed (Gravel)



$V_{berm} = A \cdot L = \frac{1}{2}(3')(2')(500')$

L = Perimeter = 500'

$V_{berm} = 1500\,ft^3 \cong$ 60 cyds

③ Determine Gravel Base Needed:

Area = 200' x 50' = 10,000 ft²

$V_{gravel\ base} = 10{,}000\,ft^2 \times \frac{4\,ft}{12} \times \frac{1\,cyd}{27\,ft} \cong$ 125 cyds.

Total Gravel Vol = 60 cyd + 125 cyd = 185 cyds.

FORM 00.01 REV. 4/81

ABB Environmental Services, Inc.

Waste Management, Inc.

1765 The Exchange
Suite 500
Atlanta, GA 30339

Phone 770.859.0800
Fax 770.644.2364

May 22, 1997

Mr. Mark Woodruff
ABB Environmental Services, Inc.
2120 Washington Boulevard
Suite 300
Arlington, VA 22204

RE: Transportation/Disposal Pricing
Pesticide Contaminated Soil
Located in Orlando, FL

Dear Mr. Woodruff:

Waste Management Industrial Sales Division is pleased to provide the following quote for the above referenced job. All waste must pass the paint filter test upon receipt at the landfill(s).

Option 1:

Disposal

via incineration at Port Arthur, TX	$ 0.30/pound (includes taxes)

Transportation

via roll-off box*	$ 3.50/loaded one-way mile
demurrage (after 2.0 hours free)	$77.00/hour

Option 2:

Disposal

via thermal desorption via Emelle, AL	$625.00 (includes taxes)

Transportation

via roll-off box*	$ 3.50/loaded one-way mile
via end dumps (22 ton maximum)	$ 3.50/loaded one-way mile
demurrage (after 2.0 hours free)	$77.00/hour

Printed on recycled paper

Option 3:

Disposal

via direct landfill at Emelle, AL	$100.00/ton (includes taxes)*

***Bulk solid pricing is based upon a minimum density of 2,000 pounds per cubic yard. Measurement of waste material (including densities for the purpose of computing fees) shall be determined by Waste Management upon delivery to the disposal facility.**

Disposal Taxes

PCB & RCRA Codes (D,F,K Codes)	$ 51.00/ton
RCRA Code (U Codes)	$ 76.00/ton
RCRA Code (P Codes)	$112.00/ton

Transportation

via roll-off box*	$ 3.50/loaded one-way mile
via end dumps (22 ton maxmium)	$ 3.50/loaded one-way mile
demurrage (after 2.0 hours free)	$77.00/hour

***All pricing for roll-off transportation is based on load and go.**

If you have any questions, please feel free to call me at 904/934-4798. Thank you for the opportunity to be of service to ABB Environmental Services, Inc.

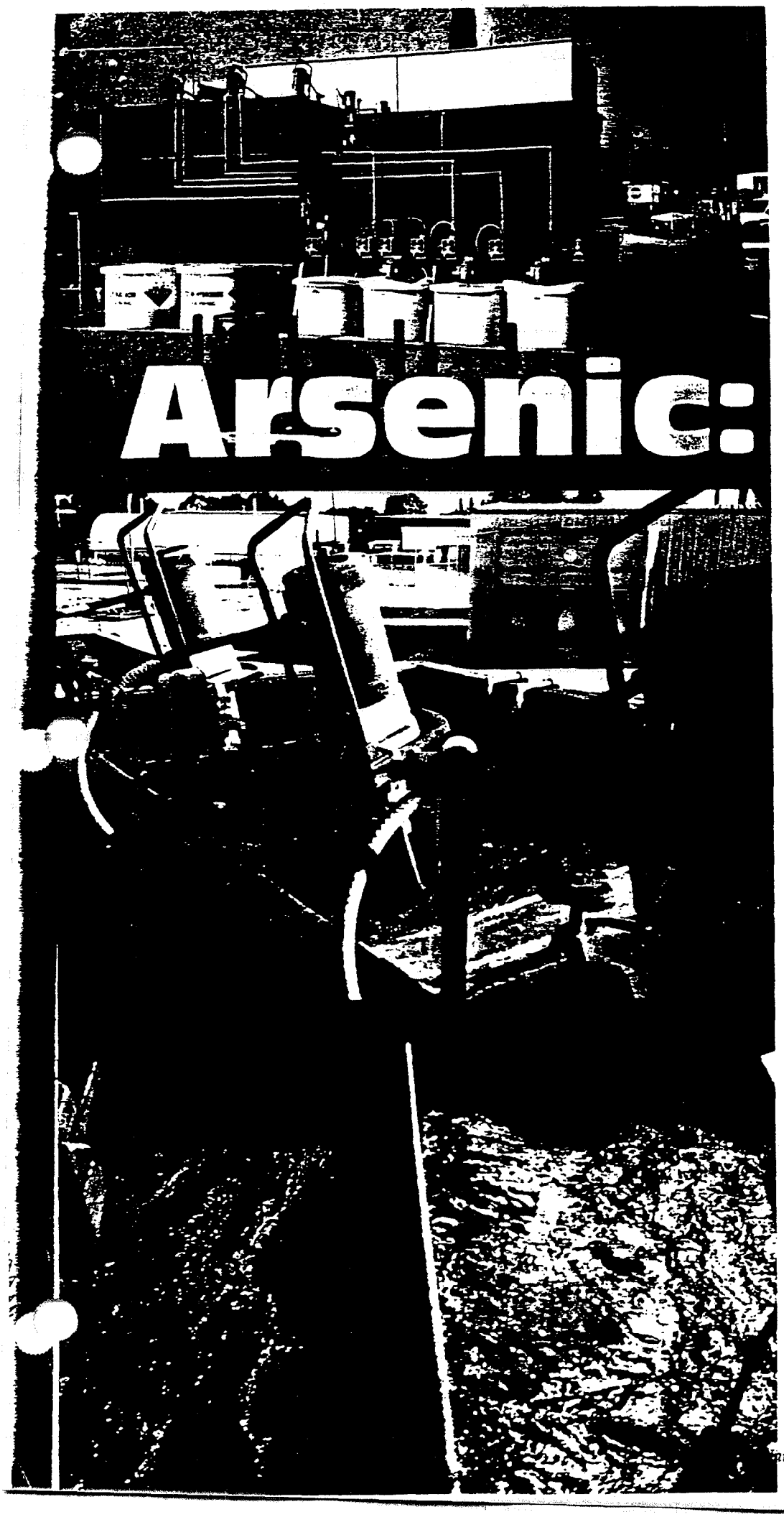
Sincerely,

Mark Rittiner

Mark Rittiner
Program Manager

MR/dlr

RENGA



Arsenic: Chemical Behavior and Treatment

David B. Vance
KTR Environmental Services, Inc.
New York, NY

Arsenic is not an abundant element in the earth's crust, with the average crustal concentration of 1.8 mg/kg ranking it 52nd, between tin and molybdenum (Demayo, 1985). However, through geogenic processing of crustal materials, arsenic can be concentrated in soils to a typical range of 2 to 20 mg/kg, and concentrations as high as 70 mg/kg are considered unremarkable (Yan-Chu, 1994). In addition, human activity generates anthropogenic arsenic, making it the third most common regulated inorganic contaminant found at Superfund sites. Its uses include pesticide and herbicide formulation, decolorization of glass, treatment/preservation of wood, paint manufacturing, and the production of semiconductors. In addition to its well-documented risks to human health, arsenic is troublesome in terms of mobility and treatment.

Chemical Character

Arsenic may occur as a semimetallic element (As^{0}), arsenate (As^{5+}), arsenite (As^{3+}), or arsine (As^{3-}). The chemical character of arsenic is dominated by the fact that it is labile, readily changing oxidation state or chemical form through

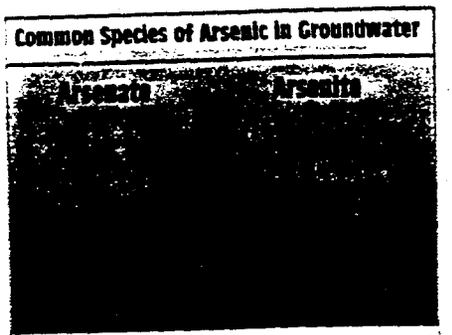


Figure 1. Molecular Configuration of Arsenate and Arsenite.

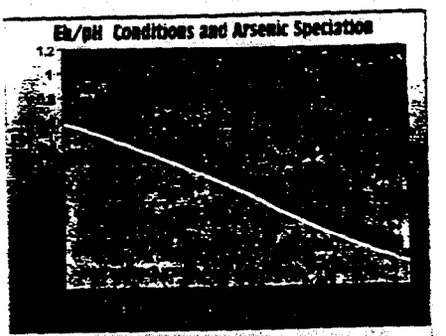


Figure 2. Control of Arsenic Speciation by Eh and pH Conditions.

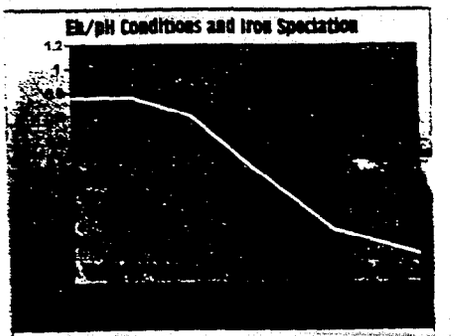


Figure 3. Iron Speciation as Controlled by Eh/pH Conditions.

chemical or biological reactions that are common in the environment. Therefore, rather than solubility equilibria controlling the mobility of arsenic, it is usually controlled by redox conditions, pH, biological activity, and adsorption/desorption reactions. Arsenic in groundwater most often occurs from geogenic sources, although anthropogenic arsenic pollution does occur. Geogenic arsenic is almost exclusively found as arsenite or arsenate, while anthropogenic arsenic may have any form including organic arsine species. Groundwater in acidic to intermediate volcanic rocks, or in sediments derived from those rocks, often has arsenic concentrations exceeding 50 µg/l (the current drinking water standard).

Figure 1 illustrates the difference in molecular structure between arsenate and arsenite. The double bond oxygen in the arsenate molecule influences its ability to become ionized through the loss of hydrogen ions, in a process termed "dissociation." A negative charge develops on the molecule when dissociation occurs. The double bond oxygen increases the capacity to delocalize that charge, easing the loss of hydrogen ions. The propensity for ionization is expressed by pK_a the constant of dissociation (which is a negative log; a smaller number shows a greater degree of dissociation). For arsenate and arsenite pK_a values are as follows:

Arsenate - H_3AsO_4	$pK_1 = 2.19$
$pK_2 = 6.94$	$pK_3 = 11.5$
Arsenite - H_3AsO_3	$pK_1 = 9.20$
$pK_2 = 14.22$*	$pK_3 = 19.22$*

*These pK_a values are extrapolated from the strength of oxygen acid rules (Pauling, 1970).

The pH at which these ionization steps occur is significantly different between arsenate and arsenite, as illustrated in Figure 2 (after Robins, 1985 and Welch, 1988). Figure 2 also shows the control of redox potential (Eh) on the arsenate/arsenite transition. This Eh/pH relationship is key to understanding arsenic mobility in groundwater and the effectiveness of arsenic water treatment systems.

Arsenic Immobilization

The most commonly recognized adsorption reactions are based on ion exchange between charged adsorption sites and charged soluble ions. However, another mechanism is also responsible for adsorption, London Van der Waals bonding, the result of complex interactions between the electron clouds of molecules, molecular polarity, and attractive forces of an atomic nucleus for electrons beyond its own electron cloud. Consequently, some degree of immobilization can occur with soluble species that are not ionized. Arsenic immobilization through ionic adsorption can be controlled within normal oxidizing Eh/pH conditions.

Components of soil that participates in both types of adsorptive reactions include clays, carbonaceous material, and oxides of iron, aluminum, and manganese. In the upper reaches of the soil column, organic fractions typically dominate, while at greater depths, iron oxyhydroxides play the principal adsorptive role. The typical iron content of soil ranges from 0.5 percent to 5 percent. Not only is iron common, but as with arsenic, it is also labile and readily reflects changes in surrounding Eh/pH conditions. This relationship for iron is illustrated in Figure 3 (after Hem, 1961). Ferric hydroxide acts as an amphoteric ion exchanger and depending on pH conditions, has the capacity for cation or anion exchange. Given the average iron concentration in soil and soluble

Table 1. Effectiveness of Arsenic Water Treatment Methods

Iron Coprecipitation	Oxidized Arsenic 56 mg/l	10 µg/l	Brewster 1992
	Arsenate 350 µg/l	6 µg/l	Logsdon 1974
	Arsenite 350 µg/l	140 µg/l	Logsdon 1974
Alum Coprecipitation	Arsenate 350 µg/l	74 µg/l	Logsdon 1974
	Arsenite 350 µg/l	283 µg/l	Logsdon 1974
Lime Precipitation	Arsenate 500 mg/l	4 mg/l	Nishimura 1985
	Arsenite 500 mg/l	2 mg/l	Nishimura 1985
	Arsenate 2 mg/l	20 µg/l	Nishimura 1985
	Arsenite 2 mg/l	350 µg/l	Nishimura 1985
Activated Alumina	Arsenate 100 µg/l	4 µg/l	Frank 1986
	Arsenite 100 µg/l	Ineffective	Frank 1986
Ion Exchange	Arsenate 100 mg/l	< 800 µg/l	Vance 1995
	Arsenate 68 mg/l	12.2 to 0 mg/l	Calmon 1973
Reverse Osmosis	Arsenite 37 µg/l	7 µg/l	Clifford 1991
Electrodialysis	Arsenite 188 µg/l	136 µg/l	Clifford 1991
Sulfide Precipitation	Arsenate 132 mg/l	26 mg/l	Rosehart 1972
Activated Carbon	Arsenite 500 µg/l	300 µg/l	Rosehart 1972

*The current federal limit set by the Safe Drinking Water Act for drinking water is 50 µg/l. ND - Not Detected.

arsenic concentrations in groundwater at [illegible]g/l, ferric hydroxides in sediment can potentially adsorb 0.5 to 5 pounds of arsenic per cubic yard of aquifer matrix. This may act as a significant potential reservoir for arsenic release under changing Eh/pH conditions.

Arsenic in Groundwater

Figure 4 superimposes the Eh/pH relationship for the arsenic and iron systems, illustrating the conditions under which arsenic is immobilized in a groundwater system and how arsenic adsorbed to ferric hydroxides in sediment can be released upon exposure to groundwater that is chemically reducing. Two effects would be at work in this case: arsenate is reduced to arsenite that will not remain ionically bound to the geologic substrate, and ferric iron is reduced to ferrous iron, which is soluble under normal pH conditions. Outside the immobilized zone, arsenic mobility is variable. London Van der Waals bonding of arsenite is in effect, but not sufficiently to ensure complete immobilization.

Water Treatment Systems

Various technologies are in use today to remove arsenic from drinking water and industrial wastewater; Table 1 summarizes the effectiveness of each.

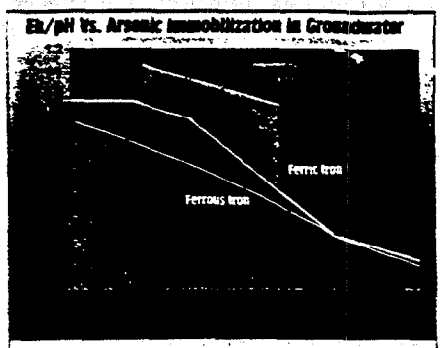


Figure 4. Arsenic mobility in groundwater as controlled by the effect of Eh/pH conditions on the speciation of Arsenic and Iron.

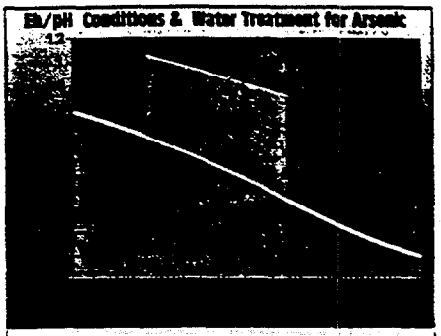


Figure 5. Eh/pH range required for effective treatment of soluble Arsenic.

Arsenite Oxidation

As previously described, the ionization chemistry of arsenic in groundwater precludes the removal of arsenite by ion exchange within normal pH ranges. Other technologies, including coprecipitation, electrodialysis, and reverse osmosis, are also affected by arsenite's dissociation profile. One solution to this problem is an oxidation step to form arsenate. Figure 5 illustrates the Eh/pH range required for this process. Oxidation, particularly of drinking water, may be problematic, however, chemical residues of the oxidant, byproducts from oxidation of other organic or inorganic species, reagent costs, and operational issues, are all potential disadvantages. Oxygen would be ideal, as it is thermodynamically capable of this oxidizing step. However, the kinetics are exceedingly slow (Clifford et al., 1983). Other chemicals can affect arsenite oxidation, including free chlorine, hypochlorite, ozone, permanganate, and hydrogen peroxide with ferrous iron.

Iron Coprecipitation

Coprecipitation of arsenate with ferric iron is recognized as the most effective and practical existing method of arsenic removal. Ferric iron coprecipitation is particularly useful in the mining industry, where large amounts of ferric iron and arsenic can be byproducts of production

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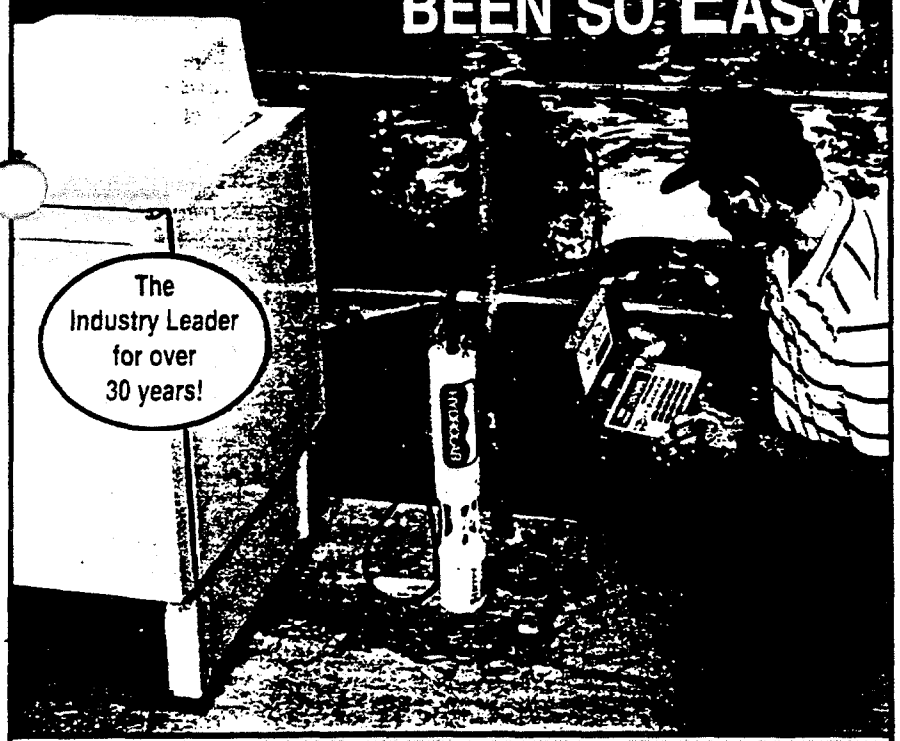

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or refining. For drinking water treatment it is usually necessary to add ferric iron salts. Figure 4 shows that arsenate is readily removed by iron coprecipitation and the Eh/pH conditions that must be maintained to effect that removal. Due to London Van der Waals bonding, ferric iron coprecipitation of arsenite is also moderately effective, with 50 percent removal at a pH of 7.0 (Pierce and Moore, 1982). The use of iron hydroxides for the coprecipitation of arsenic in industrial wastewater (in which arsenic is in the mg/l range) requires iron doses 4 to 8 times higher than those of the soluble arsenic, a greater iron dosage yields no further benefit (Krause and Ettel, 1985).

Alum Coprecipitation

Suspended aluminum salts (alum) can remove arsenate via mechanisms similar to those for ferric hydroxides. However, it is less effective over a narrower pH range for arsenate removal and is ineffective at removing arsentie (Sorg and Logsdon, 1978).

Lime Precipitation

In testing by Nishimura and Tozawa (1985), removal of arsenic with lime precipitation was deemed feasible, but not necessarily practical. High concentrations of arsenic were removed to 2 and 4 mg/l for arsenate and arsenite, respectively. Removal to lower levels required a second treatment step in which initial arsenic concentrations of 2 mg/l were lowered to 20 µg/l for arsenate and 160 µg/l for arsenite. However, to achieve these removal efficiencies, a lime dosage of between 5 to 15 grams/l was necessary.

Activated Alumina

Activated alumina can be effective for the removal of arsenate under moderately acidic pH conditions (5.5 to 6.0). High levels of competing anions, such as sulfate, significantly reduce the effectiveness of activated alumina (Frank and Clifford, 1986). The use of activated alumina for complete arsenite removal is ineffective due to the nonionic character of arsenite in that pH range (see Figure 1). Some initial arsenite removal is observed due to London Van der Waals bonding, but compared with arsenate adsorption, this capacity is rapidly exhausted.

Ion Exchange

Ion exchange has the potential for soluble arsenic removal. Anion exchange resins are available in two basic forms weak-base and strong base. Many weak-base anion exchangers are capable of significant adsorption due to London Van der Waals bonding in addition to ion exchange, giving them a higher level of adsorptive capacity for nonionic arsenite. The author has evaluated anion exchange resins for arsenate removal and determined the most effective activation to be in the hydroxyl form. Chloride and acetate were also tested. Weak-base resins had higher loading capacities than strong-base (6 percent vs. 4.8 percent), but did not have adequate removal efficiencies (75 percent vs. 99+ percent for the strong-base resin). Anion exchange resins are also prone to chromatagraphing due to the presence of competing anions in the treated water. However, ion exchange is an area of intense research where the development of anionic chelat-

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ing exchange resins or ion exchange polymers may dramatically improve the technology for arsenic treatment.

Reverse Osmosis

Reverse osmosis has been shown to have an arsenic removal efficiency greater than 97 percent. As a comparison, electrodialysis was only 73 percent effective. When used to treat 100 percent arsenite, however, removal efficiency fell to 28 percent (Clifford and Lin, 1991).

Other Technologies

Rosehart (1972) evaluated a series of removal technologies, including activated carbon and sulfide precipitation, but concluded that none performed at a level adequate for use in the treatment of drinking water.

Conclusions

The behavior of arsenic in groundwater and industrial wastewater is dominated by redox and pH conditions. Under a limited range of specific Eh/pH conditions, there exists the ability to predict total immobility of arsenic in groundwater and in water treatment systems (see Figures 4 and 5). Except for those conditions, arsenic will be partially mobile, although the magnitude of this mobility is difficult to predict. Implications and conclusions of this behavior include the following.

- Arsenic treatment without control of Eh/pH is likely to be ineffective.
- The injection of water in a reduced oxidation state into sediments with adsorbed arsenic may cause a dramatic mobilization of arsenic into the groundwater.
- If ferric iron sludges used for the coprecipitation of arsenic are disposed under improper Eh/pH conditions, arsenic will remobilize.
- In situ remediation via recovery or stabilization of arsenic-contaminated groundwater should be focused on Eh control through chemical or biological methods.

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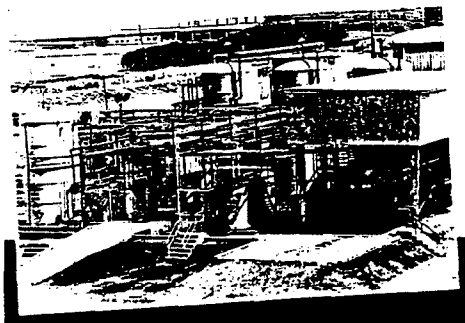

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Treatment Walls--GENERAL

Abstract

Treatment walls are barriers placed in the soil across the groundwater flow path of a contaminant plume which allow the plume to move passively through while precipitating, sorbing, or degrading the contaminants. The walls may contain metal-based catalysts for degrading volatile organics, chelators for immobilizing metals, nutrients and oxygen to encourage bioremediation, or other agents.

A reactive treatment wall containing 220 tons of iron shavings was installed at a former semiconductor manufacturing site in Sunnyvale, California, in December 1994. The first commercial application of elemental iron using a funnel and gate system for the removal of chlorinated hydrocarbons was installed in February 1995. Developers and vendors of treatment walls are the Waterloo Centre for Groundwater Research, EnviroMetal Technologies, Inc., Battelle Pacific Northwest Laboratories, GEOCHEM, and Rust Geotech, Inc., for example.

The best site for a treatment wall is one having porous sandy soil, contamination no deeper than about 50 feet below ground, and a good flow of groundwater. The successful application of a treatment walls requires a careful study of the underground environment and an understanding of the contaminant and groundwater flows.

TO: MARK TODARO

SOME TRT WALL INFO

FROM: MIKE RENGA

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Treatment Walls--GENERAL

Technology Description

Introduction, History and Current Development, Process Description, Government Involvement, Performance, Limitations, Capacity, Material Handling, Waste Streams, Operator Requirements, Utilities, Set-Up/Tear-Down, Reliability/Maintainability, Public Acceptance, Information Sources

1. Introduction

Treatment walls are barriers placed in the soil across the groundwater flow path of a contaminant plume which allow the plume to move passively through while precipitating, sorbing, or degrading the contaminants. The walls may contain metal-based catalysts for degrading volatile organics, chelators for immobilizing metals, nutrients and oxygen to encourage bioremediation, or other agents (D16067I, p. 1).

2. History and Current Stage of Development

A reactive treatment wall with 220 tons of iron shavings was installed at a former semiconductor manufacturing site in Sunnyvale, California, in December 1994 (D16066H, p. 3). The first commercial application of elemental iron using a funnel and gate system for the removal of chlorinated hydrocarbons was installed in February 1995 (D16068J). Developers and vendors of treatment walls are the Waterloo Centre for Groundwater Research, EnviroMetal Technologies, Inc., Battelle Pacific Northwest Laboratories, GEOCHEM, and Rust Geotech, Inc., for example (D16067I).

3. Process Description

Treatment walls are installed underground by constructing a trench across the flow path of contaminated groundwater and filling it with a reactive material selected for its ability to degrade the specific types of contaminants. The reactive filling is often mixed with sand or some other porous material to make it less dense than the soil around it to encourage the ground water to flow through the wall. At some sites, an underground funnel system is added to direct the contaminated groundwater to the wall. Sorption barriers include adsorbents such as zeolites and activated carbon. Precipitation barriers contain fillings that react with the contaminants to produce a precipitate that is trapped in the barrier. Degradation barriers employ chemical or biodegradation approaches (D16066H, pp. 1 and 2).

Site characterization, including an assessment of hydrological, geological, and geochemical and contaminant distribution, is the first step in evaluating the use of treatment walls. The size of the plume and the direction of the plume movement must be known. The properties of the contaminant, such as solubility and partitioning, should be determined (D16068J).

To design the treatment wall, the proper reactive media and the required residence time in the reaction zone are first determined. Typically, treatability studies using batch reaction tests and laboratory- or field-scale column tests are performed. Column tests are conducted by packing a column with reactive medium and passing the contaminated groundwater through the column until steady-state performance is observed. Flow velocities are adjusted to simulate groundwater velocity and reactor residence time (D16068J).

Funnel-and-gate systems for in situ treatment of contaminated plumes consist of low hydraulic conductivity cutoff walls with gaps that contain in situ reaction zones. Cutoff walls (the funnel) modify flow patterns so that groundwater primarily flows through the high conductivity gaps (the gates). Slurry walls, sheet piles, and soil admixtures applied by soil mixing or jet grouting may be used as cutoff walls (D16068J).

Monitoring is important for both pilot- and full-scale treatment wall systems and should include the following parameters:

- contaminant concentration and distribution
- possible by-products and reaction intermediates
- groundwater velocity and pressure levels
- permeability of the reactive barrier
- groundwater quality parameters such as pH and alkalinity
- dissolved gas concentrations (D16068J).

4. Involvement With Government Programs/Regulatory Acceptance

Some of the Superfund Sites that plan to use treatment walls include the Brown's Battery Breaking site in Pennsylvania, Tonolli Corporation in Pennsylvania, and Somersworth Sanitary Landfill in New Hampshire (D16066H, p. 4).

5. Performance

The Waterloo Centre for Groundwater Research at the University of Waterloo has completed two demonstrations of treatment walls. At the Canadian Forces Base Borden, a permeable reaction wall with an iron-based catalyst was installed about 16.5 feet downgradient from the source to pilot test the capability of the wall to degrade halogenated organic compounds. The maximum trichloroethylene (TCE) concentration was about 250,000 micrograms per liter, and the maximum tetrachloroethene (PCE) concentration was about 43,000 micrograms per liter. Most of the contaminant mass removal occurred within the first 50 centimeters of the wall. The TCE concentration was reduced by 95% and the PCE by 91%. Further work at this site has included field testing of an in situ permeable wall for introducing nutrient solutions to enhance biodegradation of carbon tetrachloride and TCE.

At the Borden Aquifer, the Waterloo Centre tested a proprietary solid peroxide formulation (an oxygen-releasing compound) to enhance biodegradation of groundwater contaminated by benzene, toluene, ethylbenzene, and xylene (BTEX). The results indicated that the oxygen-releasing compound can support biodegradation of benzene and toluene (the two compounds tested) at concentrations typical of those found at petroleum-contaminated sites.

EnviroMetal Technologies has performed an above-ground field test of a reactor with 50% iron for a General Electric (GE) semiconductor manufacturing facility with TCE, cis-1,2-dichloroethene (DCE), vinyl chloride, and freon contamination. The times to degrade one half of the contaminant mass were 4 hours or less. The estimated cost of the project is $175,000 to $200,000.

At a Coast Guard Air Station in Elizabeth City, North Carolina, EPA started a demonstration using iron in September 1994. Chromium, vinyl chloride, TCE, and PCE have been treated. Chromium has been reduced to below detection limits and vinyl chloride to less than 1 microgram per liter. A greater than 75% reduction in TCE has been achieved (D16067I).

6. Limitations

The best site for a treatment wall is one having porous sandy soil, contamination no deeper than about 50 feet below ground, and a good flow of groundwater. The successful application of a treatment walls requires a careful study of the underground environment and an understanding of the contaminant and groundwater flows (D16066H, p. 3).

7. Feed Rate or Capacity

No available information.

8. Material Handling and Pretreatment Needs

No available information.

9. Process Waste Streams

No available information.

10. Operator Requirements

No available information.

11. Utility Requirements

No energy is required for treatment walls (D16068J).

12. Set-Up/Tear-Down Requirements

Several approaches can be used for installing a treatment wall. The simplest of these is excavation of a trench of the proper size and backfilling with the reactive material. Often, steps like shoring of the trench and use of an appropriate slurry or steel sheet piling are required from a safety standpoint to excavate deeper. Biodegradable polymers are used (instead of bentonite or cement) to avoid plugging of the wall with residual slurry material. Specialized trenching methods using trenching machines that were developed for installing underground utilities can be used to install treatment walls. Other specialized technologies like jet grouting, mandrel-based emplacement and vibrating beam technology are sometimes used for treatment wall installation (D16068J).

13. Technology Reliability/Maintainability

Although most barriers are designed to operate in situ for years with minimal maintenance and without an external energy source, the stability of aging barriers has not been established (D16067I, p. 1). Periodic replacement or rejuvenation of the reaction medium might be required after the capacity is exhausted or when the wall becomes clogged with microorganisms or precipitated materials. Reactive media can be placed in the subsurface in removable cassettes (D16068J).

14. Public Acceptance

No available information.

15. Information Sources

D16067I, EPA, 1995
D16068J, Vidic and Pohland, 1996
D16066H, EPA, 1996

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Treatment Walls--GENERAL

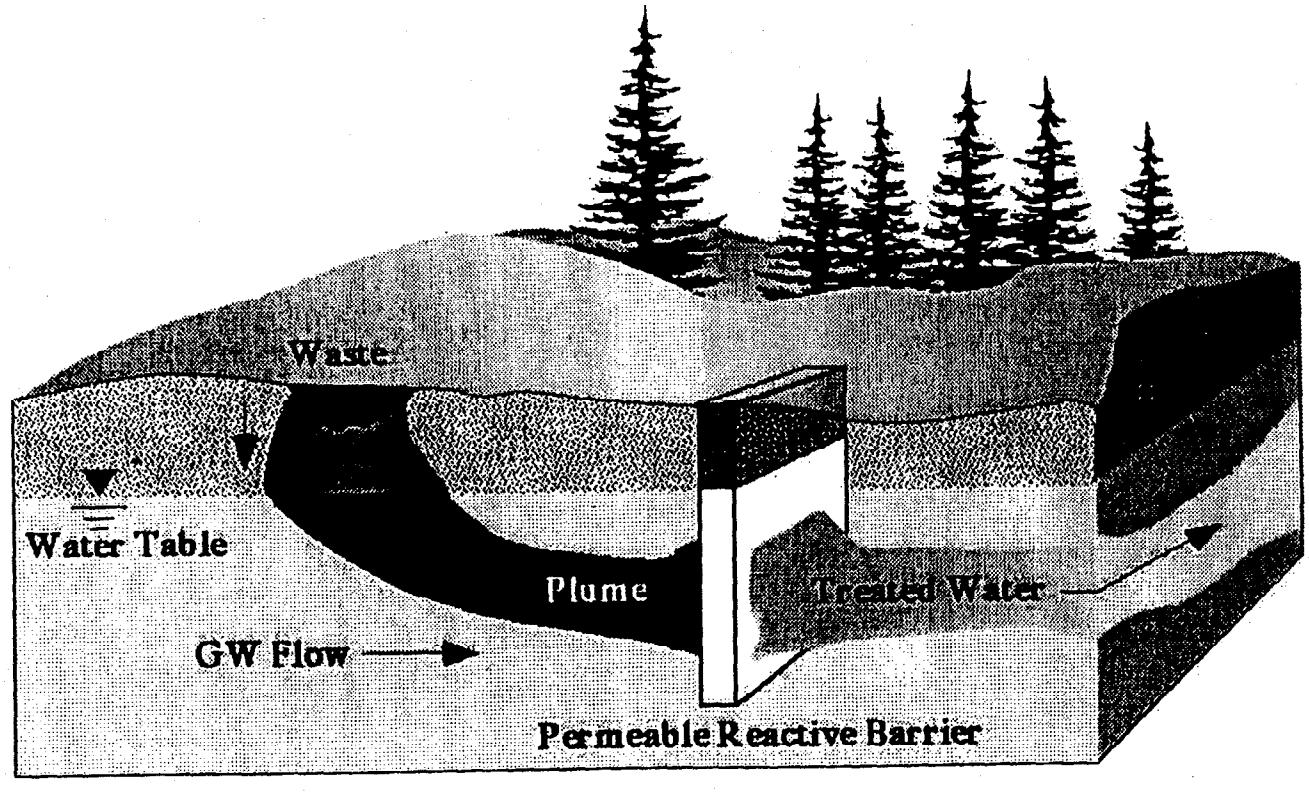
Technology Cost

For treatment walls using elemental iron, the cost of the media can be estimated based on a density of about 2.83 kilograms per meter and a cost of approximately $440 to $500 per ton. An installation cost between $2.50 treatment capacity is a rule-of-thumb for estimating capital cost. Because the elemental iron treatment wall is p capital costs, including materials and construction) is required. Operation and maintenance costs between $1.3 water can be used as a rule-of-thumb estimate (D16068J).

Information Sources

D16068J, Vidic and Pohland, 1996

Contaminant remediation using permeable reactive barriers



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Contaminant remediation using permeable reactive barriers

Figure 1. The two basic designs being used in current full-scale installations

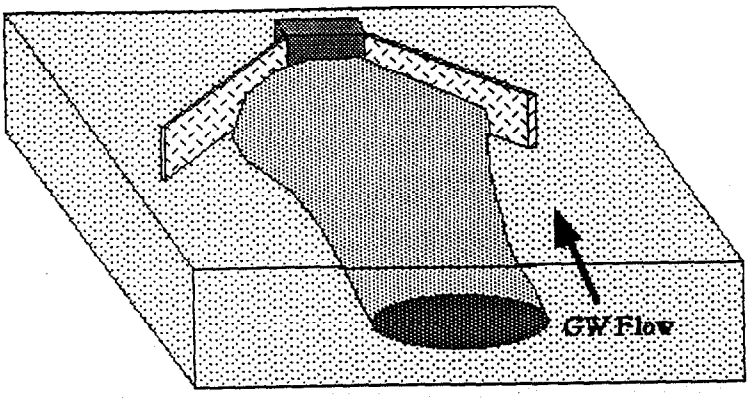

Figure 1a. Plume capture by a funnel & gate system. Sheet piling funnels direct the plume through the reactive gate.

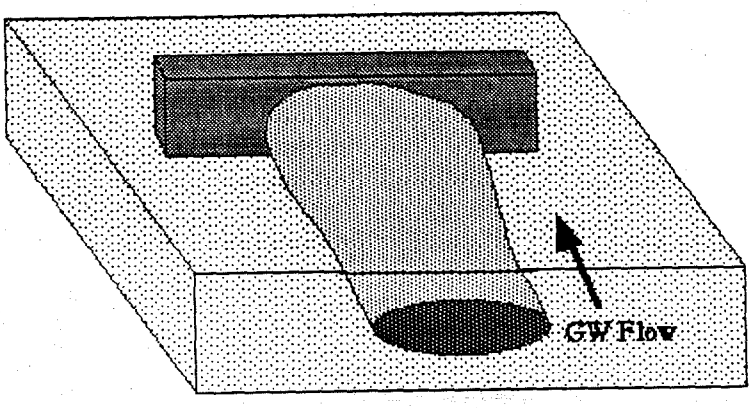

Figure 1b. Plume capture by a continuous trench system. The plume moves unimpeded through the reactive gate.

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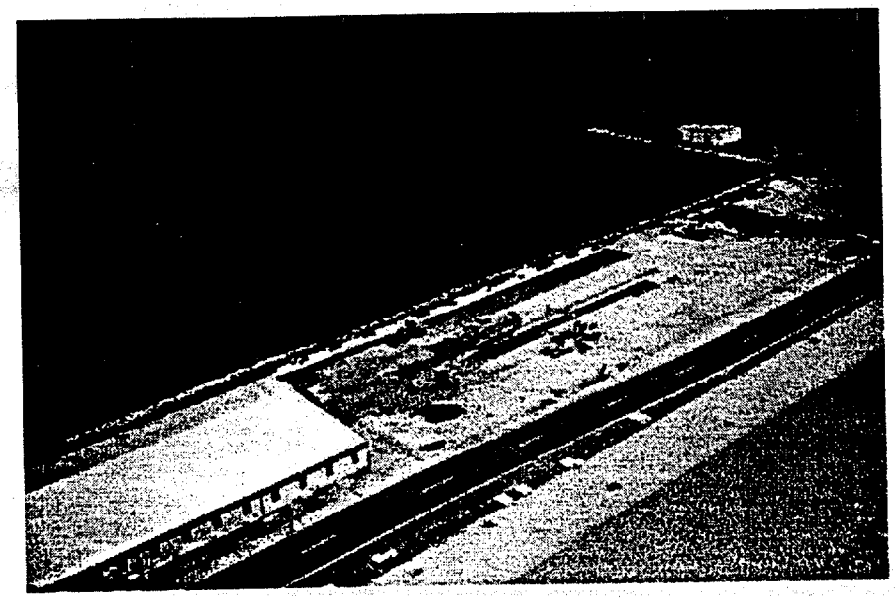


Back to Full-Scale Demonstration Page

This page is maintained by Dan West (ManTech Environmental Technology, Inc.) at NRMRL - Subsurface Protection & Remediation Division, Ada, OK.

Comments, suggestions, or questions about these pages may be sent to:
Dan West, dwest@ad3100.ada.epa.gov
or to the EPA Coordinator:
Joe Williams, williams@ad3100.ada.epa.gov

Last updated January 14, 1998.

Mark Todaro/Orla/USEVS/ABB
10/29/98 01:56 PM (Phone: 407/895-8845 ext 231)

To: Michael J. Renga/Arli/USEVS/ABB@ABB_USEVS
cc:
Subject: Re: More Info

Mike,
Here is some more info on the walls.

1) Estimated treatment duration is 5-10 years, depending on lab results from monitoring wells.
2)One wall at SA8 approx. 150 feet long, 10 feet deep, 5 feet thick.
One wall at SA9 approx. 50 feet long, 10 feet deep, 5 feet thick.
3)The material should be changed every 10 years, unless saturation occurs sooner. Pilot studies are being done now on some sites, but none have been in use for ten years yet.
4)I left electricity in the cost table in case we would need a trailer with electricity for construction workers and field support purposes.
5)Estimated disposal costs: This is hard to estimate since there is a huge difference in disposing hazardous vs. non-hazardous soil. Most of the used soil would probably have high concentrations of organics and arsenic.
I will make some more calls on this and get back to you.

I apologize for the lack of info, but this technology is relatively new and cost studies (and long-term studies) are not available.

Thanks,
Mark T.

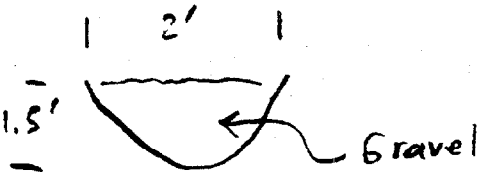
PROJECT	COMP. BY	JOB NO.
G-3 GW Greenhouse Phytoremediation	MBC	2546.51
	CHK. BY MNL	DATE 11/4/98

27x24 Greenhouse

V.J. Growers

4' x 90' = 360 ft²
x 5
1800 ft²

Laminated HDPE



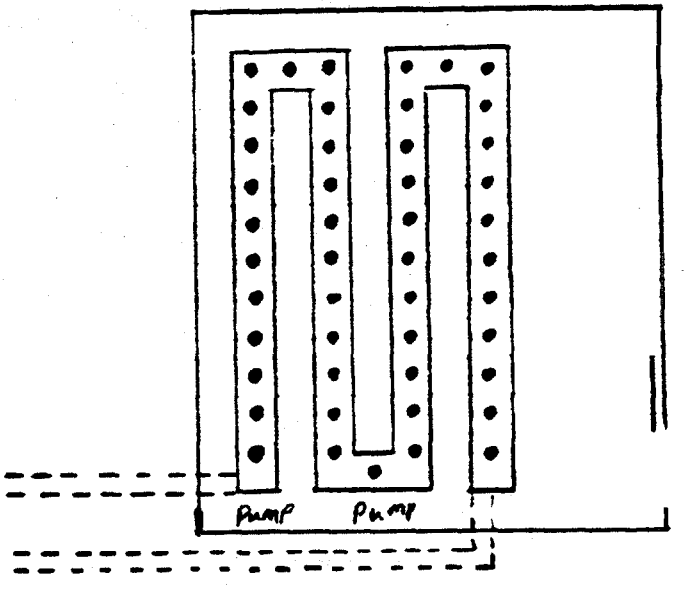
~ 2.25 ft² * 450' =

1012 ft³ Gravel

$20/yd³ Gravel

38 cyd Gravel

38 * 20 = $760



CORE GROUP
SERVICES, INC.

October 23, 1998

Mr. Michael Cusick
Harding Lawson Associates
2120 Washington Blvd., Ste. 300
Arlington, VA 22204

Dear Mike,

Enclosed is the write-up and sketch using rhizofiltration (see p. 5) for the removal of contaminants from ground and surface waters. Resultant contaminated plant residue would be dried and compacted to reduce disposal cost.

Sincerely,

Karl C. Ashley
Principal

KCA/att

enc.

1729 S.W. 77th Terrace, Suite A · Gainesville, Florida 32607-3498
Phone: (352) 332-7411 · FAX (352) 331-5424

Fax

CoreGroup Services, Inc. 1729 SW 77th Terrace Ste. A Gainesville FL 32607-3498

Date: October 23, 1998

To: Mr. Michael Cusick Harding Lawson Associates
Phone: 703-769-8181
Fax: 703-769-8182

From: Karl C. Ashley
Phone: 352-332-7411
Fax: 352-331-5424

Pages: 1 (including cover sheet)

Subject: Phytoremediation, Ar (III) sites in Florida

Confirming our telcon:

Extraction of Ar III from soil using phytoextraction

expect to remove up to 80% of bioavailable fraction
total cost: $80 to $100/treated ton
minimum time: one growing season

Treatability study needed: $12,000 for one site, $15,000 for two sites, if done simultaneously.

Extraction of Ar III from contaminated water using rhizofiltration

removal efficiency and limit varies with water, pretreatment
cost: set up green house $40,000 to $50,000, O&M of $4,000 to $5,000/month
cost per gallon: TBD

Treatability study needed: $14,000 for one site, $18,000 for two sites if done simultaneously.
(More work, setup and analytical costs involved for water studies)

Descriptive text and sketch in today's mail.

PHYTOREMEDIATION
TECHNICAL SUMMARY

Toxic metal-contaminated soils, aqueous waste streams and groundwaters pose a major environmental and human health problem. Bioremediation, i.e. the use of living organisms to treat contaminants, is increasingly favored by both the public and the private sectors as a method for waste treatment because of its low costs and minimal environmental impact. Current bioremediation methods cannot economically treat toxic metals, thus making many sites suitable only for conventional and very costly "removal and burial" technology. Phytoremediation technology has been developed to overcome the shortcomings of classical bioremediation and waste removal methods. Plants that accumulate toxic metals from contaminated soil and water can be grown and harvested economically, leaving soil or water with only residual levels of pollutants.

The ability of certain selected plants to effectively remove large amounts of toxic metals from soils and waters can provide novel, economically efficient and environmentally friendly approaches to reduce toxic metals in the environment. The demonstrated feasibility of this approach at the laboratory scale has led to the development of three distinct approaches to phytoremediation :

- **Phytoextraction:** the use of metal-accumulating plants, which can transport and concentrate metals from the soil in the roots and aboveground shoots.
- **Rhizofiltration:** the use of plant roots to absorb, concentrate and precipitate toxic metals from polluted aqueous streams.
- **Phytostabilization:** the use of plants to eliminate the bioavailability of toxic metals in soils.

A. *Approaches To Treatment*

Several approaches are currently used for treating soils contaminated with toxic metals:

- **Fixation:** the chemical processing of soils to immobilize the metals, is usually followed by treatment of the soil surface to eliminate penetration by water.
- **Landfilling :** the excavation, transport and deposit of contaminated soil in a permitted hazardous waste landfill.
- **Leaching:** using acid solutions or proprietary leachants can be very effective in removing certain metals from soil and permits the return of clean soil to the site.

Phytoextraction may be a cost-effective alternative to these approaches. We estimate that using phytoextraction to clean up of one acre of sandy loam soil to a depth of 50 cm will cost $60,000-100,000 compared to at least $400,000 for excavation and storage alone using traditional soil removal methods. Phytoremediation applications will involve costs related to treatment of hazardous materials, extensive metal analysis during and after the treatment, and handling and disposing of metal-containing plant residues. Growing several sequential crops of metal-accumulating plants will still be up to an order of magnitude cheaper than soil removal methods. Furthermore, this method is ecologically preferable, since it reclaims soil at the site, recycling it in a biologically safe state rather than permanently disposing of it by removal to a storage site.

Cost Advantage Of Phytoextraction

Type of Treatment	Cost/m^3 ($)	Time Required (months)	Additional factors/expense	Safety Issues
Fixation	90-200	6-9	Transport/excavation Long-term monitoring	Leaching
Landfilling	100-400	6-9	Long-term monitoring	Leaching
Soil extraction, leaching	250-500	8-12	5,000 m^3 minimum Chemical recycle	Residue disposal
Phytoextraction	15-40	18-60	Time/land commitment	Residue disposal

Current approaches to treating heavy metal contamination in water include:

i. **Precipitation or flocculation**, followed by sedimentation and disposal of the resulting sludge. For many water streams, treatment is relatively simple and inexpensive, but the special characteristics of some toxic metals in water make these streams much more difficult and expensive to treat. For example, the treatment of chelated copper in electroplating rinse water can cost up to $40 per pound of copper removed; rhizofiltration cost estimates range from $1-5 per pound.

ii. **Ion exchange** processes are used to treat waters containing a variety of cationic metals at moderate to high concentrations. A recently developed ion-exchange process for treating chelated copper, which assumes that the copper can be electrochemically recovered from the residue to eliminate disposal, reduces treatment costs to $15 per pound of copper removed.

iii. **Reverse Osmosis** is a sophisticated treatment technology widely used to purify saline water for drinking in arid countries. This approach is effective in removing contaminants to below discharge standards, but generates a residual brine and is relatively expensive.

iv. **Microfiltration** is used to "polish" certain highly toxic metals after conventional treatment to meet discharge standards. An important example is radionuclide waste. Precipitation and microfiltration to recover radionuclides from water has projected site-related costs of over $1 million to treat a relatively small flow of 2 gallons per minute, primarily due to the cost of radioactive sludge disposal.

Rhizofiltration offers a major cost advantage in water treatment because of the ability of plants to remove up to 60% of their dry weight as toxic metals, thus markedly reducing the generation and disposal cost of the hazardous or radioactive residue. Rhizofiltration will also be a cost-competitive technology in the treatment of surface or ground water containing low but significant concentrations of toxic metals such as chromium, lead and zinc.

B. Results of Work to Date

i. **Phytoextraction:** Extensive screening and selection procedures have identified promising metal-accumulating lines of fast-growing plants which can effectively remove toxic metals from soils. These plants concentrate metals in their roots and transport metals to the above-ground shoots which can be easily harvested.

Phytoextraction technology has been advanced by intentionally avoiding known non-crop metal-accumulating species because of their low biomass production, handling difficulties, genetic variability and lack of established cultivation practices. Instead, screening efforts have focused on crop and crop-related species because of their ability to accumulate metals and their good agronomic characteristics. Of 16 species studied, *Brassica* was the best accumulator of lead in shoots. In addition to having the highest metal-accumulating ability, it showed low levels of lead toxicity. It is also a high biomass producer (average yield of 18 tons/hectare) - meaning that it can extract and store more contaminants from the soil. The ease of cultivation and predictable field performance led to the choice of *Brassica* as the best metal-accumulating species for phytoextraction.

Identification of *Brassicas* as the best metal-accumulator was followed by screening of 120 cultivars to utilize existing genetic variability and find the best phytoextracting line(s). Fig. 1 demonstrates the ability of the ten best lead-accumulating cultivars identified in the screen to concentrate lead in shoots (A) and roots (B). Cultivar 426308, the best metal-accumulator identified to date, contained almost 3.5% of lead by weight in the dried shoots. In a number of experiments, roots of cultivar number 426308 were able to concentrate lead 173-fold over the lead levels in the growing medium. The highest root accumulation was observed in lines 211000, 478326 and 478336. All lead accumulating cultivars are vigorous plants with high above-ground biomass.

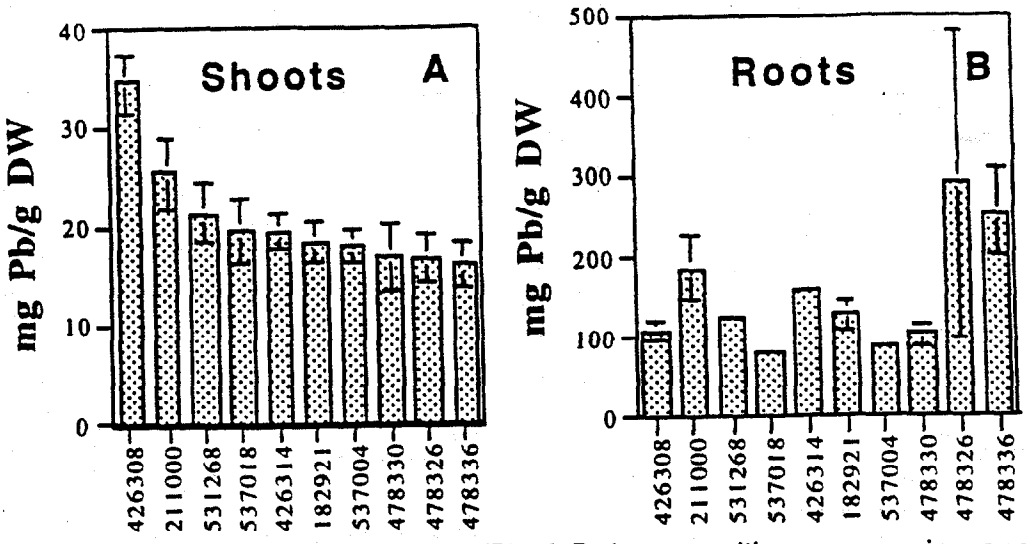


Figure 1. Lead content of shoots (A) and roots (B) of *B. juncea* cultivars grown in sand/Perlite mixture containing 625 µg Pb/g DW for 14 days. Vertical bars denote S.E. (n=4).

Chromium is another major environmental contaminant of soils and waters. Preliminary results indicate that these plants are also extremely good accumulators of chromium. The phytoextractability of copper, cadmium, zinc, nickel, lead, and both trivalent and hexavalent chromium by *Brassica* cultivars was tested and is shown in Figure 2.

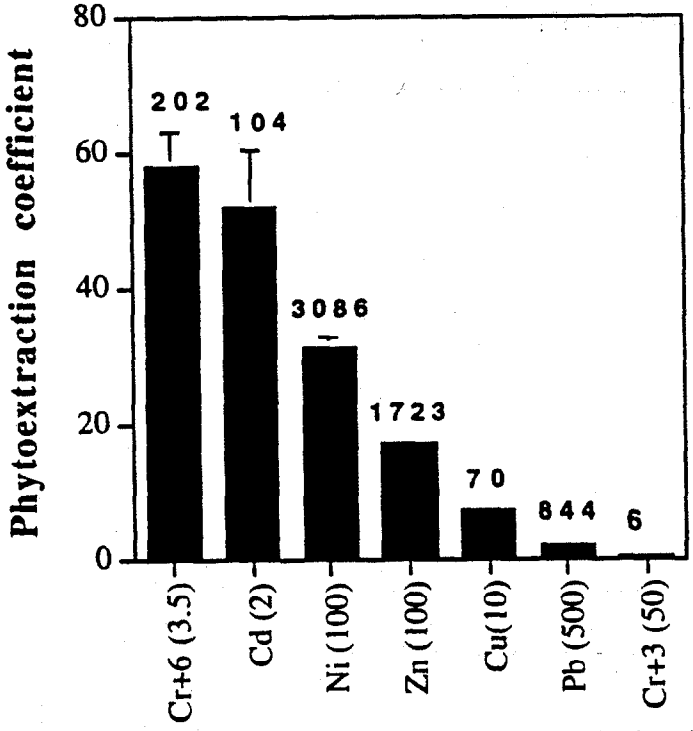


Figure 2. Phytoextraction Coefficient of different heavy metals in shoots of *B. juncea* cultivar 182921 grown for 14 days in a fertilized sand/Perlite mixture supplemented with a heavy metal. The values in parenthesis indicate the µg metal/g DW soil. The values above the columns indicate µg metal/g DW shoot tissue. Phytoextraction coefficients are the ratios between µg metal/g DW shoot and µg metal/g DW soil. Vertical bars denote S.E. (n=4).

ii. Rhizofiltration: The roots of living plants can absorb remarkably large quantities of lead and chromium from contaminated soil. Rhizofiltration technology exploits the ability of plant roots to treat aqueous streams. Fig. 3 shows a flow-through pilot system in which water containing toxic metals is passed through a trough packed with plant roots. An intermittent-action system has also been developed. The batch system performed similarly to the flow-through system in all trials. In addition to concentrating metals in root tissue, rhizofiltrating plants can precipitate large amounts of metal with compounds exuded from the roots (see below). The suspended particles containing metals precipitated by root exudates are filtered and collected at the outlet to produce clean water. Various plants can be used in a rhizofiltration system. Metal-enriched roots are harvested after the remediation cycle. Shoots can be discarded or allowed to regenerate new roots depending on the species used. New plants can be added to the system to maintain the continuity of the operation.

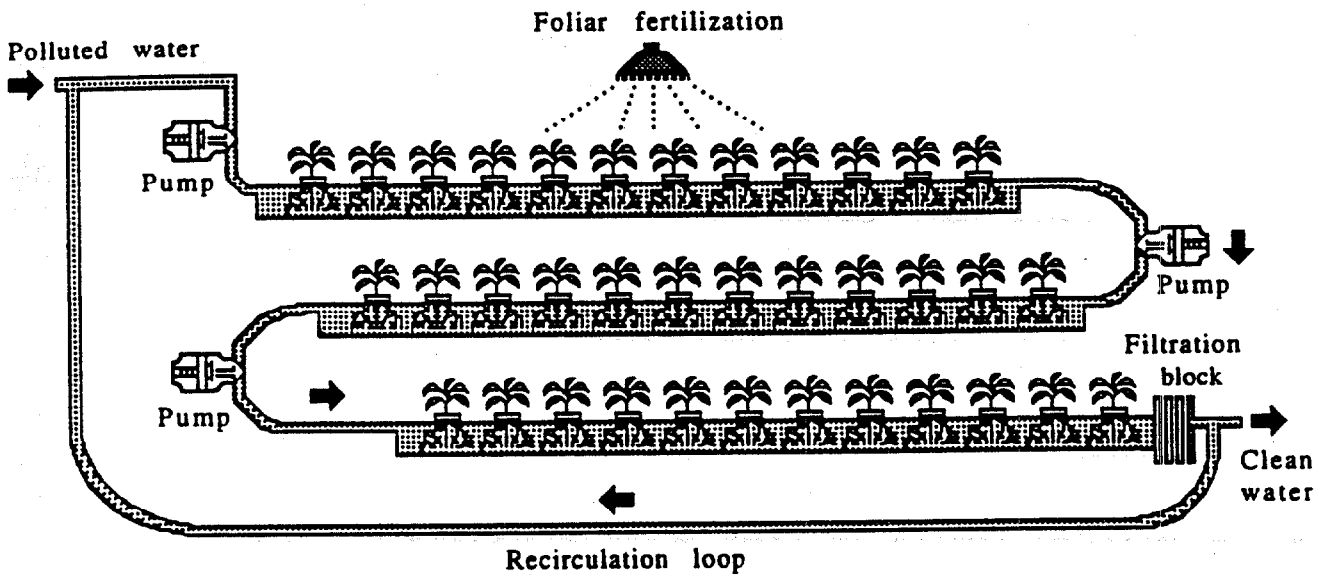


Figure 3. Flow-through rhizofiltration system

The ability to absorb different metal ions is a common property of all plant roots but varies widely between plant species. Brassicas efficiently and rapidly remove a variety of heavy metals from water. This was demonstrated by immersing roots of hydroponically grown*B. juncea* plants in 400 ml of deionized water containing Cd^{+2} (2 mg/L), Ni^{+2}(10 mg/L), Cu^{+2}(6 mg/L), Zn^{+2}(100 mg/L), Cr^{+6}(4 mg/L), or Pb^{+2} (2 mg/L) (Figure 4). These concentrations exceeded NJ ground water quality criteria by 500, 400, 100, 40, 20 and 6 fold, respectively. Experimental plants did not show visible phytotoxicity for the duration of the experiment. In 8 hours roots dramatically reduced the content of all tested metals in solution. Bioaccumulation coefficients, the ratio of metal concentration in root tissue (µg/g DW) to initial metal concentration in solution (mg/L), determined after 24 h of metal treatment varied significantly for different metals.

Figure 5-5

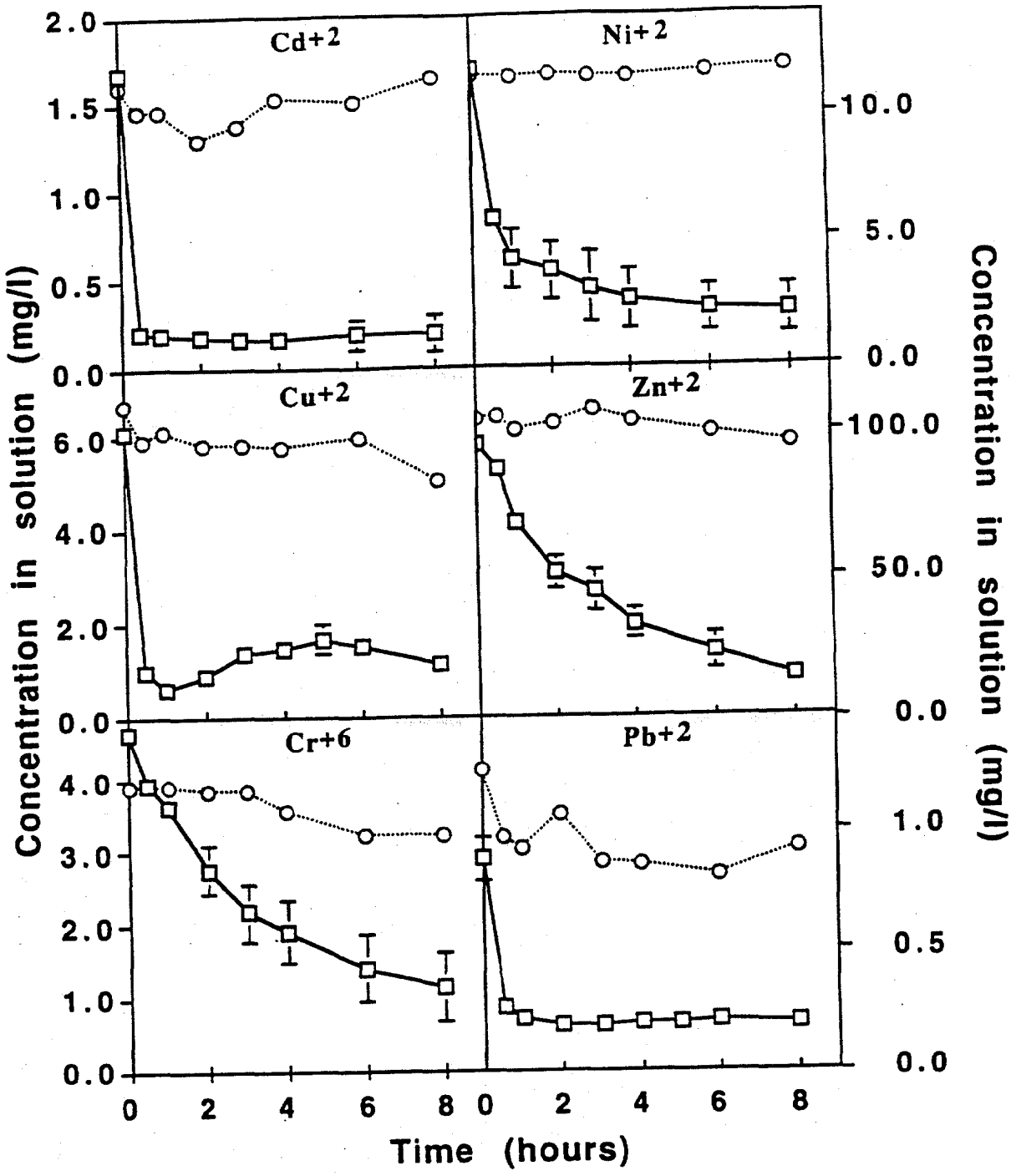


Figure 4. Removal of different metals from aqueous solutions by *B. juncea* roots ( ). Metal ions are indicated on the top of each panel. Control treatments (O) did not contain roots. Vertical bars denote S.E. (n=4). Vertical axis scales are metal concentrations in mg/L (ppm).

iii. Phytostabilization: The ability of plant roots to absorb and precipitate large quantities of toxic metals can be utilized to reduce the bioavailability of toxic metals in soils and to prevent their entry into ground water and food chains; therefore, a technology which will render toxic metals not bioavailable will greatly reduce human exposure to them. Figure 5 demonstrates the ability of Brassica roots to take up and

immobilize lead in the soil. Seedlings were grown in sand-Perlite mixtures, and when the plants were 3 weeks old, a lead solution was administered to pots with and without plants to obtain a final lead concentration of 625 ppm. On the sixth day after lead treatment, solution leached from each pot was collected to determine the available lead by atomic absorption spectroscopy. Leachate from pots containing plants had almost no lead; however, leachate from pots with no plants contained large amounts of lead.

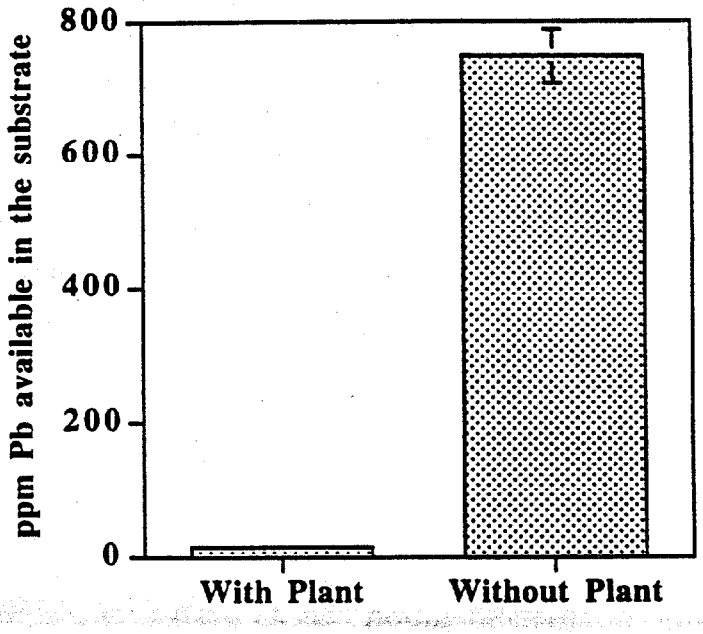


Figure 5. Effect of plant roots on the leachability of lead in soil (ppm = parts per million)

This study demonstrates that roots of plants can effectively immobilize lead in soil, thereby making it much more harmless to the environment. The ability of various plants to phytostabilize other toxic metals is currently under investigation. Phytostabilization research is directed towards development of plant varieties which can develop a substantial root biomass capable of binding and retaining toxic metals in the contaminated soils without transporting metal to the shoots. Reduced shoot transport will eliminate the necessity of treating harvested shoot residue as hazardous waste.

C. *Applications*

The low cost of phytoextraction will allow on-site remediation of many locations that are not being cleaned up because of the prohibitively high cost of currently available methods. The amount of hazardous materials generated as a result of the cleanup will be dramatically reduced. Top soil will be preserved. The environmentally friendly nature of phytoremediation should be attractive to the public, government and regulatory agencies.

Rhizofiltration may have as broad an application as phytoextraction and phytostabilization. It can be used to remove certain metals from groundwaters, industrial waste streams, sewage sludges, downwashes from powerlines, mining

operations and construction sites, effluents from water treatment plants, agricultural run-offs, and output from other activities which generate toxic metals. Rhizofiltration and phytoextraction offer efficiency and low cost.

i. **Phytoextraction**: Based on available information, the rate of lead removal from contaminated soils can be estimated: Total aboveground biomass production is 18 tons/hectare with up to 2.5% lead accumulation in plant shoots, and approximately 8 tons/hectare production of root mass with 20% lead. One planting of the best lead accumulating lines can remove as much as 2000 kg lead/hectare when grown in soil containing lead. In most of the areas of the US at least three sequential crops can be grown each year. An optimistic scenario would suggest that the best metal-accumulating lines can extract approximately 6000 kg lead/hectare/year. At those sites where only the aboveground biomass can be harvested, plants can still remove 1.9 tons of lead/hectare/year. Dried biomass, if combusted, will produce ash containing up to 25 % lead which may then be used to reclaim and recycle the metal, precluding landfill disposal.

ii. **Rhizofiltration**: Roots of the best rhizofiltrating plants identified in screens contain 15% lead in dry biomass, which is equivalent to 65 % in ash. By combining absorption and precipitation the roots of the most efficient rhizofiltrating plants remove lead equal to 60% of their dry weight. This high concentration also makes reclaiming metals from ash a potentially viable alternative to ash burial.

iii. **Phytostabilization:** Phytostabilization can be particularly useful in situations where there is a need for a rapid immobilization of metal in soils in order to prevent its movement into ground and/or surface waters. It may be also used on large sites which have marginally elevated levels of toxic metals. In addition, phytostabilization can be used as a follow-up treatment to phytoextraction or conventional removal and burial methods.

The application of phytoremediation will be driven by its technical and economic advantages over alternative approaches:

- **Lower costs for soil, groundwater and end-of-pipe treatment**
- **Generation of a recyclable metal-rich plant residue**
- **Applicability to a range of toxic metals and radionuclides**
- **Minimal environmental disturbance**
- **Elimination of secondary air or water-borne wastes**
- **Public acceptance.**

REGULATORY APPROVALS

Successful phytoremediation must meet cleanup standards in order to be approved by regulatory agencies. Preliminary results indicate that, in situations where phytoremediation is appropriate, cleanup standards will be met. In addition, the

commercialization of the technology can only increase the ability to match standards. This is true in large part because the broader technology of bioremediation, of which phytoremediation is a novel and distinctive subset, is currently clearing the path to government approvals. For example, EPA's Bioremediation Action Committee, in conjunction with EPA's Office of Engineering and Technology Demonstration and its Technology Innovation Office, is exploring ways in which standards can be based upon actual danger rather than simple detectability of contaminants. The intent is to give a chance to technologies that provide alternatives to costly incineration. Such policies will be even more firmly in place by the time phytoremediation enters the market. In addition, early pro-active communication and negotiation with state agencies, the EPA and international environmental agencies will further ensure that phytoremediation-specific benefits will be considered from the start.

AGRATECH
2131 Piedmont Way
Pittsburg, CA 94565
1-510-432-3399
FAX 1-510-432-3521

To: **Mr. Rob Bartholomew VJ Growers Supply, Inc. 407-880-1722**
From: Bob Scavetta
Date: October 29, 1998
Subject: Sales Lead - Harding Lawson Associates
Pages 1

Rob,

I had a gentleman fronm a engineering firm call in regards to a remediation project that they would be undertaking in the Orland, FL area. They were asking about a small Continental 27 x 24 structure and wanted to get some budgetary figures. Here is the information that I have given him;

Continental 27 x 24 x 10 20/90/B code Double Poly Roof w/ a single vent w/ motor Wall vent with motor. Sides and ends in Corrugated Polycarbonate. One 4' Sliding door . No cooling or heating.
Approximately $10,000.00

I him that VJ Growers Inc is our closest distributr in the area, and that I would be furnishing you this information for follow up. The figure I quoted to him was a very rough approximation and told him that you would be better able to get a better dollar amout. I was nt able to answer his question on the cost of construction. I have deferred that to you and your local connections with builders that may be able to give him an idea.

Here is his address and phone number for your follow up.

Mr. Michael Cusick
Harding Lawson Associates
2120 Washington Blvd.
Arlington, VA 22204

Phone # 703-769-8141 Fax# 703-769-8182

Regards,

Bob

Bob Scavetta
Sales Engineer

AGRATECH

Home | Request Info

Agra Tech, Inc

Greenhouses

Greenhouse Acc.

Agra Tech Services

Agra Tech News

Agra Tech is a 25 year old company specializing in quality commercial greenhouses. The broadest possible spectrum of model and functions is available from Agra Tech.

Our Mission

- Strength and quality
- Ease of construction
- Complete assembly instructions
- Design code houses to UBC, BOCA and SBC
- Quickest delivery in the greenhouse industry

Company Profile

The corporation is owned and operated by its founders - John and Eloise Pound.

Member of National Greenhouse Manufacturers Association and National Association of Horticultural Suppliers.

Contact Information

Sales East Coast & Mid-West - Casey Pea- aticasey@slip.net
Sales Central CA and Southwest - Roger Havens - atiroger@slip.net
Sales Northern CA and NW - Bob Scavetta - atibobs@slip.net
Sales Manager USA - C. Patrick Coleman atipat@slip.net
Manager of International Sales - Bob Pound - atibobp@slip.net

Telephone
925-432-3399
FAX
925-432-3521
Postal address
2131 Piedmont Way Pittsburg, CA 94565
Electronic mail

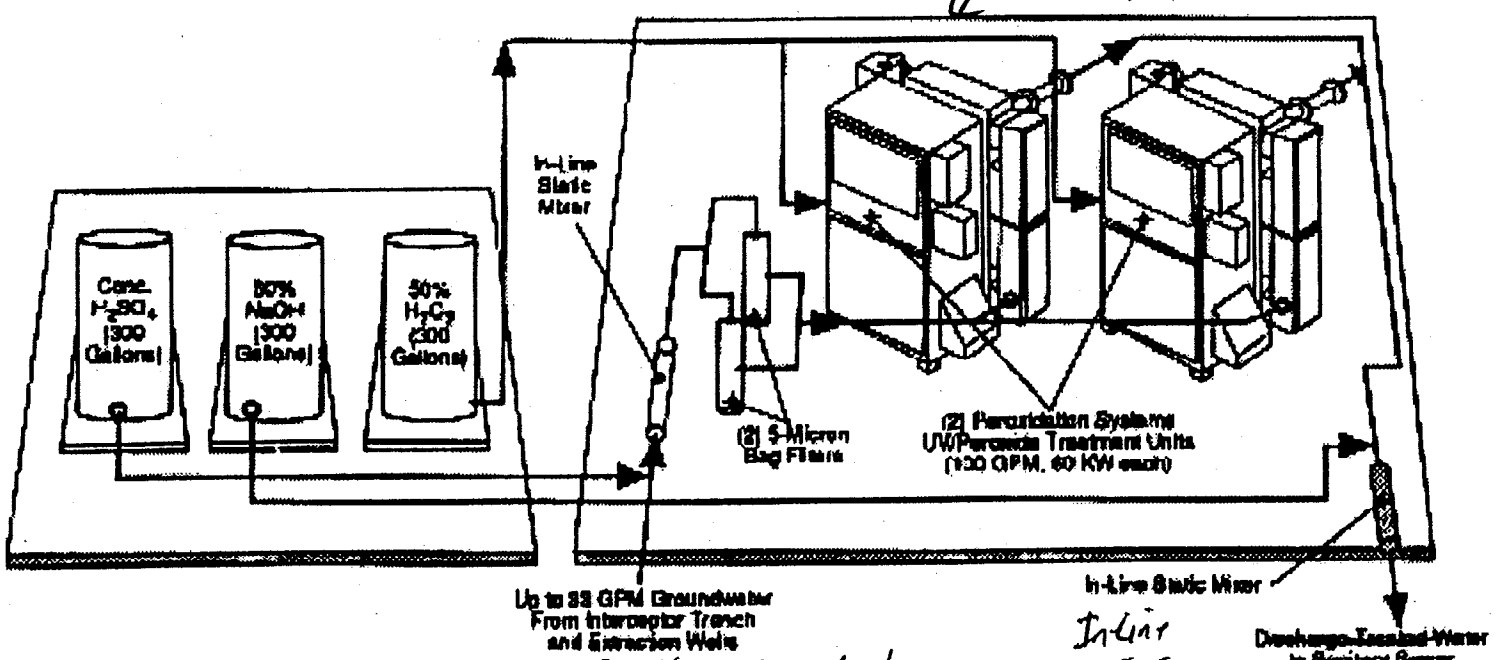
General Information, Sales, Tech Support: ati@slip.net
Business Hours 7:30 a.m. to 5:00 p.m. Monday - Friday

Agra Tech, Inc. - 2131 Piedmont Way - Pittsburg, CA 94565 - Phone 925-432-3399 - Fax 925-432-3521
Business Hours 7:30 a.m. - 5:00 p.m Pacific Time

Send mail to ati@slip.net with questions or comments about this web site.
Last modified: September 04, 1998

Treatment System Schematic

UV/Oxidation Process



Intake Groundwater

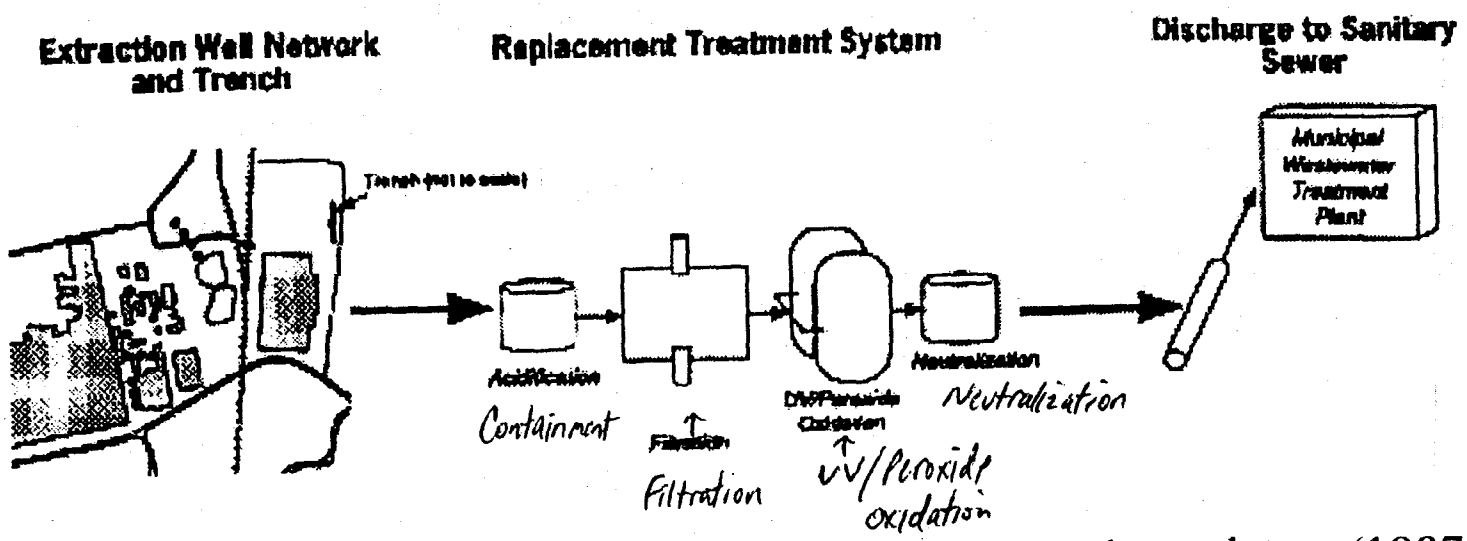
In-Line Mixer

discharge Treated water

Back to Site Characteristics | Table of Contents | Forward to Performance

[redacted] TREATMENT SYSTEM [redacted]

verall Process Schematic



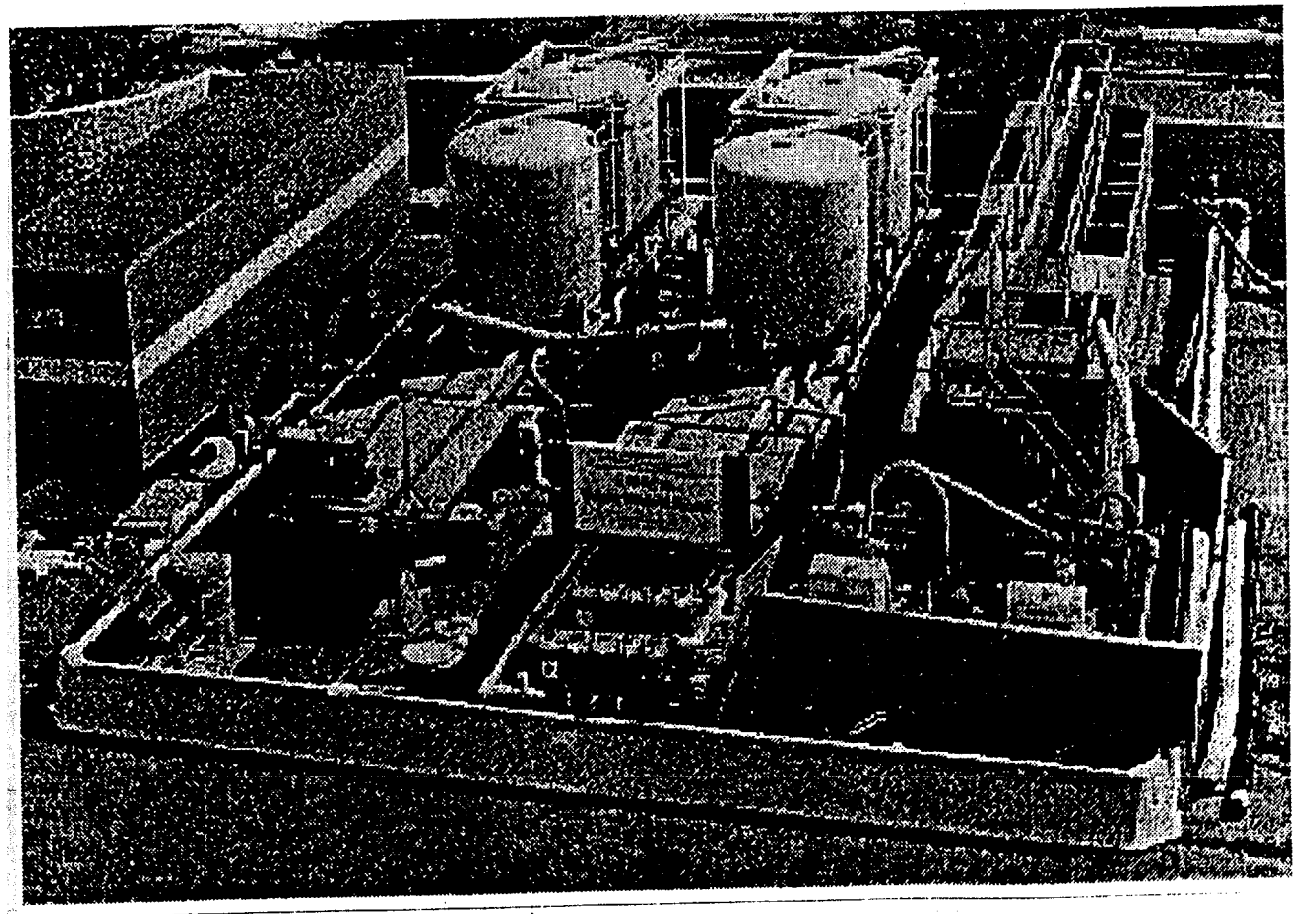
- Fourteen extraction wells and one trench installed in three phases (1987, 1988, and 1989).
- Acidification to solubilize inorganic metals, bag filtration, (UV/peroxide) oxidation of organic contaminants in one of two reactors, and subsequent neutralization.
- Discharge treated water to municipal wastewater treatment plant.

xtractior Well Network

Rental/Lease Programs

Extraction Systems, Groundwater Treatment Systems - turn key

week to over a year
em operators available
ılable throughout the
t coast
t systems come with
ıits



BARNEBEY & SUTCLIFFE CORPORATION
P.O. Box 2526
COLUMBUS, OHIO 43216

FAX NUMBER: 614-258-3464
PHONE NUMBER: 614-258-9501

FACSIMILE MESSAGE

TO: Michael Renga
Harding Lawson Assc.

FROM: Ken Stensrud
Carbon Division

DATE: October 26, 1998

TIME: 2:36 pm

FAX #: (703)769-8182

PAGE #1 of 8

SUBJECT: GW 2546-51

Michael,

It was pleasure speaking with you this morning.

I need to take exception to a few of the requirements outlined in your fax this morning. First, Barnebey & Sutcliffe does not provide installation or O & M. I have forwarded these requirements to an environmental firm specializing in this type of work and will report back to you their pricing. Second, a removal efficiency guarantee of greater than 95 % when working with unknown total ground water constituents is impractical without continuous on site monitoring. Thirdly, providing O & M costing of a project beyond five years is impractical, let alone 30 years. Fourth, Barnebey & Sutcliffe does not provide technology for iron removal. Firms which offer precipitation or ion exchange should be contacted.

Based upon the data provided and the above exceptions, we would propose and estimate the remediation of SA8 and SA9 as follows:

SA8
Design Criteria: 15 gpm @ 95% removal efficiency of arsenic and TTO
Equipment and Flow: Influent --> one L500 Carbon --> two L170 Green Sand (series) --> one L500 ATS Arsenic
Media Consumption: Carbon Life = 50 days (10 Lb/Day)
Green Sand Life = 100 days (5 Lb/Day)
ATS Arsenic Life = 100 days (7 Lb/Day)
Media Cost: Carbon ..... $ 0.65 / Lb.
Green Sand .... $ 0.75 / Lb.
ATS Arsenic ... $ 8.75 / Lb.

SA9
Design Criteria: 5 gpm @ 95% removal efficiency of arsenic and TTO
Equipment and Flow: Influent --> one L500 Carbon --> one L170 Green Sand --> one L170 ATS Arsenic
Media Consumption: Carbon Life = 40 days (12 Lb/Day)
Green Sand Life = 40 days (6 Lb/Day)
ATS Arsenic Life = 40 days (6 Lb/Day)
Media Cost: Carbon ..... $ 0.65 / Lb.
Green Sand .... $ 0.75 / Lb.
ATS Arsenic ... $ 8.75 / Lb.

Total estimated vessel costs with initial media charges: $ 25,000.00
Note: Pricing does not include pumps or piping.

I hope this preliminary information is helpful. Additionally, I've attached some cut sheets for your reference. Please feel free to contact me with any questions.

Kind Regards,

Ken

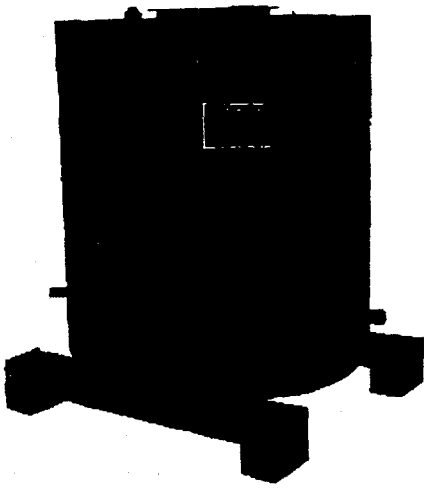
BARNEBEY & SUTCLIFFE CORPORATION

ACTIVATED CARBON TECHNOLOGIES

V-500 and L-500 Portable Carbon Adsorbers

Barnebey & Sutcliffe Corporation has been serving industry and government for over 75 years. We specialize in various adsorption equipment and systems designed and manufactured to fully utilize the advantages inherent in activated carbon adsorption technology.

PROTECT™ adsorbers offer the proven effectiveness of granular activated carbon in a modular, inexpensive, and versatile design. It is the practical solution for remediation, most industrial wastewater discharges, organic vapor emissions, and odor control applications.



Applications V-500

- Air Stripper Exhaust
- Tank Venting
- Emission Control
- Pilot Studies
- Soil Vapor Extraction

Applications L-500

- Product Purification
- Pilot Studies
- Industrial Wastewater
- Groundwater Treatment

PROTECT™ Vapor Phase

Contaminated air can simply be piped to one or more adsorbers which contain specially selected activated carbon. The carbon adsorbs the pollutants such as odor producing chemicals, allowing clean air to be vented to the atmosphere.

PROTECT™ Liquid Phase

The liquid phase adsorption system is both efficient and flexible. The PROTECT™ adsorbers provide a simple solution to most wastewater problems. Units can be installed in series to increase contact time or in parallel to increase flow rate.

Service

Full service contracts provide ongoing satisfaction for your carbon applications. Supported by our modern laboratory and technical staff, we can provide information related to carbon consumption rate, process design, plant start-up, testing and maintenance programs, and services associated with the removal and reactivation of spent carbon.

Reactivation

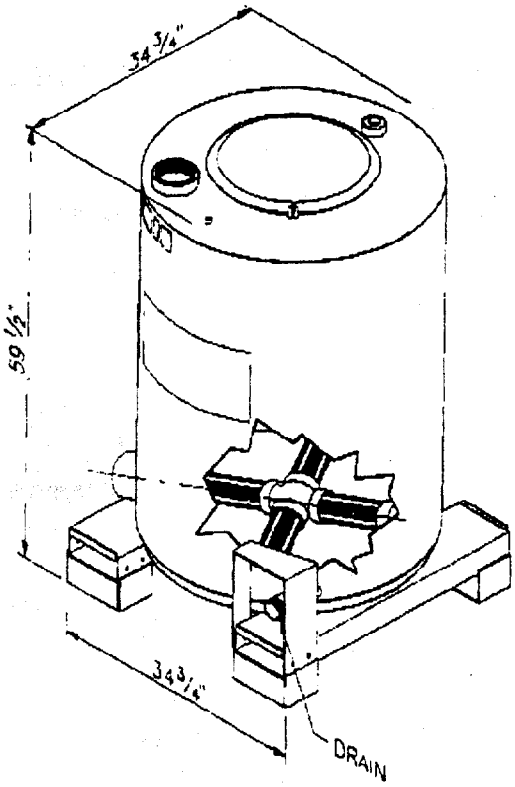
Our facility in Columbus, Ohio reactivates carbon safely and economically. Reactivation ensures destruction of the adsorbed compounds while allowing recovery of the carbon at near virgin quality. In addition, we arrange and manage shipment of manifested spent carbon to contracted reactivation and incineration plants permitted under RCRA part B.

Options

PROTECT™ adsorbers are available in a variety of standard sizes or can be custom designed to meet the requirements of the application. They are available in stainless steel and can be fitted to meet D.O.T. and U.N. standards. Custom size pressure vessels are also available. Additionally, adsorbers can be fitted with a break through indicator and/or analyzer.

Materials of Construction

PROTECT™ adsorbers are manufactured using carbon steel with an enamel exterior and phenolic epoxy coated interior.



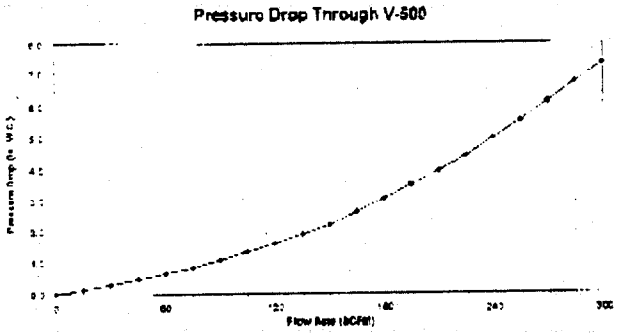
Specifications

	V-500	L-500
Maximum Flow	300cfm	25gpm
Maximum Pressure (psig)	10*	10*
Maximum Temperature	110°F	110°F
Minimum Carbon Weight (lbs.)***	500	500
Connection Size	4" FPT	4" FPT
Shipping Weight	700	700
Recommended Direction of Flow	Up**	Up**

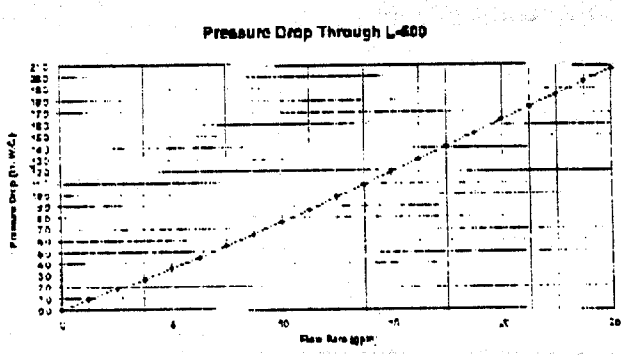
*Unit subject to severe damage if pressure exceeds maximum rating. Installation of valves and restrictions in the outlet piping must be avoided. Maximum hydraulic head should not exceed 15 feet of water.

**Units are designed to accept flow in either direction.

***B&SC manufactures over 100 types of activated carbon. Our technical staff is available for assistance in the selection of a proper carbon for the application.



Vapor Phase



Liquid Phase

Safety

Activated carbon adsorbs atmospheric oxygen. Before entering carbon vessels, follow all safety guidelines applicable to oxygen depleted areas. Certain chemicals may undergo fast and extreme polymerization and/or oxidation. The heat developed from the reaction could ignite the carbon bed. Please consult Barnebey & Sutcliffe if you require further assistance.

Barnebey & Sutcliffe is continually improving carbon capacity and system performance. Due to the ongoing improvement of our products, we reserve the right to change system specification and performance criteria without notification.

BARNEBEY & SUTCLIFFE CORP.

ACTIVATED CARBON TECHNOLOGIES

P.O. Box 2526
Columbus, OH 43216
(614) 258-9501
(800) 886-2272
Fax: (614) 258-3464
E-Mail: activated_carbon@msn.com

Regional Offices:
Columbia, MD: (410) 381-5870
Addison, IL: (630) 543-1251
Sparks, NV: (702) 355-7770
Carson, CA: (310) 638-7240

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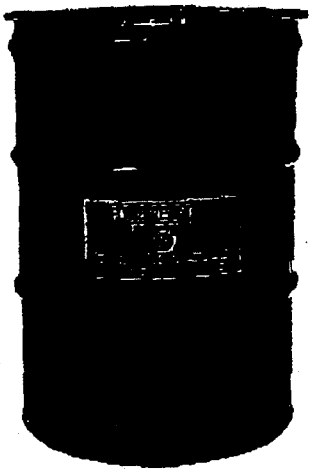
BARNEBEY & SUTCLIFFE CORPORATION

ACTIVATED CARBON TECHNOLOGIES

V-170 and L-170 Portable Carbon Adsorbers

Barnebey & Sutcliffe Corporation has been serving industry and government for over 75 years. We specialize in various adsorption equipment and systems designed and manufactured to fully utilize the advantages inherent in activated carbon adsorption technology.

PROTECT® offers the proven effectiveness of granular activated carbon in a modular, disposable, inexpensive, and versatile design. It is the practical solution for remediation, most industrial wastewater discharges, organic vapor emissions, and odor control applications.



Applications V-170

- Air Stripper Exhaust
- Tank Venting
- Emission Control
- Pilot Studies
- Soil Vapor Extraction

Applications L-170

- Product Purification
- Pilot Studies
- Industrial Wastewater
- Groundwater Treatment

PROTECT® Vapor Phase

Contaminated air can simply be piped to one or more adsorbers which contain specially selected activated carbon. The carbon adsorbs the pollutants or odor producing chemicals, allowing clean air to be vented to the atmosphere.

PROTECT® Liquid Phase

The liquid phase adsorption system is both efficient and flexible. The PROTECT® provides a simple solution to most wastewater problems. Units can be installed in series to increase contact time or in parallel to increase flow rate.

Service

Full service contracts provide on-going satisfaction for your carbon applications. Supported by our modern laboratory and technical staff, we can provide information related to carbon consumption rate, process design, plant start-up, testing and maintenance programs, and removal and reactivation of spent carbon.

Reactivation

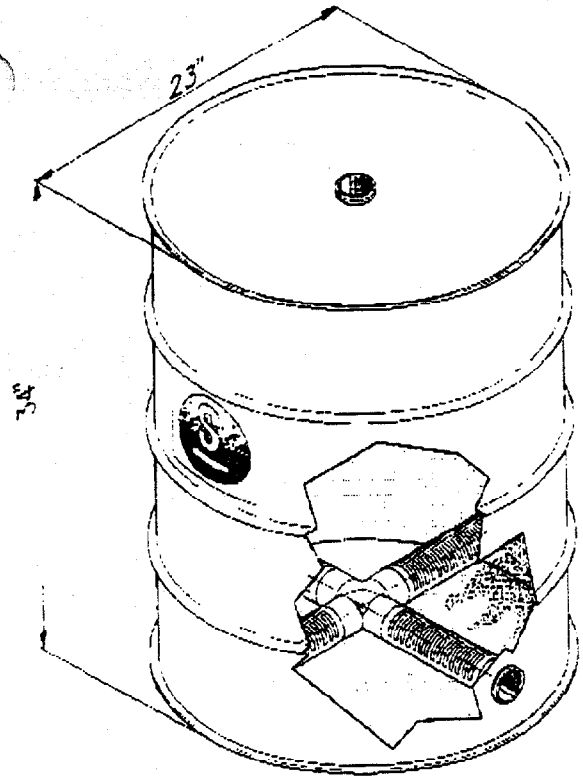
Our facility in Columbus, Ohio reactivates carbon safely and economically. Reactivation ensures destruction of the adsorbed compounds while allowing recovery of the carbon at near virgin quality. In addition, we arrange and manage shipment of manifested spent carbon to contracted reactivation and incineration plants permitted under RCRA part B.

Options

PROTECT® units are available in a variety of standard sizes or can be custom designed to meet the requirements of the application. Custom size pressure vessels are also available. Additionally, they can be fitted with a break through indicator and/or analyzer.

Materials of Construction

PROTECT® units are made from carbon steel with an enamel exterior and phenolic epoxy coated interior. They are D.O.T. and U.N. approved.



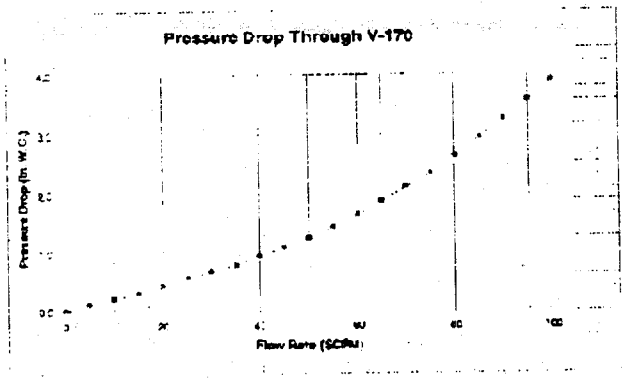
Specifications

	V-170	L-170
Maximum Flow	100cfm	10gpm
Maximum Pressure (psig)	2*	8*
Maximum Temperature	110°F	110°F
Minimum Carbon Weight (lbs.)***	170	170
Connection Size	2" fpt	2" fpt
Shipping Weight	220 lbs.	220 lbs.
Recommended Direction of Flow	Up**	Up**

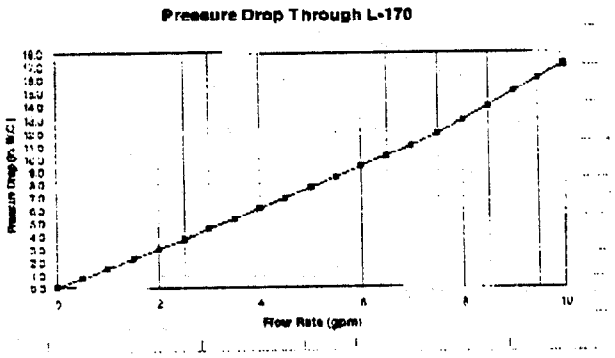
*Unit subject to severe damage if pressure exceeds maximum rating. Installation of valves and restrictions in the outlet piping must be avoided. Maximum hydraulic head should not exceed 15 feet of water.

**Units are designed to accept flow in either direction.

***B&SC manufactures over 100 types of activated carbon. Our technical staff is available for assistance in the selection of a proper carbon for the application.



Vapor Phase



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Carson, CA: (310) 638-7240

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ENGELHARD

ENGELHARD ATS™ ARSENIC

SAFE, PURE WATER...IT'S WHAT WE DO

Engelhard Corporation, an industry leader in water treatment products, is dedicated to providing safe, efficient, cost-effective water treatment solutions for household, industrial and water utility applications. Using natural elements combined with today's leading-edge technology, we work in close alliance with you to improve your products, expand your markets, and make the world a better place to live. Engelhard's commitment to excellence and our ability to listen and respond to our customers' needs results in innovations that create lasting partnerships, and profound and enduring results in the world marketplace.

WATER TREATMENT PRODUCTS
ENGELHARD ATS™ ARSENIC

Performance Benefits

- Specially tailored absorbent that effectively removes low levels of arsenic from drinking water.
- Can be used in household filters, industrial applications or water utility protocols for arsenic remediation.
- In laboratory tests at effluent concentrations of 0.010 mg/l (parts per million), Engelhard ATS™ Arsenic absorbs arsenic five times more efficiently than activated alumina.
- Media regeneration is accomplished by contact with 5 BV of 3% NaOH followed by flushing with 5 BV of water.

Typical Usage

- Supplied in granular or powder forms. Granules are designed for packed bed applications of any size; powder is used in DE Filter Systems or mixed directly into treatment tanks.
- Since studies by the EPA and the Department of Commerce have shown that arsenic is most readily removed in its oxidized form, pre-treatment with chlorine, ozone or another oxidant is recommended to achieve best results.
- Peak arsenic removal capacity is reached at pH 6.0.
- ATS™ Arsenic technology works best on drinking water contaminated with arsenic levels of 1.0 mg/l or less. EBCT of at least 5 - 10 minutes is recommended, longer time will give better results.

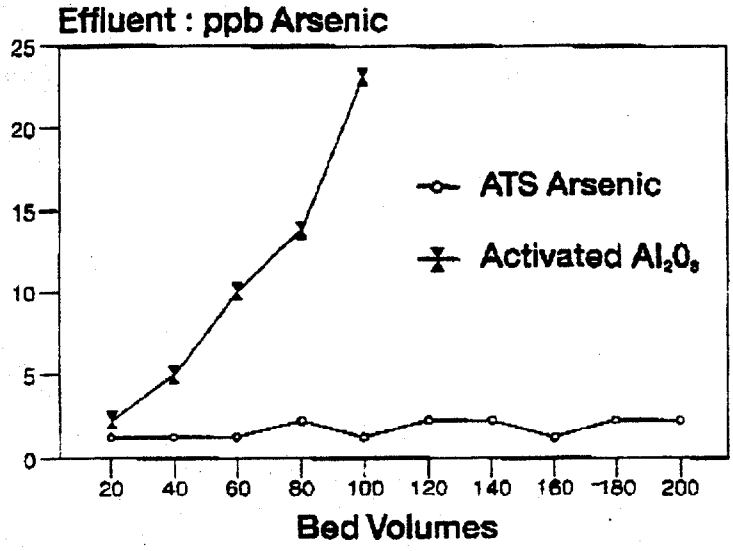
PROPERTIES

Composition ..... Porocel bauxite synergized with Versal aluminum hydroxide

Form ..... 20/50 mesh granules
Powder in varying sizes

Bulk Density ..... 45 lbs/Ft 3

COLUMN TESTS FOR ARSENIC REMOVAL



Bed Volumes = 55 cc. EBCT = 1.5 min, L/D = 4
flowrate @ 35 cc/min, Column I.D. = [illegible]
100 ppb As, 60 ppm SO_4, 3 ppm Cl, pH = 7.5

For further information phone (908) 205-6573 or 6562 or write: Engelhard Corporation, 101 Wood Avenue, Iselin, New Jersey 08830

Engelhard seeks to present reliable information concerning the composition, properties and use of its products, however, (1) All advice concerning selection and use of any product is provided AT NO CHARGE AND WITH NO WARRANTY. (2) No warranty is made hereby. Products described herein are warranted to conform to Engelhard's specifications only at the time of sale. All sales are subject to Engelhard's standard terms and conditions, which are reproduced on the reverse side of each invoice. ALL WARRANTIES OF MERCHANTABILITY AND FITNESS OF PURPOSE ARE DISCLAIMED and remedy for any breach of warranty is limited to replacement of the defective product. (3) Engelhard assumes no responsibility for any patent liability arising from the use of any product in a process, manner or formula not designed by Engelhard. Nothing in the listed information shall be construed as an inducement or recommendation to use any process or to produce or use any product in conflict with existing or future patents.

ENGELHARD

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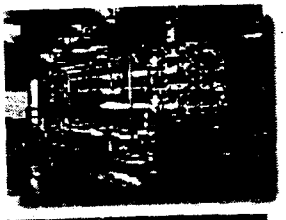
ECOLOCHEM, Inc.

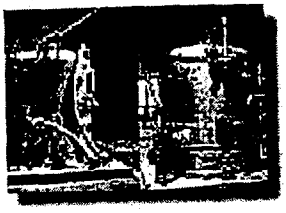
High Purity Security™

EQUIPMENT



Reverse Osmosis

Fixed, skid-mounted systems and trailer-enclosed systems in 100 and 200 gpm sizes; custom systems for 1000 gpm and over.

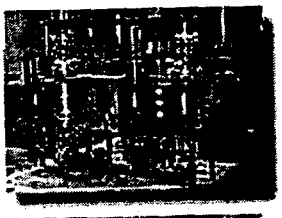


Filters

Skid-mounted and trailer-enclosed systems for 50 gpm and up, for surface water treatment, RO pre-treatment, etc.; proprietary media and coagulant feed system included.

MobileFlow®

Mobile system for demineralization, deoxygenation, filtration, softening, activated carbon; flow rates up to 1000 gpm per unit, depending on application.



Deoxygenation

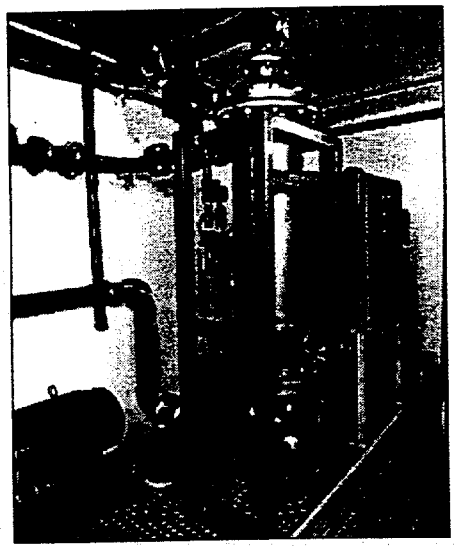
New membrane technology for removal of oxygen and other dissolved gases from water; patented DEOX® process also available for removal of dissolved oxygen down to 1 ppb.

DeltaFlow® Systems

The DeltaFlow process is a new approach in water purification that uses three membrane technologies to produce ultrapure water without chemicals.

Microfiltration

Ecolochem microfiltration systems are extremely compact and offer the ability to filter high turbidity water sources with low operating and maintenance cost. The ceramic filters also offer excellent chemical resistance and the ability to withstand high pressures and temperatures.



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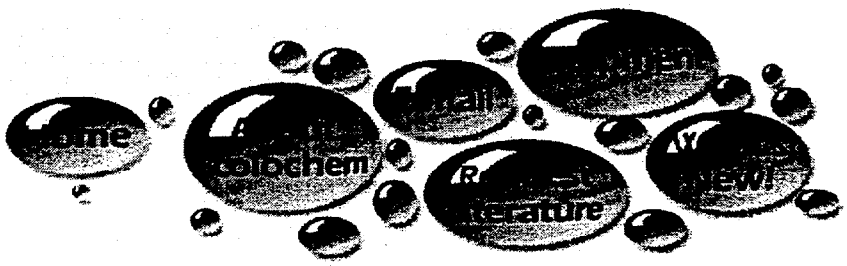

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Ecolochem, International, Inc.,
Hydrohouse, Peterborough
PE2 6SE, UK
Phone 01733-394555
Fax 01733-390179

ECOLOCHEM®, INC.
2855 N.W. 75TH AVENUE • MIAMI, FLORIDA 33122 U.S.A. • 305/592-1000 • FAX 305/477-4132

October 23, 1998

VIA FAX AND FIRST CLASS MAIL
703/769-8182

Mr. Michael Renga
Harding Lawson Associates
2120 Washingtonian Blvd.
Suite 300
Arlington, VA 22204

Dear Mr. Renga:

As per our telephone conversation, I am pleased to provide the following budget estimate for Ecolochem to provide an activated carbon system for toxic organic removal at the two locations in Orlando, FL.

Ecolochem will likely provide our MultiFlow® Series 500 skid or skids (drawing, pressure drop curve and description attached) loaded with granular activated carbon. We are currently working with our carbon supplier to determine details of the capacity of the carbon and handling and refire options. This could have a significant impact on the price, so as soon as I have this information, I will forward it to you.

For now, I will outline the general costs to give you an idea.

MultiFlow Series #500 skid	
Equipment preparation charge	$2,000/each
Daily equipment service charge	$100/day/each
Delivery and removal	$1.70/mile round-trip

(We did not discuss flow rates, however I believe the 500 skid will fit the application as it has a wide range of flow capability.)

Ecolochem will also provide a Field Service Representative (FSR) to support the start-up and if you desire, he can stay throughout the job to monitor the system.

Field Service Representative (FSR)	$40.00/hr. Minimum 8 hrs/day
Per Diem	$125/day/Plus travel cost to and from the job

HLA will need to provide:

- suitable flow rate at sufficient pressure
- suitable location
- possible handling, unloading and disposal of the carbon
- off-loading and loading of the skid with a forklift
- suitable connections to and away from our skid

I hope that this is helpful to you and I will contact you again once I have confirmed the details on the carbon.

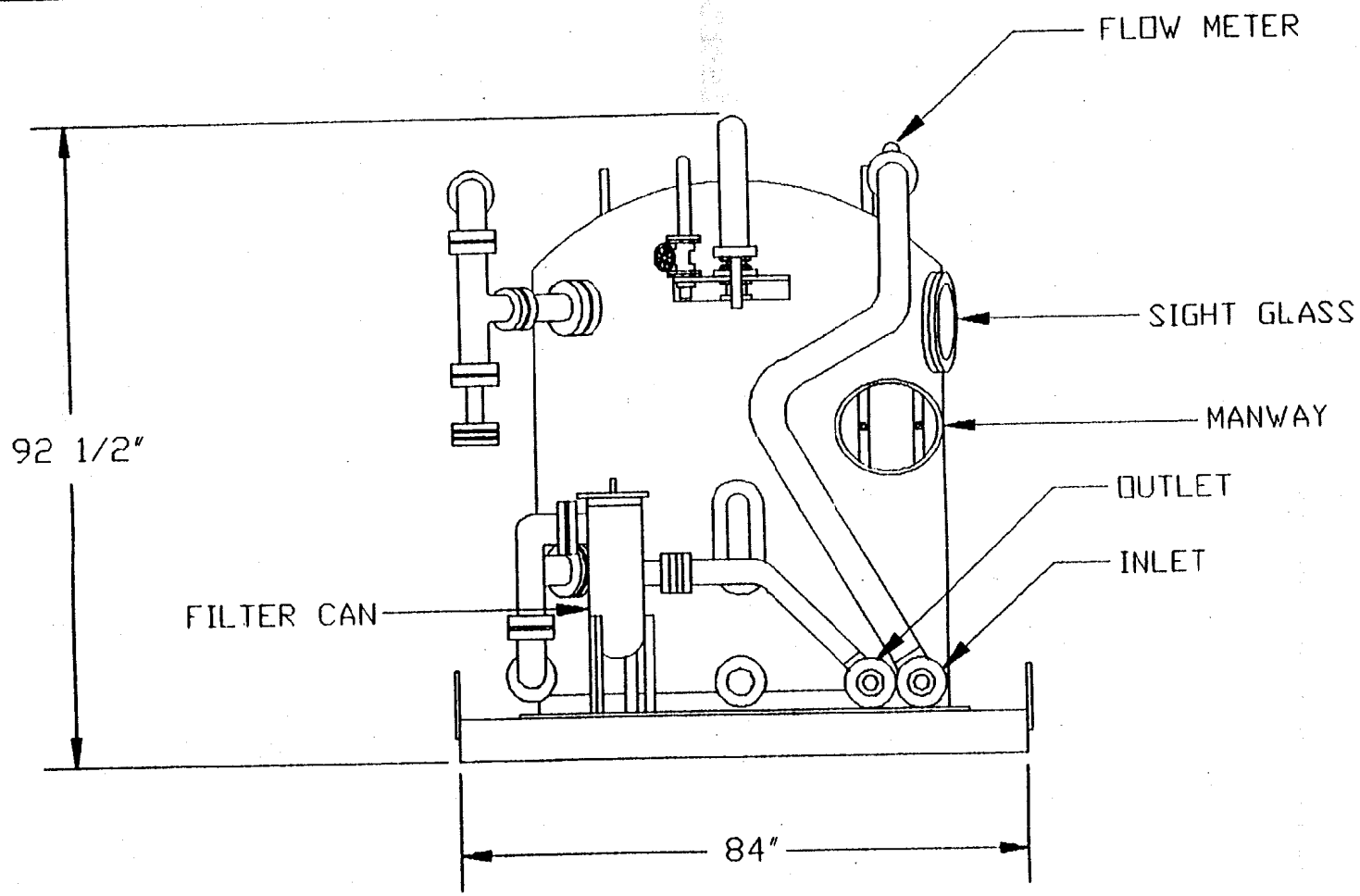
Very truly yours,

ECOLOCHEM, INC.

Michael E. Moore
Technical Sales Manager

MEM/fh

Encl: MultiFlow Series #500 Drawing, Pressure Drop Curve and Description

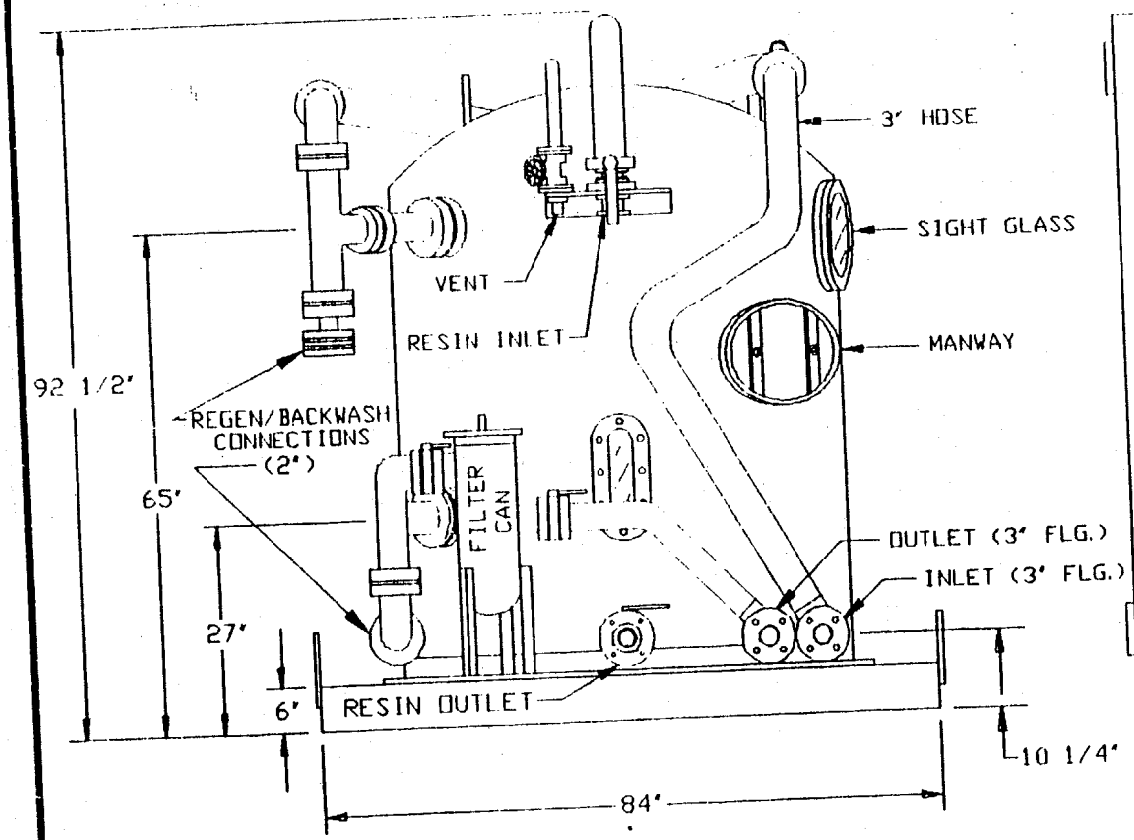


500 SERIES MULTIFLOW® TANK
SKID-MOUNTED

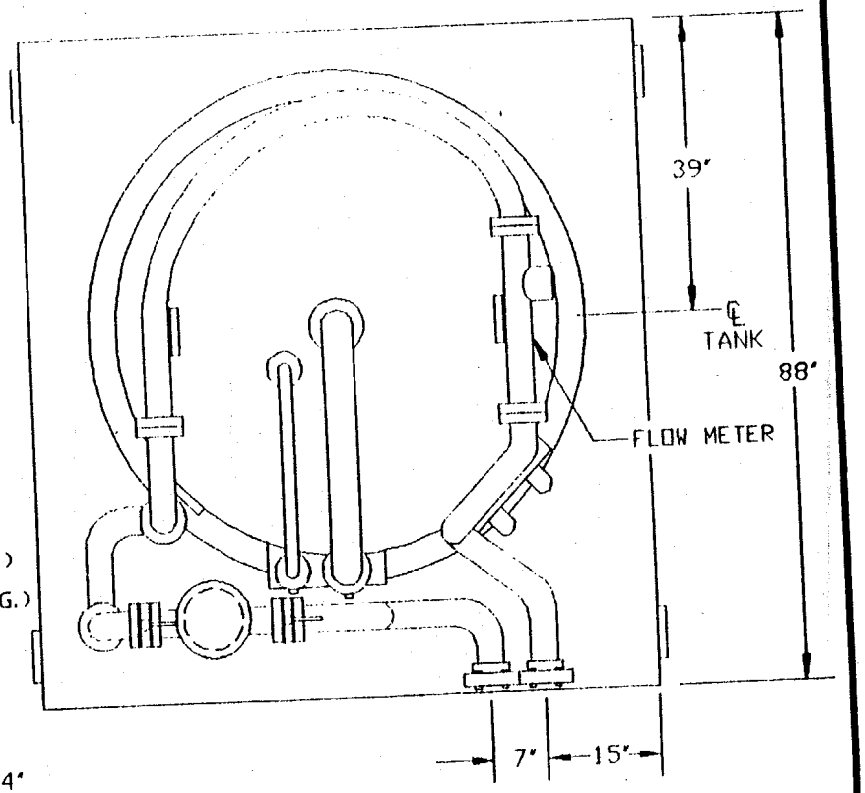
GENERAL NOTES
DEPTH OF SKID 88"
POWER REQUIREMENTS (FOR METERS ONLY):
120 VOLTS-1Ø-10 AMPS

ECOLOCHEM, INC.	500 SERIES MULTIFLOW TANK	DRAWING FILE: \EQUIP\500SKID
	SKID-MOUNTED	DRAWN BY: DRUMMOND
		DATE: 8-20-92

500 SERIES SKID MOUNTED MULTIFLOW® TANK



ELEVATION VIEW



PLAN VIEW

ECOLOCHEM, INC.	500 SERIES MULTIFLOW TANK	DRAWING FILE: \EQUIP\MULTIFLO
	SKID-MOUNTED	DRAWN BY: DRUMMOND
		DATE: 5-1-93

MUTIFLOW® SERIES 500 UNIT

ASME Code Steel, rubber lined vessel with hydraulic flow capability of up to 250 GPM each. The vessel is equipped with two sight ports, media fill and removal connections, lifting ears, forklift ports, flow meter and a 5 micron media trap on the outlet.

Materials of Construction: Carbon Steel Shell, Rubber Lining, Fiberglass and PVC Piping for Vessel, Carbon Steel for Mounting Skid

Dimensions: Each Unit - Length 88", Width 84", Height 90", Vessels is 5' Diameter and 5' Straight Side Height

Operating Weight: 10,000 Pounds

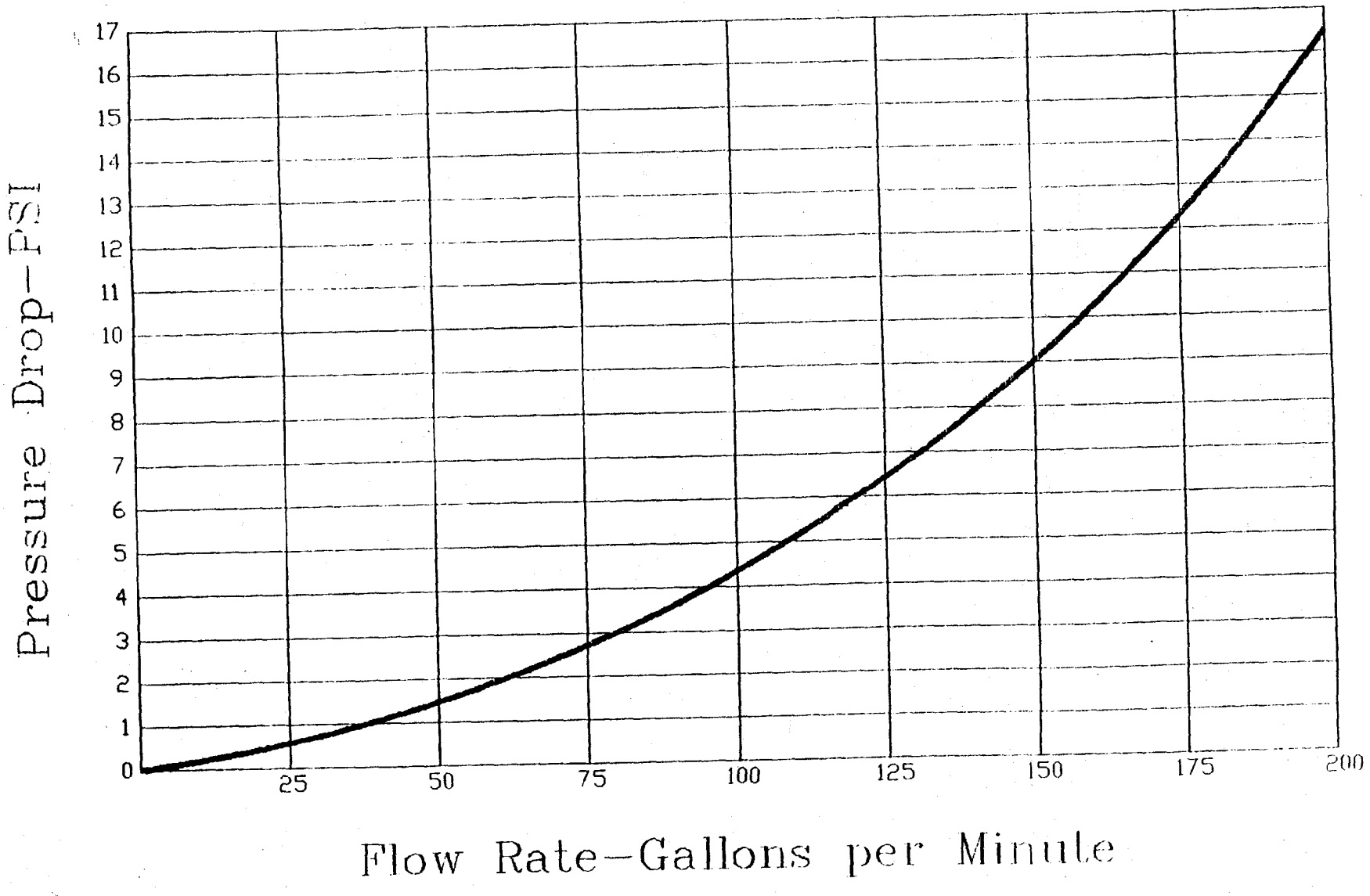
Inlet/Outlet Piping Connections: 3", 150 Lb. Flange

Media: Granular Activated Carbon

Instrumentation: Flow Meter/Totalizer, Inlet/Outlet Pressure Gauges, Thornton 770 PC Conductivity meter and sensor

500 Skid Pressure Drops

ECOLOCHEM, INC.



4.56 Ultraviolet (UV) Oxidation

(Ex Situ Ground Water Remediation Technology)

* COST DATA ON PAGE 3

Technology	Description
Ground Water, Surface Water, and Leachate	
3.12 Ex Situ Physical/Chemical Treatment (assuming pumping)	
4.56 Ultraviolet (UV) Oxidation	Ultraviolet (UV) radiation, ozone, and/or hydrogen peroxide are used to destroy organic contaminants as water flows into a treatment tank. If ozone is used as the oxidizer, an ozone destruction unit is used to treat collected off gases from the treatment tank and downstream units where ozone gas may collect, or escape.

Description:

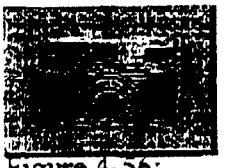


Figure 4-56: Typical UV/Oxidation Ground water Treatment System

UV oxidation is a destruction process that oxidizes organic and explosive constituents in wastewater by the addition of strong oxidizers and irradiation with UV light. Oxidation of target contaminants is caused by direct reaction with the oxidizers, UV photolysis, and through the synergistic action of UV light, in combination with ozone (O_3) and/or hydrogen peroxide (H_2O_2). If complete mineralization is achieved, the final products of oxidation are carbon dioxide, water, and salts. The main advantage of UV oxidation is that it is a destruction process, as opposed to air stripping or carbon adsorption, for which contaminants are extracted and concentrated in a separate phase. UV oxidation processes can be configured in batch or continuous flow modes, depending on the throughput under consideration.

The UV oxidation process is general done with low pressure lamps operating at 65 watts of electricity for ozone systems and lamps operating at 15kW to 60kW for hydrogen peroxide systems.

➢***UV Photolysis***

UV photolysis is the process by which chemical bonds of the contaminants are broken under the influence of UV light. Products of photo-degradation vary according to the matrix in which the process

occurs, but the complete conversion of an organic contaminant to CO_2, H_2O, etc. is not probable.

The duration of operation and maintenance of UV oxidation depends on influent water turbidity, contaminant and metal concentrations, existence of free radical scavengers, and the required maintenance intervals on UV reactors and quartz sleeves..

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Synonyms: **DSERTS Code:** F21 (UV Oxidation)

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Applicability: Practically any organic contaminant that is reactive with the hydroxyl radical can potentially be treated. A wide variety of organic and explosive contaminants are susceptible to destruction by UV/oxidation, including petroleum hydrocarbons; chlorinated hydrocarbons used as industrial solvents and cleaners; and ordnance compounds such as TNT, RDX, and HMX. In many cases, chlorinated hydrocarbons that are resistant to biodegradation may be effectively treated by UV/oxidation. Typically, easily oxidized organic compounds, such as those with double bonds (e.g., TCE, PCE, and vinyl chloride), as well as simple aromatic compounds (e.g., toluene, benzene, xylene, and phenol), are rapidly destroyed in UV/oxidation processes.

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Limitations: Limitations of UV/oxidation include:

- The aqueous stream being treated must provide for good transmission of UV light (high turbidity causes interference). This factor can be more critical for UV/H_2O_2 than UV/O_3. (Turbidity does not affect direct chemical oxidation of the contaminant by H_2O_2 or O_3.)
- Free radical scavengers can inhibit contaminant destruction efficiency. Excessive dosages of chemical oxidizers may act as a scavenger.
- The aqueous stream to be treated by UV/oxidation should be relatively free of heavy metal ions (less than 10 mg/L) and insoluble oil or grease to minimize the potential for fouling of the quartz sleeves.
- When UV/O_3 is used on volatile organics such as TCA, the contaminants may be volatilized (e.g., "stripped") rather than destroyed. They would then have to be removed from the off-gas by activated carbon adsorption or catalytic oxidation.
- Costs may be higher than competing technologies because of energy requirements.
- Pretreatment of the aqueous stream may be required to minimize ongoing cleaning and maintenance of UV reactor and quartz sleeves.
- Handling and storage of oxidizers require special safety precautions.

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Data Needs: A detailed discussion of these data elements is provided in Subsection

2.2.2 (Data Requirements for Ground Water, Surface Water, and Leachate).

Design and operational parameters include contact or retention time, influent water turbidity, metals and contaminant concentrations, existence of free radical scavengers, oxidizer influent dosages, pH, temperature, UV lamp intensity, and performance characteristics of catalysts.

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Performance Data: The UV/oxidation is an innovative ground water treatment technology that has been used in full-scale ground water treatment application for more than 10 years. Currently, UV/oxidation processes are in operation in more than 15 full-scale remedial applications. A majority of these applications are for ground water contaminated with petroleum products or with a variety of industrial solvent-related organics such as TCE, DCE, TCA, and vinyl chloride.

A wide range of sizes of UV/oxidation systems are commercially available. Single-lamp benchtop reactors that can be operated in batch or continuous modes are available for the performance of treatability studies. Pilot and full-scale systems are available to handle higher throughput (e.g., 3,800 to 3,800,000 liters or 1,000 to 1,000,000 gallons per day).

I used the highest cost

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Cost: Costs generally are between $0.03 to $3.00 per 1,000 liters ($0.10 to $10.00 per 1,000 gallons). Factors that influence the cost to implementing UV/oxidation include:

- Types and concentration of contaminants (as they affect oxidizer selection, oxidizer dosage, UV light intensity, and treatment time).
- Degree of contaminant destruction required.
- Desired water flow rates.
- Requirements for pretreatment and/or post-treatment.

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References:

Buhts, R., P. Malone, and D. Thompson, 1978. **"Evaluation of Ultra-Violet/Ozone Treatment of Rocky Mountain Arsenal (RMA) Groundwater"**, USAE-WES Technical Report No. Y-78-1.

California Base Closure Environmental Committee (CBCEC), 1994. ***Treatment Technologies Applications Matrix for Base Closure Activities, Revision 1***, Technology Matching Process Action Team, November, 1994.

Christman, P.L. and A.M. Collins, April 1990. **"Treatment of Organic Contaminated Groundwater by Using Ultraviolet Light and Hydrogen Peroxide,"** in *Proceedings of the Annual Army Environmental Symposium*, USATHAMA Report CETHA-TE-TR-90055.

EPA, 1989. ***Ultrox International UV Ozone Treatment for Liquids***, EPA RREL, series includes Technology Evaluation, EPA/540/5-89/012, PB90-198177; Applications Analysis, EPA/540/A5-89/012; Technology Demonstration Summary, EPA/540/S5-89/012; and Demonstration Bulletin, EPA/540/MS-89/012.

EPA, 1990. ***Innovative and Alternative Technology Assessment Manual,***

Table 3. Capital Cost Summary for Treatment Walls

LOCATION	DIMENSIONS	CONTAMINANTS	COST ($)		
			Construc.	Media	Total
Sunnyvale, CA (full-scale) (built)	75-m slurry wall on either side of 12-m long treatment section; 6m deep; 3.5-m vertical and 1.2-m flowthrough thickness of iron	1 - 2 mg/L VC, *cis*-1,2-DCE, and TCE	550,000	170,000	720,000
Moffet Federal Air Field, CA (full-scale) (built)	6.5-m long interlocking sheet piles on either side of a 3.2-m wide, 3.2-m thick, and 8.2-m deep reaction cell	1 mg/L TCE			300,000
Coffeyville, KS (pilot-scale) (built)	150-m slurry wall on either side of 6-m long gate; 9-m deep; 3.8-m vertical and 1-m flowthrough thickness of iron	100's µ g/L TCE	350,000	50,000	400,000
Elizabeth City, NC (full-scale) (built)	45-m long, 5.5-m deep, and 0.6-m wide zero-valent iron wall	TCE, chromium	220,000	200,000	420,000
Lowry AFB, CO (pilot-scale) (built)	3.5-m wide, 1.6-m thick, and 2.9-m deep gate with 5-m long cutoff walls on each side of the reaction zone	850 µ g/L TCE 220 µ g/L cis-1,2-DCE	105,000	32,500	137,500
New Hampshire (full-scale) (estimate)	400-m long wall with several gates; 9-m deep	100's µ g/L TCE, VC, *cis*-1,2-DCE	1,200,000	900,000	2,100,000
Michigan (full-scale) (estimate)	90-m long with 3 gates; 6-m deep	10 - 100 mg/L TCE	300,000	135,000	435,000
Canada (full-scale) (estimate)	45-m long with 2 gates; 4.5-m deep	50 - 100 µ g/L TCE	130,000	52,500	182,500

Monitoring is important for both pilot- and full-scale treatment wall systems and should include the following parameters:

- contaminant concentration and distribution
- possible by-products and reaction intermediates
- groundwater velocity and pressure levels
- permeability of the reactive barrier
- groundwater quality parameters such as pH and alkalinity
- dissolved gas concentrations (D16068J).

4. Involvement With Government Programs/Regulatory Acceptance

Some of the Superfund Sites that plan to use treatment walls include the Brown's Battery Breaking site in Pennsylvania, Tonolli Corporation in Pennsylvania, and Somersworth Sanitary Landfill in New Hampshire (D16066H, p. 4).

5. Performance

The Waterloo Centre for Groundwater Research at the University of Waterloo has completed two demonstrations of treatment walls. At the Canadian Forces Base Borden, a permeable reaction wall with an iron-based catalyst was installed about 16.5 feet downgradient from the source to pilot test the capability of the wall to degrade halogenated organic compounds. The maximum trichloroethylene (TCE) concentration was about 250,000 micrograms per liter, and the maximum tetrachloroethene (PCE) concentration was about 43,000 micrograms per liter. Most of the contaminant mass removal occurred within the first 50 centimeters of the wall. The TCE concentration was reduced by 95% and the PCE by 91%. Further work at this site has included field testing of an in situ permeable wall for introducing nutrient solutions to enhance biodegradation of carbon tetrachloride and TCE.

At the Borden Aquifer, the Waterloo Centre tested a proprietary solid peroxide formulation (an oxygen-releasing compound) to enhance biodegradation of groundwater contaminated by benzene, toluene, ethylbenzene, and xylene (BTEX). The results indicated that the oxygen-releasing compound can support biodegradation of benzene and toluene (the two compounds tested) at concentrations typical of those found at petroleum-contaminated sites.

EnviroMetal Technologies has performed an above-ground field test of a reactor with 50% iron for a General Electric (GE) semiconductor manufacturing facility with TCE, cis-1,2-dichloroethene (DCE), vinyl chloride, and freon contamination. The times to degrade one half of the contaminant mass were 4 hours or less. The estimated cost of the project is $175,000 to $200,000.

At a Coast Guard Air Station in Elizabeth City, North Carolina, EPA started a demonstration using iron in September 1994. Chromium, vinyl chloride, TCE, and PCE have been treated. Chromium has been reduced to below detection limits and vinyl chloride to less than 1 microgram per liter. A greater than 75% reduction in TCE has been achieved (D16067I).

6. Limitations

The best site for a treatment wall is one having porous sandy soil, contamination no deeper than about 50 feet below ground, and a good flow of groundwater. The successful application of a treatment walls requires a careful study of the underground environment and an understanding of the contaminant and groundwater flows (D16066H, p. 3).

7. Feed Rate or Capacity

No available information.

FACSIMILE TRANSMISSION

To: Michael Renga

Fax Number: 703-769-8182

From: Mark Todaro

Date: 11/4/98

Time:

Project Number:

Number of pages (including this cover sheet): 6

Original to follow by mail: ____ Yes ✓ No

Remarks:

Mike,
Here are the website pages with data.

cc:

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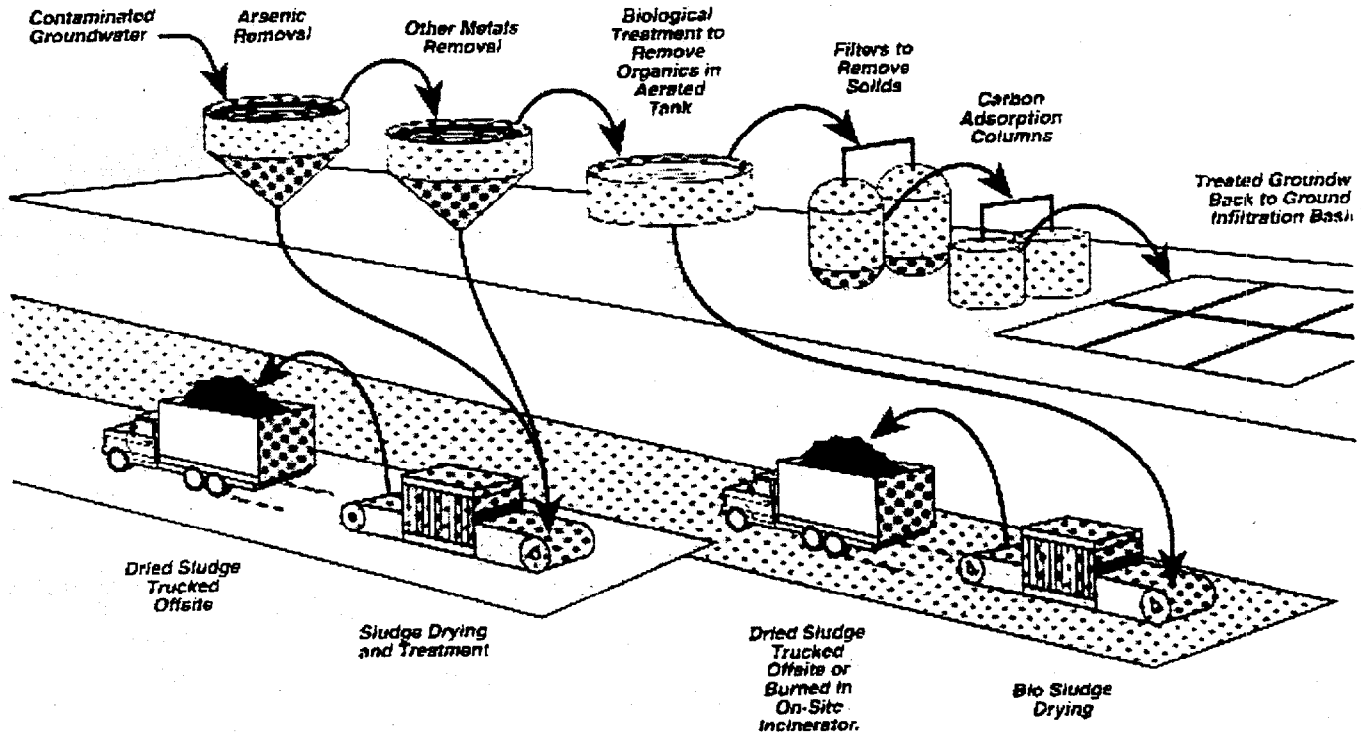
HLA

Harding Lawson Associates

1080 Woodcock Road, Suite 100
Orlando, FL 32803 (407) 895-8845

FAX (407) 896-6150

Baird & McGuire Groundwater Treatment Plant



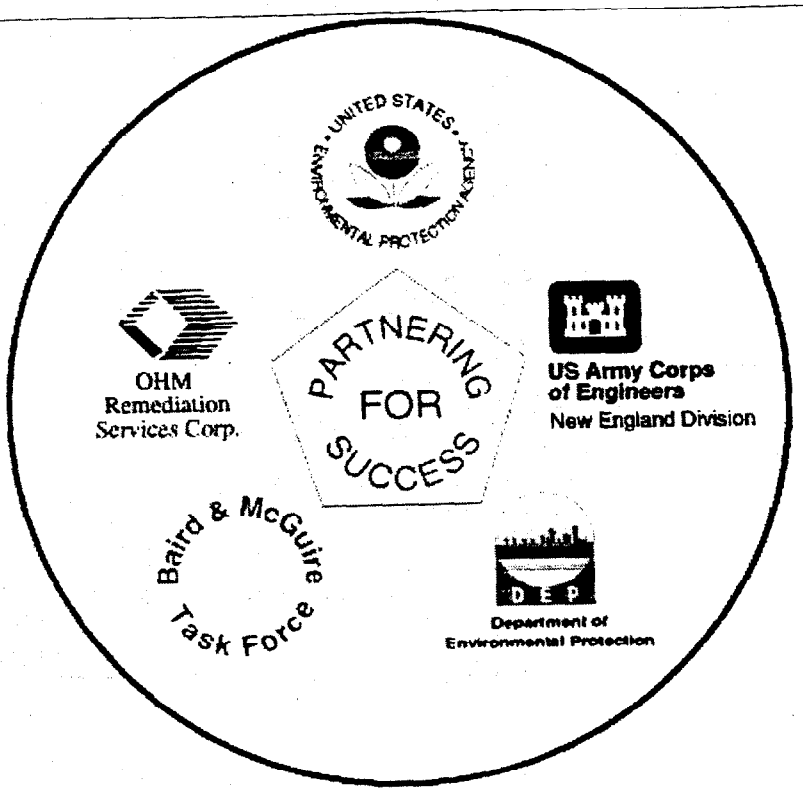
Contaminated groundwater is pumped from six extraction wells to the groundwater treatment plant. The treatment plant removes solids, metals and organic contaminants. The metals process consists of two stages. In the first stage, arsenic is removed by precipitation at a relatively neutral pH. In the second stage, other metals are removed at a higher pH. Metallic sludge is dried and then trucked offsite to a disposal facility. After metals are removed from the groundwater, most of the organic contaminants are removed with biological treatment. Biological treatment consists of micro-organisms eating the organics in the presence of oxygen. Biological sludge is dried and disposed of in the on-site incinerator or in an off-site landfill.

Following biological treatment, groundwater is pumped to a sand filtration system where more solids are removed. Carbon adsorption columns are the last step in the process to remove any remaining organic compounds.

Back to Baird & McGuire Superfund Site Home Page

Baird & McGuire Superfund Site

This page was developed by: Department of Environmental Protection



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- Incineration is Complete
- Site Contacts
- Site Background
- Baird & McGuire Superfund Site Task Force Meeting Schedule

- Aerial Photography: January - March 1997
- Aerial Photography: August & October 1996
- Aerial Photography: 1982 - July 1996
- Incineration Process Description
- Groundwater Treatment Plant Process Description
- Other links

Site Contacts

Baird & McGuire Site Hotline	(617) ~~573-5738~~ (617) 918-1322 Chet Janowski
EPA Remedial Project Manger	Janowski.Chet@epamail.epa.gov (617) 573 -9623 Kristen Conroy
EPA Community Relations	Conroy.Kristen@epamail.epa.gov (617) 565-3618 Helen Waldorf
DEP Contact	Helen.Waldorf@state.ma.us (617) 292-5716

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Site Background

Site History

The Baird & McGuire Site is located on South Street near the Holbrook/Randolph line in Massachusetts. Eight of the twenty acres comprising the site have been owned by Baird & McGuire, Inc., since 1912. For more than 70 years, Baird & McGuire operated a chemical manufacturing and batching facility on the property. Activities included mixing, packaging, storing and distribution of various products, including herbicides, pesticides, disinfectants, soaps, floor waxes and solvents. The property originally included a laboratory, storage and mixing buildings, an office building and a tank farm. Some of the raw materials used at the site were stored in the tank farm and piped to the laboratory or mixing buildings. Other raw materials were stored in drums.

Waste disposal at the site included direct discharges into the soil, a nearby brook and wetlands, and dumping in a former gravel pit (now covered) in the eastern part of the site. Underground disposal systems also were used. The South Street wellfield, part of the municipal water supply for Holbrook, is within 1,500 feet of the former Baird & McGuire plant area. The last operating well was closed in 1982 due to organic contamination. Studies indicate that contaminants used or stored at the site were

possible sources.

Site Contamination

The groundwater is contaminated with pesticides and organic and inorganic chemicals. Studies found significant levels of volatile organic compounds (VOCs), other organic compounds, arsenic and pesticides including DDT and chlordane in Cochato River sediments. Site soils were found to be contaminated with VOCs, polycyclic aromatic hydrocarbons (PAHs), other organic compounds, pesticides, dioxin and heavy metals such as lead and arsenic. Dioxin also has been detected in area wetland soils.

Remedial Activities

The Superfund cleanup project at the Baird & McGuire Site is divided into four operable units. The Record of Decision (ROD) for the first two operable units was signed in September 1986; the ROD for the third operable unit was signed in September 1989; and the ROD for the fourth operable unit was signed in September 1990. The goals of the first three operable units are to manage migration and control the source of contamination. The goal of the fourth operable unit is to replace the "Lost Demand" to the Town of Holbrook due to contamination of the South Street Wells.

Operable Unit # 1 : Groundwater Treatment Plant (GWTP)

Construction of the GWTP was completed in 1992. This treatment plant removes metals and VOCs from the contaminated groundwater at this site.

Operable Unit # 2 : Contaminated Soil Incineration

The soils at Baird & McGuire are contaminated with creosotes, VOCs, pesticides herbicides and heavy metals (arsenic and lead). This soil will be incinerated over a two year period to destroy the organic compounds. Incinerated ash is tested to insure that the metals do not leach into the groundwater. If it fails this analysis, the ash is stabilized prior to being backfilled on site.

Operable Unit # 3 : Cochato River Sediment Dredging

The Cochato River, which is located downstream of the site, was dredged to remove contaminated sediments. These sediments were then treated in the incinerator.

Operable Unit # 4 : Donna Road Water Supply

To replace the "lost demand" of the South Street Wells contaminated by Baird & McGuire, the ROD determined that the Donna Road Aquifer should be developed to supply the Town of Holbrook with 310,000 gallons per day.

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Task Force Meeting Schedule

Please contact Kristen Conroy (Conroy.Kristen@epamail.epa.gov, (617) 565-3618) call for more information on the next meeting of the Baird & McGuire Task Force.

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Other Links

Massachusetts Department of Environmental Protection

Bureau of Waste Site Cleanup

Environmental Protection Agency - Region I

U.S. Army Corps of Engineers - New England Division

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Comments or Questions

Department of Environmental Protection
One Winter Street, 7th Floor
Boston, MA 02108
(617) 292-5716

D.Bakely@state.ma.us

OFFICES:
6630 BALTIMORE NAT'L PIKE
ROUTE 40 WEST
BALTIMORE, MD 21228
410-747-8770
800-932-9047
FAX 410-788-8723

PHASE SEPARATION SCIENCE, INC.

ANALYTICAL CHEMISTRY • ENVIRONMENTAL SCIENCE •

Quotation

Date: 10/28/98

To: Michael Renga
Harding Lawson Associates
2120 Washington Boulevard
Arlington, VA 22204

Fax Number: 703-769-8182
Phone Number: 703-769-8187

From: Craig T. Harden

Quotation Number: 981028001H

Project: Groundwater discharge

Analysis	Method	Price per Sample
Discharge Monitoring		**$1057.25**
Metals *Includes: Antimony, Arsenic, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Lead, Manganese, Mercury, Nickel, Selenium, Silver, Sodium, Tin and Zinc.*	EPA 200.8	
BOD	EPA 405.1	
Cyanide	EPA 335.2	
Oil & Grease	EPA 1664	
Phenolics	EPA 420.1	
TSS	EPA 160.2	
TTO	EPA 624/625/608	
Matrix: Water		

This quotation is valid for a period of one year. Please include the Quotation Number on the chain of custody to insure proper invoicing. Sample containers and sample pickup are included in the proposal.

FACSIMILE TRANSMISSION

To: Craig Harden

Fax Number: (410) 798-9723

From: Mike Renga

Date: 10/27/98

Subject: Grab Samples

Project Number: #2546-51

Number of pages (including this cover sheet): 2

Original to follow by mail: ____ Yes ✓ No

Remarks:

Craig:

Please quote on 104 samples/yr

52 influent samples (1 grab/week)
52 effluent samples (1 grab/week)

Just preliminary #'s now, fax acceptable.

cc:

Transmitted by:

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Harding Lawson Associates

2120 Washington Blvd. Suite 300
Arlington, VA 22204 — (703) 769-8181

FAX (703) 769-8182

INDUSTRIAL USER DISCHARGE PERMIT
Number: CO62QA
Category: Groundwater Discharge
Expiration Date: 08/01/00

Permittee:

[redacted]

Parameter	Sample Type	Monitoring Frequency	Reporting Frequency
Antimony			
Arsenic			
Barium			
Beryllium			
BOD			
~~Boron~~			
Cadmium			
Chromium (Total)			
Cobalt			
Copper			
Cyanide			
Grease			
Lead			
~~LEL~~			
~~Lithium~~			
Manganese			
Mercury			
Nickel			
~~pH~~			
Selenium			
Silver			
Sodium			
Tin			
Zinc			
Total Metals			
Total Phenols			
TSS			
TTO			

A state-certified laboratory shall be used for analysis (except pH). Analysis may be performed in-house provided that the permittee petitions the City for approval of in-house analysis and that EPA-approved laboratory methodologies are used for analysis (see Title 40 CFR, Part 136). NOTE: If analyses are performed in-house, the City's laboratory result shall prevail for any split samples.

Reports on wastewater analysis and the amount of hazardous waste [redacted] produced shall be submitted to the [redacted] Control Section as follows:

ARCADIS Geraghty & Miller, Inc.
14497 North Dale Mabry Hwy.
Suite 240
Tampa
Florida 33618
Tel 813 264 3506
Fax 813 962 0867

MEMO

To:
Michael Renga

Copies
Kevin Simmons

ART

From:
Michael J. Mann, P.E.

Date:
28 October 1998

Subject:
GW Remediation - NTC Orlando

Dear Mike,
I apologize for being late on this information. Assuming chemical precipitation for inorganics and carbon adsorption for organics, with a nominal treatment capacity of 20 gpm, approximately 6 months of operation with a plant availability of 85%., will be required. We have assumed that this plant will be skid mounted and be relocated from SA 8 to SA 9; once started up, it will run essentially unattended with a qualified operator spending two days per week at the site. This cost for the is contained in line 7, Treatment Process and Operation. The operations cost, once started-up is line 8, O&M. Our cost estimate for the tasks is as follows:

1 Treatability Studies	$5,000
2 Design (required)	$10,000
3 Mobilization/Site Prep	$15,000
4 Well Installation	$20,000
5 Utilities	$3,000
6 Miscellaneous Equipment	$10,000
7 Treatment Process and Ops	$75,000
8 O&M (required)	$7,000 per month
9 Site Restoration	$5,000

This assumes that process sampling, analytical, permitting, and reporting will be provided by others and that the sites are accessible and commercial power and water are available for connection. Three collection wells (4") in and two monitoring wells (2") will be installed in each SA.

We would like to talk to you about this in more detail and with that discussion.

Our ref.:
OurRef/hla gw

ARCADIS GERAGHTY & MILLER

ARCADIS Geraghty & Miller, Inc
14497 North Dale Mabry Highway
Suite 240
Tampa
Florida 33618
Tel 813 264 3506
Fax 813 962 0867

TELEFAX

To: Michael Renga
HLA

Copies:

BUSINESS UNIT

Fax:

Date: 10-28-98

From: Mike Mann

Total pages: 2

Extension:

Our ref.:

Subject: GW Remediation

If you do not receive all pages, please call to let us know as soon as possible.

Michael -
Response to your request.

M

THIS MESSAGE IS INTENDED ONLY FOR THE USE OF THE INDIVIDUAL OR ENTITY TO WHICH IT IS ADDRESSED AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED, CONFIDENTIAL, AND EXEMPT FROM DISCLOSURE UNDER APPLICABLE LAW. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone and return the original message to us at the above address via the U.S. postal service.

PROJECT	COMP. BY	JOB NO.
Calc vol of concrete pads at SAE For Alternatives S-1 to S-5	MSC	2546.51
	CHK. BY	DATE
	MMC	10/19/88

1.2 Tons/cu yd

Assumptions

① Concrete pads are 1.5' Thick

② Shaded Structures on Attached Map (13) have pads

③

① 19 x 10 = 190 ft² x 1.5' = ~~285 ft³~~

② 56 x 23 = 1288 ft² x 1.5' = 1,932 ft³

③ 45 x 20 = 900 ft² x 1.5' = 1,350 ft³

④ 5 x 6 = 30 ft² x 1.5' = ~~45 ft³~~

⑤ 6 x 5 = 30 ft² x 1.5' = ~~45 ft³~~

⑥ 28 x 14 = 392 ft² x 1.5' = 588 ft³

⑦ 8 x 15 = 120 ft² x 1.5' = 180 ft³

⑧ 5 x 5 = 25 ft² x 1.5' = ~~38 ft³~~

⑨ 10 x 19 = 190 ft² x 1.5 = 285 ft³

⑩ 12 x 21 = 252 ft² x 1.5 = 378 ft³

⑪ 11 x 15 = 165 ft² x 1.5 = 248 ft³

⑫ 5 x 5 = 25 ft² x 1.5 = ~~38 ft³~~

⑬ (28 x 19) + (4 x 10) + (3 x 3) + (3 x 3) = 780 x 1.5 = 1170 ft³

$\boxed{\sum 1 \ldots 13 = 6{,}582 \text{ ft}^3}$

For concrete

1 ft³ = 94 Lbs

and ~ 2200 Lbs/Ton

∴ There are $\boxed{0.04273 \text{ Tons/ft}^3}$

or $\boxed{23.40 \text{ ft}^3/\text{Ton}}$

∴

6,582 ft³ / 23.40 ft³/Ton =

$\boxed{\sim 280 \text{ Tons}}$

$\sum 2,3,6,7,9,10,13 = 5883 \text{ ft}^3$

5883/23.4 = $\boxed{251 \text{ Tons}}$

FORM 00.01 REV. 4/81

ABB Environmental Services, Inc.

PROJECT	COMP. BY	JOB NO.
NTC ORLANDO: S-3 Phytoremediation	MBC	2546.51
	CHK. BY MJK	DATE 10/23/98

From Volume of COC Calculations

① STUDY AREA 8 Around Site (square) to Shoreline

315' x 383' = 120,645 ft² to Cover

STUDY AREA 9 Just the ditches

Length x width

143' x 3' = 429 ft² + Area around ditches Approx double ∴

860 ft² to Cover

② Fencing

SA 8 (315*2) + 383 = 1013 LF

SA9 (12*2) + (160*2) = 344 LF

1350 Total

③ Acres to Plant 120,645
+ 860
121,505 ft²

43,560 ft²/Acre

∴ 2.79 Acres to Plant

FORM 00.01 REV. 4/81

ABB Environmental Services, Inc.

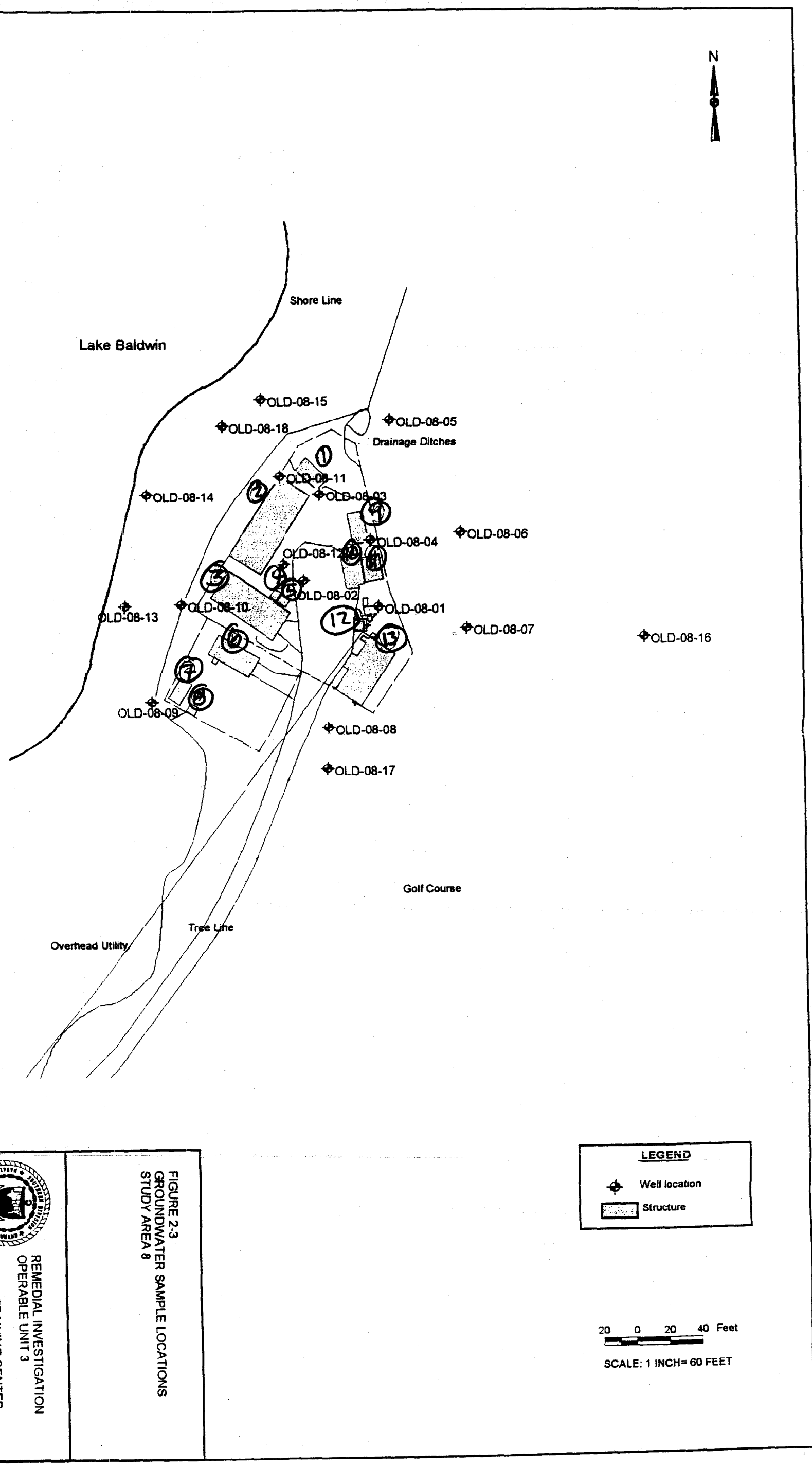

FIGURE 2-3
GROUNDWATER SAMPLE LOCATIONS
STUDY AREA 8

REMEDIAL INVESTIGATION
OPERABLE UNIT 3
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

0019D052