N00174.AR.000263
NSWC INDIAN HEAD
5090.3a

Remedial Investigation Report

Site 12 - Town Gut Landfill
Site 39/41 - Organics Plant/Scrap Yard
Site 42 - Olsen Road Landfill
Site 44 - Soak Out Area

Indian Head Division
Naval Surface Warfare Center
Indian Head, Maryland

VOLUME II - APPENDICES

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command
Contract Number N62472-90-D-1298
Contract Task Order 0245

FINAL

July 1999

TETRA TECH NUS, INC.

APPENDIX A

SAMPLE LOG SHEETS

Appendix A.1	**Surface Water**
Appendix A.2	**Sediment**
Appendix A.3	**Surface Soil**
Appendix A.4	**Groundwater**

APPENDIX A.1

SURFACE WATER

SITE 12:	6 SAMPLES
SITE 39/41:	6 SAMPLES
SITE 42:	4 SAMPLES

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: HEAD INDIAN RI
Project No.: 7129

[] Stream
[] Spring
[✓] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: S12SW0010001
Sample Location: POND TOWARDS LANDFILL
Sampled By: FLR
C.O.C. No.: 1 and 7

Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-7-97 Time: 1630 Depth: SURFACE Method: DIRECT FILL	CLEAR	8.12	.502	25	22	12.66	.02	—

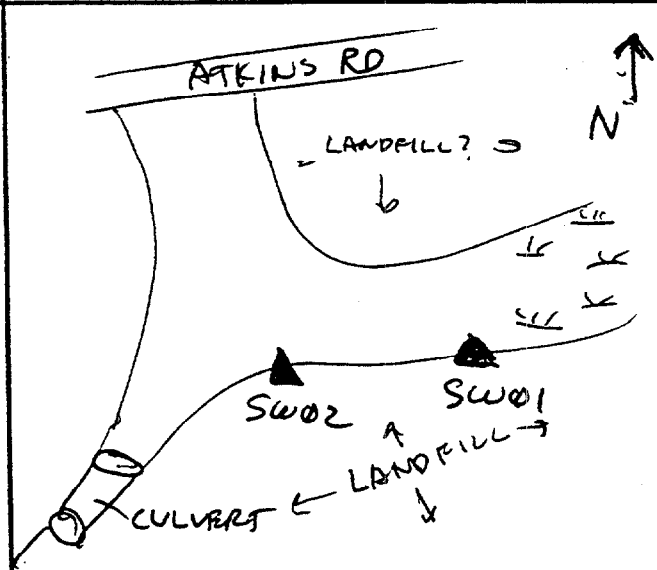
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3 x 40 ml VIAL	✓
TCL S-VOA	—	1 x 1 l AMB GLASS	✓
TAL METALS + ARSENIC	HNO_3	1 x 500 ml HDPE	✓
~~TAL~~ TCL PESTS/PCB	—	1 x 1 l AMB GLASS	✓
CYANIDE		1 x 500 ml	10/14/97

OBSERVATIONS / NOTES:

COLLECT CN @ 1630

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI SITE 12
Project No.: 7129

[] Stream
[] Spring
[✓] Pond
[] Lake
[] Other: _____
[] QA Sample Type: _____

Sample ID No.: S12SW0020001
Sample Location: POND DOWG LANDFILL
Sampled By: FWR
C.O.C. No.: 1 of 7

Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-7-97 Time: 1600 Depth: SURFACE Method: DIRECT FILL	CLEAR	7.25	.504	24.4	62	7.23	0.02	—

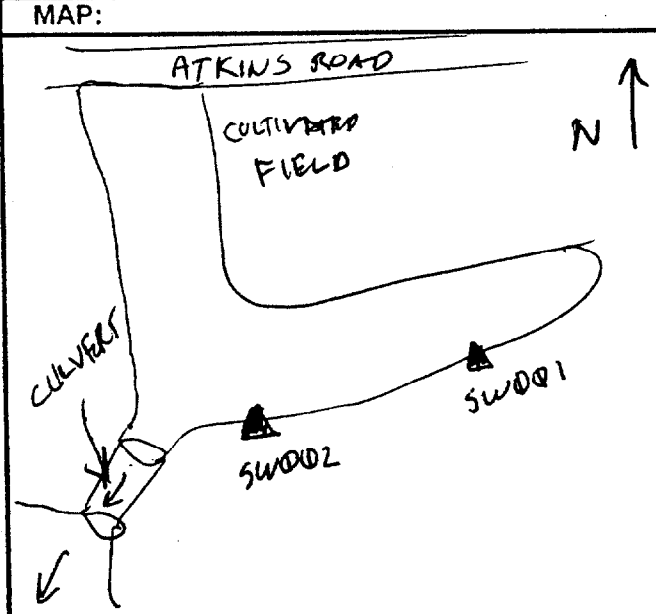
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x 40ml VIAL	
TCL S-VOA	—	1x 1l AMB GLASS	
TAL METAL + ARSENIC	HNO_3	1x 500ml HDPE	
PEST/PCB	—	1x 1l AMB GLASS	
~~CYANIDE~~ CYANIDE	NaOH	1x 500ml HDPE	10-14-97

OBSERVATIONS / NOTES:

CN COLLECTED @ 1635

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Fred W Ramer

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI SITE 12
Project No.: 7129

[] Stream
[] Spring
[✓] Pond
[] Lake
[] Other: _____
[] QA Sample Type: _____

Sample ID No.: S12SW0030001
Sample Location: POND, DOWNGRADIENT LANDFILL
Sampled By: FWR
C.O.C. No.: 157

Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-7-97	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Time: 1455								
Depth: SURFACE	CLEAR	7.36	.533	25.4	29	8.68	0.02	
Method: DIRECT FILL								

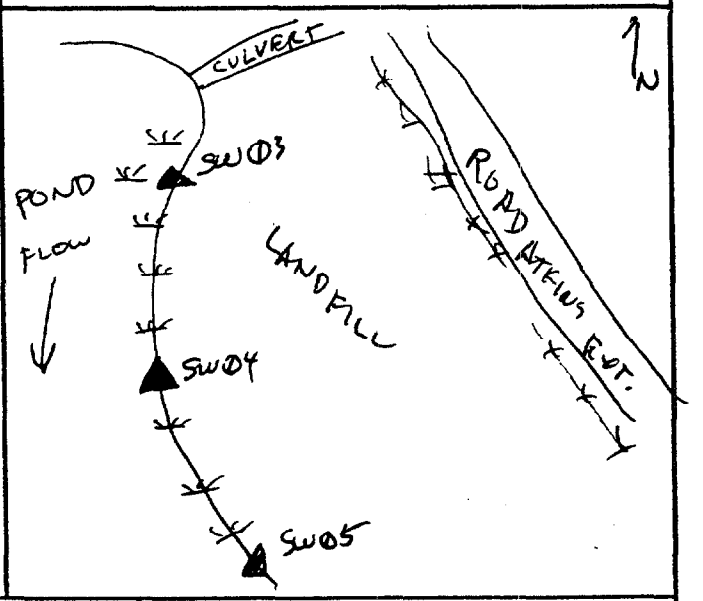
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3 x 40ml	
TCL S-VOA	– 4oC	1 x 1 l AMB	
TAL METAL + ARSENIC	HNO_3	1 x 500ml HDPE	
PEST/PCB	– 4°C	1 x 1 l AMB.	
CYANIDE	NaOH	1 x 500ml HDPE	10-14-97

OBSERVATIONS / NOTES:

CN COLLECTED @ 1640

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Fred Ramsa

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIANHEAD SITE 12
Project No.: 7129

[] Stream
[] Spring
[X] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: S12SW0040001
Sample Location: POND CENTER
Sampled By: SWR
C.O.C. No.: L & 7

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-7-97 Time: 1430 Depth: SURFACE Method: DIRECT FILL	CLEAR	7.16	~~.525~~ .532	25.0	21	~~8.7~~ 10.38	0.02	—

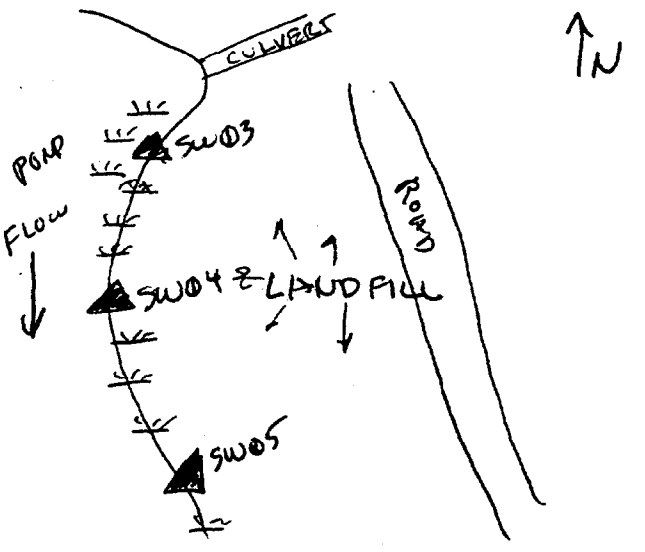
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3 x 40ml VIAL	✓
TCL SVOA	—	1 x 1 LAMB GLASS	✓
TAL METAL + ARSENIC	HNO_3	1 x 500ml HDPE	✓
PEST/PCB	—	1 x 1 LAMB GLASS	✓
CYANIDE	NaOH	1 x 500ml HDPE	10-14-97

OBSERVATIONS / NOTES:

CN COLLECTED @ 1642

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Steve W Ramsey

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 12
Project No.: 7129

[] Stream
[] Spring
[x] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: S12SW0005 0041
Sample Location: POND, DOWNGRADIENT LANDFILL
Sampled By: FWR
C.O.C. No.: 157

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-7-97								
Time: 1400								
Depth: SURFACE	Clear	6.88	.572	23.2	+22	10.90	.02	—
Method: DIRECT FILL								

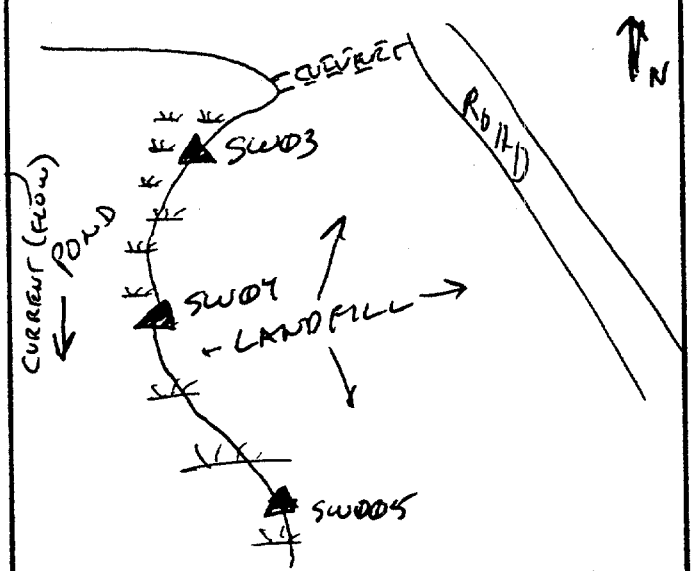
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x40mL	✓
TCL S-VOA	4°C	1x1L AMB	✓
TAL METALS + AS	HNO_3	1x500mL HDPE	✓
PEST/PCBs	4°C	1x1L AMB	✓
CYANIDE	NaOH	1x500mL HDPE	10-14-97

OBSERVATIONS / NOTES:

Cn collected at 1644

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Fred W Ramsey

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 7129

[] Stream
[] Spring
[✓] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: S12SW0060001
Sample Location: POND TOWARDS LANDFILL
Sampled By: FMR
C.O.C. No.: 1 of 7

Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-7-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1730	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: SURFACE	CLEAR	7.24	.506	24.0	25	7.08	.02	—
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

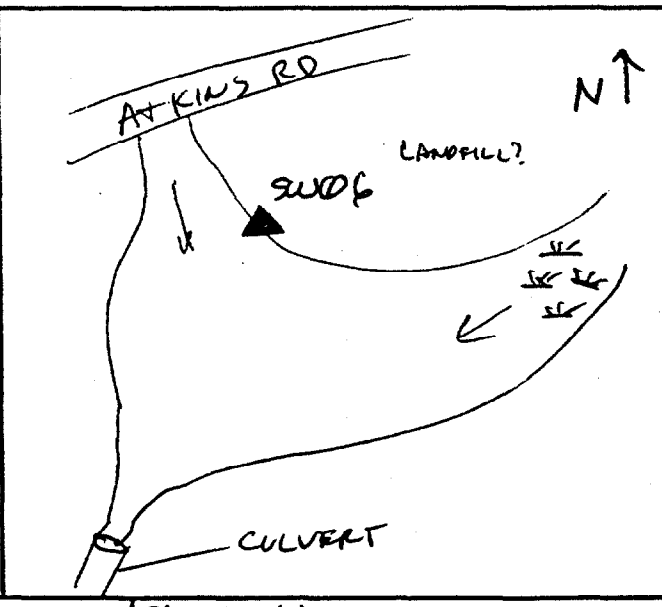
Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x40ml VIALS	✓
TCL S-VOA	—	1x1L AMB GLASS	✓
TAL METALS + ARSENIC	HNO3	1x500ml HDPE	✓
PEST/PCB	—	1x1L AMB GLASS	✓
CYANIDE	NaOH	1x500ml HDPE	10-14-97

OBSERVATIONS / NOTES:

CYANIDE COLLECTED 1645 HRS

Dup taken here.

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.: S12DUP0001 TIME 0000

Signature(s): Fred M Ramer

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - 21
Project No.: 7129

Sample ID No.: S39SW001000 1
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: 10

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-21-97 Time: 1400 Depth: Surface Method: Direct All	Clear	8.03	1.91	15.	0	12.86	0.09	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	3 40 ml vials	
TCL SVOC	4°	1 L amber	
TAL metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

Collected from same location as S39SD001 location.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - RI
Project No.: 7129

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: S39 SW 002 0001
Sample Location: Site 39 141
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-21-97 / Time: 1415 / Depth: Surface / Method: direct All	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	Clear	8.23	1.91	14.8	0	12.15	0.08	-

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	3 40 ml vials	
TCL SVOC	40	1 1 L amber	
TAL metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

collected from same location as S39SD003

Directly in front of Building 497 pipe outfall

MAP:

Circle if Applicable:

MS/MSD ✓

Duplicate ID No.: S39 DUP 08

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - RI
Project No.: 7124

Sample ID No.: S39SW0030001
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: # 10

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-21-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1440	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: Surface	Clear	8.28	1.91	14.7	0	12.51	0.09	—
Method: Direct Fill								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	(3) 40 ml vials	
TCL SVOC	4°	1 1 L amber	
TAL metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

collected from same location as S39SD005.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - A1
Project No.: 7129

Sample ID No.: S39SW004 0001
Sample Location: site 39/41
Sampled By: CF
C.O.C. No.: # 10

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-21-97 Time: 1450 Depth: Surface Method: Direct Fill	clear	8.23	1.90	14.3	0	11.79	0.08	-

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	(3) 40 ml vials	
TCL SVOC	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

collected from same location as S39SD006.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - RI
Project No.: 7124

Sample ID No.: S39SW005 0001
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: #11

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-21-97 Time: 1500	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: Surface Method: Direct Fill	Clear	8.14	1.89	14.3	0	11.84	0.08	–

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	(3) 40 ml vials	
TCL SVOC	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

Collected from same location as S39SD007.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - A1
Project No.: 7129

Sample ID No.: S39SW006000
Sample Location: S.K 39/41
Sampled By: CF
C.O.C. No.: #11

[X] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-21-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1510	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: Surface	Clear	8.25	1.85	14.6	0	13.01	0.08	—
Method: Direct Fill								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	3 40 ml vials	
TCL SVOC	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

Collected from same location as S39SD008.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD
Project No.: 7129

[✓] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: S42SW0001 0001
Sample Location: SITE 42
Sampled By: PWR
C.O.C. No.: #3

Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-10-97								
Time: 1650								
Depth: SURFACE	LT BRN	5.32	.054	23.2	400	4.66	0.00	—
Method: DIRECT FILL								

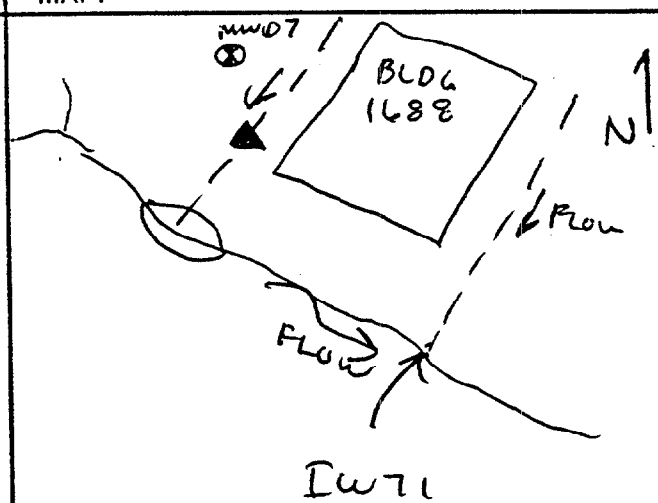
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL METALS	HNO_3		
CN	NaOH		

OBSERVATIONS / NOTES:

MOVED SAMPLING LOCATION DOWN STREAM ~50-75' TO 1ST LOCATION WHERE WATER WAS AVAIL.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 7129

[✓] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: S42SW0020001
Sample Location: SITE 42 DRAINAGE
Sampled By: FAUR
C.O.C. No.: #2

Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-10-97 / Time: 1620	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: SURFACE / Method: DIRECT FILL	LT. BRN	6.10	.128	22.0	161	2.33	0.00	–

SAMPLE COLLECTION INFORMATION:

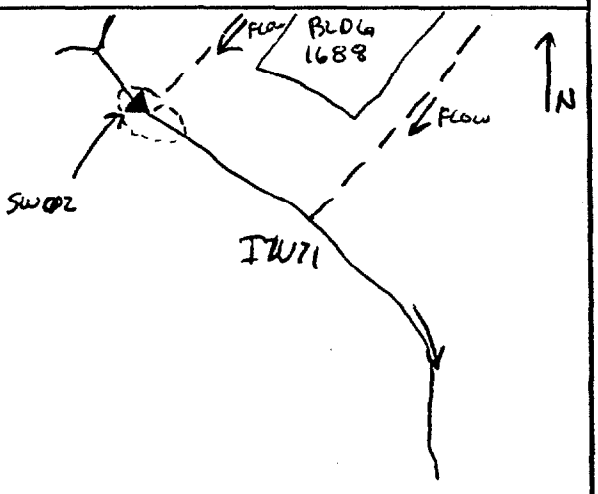
Analysis	Preservative	Container Requirements	Collected
TAL METALS	HNO_3	500 ml	✓
CN	NaOH	500 ml	–

OBSERVATIONS / NOTES:

PONDED WATER
VERY/SLIGHT TURBIDITY

Dup. taken here

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.: S42DUP0003

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD ~~HEAD~~ RI
Project No.: 7129

[✓] Stream
[] Spring
[] Pond
[] Lake
[] Other: _____
[] QA Sample Type: _____

Sample ID No.: S42SW0030001
Sample Location: STREAM
Sampled By: RWR
C.O.C. No.: #2

Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

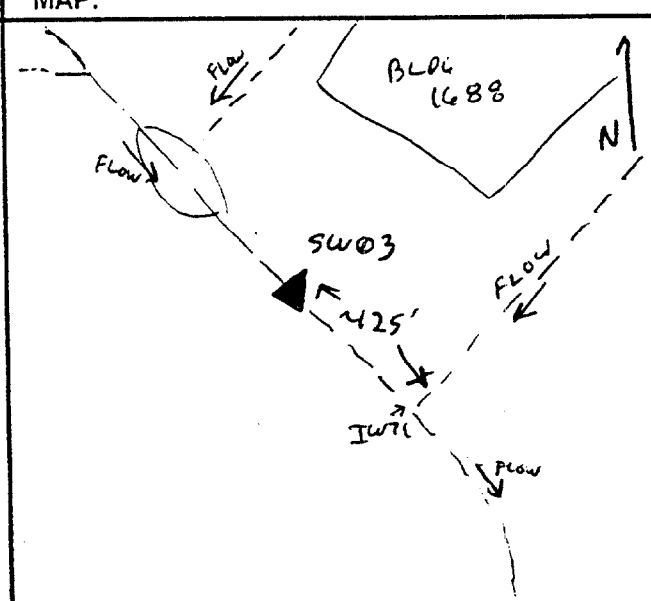
	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-10-97 Time: 1600 Depth: SURFACE Method: DIRECT FILL	CLEAR YELLOW	7.01	.200	21.5	794	~~7.54~~ 3.46	0.00	—

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL METALS	HNO_3	500 ml HDPE	
CYANIDE	NaOH	500 ml HDPE	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 7129

Sample ID No.: 342SW0040001
Sample Location: SITE 42
Sampled By: RLR
C.O.C. No.: 2

- [x] Stream
- [ ] Spring
- [ ] Pond
- [ ] Lake
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

SAMPLING DATA:

Date: 10-10-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1345	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: SURFACE	CLEAR	7.22	.464	23.2	242	9.44	.01%	—
Method: DIRECT FILL								

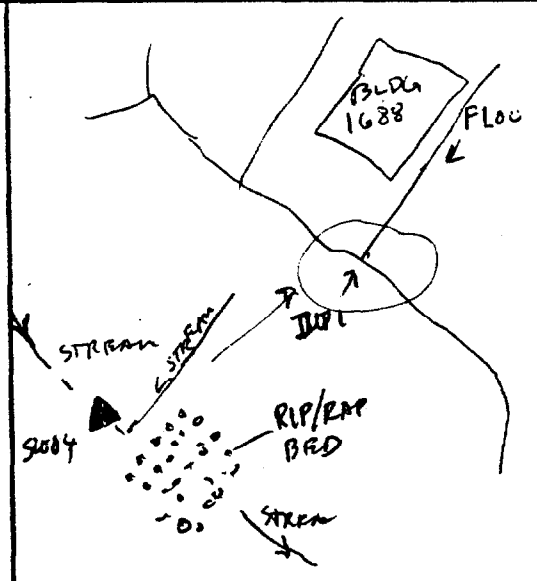
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TAL METALS	HNO_3	1x500ml HDPE	–
CYANIDE	$NaOH_3$	1x500ml HDPE	–

OBSERVATIONS / NOTES:

COLLECTED @ IW71

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

APPENDIX A.2

SEDIMENT

SITE 12:	6 SAMPLES
SITE 39/41:	8 SAMPLES
SITE 42:	6 SAMPLES

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S12SD00801001
Sample Location: Site 12
Sampled By: CF
C.O.C. No.: B

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10-20-97	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1650	0-6"	Black	Sandy - organic. Gravelly.
Method: S.S. Shovel / Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:			N.A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pesticides / PCBs	8 oz		
TAL metals	8 oz		
TOC	8 oz		
SEM / AVS	8 oz		
Explosives	4 oz		

OBSERVATIONS / NOTES:

collected near S12SW001 location

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: SB-S12SD002-0001
Sample Location: Site 12
Sampled By: CF
C.O.C. No.: B

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-20-97 Time: 1720 Method: SS. trowel Monitor Reading (ppm): -	0-6"	olive brown	Silty clay with sand & gravels

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
" SVOC	8 oz		
" Pest. / PCBs			
TAL metals			
TOC	8 oz		
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected near S12SW002 loc'n.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S12 SD0030001
Sample Location: Site 12
Sampled By: PMD
C.O.C. No.: 8

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-20-97 Time: 1625 Method: S.S. Auger / Trowel Monitor Reading (ppm): —	0-6"	Olive brown	Silty clay - some sand and gravel

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pesticides / PCB's			
TAL metals (As)	8 oz		
TOC			
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

collected near S12SW003 location.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Pamela D.

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S12SD004 0001
Sample Location: SIK 12
Sampled By: PMD
C.O.C. No.: 8

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-20-97 Time: 1445 Method: S.S. Auger / Trowel Monitor Reading (ppm): —	0-6"	Olive-gray	Silty clay - some sand and gravel.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N/A	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pesticides / PCB's			
TAL metals (w/ As)(Cn)	8 oz		
TOC			
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

collected near S12SW004 location

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.: final: 0000 S12 DUP007

Signature(s): Paul M. [illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S12SD005 0001
Sample Location: Site 12
Sampled By: PMP
C.O.C. No.: 8

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-20-97 Time: 1400 Method: S.S. Auger/trowel Monitor Reading (ppm): —	0-6"	olive-gray	Silty clay - some sand - trace of gravel

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N.A.	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pesticides / PCB's			
TAL metals w/ As. / Cn			
TOC	8 oz		
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected near S12SW005 location.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Paul M. D[illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S12SD006 0001
Sample Location: Site 12
Sampled By: PMD
C.O.C. No.: B

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-20-97 Time: 1700 Method: SS Auger / trowel Monitor Reading (ppm): —	0-6"	olive brown	silty clay - some sand and gravels

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N.A.	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pesticides / PCB's			
TAL metals	8 oz		
TOC			
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

collected near S12SW006 location

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - A1
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S39SD001 0001
Sample Location: Site 39 SD41
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-21-97	~~bright~~ 0-6" ~~brown~~ PMD	light brown	Sand - Some silt, not much gravel.
Time: 1110			
Method: Auger / Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pest. / PCB			
TAL Metals			
TOC	8 oz		
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected ≈ 100' west of Bldg. 497 pipe outfall. 10' off shore. water was 3½'-deep.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - R1
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S39SD002 0001
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-21-97 Time: 1050 Method: S.S. Auger/Trowel Monitor Reading (ppm): —	0-6"	med. Brown	Sand & Silt with gravels and pebbles.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pest./PCB	8 oz		
TAL metals	8 oz		
TOC	8 oz		
SEM/AVS	8 oz		
Explosives	4 oz		

OBSERVATIONS / NOTES:

collected 20' west of bldg. 497 pipe outfall; 8' offshore, water was 3' deep.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head N1
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S39SD003 0001
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10-21-97	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1630	0-6"	dark brown	Sand - Some silt with gravels & pebbles
Method: SS. Auger & Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pest / PCB			
TAL metals	8 oz		
TOC			
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected directly in front of Pipe outfall (Bldg. 497). 2'-off Shore. water was 1-foot deep.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - RI
Project No.: 7129

[] Surface Soil
[X] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S39SD004 0001
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-21-97 Time: 1015 Method: S.S. Auger/trowel Monitor Reading (ppm): -	0-6"	Brown	Sand & silt with a lot of gravel and pebbles

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N.A.	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL pest./PCB's			
TAL metals			
TOC	8 oz		
SEM/AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

collected 15' east of pipe outfall from Bldg. 497 and 15' off shore. water was 2' deep.

MAP:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - 21
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S39SD005001
Sample Location: Site 39 / 41
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10-21-97	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1200	0-6"	grayish-brown	Sandy Silt.
Method: Hand Auger / Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pest. / PCB			
TAL metals	8 oz		
TOC			
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected 20' off shore; ~ 300' east of Bldg 497 pipe outfall. Water was 4 feet deep.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - R1
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S39SD006WD
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-21-97 Time: 1230 Method: Hand Auger / Trowel Monitor Reading (ppm): —	0-6"	Brown & Black	Cinders, wood, broken brick fragments, (fill) Sand & silt.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4oz		
TCL SVOC	8oz		
TCL Pest. / PCB			
TAL metals	8oz		
TOC			
SEM / AVS			
Explosives	4 oz		

OBSERVATIONS / NOTES:

collected 20'-25' off shore (near wood pilings) 100' to 150' west of pilings. (250'-300' east of SED #005 location.) Water was 6-8' deep.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - R1
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[X] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S39 SD 007 0001
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-21-97 Time: 1300 Method: Auger / trowel Monitor Reading (ppm): —	0-6"	Black	Organic silts and clays (mud)

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pest. / PCB's	8 oz		
TAL metals	8 oz		
TOC	8 oz		
SEM / AVS	8 oz		
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected 25'-50' west of Bldg. 1690 dock (hoist); 12-feet off-shore. water was 6' deep.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SEDIMENT ~~SURFACE WATER~~ SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - RI
Project No.: 7129

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Sediment
[] QA Sample Type:

Sample ID No.: S39 SD 0060001
Sample Location: Site 39/41
Sampled By: CF
C.O.C. No.: 10

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Date: 10-21-97								
Time: 1320								
Depth: 0-6"				N.A				
Method: Auger / Trowel								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	4°	4 oz	
TCL SVOC	4°	2	
TCL Pest / PCB	4°	8 oz	
TAL metals	4°	2	
TOC	4°	8 oz	
SEM / AVS	4°		
Explosives	4°	4 oz	

OBSERVATIONS / NOTES:

Black organic silts and clays

Collected 300' east of Bldg. 1690 dock corner. 10-15' off shore. water was 6' deep.

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[x] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S42SD0010001
Sample Location: SITE 42
Sampled By: FUR
C.O.C. No.: 2

Type of Sample:
[x] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-10-97 Time: 1400 Method: S.S. TROWL Monitor Reading (ppm): —	0-3"	YEL BRN GRAY/GREEN	SILT + f-g SAND SATURATED

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

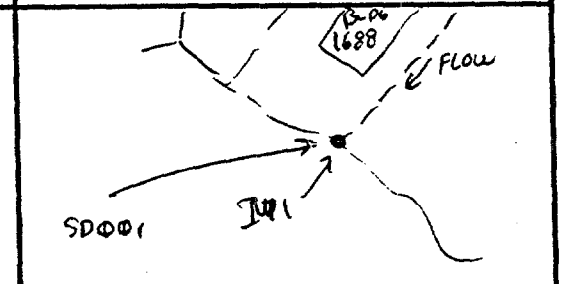
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL METALS	8oz		
CN			
TOC			
SEM/AVS			

OBSERVATIONS / NOTES:

RUNNING WATER
COLLECTED @ 1071

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[✓] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S42SD00200001
Sample Location: STREAM
Sampled By: PLR
C.O.C. No.: #2

Type of Sample:
[✓] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-10-97 Time: 1610 Method: S.S. TROWEL Monitor Reading (ppm): —	0-3"	DK GREY GREEN	SILT + CLAY

COMPOSITE SAMPLE DATA:

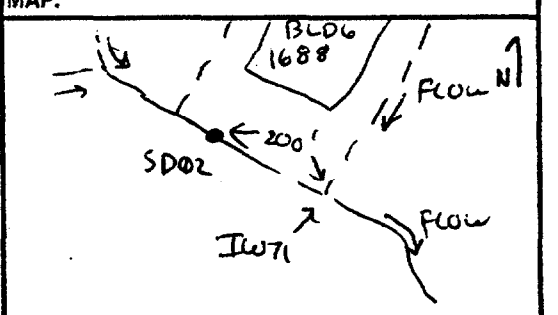
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL METALS	8oz		
CN			
TOC			
SEM/AVS			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[✓] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S42SD003000001
Sample Location: SITE 42
Sampled By: PWR
C.O.C. No.: 3

Type of Sample:
[✓] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-10-97 Time: 1645 Method: S.S. TROWEL Monitor Reading (ppm): —	0-3"	YEL BRN	f-g SAND DRY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

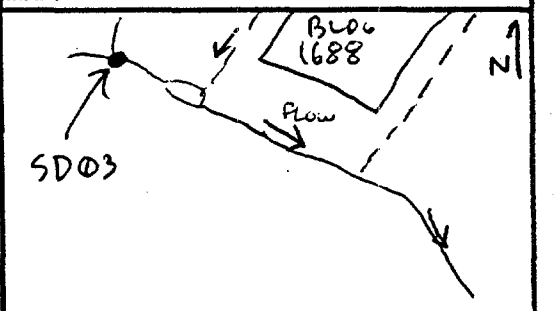
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
DALMETALS	8oz	✓	
CN		✓	
TOC		✓	
SEM/AVS		✓	

OBSERVATIONS / NOTES:

DRY BED

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Fred U Ramser

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[x] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S42SD0040001
Sample Location: SITE 42
Sampled By: FVR
C.O.C. No.: #3

Type of Sample:
[x] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-10-97	0-3"	GREY	SILT + CLAY SAT.
Time: 1635			
Method: S.S. TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

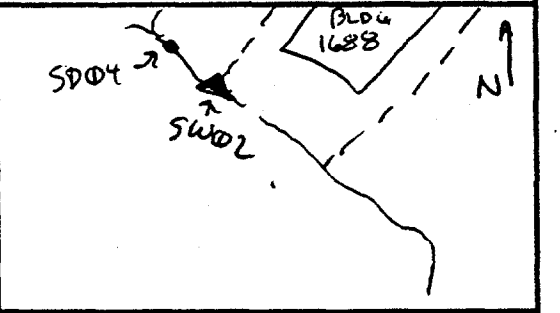
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL METALS	8oz		
CN			
TOC			
SEM/AVS			

OBSERVATIONS / NOTES:

RUNNING H_2O
~125' UPSTREAM OF SW02

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[✓] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S42SD0050001
Sample Location: STREAM SITE 42
Sampled By: FVR
C.O.C. No.: 2

Type of Sample:
[✓] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-10-97 Time: 1300 Method: S.S. TROWEL Monitor Reading (ppm): —	0-3'	GREENISH GREY BROWN	SILT TR FG SAND ABOVE SILTY CLAY.

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

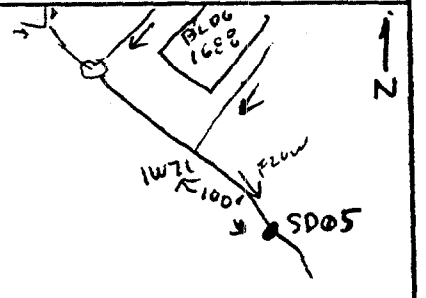
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL METALS	8 oz WMG	✓	
CN			
TOC			
SEM/AVS			

OBSERVATIONS / NOTES:

DRY STREAM BED

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[✓] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S42SD0060001
Sample Location: SD06 SITE 42
Sampled By: FWR
C.O.C. No.: #2

Type of Sample:
[✓] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

Date: 10-10-97	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1250	0-3"	GREEN GREY	CLAYEY SILT W/SOME FG SAND SATURATED
Method: S.S. TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

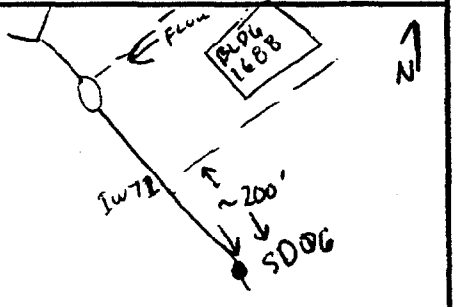
Analysis	Container Requirements	Collected	Other
TAL METALS	8oz WMG	✓	
CN			
TOC			
SEM/AVS			

OBSERVATIONS / NOTES:

RUNNING WATER

DUP. taken here.

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.: S42DUP601

Signature(s): Fred W Ramer

APPENDIX A.3

SURFACE SOIL

SITE 12:	5 SAMPLES
SITE 39/41:	9 SAMPLES
SITE 42:	3 SAMPLES
SITE 44:	4 SAMPLES

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head RI
Project No.: 7129

Sample ID No.: S12 SS 001 0001
Sample Location: Site 12
Sampled By: CF
C.O.C. No.: 8

[X] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-20-97 Time: 1450 Method: S.S. Trowel Monitor Reading (ppm): —	0-6"	Dark brown	Organic loam - trace of sand

COMPOSITE SAMPLE DATA:

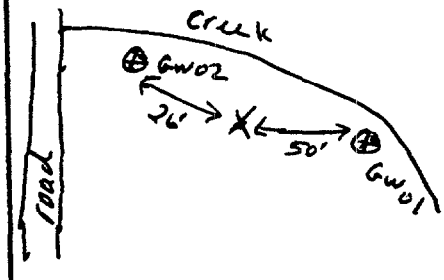
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pesticides / PCB's			
TAL metals Ag/Cn	8 oz		
Explosives	4 oz		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

[X] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: S12SS002 0001
Sample Location: Site 12
Sampled By: CF
C.O.C. No.: 8

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-20-97 Time: 1500 Method: S.S. Trowel Monitor Reading (ppm): —	0-6"	brown	Sandy organic loam mix trace of gravel

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N.A.	
Monitor Readings (Range in ppm):				

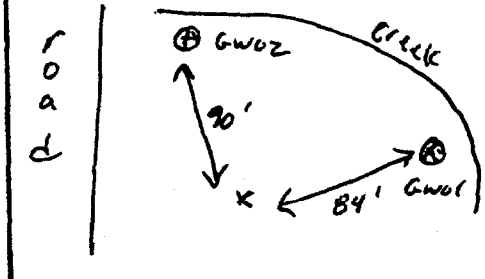
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pesticides / PCB's	8 oz		
metals	8 oz		
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected at site slope bottom

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

Sample ID No.: S12 SS 003 0001
Sample Location: Site 12
Sampled By: CF
C.O.C. No.: 8

[X] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10.20.97 Time: 1425 Method: S.S. Trowel Monitor Reading (ppm):	~~Dark~~ 0-6" ~~Brown~~	Dark brown	organic loam - trace of gravel

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

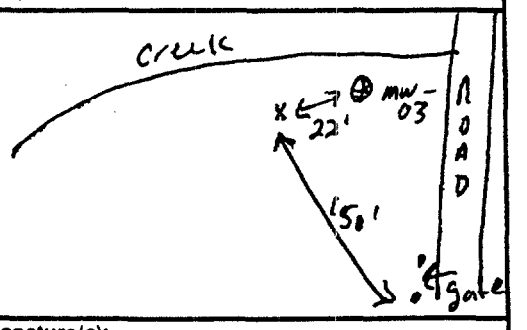
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	} 8 oz		
TCL Pesticides / PCBs	}		
TAL metals (As) (Cr)	8 oz		
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected at overall site slope bottom.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

Sample ID No.: S12SS0040001
Sample Location: SITE : 12
Sampled By: C.F
C.O.C. No.: ~~4B~~ 8

- [x] Surface Soil
- [ ] Subsurface Soil
- [x] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-20-97 Time: 1350 Method: S.S. Trowel Monitor Reading (ppm): —	0-6"	Dark Brown	Organic - trace of gravel

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

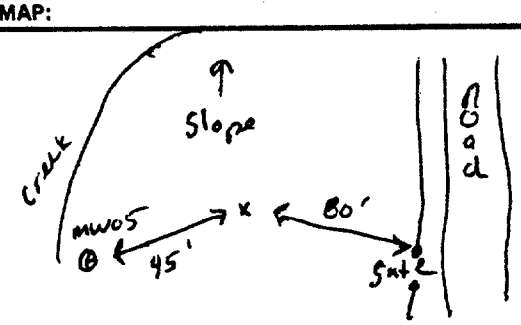
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	8 oz		
TCL Pesticides / PCB's			
TAL metals w/ arsenic/Cn	8 oz		
Explosives	4 oz		

OBSERVATIONS / NOTES:

Collected from localized low point in area.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head
Project No.: 7129

Sample ID No.: S12SS0050001
Sample Location: Site 12
Sampled By: CF
C.O.C. No.: 8

[X] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

Date: 10-20-97	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1600	0-6"	Brown	Sandy organic loam mix with trace of gravel.
Method: S.S. Trowel			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
			N.A.	
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC	4 oz		
TCL SVOC	2		
TCL Pesticides / PCB's	3 8 oz		
TAL Metals	8 oz		
Explosives	4 oz		

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Site 41
Project No.: 7129

Sample ID No.: S4155001 0001
Sample Location: Site 41
Sampled By: CF
C.O.C. No.: #12

[X] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[X] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

Date: 10/22/97	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1215	6"	brown	silty sand
Method: S.S. Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

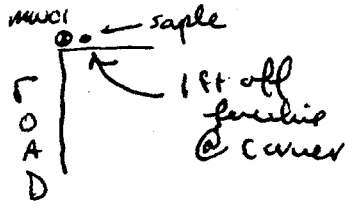
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4oz	10/22	
TCL SVOC	8oz		
TAL Met / CN			
TCL Pest / PCB			
Explosives	4oz		

OBSERVATIONS / NOTES:

collected from low point, depression near 41MW01. Possible drainage off site under fence

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
	—

Signature(s): CFarrior

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head Site 41
Project No.: 7129

Sample ID No.: 5415S002-0001
Sample Location: Site 41
Sampled By: CF
C.O.C. No.: #12

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/22/97 Time: 1223 Method: S.S. Trowel Monitor Reading (ppm): —	6"	brown	silty sand

COMPOSITE SAMPLE DATA:

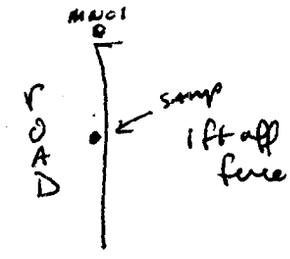
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4oz	10/22	
TCL SVOA	8oz		
TAL Met / CN			
Pest / PCB			
Explo	4oz		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Dudley Island - RI
Project No.: 7124

Sample ID No.: S41SS003 0001
Sample Location: S.D 41
Sampled By: CF
C.O.C. No.: #12

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/22/97 Time: 1240 Method: S.S. Trowel Monitor Reading (ppm): —	6"	dark brown black	silty sand

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

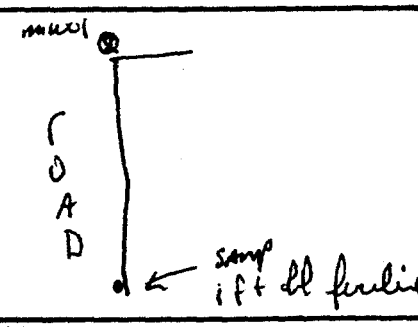
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4oz	10/22	
TCL SVOA	8oz		
TAL Met / CN			
TCL Pest / PCB			
Explo	4oz		

OBSERVATIONS / NOTES:

Sampled in area of dead, decayed leaves — potential drainage area some dark soils may be staining

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
	—

Signature(s): C Forbes

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head - R1
Project No.: 7129

Sample ID No.: S41SS0041 0001
Sample Location: S.E 41
Sampled By: CF
C.O.C. No.: #12

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/22/97 Time: 1320 Method: S.S. Trowel Monitor Reading (ppm): —	6"	dark brown	silty sand w some gravel moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

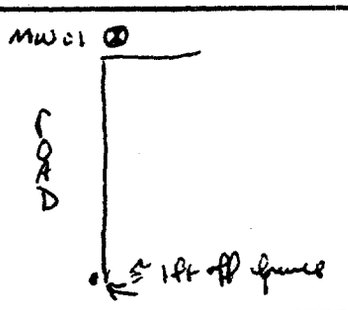
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4g	10/22	
TCL SVOA	8g		
TAL Met / CN			
Pest / PCB			
Explo	4g		

OBSERVATIONS / NOTES:

Taken from moist drainage area under fence line.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): CFarmer

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head - A1
Project No.: 7129

Sample ID No.: S41 SS005000 1
Sample Location: S:641
Sampled By: CF
C.O.C. No.: #12

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/22/97 Time: 1405 Method: S.S. Trowel Monitor Reading (ppm): —	6"	dark brown	moist silty sand w some gravel

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

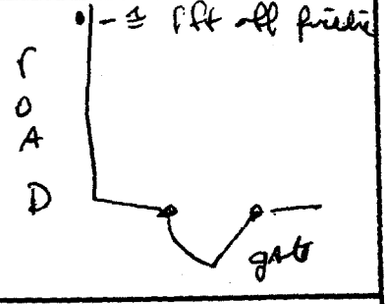
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4g	10/22	
TCL SVOA	8g		
TAL met / CN			
Pest / PCB			
Explo	4g		

OBSERVATIONS / NOTES:

collected from narrow drainage line ≈ 1ft away from fenceline

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): C Parkos

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head - R1
Project No.: 7129

Sample ID No.: S415S006 001
Sample Location: S.to 41
Sampled By: CF
C.O.C. No.: #12

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/22/97 Time: 1345 Method: S.S. Trowel Monitor Reading (ppm): –	6"	light grey	Clayey moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

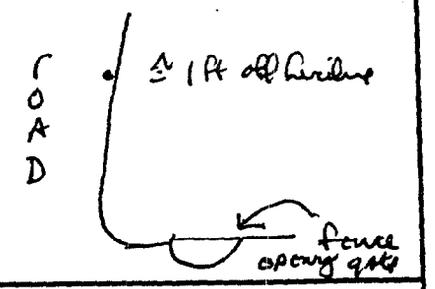
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4g	10/22	
TCL SVOA	8oz		
TAL inct / ow			
Pest / PCB			
Hypo	4g		

OBSERVATIONS / NOTES:

Collected from moist low drainage area under Remedial

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): CFarhos

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head - M1
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S4L55007000 1
Sample Location: S.6 41
Sampled By: CF
C.O.C. No.: 412

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/22/97 Time: 1420 Method: S.S. Trowel Monitor Reading (ppm): –	6"	light grey	clayey soil - moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

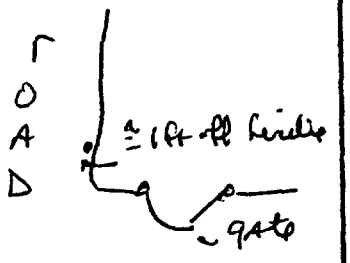
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4oz	10/22	
TCL SVOA	8oz		
TAL MCT / CN			
PCBT / PCB			
Explo	4oz		

OBSERVATIONS / NOTES:

moist drainage area 1 ft off fenceline. Possible odors detected - organic like odors - paint.

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): C Farkus

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head RI
Project No.: 7129

Sample ID No.: 54155 008 0001
Sample Location: Site 41
Sampled By: CF
C.O.C. No.: 1E 12

[x] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[x] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/22/97	6"	black	silty sand w/ gravel
Time: 1040			
Method: S.S. Trowel			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):			N.A.	

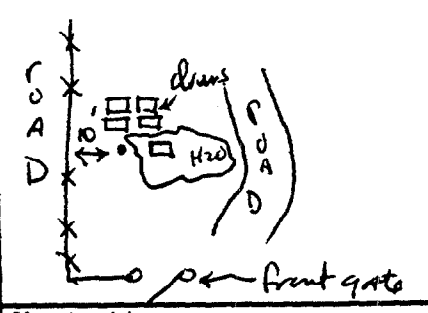
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4g	10/22	
TCL SVOA	8oz		
TAL Met / CN			
Pest / PCB			
Explo	4g		

OBSERVATIONS / NOTES:

Collected from moist area beside drums & just off from stagnant water. Collected from area of undisturbed (unpaved) soil.

MAP:



Circle if Applicable:

MS/MSD ✓ Duplicate ID No.: 54IDup 009

Signature(s): C Fathos

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head-21
Project No.: 7129

Sample ID No.: 541SS009 1001
Sample Location: S-41
Sampled By: CF
C.O.C. No.: #12

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/22/97 Time: 1025 Method: S.S. Trowel Monitor Reading (ppm): —	6"	dark brown	silty sand & gravel

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

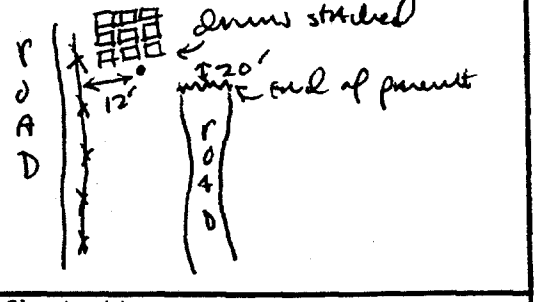
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4cy	10/22	
TCL SVOA	6 Bcy		
TAL met / CN			
Pest / PCB			
Explo	4cy		

OBSERVATIONS / NOTES:

concrete slab ≅ 6" below soil surface. Soil collected in darker soil area in moist area where drainage & settlement may occur

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): C Farkos

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD
Project No.: 7129

[x] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: S42S5001 0001
Sample Location: SITE 42
Sampled By: RYK
C.O.C. No.: 2

Type of Sample:
[x] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

Date: 10-10-97	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1330	0-6'	YEL BROWN	SILT + f-g SAND
Method: S.S. TROWEL			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

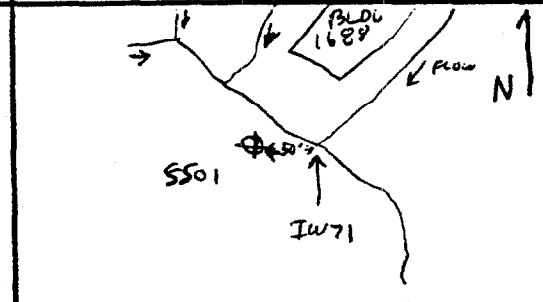
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4oz		
TCL S-VOA	8oz		
PEST/PCB			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIANHEAD RI
Project No.: 7129

Sample ID No.: S42SS002D001
Sample Location: SITE 42
Sampled By: FWR
C.O.C. No.: 2

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-10-97 Time: 1315 Method: S.S. TROWELL Monitor Reading (ppm): —	0-6"	YELBRN	SILT + f.g SAND DRY

COMPOSITE SAMPLE DATA:

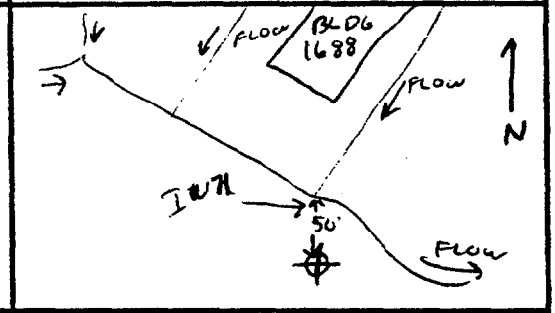
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4 oz		
TCL SVOA, ~~TAL~~ PA	8 oz		
PEST/PCB			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 7129

Sample ID No.: S42SS0003 0001
Sample Location: SITE 42
Sampled By: RCR
C.O.C. No.: 2

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-10-97 Time: 1305 Method: S. S. TROWEL Monitor Reading (ppm): —	0-6"	YEL BROWN	SILT + f-g SAND PEBBLES DRY

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

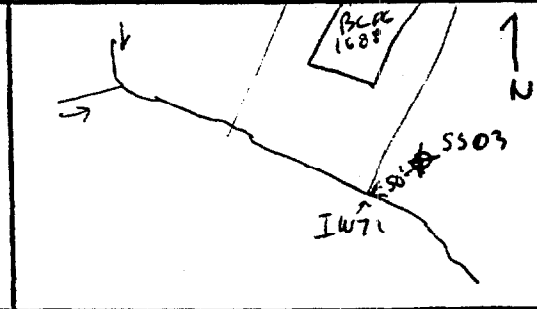
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOA	4 oz		
TCLSVOA	8 oz		
PEST / PCB			

OBSERVATIONS / NOTES:

Dup. taken here

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	S42DUP0002

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head - R1
Project No.: 7129

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: S44 SS001000 1
Sample Location: S. Ed 44
Sampled By: CF
C.O.C. No.: #14

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/23/97 Time: 1700 Method: S.S. Trowel Monitor Reading (ppm): –	6"	Dark brown	silty sand

COMPOSITE SAMPLE DATA:

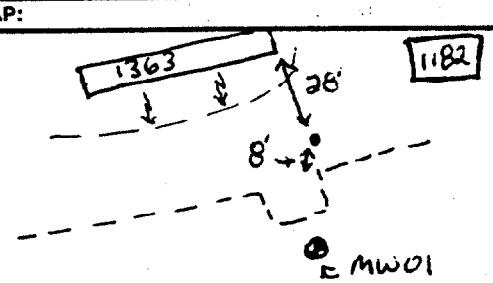
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL Metals / CN	8oz	10/23	
Ex 10	8oz	10/23	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): C Fathos

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head - RI
Project No.: 87129

Sample ID No.: S44SS002000
Sample Location: Site 44
Sampled By: CF
C.O.C. No.: # 14

- [x] Surface Soil
- [ ] Subsurface Soil
- [ ] Sediment
- [ ] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/23/97 Time: 1710 Method: S.S. Trowel Monitor Reading (ppm): –	6"	dark brown	silty sand slight moist

COMPOSITE SAMPLE DATA:

Date: 10/23	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

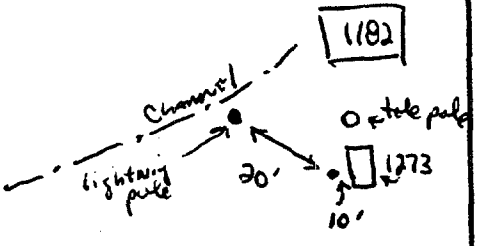
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL metal / CN	Bag	10/23	
Explo	Bag	10/23	

OBSERVATIONS / NOTES:

Collected from low point in ground. Signs of decayed grass from water collection

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): C Farhos

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head - A1
Project No.: 7129

Sample ID No.: S44 SS003 U001
Sample Location: Site 44
Sampled By: CF
C.O.C. No.: # 14

[x] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[ ] Other:
[ ] QA Sample Type:

Type of Sample:
[x] Low Concentration
[ ] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/23/97 Time: 1640 Method: S.S. Trowel Monitor Reading (ppm): —	6"	dark brown	silty sand

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

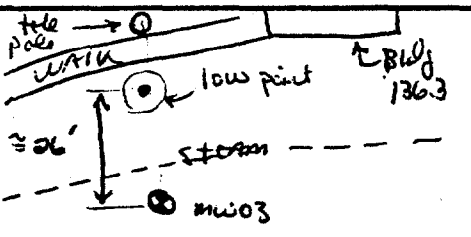
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL Metals / CN	8oz	10/23	
Explosives	4oz	" "	

OBSERVATIONS / NOTES:

Sample collected from inside ground depression.
In line w telephone pole & GW well 03

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): CSFathoi

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Indian Head - RI
Project No.: 7129

Sample ID No.: S44 SS004 0001
Sample Location: S. to 44
Sampled By: CF
C.O.C. No.: #14

[] Surface Soil
[] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/23/97 Time: 1600 Method: S.S. Trowel Monitor Reading (ppm): —	6"	rusty brown & grey	sandy soil moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):			N.A.	

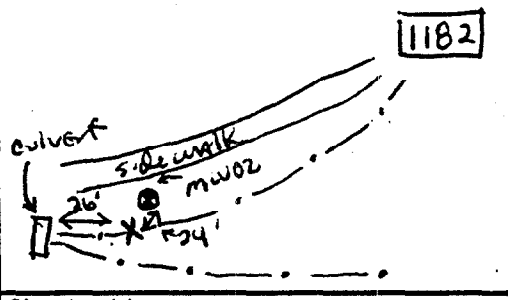
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TAL metals / CN	8oz	10/23	
Explo	4oz	10/23	

OBSERVATIONS / NOTES:

collected from under rip-rap lining of drainage channel
Soil was moist.
Collected from low point within channel

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): C Parkes

APPENDIX A.4

GROUNDWATER

SITE 12:	6 SAMPLES
SITE 39/41:	4 SAMPLES
SITE 42:	5 SAMPLES
SITE 44:	3 SAMPLES

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 7129

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S12WP001 [U/F] 001
Sample Location: WP DI SITE 12
Sampled By: FLR
C.O.C. No.: 6
Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-14-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1100	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: SLOW PURGE	CLEAR	6.64	.612	19.1	25NTU	0.71	0.02	—

PURGE DATA:

Date: 10-14-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Slow Flow	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2							
Type: 3/8" PVC	3							
Total Well Depth (TD): 8.91								
Static Water Level (WL): 2.58								
One Casing Volume(gal/L): ~.5GAL								
Start Purge (hrs): 1000								
End Purge (hrs): 1100								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 2.5GAL								

SEE PURGE DATA SHEET

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x 40ml vial	
TCL S-VOA	—	1x 1L amb. glass	
TAL Metals Total	HNO_3	1x 500ml HDPE	
Dissolved	HNO_3	1x 500ml HDPE	
Pest / PCB	—	1x 1L amb. glass	
Cyanide	NaOH	1x 500ml HDPE	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

LOW FLOW PUI : DATA SHEET

PROJECT SITE NAME: INDIAN HEAD
PROJECT NUMBER: 7129

WELL I.D.: S12 WP01
DATE: 10-14-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1000	* 3.58	100 ml							*CAN NOT MEASURE WL DURING
1003		120	18.7	6.61	.573	0.64	0.02	88	PURGE PROCESS ID. IS 1/4 in
1009		120	18.8	6.65	.578	1.09	0.02	111	DOES NOT ALLOW 1/4 IN TUBE +
1014		120	18.8	6.65	.577	3.00	0.02	261	PROBE IN WELL AT SAME
1019		~75	18.8	6.64	.586	2.49	0.02	55	TIME
1026		75	18.9	6.66	.597	0.77	0.02	41	
1032		75	18.9	6.63	.584	-0.76	0.02	21	
1037		75	18.9	6.63	.592	0.996	0.02	16	
1043			18.9	6.64	.602	0.33	0.02	14	
1050			18.9	6.65	.605	2.91	0.02	13	
1057			19.1	6.64	.612	0.71	0.02	25	

SIGNATURE(S) _____

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head RI
Project No.: 7129

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S12WP002 [illegible]
Sample Location: WP02
Sampled By: FUR
C.O.C. No.: 6
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-14-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1045	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: Peris. pump/PE tubing	CLEAR	6.65	.751	19.5	18.5	—	—	—

PURGE DATA:

Date: 10-14-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic pump	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2							
Type: PVC 3/8"	3							
Total Well Depth (TD): 10.50'								
Static Water Level (WL): 3.80'								
One Casing Volume(gal/L): ≈ .5								
Start Purge (hrs): 0933								
End Purge (hrs): 1022								
Total Purge Time (min): 49								
Total Vol. Purged (gal/L): 1.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3 x 40 ml vials	
TCL SVOA	—	1 x 1 L amb. glass	
TAL Metals Total	HNO_3	1 x 500 ml HDPE	
Dissolved	HNO_3	1 x 500 ml HDPE	
Pest / PCB	—	1 x 1 L amb. glass	
Cyanide	NaOH	1 x 500 ml HDPE	

OBSERVATIONS / NOTES:

$\frac{1}{2}(.25'')\pi^2$ = AREA
.125 = $1.23 in^2$
$1.23 in^2 \times 12 in = 14.76 in^3$

4.33×10^{-3} gal/in^3
6.39×10^{-2} gal/lin ft

.064 gal/lin ft
.383 gal

DUP. taken here

Circle if Applicable:
MS/MSD
Duplicate ID No.: S12 DUP 006

Signature(s):

LOW FLOW PU E DATA SHEET

Site 12

PROJECT SITE NAME: Indian Head A1
PROJECT NUMBER: 7129

WELL I.D.: S12-WP002
DATE: 10-14-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. (µS)	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
0933	3.80	175 ml/min	18.2	6.27	754	—	—	171	w/1/2 IN ID CAN NOT MEASURE
0938	-	100 ml	19.0	6.35	756	—	—	94.6	WL DURING PURGE PROCESS
0942		100 ml	19.4	6.46	755	—	—	82.1	
0947		75 ml	19.3	6.55	760	—	—	56.1	
0952		75 ml	19.4	6.58	760	—	—	38.3	
0957		75	19.4	6.60	755	—	—	35.0	
1002		75	19.5	6.71	753	—	—	27.7	
1007		75	19.6	6.69	753	—	—	23.7	
1012		75	19.5	6.67	751	—	—	20.5	
1017		75	19.5	6.66	750	—	—	18.2	
1022		75	19.5	6.65	751	—	—	18.5	purged 1.6 gals

SIGNATURE(S) _____

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: 77129

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S12WP003[W/F]001
Sample Location: SITE 12, WP 03
Sampled By: FR
C.O.C. No.: 6
Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10-14-97	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Time: 1500								
Method: SLOW PURGE	CLEAR	6.49	0.775	21.0	9	-0.07	0.03	—

PURGE DATA:

Date: 10-14-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: SLOW PURGE	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2							
Type: 3/8" PVC	3							
Total Well Depth (TD): ~9'								
Static Water Level (WL): 3.50								
One Casing Volume(gal/L): .5 GAL								
Start Purge (hrs): 1415								
End Purge (hrs): 1500								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): ~2 GALS								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3 x 40 ml vials	
TCL S-VOA	—	1 x 1L amber glass	
TAL METALS TOTAL	HNO_3	1 x 500 ml HDPE	
DISSOLVED	HNO_3	1 x 500 ml HDPE	
CYANIDE	NaOH	1 x 500 ml HDPE	
PEST/PCB	—	1 x 1L amber glass	

OBSERVATIONS / NOTES:

TD @ 6.5' TPVC?, BENT RISER, PUSHED 1/4" TUBING TO BOTTOM.
SLIGHT SHEEN ON WATER.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred W Ramsey

LOW FLOW PU[illegible] DATA SHEET

S12WP003C/F001

PROJECT SITE NAME: INDIAN HEAD
PROJECT NUMBER: 7129

WELL I.D.: WP03
DATE: 10-14-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1415		100 ml/min	22.1	6.67	0.93	-0.35	0.04	205	
1422			21.6	6.63	0.94	0.61	0.04	24	
1427			21.4	6.53	0.806	0.07	0.03	14	
1433			21.4	6.44	0.794	0.75	0.03	9	
1438			21.4	6.46	0.800	-0.00	0.03	8	
1445			21.4	6.45	0.861	0.09	0.03	9	
1450			20.9	6.49	0.799	0.55	0.03	9	
1455			21.0	6.49	0.795	-0.07	0.03	9	

SIGNATURE(S) _____

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD NI
Project No.: 7129

[ ] Domestic Well Data
[✓] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: S12WP004 [Y/F] 001
Sample Location: SITE 12, WP04
Sampled By: PUR
C.O.C. No.: #8
Type of Sample:
[✓] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10-14-97	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO	Salinity	Eh mV
Time: 1505		6.33						
Method: PERIST. PUMP & PE tubing	CLEAR	6.40	1.192	20.6	8.4	—	—	—

PURGE DATA:

Date: 10-14-97	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	
Method: SLOW FLOW	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter: .5 ID	2							
Well Casing Material: PVC	3							
Total Well Depth (TD): 8.80								
Static Water Level (WL): 3.25								
One Casing Volume (gal/L): ~.5								
Start Purge (hrs): 1400								
End Purge (hrs): 1500								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 1.45								

SEE LOW FLOW PURGE DATA SHEET

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x40ml VIAL	
TCL S-VOA	—	1x 1l AMB GLASS	
TAL METALS TOTAL	HNO_3	1x 500ml HDPE	
DISSOLVED	HNO_3	1x 500ml HDPE	
PEST/PCB	—	1x 1l AMB GLASS	
CYANIDE	NaOH	1x 500ml HDPE	

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred M Ramsa

LOW FLOW PUMPING DATA SHEET

PROJECT SITE NAME: Indian Head
PROJECT NUMBER: 7129

WELL I.D.: 512 WP004
DATE: 10-14-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1404		85	22	6.48	1192	—	—	192.5	
1409		100	21.5	6.31	1202	—	—	175.3	
1414		100	21.1	6.28	1224	—	—	107.8	
1419		100	20.7	6.28	1233	—	—	62.8	
1424		100	20.6	6.32	1235	—	—	54.7	
1429		100	20.6	6.34	1237	—	—	75.1	
1434		100	20.7	6.34	1244	—	—	43.6	
1439		100	20.7	6.33	1244	—	—	21.5	
1444		100	20.6	6.33	1244	—	—	14.8	purge = 1.0 gallon
1449		100	20.7	6.32	1242	—	—	12.2	
1454		100	20.6	6.33	1244	—	—	8.4	Stop pump.

SIGNATURE(S) _____

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Indian Head - R1
Project No.: 7129

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: S12GW005[X]/F[ ]
Sample Location: Site 12
Sampled By: PD
C.O.C. No.: # 15
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLE

SAMPLING DATA

Date: 10-24-97	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO	Salinity	Eh mV
Time: 0915								
Method: PE Tubing / peris.								

PURGE pump.

PURGE DATA

Date: 10-24-97	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	
Method: Slow Flow	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter: 3/8"	2		See	page	2			
Well Casing Material: PVC	3							
Total Well Depth (TD): 12.46'								
Static Water Level (WL): 7.14'								
One Casing Volume(gal/L): —								
Start Purge (hrs): 0807								
End Purge (hrs): 0903								
Total Purge Time (min): 56								
Total Vol. Purged (gal/L): 2.75								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	(3) 40 ml vial	
TCL SVOC	40	1 1L amber	
TCL Pest./PCB	40	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
DIS. metals	HNO3	1 500 ml poly	
cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES

Place tubing 2' off of well bottom.

Circle if Applicable:
MS/MSD
Duplicate ID No.: S12 Dup 11

Signature(s): Paulson

LOW FLOW PU E DATA SHEET

PROJECT SITE NAME: Indian Head - 21
PROJECT NUMBER: 7129

WELL I.D.: 512 GW 005 [U/F] 001
DATE: 10-24-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. µS	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
0807	well dia.	100	12.5	5.05	1106	—	—	197.1	
0812	too small	100	13	5.30	1105	—	—	30.2	
0817	to collect	100	13.5	5.31	1104	—	—	39.4	
0822	water level.	100	14	5.36	1098	—	—	41.7	
0827		100	14	5.59	1093	—	—	21.0	
0833		100	15	5.58	1091	—	—	19.0	
0838		100	15	5.57	1091	—	—	17.6	
0843		100	15	5.58	1091	—	—	17.3	
0848		100	15	5.58	1093	—	—	21.3	
0853		100	15	5.59	1093	—	—	17.1	
0858		100	15	5.59	1091	—	—	8.6	
0903		100	15	5.57	1089	—	—	8.4	Stop pump. 2.75 gals

SIGNATURE(S) Paul m. D

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GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Ind. in Rtcmd
Project No.: 7129

[] Domestic Well Data
(X) Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S12GW006[U/F]001
Sample Location: GW06 Site 12
Sampled By: CF
C.O.C. No.: # 15
Type of Sample:
(X) Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 10/24/97	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Time: 8:50								
Method: PE Using / Avis.	Cloudy	6.58	1.53	11.6	-10			

PURGE DATA: pump

Date: 10-24-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Slow Flow	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2		See	page	2			
Type: PVC 3/8"	3							
Total Well Depth (TD): 9.00'								
Static Water Level (WL): 3.22'								
One Casing Volume(gal/L): —								
Start Purge (hrs): 8:07								
End Purge (hrs): 8:32								
Total Purge Time (min): 25								
Total Vol. Purged (gal/L): .75								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	40 ml glass	10/24
TCL SVOC	—	1 l amber	
TAL Met	HNO3	.5 l plastic	
~~Explosives~~		~~.5 l plastic~~	
CN	NaOH	.5 l plastic	
PEST / PCB	—	1 l amber	
DIS. metals	HNO3	1.5 l plastic	

OBSERVATIONS / NOTES:

Well pumped dry @ low flow 100 ml/min
Allowed to recharge. Well pumped dry @ low flow 75 ml/min
Samples collected after second recharge

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): CFarhos

LOW FLOW PU. E DATA SHEET

PROJECT SITE NAME: Indian Head S.t 12
PROJECT NUMBER: 7129

WELL I.D.: 5126W006
DATE: 10/24

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
8:07	3.22	100	11.7	6.58	1.76			-10	
8:12		well pumped dry							
8:17									
8:22	5.27	75	11.6	6.76	1.53			-10	
8:32	5.27								
		After recharge well pumped dry again at low flow rate							

SIGNATURE(S) CFarnos

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Site 41 - A1
Project No.: Indian Head

[ ] Domestic Well Data
[X] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: S41GW001[W/F]001
Sample Location: S41GW001
Sampled By: CF
C.O.C. No.: #13
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10/22/97	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO	Salinity	Eh mV
Time: 17:40								
Method: Low flow								

PURGE DATA

Date: 10/22/97	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	
Method: low flow	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter: 4"	2			See	page	2		
Well Casing Material: PVC	3							
Total Well Depth (TD): 20.30								
Static Water Level (WL): 7.38								
One Casing Volume (gal/L): 8.4								
Start Purge (hrs): 15:05								
End Purge (hrs): 17.15								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 5.5								

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	40 ml	10/22
TCL SVOA	4°	1L Amb	
TAL Metals	HNO3	500ml	
CN	NAOH	500 ml	
Diss Metals	HNO3	500ml	
TCL Pest / PCB	4° 1L Amb	1L Amb	
Explosives	4° 1L Amb	1L Amb	

OBSERVATIONS / NOTES

Screen 10ft long
Total vol purged = 6.5 gal (Saturated screen length) = 10 ft)
Purge cut slightly short to make sample delivery time to courier

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	C. Farkas

LOW FLOW PUMPING DATA SHEET

PROJECT SITE NAME: Indian Head S.641
PROJECT NUMBER: 7129

WELL I.D.: S41GW001 [U/F] 001
DATE: 10/22/97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1505	7.70	250	16.5	4.93	464			-10	
1515	7.95	250	16.5	4.79	441			-10	
1525	8.20	200	16.6	4.80	413			-10	
1535	8.70	150	17.0	4.67	410			-10	
1545	8.77	150	17.1	4.64	418			-10	
1555	8.84	150	17.1	4.67	415			-10	
1605	8.95	150	17.5	4.69	416			-10	
1615	9.03	150	17.5	4.68	415			-10	
1625	9.10	150	17.5	4.68	414			-10	
1635	9.15	150	17.5	4.68	414			-10	
1645	9.19	150	17.5	4.68	414			-10	
1655	9.22	150	17.8	4.70	413			-10	
1705	9.28	150	17.8	4.70	413			-10	
1715	9.32	150	17.8	4.70	413			-10	
1725									
1									

SIGNATURE(S) C Fankos

PAGE 1 of 1

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - R1
Project No.: 7129

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S416W002[U/F]001
Sample Location: Site 41
Sampled By: PMD
C.O.C. No.: # 13
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10.22-97								
Time: 1610								
Method: peristaltic pump/PE tube								

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 10-22-97								
Method: Slow Flow	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2							
Type: PVC 4"	3			See	page	2		
Total Well Depth (TD): 20.22'								
Static Water Level (WL): 5.44'								
One Casing Volume (gal/L): 9.65 ~~20.20~~								
Start Purge (hrs): 1340								
End Purge (hrs): 1535								
Total Purge Time (min): 115								
Total Vol. Purged (gal/L): 6.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	(3) 40 ml vial	
TCL SVOA	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	
Dis metals	HNO3	1 500 ml poly	
TCL Pest./PCB's	4°	1 1L Amber	
Explosives	4°	1 1L Amber	

OBSERVATIONS / NOTES:

10' - Screen
Total Amount to purge = 6.53 gallons (10' of Saturated Screen)
place pump tubing 5' off of well bottom.

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Paul M. [illegible]

LOW FLOW PU[illegible]E DATA SHEET

PROJECT SITE NAME: Indian Head - 21
PROJECT NUMBER: 7129

WELL I.D.: 541GW002[U/F]001
DATE: 10-22-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1345	5.48	200	15.0	5.88	0.261	1.15	0.01	775	orange color
1350	5.58	185	15.1	5.94	0.250	1.03	0.00	719	
1400	5.57	195	15.1	5.90	0.242	1.39	0.00	700	
1410	5.56	190	14.8	5.94	0.238	1.77	0.00	605	
1420	5.56	190	14.5	5.89	0.237	1.62	0.00	600	
1430	5.59	190	14.7	5.81	0.237	1.26	0.00	500	
1440	5.58	190	14.8	5.80	0.238	1.16	0.00	500	
1450	5.58	190	14.6	5.83	0.238	1.35	0.00	422	
1500	5.59	190	14.6	5.81	0.239	1.57	0.00	415	
1510	5.59	190	14.7	5.80	0.240	1.27	0.00	380	
1520	5.60	190	14.8	5.78	0.240	1.13	0.00	360	
1530	5.60	190	14.9	5.77	0.240	1.03	0.00	350	stop pump, 6.5 galons

SIGNATURE(S) Paul [illegible]

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Indian Head -N1
Project No.: 7129

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S41GW003[U/F] 001
Sample Location: Site 41
Sampled By: PMD
C.O.C. No.: #13
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10/22/97								
Time: 1220								
Method: Pers. pump/PE tubing								

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 10/22/97								
Method: peristaltic pump	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2			See	page	2		
Type: PVC - 4"	3							
Total Well Depth (TD): 20.10' TOC								
Static Water Level (WL): 4.61' TOC								
One Casing Volume (gal/L): 10.1								
Start Purge (hrs): 1025								
End Purge (hrs): 1202								
Total Purge Time (min): 97								
Total Vol. Purged (gal/L): 65								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3 40 ml vial	
TCL SVOA	4°	1 1L amber	
TCL pesticides / PCB's	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
DIS. metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	
Explosives	4°	1 1L amber	

OBSERVATIONS / NOTES:

10' - Screen
Total Amt to purge: 65 gallons (10' of Saturated Screen)
Place pump tubing 5' off of well bottom

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Paul M. D

LOW FLOW PU E DATA SHEET

PROJECT SITE NAME: Indian Head
PROJECT NUMBER: 7129

WELL I.D.: S41GW003[U/F]001
DATE: 10-22-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1027	4.65	180	14.7	3.69	0.607	0.65	0.02	0	
1032	4.68	180	14.9	3.86	0.600	0.85	0.02	0	
1042	4.70	180	15.1	3.85	0.600	1.21	0.02	0	
1052	4.70	180	15.0	3.84	0.606	1.56	0.02	0	
1102	4.70	180	15.1	3.83	0.603	1.55	0.02	0	
1112	4.71	180	15.2	3.82	0.603	1.98	0.02	0	
1122	4.71	180	15.2	3.82	0.601	1.59	0.02	0	
1132	4.71	180	15.3	3.80	0.600	1.37	0.02	0	
1142	4.71	180	15.4	3.79	0.600	1.21	0.02	0	
1152	4.70	180	15.4	3.78	0.601	1.57	0.02	0	
1202	4.71	180	15.5	3.78	0.600	1.67	0.02	0	Stop pump - 6.5 gallons

SIGNATURE(S) Paul M. [illegible]

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Indian Head - A1
Project No.: 7124

[] Domestic Well Data
[] Monitoring Well Data
[X] Other Well Type: Base Supply Well (drinking)
[] QA Sample Type:

Sample ID No.: S41GW004[-/F]001
Sample Location: Site 41
Sampled By: PMD
C.O.C. No.: #14
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 10-23-97								
Time: 1000								
Method: Direct Fill (from pump)								

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 10/23/97								
Method: Supply pump	Initial							
Monitor Reading (ppm): —	1	NO parameters were taken						
Well Casing Diameter & Material	2	pump is constantly on.						
Type: —	3							
Total Well Depth (TD): N/A								
Static Water Level (WL): N/A								
One Casing Volume(gal/L): N/A								
Start Purge (hrs): 0945								
End Purge (hrs): 1000								
Total Purge Time (min): 15								
Total Vol. Purged (gal/L): —								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	3 40 ml vials	
TCL SVOC	4°	1 1L amber	
TCL Pest. / PCB	4°	1 1L amber	
Explosives	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
Dis. metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

Base Supply Well (PW-7)

Circle if Applicable:

MS/MSD

Duplicate ID No.: S41 Dup 10

Signature(s): Paul M. D

GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: INDIAN HEAD RI
Project No.: 7129

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S42MW0002 [✓] A001
Sample Location: MW02 SITE 42
Sampled By: FLR
C.O.C. No.: 4
Type of Sample:
[] ~~Low~~ Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-11-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1155	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: SLOW PURGE	CLEAR	5.70	0.319	17.1	0	0.02	0.01	—

PURGE DATA:

Date: 10-11-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic pump	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2							
Type: 4" PVC .653	3							
Total Well Depth (TD): 30' TPVC								
Static Water Level (WL): 12.00'								
One Casing Volume (gal/L): 18.06								
Start Purge (hrs): 0923								
End Purge (hrs): 1155								
Total Purge Time (min): 152								
Total Vol. Purged (gal/L):								

SEE LOW FLOW PURGE DATA SHEET

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x40ml	
TCL S-VOA	4°C	1x1l AMB	
TAL METAL TOTAL	HNO_3	1x500ml HDPE	
DISSOLVED	HNO_3	1x500ml HDPE	
CYANIDE	NaOH	1x500ml HDPE	

OBSERVATIONS / NOTES:

10' SCREEN

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

LOW FLOW PUMPING DATA SHEET

PROJECT SITE NAME: Indian Head
PROJECT NUMBER: 7129

WELL I.D.: S42 MW002 [U/F] 001
DATE: 10-11-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
0925	12.17	200	15.4	6.28	0.361	2.62	0.01	275	
0935	12.30	150	15.6	6.34	0.351	1.20	0.01	130	
0945	12.35	250	15.7	6.27	0.353	0.56	0.01	75	
0955	12.42	250	16.0	6.26	0.353	-1.43	0.01	30	
1005	12.45	250	16.1	6.27	0.360	-0.35	0.01	33	
1015	12.45	250	16.2	6.28	0.360	0.00	0.01	27	
1025	12.47	250	16.7	6.27	0.358	-0.05	0.01	5	
1035	12.47	250	16.6	6.24	0.355	-0.00	0.01	0	
1045	12.46	250	16.8	6.20	0.350	-0.01	0.01	10	
1055	12.47	250	16.5	6.10	0.347	0.05	0.01	10	
1105	12.47	250	16.8	6.02	0.339	-0.66	0.01	0	
1115	12.47	250	16.9	5.92	0.332	0.07	0.01	-5	
1125	12.47	250	17.0	5.84	0.326	-0.14	0.01	-4	
1135	12.47	250	17.3	5.76	0.320	-0.24	0.01	-1	
1145	12.47	250	17.1	5.70	0.319	0.02	0.01	-4	

SIGNATURE(S) _____

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: INDIAN HEAD RI
Project No.: 7129

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S42MW0034001
Sample Location: MW03 SITE42
Sampled By: ERIN LRAMSER
C.O.C. No.: 4
Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-11-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1615	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: SLOW FLOW	CLEAR	6.58	0.281	17.9	89	1.51	0.01	—

PURGE DATA:

Date: 10-11-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: SLOW FLOW	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2							
Type: 4" PVC	3							
Total Well Depth (TD): 20.20								
Static Water Level (WL): 5.29								
One Casing Volume(gal/L): 9.13								
Start Purge (hrs): 1407								
End Purge (hrs): 1615								
Total Purge Time (min): 128								
Total Vol. Purged (gal/L):								

SEE LOW FLOW PURGE DATA SHEET

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x40ml	
TCL S-VOA	—	1x1l AMB	
TAL METALS TOTAL	HNO_3	1x500ml HDPE	
DISSOLVED	HNO_3	1x500ml HDPE	
CYANIDE	NaOH	1x500ml HDPE	

OBSERVATIONS / NOTES:

10' SCREEN

Dup. taken here

Circle if Applicable:

MS/MSD (Duplicate ID No.: S42DUP0004)

Signature(s): [signature]

LOW FLOW PU. E DATA SHEET

PROJECT SITE NAME: INDIANHEAD SITE 42
PROJECT NUMBER: 7129

WELL I.D.: S42MW003
DATE: 10-11-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1400	5.29	225 ML							INITIAL
1413	5.87	~~225~~/250	18.6	6.72	0.336	0.70	0.01	80	
1423	6.28	250	18.2	6.75	0.330	0.65	0.01	66	
1433	6.80	200	18.2	6.74	0.325	0.49	0.01	48	
1443	7.08	150	18.5	6.74	0.320	-0.36	0.01	47	
1453	7.29	150	18.5	6.72	0.311	0.33	0.01	51	
1503	7.51	150	18.4	6.71	0.307	0.24	0.01	63	
1513	7.59	150	18.5	6.68	0.302	1.07	0.01	70	
1523	7.64	150	18.1	6.68	0.296	0.46	0.01	78	
1533			18.1	6.64	0.288	0.36	0.01	82	
1543	7.74	150	18.1	6.65	0.283	1.01	0.01	88	
1553	7.72	150	18.2	6.62	0.281	1.20	0.01	89	
1603	7.72	150	18.0	6.63	0.282	1.00	0.01	88	
1613		150	17.9	6.58	0.281	1.51	0.01	89	

SIGNATURE(S) _____

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GROUNDWATER SAMPLE LOG SHEET

Project Site Name: INDIAN HEAD RI
Project No.: 7129

[ ] Domestic Well Data
[✓] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 542MW004D01 [V/E]
Sample Location: MW04
Sampled By: PVR
C.O.C. No.: 5
Type of Sample:
[✓] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 10-12-97 Time: 1245	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO	Salinity	Eh mV
Method: SLOW FLOW	CLEAR	6.16	.219	17.4	0	-1.71	0.00	—

PURGE DATA

Date: 10-12-97	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity	
Method: SLOW FLOW	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter: 4"	2							
Well Casing Material: PVC	3							
Total Well Depth (TD): 27.90								
Static Water Level (WL): 8.30								
One Casing Volume(gal/L): 12.4								
Start Purge (hrs): 1100								
End Purge (hrs): 1240								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L):								

SEE LOW FLOW PURGE DATA SHEET

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x40ml	
TCL S-VOA	4°C	1x 1L AMB	
TAL METALS TOTAL	HNO_3	500ml HDPE	
DISSOLVED	HNO_3	500ml HDPE	
CYANIDE	NaOH	500ml HDPE	

OBSERVATIONS / NOTES

10' SCREEN

Dup. taken here.

Circle if Applicable:

MS/MSD

Duplicate ID No.: 542DUP005

Signature(s): SW

LOW FLOW PU[illegible] DATA SHEET

PROJECT SITE NAME: INDIAN HEAD RI
PROJECT NUMBER: 7129

WELL I.D.: S42 MCU004
DATE: 10-12-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1100	8.47	150	16.9°	6.47	.332	0.76	0.01	130	INITIAL WL = 8.30
1110	8.55	100	16.6°	6.61	.293	2.10	0.01	54	
1120	8.54	100	16.6°	6.58	.287	0.58	0.01	35	
1130	8.54	100	16.8	6.56	.281	0.13	0.01	26	
1140	8.59	180	16.7	6.56	.275	0.00	0.01	23	
1150	8.61	180	17.2	6.48	.262	0.14	0.01	7	
1200	8.62	180	17.4	6.41	.252	-0.66	0.00	1	
1210	8.62	180	17.1	6.34	.241	-0.04	0.00	0	
1220	8.62	180	17.3	6.21	.231	0.06	0.00	0	
1230	8.60	175	17.6	6.19	.226	-1.50	0.00	1	
1240	8.61	180	17.4	6.16	.219	-1.71	0.00	0	

SIGNATURE(S) _____

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD RI
Project No.: ~~7126~~ 7129

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S42MW006[Y/N]001
Sample Location: S42 MW006
Sampled By: RUK
C.O.C. No.: 5
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-12-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1600	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: SLOW PURGE	CLEAR	5.60	0.091	15.3	0	1.21	0.00	—

PURGE DATA:

Date: 10-12-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: SLOW PURGE	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2							
Type: 4" PVC	3							
Total Well Depth (TD): 25.55								
Static Water Level (WL): 11.35								
One Casing Volume(gal/L): 9.27								
Start Purge (hrs): 1400								
End Purge (hrs): 1600								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x40ml	
TCL S-VOA	- 4°C	1x1 LAMB	
TAL METAL TOTAL	HNO_3	1x500ml HDPE	
DISSOLVED	HNO_3	1x500ml HDPE	
CYANIDE	NaOH	1x500ml HDPE	

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PUI . DATA SHEET

PROJECT SITE NAME: INDIAN HEAD SITE 42
PROJECT NUMBER: ~~7126~~ 7129

WELL I.D.: S42MW006
DATE: 10-12-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1400	11.45	200							INITIAL @ 11.35
1400	11.51	150	17.2	6.31	0.165	0.78	0.00	22	
1410	11.53	150	15.9	6.12	0.151	0.44	0.00	15	
1420	11.54	175	15.8	6.10	0.142	1.13	0.00	8	
1430	11.55	175	15.6	5.93	0.128	0.88	0.00	2	
1440	11.55	150	15.6	5.76	0.116	1.35	0.00	0	
1450	11.56	175	15.6	5.67	0.112	1.47	0.00	0	
1500	11.60		15.3	5.57	0.107	0.44	0.00	0	
1510	11.56		15.4	5.40	0.100	1.09	0.00	0	
1520	11.56		15.3	5.50	0.096	1.86	0.00	0	
1530	11.58		15.3	5.59	0.095	1.26	0.00	0	
1540	11.58	175	15.2	5.58	0.093	1.19	0.00	0	
1550	11.57		15.3	5.60	0.091	1.21	0.00	0	
1600									

SIGNATURE(S) _____

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: INDIAN HEAD SITE 42
Project No.: 7129

[] Domestic Well Data
[✓] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 542MW007 [W/F] 001
Sample Location: BLDG 1866, MW07
Sampled By: PLR
C.O.C. No.: ~~2~~ #7
Type of Sample:
[✓] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-14-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1745	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: Slow Flow	BRN	5.92	0.255	16.5	999	3.00	0.01	—

PURGE DATA:

Date: 10/10, 10/11, 10/12	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Slow Flow	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2							
Type: 2" PVC	3							
Total Well Depth (TD): 28.27'								
Static Water Level (WL): 11.55								
One Casing Volume (gal/L): 1.42								
Start Purge (hrs): 1045								
End Purge (hrs):								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SEE PURGE DATA SHEET

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOA	HCL	3x40ml	
TCL S-VOA	4°C	1x1 Liter	
TAL METAL TOTAL	HNO_3	1x500ml HDPE	
DISSOLVED	HNO_3	1x500ml HDPE	
CYANIDE	NaOH	1x500ml HDPE	

OBSERVATIONS / NOTES:

initial SWL: 10.37' btoc 10/10/97, WATER EXTREMLY TURBID STOPPED PURGING WILL CONTINUE TO MORROW

10/11/97 SWL = 10.68 TPVC

purged dry several times

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Fred M Ramos

LOW FLOW PU. E DATA SHEET

PROJECT SITE NAME: INDIAN HEAD SITE 42
PROJECT NUMBER: 7129

WELL I.D.: 542MW007
DATE: 10-10-97, 10-11, 10-12, 10-14

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
	11.55	250							10-10-97 Extremely turbid
1045	12.32	175							10-10-97
1052	12.73	100							10-10-97
0800	11.57	110							10-11-97
0815	13.55	—							
0820	13.75	105	16.8	5.57	0.291	2.94	0.01	999	Light brown - turbid
0830	14.30	110	16.7	5.87	0.326	1.58	0.01	999	" " - "
0840	14.80	110	16.9	5.86	0.326	1.25	0.01	999	" " - "
0850	15.05	110	17.0	5.87	0.327	1.31	0.01	999	Stop pump.
0830	~~16.70~~ 15.70								10-12-97 INITIAL
	16.02	75							
0845	16.17								
~~0830~~ 0900	16.67	75	16.4	5.88	0.235	2.20	0.01	999	
0910	17.20	75	16.5	5.92	0.255	3.00	0.01	999	~~[illegible]~~ Stop pump
1630	16.70								INSUFFICIENT VOL. WILL ALLOW WELL TO RECOVER
1720	15.96								SWL = 15.96
									10-14-97

SIGNATURE(S) _____

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - RI
Project No.: 7129

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 5446W001[U/F]00
Sample Location: Site 44
Sampled By: ~~5446W001[U/F]00~~ PMD
C.O.C. No.: #14
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-23-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1720	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: PE Tubing/Bails.								

PURGE DATA: pump.

Date: 10-23-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Slow Flow	Initial							
Monitor Reading (ppm): -	1							
Well Casing Diameter & Material	2							
Type: PVC 4"	3			See	page	2		
Total Well Depth (TD): 20.30'								
Static Water Level (WL): 8.29'								
One Casing Volume (gal/L): 7.5								
Start Purge (hrs): 1520								
End Purge (hrs): 1710								
Total Purge Time (min): 110								
Total Vol. Purged (gal/L): 6.53								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	(3) 40 ml vials	
TCL SVOC	4°	1 1L amber	
Explosives	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
DIS metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

Screen = 10'
Saturated screen = 10 gals. Tot. Amt to purge = 6.53 gals.
Place tubing 5' off of well bottom.

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Paul M [illegible]

LOW FLOW PU. E DATA SHEET

PROJECT SITE NAME: Indian Head - RI
PROJECT NUMBER: 7129

WELL I.D.: S44GW001 [U/F] 001
DATE: 10-23-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. mS/cm	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1520	8.41'	200	17.8	5.53	0.131	-0.30	0.00	25	
1530	8.42'	190	18.0	5.59	0.129	-0.43	0.00	10	
1540	8.50	190	18.1	5.56	0.125	-1.27	0.00	10	
1550	8.52	190	18.0	5.52	0.120	-0.12	0.00	10	
1600	8.54	190	18.1	5.18	0.115	-0.62	0.00	5	
1610	8.56	190	18.1	5.16	0.110	-0.77	0.00	1	
1620	8.58	190	17.9	5.05	0.105	-0.65	0.00	0	
1630	8.60	190	17.9	4.98	0.099	-0.37	0.00	0	
1640	8.61	190	17.8	4.85	0.096	-0.89	0.00	0	
1650	8.61	190	17.7	4.88	0.094	-0.12	0.00	0	
1700	8.62	190	17.9	4.86	0.092	-0.22	0.00	0	
1710	8.62	190	17.8	4.86	0.090	-0.03	0.00	0	Step pump = 6.53 gals

SIGNATURE(S) Paul M. [illegible]

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Indian Head - A1
Project No.: 7129

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S44GW07[U/F]001
Sample Location: Site 44
Sampled By: CPMD
C.O.C. No.: # 14
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-23-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1400	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: PE/IS, pump / PE tubing								

PURGE DATA:

Date: 10-23-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Low Flow	Initial							
Monitor Reading (ppm): —	1							
Well Casing Diameter & Material	2		See	page	2			
Type: PVC 4"	3							
Total Well Depth (TD): 20.30'								
Static Water Level (WL): 7.16'								
One Casing Volume (gal/L): 8.6								
Start Purge (hrs): 1210								
End Purge (hrs): 1350								
Total Purge Time (min): 100								
Total Vol. Purged (gal/L): 6.53								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	3 40 ml Vials	
TCL SVOC	4°	1 1L amber	
Explosives	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
DIS metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

10' Screen
Total Amt. to purge = 6.53 gallons (10' of saturated screen)
Tubing - 5' off of well bottom

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Paul M. [illegible]

LOW FLOW PUMPING DATA SHEET

PROJECT SITE NAME: Indian Head - N1
PROJECT NUMBER: 7129

WELL I.D.: S44GW002 [U/F] 001
DATE: 10-23-97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. µS	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1210	7.25	195	17.	5.55	184	—	—	67.2	
1220	7.36	190	17.5	5.86	171	—	—	76.2	
1230	7.37	190	17.5	5.87	167	—	—	63.1	
1240	7.39	190	17.5	5.78	166	—	—	46.7	
1250	7.40	190	17.5	5.82	167	—	—	36.5	
1300	7.41	190	17.5	5.80	166	—	—	32.7	
1310	7.43	190	17.5	5.81	165	—	—	24.3	
1320	7.44	190	17.5	5.79	165	—	—	22.1	
1330	7.44	190	17.5	5.79	164	—	—	21.0	
1340	7.44	190	17.5	5.77	161	—	—	16.0	
1350	7.44	190	17.5	5.79	161	—	—	14.3	Stop pump 6.5 gallons

SIGNATURE(S) Paulon. Dri

PAGE __ of __

GROUNDWATER SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: Indian Head - R1
Project No.: 7129

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: S44GW03[U/F]001
Sample Location: Site 44
Sampled By: CF
C.O.C. No.: # 14
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-23-97	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1415	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: PE tubing / peristaltic								

PURGE DATA: Pump)

Date: 10-23-97	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Slow Flow	Initial							
Monitor Reading (ppm): -	1							
Well Casing Diameter & Material	2							
Type: PVC 4"	3		See	page	2 -			
Total Well Depth (TD): 17.20								
Static Water Level (WL): 7.46'								
One Casing Volume(gal/L): 6.36								
Start Purge (hrs): 1205								
End Purge (hrs): 1410								
Total Purge Time (min): 125								
Total Vol. Purged (gal/L): 6.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOC	HCL	(3) 40 ml vials	
TCL SVOC	4°	1 1L amber	
Explosives	4°	1 1L amber	
TAL metals	HNO3	1 500 ml poly	
DIS metals	HNO3	1 500 ml poly	
Cyanide	NaOH	1 500 ml poly	

OBSERVATIONS / NOTES:

10' screen
Total Amt. to purge = 6.36'. (Saturated screen length = 9.74')
place pump 5' off of well bottom.

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

LOW FLOW PUI DATA SHEET

PROJECT SITE NAME: Indian Head - 11
PROJECT NUMBER: 7179

WELL I.D.: S44 GW03 [U/F] 001
DATE: 10/23/97

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1208	7.59	200	18.1	5.20	123			-1	
1218	7.73	200	18.3	5.59	094			~~4~~ ~~4~~ 5	
1228	7.85	200	18.2	5.57	091			-5	
1238	7.90	150	18.1	5.57	091			-2	
1248	7.95	150	18.2	5.50	091			20	
1258	7.96	150	18.4	5.58	092			24	
1308	7.96	150	18.3	5.58	093			14	
1318		Missed	18.0					~~26~~	
1328	7.95	150	18.0	5.69	095			-6	
1338	7.93	150	18.1	5.58	096			-7	
1348	7.96	150	18.4	5.58	096			-7	
1358	7.95	150	18.6	5.65	097			-7	
1408	7.95	150	18.4	5.65	098			-7	

SIGNATURE(S) _____

PAGE __ of __

APPENDIX B

CHAIN OF CUSTODY FORMS

FAXED 10-9-97
0745

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#1 of ____ Pgs.

Project: INDIANHEAD RI #7129
Client: NAVY/BROWN+ROOT FNV
Send Results To: GEORGE LATULIPPE
Address: 661 ANDERSEN DR BLDG #7
PITTSBURGH PA 15220
Phone: 412 921-7090

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOA	TCL S-VOA	TAL METAL + ARSENIC	PEST/PCB							CLIENT COMMENTS
Turnaround Time					STD	STD	STD	STD							
# of Containers					3	1	1	1							
Container Type					40ml	1 L AMBER	1 L HDPE	1 L AMBER							
Preservative Used					HCL	4°C	HNO_3	4°C							
Lab Cooler No.															
+S12SW0050001	10-7-97	1400	AQ	FWR	✓	✓	✓	✓							
+S12SW0040001	10-7-97	1430	AQ	FWR	✓	✓	✓	✓							
+S12SW0030001	10-7-97	1455	AQ	FWR	✓	✓	✓	✓							
+S12SW0020001	10-7-97	1600	AQ	FWR	✓	✓	✓	✓							
+S12SW0010001	10-7-97	1630	AQ	FWR	✓	✓	✓	✓							
+S12SW0000001	10-7-97	1730	AQ	FWR	✓	✓	✓	✓							
⊥S12DUP0001	10-7-97	0000	AQ	FWR	✓	✓	✓	✓							
TB-1007971	10-7-97	1200	AQ	FWR	2	—	—	—							

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Paul M. Klein	10/8/97 1625	10-08-97 Pirall 16:25			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:
			SAMPLES IN ONE COOLER GPES Lab pick-up.	

G.P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

2 of _____ Pgs.

Project: INDIAN HEAD RE
Client: BROWN + ROOT FUR
Send Results To: GEORGE LAT
Address: 661 ANDERSON ROAD #7
PITTSBURGH PA 15220
Phone: 412-921-7090

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	TAL METALS + CN TOC/TPH/NO	TCL VOCs	TCL S-VOCs + PCB	TAL METALS								CLIENT COMMENTS
Turnaround Time					STD	STD	STD	STD	STD							
# of Containers					8	4	8oz									
Container Type					↓	↓	↓	↓	↓							
Preservative Used					4°C	4°C	4°C	HNO3	NaOH							
+ S42SD000001	10-10-97	1250	SO	FUR	1											
+ S42SD005001	↓	1300	SO	FUR	1											
+ S42SS003001	↓	1305	SO	FUR		1	1									
+ S42SS002001	10-10-97	1315	SO	FUR		1	1									
+ S42SS001001	10-10-97	1330	SO	FUR		1	1									
+ S42W004001	10-10-97	1345	~~SO~~ AQ	FUR				1	1							
+ S42D001001	10-10-97	1400	SO	FUR	1											
− S42DUP001	10-10-97	0000	SO	FUR	1											
− S42DUP002	10-10-97	0000	SO	FUR		1	1									
+ S42W003001	10-10-97	1100	AQ	FUR				1	1							
+ S42SD002001	10-10-97	1610	SO	FUR	1											
+ S42W002001	10-10-97	1620	~~SO~~ AQ	FUR				1	1							

Lab Cooler No.

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
[signature]	10/10/97 1800	[signature] 10:00			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

FAXED 10-14

P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#3 of _____ Pgs.

Project: INDIANHEAD RI
Client: BROWN + ROOT ENV
Send Results To: GEORGE LAC
Address: 661 ANDERSEN DR BLDG #7
PITTSBURGH PA 15220
Phone: 412-921-7090

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	TAL METALS (+TOC, SEMIVOLS)	TCL-VOAS	TCL S-VOCS PEST/PCB	TAL METALS	CYANIDE	TCL VOAS	TCL S-VOA	PEST/PCB	TOC	Lab Cooler No.	CLIENT COMMENTS
Turnaround Time					STD	STD	STD	STD	STD	STD	STD	STD	STD		
# of Containers											1				
Container Type					8oz	4oz	8oz	500ml HDPE	500ml HDPE	40ml	1 liter	1 liter	1 liter		
Preservative Used					4°C	4°C	4°C	HNO3	NaOH	HCL	4°C	4°C	H2SO4		
+ S42SD0040001	10-10-97	1635	SO	SUR	1										
+ S42SD0030001	10-10-97	1645	SO	FUR	1										
+ S42SW0010001	10-10-97	1650	AQ	FUR				1	1						
− S42DUP0003	10-10-97	0000	AQ	FUR				1	1						
TB-101097-1	10-10-97	1000	AQ	FUR						2					
RB-101097-1	10-10-97	0900	AQ	FUR				1	1	3	1	1	1		

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Fred Ramos	10/10/97 1800	10-10-97 Rick 18:00			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

FAXED 10-14

G.P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#4 of ____ Pgs.

Project: INDIANHEAD RT 47129
Client: BROWN & ROOT ENV
Send Results To: GEORGE LAT
Address: 661 ANDERSEN DR BLDG #7
PITTSBURGH PA 15220
Phone: 412-921-7040

Turnaround Time	SED	SID	SID	SID	SID
# of Containers					
Container Type	40ml	1 Liter	1 Liter	1 Liter	1 Liter
Preservative Used	HCL	4°C			
Type of Analysis	TCL VOA	TCLS-VOA	TAL METALS TOTAL	TAL METALS DISSOLVED	CYANIDE

	Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOA	TCLS-VOA	TAL METALS TOTAL	TAL METALS DISSOLVED	CYANIDE	Lab Cooler No.	CLIENT COMMENTS
+	S42MW002W001	10-11-97	1155	AQ	FCR	3	1	1		1		
+	S42MW002F001		1155		FCR				1			
+	S42MW003W001		1615		FCR	3	1	1		1		
+	S42MW003F001		1615		FCR				1			
−	S42DUP004		0000		FCR	3	1	1	1	1		
	TB-101197-1	10-11-97	0900	AQ	FCR	2						

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Fred W Ramser	10/11/97 1810	10-11-97 18:10			
Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.
Relinquished By:	Date/Time	Received By:	Lab Comments:		Temp:

FAXED 10-14

W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#5 of _____ Pgs.

Project: INDIAN HEAD RI #7129
Client: P&R ENV
Send Results To: GEORGE LATOLIPPI
Address: 601 ALDERSON DR BLDG #7
PITTSBURGH PA 15220
Phone: 412-921-7090

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOA	TCL SVOA	TAL METALS (TOTAL)	TAL METALS (DISSOLVED)	CYANIDE	EXPLOSIVES	PEST/PCB					Lab Cooler No. / CLIENT COMMENTS
Turnaround Time					STD	STD	STD	STD	STD	STD						
# of Containers																
Container Type					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Preservative Used					HCL	[illegible]	[illegible]	[illegible]	NaOH	[illegible]	[illegible]					
+ S42SMW004001	10/12/97	1245	AQ	LCR	3	1	1		1							
+ S42MW004F001		1245	AQ	LCR				1								
+ S42MW006001		1600	AQ	LCR	3	1	1		1							
+ S42MW006F001		1600	AQ	LCR				1								
- S42DUP005		0000	AQ	LCR	3	1	1	1	1							
TB-101297-1	10/12/97	0500	AQ	LCR	2											
RB-101397-1	10/13/97	1500	AQ	LCR	2	1	1	1	1	1	1					

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
[signature]	[illegible]	10-13-97 [signature] 17:25			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

FAXED 10-14

G.P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

FAXED TO PITTSBURGH
LEE LECK 10-15-97

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#6 of _____ Pgs.

Project: INDIAN HEAD JOB# 7129
Client: BROWN & ROOT FNV
Send Results To: GEORGE LATULLIPE
Address: 661 ANDERSEN DR BLDG #7
PITTSBURGH PA 15220
Phone: 412-921-

Turnaround Time	STD	←				→ STD								
# of Containers														
Container Type	40ml VIAL	1 L AMB	.5 L HDPE	.5 L HDPE	.5 L HDPE	1 L AMB								
Preservative Used	HCL	—	HNO_3	HNO_3	NaOH	—								
Type of Analysis	TCL VOA	TCL S-VOA	TAL METALS (TOTAL)	TAL METALS (DISSOLVED)	CYANIDE	PESTICIDES/PCBS								
Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials										CLIENT COMMENTS
+ S12WP002W001	10-14-97	1045	AQ	FWR	3	1	1	1*	1	1				
+ S12WP002F001	10-14-97	1045	AQ	FWR				1						
+ S12WP001W001	10-14-97	1100	AQ	FWR	3	1	1		1	1				
+ S12WP001F001	10-14-97	1100	AQ	FWR				1						
- S12DUP006	10-14-97	0000	AQ	FWR	3	1	1	1	1	1				
+ S12WP003W001	10-14-97	1500	AQ	FWR	3	1	1		1	1				
+ S12WP003F001	10-14-97	1500	AQ	FWR				1						
+ S12WP004W001	10-14-97	1505	AQ	FWR	3	1	1		1	1				
+ S12WP004F001	10-14-97	1505	AQ	FWR				1						
TB101497-1	10-14-97	0800	AQ	FWR	2									
S12WP003W001	10-14-97	1500	AQ	FWR	3	1	1		1	1				
S12WP003F001	10-14-97	1500	AQ	FWR				1						

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Fred M Ramser	10/14/97 1825	10-14-97 18:25			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#7 of ____ Pgs.

Project: INDIAN HEAD JOB# 7129
Client: BROWN & ROOT ENV
Send Results To: GEORGE LAUGHLIN
Address: 661 ALLEGHENY BLDG
PITTSBURGH PA
Phone: 412-921-7090

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOA	TCL S-VOA	TAL METALS TOTAL	TAL METALS DISSOLVED	CYANIDE	PESTICIDE/PCB					CLIENT COMMENTS
Turnaround Time					STD					STD					
# of Containers															
Container Type					VOA 40mL	1L AMB	500	500	500	1L AMB					
Preservative Used					HCL	—	HNO_3	HNO_3	NaOH	—					
? S12WP0004F001	10/14/97	1505	AQ	FWR	3	X	X		X	X					
? S12WP0004F001	10/14/97	1505	AQ	FWR				X							
+ S12SW0001000	10/14/97	1630	AQ	FWR					1						
+ S12SW0002000	10/14/97	1635	AQ	FWR					1						
+ S12SW0003000	10/14/97	1640	AQ	FWR					1						
+ S12SW0004000	10/14/97	1642	AQ	FWR					1						
+ S12SW0005000	10/14/97	1644	AQ	FWR					1						
+ S12SW0006000	10/14/97	1645	AQ	FWR					1						
+ S12MW0007000	10/14/97	1745	AQ	FWR	3	1	1		1						
+ S12MW0007F001	10/14/97	1745	AQ	FWR				1							
— S12DUP001	10/14/97	0000	AQ	FWR					1						

Lab Cooler No.

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Fred M Ramer	10/14/97 1825	10-14-97 Brian 18:25			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

G.P. W.O. _____

Faxed 10-21-97
0815

GP ENVIRONMENTAL SERVICES, INC.

(1 of 2)

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

8 of _____ Pgs.

Project: [illegible]
Client: Navy [illegible]
Send Results To: [illegible]
Address: [illegible]
Phone: [illegible]

Sample ID#	Date Sampled (97)	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOC	SVOC	Pest/PCBs	Total Cyanide/Sulfide	Explosives 4o2	SCM/Aus. metals (Arsenic)					Lab Cooler No. / CLIENT COMMENTS
Turnaround Time					[illegible]										
# of Containers															
Container Type					[illegible]										
Preservative Used					[illegible]										
+ S12SS004001	10/20	1350	SS	CF	1	1	1	1	—						[illegible]
+ S12SD005001	10/20	[illegible]	SD	PMD	1	1	—	1	1						
+ S12SS003001	10/20	1425	SS	CF	1	1	1	1	—						
+ S12SD001001	10/20	1445	SD	PMD	3	3	—	3	3						DO MS/MSD
— S12Dup107	10/20	0000	SD	PMD	1	1	—	1	1						
+ S12SS002001	10/20	1500	SS	CF	1	1	1	1	—						
+ S12SS001001	10/20	1450	SS	CF	1	1	1	1	—						
+ S12SD003001	10/20	1625	SD	PMD	1	1	—	1	1						
+ S12SS005001	10/20	1600	SS	CF	1	1	1	1	—						
+ S12SD004001	10/20	1550	SD	CF	1	1	—	1	1						
+ S12SD006001	10/20	1700	SD	PMD	1	1	—	1	1						
+ S12SD002001	10/20	1720	SD	CF	1	1	—	1	1						

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Paula D[illegible]	10/20/97 1620	Perry Ak 16:20			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

W.O. _____

Faxed 10-21-97
815

GP ENVIRONMENTAL SERVICES, INC.

(2 of 2)

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

9 of _____ Pgs.

Project: Indian Head RI 7129
Client Navy / BRAE
Send Results To: George Latulippe
Address: 661 Anderson Dr Bldg #7
Pittsburgh PA 15220
Phone: 412 921-7090

Sample ID#	Date Sampled (97)	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOA	TAL Metals ~~Cyanide~~	TCL SVOA	Pest/PCBs	TOC	Cyanide					Lab Cooler No. / CLIENT COMMENTS
Turnaround Time					STD										
# of Containers					3										
Container Type					40ml	500ml	1L Amb	1L Amb	1L Amb						
Preservative Used					HCl	HNO3	4°C	4°C	H_2SO_4						
TB-102097-1	10/20	1200	AQ	CF	3	+	+	+	+	+					Trip Blank
RB-102097-1	10/20	1800	AQ	PMD	3	1	1	1	1	1					Rinsate Blank

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Paul M. D[illegible]	10.20.97 1820	Brg Ale 10-20-97 18:20			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

G.P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#10 of _____ Pgs.

Project: Indian Head
Client: Brown & Root / NAVY
Send Results To: G. Catulipe
Address: 601 Anderson Dr
#7 Pittsburgh PA 15220
Phone: (412) 921-8208

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOC	Explosives	Metals/TOC Semivols	SVOC Pest/PCBs		TCL VOC	TAL Metals	CN	TCL SVOC		CLIENT COMMENTS
Turnaround Time					SD								SD		
# of Containers															
Container Type					4oz	4oz	Bag	Bag				.5lP	.5lP	1l amb	
Preservative Used											HCl	HNO3	NaOH	—	
Type of Analysis															Lab Cooler No.
+539SD001000	10/21	10:10	SD	CF	1	1	1	1							
+539SD002000		10:50			1	1	1	1							
+539SD003000		10:30			1	1	1	1							
+539SD004000		10:15			1	1	1	1							
+539SD005000		12:00			1	1	1	1							
+539SD006000		12:30			1	1	1	1							
+539SD007000		1300			1	1	1	1							
+539SD008000	10/21	1320			1	1	1	1							
+539SW001000		1400	AQ	CF						3	1	1	1		
+539SW002000		1415								9	3	3	3		DO ms/MSD
+539SW003000		1410								3	1	1	1		
+539SW004000		1450								3	1	1	1		

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Paula D.	10/21/97 1840	Billy Ch 10-21-97 18:40			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

11 of _____ Pgs.

Project: Indian Head
Client: Brown & Root / Navy
Send Results To: G. Latulippe
Address: 6061 Anderson Dr #7
Pittsburgh PA 15220
Phone: (412) 921-8208

Sample ID#	Date Sampled (97)	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOC	TAL Metals	CN	TCL SVOC	TPH						Lab Cooler No. / CLIENT COMMENTS
Turnaround Time					30				7						
# of Containers															
Container Type					0.5 AG	1.5 PE	1.5 PE	1.5 AG							
Preservative Used					HCl	HNO3	NaOH	—							
+539SW005cc0	10/21	1500	AQ	CF	3	1	1	1							
+539SW006cc0	10/21	1510		CF	3	1	1	1							
-539DUP08	10/21	0000		CF	3	1	1	1							
TB-102197-1	10/21	0880	AQ	-	3	—	—	—							
RB-102197-1	10/21	1800	AQ	PD	3	1	1	1	1						

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Paul M. D.	10/21/97 1840	Bill Ly 18:40			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

G.P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

12 of _____ Pgs.

Project: Indian Head RI #7127
Client: Brown & Root Env.
Send Results To: George Latulippe
Address: 661 Andersen Dr. #7
Pitt., Pa. 15220
Phone: 412 921-7090

Sample ID#	Date Sampled	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOC	TCL SVOC (AW MINI DESIRE)	Explosives								Lab Cooler No.	CLIENT COMMENTS
Turnaround Time					STD	STD	STD									
# of Containers					1	1	1									
Container Type					40z	8oz	40z									
Preservative Used					4°	4°	4°									
+ 541SS001 0001	10/22	1215	SS	CF	1	1	1									
+ 541SS002 0001		1223			1	1	1									
+ 541SS003 0001		1240			1	1	1									
+ 541SS004 0001		1320			1	1	1									
+ 541SS005 0001		1405			1	1	1									
+ 541SS006 0001		1315			1	1	1									
+ 541SS007 0001		1420			1	1	1									
+ 541SS008 0001		1040			3	3	3									DO MS/MSD
+ 541SS009 0001		1025			1	1	1									
- 541DU709	10/22	0000	SS	CF	1	1	1									

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Paul M. Dini	10/22/97 1815	Fed Ex 18:15			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

C.P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

H 7129

Contract #/Billing Reference: _____

H 13 of _____ Pgs.

Project: Indian Head RI
Client: NAVY - Brown & Root Env.
Send Results To: George Catulione
Address: 661 Andersen Dr. #7
Pitt., Pa. 15220
Phone: 412 921 7090

Sample ID#	Date Sampled ('97)	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOA	TCL SVOC	TAL Metals	Cyanide	Dissolved metals	TCL Pest./PCB	Explosives				Lab Cooler No. / CLIENT COMMENTS
Turnaround Time					STD	STD	STD	STD	STD	STD	STD				
# of Containers					3	1	1	1	1	1	1				
Container Type					40 ml	1L Amb	500 ml	500 ml	500 ml	1L Amb	1L Amb				
Preservative Used					HCL	4°	HNO3	NaOH	HNO3	4°	4°				
~~S41 TB-102297-1 (V/F)~~	10/22	0900	AQ	—	3	—	—	—	—	—	—				
+S416W003A001 (V/F)	10/22	1210	AQ	PMD	3	1	1	1	1	1	1				
+S416W002A001 (V/F)	10/22	1610	AQ	PMD	3	1	1	1	1	1	1				
+S416W001A001 (V/F)	10/22	1740	AQ	CF	3	1	1	1	1	1	1				
RB-102297-1	10/22	1730	AQ	PMD	3	1	1	1	—	1	1				

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Paul M [illegible]	10/22/97 1815	10-22-97 [illegible] 18:15			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

G.P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#14 of _____ Pgs.

Project: Indian Head RI 1129
Client: NAVY Brown & Root Env.
Send Results To: George Lakhapse
Address: 661 Andersen Dr. #7
Pitt., PA. 15220
Phone: 412-921-7090

Sample ID#	Date Sampled ('97)	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOC	TCL SVOC	TCL Pest/PCB	Explosives	TAL metals	Dis. metals	Cyanide	TAL metals & CA	Explosives	Lab Cooler No.	CLIENT COMMENTS
Turnaround Time					STD										
# of Containers					3	1	1	1	1	1	1	1	1	1	
Container Type					40 ml	1L Amb	1L Amb	1L Amb	500 ml poly	500 ml poly	500 ml poly	~~500 ml poly~~	~~500 ml poly~~	PMD 1L amb	
Preservative Used					HCL	4°	4°	4°	HNO3	HNO3	NaOH	4°	4°		
TB-102397.1	10-23	0900	AQ	-	3										
+S416W004[U/F]-001		1000	AQ	PMD	3	1	1	1	1	1	1	—	—		
+S41 Dup 10		0000	AQ	PMD	3	1	1	1	1	1	1	—	—		
+S446W002[U/F]001		1400	AQ	PMD	3	1	—	1	1	1	1	—	—		
+S446W003[U/F]001		1415	AQ	CF	3	1	—	1	1	1	1	—	—		
+S44SS001 0001		1700	SS	CF								1	1		
+S44SS002 0001	CF ~~1710~~	1710	SS	CF								1	1		
+S44SS003 0001		1640	SS	CF								1	1		
+S44SS004 0001		1600	SS	CF								1	1		
+S446W001[U/F]-001		1720	AQ	PMD	3	1	—	1	1	1	1				
RB-102397.1		1815	AQ	PMD	—	—	—	1	1	—	1	—	—		

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
[signature]	10/24/97 1100	[signature] 10-24-97 11:00			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#15 of _____ Pgs.

Project: Indian Head RI #7129
Client: Navy - Brown & Root Env.
Send Results To: George Catullus
Address: 661 Andersen Dr. #7
Pitt., Pa. 15220
Phone: 412-921-7090

Sample ID#	Date Sampled ('97)	Time Sampled	Sample Matrix	Sampler's Initials	TCL VOC	TCL SVOC	TCL pest/PCB	TAL Metals	TAL DIS. metals	Cyanide					CLIENT COMMENTS
Turnaround Time					STD										
# of Containers					3	1	1	1	1	1					
Container Type					40ml	1L Am	1L Am	500ml poly	500ml poly	500ml poly					
Preservative Used					HCL	4°	4°	4° HNO_3	HNO_3	NaOH					
+ S12GW006 [4/F] 001	10/24	0850	AQ	CF	3	1	1	1	1	1					
+ S12GW005 [4/F] 001	10/24	0915	AQ	PMD	3	1	1	1	1	1					
S12 DUP 11	10/24	0000	AQ	—	3	1	1	1	1	1					

Lab Cooler No.

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
[signature]	10/24/97 1100	[signature] 10-24-97 11:00			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

G.P. W.O. _____

GP ENVIRONMENTAL SERVICES, INC.

202 Perry Parkway
Gaithersburg, Maryland 20877
(301) 926-6802

Contract #/Billing Reference: _____

#16 of _____ Pgs.

Project: Indian Head RI #7129
Client: Navy / Brown & Root Env.
Send Results To: George Lutolipski
Address: 661 Anderson Dr. Bldg #7
Pitt., PA 15220
Phone: 412-921-7090

Sample ID#	Date Sampled ('97)	Time Sampled	Sample Matrix	Sampler's Initials	TCLP VOA	TCLP SVOA	TCLP Pest/PCB	TCLP Herbicide	TCLP metals	TCLP Corrosivity & Ignitability	TCLP Reactivity				Lab Cooler No. / CLIENT COMMENTS
Turnaround Time					STD.	→									
# of Containers					3	1	1	1	1	1	1				
Container Type					40 ml	1L Am	1L Am	1L Am	1L poly	1L Am	1L Am				
Preservative Used					4°	4°	4°	4°	4°	4°	4°				
IDW-110497	11/04	1020	AQ	PMD	✓	✓	✓	✓	✓	✓	✓				TCLP Analysis

Relinquished By:	Date/Time	Received By:	Relinquished By:	Received for Laboratory By:	Date/Time
Paulette Dunn	11/4/97 1430	Bill Oll 11-04-97 14:30			

Relinquished By:	Date/Time	Received By:	Date/Time	Shipper:	Airbill No.:

Relinquished By:	Date/Time	Received By:	Lab Comments:	Temp:

P.W.O. _____

APPENDIX C

BORING LOG SHEETS

Appendix C.1	Boring Logs from October 1997
Appendix C.2	Boring logs from Phase I Site Inspection Report
Appendix C.3	Boring Logs from Phase II Site Inspection Report

APPENDIX C.1

BORING LOGS FROM OCTOBER 1997

SITE 12:	12 BORINGS
SITE 42:	1 BORING

BORING LOG

PROJECT NAME: INDIAN HEAD RI SITE 12
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP01
DATE: 10-8-97
GEOLOGIST: FRED W RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1605	S 1			FILL	LOOSE								
	2						~1' OF DRK BROWN SAND + GRAVELS	GM	DRY				
	3						~1' OF BLK TAR SHINGLES		ROOF SHINGLES				
	4		2.0 / 4.0				SATURATED		VERY LOOSE				
S 2 1615	5				LOOSE								
	6												
	7												
	8		.8' / 4.0				~.8' OF BLK TAR SHINGLES SATURATED		RODS SATURATED @ 2' W.L.C INSTL				
									SCREEN ~~1'-7'~~ RE				
									REMEASURED H2O @ 1.5' BGS				
									PLACE SCREEN				
									@ 1'-7'				
									SAND @ 9" BGS - 7'				
									BENT @ 3" BGS				

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm):

Remarks: 4' MACRO CORE SAMPLER FOR LITHOLOGIC LINED W/ PLASTIC TUBE

Converted to Well: Yes ✓ No _____ Well I.D. #: S12WP01

BORING LOG

PROJECT NAME: INDIAN HEAD RI SITE 12
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP02
DATE: 10-8-97
GEOLOGIST: FRED W RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Readings ppm: Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1510	1												
	2						NO RECOVERY						
	3								HIT H_2O ~3.5				
	4						MEASURE HOLE OPEN		SLEEVE WET @3.5				
S-2 1520	5			FILL?			TO 2.5'						
	6								WATER ON				
	7						NO RECOVERY		RODS AT 2' BGS				
	8								WILL INSTALL				
									WELL @				
									1.5 - 7.5				
									SAND @ 1.0 to 2.5				
							6' STAINLESS STEEL						
							OUTER SCREEN w/ PVC INNER SCREEN						
							RISER IS 3/4" OD PVC						
							RISER						

* When rock coring, enter rock brokeness.

** Include monitor reading in 5 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm):

Remarks: GEOPROBE DP w/ 4' MACRO CORE SAMPLER LINED WITH PE TUBE

Converted to Well: Yes ✓ No _____ Well I.D. #: S12WP02

BORING LOG

PROJECT NAME: NIDIAN HEAD RI
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP03
DATE: 10-9-97
GEOLOGIST: FRED WRAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 1555	1			FILL			YELORG SILT FG SAND	SM	ROOT MATL				
	2						AND TR GRA.		DRY				
	3						F-G SAND + GRAVEL TR SILT+CLAY	SM	SATURATED @ 2'				
	4		3.0/4.0										
S-2 1600	5						BLK SILT + GRA.						
	6						POOR RECOVERY						
	7												
	8		10/10										
									PLACE SCREEN @ 1'-7'				
									SAND @ 9"-7'				
									BENT @ 3"-9"				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm):

Remarks: GEOPROD ATV RIG DP, MACRO CORE SAMPLER

Converted to Well: Yes ✓ No

Well I.D. #: S12WP03

BORING LOG

PROJECT NAME: Indian Head
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP-04
DATE: 10-9-97
GEOLOGIST: PAUL DAVIS
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Ref: Sample	Sampler BZ	Borehole**
S-1	1					Brn	silt - some pebbles					
	2											
	3					Yel-brn	Clayey silt with		wet			
	4		3.0/4.0				fill - wood, plastic, cloth		creosote odors			
S-2	5					Gray	Clayey silt some					
	6					brn	pebbles & sand -		saturated			
	7						pc. of wood					
	8		1.0/4.0									
							SCREEN 4' - 10' BGS					
							SAND @ 3' - 4' BGS					
							BENT @ 1' - 3' BGS					

FILL

* When rock coring, enter rock brokeness.
** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm):

Remarks: 4" MACRO CORE SAMPLER FOR LITHOLOGIC

Converted to Well: Yes ✓ No _____ Well I.D. #: S12WP04

BORING LOG

PROJECT NAME: Indian Head RI
PROJECT NUMBER: 7129
DRILLING COMPANY: Hardin Huber
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WP05
DATE: 10-9-97
GEOLOGIST: PAUL DAVIS
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
S-1	1					or. brn.	silt w/ gravels		Dry				
	2						↓		↓				
	3					Brn.	silt w/ gravel & pebbles						
	4		4.0/4.0			↓	↓ some cinders		moist				
S-2	5			FILL					Satur. 5'				
	6												
	7					gray brn	silt some sand		~~saturated 5.5'~~				
	8		3.5/4.0				and gravels/pebbles		(organics)				
S-3	9					gray brn	silt with		saturated				
	10						wood (lumber)						
	11												
	12		3.0/4.0										
							SCREEN @ 4'-10' BGS						
							SAND @ 3'-4'						
							BENT @ 1'-3'						
							water in hole 4.5'		to 5.0'				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ____

Remarks: 4' MACRO CORE SAMPLER W/PLASTIC LINER FOR LITHO. ONLY

Converted to Well: Yes ✓ No ____ Well I.D. #: S12WP05

BORING LOG

PROJECT NAME: INDIAN HEAD RT
PROJECT NUMBER: 7129
DRILLING COMPANY: HAROLD HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: WPD6
DATE: 10-9-97
GEOLOGIST: FRED RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading: Sample	Sampler BZ	Borehole**	Driller BZ**
S-1 0900	1			FILL									
	2						POOR RECOVERY		TOP 6" DRY LOWER 3" SATURATED				
	3						SILT + SAND + GRAVEL		SILT + GRAVEL TR. WOOD FRAG.				
	4		0.8 / 4.0										
S-2 0905	5												
	6			FILL?	SOFT		GREENISH GREY SILT +		SATURATED				
	7						GRAVEL						
	8		3.0 / 4.0										
							MEASURED HIGH IN						
							HOLE @ 2'		PLACE SCREEN				
									1'-6'				
									SAND TO 9" BGS				
									BENTO TO 3" BGS				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm):

Remarks: 4' MACRO CORE SAMPLER W/PLASTIC LINER FOR LITHOLOGIC.

Converted to Well: Yes ✓ No _____ Well I.D. #: S12WPD6

BORING LOG

PROJECT NAME: INDIANHEAD RI SITE 12
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN-HUBER
DRILLING RIG: DP ATV GEOPROBE.

BORING NUMBER: RI12GW01
DATE: 8-5-97
GEOLOGIST: BURAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1			SSS			PALE YEL BRN SILT+SAN GRADING DOWNWARD		ROOT MATL: TO 1.0 ABUNDANT				
	2						TO SILT W/SOME GRA. @ 4'		LESSER ROOT DOWNWARD				
	3								LOOKS NATURAL? MAY BE REWORKED				
	4		3.0 / 4.0						TD MEASURED @ 4'				
	5												
	6												
	7												
	8		1.0 / 2.0				YEL BROWN CLAYEY SILT + SAND		TR. ROOT SATURATED				
									@ 8' STILL LOOKS NATURAL				
									WILL PLACE SCREEN				
									@ ~~4-14~~				
									4.5'-9.5'				
									SCREEN				
									HOLE COLLAPSED				
									PUSHED SCREEN				
									TO ONLY 8.5' DWN				

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm):

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #:

BORING LOG

PROJECT NAME: SITE 12, INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: ATV MT. GEOPROBE

BORING NUMBER: RT12GW02
DATE: 8-5-97
GEOLOGIST: R. KRAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Read: Sample	Sampler BZ	Borehole**	Driller BZ**
S-1	1			SSS			LIGHT BRN SILT+SAND		TO 6" ROOT MATL. DOWN	0			
	2						LIGHT BRN TO MOD BRN SAND W/SOME GRA. TR SILT		DRY	0			
	3						BLK ASPHALT 2-2.5'			0			
	4		3/4				YEL BRN GRAVEL+SAND 2.5'-2.7'			0			
				▽			BLK ASPHALT TO 3.8'		CLAY w/ WOOD MATL SAT @ 3.8'-4.0' (FILL)				
S-2	5												
	6												
	7												
	8		1.1/4				BLK. METAL FRAGS IN SHOLE ORGANIC MATL.		SAT (FILL)				
									TOOK 2 4' SPL				
									0-4, 4-8				
							MEASURED WATER		SATURATED @				
							IN HOLE AT 4'		4'				
							WILL PLACE SCREEN						
							4'-9'						

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm):

Remarks: TEMPORARY WELL POINT, 1.5" ID PVC RISER + SCREEN

Converted to Well: Yes ✓ No _____ Well I.D. #: TEMP WELL

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12 RT INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: RI12GW03
DATE: 8-5-97
GEOLOGIST: FRED W. RAMSER
DRILLER: BILL KIMESI

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS	Remarks	PID/FID Reading (pp Sample	Sampler BZ	Borehole**
	1						PALE YEL BRN			0		
	2						YEL BRN SAND + SILT			0		
	3			?					VERY HARD AT 2' BROKE			
	4		2.0 / 4.0						THROUGH WAT ON SPL @ 2'			
									REFUSAL @ 4.5'			
									USED DRIVE POINT TO GET THROUGH			
									SOFT FROM 5.5' ON DOWN TO 7.5'			
									WILL PLACE SCREEN @ 2.5-7.5			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: ___

Converted to Well: Yes ✓ No ___ Well I.D. #: ___

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12 RI INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: GEOPROBE ON ATV

BORING NUMBER: RI12GW04
DATE: 8-5-97
GEOLOGIST: FRED W RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (FL) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/FL) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID R... (P... Sample	Sampler BZ	Borehole**
S-1 1430	1						TEL ORG SILT + SAND		ROOT MATL. DRY			
	2						AS ABOVE W/GRAVEL					
	3						WOOD FRAG @ 3-3.1		DRY			
	4		4.0/4.0						SATURATED @ 4'			
S-2 1445	5						SAND + SILT WOOD					
	6						FRAGMENT APPARENT CHARCOAL		REFUSAL @			
	7								7'5"			
			3.5						WOOD IN SHOE — REFUSAL			
							PLACE SCREEN		2.5'-7.5'			

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area ___
Background (pp... ___

Remarks: ___

Converted to Well: Yes ✓ No ___ Well I.D. #: ___

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12, RI INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: ATV MT. GEOPROBE

BORING NUMBER: RI12GW05
DATE: 8-5-97
GEOLOGIST: FRED W RAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**
S-1 1330	1						YEL BRN SILT + SAND		ORGANIC MATL			
	2		2.0/2.0				W/TR GRA.		HM REFUSAL @ 2'			
	3			?			PROBABLY CONCRETE		DRIVE POINT TO 4'			
	4											
									HAD DRIVE PT REFUSAL @			
									5' MOVE RIG.			
	0											
	1						MOD YEL BRN SILT + SAND CLAY CONTENT INCREASES		SOME GRA.			
	2						DOWNWARD TO 4.0'					
	3											
	4		4.0/4.0				CLAYEY GRAVEL					
	5						YEL BRN SANDY CLAY					
	6						↓					
	7						DK YEL BRN MOTTLED BLK CLAY + GRA.		TR GLASS FRAG BRICK "FILL"			
	8		4.5/4.0				AS ABOVE		SATURATED @ 6'			
	9						AS ABOVE					
	10						WOOD FRAGMENTS					
	11						BLK LAYER @ 10'					
	12		4.0/4.0						THICK WOOD IN SHOE			
							PLACE SCREEN @					
							6.8" TO 11'8"					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: GEOPROB DP 4' MACRO CORE SAMPLERS
WILL USE 5' SCREEN

Converted to Well: Yes ✓ No ___ Well I.D. #: ___

BORING LOG

Page ___ of ___

PROJECT NAME: SITE 12 RI INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: ATV MT. GEOPROBE
BORING NUMBER: RI12GW06
DATE: 8-5-97
GEOLOGIST: FURAMSER
DRILLER: BILL KIMES

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS	Remarks	PID/FID Read. (PP Sample	Sampler BZ	Borehole**
S-1 1220	1						YEL BRN SILT + f-g SAND		TR ROOTS	0		
	2						MOD BRN TO YEL BRN SILT + f-g SAND TR GR.		DRY	0		
	3								WOOD FRAG. WELL ROUND GRA.	0		
	4		3.0/4.0				YEL BRN f-g SAND		TR ~~ASPHALT~~ (FILL) DRY	0		
S-2 1230	5			FILL			LARGE REDDISH WOOD FRAGS. 4-4.4		ASPHALT			
	6						PALE YEL BRN TO MOD BRN f-g SANDY W/ SOME GRA. TR SILT		DRY	0		
	7						LT BRNISH GREY CONCRETE? SAND STONE?		CONSOLIDATED MAYBE CONCRETE	0		
	8		4.0/4.0				OLIVE GREY CLAY W/ SOME GRA. AND PLANT MATL		(FILL) ~~DK~~ GREY WET IN TIP OF SHOE	0		
S-3 1245	9									0		
	10						DK YEL BRN CLAY ~~TR~~ SAND TR GRA.		SATURATED			
	11								LOOKS NATURAL			
	12		4.0/4.0				ABUNDANT PLANT MATL TR SAND	PT	LEAVES SATURATED			
S-4 1255	13								OPERATOR STATES MATL. VERY SOFT			
	14						AS ABOVE	PT				
	15		1.0/3.0						WET REFUSAL AT 15' BGS LARGE			
									METALLIC FRAG IN CUTTING			
							WILL PLACE IN		SHOE? 1) MAY STILL BE IN FILL			
							5' SCREEN		2) OR WE DRAGGED FRAG TO BOTTOM?			
							7'-12' BELOW					

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area ___

Background (ppm) ___

Remarks: _____

Converted to Well: Yes ✓ No ___ Well I.D. #: ___

BORING LOG

PROJECT NAME: INDIAN HEAD
PROJECT NUMBER: 7129
DRILLING COMPANY: HARDIN HUBER
DRILLING RIG: ATV RIG

BORING NUMBER: 042 SB 07
DATE: 8-2-97
GEOLOGIST: HALE
DRILLER: McKINNEY

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**
		3/5			LOOSE	yell	silty fine sand w/ some	SM	D roots	Ø		
0944	2	7/6	0.5/2		LOOSE	brn	fine → medium gravel	SM	D	Ø		
		5/8			M.STF	orn	silty clay, mottled w/	CL	M large (2")	Ø		
0947	4	10/9	1/2		STIFF	orn	orange/black/cream	CL	M auto gravel	Ø		
		4/11				grey		CL	M	Ø		
0951	6	10/11	1.5/2			orn		CL	M	Ø		
		3/5			M.STIFF		grades into a	CL	M mottled	Ø		
0957	8	5/7	1.5/2			pink cream	silty sand.	SM	W-S	Ø		
		2/3			V LOOSE		grades to fine sand	SP	S SCREEN	Ø		
1000	10	5/7	2/2		M.STIFF	light green brown	uniform clay w/trace orn	CL	M S-1S1	Ø		
		3/5			LOOSE		fine grained sand	SP	S	Ø		
1005	12	7/9	1.7/2		STIFF	light brown	clay w/orange/black blebs	CL	M *blebs look	Ø		
		5/8			M.STIFF	light gray		CL	M like oxidized	Ø		
1013	14	15/16	2/2		V.STIFF	red brown		CL	M cinders	Ø		
		4/10			STIFF		blebs more	CL	M *void in	Ø		
1022	16	5/16	1.6/2				prevalent	CL	M center of s.s	Ø		
		3/5			SOFT		above mat'l (6") grades into silty clay (1') over silty	CL	M	Ø		
1032	18	7/12	2/2		M.STIFF		fine sand.	CL / SM	M / W	Ø		
		5/6			M.STIFF	grey red	6" clay over 1' silty sand	CL / SM	M / M-W	Ø		
1040	20	7/7	2/2			orn pink	over 6" clay agown	CL	M	Ø		

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated response read.

Drilling Area Background (ppm): ___

Remarks: HSA 4¼ ID, 2" ID Split Spoons

Converted to Well: Yes ✓ No ___ Well I.D. #: 042 MW 07

APPENDIX C.2

BORING LOGS FROM PHASE I SITE INSPECTION REPORT

The boring logs in this appendix were copied from the Final Site Inspection Report: Phase I Olsen Road Landfill (E/A&H, 1992). The boring logs were prepared by ENSAFE/Allen & Hoshall, and published in the 1992 report.

References:

E/A&H (ENSAFE/Allen & Hoshall), 1992. Final Report Site Inspection: Phase I Olson Road Landfill, July.

DATE OF BORING: 10/09/91

SAMPL No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS BG (BACKGROUND) = .02ppm BBG = BELOW BACKGROUND
1	SS	25	15	1340	BG	(0-2 feet) Very dry silty clay. Tan with roots. Not enough recovery for sample.
2 5	SS	100	20	1345	BG	(4-6 feet) Sand and silt fine grained sand with some silt, dry.
3 10	SS	100	12	1440	BG	(9-10 feet) Brown silty clay with some fine sand. Clay brown mottled with gray clay.
4 15	SS	100	16	1453	BG	(14-16 feet) Clay, stiff brown with reddish iron streaks. Some orgaincs. Dry.
5 20	SS	100		1456		(19-21 feet) Stiff medium dark brown clay with organics and lignite.
6 25	SS	100	15	1505	BG	(24-26 feet) Brown clay, 24.0 to 24.5 feet. Meduim grained, well sorted sand 24.5 to 26.0 feet, wet.

WATER TABLE @ 25'

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B1
SITE 42
NSWC Indian Head, MD.

DATE: 04/10/92 | DWG NAME: IHBOR1

DATE OF BORING: 10/10/91

SAMPL. No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						BACKGROUND VAPOR READING = <0.1ppm
1	SS	25	18	0840	BG	(0–2 Feet) Orange brown silty clay with some sand and a trace of organics.
2 5	SS	75	15	0844	BG	(4–6 Feet) Orange and gray mottled clay wiht some silt.
3 10	SS	100	12	0855	BG	(9–11 FEET) Silty sand, brown with gray clay, wet, (9.0 to 9.5 feet). Clayey silt mottled with brown clay sitff, slightly moist (9.5 to 11.0 feet).
4 15	SS	100	22	0914	BG	(14–16 FEET) BROWN–ORANGE CLAY WITH SOME GRAY MOTTLES. MINOR ORGANICS, STIFF AND DRY.
5 20	SS	73	8		8	(19–20 Feet) Brown orange sandy silt, firm dry (19.0 to 20.0 feet). Gray and orange clay with some silt, firm and wet (20.0 to 21.0 feet). Gronudwater @ 20.5 feet.
6 25	SS	100	13		3	(24-26 feet) Fine grained sand with silty & clays, brown and wet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B2
SITE 42
NSWC Indian Head, MD.

DATE: 04/09/92 | DWG NAME: IHBOR2

DATE OF BORING: 10/10/92

DESCRIPTION OF SUBSURFACE MATERIALS

BACKGROUND VAPOR READING = 0.2 ppm

SAMPL. No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	
1	SS	100	15	1037	BG	(0-2 Feet) Sandy silt-very hard Brown to tan (0 to 0.5 feet). Sand and gravel with quartz, Sand is medium to coarse grained, gravel is fine grained (0.5 to 1.3 feet).
2 5	SS	100	15	1037	BG	(4-6 Feet) Silty clay, brown mottled with gray clay, with some organics.
3 10	SS	100	14	1045	BG	(9-10 Feet) Gray to brown silty sand. Sand is fine to medium grained and poorly sorted.
4 15	SS	100	19	1100	BG	(14-16 Feet) Silty clay with fine grained sand and some organics. Orange to brown, stiff and dry.
5 20	SS	100	20	1105	BG	(19-21 Feet) Brown to orange silty clay with organics (19.0 to 19.7 feet). Fine grained silty sand, moist (19.8 to 21.0 feet).
6 25	SS	100	21		BG	(24-26 Feet) Gray, fine to medium grained sand, wet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B3
SITE 42
NSWC Indian Head, MD.

DATE: 04/10/92

DWG NAME: IHBOR3

DATE OF BORING: 10/10/91

DESCRIPTION OF SUBSURFACE MATERIALS

BACKGROUND VAPOR READING = <0.1 ppm

SAMPL No & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	
1	SS	75	25	1402	<0.01	(0-2 feet) Orange to brown silty clay with some sand, dry, stiff, minor orgaincs and some iron staining.
2 5	SS	100	20	1408	<0.01	(4-6 feet) Orange to tan silty sand. Red orange silty clay with iron staining.
3 10	SS	100	13	1412	<0.01	(9-11 feet) Gray orange clayey silt with some sand. Moist to wet.
4 15	SS	100	21	1425	<0.01	(14-16 feet) Red orange clay with organic mottling. Some iron staining, dry stiff.
5 20	SS	100	17		<0.01	(19-21 feet) Red orange clay with some iron staining, stiff but moist. Red orange sandy silt with iron staining wet and firm.
6 25	SS	100	15	1450	<0.01	(24-26 feet) Orange to brown medium to fine grained sand with some silt (24.0 to 24.3). Gray medium grained sand moderately well sorted, wet (24.3 to 26.0).

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

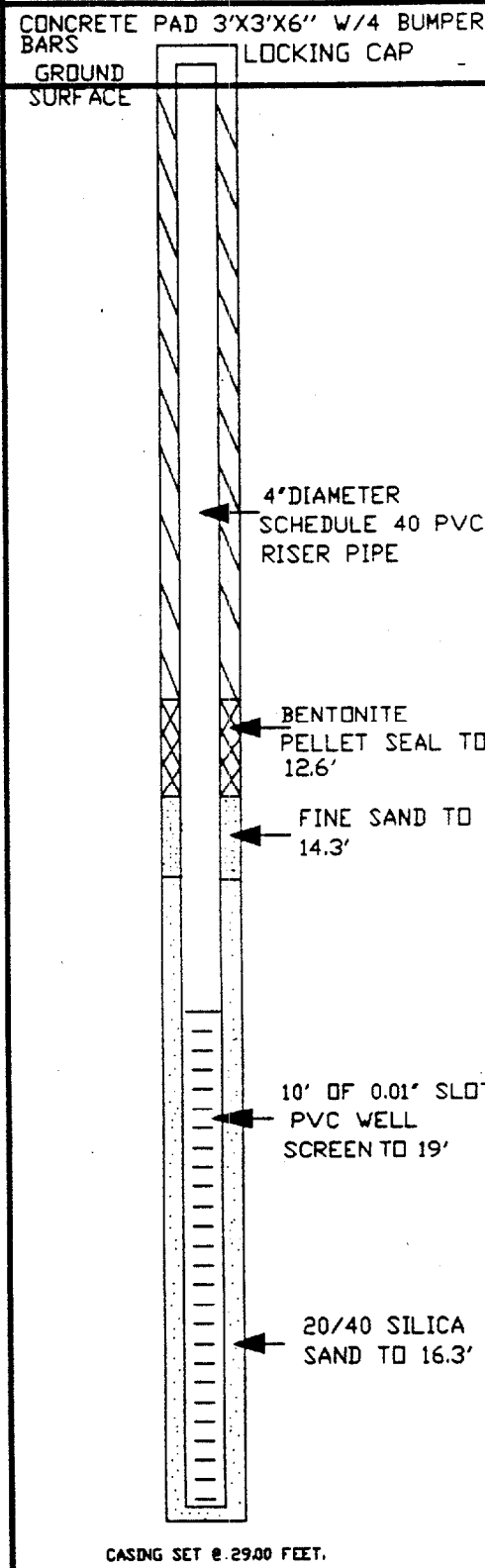
BORING B4
SITE 42
NSWC Indian Head, MD.

DATE: 04/10/92 | DWG NAME: IHBOR4

DATE OF BORING: 10/09/91

SAMPL. No.	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
1		SS	50	23	1653	BG	(0-2 feet) Topsoil (0 to 0.2 feet). Remaining sample stiff and dry with organics.
2	5	SS	75	24	1656	BG	(4-6 feet) Gray to orange sandy silt, moist and stiff.
3	10	SS	75	16	1703	BG	(9-11 feet) Gray silty sand with some clay, moist.
	15	SS	100	20	1715	BG	(14-16 feet) Brown to orange stiff clay mottled gray with iron staining and some organics, dry.
5	20	SS	100	26	1720		(19-21 feet) Reddish brown clay with silt and some sand, mottled with gray clay, some organics.
6	25	SS	100	21		BG	(24-26 feet) Medium to fine grained moderately well sorted sand with some silt and clay, wet.
7	30	SS	100	21		BG	(29-31 feet) Medium to fine grained sand, some clay, wet.

WELL CONSTRUCTION DETAILS



SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

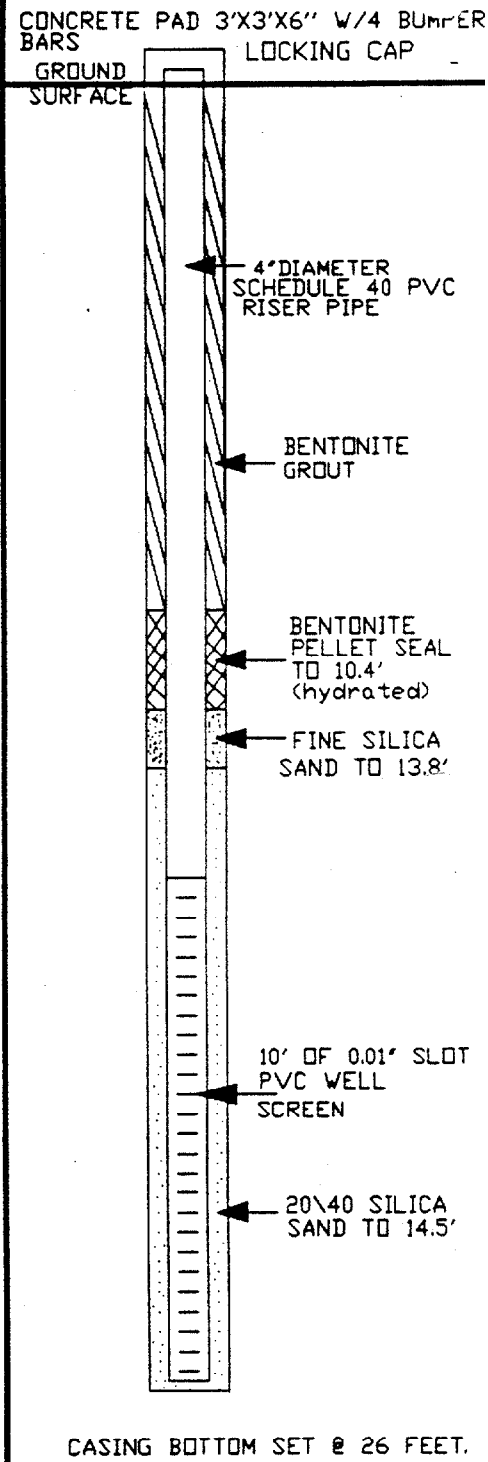
BORING-5 / MW-1
PHASE I - SITE INSPECTION
NSWC INDIAN HEAD, MARYLAND

DATE: 04/29/92 | DWG NAME: IHMW1

DATE OF BORING: 10/09/91

SAMPL. No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS BG (BACKGROUND) = 0.0ppm
						NO SAMPLE
2 5	SS	16	38	1600	BG	(4-6 feet) Sand and gravel Insufficient recovery for sampling.
3 10	SS	58	27	1625	BG	(9-11 feet) Gravel and cobble fill becoming a brown silty clay with organics and iron staining.
4 15	SS	100	20	1640	BG	(14-16 feet) Reddish brown clay stiff and dry (14.0 to 14.4 feet) Medium to coarse grained sand.
5 20	SS	83		1650		(19-21 feet) Brown medium grained sand, wet. Remaining sample gray medium grained sand.
6	SS	100	4	1653	BG	(21-23 feet) Gray sand changing to an orange medium grained sand at approximately 21.3 feet. Wet with minor organics.
7 25						(24-26 feet) Gray clay with very little silt or sand, moist.
30						

WELL CONSTRUCTION DETAILS



SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING-6 / MW-2
PHASE I - SITE INSPECTION
NSWC INDIAN HEAD, MARYLAND

DATE: 04/10/92 | DWG NAME: IHBOR1

DATE OF BORING: 10/14/91

SAMPLE No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						BACKGROUND VAPOR READING = No readings, insturment malfunction.
1	SS	50	15	1518	NR	(0-2 feet) Brown silty clay with some sand & organic layers.
2 5	SS	100	16	1515	NR	(4-6 feet) Brown silty clay mottled with gray clay, stiff.
3 10	SS	100	15	1530	NR	(9-11 feet) Fine grained sand - gray with silt & clay. Minor organics, moist.
3						
4 15	SS	100	13	1542	NR	(14-16 feet) Silty clay (14.0 to 15.2') with some brown dry clay. Clay with minor silt & organics, stiff & dry (15.2 to 16.0),
5 20	SS	100		1550	NR	(19-20 feet) Clay with minor silts & organics (19.0 to 19.4'). Silty clay (19.4 to 20.1). Sand gray, medium grained, wet (20.3 to 21.0).
25						Boring terminated at 21 feet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B7
SITE 42
NSWC Indian Head, MD.

DATE: 04/29/92 | DWG NAME: IHBOR7

DATE OF BORING: 10/14/91

SAMPLE No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						BG (BACKGROUND) = 2.0 ppm
1	SS	10	13	1700	BG	(0-2 feet) Gravel, No recovery.
2 5	SS	91	7	1705	BG	(4-6 feet) Clay with moderate amounts of silt and fine grained sand, brown mottled gray clay with some organics moist.
3 10	SS	100	19	1715	BG	(9-10 feet) Tight red clay wiht iron staining at approximatley 9.8 feet iron concretions and some organics, dry.
4 15	SS	100	14	1728	BG	(14-16 feet) Red silty clay with some orgaincs, dry and stiff.
5 20	SS	100	12	1736		(19-21 feet) Tight reddish brown clay, (20.2 to 20.8 feet). Silty clay with fined grained sand and organics with iron staining (20.8 to 21.0 feet). Boring terminated at 21 feet.
25						

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B8
SITE 42
NSWC Indian Head, MD.

DATE: 04/29/92 | DWG NAME: IHBOR8

DATE OF BORING: 10/15/91

SAMPL. No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS BG (BACKGROUND) = .02ppm BBG = BELOW BACKGROUND
1	SS	25		0920	BG	(0-2 feet) Gravel and clay.
2 5	SS	63	12	0922	BG	(4-6 feet) Red to brown clay mottled with gray clay, sitff and dry.
3 10	SS	100	10	0934	BG	(9-10 feet) Sand (9.0 to 9.3 feet). Moist brown clay with some silt (9.3 to 11.0 feet). Very stiff (10.3 to 11.0).
4 15	SS	100	13	0945	BG	(14-16 feet) Reddish brown clay with silt and organics, stiff and dry.
5 20	SS	100	9	1034		(19-21 feet) Red to brown clay (19.0 to 20.8 feet). Sand, medium to fine grained with some silt and organics. Boring terminated at 21 feet.
25						

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

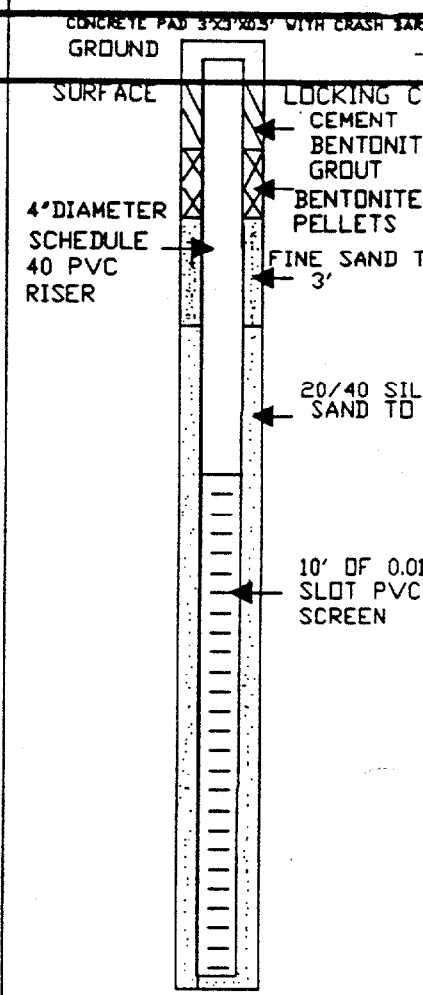
BORING B9
SITE 42
NSWC Indian Head, MD.

DATE: 04/29/92 | DWG NAME: IHBOR9

DATE OF BORING: 10/09/91

SAMPLING No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						BG (BACKGROUND) = 0.1ppm
1						No sample
2 5	SS	83	-	1425	BG	REDDISH BROWN CLAY WITH SOME SILT AND ORGANICS, MOIST.
3 10	SS	100	9	1436	BG	GRAY MEDIUM GRAINED SAND, WET
4 15	SS	100	15	1447	BG	14.0-14.8' GRAY SAND, INCREASING SILT AND CLAY WITH DEPTH, WET. 14.8-16.0' TIGHT GREEN CLAY.
5 20	SS	18.3	5	1457	-	GREEN CLAY. MOIST CLEAN.
6 25						

WELL CONSTRUCTION DETAILS



SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING-10 / MW-3
PHASE I - SITE INSPECTION
NOS INDIAN HEAD, MARYLAND

DATE: 04/10/92 | DWG NAME: IHBOR1

DATE OF BORING: 10/16/91

SAMPL. No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						No reading, insturment malfunction.
1	SS	42	7	1018	NR	(0-2 feet) Black (stained) clayey sand (0 to 0.1), red to brown clay.
2 5	SS	92	13	1020	NR	(4-6 feet) Reddish brown clay with silt and some fine sand mottled with gray clay, minor organics moderately stiff and dry.
3 10	SS	100	26	1030	NR	(9-11 feet) Brown silty clay with little to no organics, mottled with gray clay and some possibly fill.
3	SS	58		1032	NR	Duplicate sample (11-13 feet) same to 12.8, changes to tight clay, brown to gray.
4 15	SS	92	23	1045	NR	(14-16 feet) Tan to brown mottled clay, some iron staining.
5 20	SS	100		1100	NR	(19-21 feet) Reddish to brown stiff clay with organics and iron staining.
6 25	SS	100		1110	NR	(24-26 feet) Brown medium grained sand (24.0 to 24.2 feet). Gray sand and clay with some silt (24.3 to 26.0 feet).
						Boring terminated at 26 feet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B11
SITE 42
NSWC Indian Head, MD.

DATE: 04/29/92 | DWG NAME: IHBOR11

DATE OF BORING: 10/16/91

SAMPLE No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						BG (BACKGROUND) = 0.2 ppm
						No sample.
2 5	SS	33	12	1358	BG	(4-6 feet) Black stained clay, silt and sand Red clay (4 inches).
3 10	SS	16	4	1410	0.4	(9-10 feet) /sandy silt and clay, insufficient recovery for a sample.
4 15	SS	100	9	1418	BG	(14-16 feet) Clay, with moderate amounts of silt and some sand. Gray clay, wet.
5 20	SS	100	20	1433		(19-21 feet) Brown clay mottled with gray clay (19.0 to 19.2 feet). Gray to brown, medium to fine grained sand.
6 25	SS			1442	BG	(24-26 feet) Reddish medium to fined grained sand wit some clay (24.0 to 24.5 feet). Medium grained moderately well sorted grand sand, wet (24.6 to 26.0 feet). WATER TABLE @ 25'

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B12
SITE 42
NSWC Indian Head, MD.

DATE: 04/29/92 | DWG NAME: IHBOR12

DATE OF BORING: 10/16/91

SAMPLE No.	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BACKGROUND VAPOR READING = 0.015 ppm
1							(0-2 feet) No sample collected.
2	5	SS	100	12	1742	BG	(0.4-0.5') Gray to brown sandy clay and silty sand, 0.5'orange to gray clay with some sand, stiff.
3	10	SS	100	19	1748	BG	(9-11 feet) Orange gray clay, stiff.
13		SS	50	--	1750		(11-13 feet) Gray clay, stiff.
4	15	SS	100	16	1755	BG	(14-16 feet) Reddish gray clay with some orange and some iron staining, moist.
5	20	SS	75	15	1802	BG	(19.0 - 20.7') Gray medium grained sand, wet.
	25						Boring temininated @ 21 feet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING 13
SITE 42
NSWC Indian Head, MD.

DATE: 10/16/91

DWG NAME: IHBOR13

DATE OF BORING: 10/16/91

SAMPL. No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						BACKGROUND VAPOR READING = 0.01 ppm
1						(0-2 feet) No sample collected.
2 (5)	SS	25 16	9	1825	BG	(4.0 - 6.0 feet) Sandy silt with organics and rock fragments (4.0 to 4.5 feet). Fill material (4.5 to 4.8 feet). Two samples attempted, low recovery.
3 (10)	SS SS	21 100	4	1834	BG	(9.0 - 10.0 feet) Dark gray to brown sandy clay. Saturated.
4 (15)	SS	75	10	1900	BG	(13 - 15 feet) Dark gray sandy clay. Saturated. Firm.
(20)	SS					Boring terminated @ 15 feet. Intersected groundwater.
(25)						

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B14
SITE 42
NSWC Indian Head, MD.

DATE: 10/16/91 | DWG NAME: IHBOR14

DATE OF BORING: 10/18/91

DESCRIPTION OF SUBSURFACE MATERIALS

BACKGROUND VAPOR READING = 0.0 ppm

SAMPL. No.	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	
1							(0-2 feet) No sample collected.
2	5	SS	0	*RJ	1048	BG	(4-6 feet) No recovery. Ply wood & concrete fill.
3	10	SS	69	13	1100	BG	(9-11 feet) Brown and gray mottled clay with silt and minor amounts of sand fill.
4	15	SS	100	12	1113	BG	(14-16 feet) Reddish brown clay mottled with gray clay (14.0 to 15.1 feet). Moderate silt and minor sand. Organics (15.1 to 16.0 feet).
5	20	SS	100	6	1120	BG	(19-21 feet) Brown sand with minor silt & clay (19.0 to 19.8 feet). Gray medium fine sand with minor amounts of silt & clay (19.8 to 20.8 feet). More clay (20.8 feet to 21.0 feet).
	25						Boring terminated @ 21 feet. Intersected groundwater.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B15
SITE 42
NSWC Indian Head, MD.

DATE: 04/20/92

DWG NAME: IHBOR15

DATE OF BORING: 10/18/91

DESCRIPTION OF SUBSURFACE MATERIALS

BACKGROUND VAPOR READING = <0.01 ppm.

SAMPLE No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	
						(0-2 feet) No sample collected.
2 5	SS	20	12	1335	BG	(4-6 feet) Clay, silt & gravel. Low recovery.
3 10	SS	16	25	1344	BG	(11-16 feet) Clay with fine gravel (cement). Minor staining, no odor. Low recovery. Sample 42B16-3C was collected from boring cuttings due to low sample recovery from the split spoon.
4 15	SS	16	--	1355	BG	(14-16 feet) Clay and silt with wood & concrete. Low recovery.
4	SS SS			1355		(16-18 feet) Brown medium to fine grained sand (16.0 to 17.6 feet). Gray medium to fine grained sand moist (17.6 to 18.0 feet).
5 20	SS	83		1355		(18-20 feet) Brown medium to fine grained sand (18.0 to 18.9 feet). Gray medium to fine grained wet sand (18.9 to 20.0).
25						Boring terminated at @ 21 feet. Intersected groundwater.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B16
SITE 42
NSWC Indian Head, MD.

DATE: 04/30/92 | DWG NAME: IHBOR16

DATE OF BORING: 03/09/92

SAMPL. No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
						BACKGROUND VAPOR READING =
1	SS	76	10	1300		(0-2 feet) 12 inches of brown silty clay, dry. A lay of peat (0.75 inches). Some thin layers of poorly sorted, medium to fine grained sand.
2 5	SS	100	18	1305		(4-6 feet) Sandy silt and clay. Clay mottled gray and orange with minor organics. Sand is poorly sorte and fine to medium grained.
3 10	SS	100	23	1321		(9-11 feet) Very stiff, gray and orange mottled clay with little silt and no sand. Minor amounts of organics.
4 15	SS	100	17	1333		(14-16 feet) Silt, sand and clay mottled orange and gray with some organics.
5 20	SS	100	20	1340		(19-21 feet) Moterately sorted, medium grained sand (19 to 20 feet). Gray and orange mottled clay, wet (20 to 20.6 feet). Remainder is gray medium grained, moterately well sorted sand, very wet.
25						Boring terminated at 21 feet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B17
SITE 42
NSWC Indian Head, MD.

DATE: 04/07/92 | DWG NAME: IHBOR17

DATE OF BORING: 03/09/92

SAMPLE No & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
1	SS	58	11	1415		(0-2 feet) Sand, small gravel and wood fragments with lots of organics.
2 5	SS	100	22	1419		(4-6 feet) Clay brown mottled with some gray and orange clay. Minor organics.
3 10	SS	100	20	1429		(9-11 feet) Stiff, brown to pink clay mottled with orange clay. Minor amounts of organics.
4 15	SS	100	26	1440		(14-16 feet) Clayey silt, mottled orange and gray with some organics.
5 20	SS	100	28	1448		(19-21 feet) Brown to reddish-brown, stiff clay (19.0 to 20.8 feet). Poorly sorted orange silty sand (20 to 20.6 feet).
6	SS	100	27	1453		(21-23 feet) Fine grained sand orange with some organics (21.0 to 21.5 feet). Medium grained orange sand (21.5 to 22.5). All wet.
25						Boring terminated at 23 feet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B18
SITE 42
NSWC Indian Head, MD.

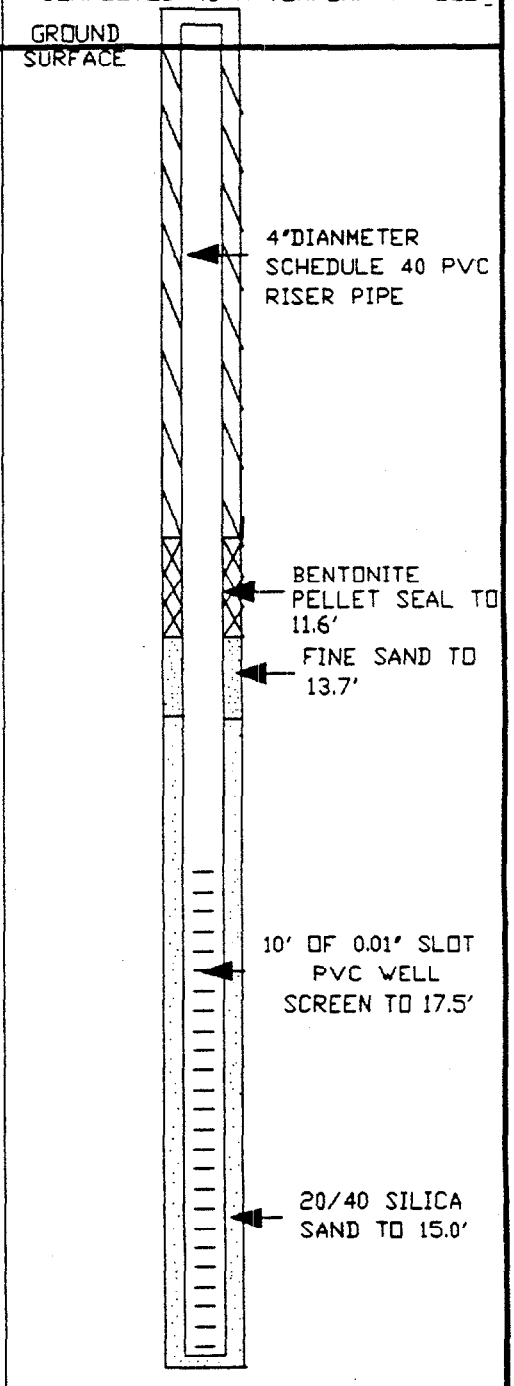
DATE: 04/07/92 | DWG NAME: IHBOR18

DATE 03/09/92

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
	SS	20	17	1658	(0-2 feet) Low recovery - Organics silty sandy clay with some small gravel.
5	SS	0	24	1659	(2-4 feet) No recovery.
10	SS	100	17	1720	(9-11 feet) Orange to gray mottled clay with minor amounts of silts and organics.
15	SS	100	19	1720	(14-16 feet) Reddish-orange silty clay and clayey silt. Lots of organics and moist. Several thin seams of very fine grained sand.
20	SS	100	26	1730	(19-21 feet) Brown medium grained sand with orgaincs. Gray medium grained moderately sorted sand with thin lens of clay.
25					Soil sampling terminated at 21 feet.

WELL CONSTRUCTION DETAILS

COMPLETED AS A TEMPORARY WELL



CASING SET @ 27.50 FEET.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING 19 / MONITORING WELL 4
SITE 42
NSWC INDIAN HEAD, MD.

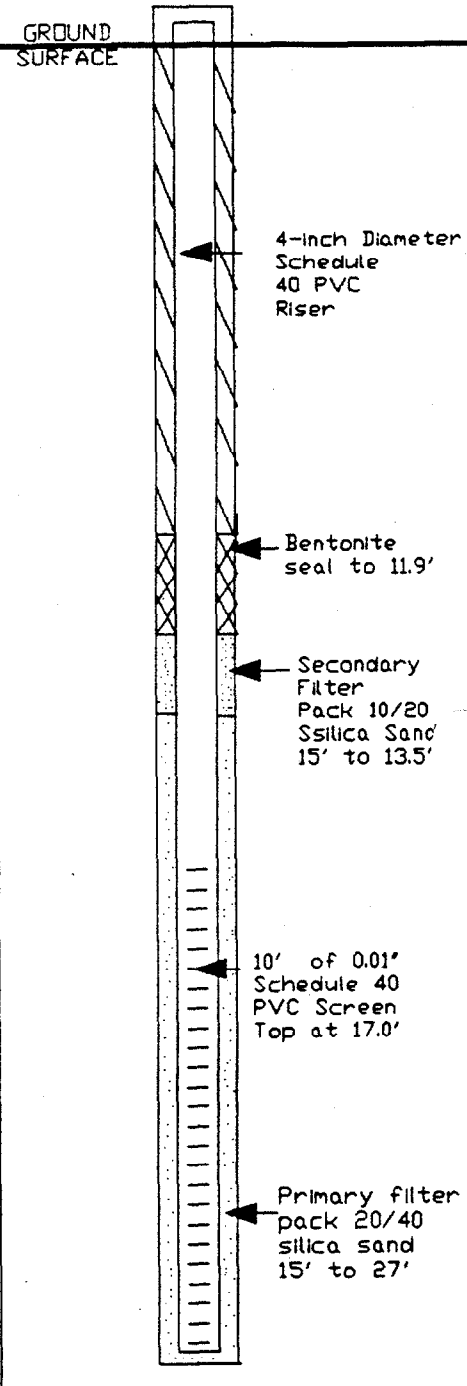
DATE: 04/07/92 | DWG NAME: IHMW4

DATE 03/10/92

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
	SS	20			(0-2 feet) No sample collected.
5	SS	100	7	1553	(4-6 feet) Clay brown with minor amounts of silt and organics.
10	SS	100	11	1600	(9-11 feet) Sandy clay with minor amounts of silt. A thin sandy layer at 10.0 to 10.3 feet.
15	SS	100	18	1605	(14-16 feet) Clay very hard with some organics and iron staining.
20	SS	100	21	1620	(19-21 feet) Poor to moderately sorted fine to medium grained sand, orange to brown, wet.
25	SS	100	28	1628	(24-26 feet) Clay, stiff brown (24.0 to 24.7 feet). Moderately sorted medium grained gray sand, wet (24.7 to 26.0 feet).
					Soil sampling terminated at 26 feet.

WELL CONSTRUCTION DETAILS

COMPLETED AS A TEMPORARY WELL



CASING SET @ 27.0 FEET.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING 20 / MONITORING WELL 5
SITE 42
NSWC INDIAN HEAD, MD.

DATE: 04/07/92 | DWG NAME: IHMW5

DATE OF BORING: 03/11/92

SAMPLE No.	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
1		SS	0				(0-2 feet) No sample collected.
2	5	SS	100	23	1202		(4-6 feet) Clayey silt with some fine grained sand with minor amounts organics (4.0 to 5.9 feet). Clay red to gray, stiff.
3	10	SS	100	20	1210		(9-11 feet) Silt and sandy. Sand fine to medium grained with a fair amount of silt and some clay with minor amounts organics.
4	15	SS	100	38	1221		(14-16 feet) Clay stiff orange to brown with minor amounts silts and lots of organics.
5	20	SS	100	21	1230		(19-21 feet) Dark brown sand meduim grained with some silts and clays. Minor amounts of organics.
6	25	SSS	100	24	1250		(24-26 feet) Clay brown stiff (24.0 to 25.2 feet). Orange and gray sand, moderately sorted, medium grained sand with some organics, wet (25.2 to 26.0 feet).

Boring terminated at 26 feet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B21
SITE 42
NSWC Indian Head, MD.

DATE: 04/07/92 | DWG NAME: IHBOR21

DATE OF BORING: 03/11/92

SAMPL. No. & DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
1						(0-2 feet) No sample collected.
2 5	SS	100	16	1420		(4-6 feet) Silty sand orange. Sand medium to fine grained with minor amounts of clay (4.0 to 5.7 feet). Clay stiff, brown (5.7 to 6.0 feet).
3 10	SS	100	10	1430		(9-11 feet) Clay stiff, brown (9.0 to 9.3) orange and gray clay (leafs and sticks). Sand medium to fine grained with some silts (9.3 to 11.0 feet).
4 15	SS	100	41	1436		(14-16 feet) Brown to gray mottled clay, with minor amounts of sitls and fine grained sand.
5 20	SS	100	21	1452		(19-21 feet) Brown to orange mottled clay with some gray clay. Stiff, with some organics (19.0 to 20.8 feet). Red silt and sand moist (20.8 to 21.0 feet).
25						Boring terminated at 21 feet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B22
SITE 42
NSWC Indian Head, MD.

DATE: 04/07/92 | DWG NAME: IHBOR22

DATE OF BORING: 03/20/92

SAMPL No.	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BACKGROUND VAPOR READING = -
1		SS	0				(0-2 feet) No sample collected.
2	5	SS	100	15	1335		(5-7 feet) Silty clay brown with a layer of silt, dry.
3	10	SS	100	22	1401		(10-12 feet) Clay stiff, gray with minor amounts of silts. Some iron staining.
4	15	SS	100	26	1404		(15-17 feet) Clay brown to gray mottled, tight.
5	20	SS	100	11	1418		(20-22 feet) Clayey silt brown to red with some fine grained sand, moist.
6	25	SS	100	2	1418		(25-27 feet) Sand and silt gray with minor organics and some clays, wet.
							Boring terminated at 27 feet.

SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
NSWC INDIAN HEAD, MD.

BORING B24
SITE 42
NSWC Indian Head, MD.

DATE: 04/07/92

DWG NAME: IHBOR24

APPENDIX C.3

BORING LOGS FROM PHASE II SITE INSPECTION REPORT

The boring logs in this appendix were copied from the Final Site Inspection Report: Phase II Indian Head Division, Naval Surface Warfare Center (E/A&H, 1994). The boring logs were prepared by ENSAFE/Allen & Hoshall, and published in the 1994 report.

References:

E/A&H (ENSAFE/Allen & Hoshall), 1994. Final Site Inspection Report, Phase II Indian Head Division, Naval Surface Warfare Center, March 4.

DATE OF BORING: 08/31/92

SAMPLE No.	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BG (BACKGROUND) = 0.0 ppm
1		SS	0	22	1230	BG	(0-2 feet) No recovery.
2	5	SS	100	5	1240	BG	(5-7 feet) Stiff to medium stiff brown and gray mottled clay with some poorly sorted sand.
3	10	SS	54	14	1248	BG	(10-12 feet) Medium to coarse grain gray sand with small size gravel; moist.
4	15	SS	100	28	1300	BG	(15-17 feet) Very stiff brown to gray mottled clay, dry.
5	20	SS	100	24	1313	BG	(20-22 feet) Very stiff brown to gray clay; dry.
6	25	SS	100		1337	BG	(25-27 feet) Very stiff clay with some pockets of fine gray sand; dry.

BORING TERMINATED AT 27'

SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB01

DATE: 09/29/92 | DWG NAME: 41SB01

DATE OF BORING: 08/31/92

SAMP No.	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BG (BACKGROUND) = 0.0 ppm
1		SS	46		1613	BG	(0-2 feet) Black clay; possibly coal (from previous stockpile) and slag fragments.
2	5	SS	29	3	1621	BG	(5-7 feet) Upper portion coal. Orange/brown to gray mottled clay with some fine grained sand with medium size gravel.
D		SS	13	3	1623	BG	(7-9 feet) Low recovery. Clay with moderate amounts of sand and some fine gravel.
3	10	SS	25	3	1627	BG	(9-11 feet) Clay with moderate amounts of fine grained sand. Low recovery.
3		SS	42	11	1632	BG	(11-13 feet) Wood and coal in upper portion. Gray medium to fine grain sandy clay; moist.
4	15	SS	21	7	1636	BG	(13-15 feet) Very low recovery.
5	20	SS	75		1650	BG	(20-22 feet) Clay with moderate amounts of fine to coarse grained sand.
	25						BORING TERMINATED AT 22'

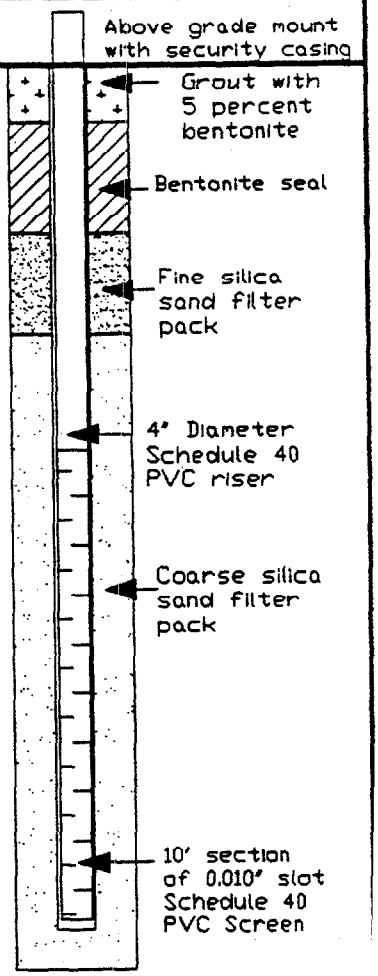
SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB02

DATE: 09/29/92 | DWG NAME: 41SB02

DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 09/01/92
	SS	83	36	0930	(0-2 feet) Sand and clay (0-1.6 ft.) with some fine gravel, coal and slag at 0.8-1.6 ft.
5	SS	21	15	0940	(5-7 feet) Moist clayey sand with medium size gravel; low recovery.
10	SS	88	20	0948	(10-12 feet) Medium to fine grained wet clayey sand.
15	SS	100	20	1010	(15-17 feet) Brown gray mottled stiff clay; dry.
20					
25					
30					BORING TERMINATED AT 18'

WELL CONSTRUCTION DETAILS



CASING SET @ 18.56'.

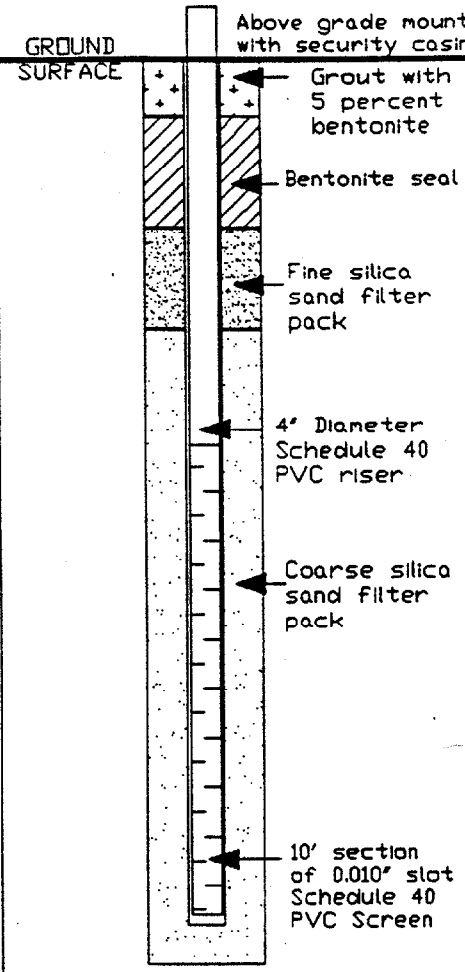
SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB03
MONITORING WELL 41MW01

DATE: 10/02/92 | DWG NAME: 41MW01

NUMBER DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 09/01/92
	SS	54	9	1459	(0-2 feet) 2 in. concrete, 8 in. coal and slag, 2 in. brown clay with coal and slag.
5	SS	25	7	1507	(5-7 feet) Brown medium to fine grained sand; moist.
10	SS	100	20	1517	(10-12 feet) Light brown sandy clay (10.0 to 10.3 feet). Medium to fine grained sand with small gravel-fining upward sequence (10.3 to 12.0 feet); moist.
15	SS	100	21	1528	(15-17 feet) Poorly sorted medium to fine grained light brown clayey sand (15.0 to 15.6 feet). Increasing amounts of clay (15.6 to 16.8 feet). Gray sand with small gravel (16.8 to 17.0 feet).
20					
25					
30					BORING TERMINATED AT 17'

WELL CONSTRUCTION DETAILS



CASING SET @ 18.48'.

SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB04
MONITORING WELL 41MW02

DATE: 10/02/92 | DWG NAME: 41MW02

DATE OF BORING: 09/02/92

SAMP	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BG (BACKGROUND) = 0.0 ppm
1		SS	38	8	0948	BG	(0-2 feet) Low recovery, 2 in. of concrete. 6 in. of dry, orange clayey silt.
2	5	SS	92	34	1000	BG	(5-7 feet) Brown poorly sorted medium to fine grained sand with moderate clays (5.0 to 6.2 ft). Iron staining present; moist (6.2 to 6.9 ft).
3	10	SS	100		1020	BG	(10-12 feet) Tan medium to fine grained sand; poorly sorted with moderate clays; wet.
4	15	SS	100	20	1030	BG	(15-17 feet) Very stiff clay, dark green to reddish, mottled; dry.
	20						
	25						BORING TERMINATED AT 17'

SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB05

DATE: 09/29/92 | DWG NAME: 41SB05

DATE OF BORING: 09/02/92

SAMP. No.	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BG (BACKGROUND) = 0.0 ppm
1		SS	0			BG	(0-2 feet) No recovery.
2	5	SS	100	12	1125	BG	(5-7 feet) Wet, poorly sorted medium to fine grained sand with mottled clay. Iron staining near 7 ft.
		SS	100	12	1130	BG	(7-9 feet) Wet, poorly sorted medium to fine grained sand with mottled clay. Iron staining throughout.
3	10	SS	100	16	1238	BG	(10-12 feet) Poorly sorted fine to medium grained sand, light brown with iron staining from 10.5 to 11.2 ft. Green clay with some iron staining from 11.2-12 ft.
		SS	100	43	1241	BG	(12-14 feet) Green clay with some iron staining as above.
	15						
	20						
	25						BORING TERMINATED AT 14'

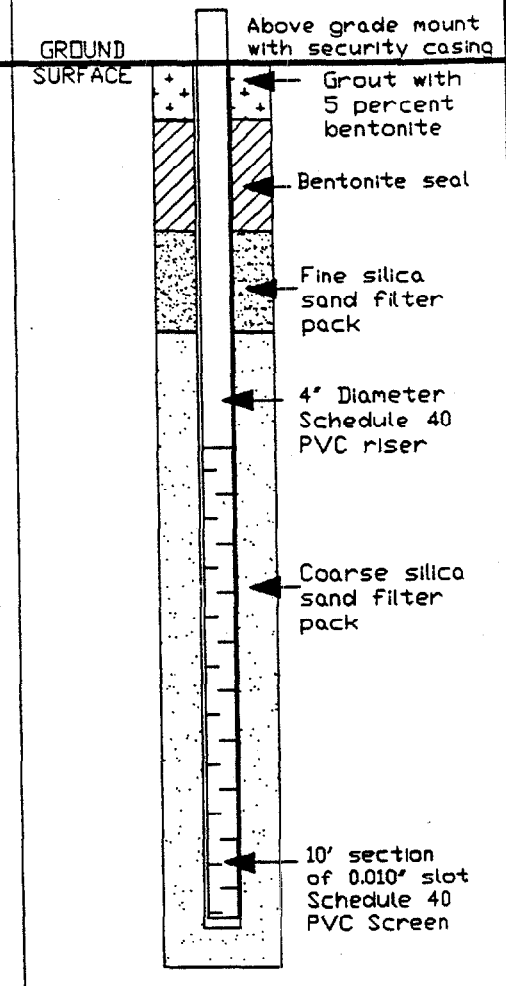
SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB06

DATE: 09/29/92 | DWG NAME: 41SB06

NUMBER (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 09/02/92
	SS	0	0	1502	(0-2 feet) No recovery.
5	SS	100	17	1511	(5-7 feet) Moderately sorted medium to fine grained sand; brown with iron staining; moist with minor clays. (7-9 feet) Same as above.
10	SS	83	26	1529	(10-12 feet) Same as above but with increasing clay. Iron staining at 11.2-11.8 ft. Some clay clast present, and sand grain size increases with depth.
	SS	83	26	1536	(12-14 feet) Very stiff green clay with dark greenish bands.
15	SS	100	22	1549	(15-17 feet) Very stiff green clay.
20					
25					
30					BORING TERMINATED AT 17'

WELL CONSTRUCTION DETAILS



CASING SET @ 18.06 FEET.

SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB07
MONITORING WELL 41MW03

DATE: 10/02/92 | DWG NAME: 41MW03

DATE OF BORING: 09/03/92

SAMP	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS BG (BACKGROUND) = 0.0 ppm
1		SS	0	0	0952	BG	(0-2 feet) No recovery; concrete cover.
2	5	SS	100	8	1005	BG	(5-7 feet) Medium to coarse, poorly sorted brown to tan sand with some fines and clay clast.
3	10	SS	100	25	1015	BG	(10-12 feet) Medium to coarse grained, poorly sorted brown sand with some silts and iron staining.
4	15	SS	100	17	1025	BG	(15-17 feet) Very stiff, dry, greenish gray clay with minor amounts of brown clay.
	20						
	25						BORING TERMINATED AT 17'

SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB08

DATE: 09/29/92 | DWG NAME: 41SB08

DATE OF BORING: 09/10/92

SAMP	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BG (BACKGROUND) = 0.0 ppm
1		SS	0	0	1035	BG	(0-2 feet) No recovery; concrete cover.
2	5	SS	83	17	1040	BG	(5-7 feet) Fine to medium grained sand; moist.
3	10	SS	100		1100	BG	(10-12 feet) Fine to medium grained sand; moist.
4	15	SS	100	12	1110	BG	(15-17 feet) Green gray clay with some silts. Decreasing silt with depth.
	20						
	25						BORING TERMINATED AT 17'

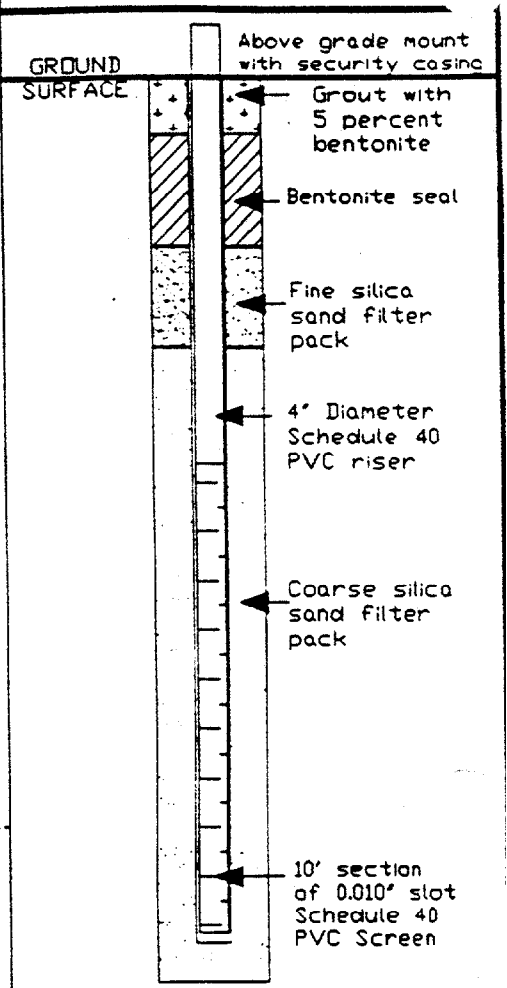
SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 41
BORING 41SB08R

DATE: 09/29/92 | DWG NAME: 41SB08R

NUMBER DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 09/08/92
	SS	100	12	1245	(0-2 feet) Medium to fine grained moderately sorted tan to dark brown sand. 0.0 ft. to 0.5 ft. is sand and topsoil; slightly moist.
5	SS	83	39	1255	(5-7 feet) Clay with gravel and cobbles; moist.
10	SS	92	11	1305	(10-12 feet) Light brown to rust medium to fine grained sand with small gravel. Sand and clay mixed at 11.8-12.0 ft. Wet.
15	SS	100	3	1315	(15-17 feet) Green clay; moist and very soft.
20					
25					
30					BORING TERMINATED AT 17'

WELL CONSTRUCTION DETAILS



CASING SET @ 18.6'.

SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 44
BORING 44SB01
MONITORING WELL 44MW01

DATE: 10/02/92 | DWG NAME: 44MW01

DATE OF BORING: 09/08/92

SAMP	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BG (BACKGROUND) = 0.0 ppm
1		SS	79	15	1350	BG	(0-2 feet) Topsoil and sand (0.0 to 0.5 feet). Medium to fine grained sand; dry (0.5 to 1.8 feet).
2	5	SS	46	59	1359	BG	(5-7 feet) Sand with gravel cobbles, slightly moist clay.
3	10	SS	100	5	1405	BG	(10-12 feet) Medium grained sand to medium sized gravel (10.0 to 11.5 ft). Poorly sorted mainly quartz gravel and a thin zone of light tan sand and gravel, fine to medium grained. Very soft moist green silty clay (11.5 to 12 ft).
4	15	SS	21	7	1425	BG	(15-17 feet) Very low recovery.
5	20	SS	33	5	1435	BG	(20-22 feet) Very soft green silty clay, decreasing silt with depth.
	25						BORING TERMINATED AT 22'

SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 44
BORING 44SB02

DATE: 09/29/92 | DWG NAME: 44SB02

DATE OF BORING: 09/09/92

SAMPLE No	DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	VAPOR READINGS	DESCRIPTION OF SUBSURFACE MATERIALS
							BG (BACKGROUND) = 0.0 ppm
1		SS	83	7	0950	BG	(0-2 feet) Fine to medium grained sand; dry.
2	5	SS	67	33	0955	BG	(5-7 feet) Very poorly sorted clay and gravel; slightly moist.
3	10	SS	79	3	1005	BG	(10-12 feet) Medium grained light brown sand to medium grained gravel (10-10.1 ft). Dark gray (10.1-10.3 ft). Very soft green clay (10.3 to 11.8 ft).
4	15	SS	100	18/1	1010	BG	(15-17 feet) Dark green clay with little silts. Very soft.
	20						
	25						BORING TERMINATED AT 17'

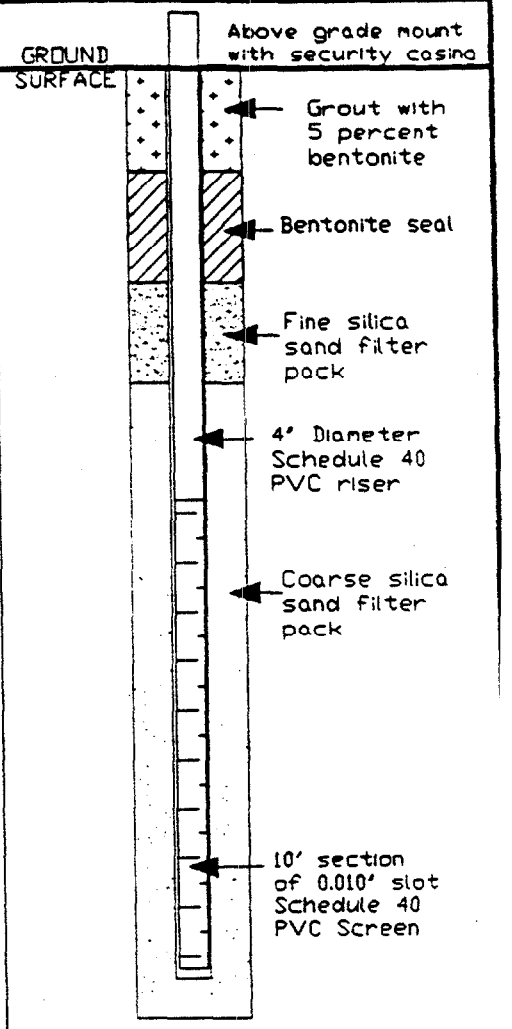
SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 44
BORING 44SB03

DATE: 09/29/92 | DWG NAME: 44SB03

NUMBER DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 09/09/92
	SS	79	16	1028	(0-2 feet) Fine to medium grained sand; dry.
5	SS	100	5	1038	(5-7 feet) Green silty clay (5.0-5.3 ft.). Becomes very poorly sorted clayey coarse sand with fine gravel; moist (5.3-7.0 ft.).
10	SS	46	2	1045	(10-12 feet) Clay with litle silt from 10.0-10.4 ft., becoming fine to medium grained sand; wet. Low recovery.
15	SS	29	2	1055	(15-17 feet) Soft clay with little silts; low recovery. Wet.
20					
25					
30					BORING TERMINATED AT 18.5'

WELL CONSTRUCTION DETAILS



CASING SET @ 18.30'.

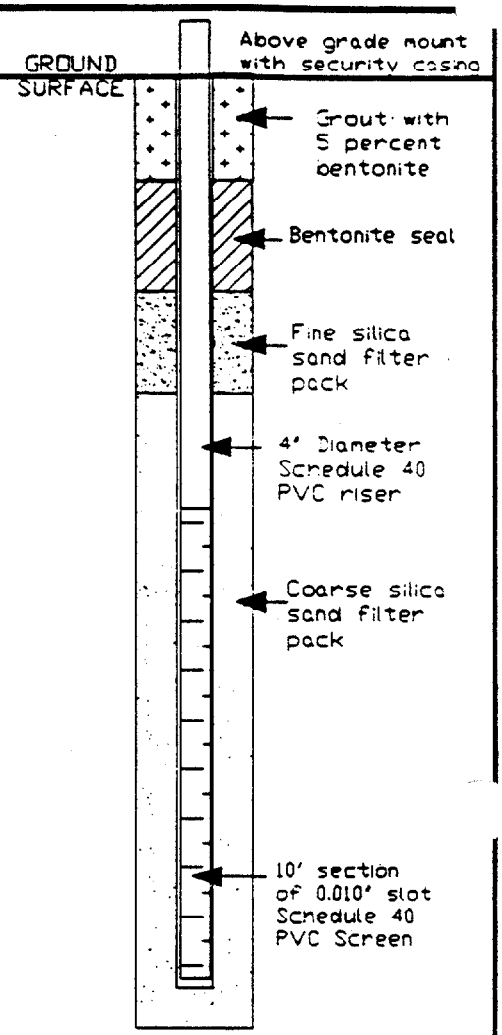
SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 44
BORING 44SB04
MONITORING WELL 44MW02

DATE: 10/02/92 | DWG NAME: 44MW02

NUMBER / DEPTH (FEET)	SAMPLE TYPE	% RECOVERY	BLOWS/FT.	TIME	DESCRIPTION OF SUBSURFACE MATERIALS
					BORING DATE 09/09/92
	SS	88	16	1433	(0-2 feet) Brown to orange fine to medium grained sand. Moderate organics from 0.8-1.3 ft.
5	SS	79	25	1443	(5-7 feet) Brown clayey sand and fine gravel; fairly moist.
10	SS	67	2	1450	(10-14 feet) Very soft dark green silty clay, wet. Decreasing silt with depth.
15	SS	75	2	1502	(15-19 feet) Very soft green clay; little silts.
20					
25					
30					BORING TERMINATED AT 19'

WELL CONSTRUCTION DETAILS



CASING SET @ 15.36'.

SITE INSPECTION
IHDIVNAVSURFWARCEN
INDIAN HEAD, MARYLAND

SITE 44
BORING 44SB05
MONITORING WELL 44MW03

DATE: 10/02/92 | DWG NAME: 44MW03

APPENDIX D

WELL CONSTRUCTION DIAGRAMS

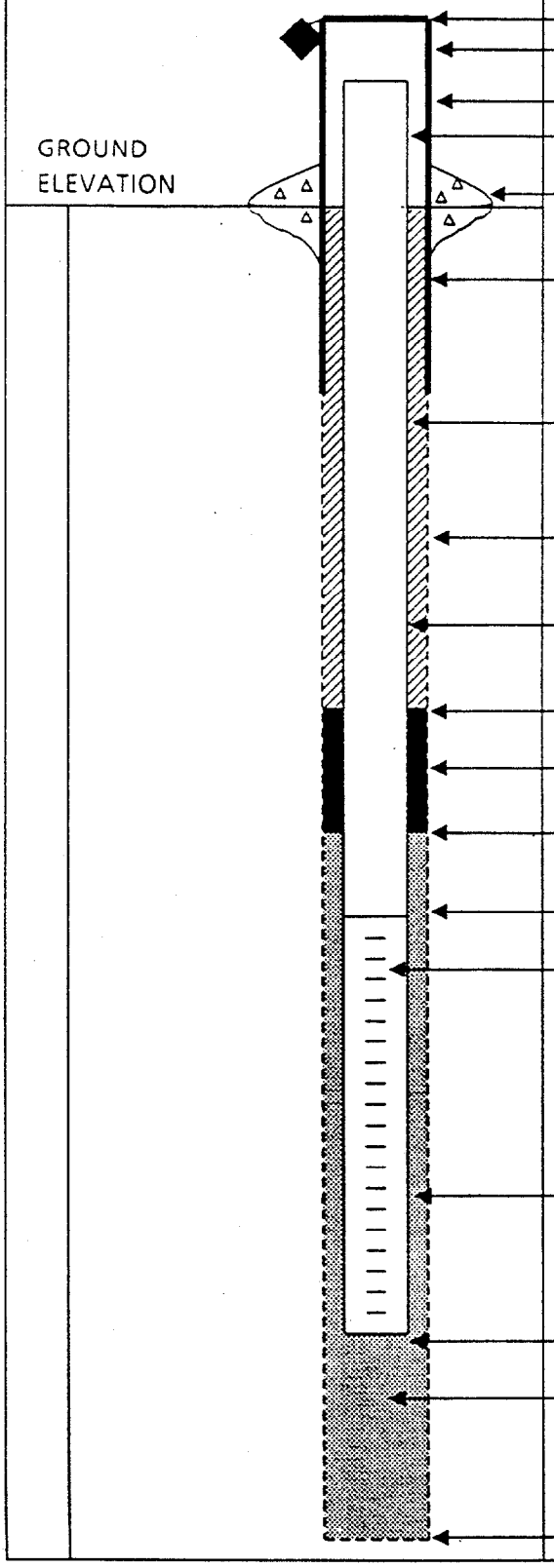
BORING NO.: S12WP01

OVERBURDEN
MONITORING WELL SHEET

PROJECT SITE 12 RI
PROJECT NO. 7129
ELEVATION
FIELD GEOLOGIST FRED W RAMSER

LOCATION INDIAN HEAD
BORING S12WP01
DATE 10-8-97

DRILLER BILL KIMES
DRILLING METHOD GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING :
ELEVATION OF TOP OF RISER PIPE:

STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE : ~2'

TYPE OF SURFACE SEAL: 2'x2'x6" CONCRETE PAD

I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: ~2"

TYPE OF BACKFILL: NONE

ELEVATION / DEPTH TOP OF SEAL: 1.25'

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: .75'

ELEVATION / DEPTH TOP OF SCREEN: 11.0'

TYPE OF SCREEN: GW2010 GEOPROBE 997JS

SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'

I.D. OF SCREEN: 1/2" ID 1.5" OD

TYPE OF SAND PACK: OSI, MILLERSVILLE #2 SILICA SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: 17.0'

ELEVATION / DEPTH BOTTOM OF SAND PACK: 18.0'

TYPE OF BACKFILL BELOW OBSERVATION WELL: SAND PACK

ELEVATION / DEPTH OF HOLE: 18.0'

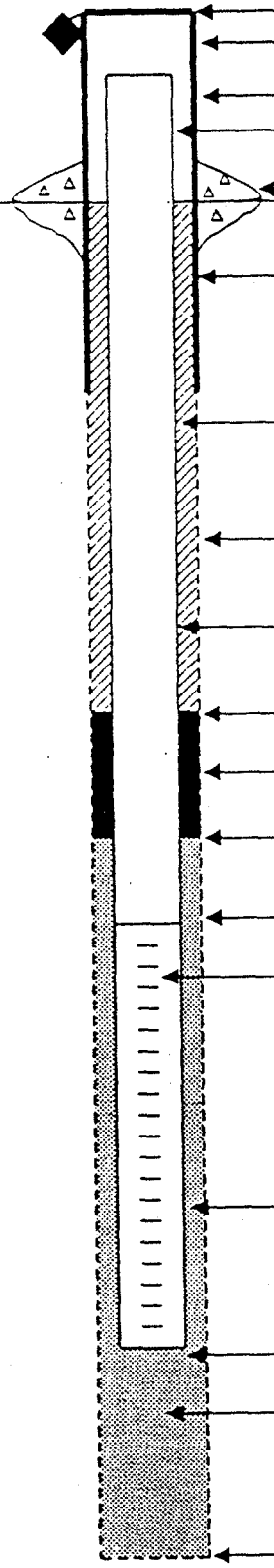
BORING NO.: S12WP02

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER

LOCATION: INDIAN HEAD
BORING: S12WP02
DATE: 10-8-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: 2'
TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 1.5'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: 1'
ELEVATION / DEPTH TOP OF SCREEN: 11.5'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE #2 SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 17.5'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 18'
TYPE OF BACKFILL BELOW OBSERVATION WELL: SAND PACK
ELEVATION / DEPTH OF HOLE: 18'

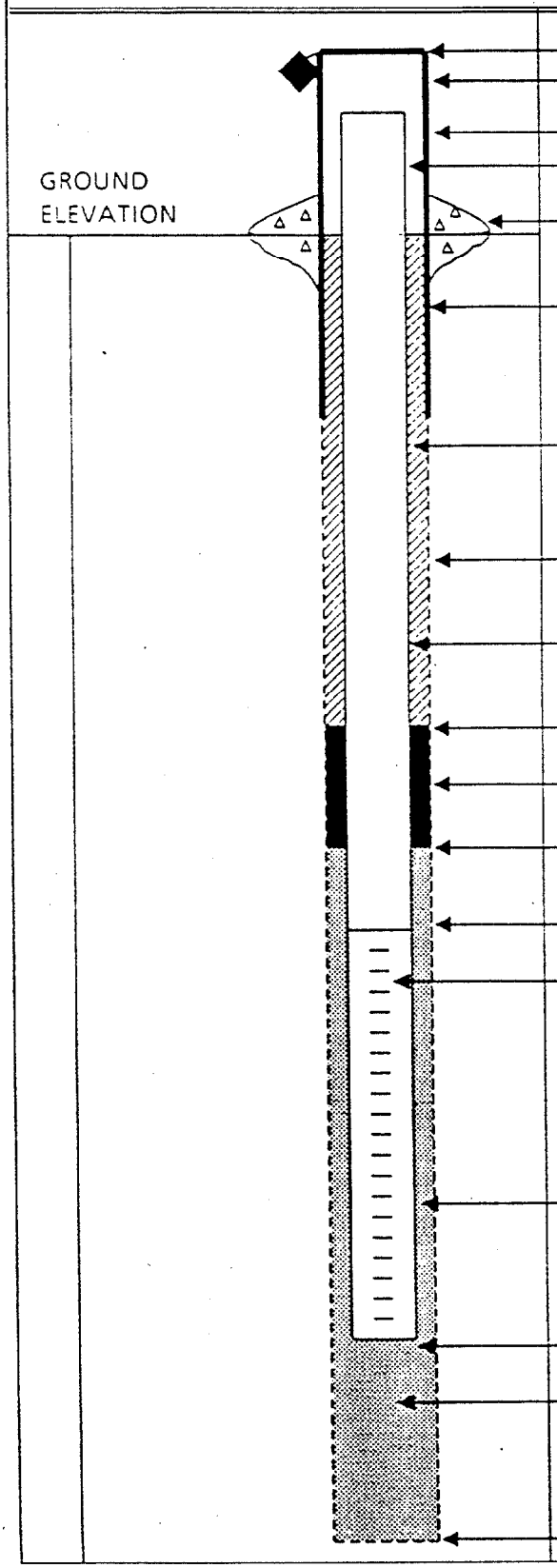
BORING NO.: S12WP03

OVERBURDEN
MONITORING WELL SHEET

PROJECT SITE 12 RI
PROJECT NO. 7129
ELEVATION
FIELD GEOLOGIST FRED W RAMSER

LOCATION INDIAN HEAD
BORING S12WP03
DATE 10-9-97

DRILLER BILL KIMES
DRILLING METHOD GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING :
ELEVATION OF TOP OF RISER PIPE:

STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE : 2'

TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD

I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL

RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC

BOREHOLE DIAMETER: ~2"

TYPE OF BACKFILL: NONE

ELEVATION / DEPTH TOP OF SEAL: 1.25'

TYPE OF SEAL: BENTONITE CHIPS

DEPTH TOP OF SAND PACK: .75'

ELEVATION / DEPTH TOP OF SCREEN: 11'

TYPE OF SCREEN: GW2010 GEOPROBE 997JS

SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'

I.D. OF SCREEN: 1/2" ID 1.5" OD

TYPE OF SAND PACK: DSI, MILLERSVILLE #2 SILICA SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: 17'

ELEVATION / DEPTH BOTTOM OF SAND PACK: 18'

TYPE OF BACKFILL BELOW OBSERVATION WELL: SANDPACK

ELEVATION / DEPTH OF HOLE: 18'

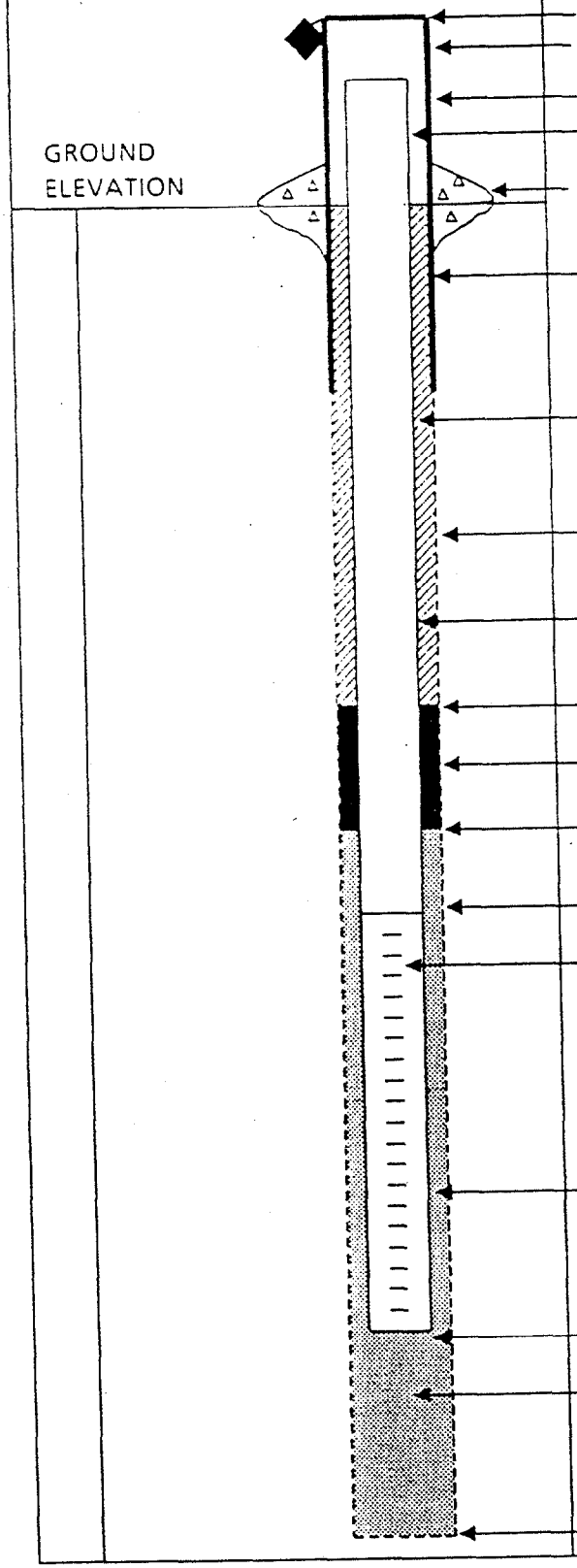
BORING NO.: S12WP04

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER

LOCATION: INDIAN HEAD
BORING: S12WP04
DATE: 10-9-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: 2'
TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 1.25'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: .75'
ELEVATION / DEPTH TOP OF SCREEN: 11'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE #1 SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 17'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 18'
TYPE OF BACKFILL BELOW OBSERVATION WELL: SANDPACK
ELEVATION / DEPTH OF HOLE: 18'

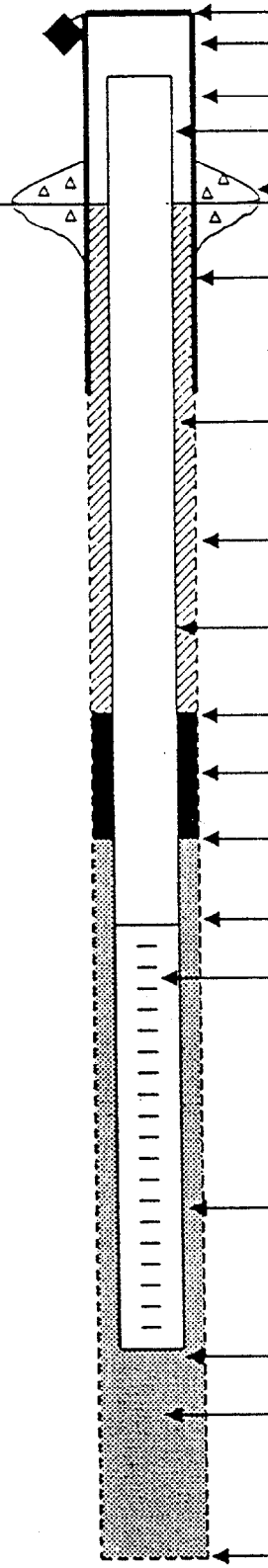
BORING NO.: S12WP05

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER

LOCATION: INDIAN HEAD
BORING: S12WP05
DATE: 10-9-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: 2'
TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 11'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: 3'
ELEVATION / DEPTH TOP OF SCREEN: 14'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE #2 SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 10'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 10'
TYPE OF BACKFILL BELOW OBSERVATION WELL: NATURAL MATL.
ELEVATION / DEPTH OF HOLE: 12'

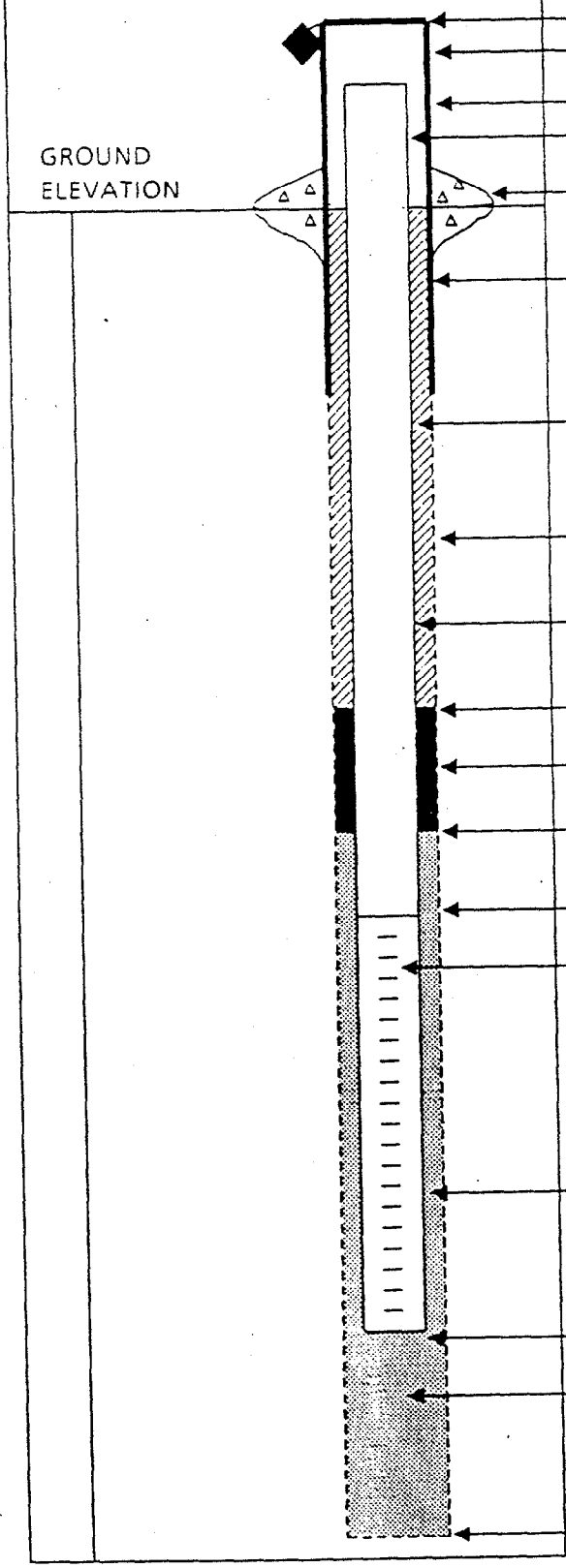
BORING NO.: S12WP06

OVERBURDEN
MONITORING WELL SHEET

PROJECT: SITE 12 RI
PROJECT NO.: 7129
ELEVATION:
FIELD GEOLOGIST: FRED W RAMSER

LOCATION: INDIAN HEAD
BORING: S12WP06
DATE: 10-9-97

DRILLER: BILL KIMES
DRILLING METHOD: GEOPROBE DIRECT PUSH
DEVELOPMENT METHOD: SURFACE PUMP



ELEVATION OF TOP OF SURFACE CASING:
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE: 2'
TYPE OF SURFACE SEAL: 2' x 2' x 6" CONCRETE PAD
I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: BLACK STEEL
RISER PIPE I.D. 3/4 OD PVC, 1/2" ID
TYPE OF RISER PIPE: PVC
BOREHOLE DIAMETER: ~2"
TYPE OF BACKFILL: NONE
ELEVATION / DEPTH TOP OF SEAL: 1.25'
TYPE OF SEAL: BENTONITE CHIPS
DEPTH TOP OF SAND PACK: .75'
ELEVATION / DEPTH TOP OF SCREEN: 11'
TYPE OF SCREEN: GW2010 GEOPROBE 997JS
SLOT SIZE x LENGTH: CONTINUOUS WROUND x 6'
I.D. OF SCREEN: 1/2" ID 1.5" OD
TYPE OF SAND PACK: DSI, MILLERSVILLE #2 SILICA SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 17'
ELEVATION / DEPTH BOTTOM OF SAND PACK: 1[illegible]'
TYPE OF BACKFILL BELOW OBSERVATION WELL:
ELEVATION / DEPTH OF HOLE: 18

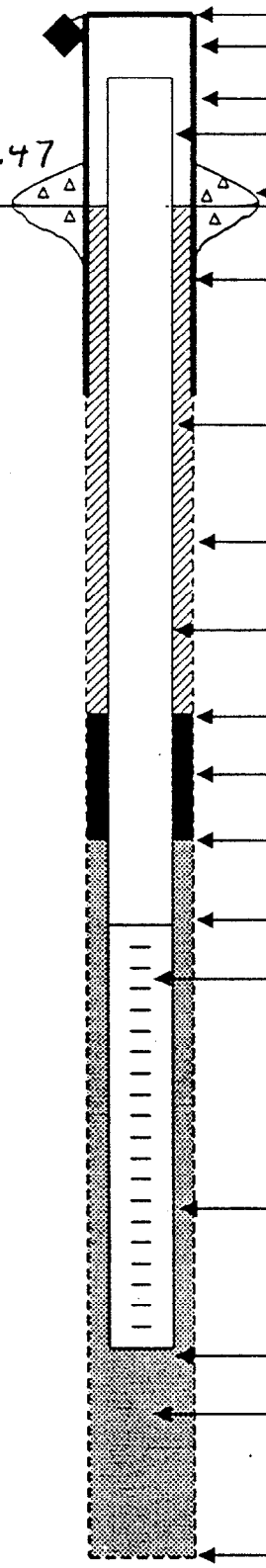
BORING NO.: 42MW07

OVERBURDEN
MONITORING WELL SHEET

PROJECT I.H. Site 42 RI
PROJECT NO. 7129
ELEVATION ~26
FIELD GEOLOGIST HALE

LOCATION Olsen Landfill
BORING 042 MW07
DATE 8-2-97

DRILLER McKINNEY
DRILLING METHOD HSA 4 1/4" ID
DEVELOPMENT METHOD BAILER



GROUND ELEVATION 25.47

ELEVATION OF TOP OF SURFACE CASING: 27.57
ELEVATION OF TOP OF RISER PIPE: 27.38

STICK-UP TOP OF SURFACE CASING: 2.5'
STICK-UP RISER PIPE: 2'

TYPE OF SURFACE SEAL: CONCRETE PAD 3' x 3' x 0.5'

I.D. OF SURFACE CASING: 6"
TYPE OF SURFACE CASING: STEEL ROUND

RISER PIPE I.D. 2"
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8"

TYPE OF BACKFILL: CEMENT (SAKRETE)

ELEVATION / DEPTH TOP OF SEAL: 21.47/4

TYPE OF SEAL: BENTONITE PELLETS

DEPTH TOP OF SAND PACK: 6

ELEVATION / DEPTH TOP OF SCREEN: 17.47/8

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.010" x 10'

I.D. OF SCREEN: 2"

TYPE OF SAND PACK: #1 VALUE

ELEVATION / DEPTH BOTTOM OF SCREEN: 7.47/18

ELEVATION / DEPTH BOTTOM OF SAND PACK: 7.47/18

TYPE OF BACKFILL BELOW OBSERVATION WELL: #1 VALUE

ELEVATION / DEPTH OF HOLE: 7.47/18

APPENDIX E

WELL DEVELOPMENT SHEETS

WELL DEVELOPMENT SHEET

PROJECT SITE NAME: SITE 42
PROJECT NUMBER: 7129
WEATHER: SUNNY
STATIC WATER LEVEL: 11.55'
TOTAL WELL DEPTH: 20.27'
ONE CASING VOLUME:
START TIME: —
END TIME: —

SITE/LOCATION: OLSON RD LANDFIL
WELL ID.: 42MW07
DATE: 8-97
PERSONNEL: PAUL H.
WELL TYPE: (PVC), [S.S.], or OTHER
MEASURING DEVICE: M-SCOUPE
ADJUSTMENT FACTOR: —

[ ] DOMESTIC WELL, [✓] MONITORING WELL, [ ] OTHER

METHOD & REMARKS: BAILER,

Approximate Volume	Time	Color	pH (S.U.)	Cond. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (Celcius)	Salinity (%)
2 GALS	—	BRN	5.61	0.324	>999	1.51	16.9	0.01
					>999			

NOTE: All measurements to nearest 0.01 foot measured from top of well riser pipe unless otherwise noted.

ADDITIONAL COMMENTS: WELL PURGED DRY W/ BAILER, ALLOWED TO RECOVER AND PURGED DRY SEVERAL TIMES.

SIGNATURE(s): _____

PAGE___OF___

APPENDIX F

GROUNDWATER LEVEL DATA

GROUNDWATER LEVEL MEASUREMENT SHEET

Brown & Root Environmental

Project Name: INDIANHEAD RI
Location: INDIANHEAD NSWC MD.
Weather: PARTLY CLOUDY
Date: 1-30-98

Project No.: 7129
Personnel: FRED W. RAMSER/R.W. WOODBURY
Measuring Device: M-SCOPE
Remarks:

Well Number	Time	(A) Elevation of Reference Point (feet)*	(B) Water Level Indicator Reading (feet)*	=(A)-(B) Groundwater Elevation (feet)*	Total Well Depth (feet)*	Comments
S12WP01	1525	8.41	3.37	5.04		
S12WP02	1528	8.63	362	5.01		
S12WP03	1545	8.37	3.32	5.05		
S12WP04	1542	8.12	3.09	5.03		
S12WP05	1540	12.11	7.09	5.02		
S12WP06	1535	8.05	2.84	5.21		
S41MW01	1328	14.97	6.39	8.58		
S41MW02	1325	9.33	4.78	4.55		
S41MW03	1330	11.18	5.87	5.31		
S42MW02	1500	23.56	10.36	13.20		
S42MW03	1439	10.44	4.48	5.96		
S42MW04	1445	20.~~36~~ 12	5.99	14.13		
S42MW06	1515	20.84	9.43	11.41		
S42MW07	1455	27.38	8.92	18.46		
S44MW01	1425	39.71	4.97	34.74		
S44MW02	1426	38.84	4.26	34.58		
S44MW03	1429	39.23	2.78	36.45		

Notes:

*All measurements to the nearest 0.01 foot

APPENDIX G

WELL COMPLETION REPORTS
AND
WELL ABANDONMENT REPORTS

(MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-310-W(M)

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED: 08 05 97

Depth of Well: 12 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": CH-94-151

OWNER: Naval Surface Warfare Center
STREET OR RFD: Indian Head Division (use name / was name) TOWN: Indian Head
SUBDIVISION: SECTION: LOT:

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow silt and sand	0	4	
olive gray clay	4	10	
dark yellow/ brown clay and sand	10	12	

*temporary geoprobe points - to be abandoned after installation.

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED: yes Y / no N

N/A

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): yes Y / no N
TYPE OF GROUTING MATERIAL (Circle one): CEMENT CM / BENTONITE CLAY BC
NO. OF BAGS ____ NO. OF POUNDS ____
GALLONS OF WATER ____
DEPTH OF GROUT SEAL (to nearest foot): from ____ ft. TOP to ____ ft. BOTTOM (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE: PL
Nominal diameter top (main) casing (nearest inch): 1
Total depth of main casing (nearest foot): 7

OTHER CASING (if used) — EACH CASING: diameter inch / depth (feet) from / to

SCREEN RECORD

screen type or open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C2

EACH SCREEN		DEPTH (nearest ft.) from	to
1	PL	7	12
2			
3			

SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK: from ____ to ____
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE CASING / LOG INDICATOR / OTHER DATA

C3

N/A

PUMPING TEST

HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING ____ ft.
WHEN PUMPING ____ ft.

TYPE OF PUMP USED (for test): A air, P piston, T turbin, C centrifugal, R rotary, O other (desc below), J jet, S submersible

GEOPROBE

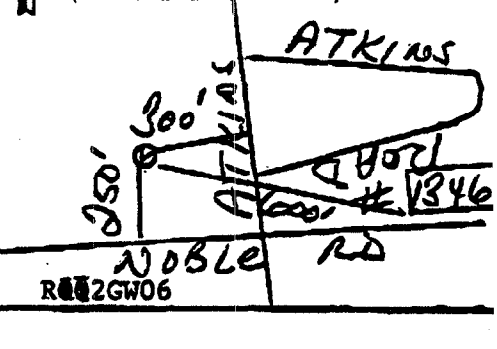
PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO): YES / NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing height): + above / − below LAND SURFACE (nearest foot) 0

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R2GW06

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH __ 94 __ 1511
* PERMIT NUMBER OF REPLACEMENT WELL __ __
* PERSON ABANDONING WELL: Bill Kimes
* WELL DRILLERS LICENSE NUMBER: MGD081
  CIRCLE: MWD/MSD/MGD
* OWNER'S NAME: Naval Surface Warfare
* WELL LOCATION: Atkins Road
  COUNTY: Charles County
  NEAREST TOWN: Indian Head
  TAX MAP _____ BLOCK _____ PARCEL _____
  SUBDIVISION: _____
  SECTION: _____ LOT: _____
  NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:
  _____ DRILLED _____ JETTED
  X BORED/AUGUERED _____ HAND DUG
  _____ OTHER (specify) _____

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
bentonite	12'	0'

* USE CODE:
  _____ DOMESTIC _____ MUNICIPAL/PUBLIC
  _____ IRRIGATION _____ INDUSTRIAL
  X TEST/OBSERVATION
* TYPE OF CASING:
  _____ STEEL X PLASTIC
  _____ CONCRETE _____ OTHER (specify) _____
* SIZE OF CASING: 1" INCHES IN DIAMETER
* DEPTH OF WELL: 12' FEET DEEP
* WAS ANY CASING REMOVED? X YES _____ NO
  if yes, length removed, in feet: _____
* WAS CASING RIPPED OR PERFORATED? ____ YES X NO

Michael W. Huber — Michael W. Huber — MGD046 — MWD/MSD/MGD — 12/08/97

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

C1 9332 SEQUENCE NO. (MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-311-W(M)

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED 08 05 97

Depth of Well 11.8 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH-94-1512

OWNER Naval Surface Warfare Center
STREET OR RFD Indian Head Division TOWN Indian Head
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow/brown silt & sand	0	4	
yellow/brown sandy clay	4	7	
yellow/brown clay & gravel	7	10	
wood fragments	10	11.8	
water @ approx 6'			

*temporary geoprobe points - to be abandoned after installation.

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

N/A

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS NO. OF POUNDS
GALLONS OF WATER
DEPTH OF GROUT SEAL (to nearest foot)
from ft. to ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	1	68

OTHER CASING (if used)
EACH CASING — diameter inch — depth (feet) from — to

SCREEN RECORD
screen type or open hole insert appropriate code below
ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	68	118
2			
3			

SLOT SIZE 1 10 2 1 3 0
DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK from to
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE CASING LOG INDICATOR OTHER DATA

C3

PUMPING TEST
N/A

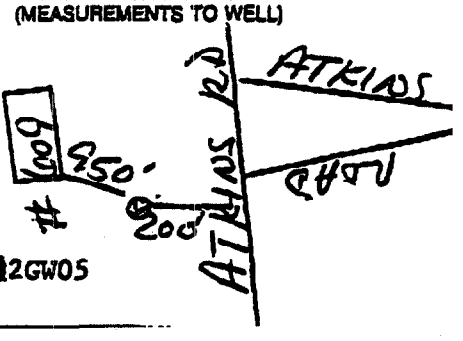
HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING ft.
WHEN PUMPING ft.

TYPE OF PUMP USED (for test)
A air P piston T turbine
C centrifugal R rotary O other (describe below)
J jet S submersible

GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing height) + above – below
LAND SURFACE 0 (nearest) foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R2GW05

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1512
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Bill Kimes
* WELL DRILLERS LICENSE NUMBER: MGD081
  CIRCLE: MWD/MSD/MGD
* OWNER'S NAME: Naval Surface Warfare
* WELL LOCATION: Atkins Road
  COUNTY: Charles County
  NEAREST TOWN: Indian Head
  TAX MAP _____ BLOCK _____ PARCEL _____
  SUBDIVISION: _____
  SECTION: _____ LOT: _____
  NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:
  _____ DRILLED _____ JETTED
  X BORED/AUGUERED _____ HAND DUG
  _____ OTHER (specify) _____

* USE CODE:
  _____ DOMESTIC _____ MUNICIPAL/PUBLIC
  _____ IRRIGATION _____ INDUSTRIAL
  X TEST/OBSERVATION

* TYPE OF CASING:
  _____ STEEL X PLASTIC
  _____ CONCRETE _____ OTHER (specify) _____

* SIZE OF CASING: 1" INCHES IN DIAMETER
* DEPTH OF WELL: 11.8 FEET DEEP
* WAS ANY CASING REMOVED? X YES _____ NO
  if yes, length removed, in feet: _____
* WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
bentonite	11.8'	0'

Michael W. Huber — Michael W. Huber — MGD046 — MWD/MSD/MGD — 12/08/97

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

JAN-07-1998 11:10 P.04/13

SEQUENCE NO. (MDE USE ONLY) 7555

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-312-W(M)

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED 08 05 97

Depth of Well 75 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH-94-1513

OWNER Naval Surface Warfare Center

STREET OR RFD Indian Head Division (first name) TOWN Indian Head

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow silt & sand	0	3	
wood fragments	3	5	
sand, silt and wood	5	7'.5"	
Water@ approx 4'			

*temporary geoprobe points - to be abandoned after installation.

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N

N/A

CIRCLE APPROPRIATE LETTER

- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD

DRILLERS LIC. NO. MGD046

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. MGD081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS ____ NO. OF POUNDS ____

GALLONS OF WATER ____

DEPTH OF GROUT SEAL (to nearest foot)

from ____ ft. (TOP) to ____ ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE: PL

Nominal diameter top (main) casing (nearest inch): 1

Total depth of main casing (nearest foot): 25

OTHER CASING (if used) — EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C2

EACH SCREEN — DEPTH (nearest ft.)

1: PL 25 75

2:

3:

SLOT SIZE 1 0 2 1 3 0

DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from ____ to ____

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) — W Q

TELESCOPE CASING ____ LOG INDICATOR ____ OTHER DATA ____

C3

N/A

PUMPING TEST

HOURS PUMPED (nearest hour) ____

PUMPING RATE (gal. per min.) ____

METHOD USED TO MEASURE PUMPING RATE ____

WATER LEVEL (distance from land surface)

BEFORE PUMPING ____ ft.

WHEN PUMPING ____ ft.

TYPE OF PUMP USED (for test)

A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

GEOPROBE

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. ____

CAPACITY: GALLONS PER MINUTE (to nearest gallon) ____

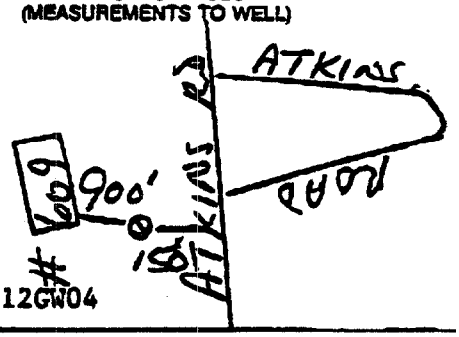
PUMP HORSE POWER ____

PUMP COLUMN LENGTH (nearest ft.) ____

CASING HEIGHT (circle appropriate box and enter casing height) + above, − below LAND SURFACE 0 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R112GW04

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1513
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Bill Kimes
* WELL DRILLERS LICENSE NUMBER: MGD081
  CIRCLE: MWD/MSD/MGD
* OWNER'S NAME: Naval Surface Warfare
* WELL LOCATION: Atkins Road
  COUNTY: Charles County
  NEAREST TOWN: Indian Head
  TAX MAP _____ BLOCK _____ PARCEL _____
  SUBDIVISION: _____
  SECTION: _____ LOT: _____
  NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
__X__ BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

* USE CODE:

_____ DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
__X__ TEST/OBSERVATION

* TYPE OF CASING:

_____ STEEL __X__ PLASTIC
_____ CONCRETE _____ OTHER (specify) _____

* SIZE OF CASING: 1" INCHES IN DIAMETER
* DEPTH OF WELL: 7.5' FEET DEEP
* WAS ANY CASING REMOVED? __X__ YES _____ NO
  if yes, length removed, in feet: _____
* WAS CASING RIPPED OR PERFORATED? ____ YES __X__ NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
bentonite	7.5'	0'

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN		LICENSE #	CIRCLE ONE	DATE
Michael W. Huber	Michael W. Huber	MGD046	MWD/MSD/MGD	12/08/97

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

COUNTY NUMBER 97-313-W(M)

ST/CO USE ONLY
DATE Received

DATE WELL COMPLETED 080697

Depth of Well 75 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH-94-1514

OWNER Naval Surface Warfare Center
STREET OR RFD Indian Head Division TOWN Indian Head
SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
pale yellow/brown sand & silt	0	7.5'	
*temporary geoprobe points - to be abandoned after installation.			

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

N/A CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
SITE SUPERVISOR (sign, of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (44) no N (44)
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM (45 46) BENTONITE CLAY BC (45 46)
NO. OF BAGS NO. OF POUNDS
GALLONS OF WATER
DEPTH OF GROUT SEAL (to nearest foot)
from ft. (48 TOP 52) to ft. (54 BOTTOM 58)
(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE: PL (60 61)
Nominal diameter top (main) casing (nearest inch): 1 (63 64)
Total depth of main casing (nearest foot): 25 (66 70)

OTHER CASING (if used)

EACH CASING: diameter inch / depth (feet) from / to

SCREEN RECORD

screen type or open hole insert appropriate code below
ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.) from	to
1	PL	25 (11 15)	75 (17 21)
2		(23 24 26 30)	(32 36)
3		(38 39 41 45)	(47 51)

SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 1 (56 60) (NEAREST INCH)

GRAVEL PACK from to
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 (68)

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (70) TELESCOPE CASING
(E.R.O.S.) (72) LOG INDICATOR
W Q (74 75 76) OTHER DATA

C 3

PUMPING TEST

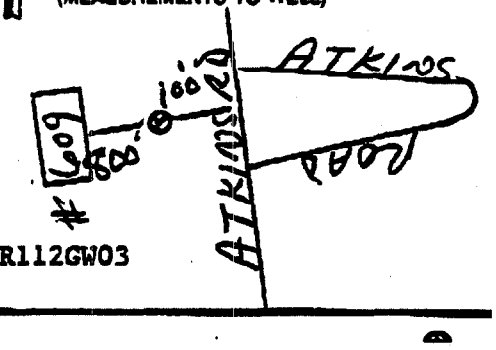
N/A

HOURS PUMPED (nearest hour) (8 9)
PUMPING RATE (gal. per min.) (11 15)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING ft. (17 20)
WHEN PUMPING ft. (22 25)
TYPE OF PUMP USED (for test)
A air (27) P piston (27) T turbine (27)
C centrifugal (27) R rotary (27) O other (describe below) (27)
J jet (27) S submersible (27)
GEOPROBE

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. (29)
CAPACITY: GALLONS PER MINUTE (to nearest gallon) (31 35)
PUMP HORSE POWER (37 41)
PUMP COLUMN LENGTH (nearest ft.) (43 47)
CASING HEIGHT (circle appropriate box and enter casing height)
+ above (49) − below (49)
LAND SURFACE 0 (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R112GW03

ORIGINAL-STATE

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1514
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Bill Kimes
* WELL DRILLERS LICENSE NUMBER: MGD081
  CIRCLE: MWD/MSD/MGD
* OWNER'S NAME: Naval Surface Warfare
* WELL LOCATION: Atkins Road
  COUNTY: Charles County
  NEAREST TOWN: Indian Head
  TAX MAP _____ BLOCK _____ PARCEL _____
  SUBDIVISION: _____
  SECTION: _____ LOT: _____
  NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

  _____ DRILLED _____ JETTED
  X BORED/AUGUERED _____ HAND DUG
  _____ OTHER (specify) _____

* USE CODE:

  _____ DOMESTIC _____ MUNICIPAL/PUBLIC
  _____ IRRIGATION _____ INDUSTRIAL
  X TEST/OBSERVATION

* TYPE OF CASING:

  _____ STEEL X PLASTIC
  _____ CONCRETE _____ OTHER (specify) _____

* SIZE OF CASING: 1" INCHES IN DIAMETER
* DEPTH OF WELL: 7.5' FEET DEEP
* WAS ANY CASING REMOVED? X YES _____ NO
  if yes, length removed, in feet: _____
* WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
bentonite	7.5	0'

Michael W. Huber — Michael W. Huber — MGD046 — MWD/MSD/MGD — 12/08/97

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

C 1 9335 — SEQUENCE NO. (MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-314-W(M)

ST/CO USE ONLY — DATE Received

DATE WELL COMPLETED: 0 8 0 5 9 7

Depth of Well: 9 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": C H - 9 4 - 1 5 1

OWNER: Naval Surface Warfare Center
STREET OR RFD: Indian Head Division (last name / first name) TOWN: Indian Head
SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
light brown silt and sand	0	8	
black fill	8	9'	
water @ approx 4'			
*temporary geoprobe points - to be abandoned after installation.			

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N — N/A

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 45
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM 45 46 BENTONITE CLAY BC 45 46
NO. OF BAGS ____ NO. OF POUNDS ____
GALLONS OF WATER ____
DEPTH OF GROUT SEAL (to nearest foot)
from ____ ft. (48 TOP 52) to ____ ft. (54 BOTTOM 58)
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL — CO CONCRETE — PL PLASTIC — OT OTHER

MAIN CASING TYPE: PL (60 61) — Nominal diameter top (main) casing (nearest inch): 1 (63 64) — Total depth of main casing (nearest foot): 4 (66 70)

OTHER CASING (If used) — EACH CASING — diameter inch — depth (feet) from — to

SCREEN RECORD
screen type or open hole insert appropriate code below
ST STEEL — BR BRASS BRONZE — HO OPEN HOLE — PL PLASTIC — OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.) from	to
1	PL	4 (11 15)	9 (17 21)
2		(23 24)	(26 30 / 32 36)
3		(38 39)	(41 45 / 47 51)

SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 1 (56 60) (NEAREST INCH)

GRAVEL PACK from ____ to ____
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 TELESCOPE — 72 LOG — 74 75 76 OTHER DATA

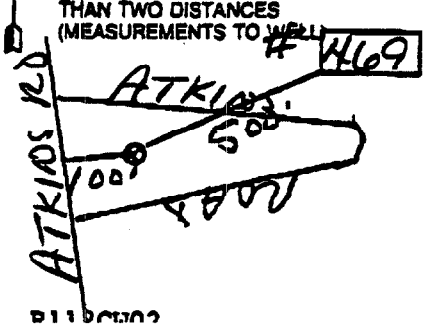
C 3 — N/A

PUMPING TEST
HOURS PUMPED (nearest hour) (8 9)
PUMPING RATE (gal. per min.) (11 ... 1)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING (17 20) ft.
WHEN PUMPING (22 25) ft.

TYPE OF PUMP USED (for test)
A air — P piston — T turbine
C centrifugal — R rotary — O other (describe below)
J jet — S submersible
GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. (29)
CAPACITY: GALLONS PER MINUTE (to nearest gallon) (31 35)
PUMP HORSE POWER (37 41)
PUMP COLUMN LENGTH (nearest ft.) (43 47)
CASING HEIGHT (circle appropriate box and enter casing height) + above / − below — LAND SURFACE 0 (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R11 2CL/02

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1515
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Bill Kimes
* WELL DRILLERS LICENSE NUMBER: MGD081
  CIRCLE: MWD/MSD/MGD
* OWNER'S NAME: Naval Surface Warfare
* WELL LOCATION: Atkins Road
  COUNTY: Charles County
  NEAREST TOWN: Indian Head
  TAX MAP _____ BLOCK _____ PARCEL _____
  SUBDIVISION: _____
  SECTION: _____ LOT: _____
  NEAREST ROAD: _____

MARYLAND GRID COORDINATES

BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

  ____ DRILLED ____ JETTED
  X BORED/AUGUERED ____ HAND DUG
  ____ OTHER (specify) _____

* USE CODE:

  ____ DOMESTIC ____ MUNICIPAL/PUBLIC
  ____ IRRIGATION ____ INDUSTRIAL
  X TEST/OBSERVATION

* TYPE OF CASING:

  ____ STEEL X PLASTIC
  ____ CONCRETE ____ OTHER (specify) _____

* SIZE OF CASING: 1" INCHES IN DIAMETER
* DEPTH OF WELL: 9' FEET DEEP
* WAS ANY CASING REMOVED? X YES ____ NO
  if yes, length removed, in feet: _____
* WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
bentonite	9'	0'

Michael W. Huber — Michael W. Huber MGD046 MWD/MSD/MGD 12/08/97

SIGNATURE-MASTER WELL ~~DRILLER OR~~ SUPERVISING SANITARIAN LICENSE # CIRCLE ONE DATE

C 1 9336 SEQUENCE NO. (MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-315-W(M)

ST/CO USE ONLY Date Received

DATE WELL COMPLETED 08 05 97

Depth of Well 9.5 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH-94-1516

OWNER Naval Surface Warfare Center
STREET OR RFD Indian Head Division (last name first name) TOWN Indian Head
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
pale yellow/ brown silt and sand to silt	0	8	
yellow/brown clayey silt and sand	8	9.5	
water @ approx 8'			
*temporary geoprobe points - to be abandoned after installation.			

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

N/A CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD/MSD/MGD
DRILLERS LIC. NO. MGD046
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. MGD081
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permitee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS NO. OF POUNDS
GALLONS OF WATER
DEPTH OF GROUT SEAL (to nearest foot)
from ft. TOP to ft. BOTTOM (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE: PL
Nominal diameter top (main) casing (nearest inch): 1
Total depth of main casing (nearest foot): 9.5

OTHER CASING (if used)
EACH CASING — diameter inch — depth (feet) from — to

SCREEN RECORD
screen type or open hole — insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	4.5	9.5
2			
3			

SLOT SIZE 1 0 2 1 3 0
DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK from to
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE LOG OTHER DATA

C 3

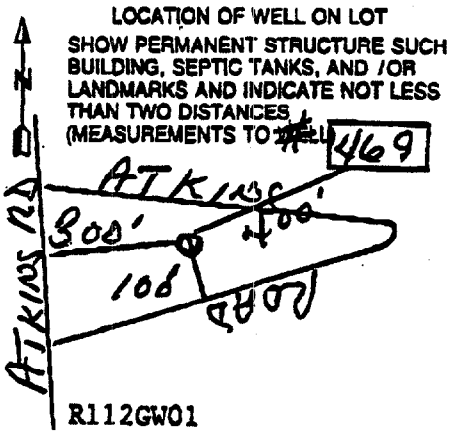
PUMPING TEST
N/A

HOURS PUMPED (nearest hour)
PUMPING RATE (gal. per min.)
METHOD USED TO MEASURE PUMPING RATE
WATER LEVEL (distance from land surface)
BEFORE PUMPING ft.
WHEN PUMPING ft.

TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible
GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.
CAPACITY: GALLONS PER MINUTE (to nearest gallon)
PUMP HORSE POWER
PUMP COLUMN LENGTH (nearest ft.)
CASING HEIGHT (circle appropriate box and enter casing height) + above, − below LAND SURFACE (nearest) foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



R112GW01

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 10/08/97 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) CH — 94 — 1516
* PERMIT NUMBER OF REPLACEMENT WELL — —
* PERSON ABANDONING WELL: Bill Kimes
* WELL DRILLERS LICENSE NUMBER: MGD081
  CIRCLE: MWD/MSD/MGD
* OWNER'S NAME: Naval Surface Warfare
* WELL LOCATION: Atkins Road
  COUNTY: Charles County
  NEAREST TOWN: Indian Head
  TAX MAP _____ BLOCK _____ PARCEL _____
  SUBDIVISION: _____
  SECTION: _____ LOT: _____
  NEAREST ROAD: _____

MARYLAND GRID COORDINATES

BOX NUMBER E 740 N 270 <

000 000	X

SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

  _____ DRILLED _____ JETTED
  X BORED/AUGUERED _____ HAND DUG
  _____ OTHER (specify) _____

* USE CODE:

  _____ DOMESTIC _____ MUNICIPAL/PUBLIC
  _____ IRRIGATION _____ INDUSTRIAL
  X TEST/OBSERVATION

* TYPE OF CASING:

  _____ STEEL X PLASTIC
  _____ CONCRETE _____ OTHER (specify) _____

* SIZE OF CASING: 1" INCHES IN DIAMETER
* DEPTH OF WELL: 9.5 FEET DEEP
* WAS ANY CASING REMOVED? X YES _____ NO
  if yes, length removed, in feet: _____
* WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
bentonite	9.5	0

Michael W. Huber — Michael W. Huber MGD046 MWD/MSD/MGD 12/08/97

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

DENV 828 JULY 1993 3) WELL OWNER

C 1 3147 (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-505-W(M)

ST/CO USE ONLY Date Received DD YY 8 13

DATE WELL COMPLETED MM DD YY 10 09 97 18 29

Depth of Well 22 6' 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 1706 28 29 30 31 32 33 34 35 36 37

OWNER US Naval Surface Warfare Center 6511
STREET OR RFD Indian Head Division TOWN Idnain Head 20640
SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
silt, sand and gravel	0	6'	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS: _____

WELL HYDROFRACTURED yes Y no N

N/A

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: MG D 046

DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: MG D 081

SITE SUPERVISOR (sign. of driller or journeyman)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 44

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM 45 BENTONITE CLAY BC 46

NO. OF BAGS 1 NO. OF POUNDS 200
GALLONS OF WATER 7
DEPTH OF GROUT SEAL (to nearest foot) 9"
from 0 TOP 46 52 ft. to 9" BOTTOM 54 58 ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE PL 60 61 | Nominal diameter top (main) casing (nearest inch) 1 63 64 | Total depth of main casing (nearest foot) 1 66 70

OTHER CASING (if used) EACH CASING diameter inch depth (feet) from to

SCREEN RECORD
screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2 1 2 DEPTH (nearest ft.)
EACH SCREEN
1 PL 8 9 1 11 16 6 17 21
2 23 24 26 30 32 36
3 38 39 41 45 47 51

SLOT SIZE 1" 0 2 1 3 0

DIAMETER OF SCREEN 1 56 60 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 from 9" to 6 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 72 74 75 76

C 3 1 2

PUMPING TEST
N/A

HOURS PUMPED (nearest hour) 8 9

PUMPING RATE (gal. per min.) 11 15

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING 17 20 ft.

WHEN PUMPING 22 25 ft.

TYPE OF PUMP USED (for test)
A air 27 | P piston 27 | T turbine 27
C centrifugal 27 | R rotary 27 | O other (describe below) 27
J jet 27 | S submersible

GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. 29

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 31 35

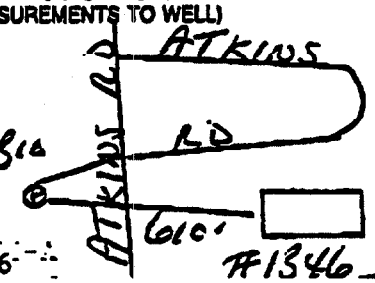
PUMP HORSE POWER 37 41

PUMP COLUMN LENGTH (nearest ft.) 43 47

CASING HEIGHT (circle appropriate box and enter casing height)
+ above 49
− below 49
LAND SURFACE 00 50 51 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



S12WP06 #1346

C1 [illegible] (MDE USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-506-W(M)

ST/CO USE ONLY DATE Received MM DD YY

DATE WELL COMPLETED MM 10 DD 09 YY 97

Depth of Well 10' (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 170

OWNER US Naval Surface Warfare Center (6512)

STREET OR RFD Indian Head Division TOWN Indian head

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
brown silt w/gravel	0	7	
gray/brown silt and sand	7	9	
gray/brown silt w/wood	9	10'	
water @ approx	4.5'		

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N — N/A

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CERTIFICATE PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046

DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M G D 081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 1 NO. OF POUNDS 100

GALLONS OF WATER 7

DEPTH OF GROUT SEAL (to nearest foot)

from 0 TOP ft. to 3 BOTTOM ft.

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE PL

Nominal diameter top (main) casing (nearest inch) 1

Total depth of main casing (nearest foot) 4

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

DEPTH (nearest ft.)

EACH SCREEN			
1	PL	4	10
2			
3			

SLOT SIZE 1 10 2 1 3 0

DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from 3 to 10

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

PUMPING TEST

N/A

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test)

A air P piston T turbine

C centrifugal R rotary O other (describe below)

J jet S submersible

GEOPROBE

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

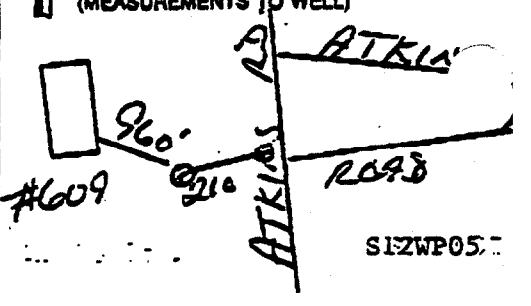
+ above

− below

LAND SURFACE 00 (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S1ZWP05

C1 0101 (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-507-W(M)

ST/CO USE ONLY
DATE Received MM DD YY 13

DATE WELL COMPLETED MM 10 DD 09 YY 97 (15–20)

Depth of Well 22 -10' 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WEL CH - 94 - 1708 (28 29 30 31 32 33 34 35 36)

OWNER US Naval Surface Warfare Center 6513

STREET OR RFD Indian Head Division (last name / first name) TOWN Indian Head

SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
brown silt	0	2	
yellow brown clayey silt, w/fill	2	5	
gray clayey silt and sand	5	10'	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS: _____

WELL HYDROFRACTURED yes Y no N — N/A

CIRCLE APPROPRIATE LETTER
- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. MGD 046 1

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. MGD 081 1

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (44) no N (44)

TYPE OF GROUTING MATERIAL (Circle one) CEMENT CM BENTONITE CLAY BC

NO. OF BAGS _____ NO. OF POUNDS 100

GALLONS OF WATER 3

DEPTH OF GROUT SEAL (to nearest foot) from 0 (48 TOP 52) ft. to 3 (54 BOTTOM 58) ft. (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE PL (60 61) Nominal diameter top (main) casing (nearest inch) 1 (63 64) Total depth of main casing (nearest foot) 4 (66 70)

OTHER CASING (if used) EACH CASING — diameter (inch), depth (feet) from / to

SCREEN RECORD

screen type or open hole insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2 (1 2) DEPTH (nearest ft.)

EACH SCREEN: 1 PL (8 9) 4 (11 15) 10 (17 21); 2 (23 24 28 30 32 36); 3 (38 39 41 45 47 51)

SLOT SIZE 1 0 2 1 3 6

DIAMETER OF SCREEN 1 (54 55) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 58 — from 3 to 10 (58)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 72 74 75 76
TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3 (1 2) PUMPING TEST

N/A

HOURS PUMPED (nearest hour) _____ (8 9)

PUMPING RATE (gal. per min.) _____ (11)

METHOD USED TO MEASURE PUMPING RATE _____

WATER LEVEL (distance from land surface)

BEFORE PUMPING _____ ft. (17 20)

WHEN PUMPING _____ ft. (22 25)

TYPE OF PUMP USED (for test)
- A air (27)
- P piston (27)
- T turbine (27)
- C centrifugal (27)
- R rotary (27)
- O other (descr below) (29)
- J jet (27)
- S submersible (27)

GEOPROBE

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) _____ (31 3)

PUMP HORSE POWER _____ (37 4)

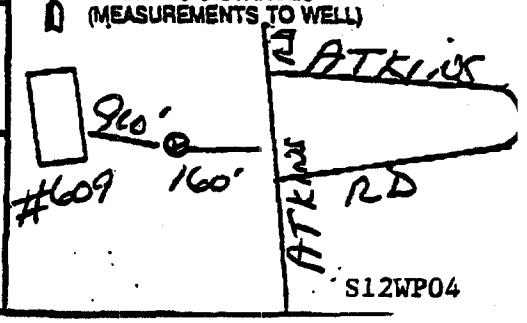
PUMP COLUMN LENGTH (nearest ft.) _____ (43 4)

CASING HEIGHT (circle appropriate box and enter casing height)
- + above (48)
- − below (48)

LAND SURFACE 60 (50 51) (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S12WP04

C 1 3752 — SEQUENCE NO. (MDE USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-508-W(M)

ST/CO USE ONLY DATE Received MM DD YY

DATE WELL COMPLETED MM DD YY: 10 09 97

Depth of Well: 71 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL": CH- 94 - 17

OWNER: US Naval Surface Warfare Center (last name) 6514 (first name)

STREET OR RFD: Indian Head Division TOWN: Indian Head

SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
yellow silt and sand	0	3	
brown gravel, tr silt & clay	3	5	
black silt & gravel	5	7'	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

N/A CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M G D 081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL (Circle one) CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 1 NO. OF POUNDS 100

GALLONS OF WATER 7

DEPTH OF GROUT SEAL (to nearest foot) from 0 TOP ft. to 9" BOTTOM ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE: PL; Nominal diameter top (main) casing (nearest inch): 1; Total depth of main casing (nearest foot): 1

OTHER CASING (if used) — EACH CASING: diameter (inch), depth (feet) from / to

SCREEN RECORD
screen type or open hole — insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2 — DEPTH (nearest ft.)

EACH SCREEN: 1 PL 1 7; 2; 3

SLOT SIZE 1 .0 2 .1 3 .0

DIAMETER OF SCREEN 1 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 59: from 9" to 7

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE LOG

C 3 — PUMPING TEST N/A

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test): A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

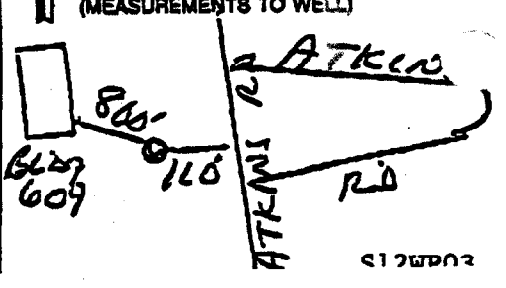
CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height) + above, − below LAND SURFACE 00 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S12WP03

C1 0100 (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-510-W(M)

ST/CO USE ONLY DATE Received DD YY 13

DATE WELL COMPLETED MM 10 DD 08 YY 97 (18–20)

Depth of Well 22 7.5 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH 94 1710 (28–37)

OWNER US Naval SUrfaec Warfare Cerner 6515
(last name first name)

STREET OR RFD Indian Head Division TOWN Indian Head
(last name first name)

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
brown sand and gravel	0	7.5	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

N/A

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P: TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046

DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M G D 081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 44 no N 44

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM 45–48 BENTONITE CLAY BC 45–48

NO. OF BAGS 1 NO. OF POUNDS 100

GALLONS OF WATER

DEPTH OF GROUT SEAL (to nearest foot)

from 0 (48 TOP 52) ft. to 1.0 (54 BOTTOM 58) ft.

(enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL (60 61)	1 (63 64)	1.5 (66 70)

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2 (1 2)

EACH SCREEN		DEPTH (nearest ft.)	
1	PL (8 9)	1.5 (11 15)	7.5 (17 21)
2	(23 24)	(26 30)	(32 36)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1 0 2 1 3 0

DIAMETER OF SCREEN 1 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from 1.0 to 7.5 (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 TELESCOPE CASING 72 LOG INDICATOR 74 75 76 OTHER DATA

C 3 (1 2)

PUMPING TEST

N/A

HOURS PUMPED (nearest hour) (8 9)

PUMPING RATE (gal. per min.) (11 15)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING (17 20) ft.

WHEN PUMPING (22 25) ft.

TYPE OF PUMP USED (for test)

A air (27) P piston (27) T turbine (27)

C centrifugal (27) R rotary (27) O other (describe below) (27)

J jet (27) S submersible (27)

GEOPROBE

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 28. (28)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) (31 35)

PUMP HORSE POWER (37 41)

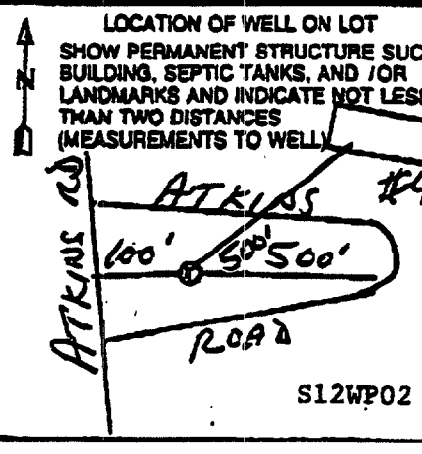
PUMP COLUMN LENGTH (nearest ft.) (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)

+ above (49) / − below (49) LAND SURFACE 00 (50 51) (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



S12WP02

C1 3154 (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 97-511-W(M)

ST/CO USE ONLY DATE Received MM DD YY 8 13

DATE WELL COMPLETED MM 10 DD 08 YY 97 (15 20)

Depth of Well 22 7 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" CH - 94 - 17 (28 29 30 31 32 33 34 35 37)

OWNER US Naval Surface Warfare Center 6516

STREET OR RFD Indian Head Division (last name / first name) TOWN Indian Head

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
dark brown sand and gravel	0	7'	
water @ approx 2'			

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N

N/A

CIRCLE APPROPRIATE LETTER
- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE DARTMENT PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M G D 046

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. M G D 081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 43 no N 44

TYPE OF GROUTING MATERIAL (Circle one) CEMENT CM 45 BENTONITE CLAY BC 46

NO. OF BAGS 1 NO. OF POUNDS 100

GALLONS OF WATER 7

DEPTH OF GROUT SEAL (to nearest foot) from 0 (48 TOP 52) ft. to 9' (54 BOTTOM 58) ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE PL (60 61) Nominal diameter top (main) casing (nearest inch) 1 (63 64) Total depth of main casing (nearest foot) 1 (66 70)

OTHER CASING (if used) EACH CASING — diameter inch — depth (feet) from — to

SCREEN RECORD
screen type or open hole insert appropriate code below

ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C2 DEPTH (nearest ft.)

EACH SCREEN: 1 PL (5 9) 1 (11 15) 7 (17 21); 2 (23 24 26 30 32 36); 3 (38 39 41 45 47 51)

SLOT SIZE 1 10 2 1 3 0

DIAMETER OF SCREEN 1 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from 9' to 7

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 TELESCOPE CASING — 72 LOG INDICATOR — 74 75 76 OTHER DATA

C3 PUMPING TEST
N/A

HOURS PUMPED (nearest hour) (8 9)

PUMPING RATE (gal. per min.) (11 15)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING (17 20) ft.

WHEN PUMPING (22 25) ft.

TYPE OF PUMP USED (for test)

A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible (27)

GEOPROBE

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. (29)

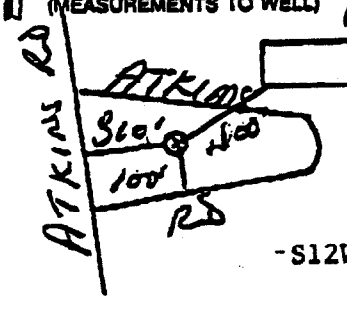
CAPACITY: GALLONS PER MINUTE (to nearest gallon) (31 35)

PUMP HORSE POWER (37 41)

PUMP COLUMN LENGTH (nearest ft.) (43 47)

CASING HEIGHT (circle appropriate box and enter casing height) + above, − below LAND SURFACE (nearest foot) (50 51)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



-S12W001

C 1 | 3241 — SEQUENCE NO. (MDE USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER: 97-316-W(M)

ST/CO USE ONLY — DATE Received MM DD YY

DATE WELL COMPLETED: MM 08 DD 02 YY 97

Depth of Well: 20 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": CH - 94 - 1517

OWNER: Naval Surface Warfare Center (6287)

STREET OR RFD: Indian Head Division (last name / first name) TOWN: Indian Head

SUBDIVISION: SECTION: LOT:

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
silty fine sand, yellow	0	4	
orange/brown silty clay	4	6	
light gray silty sand	6	12	
lt brown clay	12	16	
brown silty clay	16	20'	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED: yes [Y] no [N]

N/A

CIRCLE APPROPRIATE LETTER

A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E — ELECTRIC LOG OBTAINED

P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M GD 046

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: M GD 081

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box): yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one): CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS: 1 NO. OF POUNDS: 100

GALLONS OF WATER: 7

DEPTH OF GROUT SEAL (to nearest foot): from 0 ft. (TOP) to 3 ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD

casing types insert appropriate code below: STEEL [ST], CONCRETE [CO], PLASTIC [PL], OTHER [OT]

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PC	2	5

OTHER CASING (if used) — EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole — insert appropriate code below: STEEL [ST], BRASS BRONZE [BR], OPEN HOLE [HO], PLASTIC [PL], OTHER [OT]

C 2

DEPTH (nearest ft.) — EACH SCREEN

1	PL	5	15
2			
3			

SLOT SIZE 1 0 2 1 3 0

DIAMETER OF SCREEN: 2 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 3 to 20

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER): T (E.R.O.S.) — W Q

TELESCOPE CASING: 70 — LOG INDICATOR: 72 — OTHER DATA: 74 75 76

C 3

PUMPING TEST

N/A

HOURS PUMPED (nearest hour)

PUMPING RATE (gal. per min.)

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL (distance from land surface)

BEFORE PUMPING ft.

WHEN PUMPING ft.

TYPE OF PUMP USED (for test): air [A], piston [P], turbine [T], centrifugal [C], rotary [R], other (describe below) [O], jet [J], submersible [S]

MONITORING

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO): YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29.

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

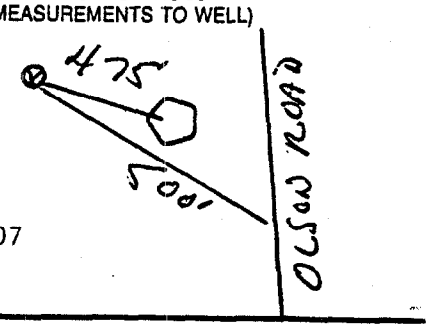
PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height): + above / − below LAND SURFACE (nearest foot)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



42MW07

ORIGINAL - STATE

APPENDIX H

ANALYTICAL DATABASE

Appendix H.1 Historical Analytical Database
Appendix H.2 October 1997 Analytical Database

APPENDIX H.1

HISTORICAL ANALYTICAL DATABASE

Appendix H.1.1 Site 39/41 Historical Analytical Database
Appendix H.1.2 Site 42 Historical Analytical Database
Appendix H.1.3 Site 44 Historical Analytical Database

APPENDIX H.1.1

SITE 39/41 HISTORICAL ANALYTICAL DATABASE

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0301					
DEPTH (feet):	0.0 - 2.0'					
SAMPLE DATE:	08/92					
LOCATION:	41MW01/41SB03					
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	11 UJ					
1,1,2,2-TETRACHLOROETHANE	11 UJ					
1,1,2-TRICHLOROETHANE	11 UJ					
1,1-DICHLOROETHANE	11 U					
1,1-DICHLOROETHENE	11 U					
1,2-DICHLOROETHANE	11 U					
1,2-DICHLOROETHENE (TOTAL)	11 U					
1,2-DICHLOROPROPANE	11 UJ					
2-BUTANONE	3 U					
2-HEXANONE	11 UJ					
4-METHYL-2-PENTANONE	11 UJ					
ACETONE	16 U					
BENZENE	11 UJ					
BROMODICHLOROMETHANE	11 UJ					
BROMOFORM	11 UJ					
BROMOMETHANE	11 U					
CARBON DISULFIDE	3 J					
CARBON TETRACHLORIDE	11 UJ					
CHLOROBENZENE	11 UJ					
CHLOROETHANE	11 U					
CHLOROFORM	11 U					
CHLOROMETHANE	11 U					
CIS-1,3-DICHLOROPROPENE	11 UJ					
DIBROMOCHLOROMETHANE	11 UJ					
ETHYLBENZENE	11 UJ					
HEXACHLOROBUTADIENE	360 U					

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0301					
DEPTH (feet):	0.0 - 2.0'					
SAMPLE DATE:	08/92					
LOCATION:	41MW01/41SB03					
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	4 U					
STYRENE	11 UJ					
TETRACHLOROETHENE	11 UJ					
TOLUENE	9 J					
TRANS-1,3-DICHLOROPROPENE	11 UJ					
TRICHLOROETHENE	11 UJ					
VINYL CHLORIDE	11 U					
XYLENES, TOTAL	11 UJ					
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	360 U					
1,2-DICHLOROBENZENE	360 U					
1,3-DICHLOROBENZENE	360 U					
1,4-DICHLOROBENZENE	360 U					
2,2'-OXYBIS(1-CHLOROPROPANE)	360 U					
2,4,5-TRICHLOROPHENOL	860 U					
2,4,6-TRICHLOROPHENOL	360 U					
2,4-DICHLOROPHENOL	360 U					
2,4-DIMETHYLPHENOL	360 U					
2,4-DINITROPHENOL	860 U					
2,4-DINITROTOLUENE	360 U					
2,6-DINITROTOLUENE	360 U					
2-CHLORONAPHTHALENE	360 U					
2-CHLOROPHENOL	360 U					
2-METHYLNAPHTHALENE	42 J					
2-METHYLPHENOL	360 U					
2-NITROANILINE	860 U					

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SB0301 0.0 - 2.0' 08/92 41MW01/41SB03					
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	360 U					
3,3'-DICHLOROBENZIDINE	360 U					
3-NITROANILINE	860 U					
4,6-DINITRO-2-METHYLPHENOL	860 U					
4-BROMOPHENYL PHENYL ETHER	360 U					
4-CHLORO-3-METHYLPHENOL	360 U					
4-CHLOROANILINE	360 U					
4-CHLOROPHENYL PHENYL ETHER	360 U					
4-METHYLPHENOL	360 U					
4-NITROANILINE	860 U					
4-NITROPHENOL	860 U					
ACENAPHTHENE	360 U					
ACENAPHTHYLENE	100 J					
ANTHRACENE	160 J					
BENZO(A)ANTHRACENE	710					
BENZO(A)PYRENE	230 J					
BENZO(B)FLUORANTHENE	530					
BENZO(G,H,I)PERYLENE	360 U					
BENZO(K)FLUORANTHENE	610					
BIS(2-CHLOROETHOXY)METHANE	360 U					
BIS(2-CHLOROETHYL)ETHER	360 U					
BIS(2-ETHYLHEXYL)PHTHALATE	360 U					
BUTYLBENZYL PHTHALATE	360 U					
CARBAZOLE	360 U					
CHRYSENE	1200					
DI-N-BUTYL PHTHALATE	360 U					

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SB0301 0.0 - 2.0' 08/92 41MW01/41SB03					
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	360 U					
DIBENZO(A,H)ANTHRACENE	360 U					
DIBENZOFURAN	53 J					
DIETHYL PHTHALATE	360 U					
DIMETHYL PHTHALATE	360 U					
FLUORANTHENE	1300					
FLUORENE	360 U					
HEXACHLOROBENZENE	360 U					
HEXACHLOROCYCLOPENTADIENE	360 U					
HEXACHLOROETHANE	360 U					
INDENO(1,2,3-CD)PYRENE	120 J					
ISOPHORONE	360 U					
N-NITROSO-DI-N-PROPYLAMINE	360 U					
N-NITROSODIPHENYLAMINE	360 U					
NAPHTHALENE	92 J					
NITROBENZENE	360 U					
PENTACHLOROPHENOL	860 U					
PHENANTHRENE	1000					
PHENOL	360 U					
PYRENE	1100					
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.6 U					
4,4'-DDE	3.6 U					
4,4'-DDT	3.6 U					
ALDRIN	1.8 U					
ALPHA-BHC	1.8 U					

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SB0301 0.0 - 2.0' 08/92 41MW01/41SB03					
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	1.8 U					
AROCLOR-1016	36 U					
AROCLOR-1221	73 U					
AROCLOR-1232	36 U					
AROCLOR-1242	36 U					
AROCLOR-1248	36 U					
AROCLOR-1254	36 U					
AROCLOR-1260	36 U					
BETA-BHC	1.8 U					
DELTA-BHC	1.8 U					
DIELDRIN	3.6 U					
ENDOSULFAN I	1.8 U					
ENDOSULFAN II	3.6 U					
ENDOSULFAN SULFATE	3.6 U					
ENDRIN	91 DP					
ENDRIN ALDEHYDE	7.2 U					
ENDRIN KETONE	3.6 U					
GAMMA-BHC (LINDANE)	1.8 U					
GAMMA-CHLORDANE	1.8 U					
HEPTACHLOR	1.8 U					
HEPTACHLOR EPOXIDE	5.5					
METHOXYCHLOR	18 U					
TOXAPHENE	180 U					
METALS (mg/kg)						
ALUMINUM	1880					
ANTIMONY	5.4 UJ					

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SB0301 0.0 - 2.0' 08/92 41MW01/41SB03					
METALS (mg/kg)						
ARSENIC	145 J					
BARIUM	36.5 B					
BERYLLIUM	0.41 B					
CADMIUM	1.1 U					
CALCIUM	8420					
CHROMIUM	5.2					
COBALT	4.1 B					
COPPER	19.5					
CYANIDE	1.3 U					
IRON	7670					
LEAD	22.5 J					
MAGNESIUM	552 B					
MANGANESE	57.1					
MERCURY	0.28					
NICKEL	6.4 B					
POTASSIUM	347 B					
SELENIUM	0.6 B					
SILVER	1.4 B					
SODIUM	71.7 U					
THALLIUM	4.3 U					
VANADIUM	5.4 B					
ZINC	24.5					
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	16.2					

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0303	41SB0304	41SB0402	41SB0403	41SB0404	41SB0702
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 9.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW01/41SB03	41MW01/41SB03	41MW02/41SB04	41MW02/41SB04	41MW02/41SB04	41MW03/41SB07
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	12 U	12 U	12 U	12 U	12 U	12 U
1,1,2,2-TETRACHLOROETHANE	12 U	12 U	12 U	12 U	12 U	12 U
1,1,2-TRICHLOROETHANE	12 U	12 U	12 U	12 U	12 U	12 U
1,1-DICHLOROETHANE	12 U	12 U	12 U	12 U	12 U	12 U
1,1-DICHLOROETHENE	12 U	12 U	12 U	12 U	12 U	12 U
1,2-DICHLOROETHANE	12 U	12 U	12 U	12 U	12 U	12 U
1,2-DICHLOROETHENE (TOTAL)	12 U	12 U	12 U	12 U	12 U	12 U
1,2-DICHLOROPROPANE	12 U	12 U	12 U	12 U	12 U	12 U
2-BUTANONE	3 U	6 U	12 U	3 U	3 U	2 U
2-HEXANONE	12 U	12 U	12 U	12 U	12 U	12 U
4-METHYL-2-PENTANONE	12 U	12 U	12 U	12 U	12 U	12 U
ACETONE	17 U	23 U	9 U	27 U	15 U	11 U
BENZENE	12 U	12 U	12 U	12 U	12 U	12 U
BROMODICHLOROMETHANE	12 U	12 U	12 U	12 U	12 U	12 U
BROMOFORM	12 U	12 U	12 U	12 U	12 U	12 U
BROMOMETHANE	12 U	12 U	12 U	12 U	12 U	12 U
CARBON DISULFIDE	12 U	12 U	4 J	6 J	3 J	3 J
CARBON TETRACHLORIDE	12 U	12 U	12 U	12 U	12 U	12 U
CHLOROBENZENE	12 U	12 U	12 U	12 U	12 U	12 U
CHLOROETHANE	12 U	12 U	12 U	12 U	12 U	12 U
CHLOROFORM	12 U	12 U	12 U	12 U	12 U	12 U
CHLOROMETHANE	12 U	12 U	12 U	12 U	12 U	12 U
CIS-1,3-DICHLOROPROPENE	12 U	12 U	12 U	12 U	12 U	12 U
DIBROMOCHLOROMETHANE	12 U	12 U	12 U	12 U	12 U	12 U
ETHYLBENZENE	12 U	12 U	12 U	12 U	12 U	12 U
HEXACHLOROBUTADIENE	400 U	420 U	370 U	390 U	400 U	410 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0303	41SB0304	41SB0402	41SB0403	41SB0404	41SB0702
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 9.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW01/41SB03	41MW01/41SB03	41MW02/41SB04	41MW02/41SB04	41MW02/41SB04	41MW03/41SB07
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	12 U	3 U	12 U	12 U	12 U	12 U
STYRENE	12 U	12 U	12 U	12 U	12 U	12 U
TETRACHLOROETHENE	12 U	12 U	12 U	12 U	12 U	12 U
TOLUENE	12 U	12 U	12 U	12 U	12 U	12 U
TRANS-1,3-DICHLOROPROPENE	12 U	12 U	12 U	12 U	12 U	12 U
TRICHLOROETHENE	12 U	12 U	12 U	12 U	12 U	12 U
VINYL CHLORIDE	12 U	12 U	12 U	12 U	12 U	12 U
XYLENES, TOTAL	12 U	12 U	12 U	12 U	12 U	12 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	400 U	420 U	370 U	390 U	400 U	410 U
1,2-DICHLOROBENZENE	400 U	420 U	370 U	390 U	400 U	410 U
1,3-DICHLOROBENZENE	400 U	420 U	370 U	390 U	400 U	410 U
1,4-DICHLOROBENZENE	400 U	420 U	370 U	390 U	400 U	410 U
2,2'-OXYBIS(1-CHLOROPROPANE)	400 U	420 U	370 U	390 U	400 U	410 U
2,4,5-TRICHLOROPHENOL	970 U	1000 U	900 U	930 U	950 U	990 U
2,4,6-TRICHLOROPHENOL	400 U	420 U	370 U	390 U	400 U	410 U
2,4-DICHLOROPHENOL	400 U	420 U	370 U	390 U	400 U	410 U
2,4-DIMETHYLPHENOL	400 U	420 U	370 U	390 U	400 U	410 U
2,4-DINITROPHENOL	970 U	1000 U	900 U	930 U	950 U	990 U
2,4-DINITROTOLUENE	400 U	420 U	370 U	390 U	400 U	410 U
2,6-DINITROTOLUENE	400 U	420 U	370 U	390 U	400 U	410 U
2-CHLORONAPHTHALENE	400 U	420 U	370 U	390 U	400 U	410 U
2-CHLOROPHENOL	400 U	420 U	370 U	390 U	400 U	410 U
2-METHYLNAPHTHALENE	400 U	420 U	370 U	390 U	400 U	410 U
2-METHYLPHENOL	400 U	420 U	370 U	390 U	400 U	410 U
2-NITROANILINE	970 U	1000 U	900 U	930 U	950 U	990 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0303	41SB0304	41SB0402	41SB0403	41SB0404	41SB0702
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 9.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW01/41SB03	41MW01/41SB03	41MW02/41SB04	41MW02/41SB04	41MW02/41SB04	41MW03/41SB07
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	400 U	420 U	370 U	390 U	400 U	410 U
3,3'-DICHLOROBENZIDINE	400 U	420 U	370 U	390 U	400 U	410 U
3-NITROANILINE	970 U	1000 U	900 U	930 U	950 U	990 U
4,6-DINITRO-2-METHYLPHENOL	970 U	1000 U	900 U	930 U	950 U	990 U
4-BROMOPHENYL PHENYL ETHER	400 U	420 U	370 U	390 U	400 U	410 U
4-CHLORO-3-METHYLPHENOL	400 U	420 U	370 U	390 U	400 U	410 U
4-CHLOROANILINE	400 U	420 U	370 U	390 U	400 U	410 U
4-CHLOROPHENYL PHENYL ETHER	400 U	420 U	370 U	390 U	400 U	410 U
4-METHYLPHENOL	400 U	420 U	370 U	390 U	400 U	410 U
4-NITROANILINE	970 U	1000 U	900 U	930 U	950 U	990 U
4-NITROPHENOL	970 U	1000 U	900 U	930 U	950 U	990 U
ACENAPHTHENE	400 U	420 U	370 U	390 U	400 U	410 U
ACENAPHTHYLENE	400 U	420 U	82 J	390 U	400 U	410 U
ANTHRACENE	400 U	420 U	90 J	390 U	400 U	410 U
BENZO(A)ANTHRACENE	400 U	420 U	320 J	390 U	400 U	410 U
BENZO(A)PYRENE	400 U	420 U	190 J	390 U	400 U	410 U
BENZO(B)FLUORANTHENE	400 U	420 U	560	390 U	400 U	410 U
BENZO(G,H,I)PERYLENE	400 U	420 U	370 U	390 U	400 U	410 U
BENZO(K)FLUORANTHENE	400 U	420 U	420	390 U	400 U	410 U
BIS(2-CHLOROETHOXY)METHANE	400 U	420 U	370 U	390 U	400 U	410 U
BIS(2-CHLOROETHYL)ETHER	400 U	420 U	370 U	390 U	400 U	410 U
BIS(2-ETHYLHEXYL)PHTHALATE	400 U	420 U	370 U	390 U	400 U	410 U
BUTYLBENZYL PHTHALATE	400 U	420 U	370 U	390 U	400 U	410 U
CARBAZOLE	400 U	420 U	48 J	390 U	400 U	410 U
CHRYSENE	400 U	420 U	520	390 U	400 U	410 U
DI-N-BUTYL PHTHALATE	400 U	420 U	370 U	390 U	400 U	410 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0303	41SB0304	41SB0402	41SB0403	41SB0404	41SB0702
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 9.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW01/41SB03	41MW01/41SB03	41MW02/41SB04	41MW02/41SB04	41MW02/41SB04	41MW03/41SB07
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	400 U	420 U	370 U	390 U	400 U	410 U
DIBENZO(A,H)ANTHRACENE	400 U	420 U	370 U	390 U	400 U	410 U
DIBENZOFURAN	400 U	420 U	42 J	390 U	400 U	410 U
DIETHYL PHTHALATE	400 U	420 U	370 U	390 U	400 U	410 U
DIMETHYL PHTHALATE	400 U	420 U	370 U	390 U	400 U	410 U
FLUORANTHENE	400 U	420 U	640	390 U	400 U	410 U
FLUORENE	400 U	420 U	370 U	390 U	400 U	410 U
HEXACHLOROBENZENE	400 U	420 U	370 U	390 U	400 U	410 U
HEXACHLOROCYCLOPENTADIENE	400 U	420 U	370 U	390 U	400 U	410 U
HEXACHLOROETHANE	400 U	420 U	370 U	390 U	400 U	410 U
INDENO(1,2,3-CD)PYRENE	400 U	420 U	120 J	390 U	400 U	410 U
ISOPHORONE	400 U	420 U	370 U	390 U	400 U	410 U
N-NITROSO-DI-N-PROPYLAMINE	400 U	420 U	370 U	390 U	400 U	410 U
N-NITROSODIPHENYLAMINE	400 U	420 U	370 U	390 U	400 U	410 U
NAPHTHALENE	400 U	420 U	56 J	390 U	400 U	410 U
NITROBENZENE	400 U	420 U	370 U	390 U	400 U	410 U
PENTACHLOROPHENOL	970 U	1000 U	900 U	930 U	950 U	990 U
PHENANTHRENE	400 U	420 U	350 J	390 U	400 U	410 U
PHENOL	400 U	420 U	370 U	390 U	400 U	410 U
PYRENE	400 U	420 U	520	390 U	400 U	410 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4 U	4.2 U	3.7 U	3.8 U	3.9 U	4.1 U
4,4'-DDE	4 U	4.2 U	3.7 U	3.8 U	3.9 U	4.1 U
4,4'-DDT	4 U	4.2 U	7.5 P	3.8 U	3.9 U	4.1 U
ALDRIN	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
ALPHA-BHC	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0303	41SB0304	41SB0402	41SB0403	41SB0404	41SB0702
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 9.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW01/41SB03	41MW01/41SB03	41MW02/41SB04	41MW02/41SB04	41MW02/41SB04	41MW03/41SB07
FIELD DUPLICATE OF:						
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
AROCLOR-1016	40 U	42 U	37 U	38 U	39 U	41 U
AROCLOR-1221	81 U	85 U	75 U	78 U	79 U	83 U
AROCLOR-1232	40 U	42 U	37 U	38 U	39 U	41 U
AROCLOR-1242	40 U	42 U	37 U	38 U	39 U	41 U
AROCLOR-1248	40 U	42 U	37 U	38 U	39 U	41 U
AROCLOR-1254	40 U	42 U	37 U	38 U	39 U	41 U
AROCLOR-1260	40 U	42 U	37 U	38 U	39 U	41 U
BETA-BHC	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
DELTA-BHC	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
DIELDRIN	4 U	4.2 U	3.7 U	3.8 U	3.9 U	4.1 U
ENDOSULFAN I	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
ENDOSULFAN II	4 U	4.2 U	3.7 U	3.8 U	3.9 U	4.1 U
ENDOSULFAN SULFATE	4 U	4.2 U	3.7 U	3.8 U	3.9 U	4.1 U
ENDRIN	4 U	4.2 U	20 P	3.8 U	3.9 U	4.1 U
ENDRIN ALDEHYDE	4 U	4.2 U	3.7 U	3.8 U	3.9 U	4.1 U
ENDRIN KETONE	4 U	4.2 U	3.7 U	3.8 U	3.9 U	4.1 U
GAMMA-BHC (LINDANE)	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
GAMMA-CHLORDANE	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
HEPTACHLOR	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
HEPTACHLOR EPOXIDE	2.1 U	2.2 U	1.9 U	2 U	2 U	2.1 U
METHOXYCHLOR	21 U	22 U	19 U	20 U	20 U	21 U
TOXAPHENE	210 U	220 U	190 U	200 U	200 U	210 U
METALS (mg/kg)						
ALUMINUM	469	3200	2030	1020	2520	415
ANTIMONY	6.1 UJ	6.4 UJ	5.9 UJ	5.8 UJ	6.1 UJ	6.1 UJ

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0303	41SB0304	41SB0402	41SB0403	41SB0404	41SB0702
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 9.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW01/41SB03	41MW01/41SB03	41MW02/41SB04	41MW02/41SB04	41MW02/41SB04	41MW03/41SB07
FIELD DUPLICATE OF:						
METALS (mg/kg)						
ARSENIC	2.4 J	0.76 UJ	6.6 J	0.69 UJ	0.73 UJ	3.4 J
BARIUM	9.0 B	70.7	14.7 B	17.9 B	23.3 B	10.0 B
BERYLLIUM	0.37 B	2.9	0.24 U	0.23 U	0.37 B	0.25 U
CADMIUM	1.2 U	1.3 U	1.2 U	1.2 U	1.2 U	1.2 U
CALCIUM	333 U	2720	209 B	76.5 B	405 B	153 B
CHROMIUM	2.5 U	3.7	4.3	2.6	3.5	2.5 U
COBALT	8.3 B	66.2	3.6 U	3.5 U	10.4 B	3.7 U
COPPER	5.9 B	62.9	4.0 B	8.4	6.7	5.4 B
CYANIDE	1.5 U	1.6 U	1.5 U	1.4 U	1.5 U	1.5 U
IRON	2480	9470	6410	1430	3040	2410
LEAD	3.2 J	10.1 J	4.1 J	3.1 J	3.6 J	2.5 UJ
MAGNESIUM	208 B	2080	117 B	46.6 B	351 B	53.2 B
MANGANESE	22.7	84.2	10.6	3.3 B	57.5	3.1 B
MERCURY	0.25 U	0.25 U	0.24 U	0.23 U	0.24 U	0.25 U
NICKEL	3.7 U	27.3	3.6 U	3.5 U	3.6 U	3.7 U
POTASSIUM	225 U	1290	305 B	213 U	354 B	237 B
SELENIUM	0.49 U	0.51 U	0.47 U	0.46 U	0.49 U	0.49 U
SILVER	1.2 U	1.3 U	1.2 B	1.2 U	10.1	1.2 U
SODIUM	50.2 U	93.4 U	61.1 U	39.1 U	46.1 U	61.5 U
THALLIUM	0.98 U	5.1 U	0.95 U	0.93 U	0.97 U	0.98 U
VANADIUM	5.1 B	22.2	7.8 B	3.4 B	12.6	5.8 B
ZINC	21.0	84.2	5.3	4.7	10.5	5.3
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	12.2 U	12.6 U	16.3	11.5 U	12 U	12.2 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0702D	41SB0703	41SB0703D	41SB0704	41SB0102	41SB0103
DEPTH (feet):	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41SB01	41SB01
FIELD DUPLICATE OF:	41SB0702		41SB0703			
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	12 U	12 U	12 U	13 U	12 U	12 U
1,1,2,2-TETRACHLOROETHANE	12 U	12 U	12 U	13 U	12 U	12 U
1,1,2-TRICHLOROETHANE	12 U	12 U	12 U	13 U	12 U	12 U
1,1-DICHLOROETHANE	12 U	12 U	12 U	13 U	12 U	12 U
1,1-DICHLOROETHENE	12 U	12 U	12 U	13 U	12 U	12 U
1,2-DICHLOROETHANE	12 U	12 U	12 U	13 U	12 U	12 U
1,2-DICHLOROETHENE (TOTAL)	12 U	12 U	12 U	13 U	12 U	12 U
1,2-DICHLOROPROPANE	12 U	12 U	12 U	13 U	12 U	12 U
2-BUTANONE	3 U	2 U	12 U	3 U	2 U	12 U
2-HEXANONE	12 U	12 U	12 U	13 U	12 U	12 U
4-METHYL-2-PENTANONE	12 U	12 U	12 U	13 U	12 U	12 U
ACETONE	16 U	18 U	17 U	27 U	38 U	490 DB
BENZENE	12 U	12 U	12 U	13 U	12 U	12 U
BROMODICHLOROMETHANE	12 U	12 U	12 U	13 U	12 U	12 U
BROMOFORM	12 U	12 U	12 U	13 U	12 U	12 U
BROMOMETHANE	12 U	12 U	12 U	13 U	12 U	12 U
CARBON DISULFIDE	12 U	12 U	12 U	13 U	12 U	6 J
CARBON TETRACHLORIDE	12 U	12 U	12 U	13 U	12 U	12 U
CHLOROBENZENE	12 U	12 U	12 U	13 U	12 U	12 U
CHLOROETHANE	12 U	12 U	12 U	13 U	12 U	12 U
CHLOROFORM	12 U	12 U	12 U	13 U	12 U	12 U
CHLOROMETHANE	12 U	12 U	12 U	13 U	12 U	12 U
CIS-1,3-DICHLOROPROPENE	12 U	12 U	12 U	13 U	12 U	12 U
DIBROMOCHLOROMETHANE	12 U	12 U	12 U	13 U	12 U	12 U
ETHYLBENZENE	12 U	12 U	12 U	13 U	12 U	12 U
HEXACHLOROBUTADIENE	410 U	420 U	420 U	430 U	400 U	410 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0702D	41SB0703	41SB0703D	41SB0704	41SB0102	41SB0103
DEPTH (feet):	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41SB01	41SB01
FIELD DUPLICATE OF:	41SB0702		41SB0703			
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	12 U	12 U	12 U	13 U	12 U	12 U
STYRENE	12 U	12 U	12 U	13 U	12 U	12 U
TETRACHLOROETHENE	12 U	12 U	12 U	13 U	12 U	12 U
TOLUENE	12 U	12 U	12 U	13 U	12 U	12 U
TRANS-1,3-DICHLOROPROPENE	12 U	12 U	12 U	13 U	12 U	12 U
TRICHLOROETHENE	12 U	12 U	12 U	13 U	12 U	12 U
VINYL CHLORIDE	12 U	12 U	12 U	13 U	12 U	12 U
XYLENES, TOTAL	12 U	12 U	12 U	13 U	12 U	12 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	410 U	420 U	420 U	430 U	400 U	410 U
1,2-DICHLOROBENZENE	410 U	420 U	420 U	430 U	400 U	410 U
1,3-DICHLOROBENZENE	410 U	420 U	420 U	430 U	400 U	410 U
1,4-DICHLOROBENZENE	410 U	420 U	420 U	430 U	400 U	410 U
2,2'-OXYBIS(1-CHLOROPROPANE)	410 U	420 U	420 U	430 U	400 U	410 U
2,4,5-TRICHLOROPHENOL	1000 U	1000 U	1000 U	1000 U	980 U	980 U
2,4,6-TRICHLOROPHENOL	410 U	420 U	420 U	430 U	400 U	410 U
2,4-DICHLOROPHENOL	410 U	420 U	420 U	430 U	400 U	410 U
2,4-DIMETHYLPHENOL	410 U	420 U	420 U	430 U	400 U	410 U
2,4-DINITROPHENOL	1000 U	1000 U	1000 U	1000 U	980 U	980 U
2,4-DINITROTOLUENE	410 U	420 U	420 U	430 U	400 U	410 U
2,6-DINITROTOLUENE	410 U	420 U	420 U	430 U	400 U	410 U
2-CHLORONAPHTHALENE	410 U	420 U	420 U	430 U	400 U	410 U
2-CHLOROPHENOL	410 U	420 U	420 U	430 U	400 U	410 U
2-METHYLNAPHTHALENE	410 U	420 U	420 U	430 U	400 U	410 U
2-METHYLPHENOL	410 U	420 U	420 U	430 U	400 U	410 U
2-NITROANILINE	1000 U	1000 U	1000 U	1000 U	980 U	980 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0702D	41SB0703	41SB0703D	41SB0704	41SB0102	41SB0103
DEPTH (feet):	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41SB01	41SB01
FIELD DUPLICATE OF:	41SB0702		41SB0703			
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	410 U	420 U	420 U	430 U	400 U	410 U
3,3'-DICHLOROBENZIDINE	410 U	420 U	420 U	430 U	400 U	410 U
3-NITROANILINE	1000 U	1000 U	1000 U	1000 U	980 U	980 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	1000 U	1000 U	1000 U	980 U	1000 U
4-BROMOPHENYL PHENYL ETHER	410 U	420 U	420 U	430 U	400 U	410 U
4-CHLORO-3-METHYLPHENOL	410 U	420 U	420 U	430 U	400 U	410 U
4-CHLOROANILINE	410 U	420 U	420 U	430 U	400 U	410 U
4-CHLOROPHENYL PHENYL ETHER	410 U	420 U	420 U	430 U	400 U	410 U
4-METHYLPHENOL	410 U	420 U	420 U	430 U	400 U	410 U
4-NITROANILINE	1000 U	1000 U	1000 U	1000 U	980 U	980 U
4-NITROPHENOL	1000 U	1000 U	1000 U	1000 U	980 U	980 U
ACENAPHTHENE	410 U	420 U	420 U	430 U	400 U	410 U
ACENAPHTHYLENE	410 U	420 U	420 U	430 U	400 U	410 U
ANTHRACENE	410 U	420 U	420 U	430 U	400 U	410 U
BENZO(A)ANTHRACENE	410 U	420 U	420 U	430 U	400 U	410 U
BENZO(A)PYRENE	410 U	420 U	420 U	430 U	400 U	410 U
BENZO(B)FLUORANTHENE	410 U	420 U	420 U	430 U	400 U	410 U
BENZO(G,H,I)PERYLENE	410 U	420 U	420 U	430 U	400 U	410 U
BENZO(K)FLUORANTHENE	410 U	420 U	420 U	430 U	400 U	410 U
BIS(2-CHLOROETHOXY)METHANE	410 U	420 U	420 U	430 U	400 U	410 U
BIS(2-CHLOROETHYL)ETHER	410 U	420 U	420 U	430 U	400 U	410 U
BIS(2-ETHYLHEXYL)PHTHALATE	410 U	420 U	420 U	430 U	400 U	410 U
BUTYLBENZYL PHTHALATE	410 U	420 U	420 U	430 U	400 U	410 U
CARBAZOLE	410 U	420 U	420 U	430 U	400 U	410 U
CHRYSENE	410 U	420 U	420 U	430 U	400 U	410 U
DI-N-BUTYL PHTHALATE	410 U	420 U	420 U	430 U	400 U	410 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0702D	41SB0703	41SB0703D	41SB0704	41SB0102	41SB0103
DEPTH (feet):	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41SB01	41SB01
FIELD DUPLICATE OF:	41SB0702		41SB0703			
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	410 U	420 U	420 U	430 U	400 U	410 U
DIBENZO(A,H)ANTHRACENE	410 U	420 U	420 U	430 U	400 U	410 U
DIBENZOFURAN	410 U	420 U	420 U	430 U	400 U	410 U
DIETHYL PHTHALATE	410 U	420 U	420 U	430 U	400 U	410 U
DIMETHYL PHTHALATE	410 U	420 U	420 U	430 U	400 U	410 U
FLUORANTHENE	410 U	420 U	420 U	430 U	400 U	410 U
FLUORENE	410 U	420 U	420 U	430 U	400 U	410 U
HEXACHLOROBENZENE	410 U	420 U	420 U	430 U	400 U	410 U
HEXACHLOROCYCLOPENTADIENE	410 U	420 U	420 U	430 U	400 U	410 U
HEXACHLOROETHANE	410 U	420 U	420 U	430 U	400 U	410 U
INDENO(1,2,3-CD)PYRENE	410 U	420 U	420 U	430 U	400 U	410 U
ISOPHORONE	410 U	420 U	420 U	430 U	400 U	410 U
N-NITROSO-DI-N-PROPYLAMINE	410 U	420 U	420 U	430 U	400 U	410 U
N-NITROSODIPHENYLAMINE	410 U	420 U	420 U	430 U	400 U	410 U
NAPHTHALENE	410 U	420 U	420 U	430 U	400 U	410 U
NITROBENZENE	410 U	420 U	420 U	430 U	400 U	410 U
PENTACHLOROPHENOL	1000 U	1000 U	1000 U	1000 U	980 U	980 U
PHENANTHRENE	410 U	420 U	420 U	430 U	400 U	410 U
PHENOL	410 U	420 U	420 U	430 U	400 U	410 U
PYRENE	410 U	420 U	420 U	430 U	400 U	410 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
4,4'-DDE	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
4,4'-DDT	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
ALDRIN	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
ALPHA-BHC	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0702D	41SB0703	41SB0703D	41SB0704	41SB0102	41SB0103
DEPTH (feet):	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41SB01	41SB01
FIELD DUPLICATE OF:	41SB0702		41SB0703			
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
AROCLOR-1016	41 U	42 U	41 U	43 U	40 U	41 U
AROCLOR-1221	84 U	86 U	84 U	86 U	81 U	82 U
AROCLOR-1232	41 U	42 U	41 U	43 U	40 U	41 U
AROCLOR-1242	41 U	42 U	41 U	43 U	40 U	41 U
AROCLOR-1248	41 U	42 U	41 U	43 U	40 U	41 U
AROCLOR-1254	41 U	42 U	41 U	43 U	40 U	41 U
AROCLOR-1260	41 U	42 U	41 U	43 U	40 U	41 U
BETA-BHC	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
DELTA-BHC	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
DIELDRIN	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
ENDOSULFAN I	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
ENDOSULFAN II	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
ENDOSULFAN SULFATE	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
ENDRIN	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
ENDRIN ALDEHYDE	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
ENDRIN KETONE	4.1 U	4.2 U	4.1 U	4.3 U	4 U	4.1 U
GAMMA-BHC (LINDANE)	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
GAMMA-CHLORDANE	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
HEPTACHLOR	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
HEPTACHLOR EPOXIDE	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.1 U
METHOXYCHLOR	21 U	22 U	21 U	22 U	21 U	21 U
TOXAPHENE	210 U	220 U	210 U	220 U	210 U	210 U
METALS (mg/kg)						
ALUMINUM	485	1390	2240	2450	7070	492
ANTIMONY	6.3 UJ	6.3 UJ	6.3 UJ	6.5 UJ	6.0 UJ	6.3 UJ

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0702D	41SB0703	41SB0703D	41SB0704	41SB0102	41SB0103
DEPTH (feet):	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41MW03/41SB07	41SB01	41SB01
FIELD DUPLICATE OF:	41SB0702		41SB0703			
METALS (mg/kg)						
ARSENIC	4.2 J	0.76 UJ	0.75 UJ	0.78 UJ	0.72 UJ	0.75 UJ
BARIUM	11.1 B	27.1 B	54.4	60.2	24.6 B	9.8 B
BERYLLIUM	0.25 U	0.25 U	0.25 U	1.5	0.52 B	0.25 U
CADMIUM	1.3 U	1.3 U	1.3 U	1.3 U	1.2 U	1.3 U
CALCIUM	180 B	1040 B	1150 B	1870	547 B	74.9 U
CHROMIUM	2.5 U	2.5 U	2.5 U	5.0	15.7	2.9
COBALT	3.8 U	22.7	15.9	71.7	4.2 B	3.8 B
COPPER	2.6 B	14.2	19.0	16.6	10.5	13.0
CYANIDE	1.3 U	1.5 U	1.5 U	1.6 U	1.5 U	1.5 U
IRON	2820	4020	5200	6510	7670	481
LEAD	3.4 J	4.3 J	6.4 J	15.8 J	4.4 J	2.6 J
MAGNESIUM	66.7 B	876 B	1150 B	1650	416 B	29.2 B
MANGANESE	3.2 B	35.4	44.9	59.5	17.9 J	1.3 UJ
MERCURY	0.25 U	0.25 U	0.25 U	0.26 U	0.12 U	0.13 U
NICKEL	3.8 U	7.2 B	6.8 B	53.1	4.1 B	3.8 U
POTASSIUM	257 B	808 B	1170 B	1410	903 B	231 B
SELENIUM	0.5 U	0.5 U	0.5 U	0.52 U	0.48 UJ	0.5 UJ
SILVER	1.3 U	1.3 U	1.3 U	1.3 U	1.2 U	1.3 U
SODIUM	50.1 U	82.9 U	56.9 U	99.4 U	59.6 U	35.6 U
THALLIUM	1.0 U	1.0 U	1.0 U	1.0 U	0.72 UJ	0.75 UJ
VANADIUM	5.3 B	7.9 B	8.8 B	14.6	27.4	4.1 B
ZINC	2.6 B	18.5	24.2	33.6	23.8	7.7
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	12.5 U	12.6 U	12.4 U	12.9 U	17.2	12.5 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0105	41SB0201	41SB0203	41SB0204	41SB0502	41SB0503
DEPTH (feet):	20.0 - 22.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB01	41SB02	41SB02	41SB02	41SB05	41SB05
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	13 U	12 UJ	11 U	12 U	12 U	12 U
1,1,2,2-TETRACHLOROETHANE	13 U	12 UJ	11 U	12 U	12 U	12 U
1,1,2-TRICHLOROETHANE	13 U	12 UJ	11 U	12 U	12 U	12 U
1,1-DICHLOROETHANE	13 U	12 U	11 U	12 U	12 U	12 U
1,1-DICHLOROETHENE	13 U	12 U	11 U	12 U	12 U	12 U
1,2-DICHLOROETHANE	13 U	12 U	11 U	12 U	12 U	12 U
1,2-DICHLOROETHENE (TOTAL)	13 U	12 U	11 U	12 U	12 U	12 U
1,2-DICHLOROPROPANE	13 U	12 UJ	11 U	12 U	12 U	12 U
2-BUTANONE	3 U	4 U	5 U	9 U	12 U	12 U
2-HEXANONE	13 U	12 UJ	11 U	12 U	12 U	12 U
4-METHYL-2-PENTANONE	13 U	12 UJ	11 U	12 U	12 U	12 U
ACETONE	220 B	38 U	1200 DB	85 U	9 U	10 U
BENZENE	13 U	12 UJ	11 U	12 U	12 U	12 U
BROMODICHLOROMETHANE	13 U	12 UJ	11 U	12 U	12 U	12 U
BROMOFORM	13 U	12 UJ	11 U	12 U	12 U	12 U
BROMOMETHANE	13 U	12 U	11 U	12 U	12 U	12 U
CARBON DISULFIDE	13 U	2 J	11 U	12 U	12 U	12 U
CARBON TETRACHLORIDE	13 U	12 UJ	11 U	12 U	12 U	12 U
CHLOROBENZENE	13 U	12 UJ	11 U	12 U	12 U	12 U
CHLOROETHANE	13 U	12 U	11 U	12 U	12 U	12 U
CHLOROFORM	13 U	12 U	11 U	12 U	12 U	12 U
CHLOROMETHANE	13 U	12 U	11 U	12 U	12 U	12 U
CIS-1,3-DICHLOROPROPENE	13 U	12 UJ	11 U	12 U	12 U	12 U
DIBROMOCHLOROMETHANE	13 U	12 UJ	11 U	12 U	12 U	12 U
ETHYLBENZENE	13 U	12 UJ	11 U	12 U	12 U	12 U
HEXACHLOROBUTADIENE	410 U	380 U	390 UJ	410 U	410 U	400 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0105	41SB0201	41SB0203	41SB0204	41SB0502	41SB0503
DEPTH (feet):	20.0 - 22.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB01	41SB02	41SB02	41SB02	41SB05	41SB05
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	13 U	12 U	11 U	12 U	12 U	12 U
STYRENE	13 U	12 UJ	11 U	12 U	12 U	12 U
TETRACHLOROETHENE	13 U	12 UJ	11 U	12 U	12 U	12 U
TOLUENE	13 U	12 UJ	11 U	12 U	12 U	12 U
TRANS-1,3-DICHLOROPROPENE	13 U	12 UJ	11 U	12 U	12 U	12 U
TRICHLOROETHENE	13 U	12 UJ	11 U	12 U	12 U	12 U
VINYL CHLORIDE	13 U	12 U	11 U	12 U	12 U	12 U
XYLENES, TOTAL	13 U	12 UJ	11 U	12 U	12 U	12 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	410 U	380 U	390 UJ	410 U	410 U	400 U
1,2-DICHLOROBENZENE	410 U	380 U	390 UJ	410 U	410 U	400 U
1,3-DICHLOROBENZENE	410 U	380 U	390 UJ	410 U	410 U	400 U
1,4-DICHLOROBENZENE	410 U	380 U	390 UJ	410 U	410 U	400 U
2,2'-OXYBIS(1-CHLOROPROPANE)	410 U	380 U	390 UJ	410 U	410 U	400 U
2,4,5-TRICHLOROPHENOL	1000 U	930 UJ	940 UJ	990 U	990 U	970 U
2,4,6-TRICHLOROPHENOL	410 U	380 UJ	390 UJ	410 U	410 U	400 U
2,4-DICHLOROPHENOL	410 U	380 U	390 UJ	410 U	410 U	400 U
2,4-DIMETHYLPHENOL	410 U	380 U	390 UJ	410 U	410 U	400 U
2,4-DINITROPHENOL	1000 U	930 UJ	940 UJ	990 U	990 U	970 U
2,4-DINITROTOLUENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
2,6-DINITROTOLUENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
2-CHLORONAPHTHALENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
2-CHLOROPHENOL	410 U	380 U	390 UJ	410 U	410 U	400 U
2-METHYLNAPHTHALENE	410 U	38 J	390 UJ	410 U	410 U	400 U
2-METHYLPHENOL	410 U	380 U	390 UJ	410 U	410 U	400 U
2-NITROANILINE	1000 U	930 UJ	940 UJ	990 U	990 U	970 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0105	41SB0201	41SB0203	41SB0204	41SB0502	41SB0503
DEPTH (feet):	20.0 - 22.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB01	41SB02	41SB02	41SB02	41SB05	41SB05
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	410 U	380 U	390 UJ	410 U	410 U	400 U
3,3'-DICHLOROBENZIDINE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
3-NITROANILINE	1000 U	930 UJ	940 UJ	990 U	990 U	970 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	930 UJ	940 UJ	990 U	990 U	970 U
4-BROMOPHENYL PHENYL ETHER	410 U	380 UJ	940 UJ	410 U	410 U	400 U
4-CHLORO-3-METHYLPHENOL	410 U	380 U	390 UJ	410 U	410 U	400 U
4-CHLOROANILINE	410 U	380 U	390 UJ	410 U	410 U	400 U
4-CHLOROPHENYL PHENYL ETHER	410 U	380 UJ	390 UJ	410 U	410 U	400 U
4-METHYLPHENOL	410 U	380 U	390 UJ	410 U	410 U	400 U
4-NITROANILINE	1000 U	930 UJ	940 UJ	990 U	990 U	970 U
4-NITROPHENOL	1000 U	930 UJ	390 UJ	990 U	990 U	970 U
ACENAPHTHENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
ACENAPHTHYLENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
ANTHRACENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
BENZO(A)ANTHRACENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
BENZO(A)PYRENE	410 U	100 J	390 UJ	410 U	410 U	400 U
BENZO(B)FLUORANTHENE	410 U	160 J	390 UJ	410 U	410 U	400 U
BENZO(G,H,I)PERYLENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
BENZO(K)FLUORANTHENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
BIS(2-CHLOROETHOXY)METHANE	410 U	380 U	390 UJ	410 U	410 U	400 U
BIS(2-CHLOROETHYL)ETHER	410 U	380 U	390 UJ	410 U	410 U	400 U
BIS(2-ETHYLHEXYL)PHTHALATE	410 U	78 UJ	390 UJ	410 U	410 U	400 U
BUTYLBENZYL PHTHALATE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
CARBAZOLE	410 U	250 J	390 UJ	410 U	410 U	400 U
CHRYSENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
DI-N-BUTYL PHTHALATE	410 U	3300 D	390 UJ	410 U	410 U	400 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0105	41SB0201	41SB0203	41SB0204	41SB0502	41SB0503
DEPTH (feet):	20.0 - 22.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB01	41SB02	41SB02	41SB02	41SB05	41SB05
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
DIBENZO(A,H)ANTHRACENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
DIBENZOFURAN	410 U	380 UJ	390 UJ	410 U	410 U	400 U
DIETHYL PHTHALATE	410 U	12000 D	390 UJ	410 U	410 U	400 U
DIMETHYL PHTHALATE	410 U	370 UJ	390 UJ	410 U	410 U	400 U
FLUORANTHENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
FLUORENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
HEXACHLOROBENZENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
HEXACHLOROCYCLOPENTADIENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
HEXACHLOROETHANE	410 U	380 U	390 UJ	410 U	410 U	400 U
INDENO(1,2,3-CD)PYRENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
ISOPHORONE	410 U	380 U	390 UJ	410 U	410 U	400 U
N-NITROSO-DI-N-PROPYLAMINE	410 U	380 U	390 UJ	410 U	410 U	400 U
N-NITROSODIPHENYLAMINE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
NAPHTHALENE	410 U	380 U	390 UJ	410 U	410 U	400 U
NITROBENZENE	410 U	380 U	390 UJ	410 U	410 U	400 U
PENTACHLOROPHENOL	1000 U	930 UJ	940 UJ	990 U	990 U	970 U
PHENANTHRENE	410 U	140 J	390 UJ	410 U	410 U	400 U
PHENOL	410 U	380 U	390 UJ	410 U	410 U	400 U
PYRENE	410 U	380 UJ	390 UJ	410 U	410 U	400 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4.1 U	53 P	3.8 U	4 U	4.1 U	0.86 JP
4,4'-DDE	4.1 U	160 D	3.8 U	4 U	4.1 U	4 U
4,4'-DDT	4.1 U	980 D	5.9 P	4 U	4.1 U	4 U
ALDRIN	2.1 U	2 U	2 U	2.1 U	2.1 U	2.1 U
ALPHA-BHC	2.1 U	2 U	2 U	2.1 U	2.1 U	2.1 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0105	41SB0201	41SB0203	41SB0204	41SB0502	41SB0503
DEPTH (feet):	20.0 - 22.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB01	41SB02	41SB02	41SB02	41SB05	41SB05
FIELD DUPLICATE OF:						
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	2.1 U	2 U	2 U	2.1 U	2.1 U	2.1 U
AROCLOR-1016	41 U	38 U	38 U	40 U	41 U	40 U
AROCLOR-1221	83 U	78 U	78 U	82 U	83 U	81 U
AROCLOR-1232	41 U	38 U	38 U	40 U	41 U	40 U
AROCLOR-1242	41 U	38 U	38 U	40 U	41 U	40 U
AROCLOR-1248	41 U	38 U	38 U	40 U	41 U	40 U
AROCLOR-1254	41 U	38 U	38 U	40 U	41 U	40 U
AROCLOR-1260	41 U	38 U	38 U	40 U	41 U	40 U
BETA-BHC	2.1 U	2 U	2 U	2.1 U	2.1 U	2.1 U
DELTA-BHC	2.1 U	2 U	2 U	2.1 U	2.1 U	2.1 U
DIELDRIN	4.1 U	3.8 U	3.8 U	4 U	4.1 U	4 U
ENDOSULFAN I	2.1 U	2 U	2 U	2.1 U	2.1 U	2.1 U
ENDOSULFAN II	4.1 U	3.8 U	3.8 U	4 U	4.1 U	1.5 J
ENDOSULFAN SULFATE	4.1 U	3.8 U	3.8 U	4 U	4.1 U	4 U
ENDRIN	4.1 U	15 P	3.8 U	4 U	4.1 U	4 U
ENDRIN ALDEHYDE	4.1 U	3.8 U	3.8 U	4 U	4.1 U	4 U
ENDRIN KETONE	4.1 U	3.8 U	3.8 U	4 U	4.1 U	4 U
GAMMA-BHC (LINDANE)	2.1 U	3.8 U	2 U	2.1 U	2.1 U	2.1 U
GAMMA-CHLORDANE	2.1 U	1.4 JP	2 U	2.1 U	2.1 U	2.1 U
HEPTACHLOR	2.1 U	2 U	2 U	2.1 U	2.1 U	2.1 U
HEPTACHLOR EPOXIDE	2.1 U	2 U	2 U	2.1 U	2.1 U	2.9
METHOXYCHLOR	21 U	20 U	20 U	21 U	21 U	21 U
TOXAPHENE	210 U	200 U	200 U	210 U	210 U	210 U
METALS (mg/kg)						
ALUMINUM	5130	2800	2390	3190	884	1960
ANTIMONY	6.4 UJ	5.5 UJ	5.8 UJ	6.0 UJ	6.2 UJ	6.0 UJ

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0105	41SB0201	41SB0203	41SB0204	41SB0502	41SB0503
DEPTH (feet):	20.0 - 22.0'	5.0 - 7.0'	10.0 - 12.0'	15.0 - 17.0'	5.0 - 7.0'	10.0 - 12.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB01	41SB02	41SB02	41SB02	41SB05	41SB05
FIELD DUPLICATE OF:						
METALS (mg/kg)						
ARSENIC	0.77 UJ	328 J	2.0 J	1.3 J	17.0 J	3.2 J
BARIUM	93.9	92.6	24.5 B	39.5 B	43.3 B	36.8 B
BERYLLIUM	4.6	0.39 B	0.31 B	0.31 B	0.3 U	0.6 B
CADMIUM	1.3 U	2.0	1.2 U	1.2 U	1.2 U	1.2
CALCIUM	3080	780 B	287 U	706 B	304 U	1430
CHROMIUM	12.8	7.2	6.6	6.6	2.5 U	8.7
COBALT	70.4	6.2 B	3.7 B	5.7 B	3.7 U	32.1
COPPER	20.5	23.9	6.6	8.6	3.8 B	8.4
CYANIDE	1.5 U	1.3 U	1.4 U	1.4 U	1.4 U	1.2 U
IRON	35200	13800	5670	6120	10300	55600
LEAD	6.2 J	46.0 J	5.0 J	6.2 J	3.2 J	29.7 J
MAGNESIUM	2350	186 B	265 B	651 B	79.8 B	417 B
MANGANESE	116 J	27.8 J	14.8 J	30.7 J	4.1	369
MERCURY	0.13 U	0.18	0.12 U	0.12 U	0.1 U	0.1 U
NICKEL	30.9	5.2 B	3.5 U	3.6 U	3.7 U	3.6 U
POTASSIUM	2100	330 B	303 B	493 B	654 B	527 B
SELENIUM	0.51 UJ	0.7 BJ	0.46 UJ	0.48 UJ	0.3 UJ	0.3 UJ
SILVER	2.0 B	1.8 B	1.3 B	1.2 U	1.2 U	4.1
SODIUM	138 B	57.4 U	48.6 U	85.0 U	84.6 U	106 U
THALLIUM	0.77 UJ	0.65 UJ	0.69 UJ	0.72 UJ	1.0 U	1.0 U
VANADIUM	58.3	11.8	11.1 B	20.4	6.4 B	12.8
ZINC	76.4	33.9	11.2	29.1	5.1	18.0
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	12.6 U	143	12.5	17.7	12.2 U	10 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0504	41SB0602	41SB062D	41SB0603	41SB063D	41SB0802
DEPTH (feet):	15.0 - 17.0'	5.0 - 9.0'	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB05	41SB06	41SB06	41SB06	41SB06	41SB08
FIELD DUPLICATE OF:			41SB0602		41SB0603	
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	13 U	12 U	12 U	12 U	12 U	12 U
1,1,2,2-TETRACHLOROETHANE	13 U	12 U	12 U	12 U	12 U	12 U
1,1,2-TRICHLOROETHANE	13 U	12 U	12 U	12 U	12 U	12 U
1,1-DICHLOROETHANE	13 U	12 U	12 U	12 U	12 U	12 U
1,1-DICHLOROETHENE	13 U	12 U	12 U	12 U	12 U	12 U
1,2-DICHLOROETHANE	13 U	12 U	12 U	12 U	12 U	12 U
1,2-DICHLOROETHENE (TOTAL)	13 U	12 U	12 U	12 U	12 U	12 U
1,2-DICHLOROPROPANE	13 U	12 U	12 U	12 U	12 U	12 U
2-BUTANONE	4 U	2 U	12 U	12 U	12 U	4 U
2-HEXANONE	13 U	12 U	12 U	12 U	12 U	12 U
4-METHYL-2-PENTANONE	13 U	12 U	12 U	12 U	12 U	12 U
ACETONE	64 U	9 U	10 U	12 U	9 UJ	41 U
BENZENE	13 U	12 U	12 U	12 U	12 U	12 U
BROMODICHLOROMETHANE	13 U	12 U	12 U	12 U	12 U	12 U
BROMOFORM	13 U	12 U	12 U	12 U	12 U	12 U
BROMOMETHANE	13 U	12 U	12 U	12 U	12 U	12 U
CARBON DISULFIDE	13 U	12 U	12 U	12 U	12 U	12 U
CARBON TETRACHLORIDE	13 U	12 U	12 U	12 U	12 U	12 U
CHLOROBENZENE	13 U	12 U	12 U	12 U	12 U	12 U
CHLOROETHANE	13 U	12 U	12 U	12 U	12 U	12 U
CHLOROFORM	13 U	12 U	12 U	12 U	12 U	12 U
CHLOROMETHANE	13 U	12 U	12 U	12 U	12 U	12 U
CIS-1,3-DICHLOROPROPENE	13 U	12 U	12 U	12 U	12 U	12 U
DIBROMOCHLOROMETHANE	13 U	12 U	12 U	12 U	12 U	12 U
ETHYLBENZENE	13 U	12 U	12 U	12 U	12 U	12 U
HEXACHLOROBUTADIENE	420 U	410 U	410 U	420 U	420 U	450 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0504	41SB0602	41SB062D	41SB0603	41SB063D	41SB0802
DEPTH (feet):	15.0 - 17.0'	5.0 - 9.0'	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB05	41SB06	41SB06	41SB06	41SB06	41SB08
FIELD DUPLICATE OF:			41SB0602		41SB0603	
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	13 U	12 U	12 U	12 U	12 U	12 U
STYRENE	13 U	12 U	12 U	12 U	12 U	12 U
TETRACHLOROETHENE	13 U	12 U	12 U	12 U	12 U	12 U
TOLUENE	13 U	12 U	12 U	12 U	12 U	12 U
TRANS-1,3-DICHLOROPROPENE	13 U	12 U	12 U	12 U	12 U	12 U
TRICHLOROETHENE	13 U	12 U	12 U	12 U	12 U	12 U
VINYL CHLORIDE	13 U	12 U	12 U	12 U	12 U	12 U
XYLENES, TOTAL	13 U	12 U	12 U	12 U	12 U	12 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	420 U	410 U	410 U	420 U	420 U	450 U
1,2-DICHLOROBENZENE	420 U	410 U	410 U	420 U	420 U	450 U
1,3-DICHLOROBENZENE	420 U	410 U	410 U	420 U	420 U	450 U
1,4-DICHLOROBENZENE	420 U	410 U	410 U	420 U	420 U	450 U
2,2'-OXYBIS(1-CHLOROPROPANE)	420 U	410 U	410 U	420 U	420 U	450 U
2,4,5-TRICHLOROPHENOL	1000 U	990 U	990 U	1000 U	1000 U	1100 U
2,4,6-TRICHLOROPHENOL	420 U	410 U	410 U	420 U	420 U	450 U
2,4-DICHLOROPHENOL	420 U	410 U	410 U	420 U	420 U	450 U
2,4-DIMETHYLPHENOL	420 U	410 U	410 U	420 U	420 U	450 U
2,4-DINITROPHENOL	1000 U	990 U	990 U	1000 U	1000 U	1100 U
2,4-DINITROTOLUENE	420 U	410 U	410 U	420 U	420 U	450 U
2,6-DINITROTOLUENE	420 U	410 U	410 U	420 U	420 U	450 U
2-CHLORONAPHTHALENE	420 U	410 U	410 U	420 U	420 U	450 U
2-CHLOROPHENOL	420 U	410 U	410 U	420 U	420 U	450 U
2-METHYLNAPHTHALENE	420 U	410 U	410 U	420 U	420 U	450 U
2-METHYLPHENOL	420 U	410 U	410 U	420 U	420 U	450 U
2-NITROANILINE	1000 U	990 U	990 U	1000 U	1000 U	1100 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0504	41SB0602	41SB062D	41SB0603	41SB063D	41SB0802
DEPTH (feet):	15.0 - 17.0'	5.0 - 9.0'	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB05	41SB06	41SB06	41SB06	41SB06	41SB08
FIELD DUPLICATE OF:			41SB0602		41SB0603	
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	420 U	410 U	410 U	420 U	420 U	450 U
3,3'-DICHLOROBENZIDINE	420 U	410 U	410 U	420 U	420 U	450 U
3-NITROANILINE	1000 U	990 U	990 U	1000 U	1000 U	1100 U
4,6-DINITRO-2-METHYLPHENOL	1000 U	990 U	990 U	1000 U	1000 U	1100 U
4-BROMOPHENYL PHENYL ETHER	420 U	410 U	410 U	420 U	420 U	450 U
4-CHLORO-3-METHYLPHENOL	420 U	410 U	410 U	420 U	420 U	450 U
4-CHLOROANILINE	420 U	410 U	410 U	420 U	420 U	450 U
4-CHLOROPHENYL PHENYL ETHER	420 U	410 U	410 U	420 U	420 U	450 U
4-METHYLPHENOL	420 U	410 U	410 U	420 U	420 U	450 U
4-NITROANILINE	1000 U	990 U	990 U	1000 U	1000 U	1100 U
4-NITROPHENOL	1000 U	990 U	990 U	1000 U	1000 U	1100 U
ACENAPHTHENE	420 U	410 U	410 U	420 U	420 U	450 U
ACENAPHTHYLENE	420 U	410 U	410 U	420 U	420 U	450 U
ANTHRACENE	420 U	410 U	410 U	420 U	420 U	450 U
BENZO(A)ANTHRACENE	420 U	410 U	410 U	420 U	420 U	450 U
BENZO(A)PYRENE	420 U	410 U	410 U	420 U	420 U	450 U
BENZO(B)FLUORANTHENE	420 U	410 U	410 U	420 U	420 U	450 U
BENZO(G,H,I)PERYLENE	420 U	410 U	410 U	420 U	420 U	450 U
BENZO(K)FLUORANTHENE	420 U	410 U	410 U	420 U	420 U	450 U
BIS(2-CHLOROETHOXY)METHANE	420 U	410 U	410 U	420 U	420 U	450 U
BIS(2-CHLOROETHYL)ETHER	420 U	410 U	410 U	420 U	420 U	450 U
BIS(2-ETHYLHEXYL)PHTHALATE	420 U	410 U	410 U	420 U	420 U	450 U
BUTYLBENZYL PHTHALATE	420 U	410 U	410 U	420 U	420 U	450 U
CARBAZOLE	420 U	410 U	410 U	420 U	420 U	450 U
CHRYSENE	420 U	410 U	410 U	420 U	420 U	450 U
DI-N-BUTYL PHTHALATE	420 U	410 U	410 U	420 U	420 U	450 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0504	41SB0602	41SB062D	41SB0603	41SB063D	41SB0802
DEPTH (feet):	15.0 - 17.0'	5.0 - 9.0'	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB05	41SB06	41SB06	41SB06	41SB06	41SB08
FIELD DUPLICATE OF:			41SB0602		41SB0603	
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	420 U	410 U	410 U	420 U	420 U	450 U
DIBENZO(A,H)ANTHRACENE	420 U	410 U	410 U	420 U	420 U	450 U
DIBENZOFURAN	420 U	410 U	410 U	420 U	420 U	450 U
DIETHYL PHTHALATE	420 U	410 U	410 U	420 U	420 U	450 U
DIMETHYL PHTHALATE	420 U	410 U	410 U	420 U	420 U	450 U
FLUORANTHENE	420 U	410 U	410 U	420 U	420 U	450 U
FLUORENE	420 U	410 U	410 U	420 U	420 U	450 U
HEXACHLOROBENZENE	420 U	410 U	410 U	420 U	420 U	450 U
HEXACHLOROCYCLOPENTADIENE	420 U	410 U	410 U	420 U	420 U	450 U
HEXACHLOROETHANE	420 U	410 U	410 U	420 U	420 U	450 U
INDENO(1,2,3-CD)PYRENE	420 U	410 U	410 U	420 U	420 U	450 U
ISOPHORONE	420 U	410 U	410 U	420 U	420 U	450 U
N-NITROSO-DI-N-PROPYLAMINE	420 U	410 U	410 U	420 U	420 U	450 U
N-NITROSODIPHENYLAMINE	420 U	410 U	410 U	420 U	420 U	450 U
NAPHTHALENE	420 U	410 U	410 U	420 U	420 U	450 U
NITROBENZENE	420 U	410 U	410 U	420 U	420 U	450 U
PENTACHLOROPHENOL	1000 U	990 U	990 U	1000 U	1000 U	1100 U
PHENANTHRENE	420 U	410 U	410 U	420 U	420 U	450 U
PHENOL	420 U	410 U	410 U	420 U	420 U	450 U
PYRENE	420 U	410 U	410 U	420 U	420 U	450 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
4,4'-DDE	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
4,4'-DDT	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
ALDRIN	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
ALPHA-BHC	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0504	41SB0602	41SB062D	41SB0603	41SB063D	41SB0802
DEPTH (feet):	15.0 - 17.0'	5.0 - 9.0'	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB05	41SB06	41SB06	41SB06	41SB06	41SB08
FIELD DUPLICATE OF:			41SB0602		41SB0603	
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
AROCLOR-1016	41 U	41 U	41 U	41 U	42 U	45 U
AROCLOR-1221	84 U	83 U	83 U	84 U	85 U	91 U
AROCLOR-1232	41 U	41 U	41 U	41 U	42 U	45 U
AROCLOR-1242	41 U	41 U	41 U	41 U	42 U	45 U
AROCLOR-1248	41 U	41 U	41 U	41 U	42 U	45 U
AROCLOR-1254	41 U	41 U	41 U	41 U	42 U	45 U
AROCLOR-1260	41 U	41 U	41 U	41 U	42 U	45 U
BETA-BHC	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
DELTA-BHC	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
DIELDRIN	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
ENDOSULFAN I	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
ENDOSULFAN II	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
ENDOSULFAN SULFATE	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
ENDRIN	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
ENDRIN ALDEHYDE	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
ENDRIN KETONE	4.1 U	4.1 U	4.1 U	4.1 U	4.2 U	4.5 U
GAMMA-BHC (LINDANE)	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
GAMMA-CHLORDANE	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
HEPTACHLOR	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
HEPTACHLOR EPOXIDE	2.1 U	2.1 U	2.1 U	2.1 U	2.2 U	2.3 U
METHOXYCHLOR	21 U	21 U	21 U	21 U	22 U	23 U
TOXAPHENE	210 U	210 U	210 U	210 U	220 U	230 U
METALS (mg/kg)						
ALUMINUM	11900	1210	1150	2740	1680	1490 J
ANTIMONY	6.5 UJ	6.3 UJ	8.3 UJ	6.2 UJ	6.4 UJ	6.2 UJ

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0504	41SB0602	41SB062D	41SB0603	41SB063D	41SB0802
DEPTH (feet):	15.0 - 17.0'	5.0 - 9.0'	5.0 - 9.0'	10.0 - 14.0'	10.0 - 14.0'	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	41SB05	41SB06	41SB06	41SB06	41SB06	41SB08
FIELD DUPLICATE OF:			41SB0602		41SB0603	
METALS (mg/kg)						
ARSENIC	0.5 UJ	11.2 J	0.5 UJ	0.5 UJ	0.5 UJ	0.74 U
BARIUM	84.1	15.4 B	13.2 B	18.5 B	28.8 B	17.2 B
BERYLLIUM	3.8	0.3 U	0.3 U	0.3	0.3 U	0.25 U
CADMIUM	1.3 U	1.3 U	1.3 U	1.2 U	1.3 U	1.2 U
CALCIUM	3480	121 U	133 U	1200 B	525 B	340 B
CHROMIUM	27.7	2.5 U	2.5 U	8.6	3.1	3.2
COBALT	70.9	3.8 U	3.8 U	8.9 B	6.0 B	18.9
COPPER	25.8	2.5 U	4.1 B	12.7	6.6	4.0 B
CYANIDE	1.4 U	1.6 U	1.5 U	1.4 U	1.6 U	1.4 U
IRON	79600	1840	1580	63300	18800	2060 J
LEAD	6.7 J	3.2 J	6.9 J	6.3 J	4.2 J	2.3
MAGNESIUM	3180	98.2 B	84.0 B	158 B	214 B	270 B
MANGANESE	219	5.4	5.6	98.6	31.2	152 J
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.12 U
NICKEL	49.0	3.8 U	3.8 U	3.8 U	3.8 U	4.7 B
POTASSIUM	3320	460 B	300 B	404 B	391 B	263 B
SELENIUM	0.3 UJ	0.7 UJ	0.3 UJ	0.3 UJ	0.3 UJ	0.49 UJ
SILVER	4.1	1.3 U	1.3 U	4.8	1.3 U	1.2 U
SODIUM	215 B	71.5 U	74.3 U	114 U	75.3 U	46.5 U
THALLIUM	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.99 U
VANADIUM	125	4.1 B	4.7 B	42.2	14.5	6.8 B
ZINC	97.2	5.3	6.5	11.4	15.3	18.6
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	12.7 U	12.5 U	12.5 U	12.4 U	12.7 U	12.2 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0803	41SB0804				
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'				
SAMPLE DATE:	08/92	08/92				
LOCATION:	41SB08	41SB08				
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	13 U	13 U				
1,1,2,2-TETRACHLOROETHANE	13 U	13 U				
1,1,2-TRICHLOROETHANE	13 U	13 U				
1,1-DICHLOROETHANE	13 U	13 U				
1,1-DICHLOROETHENE	13 U	13 U				
1,2-DICHLOROETHANE	13 U	13 U				
1,2-DICHLOROETHENE (TOTAL)	13 U	13 U				
1,2-DICHLOROPROPANE	13 U	13 U				
2-BUTANONE	2 U	3 U				
2-HEXANONE	13 U	13 U				
4-METHYL-2-PENTANONE	13 U	13 U				
ACETONE	30 U	41 U				
BENZENE	13 U	13 U				
BROMODICHLOROMETHANE	13 U	13 U				
BROMOFORM	13 U	13 U				
BROMOMETHANE	13 U	13 U				
CARBON DISULFIDE	13 U	13 U				
CARBON TETRACHLORIDE	13 U	13 U				
CHLOROBENZENE	13 U	13 U				
CHLOROETHANE	13 U	13 U				
CHLOROFORM	13 U	13 U				
CHLOROMETHANE	13 U	13 U				
CIS-1,3-DICHLOROPROPENE	13 U	13 U				
DIBROMOCHLOROMETHANE	13 U	13 U				
ETHYLBENZENE	13 U	13 U				
HEXACHLOROBUTADIENE	470 U	420 U				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0803	41SB0804				
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'				
SAMPLE DATE:	08/92	08/92				
LOCATION:	41SB08	41SB08				
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	13 U	13 U				
STYRENE	13 U	13 U				
TETRACHLOROETHENE	13 U	13 U				
TOLUENE	13 U	13 U				
TRANS-1,3-DICHLOROPROPENE	13 U	13 U				
TRICHLOROETHENE	13 U	13 U				
VINYL CHLORIDE	13 U	13 U				
XYLENES, TOTAL	13 U	13 U				
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	470 U	420 U				
1,2-DICHLOROBENZENE	470 U	420 U				
1,3-DICHLOROBENZENE	470 U	420 U				
1,4-DICHLOROBENZENE	470 U	420 U				
2,2'-OXYBIS(1-CHLOROPROPANE)	470 U	420 U				
2,4,5-TRICHLOROPHENOL	1100 U	1000 U				
2,4,6-TRICHLOROPHENOL	470 U	420 U				
2,4-DICHLOROPHENOL	470 U	420 U				
2,4-DIMETHYLPHENOL	470 U	420 U				
2,4-DINITROPHENOL	1100 U	1000 U				
2,4-DINITROTOLUENE	470 U	420 U				
2,6-DINITROTOLUENE	470 U	420 U				
2-CHLORONAPHTHALENE	470 U	420 U				
2-CHLOROPHENOL	470 U	420 U				
2-METHYLNAPHTHALENE	470 U	420 U				
2-METHYLPHENOL	470 U	420 U				
2-NITROANILINE	1100 U	1000 U				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SB0803 10.0 - 12.0' 08/92 41SB08	41SB0804 15.0 - 17.0' 08/92 41SB08				
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	470 U	420 U				
3,3'-DICHLOROBENZIDINE	470 U	420 U				
3-NITROANILINE	1100 U	1000 U				
4,6-DINITRO-2-METHYLPHENOL	1100 U	1000 U				
4-BROMOPHENYL PHENYL ETHER	470 U	420 U				
4-CHLORO-3-METHYLPHENOL	470 U	420 U				
4-CHLOROANILINE	470 U	420 U				
4-CHLOROPHENYL PHENYL ETHER	470 U	420 U				
4-METHYLPHENOL	470 U	420 U				
4-NITROANILINE	1100 U	1000 U				
4-NITROPHENOL	1100 U	1000 U				
ACENAPHTHENE	470 U	420 U				
ACENAPHTHYLENE	470 U	420 U				
ANTHRACENE	470 U	420 U				
BENZO(A)ANTHRACENE	470 U	420 U				
BENZO(A)PYRENE	470 U	420 U				
BENZO(B)FLUORANTHENE	470 U	420 U				
BENZO(G,H,I)PERYLENE	470 U	420 U				
BENZO(K)FLUORANTHENE	470 U	420 U				
BIS(2-CHLOROETHOXY)METHANE	470 U	420 U				
BIS(2-CHLOROETHYL)ETHER	470 U	420 U				
BIS(2-ETHYLHEXYL)PHTHALATE	110 U	62 U				
BUTYLBENZYL PHTHALATE	470 U	420 U				
CARBAZOLE	470 U	420 U				
CHRYSENE	470 U	420 U				
DI-N-BUTYL PHTHALATE	470 U	420 U				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SB0803 10.0 - 12.0' 08/92 41SB08	41SB0804 15.0 - 17.0' 08/92 41SB08				
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	470 U	420 U				
DIBENZO(A,H)ANTHRACENE	470 U	420 U				
DIBENZOFURAN	470 U	420 U				
DIETHYL PHTHALATE	470 U	420 U				
DIMETHYL PHTHALATE	470 U	420 U				
FLUORANTHENE	470 U	420 U				
FLUORENE	470 U	420 U				
HEXACHLOROBENZENE	470 U	420 U				
HEXACHLOROCYCLOPENTADIENE	470 U	420 U				
HEXACHLOROETHANE	470 U	420 U				
INDENO(1,2,3-CD)PYRENE	470 U	420 U				
ISOPHORONE	470 U	420 U				
N-NITROSO-DI-N-PROPYLAMINE	470 U	420 U				
N-NITROSODIPHENYLAMINE	470 U	420 U				
NAPHTHALENE	470 U	420 U				
NITROBENZENE	470 U	420 U				
PENTACHLOROPHENOL	1100 U	1000 U				
PHENANTHRENE	470 U	420 U				
PHENOL	470 U	420 U				
PYRENE	470 U	420 U				
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4.7 U	4.2 U				
4,4'-DDE	4.7 U	4.2 U				
4,4'-DDT	4.7 U	4.2 U				
ALDRIN	2.4 U	2.2 U				
ALPHA-BHC	2.4 U	2.2 U				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	41SB0803	41SB0804				
DEPTH (feet):	10.0 - 12.0'	15.0 - 17.0'				
SAMPLE DATE:	08/92	08/92				
LOCATION:	41SB08	41SB08				
FIELD DUPLICATE OF:						
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	2.4 U	2.2 U				
AROCLOR-1016	47 U	42 U				
AROCLOR-1221	96 U	85 U				
AROCLOR-1232	47 U	42 U				
AROCLOR-1242	47 U	42 U				
AROCLOR-1248	47 U	42 U				
AROCLOR-1254	47 U	42 U				
AROCLOR-1260	47 U	42 U				
BETA-BHC	2.4 U	2.2 U				
DELTA-BHC	2.4 U	2.2 U				
DIELDRIN	4.7 U	4.2 U				
ENDOSULFAN I	2.4 U	2.2 U				
ENDOSULFAN II	4.7 U	4.2 U				
ENDOSULFAN SULFATE	4.7 U	4.2 U				
ENDRIN	4.7 U	4.2 U				
ENDRIN ALDEHYDE	4.7 U	4.2 U				
ENDRIN KETONE	4.7 U	4.2 U				
GAMMA-BHC (LINDANE)	2.4 U	2.2 U				
GAMMA-CHLORDANE	2.4 U	2.2 U				
HEPTACHLOR	2.4 U	2.2 U				
HEPTACHLOR EPOXIDE	2.4 U	2.2 U				
METHOXYCHLOR	24 U	22 U				
TOXAPHENE	240 U	220 U				
METALS (mg/kg)						
ALUMINUM	769 J	7150 J				
ANTIMONY	6.4 UJ	6.5 UJ				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SB0803 10.0 - 12.0' 08/92 41SB08	41SB0804 15.0 - 17.0' 08/92 41SB08				
METALS (mg/kg)						
ARSENIC	0.77 U	0.78 U				
BARIUM	7.2 B	74.8				
BERYLLIUM	0.26 U	1.0 B				
CADMIUM	1.3 U	1.3 U				
CALCIUM	309 B	2130				
CHROMIUM	2.6 U	8.5				
COBALT	5.9 B	26.5				
COPPER	2.6 U	6.9				
CYANIDE	1.4 U	1.6 U				
IRON	1900 J	11100 J				
LEAD	1.7	4.6				
MAGNESIUM	170 B	1890				
MANGANESE	7.4 J	85.8 J				
MERCURY	0.13 U	0.13 U				
NICKEL	3.9 U	13.7				
POTASSIUM	237 U	1680				
SELENIUM	0.51 UJ	0.52 UJ				
SILVER	1.3 U	1.3 U				
SODIUM	46.5 U	110 B				
THALLIUM	1.0 U	1.0 U				
VANADIUM	4.3 B	22.2				
ZINC	17.6	53.1				
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	12.7 U	12.9 U				

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SW01 09/92 41SW01					
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE	10 U					
1,1,2,2-TETRACHLOROETHANE	10 U					
1,1,2-TRICHLOROETHANE	10 U					
1,1-DICHLOROETHANE	10 U					
1,1-DICHLOROETHENE	10 U					
1,2-DICHLOROETHANE	10 U					
1,2-DICHLOROETHENE (TOTAL)	10 U					
1,2-DICHLOROPROPANE	10 U					
2-BUTANONE	10 U					
2-HEXANONE	10 U					
4-METHYL-2-PENTANONE	10 U					
ACETONE	11 U					
BENZENE	10 U					
BROMODICHLOROMETHANE	10 U					
BROMOFORM	10 U					
BROMOMETHANE	10 U					
CARBON DISULFIDE	10 U					
CARBON TETRACHLORIDE	10 U					
CHLOROBENZENE	10 U					
CHLOROETHANE	10 U					
CHLOROFORM	10 U					
CHLOROMETHANE	10 U					
CIS-1,3-DICHLOROPROPENE	10 U					
DIBROMOCHLOROMETHANE	10 U					
ETHYLBENZENE	10 U					
HEXACHLOROBUTADIENE	10 U					
METHYLENE CHLORIDE	10 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SW01 09/92 41SW01					
VOLATILES (µg/L)						
STYRENE	10 U					
TETRACHLOROETHENE	10 U					
TOLUENE	10 U					
TRANS-1,3-DICHLOROPROPENE	10 U					
TRICHLOROETHENE	10 U					
VINYL CHLORIDE	10 U					
XYLENES, TOTAL	10 U					
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE	1 J					
1,2-DICHLOROBENZENE	10 U					
1,3-DICHLOROBENZENE	10 U					
1,4-DICHLOROBENZENE	10 U					
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U					
2,4,5-TRICHLOROPHENOL	26 U					
2,4,6-TRICHLOROPHENOL	10 U					
2,4-DICHLOROPHENOL	10 U					
2,4-DIMETHYLPHENOL	10 U					
2,4-DINITROPHENOL	26 U					
2,4-DINITROTOLUENE	10 U					
2,6-DINITROTOLUENE	10 U					
2-CHLORONAPHTHALENE	10 U					
2-CHLOROPHENOL	10 U					
2-METHYLNAPHTHALENE	10 U					
2-METHYLPHENOL	10 U					
2-NITROANILINE	26 U					
2-NITROPHENOL	10 U					
3,3'-DICHLOROBENZIDINE	10 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SW01 09/92 41SW01					
SEMIVOLATILES (µg/L)						
3-NITROANILINE	26 U					
4,6-DINITRO-2-METHYLPHENOL	26 U					
4-BROMOPHENYL PHENYL ETHER	10 U					
4-CHLORO-3-METHYLPHENOL	10 U					
4-CHLOROANILINE	10 U					
4-CHLOROPHENYL PHENYL ETHER	10 U					
4-METHYLPHENOL	10 U					
4-NITROANILINE	26 U					
4-NITROPHENOL	26 U					
ACENAPHTHENE	10 U					
ACENAPHTHYLENE	10 U					
ANTHRACENE	10 U					
BENZO(A)ANTHRACENE	10 U					
BENZO(A)PYRENE	10 U					
BENZO(B)FLUORANTHENE	10 U					
BENZO(G,H,I)PERYLENE	10 U					
BENZO(K)FLUORANTHENE	10 U					
BIS(2-CHLOROETHOXY)METHANE	10 U					
BIS(2-CHLOROETHYL)ETHER	10 U					
BIS(2-ETHYLHEXYL)PHTHALATE	10 U					
BUTYLBENZYL PHTHALATE	10 U					
CARBAZOLE	10 U					
CHRYSENE	10 U					
DI-N-BUTYL PHTHALATE	10 U					
DI-N-OCTYL PHTHALATE	10 U					
DIBENZO(A,H)ANTHRACENE	10 U					
DIBENZOFURAN	10 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SW01 09/92 41SW01					
SEMIVOLATILES (µg/L)						
DIETHYL PHTHALATE	10 U					
DIMETHYL PHTHALATE	10 U					
FLUORANTHENE	1 J					
FLUORENE	10 U					
HEXACHLOROBENZENE	10 U					
HEXACHLOROCYCLOPENTADIENE	10 U					
HEXACHLOROETHANE	10 U					
INDENO(1,2,3-CD)PYRENE	10 U					
ISOPHORONE	10 U					
N-NITROSO-DI-N-PROPYLAMINE	10 U					
N-NITROSODIPHENYLAMINE	10 U					
NAPHTHALENE	10 U					
NITROBENZENE	10 U					
PENTACHLOROPHENOL	26 U					
PHENANTHRENE	10 U					
PHENOL	10 U					
PYRENE	1 J					
PESTICIDES/PCBs (µg/L)						
4,4'-DDD	0.035 JP					
4,4'-DDE	0.23 P					
4,4'-DDT	0.11 U					
ALDRIN	0.053 U					
ALPHA-BHC	0.053 U					
ALPHA-CHLORDANE	0.053 U					
AROCLOR-1016	1.1 U					
AROCLOR-1221	2.1 U					
AROCLOR-1232	1.1 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SW01 09/92 41SW01					
PESTICIDES/PCBs (µg/L)						
AROCLOR-1242	1.1 U					
AROCLOR-1248	1.1 U					
AROCLOR-1254	1.1 U					
AROCLOR-1260	47 P					
BETA-BHC	0.053 U					
DELTA-BHC	0.053 U					
DIELDRIN	0.11 U					
ENDOSULFAN I	0.031 JP					
ENDOSULFAN II	0.11 U					
ENDOSULFAN SULFATE	0.11 U					
ENDRIN	0.11 U					
ENDRIN ALDEHYDE	0.11 U					
ENDRIN KETONE	0.11 U					
GAMMA-BHC (LINDANE)	0.053 U					
GAMMA-CHLORDANE	0.053 U					
HEPTACHLOR	0.053 U					
HEPTACHLOR EPOXIDE	0.053 U					
METHOXYCHLOR	0.53 U					
TOXAPHENE	5.3 U					
METALS (µg/L)						
ALUMINUM	3740 J					
ANTIMONY	25.0 U					
ARSENIC	7.2 B					
BARIUM	372					
BERYLLIUM	1.0 U					
CADMIUM	104					
CALCIUM	49100					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41SW01 09/92 41SW01					
METALS (µg/L)						
CHROMIUM	37.6					
COBALT	15.0 U					
COPPER	154					
CYANIDE	10.0 U					
IRON	16700					
LEAD	716 J					
MAGNESIUM	7790					
MANGANESE	225					
MERCURY	2.8					
NICKEL	40.2					
POTASSIUM	14400					
SELENIUM	2.0 U					
SILVER	8.1 B					
SODIUM	12700					
THALLIUM	3.0 U					
VANADIUM	14.9 B					
ZINC	1150					
PETROLEUM HYDROCARBONS (µg/L)						
TOTAL PETROLEUM HYDROCARBONS	549 U					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	39DP01	39DP01D	39DP02	39DP03	39DP04	39DP05
SAMPLE DATE:	09/01/92	09/01/92	09/01/92	09/01/92	09/01/92	09/01/92
LOCATION:	39DP01	39DP01	39DP02	39DP03	39DP04	39DP05
FIELD DUPLICATE OF:		39DP01				
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	12 U	12 U	11 U	31 U	42 U	14 U
1,1,2,2-TETRACHLOROETHANE	12 U	12 U	11 U	31 U	42 U	14 U
1,1,2-TRICHLOROETHANE	12 U	12 U	11 U	31 U	42 U	14 U
1,1-DICHLOROETHANE	12 U	12 U	11 U	31 U	42 U	14 U
1,1-DICHLOROETHENE	12 U	12 U	11 U	31 U	42 U	14 U
1,1-DIETHOXYETHANE (ACETAL)	12 U		11 U	31 U	42 U	14 U
1,2-DICHLOROETHANE	12 U	12 U	11 U	31 U	42 U	14 U
1,2-DICHLOROETHENE (TOTAL)	12 U	12 U	11 U	31 U	42 U	14 U
1,2-DICHLOROPROPANE	12 U	12 U	11 U	31 U	42 U	14 U
2-BUTANONE	12 U	12 U	11 U	17 U	14 U	7 U
2-HEXANONE	12 U	12 U	11 U	31 U	42 U	14 U
4-METHYL-2-PENTANONE	12 U	12 U	11 U	31 U	42 U	14 U
ACETONE	12 U	12 U	11 U	110 U	110 U	280 U
BENZENE	12 U	12 U	11 U	31 U	42 U	14 U
BROMODICHLOROMETHANE	12 U	12 U	11 U	31 U	42 U	14 U
BROMOFORM	12 U	12 U	11 U	31 U	42 U	14 U
BROMOMETHANE	12 U	12 U	11 U	31 U	42 U	14 U
CARBON DISULFIDE	12 U	12 U	11 U	5 J	42 U	14 U
CARBON TETRACHLORIDE	12 U	12 U	11 U	31 U	42 U	14 U
CHLOROBENZENE	12 U	12 U	11 U	31 U	42 U	14 U
CHLOROETHANE	12 U	12 U	11 U	31 U	42 U	14 U
CHLOROFORM	12 U	12 U	11 U	31 U	42 U	14 U
CHLOROMETHANE	12 U	12 U	11 U	31 U	13 J	14 U
CIS-1,3-DICHLOROPROPENE	12 U	12 U	11 U	31 U	42 U	14 U
DIBROMOCHLOROMETHANE	12 U	12 U	11 U	31 U	42 U	14 U
DIMETHOXYMETHANE (FORMAL)	12 U		11 U	31 U	42 U	14 U
ETHYLBENZENE	12 U	12 U	11 U	31 U	42 U	14 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	39DP01	39DP01D	39DP02	39DP03	39DP04	39DP05
SAMPLE DATE:	09/01/92	09/01/92	09/01/92	09/01/92	09/01/92	09/01/92
LOCATION:	39DP01	39DP01	39DP02	39DP03	39DP04	39DP05
FIELD DUPLICATE OF:		39DP01				
VOLATILES (µg/kg)						
HEXACHLOROBUTADIENE	370 U	390 U	370 U	1100 U	1400 U	420 U
METHYLENE CHLORIDE	12 U	12 U	11 U	31 U	42 U	14 U
STYRENE	12 U	12 U	11 U	31 U	42 U	14 U
TETRACHLOROETHENE	12 U	12 U	11 U	31 U	42 U	14 U
TOLUENE	12 U	12 U	11 U	31 U	42 U	14 U
TRANS-1,3-DICHLOROPROPENE	12 U	12 U	11 U	31 U	42 U	14 U
TRICHLOROETHENE	12 U	12 U	11 U	31 U	42 U	14 U
VINYL CHLORIDE	12 U	12 U	11 U	31 U	42 U	14 U
XYLENES, TOTAL	12 U	12 U	11 U	31 U	42 U	14 U
SEMIVOLATILES (µg/kg)						
1,1-DIMETHYLHYDRAZINE	5400 U	5800 U	5600 U	61800	57500	5100 U
1,2,4-TRICHLOROBENZENE	370 U	390 U	370 U	1100 U	1400 U	420 U
1,2-DICHLOROBENZENE	370 U	390 U	370 U	1100 U	1400 U	420 U
1,3-DICHLOROBENZENE	370 U	390 U	370 U	1100 U	1400 U	420 U
1,4-DICHLOROBENZENE	370 U	390 U	370 U	1100 U	1400 U	420 U
2,2'-OXYBIS(1-CHLOROPROPANE)	370 U	390 U	370 U	1100 U	1400 U	420 U
2,4,5-TRICHLOROPHENOL	900 U	950 U	890 U	2700 U	3300 U	1000 U
2,4,6-TRICHLOROPHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U
2,4-DICHLOROPHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U
2,4-DIMETHYLPHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U
2,4-DINITROPHENOL	900 U	950 U	890 U	2700 U	3300 U	1000 U
2,4-DINITROTOLUENE	370 U	390 U	370 U	1100 U	1400 U	420 U
2,6-DINITROTOLUENE	370 U	390 U	370 U	1100 U	1400 U	420 U
2-CHLORONAPHTHALENE	370 U	390 U	370 U	1100 U	1400 U	420 U
2-CHLOROPHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U
2-METHYLNAPHTHALENE	370 U	390 U	370 U	1100 U	1400 U	420 U
2-METHYLPHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	39DP01 09/01/92 39DP01	39DP01D 09/01/92 39DP01 39DP01	39DP02 09/01/92 39DP02	39DP03 09/01/92 39DP03	39DP04 09/01/92 39DP04	39DP05 09/01/92 39DP05
SEMIVOLATILES (µg/kg)						
2-NITROANILINE	900 U	950 U	890 U	2700 U	3300 U	1000 U
2-NITROPHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U
3,3'-DICHLOROBENZIDINE	370 U	390 U	370 U	1100 U	1400 U	420 U
3-NITROANILINE	900 U	950 U	890 U	2700 U	3300 U	1000 U
4,6-DINITRO-2-METHYLPHENOL	900 U	950 U	890 U	2700 U	3300 U	1000 U
4-BROMOPHENYL PHENYL ETHER	370 U	390 U	370 U	1100 U	1400 U	420 U
4-CHLORO-3-METHYLPHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U
4-CHLOROANILINE	370 U	390 U	370 U	1100 U	1400 U	420 U
4-CHLOROPHENYL PHENYL ETHER	370 U	390 U	370 U	1100 U	1400 U	420 U
4-METHYLPHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U
4-NITROANILINE	900 U	950 U	890 U	2700 U	3300 U	1000 U
4-NITROPHENOL	900 U	950 U	890 U	2700 U	3300 U	1000 U
ACENAPHTHENE	370 U	390 U	370 U	1100 U	1400 U	420 U
ACENAPHTHYLENE	33 J	390 U	370 U	1100 U	1400 U	420 U
ANTHRACENE	27 J	64 J	370 U	1100 U	1400 U	420 U
BENZO(A)ANTHRACENE	82 J	39 J	370 U	1100 U	1400 U	65 J
BENZO(A)PYRENE	95 J	36 J	370 U	1100 U	1400 U	59 J
BENZO(B)FLUORANTHENE	54 J	24 J	370 U	1100 U	1400 U	45 J
BENZO(G,H,I)PERYLENE	62 J	28 J	370 U	1100 U	1400 U	40 J
BENZO(K)FLUORANTHENE	76 J	36 J	370 U	1100 U	1400 U	48 J
BIS(2-CHLOROETHOXY)METHANE	370 U	390 U	370 U	1100 U	1400 U	420 U
BIS(2-CHLOROETHYL)ETHER	370 U	390 U	370 U	1100 U	1400 U	420 U
BIS(2-ETHYLHEXYL)PHTHALATE	68 U	390 U	370 U	120 U	130 U	68 U
BUTYLBENZYL PHTHALATE	370 U	390 U	370 U	1100 U	1400 U	420 U
CARBAZOLE	370 U	390 U	370 U	1100 U	1400 U	420 U
CHRYSENE	98 J	49 J	370 U	64 J	1400 U	69 J
DI-N-BUTYL PHTHALATE	370 U	390 U	370 U	1100 U	1400 U	420 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	39DP01	39DP01D	39DP02	39DP03	39DP04	39DP05
SAMPLE DATE:	09/01/92	09/01/92	09/01/92	09/01/92	09/01/92	09/01/92
LOCATION:	39DP01	39DP01	39DP02	39DP03	39DP04	39DP05
FIELD DUPLICATE OF:		39DP01				
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	370 U	390 U	370 U	1100 U	1400 U	420 U
DIBENZO(A,H)ANTHRACENE	370 U	390 U	370 U	1100 U	1400 U	420 U
DIBENZOFURAN	370 U	390 U	370 U	1100 U	1400 U	420 U
DIETHYL PHTHALATE	370 U	390 U	370 U	1100 U	1400 U	420 U
DIMETHYL PHTHALATE	370 U	390 U	370 U	1100 U	1400 U	420 U
FLUORANTHENE	110 J	65 J	370 U	92 J	83 J	87 J
FLUORENE	370 U	390 U	370 U	1100 U	1400 U	420 U
HEXACHLOROBENZENE	370 U	390 U	370 U	1100 U	1400 U	420 U
HEXACHLOROCYCLOPENTADIENE	370 U	390 U	370 U	1100 U	1400 U	420 U
HEXACHLOROETHANE	370 U	390 U	370 U	1100 U	1400 U	420 U
INDENO(1,2,3-CD)PYRENE	49 J	21 J	370 U	1100 U	1400 U	33 J
ISOPHORONE	370 U	390 U	370 U	1100 U	1400 U	420 U
N-NITROSO-DI-N-PROPYLAMINE	370 U	390 U	370 U	1100 U	1400 U	420 U
N-NITROSODIPHENYLAMINE	370 U	390 U	370 U	230 J	1400 U	420 U
NAPHTHALENE	370 U	390 U	370 U	1100 U	1400 U	420 U
NITROBENZENE	370 U	390 U	370 U	1100 U	1400 U	420 U
PENTACHLOROPHENOL	900 U	950 U	890 U	2700 U	3300 U	1000 U
PHENANTHRENE	49 J	55 J	370 U	1100 U	1400 U	30 J
PHENOL	370 U	390 U	370 U	1100 U	1400 U	420 U
PYRENE	190 J	110 J	370 U	98 J	77 J	150 J
ENERGETICS (µg/kg)						
NITROCELLULOSE	17300 J	10200 J	9900 J	365000 J	209000 J	41600 J
NITROGUANIDINE	429	178	1880	88 U	88 U	88 U
METALS (mg/kg)						
ALUMINUM	381	470	352	9030	12600	916
ANTIMONY	5.1 U	6 U	5.6 U	17 U	20.5 U	6.5 U
ARSENIC	0.87 B	3.7	1.7 B	7.7	2.5 U	3.8

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	39DP01	39DP01D	39DP02	39DP03	39DP04	39DP05
SAMPLE DATE:	09/01/92	09/01/92	09/01/92	09/01/92	09/01/92	09/01/92
LOCATION:	39DP01	39DP01	39DP02	39DP03	39DP04	39DP05
FIELD DUPLICATE OF:		39DP01				
METALS (mg/kg)						
BARIUM	6.5 B	3.7 B	13.5 B	110 B	138 B	11.5 B
BERYLLIUM	0.2 B	0.24 B	0.22 B	0.99 B	1.2 B	0.26 U
CADMIUM	1	1.2 U	1.1 U	3.4 U	4.1 U	1.3 U
CALCIUM	417 B	577 B	191 B	3170 B	4200	407 B
CHROMIUM	6.3	12	2.8	21.6	27.5	6.9
COBALT	8.5 B	9.2 B	16.2	19.4 B	22.9 B	5.2 B
COPPER	11.4	11.2	2.2 U	27.7	35.9	5.4 B
CYANIDE	1.2 U	1.4 U	1.3 U	4.1 U	4.9 U	1.6 U
IRON	8560	7020	2320	22000	29800	3750
LEAD	45.2	89.6	10.8	45.9 J	46.6 J	12.5 J
MAGNESIUM	3260	1730 B	82.9 B	1790 B	25.2 B	290 B
MANGANESE	76 J	52.3 J	250 J	700 J	1050 J	71.7 J
MERCURY	0.1 U	0.12 U	0.1 U	2.2	9.5	0.12 U
NICKEL	31.1	59.8	3.4 U	17.7 B	24.2 B	3.9 U
POTASSIUM	188 U	220 U	207 U	968 B	1040 B	238 U
SELENIUM	1 U	1.2 U	1.1 U	3.4 U	4.1 U	1.3 U
SILVER	7.9 J	12.7 J	1.4 BJ	3.4 UJ	4.1 UJ	42.7 J
SODIUM	32.7 B	59 B	29.5 B	201 B	253 B	40.1 B
THALLIUM	0.61 U	0.72 U	0.67 U	2 U	2.5 U	0.78 U
VANADIUM	3.9 B	2.9 B	3.3 B	29.3 B	36.6 B	4 B
ZINC	117 J	76.5 J	27.3 J	158 J	191 J	42.6 J

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	39DP06 09/01/92 39DP06	41DP01 08/92 41DP01	41DP01D 08/92 41DP01 41DP01	41DP02 08/92 41DP02	41DP03 08/92 41DP03	41DP04 08/92 41DP04
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	43 U	14 U	23 U	38 U	40 U	42 U
1,1,2,2-TETRACHLOROETHANE	43 U	14 U	23 U	38 U	40 U	42 U
1,1,2-TRICHLOROETHANE	43 U	14 U	23 U	38 U	40 U	42 U
1,1-DICHLOROETHANE	43 U	14 U	23 U	38 U	40 U	42 U
1,1-DICHLOROETHENE	43 U	14 U	23 U	38 U	40 U	42 U
1,1-DIETHOXYETHANE (ACETAL)	43 U					
1,2-DICHLOROETHANE	43 U	14 U	23 U	38 U	40 U	42 U
1,2-DICHLOROETHENE (TOTAL)	43 U	14 U	23 U	38 U	40 U	42 U
1,2-DICHLOROPROPANE	43 U	14 U	23 U	38 U	40 U	42 U
2-BUTANONE	14 U	6 U	33 UJ	66 UJ	49 UJ	94 BJ
2-HEXANONE	43 U	14 U	23 U	38 U	40 U	42 U
4-METHYL-2-PENTANONE	43 U	14 U	23 U	38 U	40 U	42 U
ACETONE	110 U	55 UJ	130 UJ	220 BJ	520 BJ	350 B
BENZENE	43 U	14 U	23 U	38 U	40 U	42 U
BROMODICHLOROMETHANE	43 U	14 U	23 U	38 U	40 U	42 U
BROMOFORM	43 U	14 U	23 U	38 U	40 U	42 U
BROMOMETHANE	43 U	14 U	23 U	38 U	40 U	42 U
CARBON DISULFIDE	43 U	14 U	3 J	38 U	40 U	42 U
CARBON TETRACHLORIDE	43 U	14 U	23 U	38 U	40 U	42 U
CHLOROBENZENE	43 U	14 U	23 U	38 U	40 U	42 U
CHLOROETHANE	43 U	14 U	23 U	38 U	40 U	42 U
CHLOROFORM	43 U	14 U	23 U	38 U	40 U	42 U
CHLOROMETHANE	5 J	14 U	23 U	38 U	40 U	42 U
CIS-1,3-DICHLOROPROPENE	43 U	14 U	23 U	38 U	40 U	42 U
DIBROMOCHLOROMETHANE	43 U	14 U	23 U	38 U	40 U	42 U
DIMETHOXYMETHANE (FORMAL)	43 U					
ETHYLBENZENE	43 U	14 U	23 U	38 U	40 U	42 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	39DP06	41DP01	41DP01D	41DP02	41DP03	41DP04
SAMPLE DATE:	09/01/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	39DP06	41DP01	41DP01	41DP02	41DP03	41DP04
FIELD DUPLICATE OF:			41DP01			
VOLATILES (µg/kg)						
HEXACHLOROBUTADIENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
METHYLENE CHLORIDE	7 U	14 U	23 U	38 U	40 U	42 U
STYRENE	43 U	14 U	23 U	38 U	40 U	42 U
TETRACHLOROETHENE	43 U	14 U	23 U	38 U	40 U	42 U
TOLUENE	43 U	14 U	23 U	38 U	40 U	42 U
TRANS-1,3-DICHLOROPROPENE	43 U	14 U	23 U	38 U	40 U	42 U
TRICHLOROETHENE	43 U	14 U	23 U	38 U	40 U	42 U
VINYL CHLORIDE	43 U	14 U	23 U	38 U	40 U	42 U
XYLENES, TOTAL	43 U	14 U	23 U	38 U	40 U	42 U
SEMIVOLATILES (µg/kg)						
1,1-DIMETHYLHYDRAZINE	85500					
1,2,4-TRICHLOROBENZENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
1,2-DICHLOROBENZENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
1,3-DICHLOROBENZENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
1,4-DICHLOROBENZENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2,2'-OXYBIS(1-CHLOROPROPANE)	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2,4,5-TRICHLOROPHENOL	3300 U	2000 U	1500 U	2900 U	3000 U	3000 U
2,4,6-TRICHLOROPHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2,4-DICHLOROPHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2,4-DIMETHYLPHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2,4-DINITROPHENOL	3300 U	2000 U	1500 U	2900 U	3000 U	3000 U
2,4-DINITROTOLUENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2,6-DINITROTOLUENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2-CHLORONAPHTHALENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2-CHLOROPHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2-METHYLNAPHTHALENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
2-METHYLPHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	39DP06	41DP01	41DP01D	41DP02	41DP03	41DP04
SAMPLE DATE:	09/01/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	39DP06	41DP01	41DP01	41DP02	41DP03	41DP04
FIELD DUPLICATE OF:			41DP01			
SEMIVOLATILES (µg/kg)						
2-NITROANILINE	3300 U	2000 U	1500 U	2900 U	3000 U	3000 U
2-NITROPHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U
3,3'-DICHLOROBENZIDINE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
3-NITROANILINE	3300 U	2000 U	1500 U	2900 U	3000 U	3000 U
4,6-DINITRO-2-METHYLPHENOL	3300 U	2000 U	1500 U	2900 U	3000 U	3000 U
4-BROMOPHENYL PHENYL ETHER	1400 U	840 U	630 U	1200 U	1200 U	1200 U
4-CHLORO-3-METHYLPHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U
4-CHLOROANILINE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
4-CHLOROPHENYL PHENYL ETHER	1400 U	840 U	630 U	1200 U	1200 U	1200 U
4-METHYLPHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U
4-NITROANILINE	3300 U	2000 U	1500 U	2900 U	3000 U	3000 U
4-NITROPHENOL	3300 U	2000 U	1500 U	2900 U	3000 U	3000 U
ACENAPHTHENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
ACENAPHTHYLENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
ANTHRACENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
BENZO(A)ANTHRACENE	1400 U	240 J	78 J	1200 U	1200 U	210 J
BENZO(A)PYRENE	1400 U	170 J	79 J	1200 U	1200 UJ	140 J
BENZO(B)FLUORANTHENE	1400 U	180 J	120 J	1200 U	1200 UJ	320 J
BENZO(G,H,I)PERYLENE	1400 U	840 U	630 U	1200 U	1200 UJ	1200 UJ
BENZO(K)FLUORANTHENE	1400 U	170 J	630 U	1200 U	1200 UJ	1200 UJ
BIS(2-CHLOROETHOXY)METHANE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
BIS(2-CHLOROETHYL)ETHER	1400 U	840 U	630 U	1200 U	1200 U	1200 U
BIS(2-ETHYLHEXYL)PHTHALATE	190 U	100 J	630 U	1200 U	140 U	170 U
BUTYLBENZYL PHTHALATE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
CARBAZOLE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
CHRYSENE	1400 U	210 J	93 J	1200 U	1200 U	250 J
DI-N-BUTYL PHTHALATE	1400 U	840 U	630 U	1200 U	1200 U	1200 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	39DP06 09/01/92 39DP06	41DP01 08/92 41DP01	41DP01D 08/92 41DP01 41DP01	41DP02 08/92 41DP02	41DP03 08/92 41DP03	41DP04 08/92 41DP04
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	1400 U	840 U	630 U	1200 U	1200 UJ	1200 UJ
DIBENZO(A,H)ANTHRACENE	1400 U	840 U	630 U	1200 U	1200 UJ	1200 UJ
DIBENZOFURAN	1400 U	840 U	630 U	1200 U	1200 U	1200 U
DIETHYL PHTHALATE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
DIMETHYL PHTHALATE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
FLUORANTHENE	1400 U	400 J	160 J	1200 U	1200 U	590 J
FLUORENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
HEXACHLOROBENZENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
HEXACHLOROCYCLOPENTADIENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
HEXACHLOROETHANE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
INDENO(1,2,3-CD)PYRENE	1400 U	840 U	630 U	1200 U	1200 UJ	1200 UJ
ISOPHORONE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
N-NITROSO-DI-N-PROPYLAMINE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
N-NITROSODIPHENYLAMINE	1400 U	130 J	120 J	1200 U	1200 U	1200 U
NAPHTHALENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
NITROBENZENE	1400 U	840 U	630 U	1200 U	1200 U	1200 U
PENTACHLOROPHENOL	3300 U	2000 U	1500 U	2900 U	3000 U	3000 U
PHENANTHRENE	1400 U	160 J	630 U	1200 U	1200 U	130 J
PHENOL	1400 U	840 U	630 U	1200 U	1200 U	1200 U
PYRENE	78 J	350 J	150 J	1200 U	1200 U	530 J
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD		3.8 U	3.9 JP	12 U	12 U	3.1 JP
4,4'-DDE		3 U	1.8 U	12 U	12 U	12 U
4,4'-DDT		14 U	6.3	12 U	3.3 JP	5.1 J
ALDRIN		4.3 U	3.2 U	6 U	6.3 U	6.2 U
ALPHA-BHC		4.3 U	3.2 U	6 U	6.3 U	6.2 U
ALPHA-CHLORDANE		4.3 U	3.2 U	6 U	6.3 U	6.2 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	39DP06 09/01/92 39DP06	41DP01 08/92 41DP01	41DP01D 08/92 41DP01 41DP01	41DP02 08/92 41DP02	41DP03 08/92 41DP03	41DP04 08/92 41DP04
PESTICIDES/PCBs (µg/kg)						
AROCLOR-1016		84 U	63 U	120 U	120 U	120 U
AROCLOR-1221		170 U	130 U	240 U	250 U	240 U
AROCLOR-1232		84 U	63 U	120 U	120 U	120 U
AROCLOR-1242		84 U	63 U	120 U	120 U	120 U
AROCLOR-1248		84 U	63 U	120 U	120 U	120 U
AROCLOR-1254		84 U	63 U	120 U	120 U	120 U
AROCLOR-1260		84 U	63 U	120 U	120 U	120 U
BETA-BHC		4.3 U	3.2 U	6 U	6.3 U	6.2 U
DELTA-BHC		4.3 U	3.2 U	6 U	6.3 U	6.2 U
DIELDRIN		8.4 U	6.3 U	12 U	12 U	12 U
ENDOSULFAN I		4.3 U	3.2 U	6 U	6.3 U	6.2 U
ENDOSULFAN II		8.4 U	6.3 U	12 U	12 U	12 U
ENDOSULFAN SULFATE		8.4 U	6.3 U	12 U	12 U	12 U
ENDRIN		1.9 U	3.3 U	12 U	12 U	12 U
ENDRIN ALDEHYDE		8.4 U	6.3 U	12 U	12 U	12 U
ENDRIN KETONE		8.4 U	6.3 U	12 U	12 U	12 U
GAMMA-BHC (LINDANE)		4.3 U	3.2 U	6 U	6.3 U	6.2 U
GAMMA-CHLORDANE		1.2 U	3.2 U	6 U	6.3 U	6.2 U
HEPTACHLOR		4.3 U	3.2 U	6 U	6.3 U	6.2 U
HEPTACHLOR EPOXIDE		4.3 U	3.2 U	6 U	6.3 U	6.2 U
METHOXYCHLOR		43 U	32 U	60 U	63 U	62 U
TOXAPHENE		430 U	320 U	600 U	630 U	620 U
ENERGETICS (µg/kg)						
NITROCELLULOSE	227000 J					
NITROGUANIDINE	88 U					
METALS (mg/kg)						
ALUMINUM	8410	6780	7930	11600	12900	14100

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	39DP06	41DP01	41DP01D	41DP02	41DP03	41DP04
SAMPLE DATE:	09/01/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	39DP06	41DP01	41DP01	41DP02	41DP03	41DP04
FIELD DUPLICATE OF:			41DP01			
METALS (mg/kg)						
ANTIMONY	21.2 U	12.9 UJ	9.7 UJ	18.1 UJ	18.6 UJ	18.4 UJ
ARSENIC	6.8 B	4.4 BJ	5.7 J	4.1 BJ	8.8 J	4.5 J
BARIUM	113 B	73.3 B	72.2 B	126 B	121 B	132 B
BERYLLIUM	0.85 U	0.83 B	0.86 B	1.2 B	1.1 B	1 B
CADMIUM	4.2 U	2.6 U	2.4	3.6 U	3.7 U	3.7 U
CALCIUM	3060 B	1780 B	1680 B	3020 B	3040 B	3280 B
CHROMIUM	18.7	17.6	17.4	28.4	28.8	28.6
COBALT	16.7 B	18.5 B	16.5 B	22.3 B	20.7 B	21.3 B
COPPER	29.6	30.8	25.1	32.3	38.1	32.8
CYANIDE	5.2 U	3 U	2 U	3.9 U	4.6 U	3.7 U
IRON	22200	16700	16800	27900	27000	29300
LEAD	38 J	36.4 J	27.2 J	35.3 J	43.3 J	31.5 J
MAGNESIUM	1780 B	1260 B	1310 B	2260 B	2470 B	2470 B
MANGANESE	933 J	447 J	366 J	986 J	924 J	1150 J
MERCURY	0.42 U	0.26 U	0.19 U	0.36 U	0.37 U	0.45
NICKEL	12.7 U	15 B	14 B	17.4 B	17.8 B	20.6 B
POTASSIUM	857 B	988 B	848 B	1330 B	1660 B	1800 B
SELENIUM	4.2 U	1.7 J	0.78 UJ	1.4 UJ	1.5 UJ	1.5 UJ
SILVER	4.2 UJ	3.8 B	3.9	5.1 B	5.3 B	4.5 B
SODIUM	202 B	150 B	119 B	267 B	337 B	270 B
THALLIUM	2.5 U	7.8 UJ	5.8 UJ	2.2 UJ	11.2 UJ	2.2 UJ
VANADIUM	26.4 B	28	27.3	35.9 B	38.6	41.7
ZINC	150 J	127	128	172	171	177
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS		25.7 U	19.2 U	39.7 U	62	215

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41DP05 08/92 41DP05	41DP06 08/92 41DP06	41DP07 08/92 41DP07	41DP08 08/92 41DP08	41DP09 08/92 41DP09	41DP10 08/92 41DP10
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
1,1,2,2-TETRACHLOROETHANE	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
1,1,2-TRICHLOROETHANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
1,1-DICHLOROETHANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
1,1-DICHLOROETHENE	43 U	37 U	14 UJ	42 U	43 U	4000 U
1,2-DICHLOROETHANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
1,2-DICHLOROETHENE (TOTAL)	43 U	37 U	14 UJ	42 U	43 U	4000 U
1,2-DICHLOROPROPANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
2-BUTANONE	120 BJ	89 B	26 UJ	71 BJ	21 UJ	1700 U
2-HEXANONE	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
4-METHYL-2-PENTANONE	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
ACETONE	5800 DBE	430 B	88 UJ	1700 DBJ	94 UJ	4500 U
BENZENE	43 U	37 U	14 UJ	42 U	43 U	4000 U
BROMODICHLOROMETHANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
BROMOFORM	43 U	37 U	14 UJ	42 U	43 U	4000 U
BROMOMETHANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
CARBON DISULFIDE	43 U	37 U	14 UJ	6 J	43 U	4000 U
CARBON TETRACHLORIDE	43 U	37 U	14 UJ	42 U	43 U	4000 U
CHLOROBENZENE	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
CHLOROETHANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
CHLOROFORM	43 U	37 U	14 UJ	42 U	43 U	4000 U
CHLOROMETHANE	43 U	37 U	14 UJ	17 J	16 J	4000 U
CIS-1,3-DICHLOROPROPENE	43 U	37 U	14 UJ	42 U	43 U	4000 U
DIBROMOCHLOROMETHANE	43 U	37 U	14 UJ	42 U	43 U	4000 U
ETHYLBENZENE	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
HEXACHLOROBUTADIENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
METHYLENE CHLORIDE	43 U	37 U	14 UJ	42 U	43 U	650 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41DP05 08/92 41DP05	41DP06 08/92 41DP06	41DP07 08/92 41DP07	41DP08 08/92 41DP08	41DP09 08/92 41DP09	41DP10 08/92 41DP10
VOLATILES (µg/kg)						
STYRENE	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
TETRACHLOROETHENE	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
TOLUENE	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
TRANS-1,3-DICHLOROPROPENE	43 U	37 U	14 UJ	42 U	43 U	4000 U
TRICHLOROETHENE	43 U	37 U	14 UJ	42 U	43 U	4000 U
VINYL CHLORIDE	43 U	37 U	14 UJ	42 U	43 U	4000 U
XYLENES, TOTAL	43 U	37 U	14 UJ	42 U	43 UJ	4000 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
1,2-DICHLOROBENZENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
1,3-DICHLOROBENZENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
1,4-DICHLOROBENZENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2,2'-OXYBIS(1-CHLOROPROPANE)	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2,4,5-TRICHLOROPHENOL	2800 U	2900 U	2900 U	2900 U	2900 U	2300 U
2,4,6-TRICHLOROPHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2,4-DICHLOROPHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2,4-DIMETHYLPHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2,4-DINITROPHENOL	2800 U	2900 U	2900 U	2900 U	2900 U	2300 U
2,4-DINITROTOLUENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2,6-DINITROTOLUENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2-CHLORONAPHTHALENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2-CHLOROPHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2-METHYLNAPHTHALENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2-METHYLPHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
2-NITROANILINE	2800 U	2900 U	2900 U	2900 U	2900 U	2300 U
2-NITROPHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
3,3'-DICHLOROBENZIDINE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41DP05 08/92 41DP05	41DP06 08/92 41DP06	41DP07 08/92 41DP07	41DP08 08/92 41DP08	41DP09 08/92 41DP09	41DP10 08/92 41DP10
SEMIVOLATILES (µg/kg)						
3-NITROANILINE	2800 U	2900 U	2900 U	2900 U	2900 U	2300 U
4,6-DINITRO-2-METHYLPHENOL	2800 U	2900 U	2900 U	2900 U	2900 U	2300 U
4-BROMOPHENYL PHENYL ETHER	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
4-CHLORO-3-METHYLPHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
4-CHLOROANILINE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
4-CHLOROPHENYL PHENYL ETHER	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
4-METHYLPHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
4-NITROANILINE	2800 U	2900 U	2900 U	2900 U	2900 U	2300 U
4-NITROPHENOL	2800 U	2900 U	2900 U	2900 U	2900 U	2300 U
ACENAPHTHENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
ACENAPHTHYLENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
ANTHRACENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
BENZO(A)ANTHRACENE	1100 U	1200 U	1200 U	1200 U	1200 U	100 J
BENZO(A)PYRENE	1100 U	1200 UJ	1200 U	1200 U	1200 UJ	970 U
BENZO(B)FLUORANTHENE	1100 U	1200 UJ	1200 U	1200 U	1200 UJ	970 U
BENZO(G,H,I)PERYLENE	1100 U	1200 UJ	1200 U	1200 U	1200 UJ	970 U
BENZO(K)FLUORANTHENE	1100 U	1200 UJ	1200 U	1200 U	1200 UJ	970 U
BIS(2-CHLOROETHOXY)METHANE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
BIS(2-CHLOROETHYL)ETHER	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
BIS(2-ETHYLHEXYL)PHTHALATE	1100 U	1200 U	160 U	1200 U	140 U	110 U
BUTYLBENZYL PHTHALATE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
CARBAZOLE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
CHRYSENE	120 J	1200 U	1200 U	1200 U	1200 U	140 J
DI-N-BUTYL PHTHALATE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
DI-N-OCTYL PHTHALATE	1100 U	1200 UJ	1200 U	1200 U	1200 UJ	970 U
DIBENZO(A,H)ANTHRACENE	1100 U	1200 UJ	1200 U	1200 U	1200 UJ	970 U
DIBENZOFURAN	1100 U	1200 U	1200 U	1200 U	1200 U	970 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41DP05 08/92 41DP05	41DP06 08/92 41DP06	41DP07 08/92 41DP07	41DP08 08/92 41DP08	41DP09 08/92 41DP09	41DP10 08/92 41DP10
SEMIVOLATILES (µg/kg)						
DIETHYL PHTHALATE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
DIMETHYL PHTHALATE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
FLUORANTHENE	240 J	1200 U	1200 U	1200 U	1200 U	240 J
FLUORENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
HEXACHLOROBENZENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
HEXACHLOROCYCLOPENTADIENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
HEXACHLOROETHANE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
INDENO(1,2,3-CD)PYRENE	1100 U	1200 UJ	1200 U	1200 U	1200 UJ	970 U
ISOPHORONE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
N-NITROSO-DI-N-PROPYLAMINE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
N-NITROSODIPHENYLAMINE	620 J	1200 U	1200 U	1200 U	1200 U	430 J
NAPHTHALENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
NITROBENZENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
PENTACHLOROPHENOL	2800 U	2900 U	2900 U	2900 U	2900 U	2300 U
PHENANTHRENE	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
PHENOL	1100 U	1200 U	1200 U	1200 U	1200 U	970 U
PYRENE	210 J	1200 U	1200 U	1200 U	1200 U	220 J
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.6 JP	12 U	12 U	12 U	12 U	7.8 JP
4,4'-DDE	11 U	12 U	3.3 JP	2.4 JP	2.4 JP	4.1 JP
4,4'-DDT	4.4 JP	12 U	3 JP	11 J	12 U	8.2 JP
ALDRIN	5.8 U	6 U	6 U	6 U	6 U	5 U
ALPHA-BHC	5.8 U	6 U	6 U	6 U	6 U	5 U
ALPHA-CHLORDANE	5.8 U	6 U	6 U	6 U	6 U	5 U
AROCLOR-1016	110 U	120 U	120 U	120 U	120 U	97 U
AROCLOR-1221	230 U	240 U	240 U	240 U	240 U	200 U
AROCLOR-1232	110 U	120 U	120 U	120 U	120 U	97 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41DP05 08/92 41DP05	41DP06 08/92 41DP06	41DP07 08/92 41DP07	41DP08 08/92 41DP08	41DP09 08/92 41DP09	41DP10 08/92 41DP10
PESTICIDES/PCBs (µg/kg)						
AROCLOR-1242	110 U	120 U	120 U	120 U	120 U	97 U
AROCLOR-1248	110 U	120 U	120 U	120 U	120 U	97 U
AROCLOR-1254	110 U	120 U	120 U	120 U	120 U	97 U
AROCLOR-1260	110 U	120 U	120 U	120 U	120 U	97 U
BETA-BHC	5.8 U	6 U	6 U	6 U	6 U	5 U
DELTA-BHC	5.8 U	6 U	6 U	6 U	6 U	5 U
DIELDRIN	11 U	12 U	12 U	12 U	12 U	9.7 U
ENDOSULFAN I	5.8 U	6 U	6 U	6 U	6 U	5 U
ENDOSULFAN II	11 U	12 U	12 U	12 U	12 U	9.7 U
ENDOSULFAN SULFATE	11 U	12 U	12 U	12 U	12 U	9.7 U
ENDRIN	2.7 JP	12 U	12 U	12 U	12 U	2.6 J
ENDRIN ALDEHYDE	11 U	12 U	12 U	12 U	12 U	9.7 U
ENDRIN KETONE	11 U	12 U	12 U	12 U	12 U	9.7 U
GAMMA-BHC (LINDANE)	5.8 U	6 U	6 U	6 U	6 U	5 U
GAMMA-CHLORDANE	5.8 U	6 U	6 U	1.5 J	1.4 JP	1.1 JP
HEPTACHLOR	5.8 U	6 U	6 U	6 U	6 U	5 U
HEPTACHLOR EPOXIDE	5.8 U	6 U	6 U	6 U	6 U	5 U
METHOXYCHLOR	58 U	60 U	60 U	60 U	60 U	50 U
TOXAPHENE	580 U	600 U	600 U	600 U	600 U	500 U
METALS (mg/kg)						
ALUMINUM	17400	13700	12900	17400	20500	11000
ANTIMONY	17.2 UJ	17.7 UJ	17.6 UJ	18.1 UJ	17.7 UJ	14.7 UJ
ARSENIC	7.3 J	3.2 J	5.8 J	4.6 J	5.1 J	5 J
BARIUM	143	123 B	140 B	154	182	125
BERYLLIUM	1.2 B	0.98 B	1.2 B	1.2 B	1.6 B	1.2 B
CADMIUM	3.4 U	3.5 U	3.5 U	3.6 U	3.8	2.9 U
CALCIUM	3850	2860 B	3540	3790	3920	2850 B

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	41DP05 08/92 41DP05	41DP06 08/92 41DP06	41DP07 08/92 41DP07	41DP08 08/92 41DP08	41DP09 08/92 41DP09	41DP10 08/92 41DP10
METALS (mg/kg)						
CHROMIUM	36.4	31.1	33.4	37.2	43.3	26.5
COBALT	25.3 B	20.9 B	25.1 B	25.1 B	30.4 B	23.3 B
COPPER	39.9	31.4	42.2	36.6	44.5	40.3
CYANIDE	3.4 U	4.4 U	4.4 U	4.5 U	4.1 U	3.4 U
IRON	32500	27500	32700	33000	38200	26800
LEAD	38.1 J	31.4 J	42.3 J	42.3 J	105 J	46.7 J
MAGNESIUM	2730 B	2420 B	2680 B	2960 B	3400 B	2120 B
MANGANESE	1150 J	1020 J	1300 J	1010 J	1240 J	581 J
MERCURY	0.62	0.36	0.36	0.36 U	0.36	0.78
NICKEL	25.5 B	16.3 B	23.9 B	26.1 B	31.1	21.7 B
POTASSIUM	1890 B	1440 B	1270 B	1460 B	2240 B	1060 B
SELENIUM	1.4 UJ	1.4 UJ	1.4 UJ	1.4 UJ	1.4 UJ	1.2 UJ
SILVER	7.8	4.3 B	6.3 B	5.1 B	8.7	6.3
SODIUM	269 B	328 B	384 B	298 B	339 B	245 B
THALLIUM	2.1 UJ	10.6 UJ	10.6 UJ	10.9 UJ	10.6 UJ	1.8 UJ
VANADIUM	45	39.4	43.4	45.9	53.6	55
ZINC	189	163	213	199	253	201
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	119	43.9	50.1	39	34.9 U	63.6

APPENDIX H.1.2

SITE 42 HISTORICAL ANALYTICAL DATABASE

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42SS-10	42SS-10D	42SS-11	42SS-14	42SS-15	42SS-7
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	03/92	03/92	03/92	03/92	03/92	03/92
LOCATION:	42SS10	42SS10	42SS11	42SS14	42SS15	42SS7
FIELD DUPLICATE OF:		42SS-10				
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	12 U	12 U	12 U	12 U	13 U	12 U
ACETONE	12 U	12 U	12 U	12 U	13 U	12 U
CHLOROBENZENE	12 U	12 U	12 U	12 U	13 U	12 U
ETHYLBENZENE	12 U	12 U	12 U	12 U	13 U	12 U
METHYLENE CHLORIDE	12 U	12 U	12 U	12 U	13 U	12 U
TOLUENE	12 U	12 U	12 U	2 J	3 J	12 U
TRICHLOROETHENE	12 U	12 U	12 U	12 U	13 U	12 U
XYLENES, TOTAL	12 U	12 U	12 U	12 U	13 U	12 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	410 U	410 U	400 U	390 U	120 J	410 U
2-METHYLNAPHTHALENE	410 U	410 U	400 U	390 U	420 U	410 U
4-METHYLPHENOL	410 U	410 U	400 U	390 U	140 J	410 U
ACENAPHTHENE	410 U	410 U	400 U	390 U	420 U	410 U
BENZO(A)ANTHRACENE	410 U	410 U	400 U	390 U	420 U	410 U
BENZO(A)PYRENE	410 U	410 U	400 U	390 U	420 U	410 U
BENZO(B)FLUORANTHENE	410 U	410 U	400 U	390 U	420 U	410 U
BENZO(G,H,I)PERYLENE	410 U	410 U	400 U	390 U	420 U	410 U
BENZO(K)FLUORANTHENE	410 U	410 U	400 U	390 U	420 U	410 U
BIS(2-ETHYLHEXYL)PHTHALATE	6400 B	8900 B	3700 B	390 U	420 U	6200 B
CHRYSENE	410 U	410 U	400 U	390 U	420 U	410 U
DI-N-BUTYL PHTHALATE	410 U	410 U	400 U	390 U	420 U	410 U
DI-N-OCTYL PHTHALATE	410 U	410 U	400 U	390 U	420 U	410 U
DIBENZOFURAN	410 U	410 U	400 U	390 U	420 U	410 U
DIETHYL PHTHALATE	410 U	410 U	400 U	390 U	420 U	410 U
FLUORANTHENE	410 U	410 U	400 U	390 U	420 U	410 U
FLUORENE	410 U	410 U	400 U	390 U	420 U	410 U

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42SS-10	42SS-10D	42SS-11	42SS-14	42SS-15	42SS-7
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	03/92	03/92	03/92	03/92	03/92	03/92
LOCATION:	42SS10	42SS10	42SS11	42SS14	42SS15	42SS7
FIELD DUPLICATE OF:		42SS-10				
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	410 U	410 U	400 U	390 U	420 U	410 U
NAPHTHALENE	410 U	410 U	400 U	390 U	420 U	410 U
PHENANTHRENE	410 U	410 U	400 U	390 U	420 U	410 U
PYRENE	410 U	410 U	400 U	390 U	420 U	410 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4.1 U	4.1 U	4 U	3.9 U	4.2 U	4.1 U
4,4'-DDE	4.1 U	4.1 U	4 U	3.9 U	4.2 U	4.1 U
4,4'-DDT	4.9	4.1 U	5.2 P	3.9 U	4.2 U	8.8
ALPHA-CHLORDANE	2 U	2 U	2 U	2 U	2.1 U	2 U
BETA-BHC	2 U	2 U	2 U	2 U	2.1 U	2 U
DELTA-BHC	2 U	2 U	2 U	2 U	2.1 U	2 U
DIELDRIN	4.1 U	4.1 U	4 U	3.9 U	4.2 U	4.1 U
ENDOSULFAN II	4.1 U	4.1 U	4 U	3.9 U	4.2 U	4.1 U
ENDOSULFAN SULFATE	4.1 U	4.1 U	4 U	3.9 U	4.2 U	4.1 U
ENDRIN	4.1 U	4.1 U	4 U	3.9 U	4.2 U	4.1 U
GAMMA-BHC (LINDANE)	2 U	2 U	2 U	2 U	2.1 U	2 U
GAMMA-CHLORDANE	2 U	2 U	2 U	2 U	2.1 U	2 U
HEPTACHLOR EPOXIDE	2 U	2 U	2 U	2 U	2.1 U	2 U
METHOXYCHLOR	20 U	20 U	20 U	20 U	21 U	20 U

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42SS-8	42SS-9				
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'				
SAMPLE DATE:	03/92	03/92				
LOCATION:	42SS8	42SS9				
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	11 U	11 U				
ACETONE	11 U	11 U				
CHLOROBENZENE	11 U	11 U				
ETHYLBENZENE	11 U	11 U				
METHYLENE CHLORIDE	11 U	11 U				
TOLUENE	11 U	11 U				
TRICHLOROETHENE	11 U	11 U				
XYLENES, TOTAL	11 U	11 U				
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	380 U	370 U				
2-METHYLNAPHTHALENE	380 U	370 U				
4-METHYLPHENOL	380 U	370 U				
ACENAPHTHENE	380 U	370 U				
BENZO(A)ANTHRACENE	380 U	370 U				
BENZO(A)PYRENE	380 U	370 U				
BENZO(B)FLUORANTHENE	380 U	370 U				
BENZO(G,H,I)PERYLENE	380 U	370 U				
BENZO(K)FLUORANTHENE	380 U	370 U				
BIS(2-ETHYLHEXYL)PHTHALATE	7100 B	6300 B				
CHRYSENE	380 U	370 U				
DI-N-BUTYL PHTHALATE	380 U	370 U				
DI-N-OCTYL PHTHALATE	380 U	370 U				
DIBENZOFURAN	380 U	370 U				
DIETHYL PHTHALATE	380 U	370 U				
FLUORANTHENE	380 U	370 U				
FLUORENE	380 U	370 U				

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42SS-8	42SS-9				
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'				
SAMPLE DATE:	03/92	03/92				
LOCATION:	42SS8	42SS9				
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	380 U	370 U				
NAPHTHALENE	380 U	370 U				
PHENANTHRENE	380 U	370 U				
PYRENE	380 U	370 U				
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.8 U	3.7 U				
4,4'-DDE	3.8 U	3.7 U				
4,4'-DDT	23 P	10 P				
ALPHA-CHLORDANE	1.9 U	1.9 U				
BETA-BHC	1.9 U	1.9 U				
DELTA-BHC	1.9 U	1.9 U				
DIELDRIN	3.8 U	3.7 U				
ENDOSULFAN II	3.8 U	3.7 U				
ENDOSULFAN SULFATE	3.8 U	3.7 U				
ENDRIN	3.8 U	3.7 U				
GAMMA-BHC (LINDANE)	1.9 U	1.9 U				
GAMMA-CHLORDANE	1.9 U	1.9 U				
HEPTACHLOR EPOXIDE	1.9 U	1.9 U				
METHOXYCHLOR	19 U	19 U				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B1-2	42B1-6	42B10-2	42B10-3	42B10-4	42B11-2
DEPTH (feet):	4.0 - 6.0'	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	14.0 - 16.0'	4.0 - 6.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B1	42B1	42B10	42B10	42B10	42B11
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U	10 U	10 U
ACETONE	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	9	10 U	8	10 U	8	10 U
TOLUENE	10 U	10 U	10 U	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10 U	10 U	10 U	7
XYLENES, TOTAL	10 U	10 U	10 U	10 U	10 U	10 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U	330 U	330 U
2-METHYLNAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
4-METHYLPHENOL	330 U	330 U	330 U	330 U	330 U	330 U
ACENAPHTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)ANTHRACENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(B)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(G,H,I)PERYLENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(K)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
CHRYSENE	330 U	330 U	330 U	330 U	330 U	330 U
DI-N-BUTYL PHTHALATE	215	220	330 U	330 U	330 U	330 U
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
DIBENZOFURAN	330 U	330 U	330 U	330 U	330 U	330 U
DIETHYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORENE	330 U	330 U	330 U	330 U	330 U	330 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B1-2	42B1-6	42B10-2	42B10-3	42B10-4	42B11-2
DEPTH (feet):	4.0 - 6.0'	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	14.0 - 16.0'	4.0 - 6.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B1	42B1	42B10	42B10	42B10	42B11
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
NAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
PHENANTHRENE	330 U	330 U	330 U	330 U	330 U	330 U
PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDE	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDT	3.3 U	3.3 U	5	3.3 U	3.3 U	3.3 U
ALPHA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
BETA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DELTA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DIELDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN II	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN SULFATE	3.3 U	3.3 U	18	13	12	14
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
GAMMA-BHC (LINDANE)	1.7 U	1.7 U	4	1.7 U	1.7 U	1.7 U
GAMMA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
METHOXYCHLOR	17 U	17 U	17 U	17 U	17 U	17 U
METALS (mg/kg)						
ALUMINUM	10200	5260	10300	3600	7640	9840
ARSENIC	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
BARIUM	98.0	1.0 U	82.0	56.0	92.0	34.0
BERYLLIUM	1.0 U	1.0 U	0.5 U	0.5 U	0.5 U	0.5 U
CADMIUM	1.0 U	1.0 U	0.5 U	0.5 U	0.5 U	1.0
CALCIUM	1000 U	1000 U	500 U	500 U	896	500 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B1-2	42B1-6	42B10-2	42B10-3	42B10-4	42B11-2
DEPTH (feet):	4.0 - 6.0'	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	14.0 - 16.0'	4.0 - 6.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B1	42B1	42B10	42B10	42B10	42B11
FIELD DUPLICATE OF:						
METALS (mg/kg)						
CHROMIUM	10.0	6.0	10.0	6.0	13.0	2.0
COBALT	18.0	1.0 U	13.0	5.0 U	5.0 U	5.0 U
COPPER	10.0	1.0 U	2.5 U	2.5 U	2.5 U	14.0
CYANIDE	0.5 U	0.5 U	0.5	0.5 U	0.5 U	0.5 U
IRON	46500	2200	11800	7540	10400	65200
LEAD	6.0	6.0	7.0	5.0	10.0	11.0
MAGNESIUM	1700	1000 U	725	500 U	1160	865
MANGANESE	34.0	75.0	261	114	84.0	37.0
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	27.0	2.0 U	8.0	4.0 U	8.0	8.0
POTASSIUM	1000 U	1000 U	500 U	500 U	958	675
SILVER	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
SODIUM	1000 U	1000 U	500 U	500 U	500 U	500 U
VANADIUM	25.0	21.0	20.0	10.0	21.0	8.0
ZINC	60.0	10.0	24.0	14.0	25.0	30.0

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B11-3	42B11-3D	42B11-5	42B11-6	42B12-4	42B12-5
DEPTH (feet):	9.0 - 11.0'	9.0 - 11.0'	19.0 - 21.0'	24.0 - 26.0'	14.0 - 16.0'	19.0 - 21.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B11	42B11	42B11	42B11	42B12	42B12
FIELD DUPLICATE OF:		42B11-3				
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U	10 U	10 U
ACETONE	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U	10 U	10 U	10
TOLUENE	10 U	10 U	10 U	10 U	10 U	10 U
TRICHLOROETHENE	6	10 U	10 U	116	10 U	10 U
XYLENES, TOTAL	10 U	10 U	10 U	10 U	10 U	10 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U	330 U	330 U
2-METHYLNAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
4-METHYLPHENOL	330 U	330 U	330 U	330 U	330 U	330 U
ACENAPHTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)ANTHRACENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(B)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(G,H,I)PERYLENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(K)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
CHRYSENE	330 U	330 U	330 U	330 U	330 U	330 U
DI-N-BUTYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
DIBENZOFURAN	330 U	330 U	330 U	330 U	330 U	330 U
DIETHYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORENE	330 U	330 U	330 U	330 U	330 U	330 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B11-3	42B11-3D	42B11-5	42B11-6	42B12-4	42B12-5
DEPTH (feet):	9.0 - 11.0'	9.0 - 11.0'	19.0 - 21.0'	24.0 - 26.0'	14.0 - 16.0'	19.0 - 21.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B11	42B11	42B11	42B11	42B12	42B12
FIELD DUPLICATE OF:		42B11-3				
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
NAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
PHENANTHRENE	330 U	330 U	330 U	330 U	330 U	330 U
PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDE	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	8
ALPHA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
BETA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DELTA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DIELDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN II	3.3 U	3.3 U	3.3 U	5	7	3.3 U
ENDOSULFAN SULFATE	13	11	15	17	3.3 U	16
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
GAMMA-BHC (LINDANE)	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
GAMMA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	17 U
METHOXYCHLOR	17 U	17 U	17 U	17 U	17 U	17 U
METALS (mg/kg)						
ALUMINUM	11800	11900	8690	3640	8130	3110
ARSENIC	10.0 U	14.0	10.0 U	10.0 U	10.0 U	10.0 U
BARIUM	97.0	85.0	113	51.0	52.0	20.0 U
BERYLLIUM	1.0	1.0	0.5 U	0.5 U	0.5 U	0.5 U
CADMIUM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CALCIUM	500 U	500 U	881	704	500 U	500 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HIS[illegible] DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B11-3	42B11-3D	42B11-5	42B11-6	[illegible]12-4	42B12-5
DEPTH (feet):	9.0 - 11.0'	9.0 - 11.0'	19.0 - 21.0'	24.0 - 26.0'	[illegible] - 16.0'	19.0 - [illegible]
SAMPLE DATE:	NA	NA	NA	NA	[illegible]	NA
LOCATION:	42B11	42B11	42B11	42B11	[illegible]B12	42B1[illegible]
FIELD DUPLICATE OF:		42B11-3				
METALS (mg/kg)						
CHROMIUM	17.0	14.0	14.0	7.0	8.0	[illegible]2.0
COBALT	7.0	6.0	35.0	10.0	12.0	[illegible]5.0 U
COPPER	10.0	14.0	16.0	7.0	2.5 U	2.5 U
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 [illegible]	0.5 U	0.5 U
IRON	26300	38000	16400	103[illegible]	9640	15500
LEAD	12.0	22.0	12.0	7.0	8.0	3.0 U
MAGNESIUM	931	938	2580	84[illegible]	627	500 U
MANGANESE	25.0	30.0	657	133	163	32.0
MERCURY	0.1 U	0.1 U	0.1 U	0.1 [illegible]	0.1 U	0.1 U
NICKEL	10.0	9.0	25.0	11.0	9.0	4.0 U
POTASSIUM	704	772	775	50[illegible]	500 [illegible]	500 U
SILVER	1.0 U	1.0 U	1.0 U	1.0 [illegible]	1.0 [illegible]	1.0 U
SODIUM	500 U	500 U	500 U	50[illegible]	[illegible]	500 U
VANADIUM	29.0	31.0	20.0	16[illegible]	[illegible].0	5.0 U
ZINC	36.0	36.0	70.0	29.[illegible]	[illegible].1 [illegible]	11.0

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B12-6	42B13-2	42B13-3	42B13-3D	42B13-5	42B14-2
DEPTH (feet):	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	9.0 - 11.0'	19.0 - 21.0'	4.0 - 6.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B12	42B13	42B13	42B13	42B13	42B14
FIELD DUPLICATE OF:				42B13-3		
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U	10 U	10 U
ACETONE	140	10 U	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	7	6	10 U	10 U	7
TOLUENE	10 U	10 U	10 U	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10	10	57	10 U
XYLENES, TOTAL	10 U	10 U	10 U	10 U	10 U	10 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U	330 U	330 U
2-METHYLNAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
4-METHYLPHENOL	330 U	330 U	330 U	330 U	330 U	330 U
ACENAPHTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)ANTHRACENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)PYRENE	279	330 U	330 U	330 U	330 U	330 U
BENZO(B)FLUORANTHENE	330 U	448	330 U	330 U	330 U	330 U
BENZO(G,H,I)PERYLENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(K)FLUORANTHENE	330 U	224	330 U	330 U	330 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
CHRYSENE	330 U	377	330 U	330 U	330 U	330 U
DI-N-BUTYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
DIBENZOFURAN	330 U	330 U	330 U	330 U	330 U	330 U
DIETHYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORANTHENE	330 U	377	330 U	330 U	330 U	330 U
FLUORENE	330 U	330 U	330 U	330 U	330 U	330 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B12-6	42B13-2	42B13-3	42B13-3D	42B13-5	42B14-2
DEPTH (feet):	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	9.0 - 11.0'	19.0 - 21.0'	4.0 - 6.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B12	42B13	42B13	42B13	42B13	42B14
FIELD DUPLICATE OF:				42B13-3		
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
NAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
PHENANTHRENE	330 U	330 U	330 U	330 U	330 U	330 U
PYRENE	330 U	755	330 U	330 U	330 U	330 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDE	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDT	3.3 U	5	3.3 U	4	3.3 U	10
ALPHA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	2
BETA-BHC	1.7 U	1.7 U	1.7 U	3	1.7 U	2
DELTA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	5
DIELDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN II	3.3 U	3.3 U	3.3 U	3.3 U	4	3.3 U
ENDOSULFAN SULFATE	3.3 U	8	17	3.3 U	16	3.3 U
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	4
GAMMA-BHC (LINDANE)	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
GAMMA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
METHOXYCHLOR	17 U	17 U	17 U	17 U	17 U	17 U
METALS (mg/kg)						
ALUMINUM	12600	8610	12800	12800	1490	8040
ARSENIC	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
BARIUM	100	71.0	74.0	50.0	20.0 U	65.0
BERYLLIUM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CADMIUM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CALCIUM	1130	990	16.0	500 U	500 U	1080

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B12-6	42B13-2	42B13-3	42B13-3D	42B13-5	42B14-2
DEPTH (feet):	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	9.0 - 11.0'	19.0 - 21.0'	4.0 - 6.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B12	42B13	42B13	42B13	42B13	42B14
FIELD DUPLICATE OF:				42B13-3		
METALS (mg/kg)						
CHROMIUM	19.0	14.0	16.0 U	14.0	5.0	11.0
COBALT	16.0	9.0	7.0	5.0 U	5.0 U	15.0
COPPER	2.5 U	7.0	2.5 U	3.0	2.5 U	10.0
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
IRON	16500	14100	9310	15100	8340	16800
LEAD	9.0	17.0	7.0	7.0	3.0 U	118
MAGNESIUM	1780	1300	1160	1110	500 U	1560
MANGANESE	124	78.0	40.0	39.0	39.0	156
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	19.0	12.0	12.0	9.0	4.0 U	16.0
POTASSIUM	1290	990	710	777	500 U	754
SILVER	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
SODIUM	500 U	500 U	500 U	500 U	500 U	500 U
VANADIUM	36.0	24.0	17.0	23.0	5.0 U	19.0
ZINC	48.0	44.0	30.0	28.0	7.0	40.0

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B14-3	42B14-3D	42B14-4	42B15-3	42B15-3D	42B15-4
DEPTH (feet):	9.0 - 11.0'	9.0 - 11.0'	14.0 - 16.0'	9.0 - 11.0'	9.0 - 11.0'	14.0 - 16.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B14	42B14	42B14	42B15	42B15	42B15
FIELD DUPLICATE OF:		42B14-3			42B15-3	
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U	10 U	10 U
ACETONE	167	211	10 U	79	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	6	10 U	10 U	10 U	13	10 U
TOLUENE	10 U	10 U	10 U	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10 U	10 U	10 U	10 U
XYLENES, TOTAL	10 U	10 U	10 U	10 U	10 U	10 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U	330 U	330 U
2-METHYLNAPHTHALENE	330 U	330 U	742	330 U	330 U	330 U
4-METHYLPHENOL	330 U	330 U	330 U	330 U	330 U	330 U
ACENAPHTHENE	330 U	330 U	1480	330 U	330 U	330 U
BENZO(A)ANTHRACENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(B)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(G,H,I)PERYLENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(K)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	668	330 U	330 U	330 U	330 U	236
CHRYSENE	330 U	330 U	330 U	330 U	330 U	330 U
DI-N-BUTYL PHTHALATE	330 U	330 U	330 U	283	247	283
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
DIBENZOFURAN	330 U	330 U	1220	330 U	330 U	330 U
DIETHYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORENE	330 U	330 U	1030	330 U	330 U	330 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B14-3	42B14-3D	42B14-4	42B15-3	42B15-3D	42B15-4
DEPTH (feet):	9.0 - 11.0'	9.0 - 11.0'	14.0 - 16.0'	9.0 - 11.0'	9.0 - 11.0'	14.0 - 16.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B14	42B14	42B14	42B15	42B15	42B15
FIELD DUPLICATE OF:		42B14-3			42B15-3	
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
NAPHTHALENE	330 U	330 U	470	330 U	330 U	330 U
PHENANTHRENE	330 U	330 U	1240	330 U	330 U	330 U
PYRENE	330 U	330 U	309	330 U	330 U	330 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	5	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDE	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDT	22	3.3 U	4	3.3 U	3.3 U	3.3 U
ALPHA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
BETA-BHC	2	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DELTA-BHC	1.7 U	3	2	1.7 U	1.7 U	1.7 U
DIELDRIN	10	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN II	3.3 U	5	3.3 U	6	3.3 U	3.3 U
ENDOSULFAN SULFATE	3.3 U	24	22	17	13	13
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
GAMMA-BHC (LINDANE)	1.7 U	4	7	1.7 U	1.7 U	1.7 U
GAMMA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
METHOXYCHLOR	1.7 U	17 U	35	1.7 U	1.7 U	1.7 U
METALS (mg/kg)						
ALUMINUM	8740	11300	5320	13000	8110	9900
ARSENIC	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
BARIUM	64.0	79.0	84.0	307	47.0	24.0
BERYLLIUM	0.5 U	0.5 U	0.5 U	1.0	1.0	0.5 U
CADMIUM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CALCIUM	500 U	633	500 U	802	500 U	500 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B14-3	42B14-3D	42B14-4	42B15-3	42B15-3D	42B15-4
DEPTH (feet):	9.0 - 11.0'	9.0 - 11.0'	14.0 - 16.0'	9.0 - 11.0'	9.0 - 11.0'	14.0 - 16.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B14	42B14	42B14	42B15	42B15	42B15
FIELD DUPLICATE OF:		42B14-3			42B15-3	
METALS (mg/kg)						
CHROMIUM	9.0	10.0	6.0	17.0	8.0	12.0
COBALT	8.0	11.0	11.0	8.0	8.0	103
COPPER	17.0	17.0	11.0	13.0	14.0	17.0
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
IRON	16700	17400	10000	22400	27000	30600
LEAD	26.0	376	8.0	12.0	12.0	8.0
MAGNESIUM	1670	1360	500 U	1530	1650	2360
MANGANESE	154	261	120	46.0	64.0	648
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	9.0	11.0	9.0	15.0	14.0	32.0
POTASSIUM	500 U	707	500 U	601	500 U	500 U
SILVER	10.0	19.0	1.0 U	1.0 U	1.0 U	1.0 U
SODIUM	154	500 U	124	271	235	672
VANADIUM	15.0	24.0	10.0	22.0	16.0	13.0
ZINC	379	109	35.0	104	35.0	64.0

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B15-5	42B16-3C	42B16-4	42B16-5	42B17-2	42B17-3
DEPTH (feet):	19.0 - 21.0'	9.0 - 11.0'	16.0 - 18.0'	18.0 - 20.0'	4.0 - 6.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	03/92	03/92
LOCATION:	42B15	42B16	42B16	42B16	42B17	42B17
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U	12 U	12 U
ACETONE	10 U	81	10 U	10 U	12 U	12 U
CHLOROBENZENE	10 U	49	10 U	10 U	12 U	12 U
ETHYLBENZENE	10 U	684	10 U	10 U	12 U	12 U
METHYLENE CHLORIDE	10 U	13	10 U	10 U	12 U	5 J
TOLUENE	10 U	20	10 U	10 U	12 U	12 U
TRICHLOROETHENE	10 U	10 U	10 U	10 U	8 J	12 U
XYLENES, TOTAL	10 U	15100	29	10 U	12 U	12 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U	410 U	400 U
2-METHYLNAPHTHALENE	330 U	330 U	330 U	330 U	410 U	400 U
4-METHYLPHENOL	330 U	330 U	330 U	330 U	410 U	400 U
ACENAPHTHENE	330 U	330 U	330 U	330 U	410 U	400 U
BENZO(A)ANTHRACENE	330 U	360	330 U	330 U	410 U	400 U
BENZO(A)PYRENE	330 U	313	330 U	330 U	410 U	400 U
BENZO(B)FLUORANTHENE	330 U	394	330 U	330 U	410 U	400 U
BENZO(G,H,I)PERYLENE	330 U	290	330 U	330 U	410 U	400 U
BENZO(K)FLUORANTHENE	330 U	325	330 U	330 U	410 U	400 U
BIS(2-ETHYLHEXYL)PHTHALATE	454	476	316	330 U	11000 EB	7500 B
CHRYSENE	330 U	464	330 U	330 U	410 U	400 U
DI-N-BUTYL PHTHALATE	379	330 U	234	222	61 J	68 J
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	330 U	410 U	400 U
DIBENZOFURAN	330 U	330 U	330 U	330 U	410 U	400 U
DIETHYL PHTHALATE	330 U	916	330 U	330 U	410 U	400 U
FLUORANTHENE	330 U	580	330 U	330 U	410 U	400 U
FLUORENE	330 U	330 U	330 U	330 U	410 U	400 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B15-5	42B16-3C	42B16-4	42B16-5	42B17-2	42B17-3
DEPTH (feet):	19.0 - 21.0'	9.0 - 11.0'	16.0 - 18.0'	18.0 - 20.0'	4.0 - 6.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	03/92	03/92
LOCATION:	42B15	42B16	42B16	42B16	42B17	42B17
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	302	330 U	330 U	410 U	400 U
NAPHTHALENE	330 U	330 U	330 U	330 U	410 U	400 U
PHENANTHRENE	330 U	847	330 U	330 U	410 U	400 U
PYRENE	330 U	1390	330 U	330 U	410 U	400 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.3 U	3.3 U	3.3 U	3.3 U	4.1 U	4 U
4,4'-DDE	3.3 U	7	3.3 U	3.3 U	4.1 U	4 U
4,4'-DDT	3.3 U	3.3 U	3.3 U	3.3 U	4.1 U	4 U
ALPHA-CHLORDANE	1.7 U	3	1.7 U	1.7 U	2 U	2 U
BETA-BHC	1.7 U	2	1.7 U	1.7 U	2 U	2 U
DELTA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	2 U	2 U
DIELDRIN	3.3 U	3.3 U	3.3 U	3.3 U	4.1 U	4 U
ENDOSULFAN II	3.3 U	3.3 U	3.3 U	3.3 U	4.1 U	4 U
ENDOSULFAN SULFATE	16	15	13	10	4.1 U	4 U
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U	4.1 U	4 U
GAMMA-BHC (LINDANE)	1.7 U	1.7 U	1.7 U	1.7 U	2 U	2 U
GAMMA-CHLORDANE	1.7 U	3	1.7 U	1.7 U	2 U	2 U
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U	2 U	2 U
METHOXYCHLOR	17 U	17 U	17 U	17 U	20 U	20 U
METALS (mg/kg)						
ALUMINUM	1140	6840	48000	5620		
ARSENIC	10.0 U	10.0 U	10.0 U	10.0 U		
BARIUM	20.0 U	50.0	60.0	54.0		
BERYLLIUM	0.5 U	0.5 U	0.5 U	1.0		
CADMIUM	0.5 U	2.0	0.5 U	0.5 U		
CALCIUM	500 U	1860	500 U	500 U		

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B15-5	42B16-3C	42B16-4	42B16-5	42B17-2	42B17-3
DEPTH (feet):	19.0 - 21.0'	9.0 - 11.0'	16.0 - 18.0'	18.0 - 20.0'	4.0 - 6.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	03/92	03/92
LOCATION:	42B15	42B16	42B16	42B16	42B17	42B17
FIELD DUPLICATE OF:						
METALS (mg/kg)						
CHROMIUM	6.0	13.0	6.0	16.0		
COBALT	5.0 U	7.0	7.0	7.0		
COPPER	2.5 U	16.0	2.5 U	2.5 U		
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 U		
IRON	8830	18600	14000	26900		
LEAD	3.0 U	57.0	8.0	10.0		
MAGNESIUM	500 U	1010	500 U	500 U		
MANGANESE	32.0	111	108	81.0		
MERCURY	0.1 U	0.1	0.1 U	0.1 U		
NICKEL	5.0	15.0	7.0	8.0		
POTASSIUM	500 U	500 U	500 U	500 U		
SILVER	1.0 U	1.0	1.0 U	1.0 U		
SODIUM	88.0	220	117	152		
VANADIUM	5.0 U	24.0	16.0	51.0		
ZINC	6.0	97.0	19.0	15.0		

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B17-4	42B17-5	42B18-3	42B18-4	42B18-6	42B19-3
DEPTH (feet):	14.0 - 16.0'	19.0 - 21.0'	9.0 - 11.0'	14.0 - 16.0'	21.0 - 23.0'	9.0 - 11.0'
SAMPLE DATE:	03/92	03/92	03/92	03/92	03/92	03/92
LOCATION:	42B17	42B17	42B18	42B18	42B18	42B19
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	12 U	14 U	12 U	12 U	13 U	12 J
ACETONE	12 U	14 U	12 U	12 U	13 U	13 U
CHLOROBENZENE	12 U	14 U	12 U	12 U	13 U	13 U
ETHYLBENZENE	12 U	14 U	12 U	12 U	13 U	13 U
METHYLENE CHLORIDE	12 U	14 U	12 U	12 U	13 U	13 U
TOLUENE	12 U	14 U	12 U	12 U	13 U	13 U
TRICHLOROETHENE	43	14 U	12 U	33	13 U	35
XYLENES, TOTAL	12 U	14 U	12 U	12 U	13 U	13 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	400 U	420 U	400 U	390 U	430 U	430 U
2-METHYLNAPHTHALENE	400 U	420 U	400 U	390 U	430 U	430 U
4-METHYLPHENOL	400 U	420 U	400 U	390 U	430 U	430 U
ACENAPHTHENE	400 U	420 U	400 U	390 U	430 U	430 U
BENZO(A)ANTHRACENE	400 U	420 U	400 U	390 U	430 U	430 U
BENZO(A)PYRENE	400 U	420 U	400 U	390 U	430 U	430 U
BENZO(B)FLUORANTHENE	400 U	420 U	400 U	390 U	430 U	430 U
BENZO(G,H,I)PERYLENE	400 U	420 U	400 U	390 U	430 U	430 U
BENZO(K)FLUORANTHENE	400 U	420 U	400 U	390 U	430 U	430 U
BIS(2-ETHYLHEXYL)PHTHALATE	4800 B	23000 EB	6600 B	2900 B	3100 B	2000 B
CHRYSENE	400 U	420 U	400 U	390 U	430 U	430 U
DI-N-BUTYL PHTHALATE	52 J	420 U	59 J	390 U	430 U	430 U
DI-N-OCTYL PHTHALATE	400 U	420 U	400 U	390 U	430 U	47 JB
DIBENZOFURAN	400 U	420 U	400 U	390 U	430 U	430 U
DIETHYL PHTHALATE	400 U	420 U	400 U	390 U	430 U	430 U
FLUORANTHENE	400 U	420 U	400 U	390 U	430 U	430 U
FLUORENE	400 U	420 U	400 U	390 U	430 U	430 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B17-4	42B17-5	42B18-3	42B18-4	42B18-6	42B19-3
DEPTH (feet):	14.0 - 16.0'	19.0 - 21.0'	9.0 - 11.0'	14.0 - 16.0'	21.0 - 23.0'	9.0 - 11.0'
SAMPLE DATE:	03/92	03/92	03/92	03/92	03/92	03/92
LOCATION:	42B17	42B17	42B18	42B18	42B18	42B19
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	400 U	420 U	400 U	390 U	430 U	430 U
NAPHTHALENE	400 U	420 U	400 U	390 U	430 U	430 U
PHENANTHRENE	400 U	420 U	400 U	390 U	430 U	430 U
PYRENE	400 U	420 U	400 U	390 U	430 U	430 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4 U	4.7 U	4 U	3.9 U	4.3 U	4.3 U
4,4'-DDE	4 U	4.7 U	4 U	3.9 U	4.3 U	4.3 U
4,4'-DDT	4 U	7.9 P	4 U	3.9 U	4.3 U	4.7
ALPHA-CHLORDANE	2 U	2.3 U	2 U	2 U	2.1 U	2.1 U
BETA-BHC	2 U	2.3 U	2 U	2 U	2.1 U	2.1 U
DELTA-BHC	2 U	2.3 U	2 U	2 U	2.1 U	2.1 U
DIELDRIN	4 U	4.7 U	4 U	3.9 U	4.3 U	4.3 U
ENDOSULFAN II	4 U	4.7 U	4 U	3.9 U	4.3 U	4.3 U
ENDOSULFAN SULFATE	4 U	4.7 U	4 U	3.9 U	4.3 U	4.3 U
ENDRIN	4 U	4.7 U	4 U	3.9 U	4.3 U	4.3 U
GAMMA-BHC (LINDANE)	2 U	2.3 U	2 U	2 U	2.1 U	2.1 U
GAMMA-CHLORDANE	2 U	2.3 U	2 U	2 U	2.1 U	2.1 U
HEPTACHLOR EPOXIDE	2 U	2.3 U	2 U	2 U	2.1 U	2.1 U
METHOXYCHLOR	20 U	23 U	20 U	20 U	21 U	21 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B19-4	42B19-5	42B2-2	42B2-3	42B2-5	42B2-6
DEPTH (feet):	14.0 - 16.0'	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'	19.0 - 21.0'	24.0 - 26.0'
SAMPLE DATE:	03/92	03/92	NA	NA	NA	NA
LOCATION:	42B19	42B19	42B2	42B2	42B2	42B2
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	57	14 U	10 U	10 U	10 U	10 U
ACETONE	12 U	14 U	10 U	10 U	10 U	10 U
CHLOROBENZENE	12 U	14 U	10 U	10 U	10 U	10 U
ETHYLBENZENE	12 U	14 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	12 U	14 U	10 U	10 U	7	10 U
TOLUENE	12 U	14 U	10 U	10 U	10 U	10 U
TRICHLOROETHENE	84	180	10 U	10 U	10 U	10 U
XYLENES, TOTAL	12 U	14 U	10 U	10 U	10 U	10 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	400 U	460 U	330 U	330 U	330 U	330 U
2-METHYLNAPHTHALENE	400 U	460 U	330 U	330 U	330 U	330 U
4-METHYLPHENOL	400 U	460 U	330 U	330 U	330 U	330 U
ACENAPHTHENE	400 U	460 U	330 U	330 U	330 U	330 U
BENZO(A)ANTHRACENE	400 U	460 U	330 U	330 U	330 U	330 U
BENZO(A)PYRENE	400 U	460 U	330 U	330 U	330 U	330 U
BENZO(B)FLUORANTHENE	400 U	460 U	330 U	330 U	330 U	330 U
BENZO(G,H,I)PERYLENE	400 U	460 U	330 U	330 U	330 U	330 U
BENZO(K)FLUORANTHENE	400 U	460 U	330 U	330 U	330 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	6400 B	18000 EB	330 U	330 U	330 U	330 U
CHRYSENE	400 U	460 U	330 U	330 U	330 U	330 U
DI-N-BUTYL PHTHALATE	400 U	460 U	330 U	330 U	361	273
DI-N-OCTYL PHTHALATE	400 U	460 U	330 U	330 U	330 U	330 U
DIBENZOFURAN	400 U	460 U	330 U	330 U	330 U	330 U
DIETHYL PHTHALATE	400 U	460 U	330 U	330 U	330 U	330 U
FLUORANTHENE	400 U	460 U	330 U	330 U	330 U	330 U
FLUORENE	400 U	460 U	330 U	330 U	330 U	330 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B19-4	42B19-5	42B2-2	42B2-3	42B2-5	42B2-6
DEPTH (feet):	14.0 - 16.0'	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'	19.0 - 21.0'	24.0 - 26.0'
SAMPLE DATE:	03/92	03/92	NA	NA	NA	NA
LOCATION:	42B19	42B19	42B2	42B2	42B2	42B2
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	400 U	460 U	330 U	330 U	330 U	330 U
NAPHTHALENE	400 U	460 U	330 U	330 U	330 U	330 U
PHENANTHRENE	400 U	460 U	330 U	330 U	330 U	330 U
PYRENE	400 U	460 U	330 U	330 U	330 U	330 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4 U	3.9 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDE	4 U	3.9 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDT	4 U	3.9 U	3.3 U	3.3 U	3.3 U	3.3 U
ALPHA-CHLORDANE	2 U	1.9 U	1.7 U	1.7 U	1.7 U	1.7 U
BETA-BHC	2 U	1.9 U	1.7 U	1.7 U	1.7 U	1.7 U
DELTA-BHC	2 U	1.9 U	1.7 U	1.7 U	1.7 U	1.7 U
DIELDRIN	4 U	3.9 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN II	4 U	3.9 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN SULFATE	4 U	3.9 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDRIN	4 U	3.9 U	3.3 U	3.3 U	3.3 U	3.3 U
GAMMA-BHC (LINDANE)	2 U	1.9 U	1.7 U	1.7 U	1.7 U	1.7 U
GAMMA-CHLORDANE	2 U	1.9 U	1.7 U	1.7 U	1.7 U	1.7 U
HEPTACHLOR EPOXIDE	2 U	1.9 U	1.7 U	1.7 U	1.7 U	1.7 U
METHOXYCHLOR	20 U	19 U	17 U	17 U	17 U	17 U
METALS (mg/kg)						
ALUMINUM			13000	14300	8530	5220
ARSENIC			10.0 U	10.0 U	10.0 U	10.0 U
BARIUM			75.0	76.0	85.0	63.0
BERYLLIUM			1.0 U	1.0 U	1.0 U	0.5 U
CADMIUM			1.0 U	1.0 U	2.0	0.5 U
CALCIUM			1000 U	1000 U	1000 U	1000 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B19-4	42B19-5	42B2-2	42B2-3	42B2-5	42B2-6
DEPTH (feet):	14.0 - 16.0'	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'	19.0 - 21.0'	24.0 - 26.0'
SAMPLE DATE:	03/92	03/92	NA	NA	NA	NA
LOCATION:	42B19	42B19	42B2	42B2	42B2	42B2
FIELD DUPLICATE OF:						
METALS (mg/kg)						
CHROMIUM			18.0	15.0	10.0	11.0
COBALT			1.0 U	1.0 U	14.0	1.0 U
COPPER			11.0	1.0 U	6.0	1.0 U
CYANIDE			0.5 U	0.5 U	0.5 U	0.5 U
IRON			44800	19000	50500	14900
LEAD			14.0	11.0	14.0	4.0
MAGNESIUM			1410	1310	1680	1490
MANGANESE			141	71.0	180	56.0
MERCURY			0.1 U	0.1 U	0.1 U	0.1 U
NICKEL			13.0	13.0	25.0	22.0
POTASSIUM			1000 U	1000 U	1000 U	1000 U
SILVER			1.0 U	1.0 U	1.0 U	1.0 U
SODIUM			1000 U	1000 U	1000 U	1000 U
VANADIUM			40.0	27.0	32.0	15.0
ZINC			44.0	34.0	58.0	40.0

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B20-2	42B20-3	42B20-5	42B21-2	42B21-4	42B21-5
DEPTH (feet):	4.0 - 6.0'	9.0 - 11.0'	19.0 - 21.0'	4.0 - 6.0'	14.0 - 16.0'	19.0 - 21.0'
SAMPLE DATE:	03/92	03/92	03/92	03/92	03/92	03/92
LOCATION:	42B20	42B20	42B20	42B21	42B21	42B21
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	12 U	12 U	12 U	13 U	12 U	12 U
ACETONE	12 U	9 J	12 U	13 U	12 U	12 U
CHLOROBENZENE	12 U	12 U	12 U	13 U	12 U	12 U
ETHYLBENZENE	12 U	12 U	12 U	13 U	12 U	12 U
METHYLENE CHLORIDE	4 J	12 U	12 U	13 U	12 U	12 U
TOLUENE	12 U	12 U	12 U	13 U	12 U	12 U
TRICHLOROETHENE	12 U	12 U	12 U	13 U	12 U	12 U
XYLENES, TOTAL	12 U	12 U	12 U	13 U	12 U	12 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	390 U	420 U	420 U	420 U	400 U	420 U
2-METHYLNAPHTHALENE	390 U	420 U	420 U	420 U	400 U	420 U
4-METHYLPHENOL	390 U	420 U	420 U	420 U	400 U	420 U
ACENAPHTHENE	390 U	420 U	420 U	420 U	400 U	420 U
BENZO(A)ANTHRACENE	390 U	420 U	420 U	420 U	400 U	420 U
BENZO(A)PYRENE	390 U	420 U	420 U	420 U	400 U	420 U
BENZO(B)FLUORANTHENE	390 U	420 U	420 U	420 U	400 U	420 U
BENZO(G,H,I)PERYLENE	390 U	420 U	420 U	420 U	400 U	420 U
BENZO(K)FLUORANTHENE	390 U	420 U	420 U	420 U	400 U	420 U
BIS(2-ETHYLHEXYL)PHTHALATE	4900 B	1700 B	20000 EB	13000 EB	8400 EB	28000 EB
CHRYSENE	390 U	420 U	420 U	420 U	400 U	420 U
DI-N-BUTYL PHTHALATE	390 U	420 U	420 U	420 U	400 U	420 U
DI-N-OCTYL PHTHALATE	390 U	420 U	420 U	420 U	400 U	420 U
DIBENZOFURAN	390 U	420 U	420 U	420 U	400 U	420 U
DIETHYL PHTHALATE	390 U	420 U	420 U	420 U	400 U	420 U
FLUORANTHENE	390 U	420 U	420 U	420 U	400 U	420 U
FLUORENE	390 U	420 U	420 U	420 U	400 U	420 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B20-2	42B20-3	42B20-5	42B21-2	42B21-4	42B21-5
DEPTH (feet):	4.0 - 6.0'	9.0 - 11.0'	19.0 - 21.0'	4.0 - 6.0'	14.0 - 16.0'	19.0 - 21.0'
SAMPLE DATE:	03/92	03/92	03/92	03/92	03/92	03/92
LOCATION:	42B20	42B20	42B20	42B21	42B21	42B21
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	390 U	420 U	420 U	420 U	400 U	420 U
NAPHTHALENE	390 U	420 U	420 U	420 U	400 U	420 U
PHENANTHRENE	390 U	420 U	420 U	420 U	400 U	420 U
PYRENE	390 U	420 U	420 U	420 U	400 U	420 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.9 U	4.2 U	4.2 U	4.2 U	4 U	4.2 U
4,4'-DDE	3.9 U	4.2 U	4.2 U	4.2 U	4 U	4.2 U
4,4'-DDT	3.9 U	4.2 U	4.2 P	5.4 P	4 U	13 P
ALPHA-CHLORDANE	1.9 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U
BETA-BHC	1.9 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U
DELTA-BHC	1.9 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U
DIELDRIN	3.9 U	4.2 U	4.2 U	4.2 U	4 U	4.2 U
ENDOSULFAN II	3.9 U	4.2 U	4.2 U	4.2 U	4 U	4.2 U
ENDOSULFAN SULFATE	3.9 U	4.2 U	4.2 U	4.2 U	4 U	4.2 U
ENDRIN	3.9 U	4.2 U	4.2 U	4.2 U	4 U	4.2 U
GAMMA-BHC (LINDANE)	1.9 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U
GAMMA-CHLORDANE	1.9 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U
HEPTACHLOR EPOXIDE	1.9 U	2.1 U	2.1 U	2.1 U	2 U	2.1 U
METHOXYCHLOR	19 U	21 U	21 U	21 U	20 U	21 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B22-2	42B22-3	42B22-6	42B23-2	42B23-4	42B23-5
DEPTH (feet):	4.0 - 6.0'	9.0 - 11.0'	24.0 - 26.0'	4.0 - 6.0'	14.0 - 16.0'	16.0 - 18.0'
SAMPLE DATE:	03/92	03/92	03/92	03/92	03/92	03/92
LOCATION:	42B22	42B22	42B22	42B23	42B23	42B23
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	13 U	12 U	12 U	12 U	12 U	12 U
ACETONE	13 U	12 U	12 U	12 U	12 U	12 U
CHLOROBENZENE	13 U	12 U	12 U	12 U	12 U	12 U
ETHYLBENZENE	13 U	12 U	12 U	12 U	12 U	12 U
METHYLENE CHLORIDE	13 U	12 U	12 U	12 U	12 U	12 U
TOLUENE	13 U	12 U	12 U	12 U	12 U	12 U
TRICHLOROETHENE	13 U	12 U	12 U	12 U	12 U	12 U
XYLENES, TOTAL	13 U	12 U	12 U	12 U	12 U	12 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	430 U	400 U	420 U	410 U	400 U	420 U
2-METHYLNAPHTHALENE	430 U	400 U	420 U	410 U	400 U	420 U
4-METHYLPHENOL	430 U	400 U	420 U	410 U	400 U	420 U
ACENAPHTHENE	430 U	400 U	420 U	410 U	400 U	420 U
BENZO(A)ANTHRACENE	430 U	400 U	420 U	410 U	400 U	420 U
BENZO(A)PYRENE	430 U	400 U	420 U	410 U	400 U	420 U
BENZO(B)FLUORANTHENE	430 U	400 U	420 U	410 U	400 U	420 U
BENZO(G,H,I)PERYLENE	430 U	400 U	420 U	410 U	400 U	420 U
BENZO(K)FLUORANTHENE	430 U	400 U	420 U	410 U	400 U	420 U
BIS(2-ETHYLHEXYL)PHTHALATE	27000 EB	12000 EB	11000 EB	8900 EB	9700 EB	12000 EB
CHRYSENE	430 U	400 U	420 U	410 U	400 U	420 U
DI-N-BUTYL PHTHALATE	430 U	47 J	420 U	410 U	400 U	420 U
DI-N-OCTYL PHTHALATE	430 U	400 U	420 U	410 U	400 U	420 U
DIBENZOFURAN	430 U	400 U	420 U	410 U	400 U	420 U
DIETHYL PHTHALATE	430 U	400 U	420 U	410 U	400 U	420 U
FLUORANTHENE	430 U	400 U	420 U	410 U	400 U	420 U
FLUORENE	430 U	400 U	420 U	410 U	400 U	420 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B22-2	42B22-3	42B22-6	42B23-2	42B23-4	42B23-5
DEPTH (feet):	4.0 - 6.0'	9.0 - 11.0'	24.0 - 26.0'	4.0 - 6.0'	14.0 - 16.0'	16.0 - 18.0'
SAMPLE DATE:	03/92	03/92	03/92	03/92	03/92	03/92
LOCATION:	42B22	42B22	42B22	42B23	42B23	42B23
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	430 U	400 U	420 U	410 U	400 U	420 U
NAPHTHALENE	430 U	400 U	420 U	410 U	400 U	420 U
PHENANTHRENE	430 U	400 U	420 U	410 U	400 U	420 U
PYRENE	430 U	400 U	420 U	410 U	400 U	420 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4.3 U	4 U	4.2 U	4.1 U	4.1 U	4.2 U
4,4'-DDE	4.3 U	4 U	4.2 U	4.1 U	4.1 U	4.2 U
4,4'-DDT	8.6	4.2 P	4.2 U	4.1 U	4.1 U	4.2 U
ALPHA-CHLORDANE	2.1 U	2 U	2.1 U	2.1 U	2 U	2.1 U
BETA-BHC	2.1 U	2 U	2.1 U	2.1 U	2 U	2.1 U
DELTA-BHC	2.1 U	2 U	2.1 U	2.1 U	2 U	2.1 U
DIELDRIN	4.3 U	4 U	4.2 U	4.1 U	4.1 U	4.2 U
ENDOSULFAN II	4.3 U	4 U	4.2 U	4.1 U	4.1 U	4.2 U
ENDOSULFAN SULFATE	4.3 U	4 U	4.2 U	4.1 U	4.1 U	4.2 U
ENDRIN	4.3 U	4 U	4.2 U	4.1 U	4.1 U	4.2 U
GAMMA-BHC (LINDANE)	2.1 U	2 U	2.1 U	2.1 U	2 U	2.1 U
GAMMA-CHLORDANE	2.1 U	2 U	2.1 U	2.1 U	2 U	2.1 U
HEPTACHLOR EPOXIDE	2.1 U	2 U	2.1 U	2.1 U	2 U	2.1 U
METHOXYCHLOR	21 U	20 U	23 P	21 U	20 U	21 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B24-2	42B24-4	42B24-6	42B3-2	42B3-4	42B3-6
DEPTH (feet):	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'
SAMPLE DATE:	03/92	03/92	03/92	NA	NA	NA
LOCATION:	42B24	42B24	42B24	42B3	42B3	42B3
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	11 J	12 U	13 U	10 U	10 U	10 U
ACETONE	12 U	200	68	10 U	10 U	10 U
CHLOROBENZENE	12 U	12 U	13 U	10 U	10 U	10 U
ETHYLBENZENE	12 U	12 U	13 U	10 U	10 U	10 U
METHYLENE CHLORIDE	3 J	12 U	2 J	40	19	18
TOLUENE	12 U	12 U	5 J	10 U	10 U	10 U
TRICHLOROETHENE	93	2 J	1 J	10 U	10 U	10 U
XYLENES, TOTAL	12 U	12 U	13 U	10 U	10 U	10 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	420 U	410 U	440 U	330 U	330 U	330 U
2-METHYLNAPHTHALENE	420 U	410 U	440 U	330 U	330 U	330 U
4-METHYLPHENOL	420 U	410 U	440 U	330 U	330 U	330 U
ACENAPHTHENE	420 U	410 U	440 U	330 U	330 U	330 U
BENZO(A)ANTHRACENE	420 U	410 U	440 U	330 U	330 U	330 U
BENZO(A)PYRENE	420 U	410 U	260 J	330 U	330 U	330 U
BENZO(B)FLUORANTHENE	420 U	410 U	440 U	330 U	330 U	330 U
BENZO(G,H,I)PERYLENE	420 U	410 U	440 U	330 U	330 U	330 U
BENZO(K)FLUORANTHENE	420 U	410 U	440 U	330 U	330 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	420 U	410 U	440 U	330 U	330 U	330 U
CHRYSENE	420 U	410 U	440 U	330 U	330 U	330 U
DI-N-BUTYL PHTHALATE	420 U	410 U	440 U	342	238	331
DI-N-OCTYL PHTHALATE	420 U	410 U	440 U	330 U	330 U	330 U
DIBENZOFURAN	420 U	410 U	440 U	330 U	330 U	330 U
DIETHYL PHTHALATE	420 U	410 U	440 U	330 U	330 U	330 U
FLUORANTHENE	420 U	410 U	440 U	330 U	330 U	330 U
FLUORENE	420 U	410 U	440 U	330 U	330 U	330 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B24-2	42B24-4	42B24-6	42B3-2	42B3-4	42B3-6
DEPTH (feet):	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'
SAMPLE DATE:	03/92	03/92	03/92	NA	NA	NA
LOCATION:	42B24	42B24	42B24	42B3	42B3	42B3
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	420 U	410 U	440 U	330 U	330 U	330 U
NAPHTHALENE	420 U	410 U	440 U	330 U	330 U	330 U
PHENANTHRENE	420 U	410 U	440 U	330 U	330 U	330 U
PYRENE	420 U	410 U	440 U	330 U	330 U	330 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4.2 U	4.1 U	4.4 U	3.3 U	3.3 U	3.3 U
4,4'-DDE	4.2 U	4.1 U	4.4 U	3.3 U	3.3 U	3.3 U
4,4'-DDT	4.2 U	4.1 U	4.4 U	3.3 U	3.3 U	3.3 U
ALPHA-CHLORDANE	2.1 U	2 U	2.2 U	1.7 U	1.7 U	1.7 U
BETA-BHC	2.1 U	2 U	2.2 U	1.7 U	1.7 U	1.7 U
DELTA-BHC	2.1 U	2 U	2.2 U	1.7 U	1.7 U	1.7 U
DIELDRIN	4.2 U	4.1 U	4.4 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN II	4.2 U	4.1 U	4.4 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN SULFATE	4.2 U	4.1 U	4.4 U	3.3 U	3.3 U	3.3 U
ENDRIN	4.2 U	4.1 U	4.4 U	3.3 U	3.3 U	3.3 U
GAMMA-BHC (LINDANE)	2.1 U	2 U	2.2 U	1.7 U	1.7 U	1.7 U
GAMMA-CHLORDANE	2.1 U	2 U	2.2 U	1.7 U	1.7 U	1.7 U
HEPTACHLOR EPOXIDE	2.1 U	2 U	2.2 U	1.7 U	1.7 U	1.7 U
METHOXYCHLOR	21 U	20 U	22 U	17 U	17 U	17 U
METALS (mg/kg)						
ALUMINUM				18300	14300	3440
ARSENIC				10.0 U	10.0 U	10.0 U
BARIUM				57.0	99.0	1.0 U
BERYLLIUM				1.0 U	1.0 U	1.0 U
CADMIUM				1.0 U	1.0 U	1.0 U
CALCIUM				1000 U	1000 U	1000 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B24-2	42B24-4	42B24-6	42B3-2	42B3-4	42B3-6
DEPTH (feet):	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'
SAMPLE DATE:	03/92	03/92	03/92	NA	NA	NA
LOCATION:	42B24	42B24	42B24	42B3	42B3	42B3
FIELD DUPLICATE OF:						
METALS (mg/kg)						
CHROMIUM				12.0	13.0	23.0
COBALT				1.0 U	1.0 U	1.0 U
COPPER				9.0	24.0	1.0 U
CYANIDE				0.5 U	0.5 U	0.5 U
IRON				29300	76200	3310
LEAD				12.0	10.0	3.0 U
MAGNESIUM				1000 U	1550	1000 U
MANGANESE				74.0	143	29.0
MERCURY				0.1 U	0.1 U	0.1 U
NICKEL				11.0	18.0	2.0 U
POTASSIUM				1000 U	1000 U	1000 U
SILVER				1.0 U	1.0 U	1.0 U
SODIUM				1000 U	1000 U	1000 U
VANADIUM				27.0	8.0	11.0
ZINC				31.0	43.0	11.0

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B4-2	42B4-4	42B4-6	42B5-2	42B5-4	42B5-7
DEPTH (feet):	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'	4.0 - 6.0'	14.0 - 16.0'	29.0 - 31.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B4	42B4	42B4	42B5	42B5	42B5
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U	10 U	10 U
ACETONE	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	10	12	9	6	8	6
TOLUENE	10 U	10 U	10 U	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10 U	10 U	10 U	10 U
XYLENES, TOTAL	10 U	10 U	10 U	10 U	10 U	10 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U	330 U	330 U
2-METHYLNAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
4-METHYLPHENOL	330 U	330 U	330 U	330 U	330 U	330 U
ACENAPHTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)ANTHRACENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(B)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(G,H,I)PERYLENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(K)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
CHRYSENE	330 U	330 U	330 U	330 U	330 U	330 U
DI-N-BUTYL PHTHALATE	286	225	306	330 U	330 U	330
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
DIBENZOFURAN	330 U	330 U	330 U	330 U	330 U	330 U
DIETHYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORENE	330 U	330 U	330 U	330 U	330 U	330 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B4-2	42B4-4	42B4-6	42B5-2	42B5-4	42B5-7
DEPTH (feet):	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'	4.0 - 6.0'	14.0 - 16.0'	29.0 - 31.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B4	42B4	42B4	42B5	42B5	42B5
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
NAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
PHENANTHRENE	330 U	330 U	330 U	330 U	330 U	330 U
PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDE	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ALPHA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
BETA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DELTA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DIELDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN II	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN SULFATE	3.3 U	3.3 U	3.3 U	12	3.3 U	3.3 U
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
GAMMA-BHC (LINDANE)	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
GAMMA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
METHOXYCHLOR	17 U	17 U	17 U	17 U	17 U	17 U
METALS (mg/kg)						
ALUMINUM	11200	16500	5870	10200	10200	3210
ARSENIC	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
BARIUM	87.0	1.0 U	54.0	1.0 U	133	1.0 U
BERYLLIUM	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
CADMIUM	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
CALCIUM	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B4-2	42B4-4	42B4-6	42B5-2	42B5-4	42B5-7
DEPTH (feet):	4.0 - 6.0'	14.0 - 16.0'	24.0 - 26.0'	4.0 - 6.0'	14.0 - 16.0'	29.0 - 31.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B4	42B4	42B4	42B5	42B5	42B5
FIELD DUPLICATE OF:						
METALS (mg/kg)						
CHROMIUM	9.0	9.0	12.0	9.0	9.0	9.0
COBALT	16.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
COPPER	8.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
IRON	33100	3310	20800	13300	6770	12100
LEAD	10.0	14.0	8.0	6.0	14.0	6.0
MAGNESIUM	1260	1000 U	1000 U	1000 U	1660	1000 U
MANGANESE	107	496	108	9.0	249	84.0
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	15.0	9.0	10.0	2.0 U	19.0	10.0
POTASSIUM	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
SILVER	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
SODIUM	1000 U	1000 U	1000 U	1000 U	1000 U	1000 U
VANADIUM	19.0	28.0	12.0	16.0	20.0	12.0
ZINC	32.0	12.0	12.0	10.0	44.0	21.0

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B6-3	42B6-5	42B6-6	42B7-2	42B7-3	42B7-3D
DEPTH (feet):	14.0 - 16.0'	21.0 - 23.0'	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B6	42B6	42B6	42B7	42B7	42B7
FIELD DUPLICATE OF:						42B7-3
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U	10 U	
ACETONE	10 U	10 U	10 U	10 U	10 U	
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	
METHYLENE CHLORIDE	10 U	10	10 U	10 U	6	
TOLUENE	10 U	10 U	7	10 U	10 U	
TRICHLOROETHENE	10 U	10 U	10 U	10 U	10 U	
XYLENES, TOTAL	10 U	10 U	10 U	10 U	10 U	
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U	330 U	
2-METHYLNAPHTHALENE	330 U	330 U	330 U	330 U	330 U	
4-METHYLPHENOL	330 U	330 U	330 U	330 U	330 U	
ACENAPHTHENE	330 U	330 U	330 U	330 U	330 U	
BENZO(A)ANTHRACENE	330 U	330 U	330 U	330 U	330 U	
BENZO(A)PYRENE	330 U	330 U	519	330 U	330 U	
BENZO(B)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	
BENZO(G,H,I)PERYLENE	330 U	330 U	330 U	330 U	330 U	
BENZO(K)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	
BIS(2-ETHYLHEXYL)PHTHALATE	330 U	330 U	2050	330 U	330 U	
CHRYSENE	330 U	330 U	330 U	330 U	330 U	
DI-N-BUTYL PHTHALATE	198	266	355	199	257	223
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	199	330 U	
DIBENZOFURAN	330 U	330 U	330 U	330 U	330 U	
DIETHYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	
FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	
FLUORENE	330 U	330 U	330 U	330 U	330 U	

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B6-3	42B6-5	42B6-6	42B7-2	42B7-3	42B7-3D
DEPTH (feet):	14.0 - 16.0'	21.0 - 23.0'	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B6	42B6	42B6	42B7	42B7	42B7
FIELD DUPLICATE OF:						42B7-3
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	330 U	330 U	330 U	330 U	
NAPHTHALENE	330 U	330 U	330 U	330 U	330 U	
PHENANTHRENE	330 U	330 U	330 U	330 U	330 U	
PYRENE	330 U	330 U	330 U	330 U	330 U	
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
4,4'-DDE	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
4,4'-DDT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
ALPHA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	
BETA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	
DELTA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	
DIELDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
ENDOSULFAN II	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
ENDOSULFAN SULFATE	3.3 U	9	3.3 U	3.3 U	3.3 U	6
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
GAMMA-BHC (LINDANE)	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	
GAMMA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U	3	
METHOXYCHLOR	17 U	17 U	17 U	17 U	17 U	
METALS (mg/kg)						
ALUMINUM	5470	2920	13600	11700	9940	
ARSENIC	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	
BARIUM	69.0	25.0	135	89.0	74.0	
BERYLLIUM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
CADMIUM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
CALCIUM	500 U	500 U	983	500 U	500 U	

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B6-3	42B6-5	42B6-6	42B7-2	42B7-3	42B7-3D
DEPTH (feet):	14.0 - 16.0'	21.0 - 23.0'	24.0 - 26.0'	4.0 - 6.0'	9.0 - 11.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B6	42B6	42B6	42B7	42B7	42B7
FIELD DUPLICATE OF:						42B7-3
METALS (mg/kg)						
CHROMIUM	5.0	6.0	18.0	18.0	21.0	
COBALT	15.0	5.0 U	16.0	11.0	5.0 U	
COPPER	2.5 U	2.5 U	22.0	5.0	5.0	
CYANIDE	0.5 U	0.5	0.5 U	0.5 U	0.5 U	
IRON	16300	7870	24600	16400	11700	
LEAD	7.0	3.0 U	13.0	8.0	5.0	
MAGNESIUM	1140	500 U	2320	1760	1290	
MANGANESE	611	52.0	355	62.0	48.0	
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1	
NICKEL	13.0	6.0	26.0	15.0	13.0	
POTASSIUM	652	500 U	1500	1080	982	
SILVER	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
SODIUM	500 U	500 U	500 U	500 U	500 U	
VANADIUM	8.0	10.0	30.0	34.0	23.0	
ZINC	34.0	13.0	64.0	33.0	33.0	

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B7-5	42B8-2	42B8-3	42B8-5	42B9-2	42B9-3
DEPTH (feet):	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B7	42B8	42B8	42B8	42B9	42B9
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U	10 U	10 U
ACETONE	10 U	10 U	10 U	10 U	10 U	10 U
CHLOROBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
ETHYLBENZENE	10 U	10 U	10 U	10 U	10 U	10 U
METHYLENE CHLORIDE	10 U	10 U	10 U	10 U	10 U	7
TOLUENE	10 U	10 U	10 U	10 U	10 U	10 U
TRICHLOROETHENE	10 U	10 U	10 U	10 U	10 U	10 U
XYLENES, TOTAL	10 U	10 U	10 U	10 U	10 U	10 U
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U	330 U	330 U
2-METHYLNAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
4-METHYLPHENOL	330 U	330 U	330 U	330 U	330 U	330 U
ACENAPHTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)ANTHRACENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(A)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(B)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(G,H,I)PERYLENE	330 U	330 U	330 U	330 U	330 U	330 U
BENZO(K)FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
BIS(2-ETHYLHEXYL)PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
CHRYSENE	330 U	330 U	330 U	330 U	330 U	330 U
DI-N-BUTYL PHTHALATE	333	330 U	318	240	330 U	253
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
DIBENZOFURAN	330 U	330 U	330 U	330 U	330 U	330 U
DIETHYL PHTHALATE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORANTHENE	330 U	330 U	330 U	330 U	330 U	330 U
FLUORENE	330 U	330 U	330 U	330 U	330 U	330 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B7-5	42B8-2	42B8-3	42B8-5	42B9-2	42B9-3
DEPTH (feet):	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B7	42B8	42B8	42B8	42B9	42B9
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
NAPHTHALENE	330 U	330 U	330 U	330 U	330 U	330 U
PHENANTHRENE	330 U	330 U	330 U	330 U	330 U	330 U
PYRENE	330 U	330 U	330 U	330 U	330 U	330 U
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDE	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
4,4'-DDT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ALPHA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
BETA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DELTA-BHC	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
DIELDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN II	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDOSULFAN SULFATE	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
GAMMA-BHC (LINDANE)	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
GAMMA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
METHOXYCHLOR	17 U	17 U	17 U	17 U	17 U	17 U
METALS (mg/kg)						
ALUMINUM	9640	13000	12900	2760	9660	9660
ARSENIC	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
BARIUM	104	66.0	141	25.0	88.0	70.0
BERYLLIUM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
CADMIUM	0.5 U	0.5 U	1.0	0.5 U	0.5 U	0.5 U
CALCIUM	1040	500 U	500 U	500 U	748	500 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B7-5	42B8-2	42B8-3	42B8-5	42B9-2	42B9-3
DEPTH (feet):	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'	19.0 - 21.0'	4.0 - 6.0'	9.0 - 11.0'
SAMPLE DATE:	NA	NA	NA	NA	NA	NA
LOCATION:	42B7	42B8	42B8	42B8	42B9	42B9
FIELD DUPLICATE OF:						
METALS (mg/kg)						
CHROMIUM	13.0	14.0	16.0	6.0	19.0	14.0
COBALT	8.0	8.0	9.0	7.0	5.0 U	5.0 U
COPPER	14.0	11.0	15.0	2.5 U	19.0	8.0
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
IRON	10500	15300	31800	72100	10000	10000
LEAD	10.0	7.0	11.0	18.0	12.0	10.0
MAGNESIUM	2980	1650	1880	500 U	2500	1160
MANGANESE	107	66.0	188	110	51.0	24.0
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	27.0	12.0	18.0	6.0	21.0	12.0
POTASSIUM	893	1060	670	500 U	1080	954
SILVER	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
SODIUM	500 U	500 U	500 U	500 U	500 U	500 U
VANADIUM	14.0	28.0	38.0	8.0	29.0	29.0
ZINC	64.0	33.0	55.0	11.0	57.0	35.0

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B9-4	42B9-5	42SB11-3	42SB7-3		
DEPTH (feet):	14.0 - 16.0'	19.0 - 21.0'	9.0 - 11.0'	9.0 - 11.0'		
SAMPLE DATE:	NA	NA	NA	NA		
LOCATION:	42B9	42B9	42SB11	42SB7		
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	10 U	10 U	10 U	10 U		
ACETONE	10 U	10 U	10 U	10 U		
CHLOROBENZENE	10 U	10 U	10 U	10 U		
ETHYLBENZENE	10 U	10 U	10 U	10 U		
METHYLENE CHLORIDE	6	7	6	10 U		
TOLUENE	10 U	10 U	10 U	10 U		
TRICHLOROETHENE	10 U	10 U	9	10 U		
XYLENES, TOTAL	10 U	10 U	10 U	10 U		
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	330 U	330 U	330 U	330 U		
2-METHYLNAPHTHALENE	330 U	330 U	330 U	330 U		
4-METHYLPHENOL	330 U	330 U	330 U	330 U		
ACENAPHTHENE	330 U	330 U	330 U	330 U		
BENZO(A)ANTHRACENE	330 U	330 U	330 U	330 U		
BENZO(A)PYRENE	330 U	330 U	330 U	330 U		
BENZO(B)FLUORANTHENE	330 U	330 U	330 U	330 U		
BENZO(G,H,I)PERYLENE	330 U	330 U	330 U	330 U		
BENZO(K)FLUORANTHENE	330 U	330 U	330 U	330 U		
BIS(2-ETHYLHEXYL)PHTHALATE	330 U	330 U	330 U	330 U		
CHRYSENE	330 U	330 U	330 U	330 U		
DI-N-BUTYL PHTHALATE	366	200	330 U	330 U		
DI-N-OCTYL PHTHALATE	330 U	330 U	330 U	330 U		
DIBENZOFURAN	330 U	330 U	330 U	330 U		
DIETHYL PHTHALATE	330 U	330 U	330 U	330 U		
FLUORANTHENE	330 U	330 U	330 U	330 U		
FLUORENE	330 U	330 U	330 U	330 U		

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B9-4	42B9-5	42SB11-3	42SB7-3		
DEPTH (feet):	14.0 - 16.0'	19.0 - 21.0'	9.0 - 11.0'	9.0 - 11.0'		
SAMPLE DATE:	NA	NA	NA	NA		
LOCATION:	42B9	42B9	42SB11	42SB7		
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	330 U	330 U	330 U	330 U		
NAPHTHALENE	330 U	330 U	330 U	330 U		
PHENANTHRENE	330 U	330 U	330 U	330 U		
PYRENE	330 U	330 U	330 U	330 U		
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.3 U	3.3 U	3.3 U	3.3 U		
4,4'-DDE	3.3 U	3.3 U	3.3 U	3.3 U		
4,4'-DDT	3.3 U	3.3 U	3.3 U	3.3 U		
ALPHA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U		
BETA-BHC	1.7 U	1.7 U	1.7 U	1.7 U		
DELTA-BHC	1.7 U	1.7 U	1.7 U	1.7 U		
DIELDRIN	3.3 U	3.3 U	3.3 U	3.3 U		
ENDOSULFAN II	3.3 U	3.3 U	3.3 U	3.3 U		
ENDOSULFAN SULFATE	3.3 U	3.3 U	3.3 U	3.3 U		
ENDRIN	3.3 U	3.3 U	3.3 U	3.3 U		
GAMMA-BHC (LINDANE)	1.7 U	1.7 U	1.7 U	1.7 U		
GAMMA-CHLORDANE	1.7 U	1.7 U	1.7 U	1.7 U		
HEPTACHLOR EPOXIDE	1.7 U	1.7 U	1.7 U	1.7 U		
METHOXYCHLOR	17 U	17 U	17 U	17 U		
METALS (mg/kg)						
ALUMINUM	9090	11200	11800	4700		
ARSENIC	10.0 U	10.0 U	10.0 U	10.0 U		
BARIUM	113	99.0	97.0	42.0		
BERYLLIUM	0.5 U	0.5 U	0.5 U	0.5 U		
CADMIUM	0.5 U	0.5 U	0.5 U	0.5 U		
CALCIUM	732	823	500 U	500 U		

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42B9-4	42B9-5	42SB11-3	42SB7-3		
DEPTH (feet):	14.0 - 16.0'	19.0 - 21.0'	9.0 - 11.0'	9.0 - 11.0'		
SAMPLE DATE:	NA	NA	NA	NA		
LOCATION:	42B9	42B9	42SB11	42SB7		
FIELD DUPLICATE OF:						
METALS (mg/kg)						
CHROMIUM	9.0	20.0	17.0	16.0		
COBALT	22.0	6.0	7.0	21.0		
COPPER	9.0	16.0	10.0	5.0		
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 U		
IRON	17700	10900	26300	8110		
LEAD	8.0	7.0	12.0	9.0		
MAGNESIUM	2240	2820	931	752		
MANGANESE	543	87.0	25.0	35.0		
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U		
NICKEL	27.0	26.0	10.0	8.0		
POTASSIUM	500 U	1290	704	599		
SILVER	1.0 U	1.0 U	1.0 U	1.0 U		
SODIUM	500 U	500 U	500 U	500 U		
VANADIUM	18.0	19.0	29.0	21.0		
ZINC	48.0	61.0	36.0	22.0		

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	42SS-12 03/92 42SS12	42SS-13 03/92 42SS13	42SS-13D 03/92 42SS13	42SS-5 NA 42SS5	42SS-6 NA 42SS6	
VOLATILES (µg/kg)						
1,2-DICHLOROETHENE (TOTAL)	15 U	19 U	17 U	10 U	10 U	
2-BUTANONE	15 U	32	17 U	10 U	10 U	
ACETONE	15 U	35	80	10 U	194	
CHLOROBENZENE	15 U	19 U	17 U	10 U	10 U	
ETHYLBENZENE	15 U	19 U	17 U	10 U	10 U	
METHYLENE CHLORIDE	15 U	19 U	17 U	10 U	10 U	
TOLUENE	15 U	19 U	17 U	10 U	10 U	
TRICHLOROETHENE	15 U	19 U	17 U	10 U	10 U	
XYLENES, TOTAL	15 U	19 U	17 U	10 U	10 U	
SEMIVOLATILES (µg/kg)						
1,4-DICHLOROBENZENE	500 U	630 U	560 U	330 U	330 U	
2-METHYLNAPHTHALENE	500 U	630 U	560 U	330 U	330 U	
4-METHYLPHENOL	500 U	630 U	560 U	330 U	330 U	
ACENAPHTHENE	500 U	630 U	560 U	330 U	330 U	
BENZO(A)ANTHRACENE	500 U	630 U	560 U	330 U	330 U	
BENZO(A)PYRENE	500 U	630 U	560 U	330 U	330 U	
BENZO(B)FLUORANTHENE	500 U	630 U	560 U	330 U	330 U	
BENZO(G,H,I)PERYLENE	500 U	630 U	560 U	330 U	330 U	
BENZO(K)FLUORANTHENE	500 U	630 U	560 U	330 U	330 U	
BIS(2-ETHYLHEXYL)PHTHALATE	4100 B	5700 B	2400 B	330 U	330 U	
CHRYSENE	500 U	630 U	560 U	330 U	330 U	
DI-N-BUTYL PHTHALATE	500 U	630 U	560 U	250	330 U	
DI-N-OCTYL PHTHALATE	500 U	630 U	560 U	330 U	330 U	
DIBENZOFURAN	500 U	630 U	560 U	330 U	330 U	
DIETHYL PHTHALATE	500 U	630 U	560 U	330 U	330 U	
FLUORANTHENE	500 U	630 U	560 U	330 U	330 U	
FLUORENE	500 U	630 U	560 U	330 U	330 U	

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	42SS-12	42SS-13	42SS-13D	42SS-5	42SS-6	
SAMPLE DATE:	03/92	03/92	03/92	NA	NA	
LOCATION:	42SS12	42SS13	42SS13	42SS5	42SS6	
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
INDENO(1,2,3-CD)PYRENE	500 U	630 U	560 U	330 U	330 U	
NAPHTHALENE	500 U	630 U	560 U	330 U	330 U	
PHENANTHRENE	500 U	630 U	560 U	330 U	330 U	
PYRENE	500 U	630 U	560 U	330 U	330 U	
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	5 U	6.3 U	5.6 U	3.3 U	3.3 U	
4,4'-DDE	5 U	8.4 P	5.6 U	3.3 U	3.3 U	
4,4'-DDT	5 U	16	5.6 U	3.3 U	3.3 U	
ALPHA-CHLORDANE	2.5 U	3.1 U	2.8 U	1.7 U	1.7 U	
BETA-BHC	2.5 U	3.1 U	2.8 U	1.7 U	1.7 U	
DELTA-BHC	2.5 U	6.3 U	2.8 U	1.7 U	1.7 U	
DIELDRIN	5 U	3.1 U	5.6 U	3.3 U	3.3 U	
ENDOSULFAN I	2.5 U	3.1 U	2.8 U	1.7 U	5	
ENDOSULFAN II	5 U	3.1 U	5.6 U	3.3 U	3.3 U	
ENDOSULFAN SULFATE	5 U	6.3 U	5.6 U	3.3 U	3.3 U	
ENDRIN	5 U	6.3 U	5.6 U	3.3 U	3.3 U	
GAMMA-BHC (LINDANE)	2.5 U	3.1 U	2.8 U	1.7 U	1.7 U	
GAMMA-CHLORDANE	2.5 U	3.1 U	2.8 U	1.7 U	1.7 U	
HEPTACHLOR EPOXIDE	2.5 U	3.1 U	2.8 U	1.7 U	1.7 U	
METHOXYCHLOR	25 U	31 U	28 U	17 U	17 U	
METALS (mg/kg)						
ALUMINUM	6990	9950	8180	8630	7240	
ARSENIC	3.5	3.2 B	1.4 B	10 U	10 U	
BARIUM	43 B	98.1	82	55	90	
BERYLLIUM	0.58 U	1.1 B	0.78 B	0.5 U	0.5 U	
CADMIUM	0.29 U	0.37 U	0.33 U	1 U	4	
CALCIUM	284 B	647 B	814 B	2880	2120	

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	42SS-12 03/92 42SS12	42SS-13 03/92 42SS13	42SS-13D 03/92 42SS13	42SS-5 NA 42SS5	42SS-6 NA 42SS6	
METALS (mg/kg)						
CHROMIUM	15.2	12.3	11.3	16	9	
COBALT	6.4 B	19.5	12.3 B	5 U	5 U	
COPPER	9.6	8.8 B	11.3	13	28	
CYANIDE	1.9 U	0.5 U	2.1 U	0.5 U	0.5 U	
IRON	18000	11600	9680	10900	2120	
LEAD	12.2	33.8	29.4	59	17	
MAGNESIUM	615 B	794 B	681 B	1000 U	918	
MANGANESE	346	245	215	270	166	
MERCURY	0.14 U	0.1 U	0.17 U	0.1	0.1 U	
NICKEL	7.6 B	15.2	13.3	10	18	
POTASSIUM	615 B	651 B	586 B	1000 U	901	
SELENIUM	0.3 U	0.55 B	0.52 B	5 U	5 U	
SILVER	13.7	3.6 B	7.3	10	99	
SODIUM	65 B	88.3 B	90.7 B	500 U	500 U	
VANADIUM	23.8	23.5	21.8	23	21	
ZINC	38.8	50.7	49.4	104	171	

APPENDIX H.1.3

SITE 44 HISTORICAL ANALYTICAL DATABASE

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB0101	44SB0401	44SB0201			
DEPTH (feet):	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'			
SAMPLE DATE:	08/92	08/92	08/92			
LOCATION:	44MW01/44SB01	44MW02/44SB04	44SB02			
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	11 U	11 U	11 U			
1,1,2,2-TETRACHLOROETHANE	11 U	11 U	11 U			
1,1,2-TRICHLOROETHANE	11 U	11 U	11 U			
1,1-DICHLOROETHANE	11 U	11 U	11 U			
1,1-DICHLOROETHENE	11 U	11 U	11 U			
1,2-DICHLOROETHANE	11 U	11 U	11 U			
1,2-DICHLOROETHENE (TOTAL)	11 U	11 U	11 U			
1,2-DICHLOROPROPANE	11 U	11 U	11 U			
2-BUTANONE	4 U	3 U	3 U			
2-HEXANONE	11 U	11 U	11 U			
4-METHYL-2-PENTANONE	11 U	11 U	11 U			
ACETONE	11 UJ	14 UJ	11 UJ			
BENZENE	11 U	11 U	11 U			
BROMODICHLOROMETHANE	11 U	11 U	11 U			
BROMOFORM	11 U	11 U	11 U			
BROMOMETHANE	11 U	11 U	11 U			
CARBON DISULFIDE	11 U	11 U	11 U			
CARBON TETRACHLORIDE	11 U	11 U	11 U			
CHLOROBENZENE	11 U	11 U	11 U			
CHLOROETHANE	11 U	11 U	11 U			
CHLOROFORM	11 U	11 U	11 U			
CHLOROMETHANE	11 U	11 U	11 U			
CIS-1,3-DICHLOROPROPENE	11 U	11 U	11 U			
DIBROMOCHLOROMETHANE	11 U	11 U	11 U			
ETHYLBENZENE	11 U	11 U	11 U			
HEXACHLOROBUTADIENE	410 U	430 U	360 U			

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB0101	44SB0401	44SB0201			
DEPTH (feet):	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'			
SAMPLE DATE:	08/92	08/92	08/92			
LOCATION:	44MW01/44SB01	44MW02/44SB04	44SB02			
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	2 U	11 U	2 U			
STYRENE	11 U	11 U	11 U			
TETRACHLOROETHENE	11 U	11 U	11 U			
TOLUENE	11 U	11 U	11 U			
TRANS-1,3-DICHLOROPROPENE	11 U	11 U	11 U			
TRICHLOROETHENE	11 U	11 U	11 U			
VINYL CHLORIDE	11 U	11 U	11 U			
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	410 U	430 U	360 U			
1,2-DICHLOROBENZENE	410 U	430 U	360 U			
1,3-DICHLOROBENZENE	410 U	430 U	360 U			
1,4-DICHLOROBENZENE	410 U	430 U	360 U			
2,2'-OXYBIS(1-CHLOROPROPANE)	410 U	430 U	360 U			
2,4,5-TRICHLOROPHENOL	990 U	1000 U	870 U			
2,4,6-TRICHLOROPHENOL	410 U	430 U	360 U			
2,4-DICHLOROPHENOL	410 U	430 U	360 U			
2,4-DIMETHYLPHENOL	410 U	430 U	360 U			
2,4-DINITROPHENOL	990 U	1000 U	870 U			
2,4-DINITROTOLUENE	410 U	430 U	360 U			
2,6-DINITROTOLUENE	410 U	430 U	360 U			
2-CHLORONAPHTHALENE	410 U	430 U	360 U			
2-CHLOROPHENOL	410 U	430 U	360 U			
2-METHYLNAPHTHALENE	410 U	430 U	360 U			
2-METHYLPHENOL	410 U	430 U	360 U			
2-NITROANILINE	990 U	1000 U	870 U			
2-NITROPHENOL	410 U	430 U	360 U			

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	44SB0101 0.0 - 1.0' 08/92 44MW01/44SB01	44SB0401 0.0 - 1.0' 08/92 44MW02/44SB04	44SB0201 0.0 - 1.0' 08/92 44SB02			
SEMIVOLATILES (µg/kg)						
3,3'-DICHLOROBENZIDINE	410 U	430 U	360 U			
3-NITROANILINE	990 U	1000 U	870 U			
4,6-DINITRO-2-METHYLPHENOL	990 U	1000 U	870 U			
4-BROMOPHENYL PHENYL ETHER	410 U	430 U	360 U			
4-CHLORO-3-METHYLPHENOL	410 U	430 U	360 U			
4-CHLOROANILINE	410 U	430 U	360 U			
4-CHLOROPHENYL PHENYL ETHER	410 U	430 U	360 U			
4-METHYLPHENOL	410 U	430 U	360 U			
4-NITROANILINE	990 U	1000 U	870 U			
4-NITROPHENOL	990 U	1000 U	870 U			
ACENAPHTHENE	410 U	430 U	360 U			
ACENAPHTHYLENE	410 U	430 U	360 U			
ANTHRACENE	410 U	430 U	360 U			
BENZO(A)ANTHRACENE	410 U	430 U	360 U			
BENZO(A)PYRENE	410 U	430 U	360 U			
BENZO(B)FLUORANTHENE	410 U	430 U	360 U			
BENZO(G,H,I)PERYLENE	410 U	430 U	360 U			
BENZO(K)FLUORANTHENE	410 U	430 U	360 U			
BIS(2-CHLOROETHOXY)METHANE	410 U	430 U	360 U			
BIS(2-CHLOROETHYL)ETHER	410 U	430 U	360 U			
BIS(2-ETHYLHEXYL)PHTHALATE	410 U	430 U	56 U			
BUTYLBENZYL PHTHALATE	410 U	430 U	360 U			
CARBAZOLE	410 U	430 U	360 U			
CHRYSENE	410 U	430 U	360 U			
DI-N-BUTYL PHTHALATE	410 U	430 U	360 U			
DI-N-OCTYL PHTHALATE	410 U	430 U	360 U			

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	44SB0101 0.0 - 1.0' 08/92 44MW01/44SB01	44SB0401 0.0 - 1.0' 08/92 44MW02/44SB04	44SB0201 0.0 - 1.0' 08/92 44SB02			
SEMIVOLATILES (µg/kg)						
DIBENZO(A,H)ANTHRACENE	410 U	430 U	360 U			
DIBENZOFURAN	410 U	430 U	360 U			
DIETHYL PHTHALATE	410 U	430 U	360 U			
DIMETHYL PHTHALATE	410 U	430 U	360 U			
FLUORANTHENE	410 U	430 U	360 U			
FLUORENE	410 U	430 U	360 U			
HEXACHLOROBENZENE	410 U	430 U	360 U			
HEXACHLOROCYCLOPENTADIENE	410 U	430 U	360 U			
HEXACHLOROETHANE	410 U	430 U	360 U			
INDENO(1,2,3-CD)PYRENE	410 U	430 U	360 U			
ISOPHORONE	410 U	430 U	360 U			
N-NITROSO-DI-N-PROPYLAMINE	410 U	430 U	360 U			
N-NITROSODIPHENYLAMINE	410 U	430 U	360 U			
NAPHTHALENE	410 U	430 U	360 U			
NITROBENZENE	410 U	430 U	360 U			
PENTACHLOROPHENOL	990 U	1000 U	870 U			
PHENANTHRENE	410 U	430 U	360 U			
PHENOL	410 U	430 U	360 U			
PYRENE	410 U	430 U	360 U			
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	11 U	14.6	10.8 U			

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB0103	44SB0104	44SB0402	44SB0403	44SB0502	44SB0503
DEPTH (feet):	10.0 - 12.	15.0 - 17.	5.0 - 7.0'	10.0 - 12.	5.0 - 7.0'	10.0 - 12.
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	44MW01/44SB01	44MW01/44SB01	44MW02/44SB04	44MW02/44SB04	44MW03/44SB05	44MW03/44SB05
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	11 U	14 U	12 U	13 U	12 U	13 U
1,1,2,2-TETRACHLOROETHANE	11 U	14 U	12 U	13 U	12 U	13 U
1,1,2-TRICHLOROETHANE	11 U	14 U	12 U	13 U	12 U	13 U
1,1-DICHLOROETHANE	11 U	14 U	12 U	13 U	12 U	13 U
1,1-DICHLOROETHENE	11 U	14 U	12 U	13 U	12 U	13 U
1,2-DICHLOROETHANE	11 U	14 U	12 U	13 U	12 U	13 U
1,2-DICHLOROETHENE (TOTAL)	11 U	14 U	12 U	13 U	12 U	13 U
1,2-DICHLOROPROPANE	11 U	14 U	12 U	13 U	12 U	13 U
2-BUTANONE	4 U	26 U	12 U	13 U	3 U	5 U
2-HEXANONE	11 U	14 U	12 U	13 U	12 U	13 U
4-METHYL-2-PENTANONE	11 U	14 U	12 U	13 U	12 U	13 U
ACETONE	21 UJ	100 UJ	21 UJ	15 UJ	15 U	21 U
BENZENE	11 U	14 U	12 U	13 U	12 U	13 U
BROMODICHLOROMETHANE	11 U	14 U	12 U	13 U	12 U	13 U
BROMOFORM	11 U	14 U	12 U	13 U	12 U	13 U
BROMOMETHANE	11 U	14 U	12 U	13 U	12 U	13 U
CARBON DISULFIDE	11 U	14 U	12 U	13 U	12 U	13 U
CARBON TETRACHLORIDE	11 U	14 U	12 U	13 U	12 U	13 U
CHLOROBENZENE	11 U	14 U	12 U	13 U	12 U	13 U
CHLOROETHANE	11 U	14 U	12 U	13 U	12 U	13 U
CHLOROFORM	11 U	14 U	12 U	13 U	12 U	13 U
CHLOROMETHANE	11 U	14 U	12 U	13 U	12 U	13 U
CIS-1,3-DICHLOROPROPENE	11 U	14 U	12 U	13 U	12 U	13 U
DIBROMOCHLOROMETHANE	11 U	14 U	12 U	13 U	12 U	13 U
ETHYLBENZENE	11 U	14 U	12 U	13 U	12 U	13 U
HEXACHLOROBUTADIENE	450 U	480 U	380 U	430 U	380 U	460 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB0103	44SB0104	44SB0402	44SB0403	44SB0502	44SB0503
DEPTH (feet):	10.0 - 12.	15.0 - 17.	5.0 - 7.0'	10.0 - 12.	5.0 - 7.0'	10.0 - 12.
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	44MW01/44SB01	44MW01/44SB01	44MW02/44SB04	44MW02/44SB04	44MW03/44SB05	44MW03/44SB05
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	2 U	14 U	12 U	13 U	12 U	2 U
STYRENE	11 U	14 U	12 U	13 U	12 U	13 U
TETRACHLOROETHENE	11 U	14 U	12 U	13 U	12 U	13 U
TOLUENE	11 U	14 U	12 U	13 U	12 U	13 U
TRANS-1,3-DICHLOROPROPENE	11 U	14 U	12 U	13 U	12 U	13 U
TRICHLOROETHENE	11 U	14 U	12 U	13 U	12 U	13 U
VINYL CHLORIDE	11 U	14 U	12 U	13 U	12 U	13 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	450 U	480 U	380 U	430 U	380 U	460 U
1,2-DICHLOROBENZENE	450 U	480 U	380 U	430 U	380 U	460 U
1,3-DICHLOROBENZENE	450 U	480 U	380 U	430 U	380 U	460 U
1,4-DICHLOROBENZENE	450 U	480 U	380 U	430 U	380 U	460 U
2,2'-OXYBIS(1-CHLOROPROPANE)	450 U	480 U	380 U	430 U	380 U	460 U
2,4,5-TRICHLOROPHENOL	1100 U	1200 U	930 U	1000 U	930 U	1100 U
2,4,6-TRICHLOROPHENOL	450 U	480 U	380 U	430 U	380 U	460 U
2,4-DICHLOROPHENOL	450 U	480 U	380 U	430 U	380 U	460 U
2,4-DIMETHYLPHENOL	450 U	480 U	380 U	430 U	380 U	460 U
2,4-DINITROPHENOL	1100 U	1200 U	930 U	1000 U	930 U	1100 U
2,4-DINITROTOLUENE	450 U	480 U	380 U	430 U	380 U	460 U
2,6-DINITROTOLUENE	450 U	480 U	380 U	430 U	380 U	460 U
2-CHLORONAPHTHALENE	450 U	480 U	380 U	430 U	380 U	460 U
2-CHLOROPHENOL	450 U	480 U	380 U	430 U	380 U	460 U
2-METHYLNAPHTHALENE	450 U	480 U	380 U	430 U	380 U	460 U
2-METHYLPHENOL	450 U	480 U	380 U	430 U	380 U	460 U
2-NITROANILINE	1100 U	1200 U	930 U	1000 U	930 U	1100 U
2-NITROPHENOL	450 U	480 U	380 U	430 U	380 U	460 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB0103	44SB0104	44SB0402	44SB0403	44SB0502	44SB0503
DEPTH (feet):	10.0 - 12.	15.0 - 17.	5.0 - 7.0'	10.0 - 12.	5.0 - 7.0'	10.0 - 12.
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	44MW01/44SB01	44MW01/44SB01	44MW02/44SB04	44MW02/44SB04	44MW03/44SB05	44MW03/44SB05
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
3,3'-DICHLOROBENZIDINE	450 U	480 U	380 U	430 U	380 U	460 U
3-NITROANILINE	1100 U	1200 U	930 U	1000 U	930 U	1100 U
4,6-DINITRO-2-METHYLPHENOL	1100 U	1200 U	930 U	1000 U	930 U	1100 U
4-BROMOPHENYL PHENYL ETHER	450 U	480 U	380 U	430 U	380 U	460 U
4-CHLORO-3-METHYLPHENOL	450 U	480 U	380 U	430 U	380 U	460 U
4-CHLOROANILINE	450 U	480 U	380 U	430 U	380 U	460 U
4-CHLOROPHENYL PHENYL ETHER	450 U	480 U	380 U	430 U	380 U	460 U
4-METHYLPHENOL	450 U	480 U	380 U	430 U	380 U	460 U
4-NITROANILINE	1100 U	1200 U	930 U	1000 U	930 U	1100 U
4-NITROPHENOL	1100 U	1200 U	930 U	1000 U	930 U	1100 U
ACENAPHTHENE	450 U	480 U	380 U	430 U	380 U	460 U
ACENAPHTHYLENE	450 U	480 U	380 U	430 U	380 U	460 U
ANTHRACENE	450 U	480 U	380 U	430 U	380 U	460 U
BENZO(A)ANTHRACENE	450 U	480 U	380 U	430 U	380 U	460 U
BENZO(A)PYRENE	450 U	480 U	380 U	430 U	380 U	460 U
BENZO(B)FLUORANTHENE	450 U	480 U	380 U	430 U	380 U	460 U
BENZO(G,H,I)PERYLENE	450 U	480 U	380 U	430 U	380 U	460 U
BENZO(K)FLUORANTHENE	450 U	480 U	380 U	430 U	380 U	460 U
BIS(2-CHLOROETHOXY)METHANE	450 U	480 U	380 U	430 U	380 U	460 U
BIS(2-CHLOROETHYL)ETHER	450 U	480 U	380 U	430 U	380 U	460 U
BIS(2-ETHYLHEXYL)PHTHALATE	150 U	1900 U	380 U	430 U	380 U	460 U
BUTYLBENZYL PHTHALATE	450 U	480 U	380 U	430 U	380 U	460 U
CARBAZOLE	450 U	480 U	380 U	430 U	380 U	460 U
CHRYSENE	450 U	480 U	380 U	430 U	380 U	460 U
DI-N-BUTYL PHTHALATE	450 U	480 U	380 U	430 U	380 U	460 U
DI-N-OCTYL PHTHALATE	450 U	480 U	380 U	430 U	380 U	460 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB0103	44SB0104	44SB0402	44SB0403	44SB0502	44SB0503
DEPTH (feet):	10.0 - 12.	15.0 - 17.	5.0 - 7.0'	10.0 - 12.	5.0 - 7.0'	10.0 - 12.
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	44MW01/44SB01	44MW01/44SB01	44MW02/44SB04	44MW02/44SB04	44MW03/44SB05	44MW03/44SB05
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
DIBENZO(A,H)ANTHRACENE	450 U	480 U	380 U	430 U	380 U	460 U
DIBENZOFURAN	450 U	480 U	380 U	430 U	380 U	460 U
DIETHYL PHTHALATE	450 U	480 U	380 U	430 U	380 U	460 U
DIMETHYL PHTHALATE	450 U	480 U	380 U	430 U	380 U	460 U
FLUORANTHENE	450 U	480 U	380 U	430 U	380 U	460 U
FLUORENE	450 U	480 U	380 U	430 U	380 U	460 U
HEXACHLOROBENZENE	450 U	480 U	380 U	430 U	380 U	460 U
HEXACHLOROCYCLOPENTADIENE	450 U	480 U	380 U	430 U	380 U	460 U
HEXACHLOROETHANE	450 U	480 U	380 U	430 U	380 U	460 U
INDENO(1,2,3-CD)PYRENE	450 U	480 U	380 U	430 U	380 U	460 U
ISOPHORONE	450 U	480 U	380 U	430 U	380 U	460 U
N-NITROSO-DI-N-PROPYLAMINE	450 U	480 U	380 U	430 U	380 U	460 U
N-NITROSODIPHENYLAMINE	450 U	480 U	380 U	430 U	380 U	460 U
NAPHTHALENE	450 U	480 U	380 U	430 U	380 U	460 U
NITROBENZENE	450 U	480 U	380 U	430 U	380 U	460 U
PENTACHLOROPHENOL	1100 U	1200 U	930 U	1000 U	930 U	1100 U
PHENANTHRENE	450 U	480 U	380 U	430 U	380 U	460 U
PHENOL	450 U	480 U	380 U	430 U	380 U	460 U
PYRENE	450 U	480 U	380 U	430 U	380 U	460 U
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	12.2 U	14.3 U	11.5 U	12.7 U	12 U	14 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB053D	44SB0504	44SB054D	44SB0202	44SB0203	44SB0302
DEPTH (feet):	10.0 - 12.	15.0 - 17.	15.0 - 17.	5.0 - 7.0'	10.0 - 12.	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	44MW03/44SB05	44MW03/44SB05	44MW03/44SB05	44SB02	44SB02	44SB03
FIELD DUPLICATE OF:	44SB0503		44SB0504			
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	13 U	13 U	13 U	12 U	12 U	12 U
1,1,2,2-TETRACHLOROETHANE	13 U	13 U	13 U	12 U	12 U	12 U
1,1,2-TRICHLOROETHANE	13 U	13 U	13 U	12 U	12 U	12 U
1,1-DICHLOROETHANE	13 U	13 U	13 U	12 U	12 U	12 U
1,1-DICHLOROETHENE	13 U	13 U	13 U	12 U	12 U	12 U
1,2-DICHLOROETHANE	13 U	13 U	13 U	12 U	12 U	12 U
1,2-DICHLOROETHENE (TOTAL)	13 U	13 U	13 U	12 U	12 U	12 U
1,2-DICHLOROPROPANE	13 U	13 U	13 U	12 U	12 U	12 U
2-BUTANONE	6 U	16 U	16 U	3 U	3 U	12 U
2-HEXANONE	13 U	13 U	13 U	12 U	12 U	12 U
4-METHYL-2-PENTANONE	13 U	13 U	13 U	12 U	12 U	12 U
ACETONE	26 U	68 U	66 U	22 UJ	31 UJ	20 UJ
BENZENE	13 U	13 U	13 U	12 U	12 U	12 U
BROMODICHLOROMETHANE	13 U	13 U	13 U	12 U	12 U	12 U
BROMOFORM	13 U	13 U	13 U	12 U	12 U	12 U
BROMOMETHANE	13 U	13 U	13 U	12 U	12 U	12 U
CARBON DISULFIDE	13 U	13 U	13 U	12 U	12 U	12 U
CARBON TETRACHLORIDE	13 U	13 U	13 U	12 U	12 U	12 U
CHLOROBENZENE	13 U	13 U	13 U	12 U	12 U	12 U
CHLOROETHANE	13 U	13 U	13 U	12 U	12 U	12 U
CHLOROFORM	13 U	13 U	13 U	12 U	12 U	12 U
CHLOROMETHANE	13 U	13 U	13 U	12 U	12 U	12 U
CIS-1,3-DICHLOROPROPENE	13 U	13 U	13 U	12 U	12 U	12 U
DIBROMOCHLOROMETHANE	13 U	13 U	13 U	12 U	12 U	12 U
ETHYLBENZENE	13 U	13 U	13 U	12 U	12 U	12 U
HEXACHLOROBUTADIENE	470 U	450 U	450 U	350 U	480 U	400 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB053D	44SB0504	44SB054D	44SB0202	44SB0203	44SB0302
DEPTH (feet):	10.0 - 12.	15.0 - 17.	15.0 - 17.	5.0 - 7.0'	10.0 - 12.	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	44MW03/44SB05	44MW03/44SB05	44MW03/44SB05	44SB02	44SB02	44SB03
FIELD DUPLICATE OF:	44SB0503		44SB0504			
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	2 U	2 U	2 U	2 U	12 U	12 U
STYRENE	13 U	13 U	13 U	12 U	12 U	12 U
TETRACHLOROETHENE	13 U	13 U	13 U	12 U	12 U	12 U
TOLUENE	13 U	13 U	13 U	12 U	12 U	12 U
TRANS-1,3-DICHLOROPROPENE	13 U	13 U	13 U	12 U	12 U	12 U
TRICHLOROETHENE	13 U	13 U	13 U	12 U	12 U	12 U
VINYL CHLORIDE	13 U	13 U	13 U	12 U	12 U	12 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	470 U	450 U	450 U	350 U	480 U	400 U
1,2-DICHLOROBENZENE	470 U	450 U	450 U	350 U	480 U	400 U
1,3-DICHLOROBENZENE	470 U	450 U	450 U	350 U	480 U	400 U
1,4-DICHLOROBENZENE	470 U	450 U	450 U	350 U	480 U	400 U
2,2'-OXYBIS(1-CHLOROPROPANE)	470 U	450 U	450 U	350 U	480 U	400 U
2,4,5-TRICHLOROPHENOL	1100 U	1100 U	1100 U	850 U	1200 U	970 U
2,4,6-TRICHLOROPHENOL	470 U	450 U	450 U	350 U	480 U	400 U
2,4-DICHLOROPHENOL	470 U	450 U	450 U	350 U	480 U	400 U
2,4-DIMETHYLPHENOL	470 U	450 U	450 U	350 U	480 U	400 U
2,4-DINITROPHENOL	1100 U	1100 U	1100 U	850 U	1200 U	970 U
2,4-DINITROTOLUENE	470 U	450 U	450 U	350 U	480 U	400 U
2,6-DINITROTOLUENE	470 U	450 U	450 U	350 U	480 U	400 U
2-CHLORONAPHTHALENE	470 U	450 U	450 U	350 U	480 U	400 U
2-CHLOROPHENOL	470 U	450 U	450 U	350 U	480 U	400 U
2-METHYLNAPHTHALENE	470 U	450 U	450 U	350 U	480 U	400 U
2-METHYLPHENOL	470 U	450 U	450 U	350 U	480 U	400 U
2-NITROANILINE	1100 U	1100 U	1100 U	850 U	1200 U	970 U
2-NITROPHENOL	470 U	450 U	450 U	350 U	480 U	400 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB053D	44SB0504	44SB054D	44SB0202	44SB0203	44SB0302
DEPTH (feet):	10.0 - 12.	15.0 - 17.	15.0 - 17.	5.0 - 7.0'	10.0 - 12.	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	44MW03/44SB05	44MW03/44SB05	44MW03/44SB05	44SB02	44SB02	44SB03
FIELD DUPLICATE OF:	44SB0503		44SB0504			
SEMIVOLATILES (µg/kg)						
3,3'-DICHLOROBENZIDINE	470 U	450 U	450 U	350 U	480 U	400 U
3-NITROANILINE	1100 U	1100 U	1100 U	850 U	1200 U	970 U
4,6-DINITRO-2-METHYLPHENOL	1100 U	1100 U	1100 U	850 U	1200 U	970 U
4-BROMOPHENYL PHENYL ETHER	470 U	450 U	450 U	350 U	480 U	400 U
4-CHLORO-3-METHYLPHENOL	470 U	450 U	450 U	350 U	480 U	400 U
4-CHLOROANILINE	470 U	450 U	450 U	350 U	480 U	400 U
4-CHLOROPHENYL PHENYL ETHER	470 U	450 U	450 U	350 U	480 U	400 U
4-METHYLPHENOL	470 U	450 U	450 U	350 U	480 U	400 U
4-NITROANILINE	1100 U	1100 U	1100 U	850 U	1200 U	970 U
4-NITROPHENOL	1100 U	1100 U	1100 U	850 U	1200 U	970 U
ACENAPHTHENE	470 U	450 U	450 U	350 U	480 U	400 U
ACENAPHTHYLENE	470 U	450 U	450 U	350 U	480 U	400 U
ANTHRACENE	470 U	450 U	450 U	350 U	480 U	400 U
BENZO(A)ANTHRACENE	470 U	450 U	450 U	350 U	480 U	400 U
BENZO(A)PYRENE	470 U	450 U	450 U	350 U	480 U	400 U
BENZO(B)FLUORANTHENE	470 U	450 U	450 U	350 U	480 U	400 U
BENZO(G,H,I)PERYLENE	470 U	450 U	450 U	350 U	480 U	400 U
BENZO(K)FLUORANTHENE	470 U	450 U	450 U	350 U	480 U	400 U
BIS(2-CHLOROETHOXY)METHANE	470 U	450 U	450 U	350 U	480 U	400 U
BIS(2-CHLOROETHYL)ETHER	470 U	450 U	450 U	350 U	480 U	400 U
BIS(2-ETHYLHEXYL)PHTHALATE	470 U	450 U	450 U	350 U	110 U	400 U
BUTYLBENZYL PHTHALATE	470 U	450 U	450 U	350 U	480 U	400 U
CARBAZOLE	470 U	450 U	450 U	350 U	480 U	400 U
CHRYSENE	470 U	450 U	450 U	350 U	480 U	400 U
DI-N-BUTYL PHTHALATE	47 U	450 U	450 U	350 U	480 U	400 U
DI-N-OCTYL PHTHALATE	470 U	450 U	450 U	350 U	480 U	400 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB053D	44SB0504	44SB054D	44SB0202	44SB0203	44SB0302
DEPTH (feet):	10.0 - 12.	15.0 - 17.	15.0 - 17.	5.0 - 7.0'	10.0 - 12.	5.0 - 7.0'
SAMPLE DATE:	08/92	08/92	08/92	08/92	08/92	08/92
LOCATION:	44MW03/44SB05	44MW03/44SB05	44MW03/44SB05	44SB02	44SB02	44SB03
FIELD DUPLICATE OF:	44SB0503		44SB0504			
SEMIVOLATILES (µg/kg)						
DIBENZO(A,H)ANTHRACENE	470 U	450 U	450 U	350 U	480 U	400 U
DIBENZOFURAN	470 U	450 U	450 U	350 U	480 U	400 U
DIETHYL PHTHALATE	470 U	450 U	450 U	350 U	480 U	400 U
DIMETHYL PHTHALATE	470 U	450 U	450 U	350 U	480 U	400 U
FLUORANTHENE	470 U	450 U	450 U	350 U	480 U	400 U
FLUORENE	470 U	450 U	450 U	350 U	480 U	400 U
HEXACHLOROBENZENE	470 U	450 U	450 U	350 U	480 U	400 U
HEXACHLOROCYCLOPENTADIENE	470 U	450 U	450 U	350 U	480 U	400 U
HEXACHLOROETHANE	470 U	450 U	450 U	350 U	480 U	400 U
INDENO(1,2,3-CD)PYRENE	470 U	450 U	450 U	350 U	480 U	400 U
ISOPHORONE	470 U	450 U	450 U	350 U	480 U	400 U
N-NITROSO-DI-N-PROPYLAMINE	470 U	450 U	450 U	350 U	480 U	400 U
N-NITROSODIPHENYLAMINE	470 U	450 U	450 U	350 U	480 U	400 U
NAPHTHALENE	470 U	450 U	450 U	350 U	480 U	400 U
NITROBENZENE	470 U	450 U	450 U	350 U	480 U	400 U
PENTACHLOROPHENOL	1100 U	1100 U	1100 U	850 U	1200 U	970 U
PHENANTHRENE	110 J	450 U	450 U	350 U	480 U	400 U
PHENOL	470 U	450 U	450 U	350 U	480 U	400 U
PYRENE	470 U	450 U	450 U	350 U	480 U	400 U
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	13.6 U	12.9 U	17	11 U	12.9 U	12.2 U

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB0303	44SB0304				
DEPTH (feet):	10.0 - 12.	15.0 - 17.				
SAMPLE DATE:	08/92	08/92				
LOCATION:	44SB03	44SB03				
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	13 U	14 U				
1,1,2,2-TETRACHLOROETHANE	13 U	14 U				
1,1,2-TRICHLOROETHANE	13 U	14 U				
1,1-DICHLOROETHANE	13 U	14 U				
1,1-DICHLOROETHENE	13 U	14 U				
1,2-DICHLOROETHANE	13 U	14 U				
1,2-DICHLOROETHENE (TOTAL)	13 U	14 U				
1,2-DICHLOROPROPANE	13 U	14 U				
2-BUTANONE	6 U	18 U				
2-HEXANONE	13 U	14 U				
4-METHYL-2-PENTANONE	13 U	14 U				
ACETONE	32 UJ	71 UJ				
BENZENE	13 U	14 U				
BROMODICHLOROMETHANE	13 U	14 U				
BROMOFORM	13 U	14 U				
BROMOMETHANE	13 U	14 U				
CARBON DISULFIDE	13 U	14 U				
CARBON TETRACHLORIDE	13 U	14 U				
CHLOROBENZENE	13 U	14 U				
CHLOROETHANE	13 U	14 U				
CHLOROFORM	13 U	14 U				
CHLOROMETHANE	13 U	14 U				
CIS-1,3-DICHLOROPROPENE	13 U	14 U				
DIBROMOCHLOROMETHANE	13 U	14 U				
ETHYLBENZENE	13 U	14 U				
HEXACHLOROBUTADIENE	400 U	530 U				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	44SB0303	44SB0304				
DEPTH (feet):	10.0 - 12.	15.0 - 17.				
SAMPLE DATE:	08/92	08/92				
LOCATION:	44SB03	44SB03				
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	13 U	14 U				
STYRENE	13 U	14 U				
TETRACHLOROETHENE	13 U	14 U				
TOLUENE	13 U	14 U				
TRANS-1,3-DICHLOROPROPENE	13 U	14 U				
TRICHLOROETHENE	13 U	14 U				
VINYL CHLORIDE	13 U	14 U				
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	400 U	530 U				
1,2-DICHLOROBENZENE	400 U	530 U				
1,3-DICHLOROBENZENE	400 U	530 U				
1,4-DICHLOROBENZENE	400 U	530 U				
2,2'-OXYBIS(1-CHLOROPROPANE)	400 U	530 U				
2,4,5-TRICHLOROPHENOL	970 U	1300 U				
2,4,6-TRICHLOROPHENOL	400 U	530 U				
2,4-DICHLOROPHENOL	400 U	530 U				
2,4-DIMETHYLPHENOL	400 U	530 U				
2,4-DINITROPHENOL	970 U	1300 U				
2,4-DINITROTOLUENE	400 U	530 U				
2,6-DINITROTOLUENE	400 U	530 U				
2-CHLORONAPHTHALENE	400 U	530 U				
2-CHLOROPHENOL	400 U	530 U				
2-METHYLNAPHTHALENE	400 U	530 U				
2-METHYLPHENOL	400 U	530 U				
2-NITROANILINE	970 U	1300 U				
2-NITROPHENOL	400 U	530 U				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	44SB0303 10.0 - 12. 08/92 44SB03	44SB0304 15.0 - 17. 08/92 44SB03				
SEMIVOLATILES (µg/kg)						
3,3'-DICHLOROBENZIDINE	400 U	530 U				
3-NITROANILINE	970 U	1300 U				
4,6-DINITRO-2-METHYLPHENOL	970 U	1300 U				
4-BROMOPHENYL PHENYL ETHER	400 U	530 U				
4-CHLORO-3-METHYLPHENOL	400 U	530 U				
4-CHLOROANILINE	400 U	530 U				
4-CHLOROPHENYL PHENYL ETHER	400 U	530 U				
4-METHYLPHENOL	400 U	530 U				
4-NITROANILINE	970 U	1300 U				
4-NITROPHENOL	970 U	1300 U				
ACENAPHTHENE	400 U	530 U				
ACENAPHTHYLENE	400 U	530 U				
ANTHRACENE	400 U	530 U				
BENZO(A)ANTHRACENE	400 U	530 U				
BENZO(A)PYRENE	400 U	530 U				
BENZO(B)FLUORANTHENE	400 U	530 U				
BENZO(G,H,I)PERYLENE	400 U	530 U				
BENZO(K)FLUORANTHENE	400 U	530 U				
BIS(2-CHLOROETHOXY)METHANE	400 U	530 U				
BIS(2-CHLOROETHYL)ETHER	400 U	530 U				
BIS(2-ETHYLHEXYL)PHTHALATE	510 U	92 U				
BUTYLBENZYL PHTHALATE	400 U	530 U				
CARBAZOLE	400 U	530 U				
CHRYSENE	400 U	530 U				
DI-N-BUTYL PHTHALATE	400 U	530 U				
DI-N-OCTYL PHTHALATE	400 U	530 U				

SUMMARY OF SUBSURFACE SOIL ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	44SB0303 10.0 - 12. 08/92 44SB03	44SB0304 15.0 - 17. 08/92 44SB03				
SEMIVOLATILES (µg/kg)						
DIBENZO(A,H)ANTHRACENE	400 U	530 U				
DIBENZOFURAN	400 U	530 U				
DIETHYL PHTHALATE	400 U	530 U				
DIMETHYL PHTHALATE	400 U	530 U				
FLUORANTHENE	400 U	61 J				
FLUORENE	400 U	530 U				
HEXACHLOROBENZENE	400 U	530 U				
HEXACHLOROCYCLOPENTADIENE	400 U	530 U				
HEXACHLOROETHANE	400 U	530 U				
INDENO(1,2,3-CD)PYRENE	400 U	530 U				
ISOPHORONE	400 U	530 U				
N-NITROSO-DI-N-PROPYLAMINE	400 U	530 U				
N-NITROSODIPHENYLAMINE	400 U	530 U				
NAPHTHALENE	400 U	530 U				
NITROBENZENE	400 U	530 U				
PENTACHLOROPHENOL	970 U	1300 U				
PHENANTHRENE	400 U	340 J				
PHENOL	400 U	530 U				
PYRENE	400 U	91 J				
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	13.2 U	14.5 U				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	44SA01 08/92 44SA01	44SA02 08/92 44SA02				
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	12 U	12 U				
1,1,2,2-TETRACHLOROETHANE	12 U	12 U				
1,1,2-TRICHLOROETHANE	12 U	12 U				
1,1-DICHLOROETHANE	12 U	12 U				
1,1-DICHLOROETHENE	12 U	12 U				
1,2-DICHLOROETHANE	12 U	12 U				
1,2-DICHLOROETHENE (TOTAL)	12 U	12 U				
1,2-DICHLOROPROPANE	12 U	12 U				
2-BUTANONE	12 U	12 U				
2-HEXANONE	12 U	12 U				
4-METHYL-2-PENTANONE	12 U	12 U				
ACETONE	460 DB	20 U				
BENZENE	12 U	12 U				
BROMODICHLOROMETHANE	12 U	12 U				
BROMOFORM	12 U	12 U				
BROMOMETHANE	12 U	12 U				
CARBON DISULFIDE	12 U	12 U				
CARBON TETRACHLORIDE	12 U	12 U				
CHLOROBENZENE	12 U	12 U				
CHLOROETHANE	12 U	12 U				
CHLOROFORM	12 U	12 U				
CHLOROMETHANE	12 U	12 U				
CIS-1,3-DICHLOROPROPENE	12 U	12 U				
DIBROMOCHLOROMETHANE	12 U	12 U				
ETHYLBENZENE	12 U	12 U				
HEXACHLOROBUTADIENE	410 U	400 U				
METHYLENE CHLORIDE	2 U	3 U				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	44SA01 08/92 44SA01	44SA02 08/92 44SA02				
VOLATILES (µg/kg)						
STYRENE	12 U	12 U				
TETRACHLOROETHENE	12 U	12 U				
TOLUENE	12 U	12 U				
TRANS-1,3-DICHLOROPROPENE	12 U	12 U				
TRICHLOROETHENE	12 U	12 U				
VINYL CHLORIDE	12 U	12 U				
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	410 U	400 U				
1,2-DICHLOROBENZENE	410 U	400 U				
1,3-DICHLOROBENZENE	410 U	400 U				
1,4-DICHLOROBENZENE	410 U	400 U				
2,2'-OXYBIS(1-CHLOROPROPANE)	410 U	400 U				
2,4,5-TRICHLOROPHENOL	1000 U	970 U				
2,4,6-TRICHLOROPHENOL	410 U	400 U				
2,4-DICHLOROPHENOL	410 U	400 U				
2,4-DIMETHYLPHENOL	410 U	400 U				
2,4-DINITROPHENOL	1000 U	970 U				
2,4-DINITROTOLUENE	410 U	400 U				
2,6-DINITROTOLUENE	410 U	400 U				
2-CHLORONAPHTHALENE	410 U	400 U				
2-CHLOROPHENOL	410 U	400 U				
2-METHYLNAPHTHALENE	410 U	400 U				
2-METHYLPHENOL	410 U	400 U				
2-NITROANILINE	10000 U	970 U				
2-NITROPHENOL	410 U	400 U				
3,3'-DICHLOROBENZIDINE	410 U	400 U				
3-NITROANILINE	1000 U	970 U				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	44SA01 08/92 44SA01	44SA02 08/92 44SA02				
SEMIVOLATILES (µg/kg)						
4,6-DINITRO-2-METHYLPHENOL	1000 U	970 U				
4-BROMOPHENYL PHENYL ETHER	410 U	400 U				
4-CHLORO-3-METHYLPHENOL	410 U	400 U				
4-CHLOROANILINE	410 U	400 U				
4-CHLOROPHENYL PHENYL ETHER	410 U	400 U				
4-METHYLPHENOL	410 U	400 U				
4-NITROANILINE	1000 U	970 U				
4-NITROPHENOL	1000 U	970 U				
ACENAPHTHENE	410 U	400 U				
ACENAPHTHYLENE	410 U	400 U				
ANTHRACENE	410 U	400 U				
BENZO(A)ANTHRACENE	410 U	400 U				
BENZO(A)PYRENE	410 U	400 U				
BENZO(B)FLUORANTHENE	410 U	400 U				
BENZO(G,H,I)PERYLENE	410 U	400 U				
BENZO(K)FLUORANTHENE	410 U	400 U				
BIS(2-CHLOROETHOXY)METHANE	410 U	400 U				
BIS(2-CHLOROETHYL)ETHER	410 U	400 U				
BIS(2-ETHYLHEXYL)PHTHALATE	410 U	400 U				
BUTYLBENZYL PHTHALATE	410 U	400 U				
CARBAZOLE	410 U	400 U				
CHRYSENE	410 U	400 U				
DI-N-BUTYL PHTHALATE	410 U	400 U				
DI-N-OCTYL PHTHALATE	410 U	400 U				
DIBENZO(A,H)ANTHRACENE	410 U	400 U				
DIBENZOFURAN	410 U	400 U				
DIETHYL PHTHALATE	410 U	400 U				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - HISTORICAL DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	44SA01 08/92 44SA01	44SA02 08/92 44SA02				
SEMIVOLATILES (µg/kg)						
DIMETHYL PHTHALATE	410 U	400 U				
FLUORANTHENE	410 U	400 U				
FLUORENE	410 U	400 U				
HEXACHLOROBENZENE	410 U	400 U				
HEXACHLOROCYCLOPENTADIENE	410 U	400 U				
HEXACHLOROETHANE	410 U	400 U				
INDENO(1,2,3-CD)PYRENE	410 U	400 U				
ISOPHORONE	410 U	400 U				
N-NITROSO-DI-N-PROPYLAMINE	410 U	400 U				
N-NITROSODIPHENYLAMINE	410 U	400 U				
NAPHTHALENE	410 U	400 U				
NITROBENZENE	410 U	400 U				
PENTACHLOROPHENOL	1000 U	970 U				
PHENANTHRENE	410 U	400 U				
PHENOL	410 U	400 U				
PYRENE	410 U	400 U				
PETROLEUM HYDROCARBONS (mg/kg)						
TOTAL PETROLEUM HYDROCARBONS	12.6 U	12.1 U				

APPENDIX H.2

OCTOBER 1997 ANALYTICAL DATABASE

Appendix H.2.1 Site 12 October 1997 Analytical Database
Appendix H.2.2 Site 39/41 October 1997 Analytical Database
Appendix H.2.3 Site 42 October 1997 Analytical Database
Appendix H.2.4 Site 44 October 1997 Analytical Database

APPENDIX H.2.1

SITE 12 OCTOBER 1997 ANALYTICAL DATABASE

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SS0010001 0.0 - 0.5' 10/20/97 S12SS01	S12SS0020001 0.0 - 0.5' 10/20/97 S12SS02	S12SS0030001 0.0 - 0.5' 10/20/97 S12SS03	S12SS0040001 0.0 - 0.5' 10/20/97 S12SS04	S12SS0050001 0.0 - 0.5' 10/20/97 S12SS05	
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	16 U	14 U	16 U	17 U	18 U	
1,1,2,2-TETRACHLOROETHANE	16 U	14 U	16 U	17 U	18 U	
1,1,2-TRICHLOROETHANE	16 U	14 U	16 U	17 U	18 U	
1,1-DICHLOROETHANE	16 U	14 U	16 U	17 U	18 U	
1,1-DICHLOROETHENE	16 U	14 U	16 U	17 U	18 U	
1,2-DICHLOROETHANE	16 U	14 U	16 U	17 U	18 U	
1,2-DICHLOROETHENE (TOTAL)	16 U	14 U	16 U	17 U	18 U	
1,2-DICHLOROPROPANE	16 U	14 U	16 U	17 U	18 U	
2-BUTANONE	16 U	14 U	16 U	17 U	18 U	
2-HEXANONE	16 U	14 U	16 U	17 U	18 U	
4-METHYL-2-PENTANONE	16 U	14 U	16 U	17 U	18 U	
ACETONE	16 U	14 U	16 U	17 U	18 U	
BENZENE	16 U	14 U	16 U	17 U	18 U	
BROMODICHLOROMETHANE	16 U	14 U	16 U	17 U	18 U	
BROMOFORM	16 U	14 U	16 U	17 U	18 U	
BROMOMETHANE	16 U	14 U	16 U	17 U	18 U	
CARBON DISULFIDE	16 UJ	14 UJ	16 UJ	17 UJ	18 UJ	
CARBON TETRACHLORIDE	16 U	14 U	16 U	17 U	18 U	
CHLOROBENZENE	16 U	14 U	16 U	17 U	18 U	
CHLOROETHANE	16 U	14 U	16 U	17 U	18 U	
CHLOROFORM	16 U	14 U	16 U	17 U	18 U	
CHLOROMETHANE	16 U	14 U	16 U	17 U	18 U	
CIS-1,3-DICHLOROPROPENE	16 U	14 U	16 U	17 U	18 U	
DIBROMOCHLOROMETHANE	16 U	14 U	16 U	17 U	18 U	
ETHYLBENZENE	16 U	14 U	16 U	17 U	18 U	
HEXACHLOROBUTADIENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12SS0010001	S12SS0020001	S12SS0030001	S12SS0040001	S12SS0050001	
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
SAMPLE DATE:	10/20/97	10/20/97	10/20/97	10/20/97	10/20/97	
LOCATION:	S12SS01	S12SS02	S12SS03	S12SS04	S12SS05	
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	11 B	3 B	4 B	3 B	13 B	
STYRENE	16 U	14 U	16 U	17 UJ	18 U	
TETRACHLOROETHENE	16 U	14 U	16 U	17 U	18 U	
TOLUENE	16 U	14 U	16 U	17 U	18 U	
TRANS-1,3-DICHLOROPROPENE	16 U	14 U	16 U	17 U	18 U	
TRICHLOROETHENE	16 U	14 U	16 U	17 U	18 U	
VINYL CHLORIDE	16 U	14 U	16 U	17 U	18 U	
XYLENES, TOTAL	16 U	14 U	16 U	17 UJ	18 U	
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
1,2-DICHLOROBENZENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
1,3-DICHLOROBENZENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
1,4-DICHLOROBENZENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2,2'-OXYBIS(1-CHLOROPROPANE)	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2,4,5-TRICHLOROPHENOL	1300 UJ	1200 UJ	1300 UJ	1400 UJ	1500 UJ	
2,4,6-TRICHLOROPHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2,4-DICHLOROPHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2,4-DIMETHYLPHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2,4-DINITROPHENOL	1300 UJ	1200 UJ	1300 UJ	1400 UJ	1500 UJ	
2,4-DINITROTOLUENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2,6-DINITROTOLUENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2-CHLORONAPHTHALENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2-CHLOROPHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2-METHYLNAPHTHALENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2-METHYLPHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
2-NITROANILINE	1300 UJ	1200 UJ	1300 UJ	1400 UJ	1500 UJ	

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12SS0010001	S12SS0020001	S12SS0030001	S12SS0040001	S12SS0050001	
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
SAMPLE DATE:	10/20/97	10/20/97	10/20/97	10/20/97	10/20/97	
LOCATION:	S12SS01	S12SS02	S12SS03	S12SS04	S12SS05	
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
3,3'-DICHLOROBENZIDINE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
3-NITROANILINE	1300 UJ	1200 UJ	1300 UJ	1400 UJ	1500 UJ	
4,6-DINITRO-2-METHYLPHENOL	1300 UJ	1200 UJ	1300 UJ	1400 UJ	1500 UJ	
4-BROMOPHENYL PHENYL ETHER	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
4-CHLORO-3-METHYLPHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
4-CHLOROANILINE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
4-CHLOROPHENYL PHENYL ETHER	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
4-METHYLPHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
4-NITROANILINE	1300 UJ	1200 UJ	1300 UJ	1400 UJ	1500 UJ	
4-NITROPHENOL	1300 UJ	1200 UJ	1300 UJ	1400 UJ	1500 UJ	
ACENAPHTHENE	92 J	480 UJ	540 UJ	560 UJ	600 UJ	
ACENAPHTHYLENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
ANTHRACENE	230 J	480 UJ	540 UJ	560 UJ	600 UJ	
BENZO(A)ANTHRACENE	1200 J	480 UJ	540 UJ	320 J	140 J	
BENZO(A)PYRENE	1100 J	480 UJ	70 J	340 J	150 J	
BENZO(B)FLUORANTHENE	1500 J	66 J	120 J	440 J	340 J	
BENZO(G,H,I)PERYLENE	740 J	480 UJ	540 UJ	190 J	120 J	
BENZO(K)FLUORANTHENE	700 J	480 UJ	540 UJ	170 J	600 UJ	
BIS(2-CHLOROETHOXY)METHANE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
BIS(2-CHLOROETHYL)ETHER	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
BIS(2-ETHYLHEXYL)PHTHALATE	57 J	480 UJ	540 UJ	560 UJ	130 J	
BUTYLBENZYL PHTHALATE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
CARBAZOLE	150 J	480 UJ	540 UJ	560 UJ	600 UJ	
CHRYSENE	1100 J	480 UJ	64 J	310 J	170 J	
DI-N-BUTYL PHTHALATE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12SS0010001	S12SS0020001	S12SS0030001	S12SS0040001	S12SS0050001	
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
SAMPLE DATE:	10/20/97	10/20/97	10/20/97	10/20/97	10/20/97	
LOCATION:	S12SS01	S12SS02	S12SS03	S12SS04	S12SS05	
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
DIBENZO(A,H)ANTHRACENE	210 J	480 UJ	540 UJ	91 J	600 UJ	
DIBENZOFURAN	70 J	480 UJ	540 UJ	560 UJ	600 UJ	
DIETHYL PHTHALATE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
DIMETHYL PHTHALATE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
FLUORANTHENE	1700 J	66 J	86 J	480 J	240 J	
FLUORENE	130 J	480 UJ	540 UJ	560 UJ	600 UJ	
HEXACHLOROBENZENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
HEXACHLOROCYCLOPENTADIENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
HEXACHLOROETHANE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
INDENO(1,2,3-CD)PYRENE	730 J	480 UJ	540 UJ	210 J	130 J	
ISOPHORONE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
N-NITROSO-DI-N-PROPYLAMINE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
N-NITROSODIPHENYLAMINE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
NAPHTHALENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
NITROBENZENE	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
PENTACHLOROPHENOL	1300 UJ	1200 UJ	1300 UJ	1400 UJ	1500 UJ	
PHENANTHRENE	1300 J	480 UJ	540 UJ	270 J	110 J	
PHENOL	530 UJ	480 UJ	540 UJ	560 UJ	600 UJ	
PYRENE	2200 J	64 J	110 J	650 J	220 J	
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	5.2 J	0.93 J	1.5 J	5.3 J	6 UJ	
4,4'-DDE	6.2 J	1.3 J	2 J	6 J	21 J	
4,4'-DDT	17 J	2 J	2.1 J	5.9 J	7.6 J	
ALDRIN	2.6 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ	
ALPHA-BHC	2.6 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ	

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SS0010001 0.0 - 0.5' 10/20/97 S12SS01	S12SS0020001 0.0 - 0.5' 10/20/97 S12SS02	S12SS0030001 0.0 - 0.5' 10/20/97 S12SS03	S12SS0040001 0.0 - 0.5' 10/20/97 S12SS04	S12SS0050001 0.0 - 0.5' 10/20/97 S12SS05	
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	2.6 UJ	2.4 UJ	2.7 UJ	1.9 J	36 J	
AROCLOR-1016	53 UJ	48 UJ	54 UJ	56 UJ	60 UJ	
AROCLOR-1221	110 UJ	96 UJ	110 UJ	110 UJ	120 UJ	
AROCLOR-1232	53 UJ	48 UJ	54 UJ	56 UJ	60 UJ	
AROCLOR-1242	53 UJ	48 UJ	54 UJ	56 UJ	60 UJ	
AROCLOR-1248	53 UJ	48 UJ	54 UJ	56 UJ	60 UJ	
AROCLOR-1254	53 UJ	48 UJ	54 UJ	56 UJ	230 J	
AROCLOR-1260	53 UJ	48 UJ	54 UJ	56 UJ	60 UJ	
BETA-BHC	2.6 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ	
DELTA-BHC	2.6 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ	
DIELDRIN	5.3 UJ	4.8 UJ	1.1 J	5.6 UJ	6 UJ	
ENDOSULFAN I	2.6 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ	
ENDOSULFAN II	5.3 UJ	4.8 UJ	5.4 UJ	5.6 UJ	6 UJ	
ENDOSULFAN SULFATE	5.3 UJ	4.8 UJ	5.4 UJ	5.6 UJ	6 UJ	
ENDRIN	5.3 UJ	4.8 UJ	5.4 UJ	5.6 UJ	6 UJ	
ENDRIN ALDEHYDE	5.3 UJ	4.8 UJ	5.4 UJ	5.6 UJ	6 UJ	
ENDRIN KETONE	5.3 UJ	4.8 UJ	5.4 UJ	5.6 UJ	6 UJ	
GAMMA-BHC (LINDANE)	2.6 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ	
GAMMA-CHLORDANE	2.6 UJ	2.4 UJ	2.7 UJ	0.94 J	23 J	
HEPTACHLOR	2.6 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ	
HEPTACHLOR EPOXIDE	2.6 UJ	2.4 UJ	2.7 UJ	0.91 J	4.4 J	
METHOXYCHLOR	26 UJ	24 UJ	27 UJ	28 UJ	30 UJ	
TOXAPHENE	260 UJ	240 UJ	270 UJ	280 UJ	300 UJ	
ENERGETICS (µg/kg)						
1,3,5-TRINITROBENZENE	40.2 U	40.2 U	40.2 U	40.2 U	40.2 UL	
1,3-DINITROBENZENE	37.2 U	37.2 U	37.2 U	37.2 U	37.2 UL	

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: DEPTH (feet): SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SS0010001 0.0 - 0.5' 10/20/97 S12SS01	S12SS0020001 0.0 - 0.5' 10/20/97 S12SS02	S12SS0030001 0.0 - 0.5' 10/20/97 S12SS03	S12SS0040001 0.0 - 0.5' 10/20/97 S12SS04	S12SS0050001 0.0 - 0.5' 10/20/97 S12SS05	
ENERGETICS (µg/kg)						
2,4,6-TRINITROTOLUENE	35.6 U	35.6 U	35.6 U	35.6 U	35.6 UL	
2-AMINO-4,6-DINITROTOLUENE	46.7 U	46.7 U	46.7 U	46.7 U	46.7 UL	
2-NITROTOLUENE	81.4 U	81.4 U	81.4 U	81.4 U	81.4 UL	
3-NITROTOLUENE	81.8 U	81.8 U	81.8 U	81.8 U	81.8 UL	
4-AMINO-2,6-DINITROTOLUENE	40.9 U	40.9 U	40.9 U	40.9 U	40.9 UL	
4-NITROTOLUENE	87.2 U	87.2 U	87.2 U	87.2 U	87.2 UL	
HMX	70.5 U	70.5 U	70.5 U	70.5 U	70.5 UL	
NITROCELLULOSE	14900 U	13800 U	17300 U	17200 U	46200	
NITROGLYCERIN	10000 U	10000 U	10000 U	10000 U	10000 U	
NITROGUANIDINE	62.5 U	62.5 U	62.5 U	62.5 U	62.5 U	
RDX	50.9 U	50.9 U	50.9 U	50.9 U	50.9 UL	
TETRYL	163 U	163 U	163 U	163 U	163 UL	
METALS (mg/kg)						
ALUMINUM	10600 J	13500 J	16300 J	11000 J	13700 J	
ANTIMONY	0.82 UR	0.74 UR	0.83 UR	0.87 UR	0.93 UR	
ARSENIC	8.1	5.5	6.3	7.4	14.4	
BARIUM	42.1	42.1	70.2	60.5	174	
BERYLLIUM	0.06 B	0.06 B	0.16 B	0.28	0.56	
CADMIUM	3.6	0.35 B	0.6	0.58	1.8	
CALCIUM	2040 J	1150 K	1840 K	3230	3220	
CHROMIUM	19.4	18.2 J	21.7 J	17.3 J	34.6 J	
COBALT	4.3	3.8	7.7	7.9	13.0	
COPPER	81.3	13.1	13.4	17.3	60.3	
CYANIDE	0.36 UL	0.26 UL	0.34 L	0.34 UL	0.4 UL	
IRON	20600	22100	22800	22400	23000	
LEAD	48.3 J	17.3 J	21.7 J	44.1 J	67.6 J	

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12SS0010001	S12SS0020001	S12SS0030001	S12SS0040001	S12SS0050001	
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
SAMPLE DATE:	10/20/97	10/20/97	10/20/97	10/20/97	10/20/97	
LOCATION:	S12SS01	S12SS02	S12SS03	S12SS04	S12SS05	
FIELD DUPLICATE OF:						
METALS (mg/kg)						
MAGNESIUM	1040 J	760 J	1540 J	1120 J	1420 J	
MANGANESE	158 J	239 J	577 J	271 J	332 J	
MERCURY	0.28	0.1	0.1	0.1	4.0	
NICKEL	11.9 J	7.2 J	11.6 J	13.1 J	13.3 J	
POTASSIUM	1100 J	728 J	1540 J	1000 J	1120 J	
SELENIUM	0.89	0.8	0.9	1.1 K	1.1 K	
SILVER	0.41	0.23 U	0.26 U	1.5	125	
SODIUM	65.5 B	85.5 B	693 B	80.8 B	941 B	
THALLIUM	0.92 UL	0.83 UL	0.93 UL	0.97 UL	1.0 UL	
VANADIUM	35.9	35.8	44.9	33.3	53.1	
ZINC	108	71.1	91.0	78.4	261	
GENERAL CHEMISTRY						
PH	5.74	5.4	5.65	4.89	6.27	

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SW0010001 10/07/97 S12SD/SW01	S12SW0020001 10/07/97 S12SD/SW02	S12SW0030001 10/07/97 S12SD/SW03	S12SW0040001 10/07/97 S12SD/SW04	S12SW0050001 10/07/97 S12SD/SW05	S12SW0060001 10/07/97 S12SD/SW06
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DIBROMO-3-CHLOROPROPANE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DIBROMOETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROPROPANE	1 U	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
2-HEXANONE	5 U	5 U	5 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	5 UR	5 UR	5 UR	5 UR	5 UR	7 L
BENZENE	1 U	1 U	1 U	1 U	1 U	1 U
BROMOCHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
BROMODICHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
BROMOFORM	1 U	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	1 U	1 U	1 U	1 U	1 U	1 U
CARBON TETRACHLORIDE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SW0010001 10/07/97 S12SD/SW01	S12SW0020001 10/07/97 S12SD/SW02	S12SW0030001 10/07/97 S12SD/SW03	S12SW0040001 10/07/97 S12SD/SW04	S12SW0050001 10/07/97 S12SD/SW05	S12SW0060001 10/07/97 S12SD/SW06
VOLATILES (µg/L)						
ETHYLBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
HEXACHLOROBUTADIENE	5 U	5 U	5 U	5 U	5 U	6 U
METHYLENE CHLORIDE	2 U	2 U	2 U	2 U	2 U	2 U
STYRENE	1 U	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	1 U	1 U	1 U	1 U	1 U	1 U
XYLENES, TOTAL	1 U	1 U	1 U	1 U	1 U	1 U
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
1,3-DICHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
1,4-DICHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U	5 U	5 U	5 U	6 U
2,4,5-TRICHLOROPHENOL	20 U	20 U	20 U	20 U	20 U	22 U
2,4,6-TRICHLOROPHENOL	5 U	5 U	5 U	5 U	5 U	6 U
2,4-DICHLOROPHENOL	5 U	5 U	5 U	5 U	5 U	6 U
2,4-DIMETHYLPHENOL	5 U	5 U	5 U	5 U	5 U	6 U
2,4-DINITROPHENOL	20 U	20 U	20 U	20 U	20 U	22 U
2,4-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U	6 U
2,6-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U	6 U
2-CHLORONAPHTHALENE	5 U	5 U	5 U	5 U	5 U	6 U
2-CHLOROPHENOL	5 U	5 U	5 U	5 U	5 U	6 U
2-METHYLNAPHTHALENE	5 U	5 U	5 U	5 U	5 U	6 U

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SW0010001 10/07/97 S12SD/SW01	S12SW0020001 10/07/97 S12SD/SW02	S12SW0030001 10/07/97 S12SD/SW03	S12SW0040001 10/07/97 S12SD/SW04	S12SW0050001 10/07/97 S12SD/SW05	S12SW0060001 10/07/97 S12SD/SW06
SEMIVOLATILES (µg/L)						
2-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U	6 U
2-NITROANILINE	20 U	20 U	20 U	20 U	20 U	22 U
2-NITROPHENOL	5 U	5 U	5 U	5 U	5 U	6 U
3,3'-DICHLOROBENZIDINE	5 U	5 U	5 U	5 U	5 U	6 U
3-NITROANILINE	20 U	20 U	20 U	20 U	20 U	22 U
4,6-DINITRO-2-METHYLPHENOL	20 U	20 U	20 U	20 U	20 U	22 U
4-BROMOPHENYL PHENYL ETHER	5 U	5 U	5 U	5 U	5 U	6 U
4-CHLORO-3-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U	6 U
4-CHLOROANILINE	5 U	5 U	5 U	5 U	5 U	6 U
4-CHLOROPHENYL PHENYL ETHER	5 U	5 U	5 U	5 U	5 U	6 U
4-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U	6 U
4-NITROANILINE	20 U	20 U	20 U	20 U	20 U	22 U
4-NITROPHENOL	20 U	20 U	20 U	20 U	20 U	22 U
ACENAPHTHENE	5 U	5 U	5 U	5 U	5 U	6 U
ACENAPHTHYLENE	5 U	5 U	5 U	5 U	5 U	6 U
ANTHRACENE	5 U	5 U	5 U	5 U	5 U	6 U
BENZO(A)ANTHRACENE	5 U	5 U	5 U	5 U	5 U	6 U
BENZO(A)PYRENE	5 U	5 U	5 U	5 U	5 U	6 U
BENZO(B)FLUORANTHENE	5 U	5 U	5 U	5 U	5 U	6 U
BENZO(G,H,I)PERYLENE	5 U	5 U	5 U	5 U	5 U	6 U
BENZO(K)FLUORANTHENE	5 U	5 U	5 U	5 U	5 U	6 U
BIS(2-CHLOROETHOXY)METHANE	5 U	5 U	5 U	5 U	5 U	6 U
BIS(2-CHLOROETHYL)ETHER	5 U	5 U	5 U	5 U	5 U	6 U
BIS(2-ETHYLHEXYL)PHTHALATE	5 U	5 U	5 U	5 U	5 U	6 U
BUTYLBENZYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	6 U
CHRYSENE	5 U	5 U	5 U	5 U	5 U	6 U
DI-N-BUTYL PHTHALATE	16 B	5 U	7 B	4 B	2 B	22

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SW0010001 10/07/97 S12SD/SW01	S12SW0020001 10/07/97 S12SD/SW02	S12SW0030001 10/07/97 S12SD/SW03	S12SW0040001 10/07/97 S12SD/SW04	S12SW0050001 10/07/97 S12SD/SW05	S12SW0060001 10/07/97 S12SD/SW06
SEMIVOLATILES (µg/L)						
DI-N-OCTYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	6 U
DIBENZO(A,H)ANTHRACENE	5 U	5 U	5 U	5 U	5 U	6 U
DIBENZOFURAN	5 U	5 U	5 U	5 U	5 U	6 U
DIETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	6 U
DIMETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	6 U
FLUORANTHENE	5 U	5 U	5 U	5 U	5 U	6 U
FLUORENE	5 U	5 U	5 U	5 U	5 U	6 U
HEXACHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	6 U
HEXACHLOROCYCLOPENTADIENE	5 U	5 U	5 U	5 U	5 U	6 U
HEXACHLOROETHANE	5 U	5 U	5 U	5 U	5 U	6 U
INDENO(1,2,3-CD)PYRENE	5 U	5 U	5 U	5 U	5 U	6 U
ISOPHORONE	5 U	5 U	5 U	5 U	5 U	6 U
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U	5 U	5 U	5 U	6 U
N-NITROSODIPHENYLAMINE	5 U	5 U	5 U	5 U	5 U	6 U
NAPHTHALENE	5 U	5 U	5 U	5 U	5 U	6 U
NITROBENZENE	5 U	5 U	5 U	5 U	5 U	6 U
PENTACHLOROPHENOL	20 U	20 U	20 U	20 U	20 U	22 U
PHENANTHRENE	5 U	5 U	5 U	5 U	5 U	6 U
PHENOL	5 U	5 U	5 U	5 U	5 U	6 U
PYRENE	5 U	5 U	5 U	5 U	5 U	6 U
PESTICIDES/PCBs (µg/L)						
4,4'-DDD	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U
4,4'-DDE	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U
4,4'-DDT	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U
ALDRIN	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011 U
ALPHA-BHC	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011 U
ALPHA-CHLORDANE	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011 U

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SW0010001 10/07/97 S12SD/SW01	S12SW0020001 10/07/97 S12SD/SW02	S12SW0030001 10/07/97 S12SD/SW03	S12SW0040001 10/07/97 S12SD/SW04	S12SW0050001 10/07/97 S12SD/SW05	S12SW0060001 10/07/97 S12SD/SW06
PESTICIDES/PCBs (µg/L)						
AROCLOR-1016	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.22 U
AROCLOR-1221	0.42 U	0.4 U	0.4 U	0.4 U	0.4 U	0.43 U
AROCLOR-1232	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.22 U
AROCLOR-1242	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.22 U
AROCLOR-1248	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.22 U
AROCLOR-1254	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.22 U
AROCLOR-1260	0.21 U	0.2 U	0.2 U	0.2 U	0.2 U	0.22 U
BETA-BHC	0.011 UJ	0.01 UJ	0.01 UJ	0.01 UJ	0.01 UJ	0.011 UJ
DELTA-BHC	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011 U
DIELDRIN	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U
ENDOSULFAN I	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011 U
ENDOSULFAN II	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.005 J
ENDOSULFAN SULFATE	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U
ENDRIN	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U
ENDRIN ALDEHYDE	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U
ENDRIN KETONE	0.021 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022 U
GAMMA-BHC (LINDANE)	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011 U
GAMMA-CHLORDANE	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011 U
HEPTACHLOR	0.011 U	0.01 U	0.01 U	0.01 U	0.01 U	0.011 U
HEPTACHLOR EPOXIDE	0.002 J	0.004 J	0.003 J	0.002 J	0.001 J	0.006 J
METHOXYCHLOR	0.11 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U
TOXAPHENE	1.1 U	1 U	1 U	1 U	1 U	1.1 U
METALS (µg/L)						
ALUMINUM	63.8 K	51.7 K	99.5 K	22.0 K	59.8 K	87.0 K
ANTIMONY	2.6 UR	2.6 UR	2.8 J	2.6 UR	2.6 UR	2.6 UR
ARSENIC	3.3 UR	3.3 UR	3.4 J	3.3 UR	3.5 J	3.3 UR
BARIUM	36.6 L	34.2 L	47.1 L	20.2 L	43.5 L	23.0 L

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SW0010001 10/07/97 S12SD/SW01	S12SW0020001 10/07/97 S12SD/SW02	S12SW0030001 10/07/97 S12SD/SW03	S12SW0040001 10/07/97 S12SD/SW04	S12SW0050001 10/07/97 S12SD/SW05	S12SW0060001 10/07/97 S12SD/SW06
METALS (µg/L)						
BERYLLIUM	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CADMIUM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
CALCIUM	12100	9650 K	14500	5950 K	12300	6230 K
CHROMIUM	0.5 UL	0.5 UL	0.55 B	0.5 UL	0.51 B	0.5 UL
COBALT	0.61 B	0.91 B	0.93 B	0.61 B	1.0 B	0.53 B
COPPER	2.2 B	2.0 B	4.3 B	1.3 B	2.5 B	2.0 B
CYANIDE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
IRON	375 L	489 L	492 L	179 J	365 L	446 L
LEAD	1.0 UR	1.7 L	1.5 K	1.0 UR	1.0 UR	6.3 L
MAGNESIUM	6840 K	5480 K	8090 K	3340 K	6820 K	3440 K
MANGANESE	69.3	104	137	62.6	134	64.0
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.22
NICKEL	1.9 K	1.6 K	2.1 K	1.3 K	1.7 K	1.3 K
POTASSIUM	3690	2990	4260	1950	3770	1930
SELENIUM	2.8 UR	2.8 UR	2.8 UR	2.8 UR	2.8 UR	2.8 UR
SILVER	0.8 UL	0.8 UL	2.0 L	0.8 UL	0.8 UL	0.8 UL
SODIUM	42900	33900	56900	24300	50100	22100
THALLIUM	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
VANADIUM	1.1 UR	1.1 UR	2.3 L	1.1 UR	1.1 UR	1.1 UR
ZINC	3.8 K	4.0 K	4.8 K	2.7 K	3.4 K	5.8 K

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12DUP001					
SAMPLE DATE:	10/14/97					
LOCATION:	S12SD/SW06					
FIELD DUPLICATE OF:	S12SW0060001					
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE	1 U					
1,1,2,2-TETRACHLOROETHANE	1 U					
1,1,2-TRICHLOROETHANE	1 U					
1,1-DICHLOROETHANE	1 U					
1,1-DICHLOROETHENE	1 U					
1,2-DIBROMO-3-CHLOROPROPANE	1 U					
1,2-DIBROMOETHANE	1 U					
1,2-DICHLOROETHANE	1 U					
1,2-DICHLOROPROPANE	1 U					
2-BUTANONE	5 UR					
2-HEXANONE	5 U					
4-METHYL-2-PENTANONE	5 U					
ACETONE	5 UR					
BENZENE	1 U					
BROMOCHLOROMETHANE	1 U					
BROMODICHLOROMETHANE	1 U					
BROMOFORM	1 U					
BROMOMETHANE	1 U					
CARBON DISULFIDE	1 U					
CARBON TETRACHLORIDE	1 U					
CHLOROBENZENE	1 U					
CHLOROETHANE	1 U					
CHLOROFORM	1 U					
CHLOROMETHANE	1 U					
CIS-1,2-DICHLOROETHENE	1 U					
CIS-1,3-DICHLOROPROPENE	1 U					
DIBROMOCHLOROMETHANE	1 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12DUP001					
SAMPLE DATE:	10/14/97					
LOCATION:	S12SD/SW06					
FIELD DUPLICATE OF:	S12SW0060001					
VOLATILES (µg/L)						
ETHYLBENZENE	1 U					
HEXACHLOROBUTADIENE	5 U					
METHYLENE CHLORIDE	2 U					
STYRENE	1 U					
TETRACHLOROETHENE	1 U					
TOLUENE	1 U					
TRANS-1,2-DICHLOROETHENE	1 U					
TRANS-1,3-DICHLOROPROPENE	1 U					
TRICHLOROETHENE	1 U					
VINYL CHLORIDE	1 U					
XYLENES, TOTAL	1 U					
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE	1 U					
1,2-DICHLOROBENZENE	1 U					
1,3-DICHLOROBENZENE	1 U					
1,4-DICHLOROBENZENE	1 U					
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U					
2,4,5-TRICHLOROPHENOL	21 U					
2,4,6-TRICHLOROPHENOL	5 U					
2,4-DICHLOROPHENOL	5 U					
2,4-DIMETHYLPHENOL	5 U					
2,4-DINITROPHENOL	21 U					
2,4-DINITROTOLUENE	5 U					
2,6-DINITROTOLUENE	5 U					
2-CHLORONAPHTHALENE	5 U					
2-CHLOROPHENOL	5 U					
2-METHYLNAPHTHALENE	5 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12DUP001 10/14/97 S12SD/SW06 S12SW0060001					
SEMIVOLATILES (µg/L)						
2-METHYLPHENOL	5 U					
2-NITROANILINE	21 U					
2-NITROPHENOL	5 U					
3,3'-DICHLOROBENZIDINE	5 U					
3-NITROANILINE	21 U					
4,6-DINITRO-2-METHYLPHENOL	21 U					
4-BROMOPHENYL PHENYL ETHER	5 U					
4-CHLORO-3-METHYLPHENOL	5 U					
4-CHLOROANILINE	5 U					
4-CHLOROPHENYL PHENYL ETHER	5 U					
4-METHYLPHENOL	5 U					
4-NITROANILINE	21 U					
4-NITROPHENOL	21 U					
ACENAPHTHENE	5 U					
ACENAPHTHYLENE	5 U					
ANTHRACENE	5 U					
BENZO(A)ANTHRACENE	5 U					
BENZO(A)PYRENE	5 U					
BENZO(B)FLUORANTHENE	5 U					
BENZO(G,H,I)PERYLENE	5 U					
BENZO(K)FLUORANTHENE	5 U					
BIS(2-CHLOROETHOXY)METHANE	5 U					
BIS(2-CHLOROETHYL)ETHER	5 U					
BIS(2-ETHYLHEXYL)PHTHALATE	5 U					
BUTYLBENZYL PHTHALATE	5 U					
CHRYSENE	5 U					
DI-N-BUTYL PHTHALATE	12 B					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12DUP001					
SAMPLE DATE:	10/14/97					
LOCATION:	S12SD/SW06					
FIELD DUPLICATE OF:	S12SW0060001					
SEMIVOLATILES (µg/L)						
DI-N-OCTYL PHTHALATE	5 U					
DIBENZO(A,H)ANTHRACENE	5 U					
DIBENZOFURAN	5 U					
DIETHYL PHTHALATE	5 U					
DIMETHYL PHTHALATE	5 U					
FLUORANTHENE	5 U					
FLUORENE	5 U					
HEXACHLOROBENZENE	5 U					
HEXACHLOROCYCLOPENTADIENE	5 U					
HEXACHLOROETHANE	5 U					
INDENO(1,2,3-CD)PYRENE	5 U					
ISOPHORONE	5 U					
N-NITROSO-DI-N-PROPYLAMINE	5 U					
N-NITROSODIPHENYLAMINE	5 U					
NAPHTHALENE	5 U					
NITROBENZENE	5 U					
PENTACHLOROPHENOL	21 U					
PHENANTHRENE	5 U					
PHENOL	5 U					
PYRENE	5 U					
PESTICIDES/PCBs (µg/L)						
4,4'-DDD	0.023 U					
4,4'-DDE	0.023 U					
4,4'-DDT	0.023 U					
ALDRIN	0.011 U					
ALPHA-BHC	0.011 U					
ALPHA-CHLORDANE	0.011 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12DUP001					
SAMPLE DATE:	10/14/97					
LOCATION:	S12SD/SW06					
FIELD DUPLICATE OF:	S12SW0060001					
PESTICIDES/PCBs (µg/L)						
AROCLOR-1016	0.23 U					
AROCLOR-1221	0.45 U					
AROCLOR-1232	0.23 U					
AROCLOR-1242	0.23 U					
AROCLOR-1248	0.23 U					
AROCLOR-1254	0.23 U					
AROCLOR-1260	0.23 U					
BETA-BHC	0.011 UJ					
DELTA-BHC	0.011 U					
DIELDRIN	0.023 U					
ENDOSULFAN I	0.011 U					
ENDOSULFAN II	0.003 J					
ENDOSULFAN SULFATE	0.023 U					
ENDRIN	0.023 U					
ENDRIN ALDEHYDE	0.023 U					
ENDRIN KETONE	0.023 U					
GAMMA-BHC (LINDANE)	0.011 U					
GAMMA-CHLORDANE	0.011 U					
HEPTACHLOR	0.011 U					
HEPTACHLOR EPOXIDE	0.005 J					
METHOXYCHLOR	0.11 U					
TOXAPHENE	1.1 U					
METALS (µg/L)						
ALUMINUM	178 K					
ANTIMONY	2.6 UR					
ARSENIC	6.0 J					
BARIUM	55.0 L					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12DUP001 10/14/97 S12SD/SW06 S12SW0060001					
METALS (µg/L)						
BERYLLIUM	0.1 U					
CADMIUM	0.3 U					
CALCIUM	15700					
CHROMIUM	0.5 UL					
COBALT	0.93 B					
COPPER	5.9					
CYANIDE	5.0 U					
IRON	854 L					
LEAD	7.9 L					
MAGNESIUM	8660 K					
MANGANESE	140					
MERCURY	0.12					
NICKEL	1.8 K					
POTASSIUM	4400					
SELENIUM	2.8 UR					
SILVER	0.8 UL					
SODIUM	55000					
THALLIUM	2.9 U					
VANADIUM	2.1 L					
ZINC	9.5 K					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0010001 10/20/97 S12SD/SW01	S12SD0020001 10/20/97 S12SD/SW02	S12SD0030001 10/20/97 S12SD/SW03	S12SD0040001 10/20/97 S12SD/SW04	S12DUP007 10/20/97 S12SD/SW04 S12SD0040001	S12SD0050001 10/20/97 S12SD/SW05
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	17 U	17 U	14 U	16 U	17 U	18 U
1,1,2,2-TETRACHLOROETHANE	17 U	17 U	14 U	16 U	17 U	18 U
1,1,2-TRICHLOROETHANE	17 U	17 U	14 U	16 U	17 U	18 U
1,1-DICHLOROETHANE	17 U	17 U	14 U	16 U	17 U	18 U
1,1-DICHLOROETHENE	17 U	17 U	14 U	16 U	17 U	18 U
1,2-DICHLOROETHANE	17 U	17 U	14 U	16 U	17 U	18 U
1,2-DICHLOROETHENE (TOTAL)	17 U	17 U	14 U	16 U	17 U	18 U
1,2-DICHLOROPROPANE	17 U	17 U	14 U	16 U	17 U	18 U
2-BUTANONE	17 U	17 U	14 U	33	17 J	15 J
2-HEXANONE	17 U	17 U	14 U	16 U	17 U	18 U
4-METHYL-2-PENTANONE	17 U	17 U	14 U	16 U	17 U	18 U
ACETONE	17 U	17 U	54 B	110 B	58 B	64 B
BENZENE	17 U	17 U	14 U	16 U	17 U	18 U
BROMODICHLOROMETHANE	17 U	17 U	14 U	16 U	17 U	18 U
BROMOFORM	17 U	17 U	14 U	16 U	17 U	18 U
BROMOMETHANE	17 U	17 U	14 U	16 U	17 U	18 U
CARBON DISULFIDE	17 UJ	17 UJ	14 UJ	16 UJ	17 UJ	18 U
CARBON TETRACHLORIDE	17 U	17 U	14 U	16 U	17 U	18 U
CHLOROBENZENE	17 U	17 U	14 U	16 U	17 U	18 U
CHLOROETHANE	17 U	17 U	14 U	16 U	17 U	18 U
CHLOROFORM	17 U	17 U	14 U	16 U	17 U	18 U
CHLOROMETHANE	17 U	17 U	14 U	16 U	17 U	18 U
CIS-1,3-DICHLOROPROPENE	17 U	17 U	14 U	16 U	17 U	18 U
DIBROMOCHLOROMETHANE	17 U	17 U	14 U	16 U	17 U	18 U
ETHYLBENZENE	17 U	17 U	14 U	16 U	17 U	18 U
HEXACHLOROBUTADIENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
METHYLENE CHLORIDE	16 B	5 B	10 B	5 B	14 B	16 B

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0010001 10/20/97 S12SD/SW01	S12SD0020001 10/20/97 S12SD/SW02	S12SD0030001 10/20/97 S12SD/SW03	S12SD0040001 10/20/97 S12SD/SW04	S12DUP007 10/20/97 S12SD/SW04 S12SD0040001	S12SD0050001 10/20/97 S12SD/SW05
VOLATILES (µg/kg)						
STYRENE	17 U	17 U	14 U	16 U	17 U	18 U
TETRACHLOROETHENE	17 U	17 U	14 U	16 U	17 U	18 U
TOLUENE	17 U	17 U	14 U	16 U	17 U	18 U
TRANS-1,3-DICHLOROPROPENE	17 U	17 U	14 U	16 U	17 U	18 U
TRICHLOROETHENE	17 U	17 U	14 U	16 U	17 U	18 U
VINYL CHLORIDE	17 U	17 U	14 U	16 U	17 U	18 U
XYLENES, TOTAL	17 U	17 U	14 U	16 U	17 U	18 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
1,2-DICHLOROBENZENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
1,3-DICHLOROBENZENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
1,4-DICHLOROBENZENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2,4,5-TRICHLOROPHENOL	1400 UJ	1400 UJ	1200 UJ	1400 UJ	1400 UJ	1500 UJ
2,4,6-TRICHLOROPHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2,4-DICHLOROPHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2,4-DIMETHYLPHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2,4-DINITROPHENOL	1400 UJ	1400 UJ	1200 UJ	1400 UJ	1400 UJ	1500 UJ
2,4-DINITROTOLUENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2,6-DINITROTOLUENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2-CHLORONAPHTHALENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2-CHLOROPHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2-METHYLNAPHTHALENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2-METHYLPHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
2-NITROANILINE	1400 UJ	1400 UJ	1200 UJ	1400 UJ	1400 UJ	1500 UJ
2-NITROPHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
3,3'-DICHLOROBENZIDINE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0010001 10/20/97 S12SD/SW01	S12SD0020001 10/20/97 S12SD/SW02	S12SD0030001 10/20/97 S12SD/SW03	S12SD0040001 10/20/97 S12SD/SW04	S12DUP007 10/20/97 S12SD/SW04 S12SD0040001	S12SD0050001 10/20/97 S12SD/SW05
SEMIVOLATILES (µg/kg)						
3-NITROANILINE	1400 UJ	1400 UJ	1200 UJ	1400 UJ	1400 UJ	1500 UJ
4,6-DINITRO-2-METHYLPHENOL	1400 UJ	1400 UJ	1200 UJ	1400 UJ	1400 UJ	1500 UJ
4-BROMOPHENYL PHENYL ETHER	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
4-CHLORO-3-METHYLPHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
4-CHLOROANILINE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
4-CHLOROPHENYL PHENYL ETHER	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
4-METHYLPHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
4-NITROANILINE	1400 UJ	1400 UJ	1200 UJ	1400 UJ	1400 UJ	1500 UJ
4-NITROPHENOL	1400 UJ	1400 UJ	1200 UJ	1400 UJ	1400 UJ	1500 UJ
ACENAPHTHENE	560 UJ	570 UJ	480 UJ	550 UJ	100 J	610 UJ
ACENAPHTHYLENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
ANTHRACENE	560 UJ	570 UJ	480 UJ	550 UJ	380 J	610 UJ
BENZO(A)ANTHRACENE	72 J	390 J	120 J	120 J	1800 J	94 J
BENZO(A)PYRENE	72 J	410 J	160 J	130 J	1300 J	120 J
BENZO(B)FLUORANTHENE	140 J	510 J	230 J	190 J	2000 J	330 J
BENZO(G,H,I)PERYLENE	560 UJ	300 J	170 J	85 J	760 J	64 J
BENZO(K)FLUORANTHENE	560 UJ	240 J	100 J	57 J	490 J	610 UJ
BIS(2-CHLOROETHOXY)METHANE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
BIS(2-CHLOROETHYL)ETHER	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	110 J
BUTYLBENZYL PHTHALATE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
CARBAZOLE	560 UJ	570 UJ	480 UJ	550 UJ	130 J	610 UJ
CHRYSENE	84 J	420 J	150 J	140 J	1600 J	210 J
DI-N-BUTYL PHTHALATE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
DI-N-OCTYL PHTHALATE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
DIBENZO(A,H)ANTHRACENE	560 UJ	97 J	480 UJ	550 UJ	220 J	610 UJ
DIBENZOFURAN	560 UJ	570 UJ	480 UJ	550 UJ	89 J	610 UJ

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0010001 10/20/97 S12SD/SW01	S12SD0020001 10/20/97 S12SD/SW02	S12SD0030001 10/20/97 S12SD/SW03	S12SD0040001 10/20/97 S12SD/SW04	S12DUP007 10/20/97 S12SD/SW04 S12SD0040001	S12SD0050001 10/20/97 S12SD/SW05
SEMIVOLATILES (µg/kg)						
DIETHYL PHTHALATE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
DIMETHYL PHTHALATE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
FLUORANTHENE	150 J	550 J	190 J	200 J	2300 J	310 J
FLUORENE	560 UJ	570 UJ	480 UJ	550 UJ	110 J	610 UJ
HEXACHLOROBENZENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
HEXACHLOROCYCLOPENTADIENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
HEXACHLOROETHANE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
INDENO(1,2,3-CD)PYRENE	560 UJ	230 J	120 J	99 J	700 J	84 J
ISOPHORONE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
N-NITROSO-DI-N-PROPYLAMINE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
N-NITROSODIPHENYLAMINE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
NAPHTHALENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
NITROBENZENE	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
PENTACHLOROPHENOL	1400 UJ	1400 UJ	1200 UJ	1400 UJ	1400 UJ	1500 UJ
PHENANTHRENE	84 J	240 J	73 J	100 J	1600 J	110 J
PHENOL	560 UJ	570 UJ	480 UJ	550 UJ	560 UJ	610 UJ
PYRENE	110 J	700 J	230 J	220 J	3200 J	250 J
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.9 J	14 J	4.8 UJ	4.3 J	4.6 J	7.1 J
4,4'-DDE	4 J	5.7 UJ	5.3 J	5 J	5.4 J	13 J
4,4'-DDT	2.4 J	8.7 J	4.8 UJ	5.7 J	8.1 J	1.5 J
ALDRIN	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ
ALPHA-BHC	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ
ALPHA-CHLORDANE	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	2.5 J
AROCLOR-1016	55 UJ	57 UJ	48 UJ	55 UJ	57 UJ	60 UJ
AROCLOR-1221	110 UJ	110 UJ	97 UJ	110 UJ	110 UJ	120 UJ
AROCLOR-1232	55 UJ	57 UJ	48 UJ	55 UJ	57 UJ	60 UJ

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0010001 10/20/97 S12SD/SW01	S12SD0020001 10/20/97 S12SD/SW02	S12SD0030001 10/20/97 S12SD/SW03	S12SD0040001 10/20/97 S12SD/SW04	S12DUP007 10/20/97 S12SD/SW04 S12SD0040001	S12SD0050001 10/20/97 S12SD/SW05
PESTICIDES/PCBs (µg/kg)						
AROCLOR-1242	55 UJ	57 UJ	48 UJ	55 UJ	57 UJ	60 UJ
AROCLOR-1248	55 UJ	57 UJ	48 UJ	55 UJ	57 UJ	60 UJ
AROCLOR-1254	55 UJ	57 UJ	48 UJ	55 UJ	57 UJ	60 UJ
AROCLOR-1260	55 UJ	57 UJ	100 J	55 UJ	57 UJ	60 UJ
BETA-BHC	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ
DELTA-BHC	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ
DIELDRIN	5.5 UJ	5.7 UJ	2.4 J	5.5 UJ	5.7 UJ	6 UJ
ENDOSULFAN I	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ
ENDOSULFAN II	5.5 UJ	5.7 UJ	4.8 UJ	3.2 J	5.7 UJ	6 UJ
ENDOSULFAN SULFATE	5.5 UJ	5.7 UJ	4.8 UJ	5.5 UJ	5.7 UJ	6 UJ
ENDRIN	5.5 UJ	5.7 UJ	4.8 UJ	5.5 UJ	5.7 UJ	6 UJ
ENDRIN ALDEHYDE	5.5 UJ	5.7 UJ	4.8 UJ	5.5 UJ	5.7 UJ	6 UJ
ENDRIN KETONE	5.5 UJ	5.7 UJ	4.8 UJ	5.5 UJ	5.7 UJ	6 UJ
GAMMA-BHC (LINDANE)	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ
GAMMA-CHLORDANE	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	1.8 J
HEPTACHLOR	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ
HEPTACHLOR EPOXIDE	2.8 UJ	2.9 UJ	2.4 UJ	2.7 UJ	2.8 UJ	3 UJ
METHOXYCHLOR	28 UJ	29 UJ	24 UJ	27 UJ	28 UJ	30 UJ
TOXAPHENE	280 UJ	290 UJ	240 UJ	270 UJ	280 UJ	300 UJ
ENERGETICS (µg/kg)						
1,3,5-TRINITROBENZENE	40.2 U	40.2 U	40.2 U	40.2 U	40.2 U	40.2 U
1,3-DINITROBENZENE	37.2 U	37.2 U	37.2 U	37.2 U	37.2 U	37.2 U
2,4,6-TRINITROTOLUENE	35.6 U	35.6 U	35.6 U	35.6 U	35.6 U	35.6 U
2-AMINO-4,6-DINITROTOLUENE	46.7 U	46.7 U	46.7 U	46.7 U	46.7 U	46.7 U
2-NITROTOLUENE	81.4 U	81.4 U	81.4 U	81.4 U	81.4 U	81.4 U
3-NITROTOLUENE	81.8 U	81.8 U	81.8 U	81.8 U	81.8 U	81.8 U
4-AMINO-2,6-DINITROTOLUENE	40.9 U	40.9 U	40.9 U	40.9 U	40.9 U	40.9 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0010001 10/20/97 S12SD/SW01	S12SD0020001 10/20/97 S12SD/SW02	S12SD0030001 10/20/97 S12SD/SW03	S12SD0040001 10/20/97 S12SD/SW04	S12DUP007 10/20/97 S12SD/SW04 S12SD0040001	S12SD0050001 10/20/97 S12SD/SW05
ENERGETICS (µg/kg)						
4-NITROTOLUENE	87.2 U	87.2 U	87.2 U	87.2 U	87.2 U	87.2 U
HMX	70.5 U	70.5 U	70.5 U	70.5 U	70.5 U	70.5 U
NITROCELLULOSE	471000	27500	9490 U	26700	16500 U	14200 U
NITROGLYCERIN	10000 U	10000 U	10000 U	10000 U	10000 U	10000 U
NITROGUANIDINE	62.5 U	62.5 U	62.5 U	62.5 U	62.5 U	62.5 U
RDX	50.9 U	50.9 U	50.9 U	50.9 U	50.9 U	50.9 U
TETRYL	163 U	163 U	163 U	163 U	163 U	163 U
METALS (mg/kg)						
ALUMINUM	7930 J	8530 J	7640 J	8350 J	7970 J	10000 J
ANTIMONY	0.85 UR	0.87 UR	0.72 UR	0.86 UR	0.88 UR	0.91 UR
ARSENIC	8.0 K	8.7	7.1	5.1	6.8	5.3
BARIUM	38.7	46.1	41.4	47.1	50.6	53.5
BERYLLIUM	0.12 B	0.14	0.2	0.16 B	0.24	0.12 B
CADMIUM	2.9 K	0.81 K	0.56	0.34 B	0.39 B	0.21 B
CALCIUM	1690 K	1620	1160 K	2070	2620	1220 K
CHROMIUM	35.6 J	18.9 J	12.9 J	21.6 J	19.3 J	17.7 J
COBALT	8.7	5.5	4.7	5.5	7.8	4.0
COPPER	34.1	14.3	10.5	13.6	23.5	62.0
CYANIDE	0.29 UL	0.4 UL	0.31 UL	0.39 UL	0.36 UL	0.37 UL
IRON	33800	32900	14200	16900	18300	14900
LEAD	34.0 J	33.3 J	28.1 J	52.2 J	58.3 J	39.6 J
MAGNESIUM	6900 J	616 J	663 J	2500 J	7480 J	745 J
MANGANESE	252 J	268 J	88.7 J	243 J	149 J	94.9 J
MERCURY	0.12	0.2	0.09	0.1	0.12	0.16
NICKEL	97.2 J	11.7 J	13.2 J	28.4 J	87.5 J	7.4 J
POTASSIUM	547 J	439 J	428 J	487 J	400 J	433 J
SELENIUM	0.92 UL	0.94 UL	0.78 U	0.92 U	0.94 U	0.98 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0010001 10/20/97 S12SD/SW01	S12SD0020001 10/20/97 S12SD/SW02	S12SD0030001 10/20/97 S12SD/SW03	S12SD0040001 10/20/97 S12SD/SW04	S12DUP007 10/20/97 S12SD/SW04 S12SD0040001	S12SD0050001 10/20/97 S12SD/SW05
METALS (mg/kg)						
SILVER	0.33	0.27 U	0.23	0.26 U	0.27 U	1.9
SODIUM	194 B	155 B	118 B	132 B	150 B	206 B
THALLIUM	0.95 UL	0.97 UL	0.81 UL	0.96 UL	0.98 UL	1.0 UL
VANADIUM	24.5	29.7	148	29.6	30.8	25.7
ZINC	76.7	94.1	76.4	65.8	69.9	86.5
AVS/SIMULTANEOUSLY EXTRACTED METALS (mg/kg)						
ACID VOLATILE SULFIDE	2.74	1.73	0.5 U	1.84	0.84	0.82
CADMIUM(SEM)	2.9 J	0.71 J	0.63 J	0.22 J	0.34 J	0.23 U
COPPER(SEM)	19.7	11.6	7.3	6.0	22.3	78.5
LEAD(SEM)	28.8	22.1	31.1	37.5	52.2	38.6
MERCURY(SEM)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
NICKEL(SEM)	19.9	5.5	5.1 B	6.4	7.9 B	2.5
ZINC(SEM)	31.7	60.1	10.5	19.6	29.1	23.9
MISCELLANEOUS PARAMETERS (mg/kg)						
TOTAL ORGANIC CARBON	19700	20600	10600	11900	18000	3670
GENERAL CHEMISTRY						
PH	6.45	6.36	6.37	6	6.22	6.72

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0060001 10/20/97 S12SD/SW06					
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	18 U					
1,1,2,2-TETRACHLOROETHANE	18 UJ					
1,1,2-TRICHLOROETHANE	18 U					
1,1-DICHLOROETHANE	18 U					
1,1-DICHLOROETHENE	18 U					
1,2-DICHLOROETHANE	18 U					
1,2-DICHLOROETHENE (TOTAL)	18 U					
1,2-DICHLOROPROPANE	18 U					
2-BUTANONE	35					
2-HEXANONE	18 UJ					
4-METHYL-2-PENTANONE	18 UJ					
ACETONE	100 B					
BENZENE	18 U					
BROMODICHLOROMETHANE	18 U					
BROMOFORM	18 U					
BROMOMETHANE	18 U					
CARBON DISULFIDE	18 UJ					
CARBON TETRACHLORIDE	18 U					
CHLOROBENZENE	18 UJ					
CHLOROETHANE	18 U					
CHLOROFORM	18 U					
CHLOROMETHANE	18 U					
CIS-1,3-DICHLOROPROPENE	18 U					
DIBROMOCHLOROMETHANE	18 U					
ETHYLBENZENE	18 UJ					
HEXACHLOROBUTADIENE	5800 UJ					
METHYLENE CHLORIDE	20 B					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0060001 10/20/97 S12SD/SW06					
VOLATILES (µg/kg)						
STYRENE	18 UJ					
TETRACHLOROETHENE	18 UJ					
TOLUENE	18 UJ					
TRANS-1,3-DICHLOROPROPENE	18 U					
TRICHLOROETHENE	18 U					
VINYL CHLORIDE	18 U					
XYLENES, TOTAL	18 UJ					
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	5800 UJ					
1,2-DICHLOROBENZENE	5800 UJ					
1,3-DICHLOROBENZENE	5800 UJ					
1,4-DICHLOROBENZENE	5800 UJ					
2,2'-OXYBIS(1-CHLOROPROPANE)	5800 UJ					
2,4,5-TRICHLOROPHENOL	15000 UJ					
2,4,6-TRICHLOROPHENOL	5800 UJ					
2,4-DICHLOROPHENOL	5800 UJ					
2,4-DIMETHYLPHENOL	5800 UJ					
2,4-DINITROPHENOL	15000 UJ					
2,4-DINITROTOLUENE	5800 UJ					
2,6-DINITROTOLUENE	5800 UJ					
2-CHLORONAPHTHALENE	5800 UJ					
2-CHLOROPHENOL	5800 UJ					
2-METHYLNAPHTHALENE	5800 UJ					
2-METHYLPHENOL	5800 UJ					
2-NITROANILINE	15000 UJ					
2-NITROPHENOL	5800 UJ					
3,3'-DICHLOROBENZIDINE	5800 UJ					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0060001 10/20/97 S12SD/SW06					
SEMIVOLATILES (µg/kg)						
3-NITROANILINE	15000 UJ					
4,6-DINITRO-2-METHYLPHENOL	15000 UJ					
4-BROMOPHENYL PHENYL ETHER	5800 UJ					
4-CHLORO-3-METHYLPHENOL	5800 UJ					
4-CHLOROANILINE	5800 UJ					
4-CHLOROPHENYL PHENYL ETHER	5800 UJ					
4-METHYLPHENOL	5800 UJ					
4-NITROANILINE	15000 UJ					
4-NITROPHENOL	15000 UJ					
ACENAPHTHENE	2600 J					
ACENAPHTHYLENE	5800 UJ					
ANTHRACENE	4300 J					
BENZO(A)ANTHRACENE	14000 J					
BENZO(A)PYRENE	12000 J					
BENZO(B)FLUORANTHENE	19000 J					
BENZO(G,H,I)PERYLENE	7600 J					
BENZO(K)FLUORANTHENE	5800 J					
BIS(2-CHLOROETHOXY)METHANE	5800 UJ					
BIS(2-CHLOROETHYL)ETHER	5800 UJ					
BIS(2-ETHYLHEXYL)PHTHALATE	5800 UJ					
BUTYLBENZYL PHTHALATE	5800 UJ					
CARBAZOLE	2100 J					
CHRYSENE	14000 J					
DI-N-BUTYL PHTHALATE	5800 UJ					
DI-N-OCTYL PHTHALATE	5800 UJ					
DIBENZO(A,H)ANTHRACENE	2300 J					
DIBENZOFURAN	1200 J					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0060001 10/20/97 S12SD/SW06					
SEMIVOLATILES (µg/kg)						
DIETHYL PHTHALATE	5800 UJ					
DIMETHYL PHTHALATE	5800 UJ					
FLUORANTHENE	22000 J					
FLUORENE	1900 J					
HEXACHLOROBENZENE	5800 UJ					
HEXACHLOROCYCLOPENTADIENE	5800 UJ					
HEXACHLOROETHANE	5800 UJ					
INDENO(1,2,3-CD)PYRENE	6900 J					
ISOPHORONE	5800 UJ					
N-NITROSO-DI-N-PROPYLAMINE	5800 UJ					
N-NITROSODIPHENYLAMINE	5800 UJ					
NAPHTHALENE	5800 UJ					
NITROBENZENE	5800 UJ					
PENTACHLOROPHENOL	15000 UJ					
PHENANTHRENE	17000 J					
PHENOL	5800 UJ					
PYRENE	24000 J					
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	33 J					
4,4'-DDE	41 J					
4,4'-DDT	53 J					
ALDRIN	2.9 UJ					
ALPHA-BHC	2.9 UJ					
ALPHA-CHLORDANE	2.9 UJ					
AROCLOR-1016	59 UJ					
AROCLOR-1221	120 UJ					
AROCLOR-1232	59 UJ					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0060001 10/20/97 S12SD/SW06					
PESTICIDES/PCBs (µg/kg)						
AROCLOR-1242	59 UJ					
AROCLOR-1248	59 UJ					
AROCLOR-1254	59 UJ					
AROCLOR-1260	59 UJ					
BETA-BHC	2.9 UJ					
DELTA-BHC	2.9 UJ					
DIELDRIN	5.9 UJ					
ENDOSULFAN I	2.9 UJ					
ENDOSULFAN II	5.9 UJ					
ENDOSULFAN SULFATE	5.9 UJ					
ENDRIN	5.9 UJ					
ENDRIN ALDEHYDE	5.9 UJ					
ENDRIN KETONE	5.9 UJ					
GAMMA-BHC (LINDANE)	2.9 UJ					
GAMMA-CHLORDANE	2.9 UJ					
HEPTACHLOR	2.9 UJ					
HEPTACHLOR EPOXIDE	2.9 UJ					
METHOXYCHLOR	29 UJ					
TOXAPHENE	290 UJ					
ENERGETICS (µg/kg)						
1,3,5-TRINITROBENZENE	40.2 UL					
1,3-DINITROBENZENE	37.2 UL					
2,4,6-TRINITROTOLUENE	35.6 UL					
2-AMINO-4,6-DINITROTOLUENE	46.7 UL					
2-NITROTOLUENE	81.4 UL					
3-NITROTOLUENE	81.8 UL					
4-AMINO-2,6-DINITROTOLUENE	40.9 UL					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0060001 10/20/97 S12SD/SW06					
ENERGETICS (µg/kg)						
4-NITROTOLUENE	87.2 UL					
HMX	70.5 UL					
NITROCELLULOSE	40200					
NITROGLYCERIN	10000 U					
NITROGUANIDINE	62.5 U					
RDX	50.9 UL					
TETRYL	163 UL					
METALS (mg/kg)						
ALUMINUM	6740 J					
ANTIMONY	2.5 L					
ARSENIC	19.7					
BARIUM	65.6					
BERYLLIUM	0.1					
CADMIUM	4.0					
CALCIUM	2360					
CHROMIUM	19.8 J					
COBALT	5.1					
COPPER	27.2					
CYANIDE	0.29 UL					
IRON	16500					
LEAD	131 J					
MAGNESIUM	627 J					
MANGANESE	271 J					
MERCURY	1.3					
NICKEL	11.3 J					
POTASSIUM	393 J					
SELENIUM	0.97 U					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S12SD0060001 10/20/97 S12SD/SW06					
METALS (mg/kg)						
SILVER	1.1					
SODIUM	139 B					
THALLIUM	1.0 UL					
VANADIUM	25.4					
ZINC	123					
AVS/SIMULTANEOUSLY EXTRACTED METALS (mg/kg)						
ACID VOLATILE SULFIDE	0.71					
CADMIUM(SEM)	4.9 J					
COPPER(SEM)	20.5					
LEAD(SEM)	132					
MERCURY(SEM)	0.01 U					
NICKEL(SEM)	5.3 B					
ZINC(SEM)	72.6					
MISCELLANEOUS PARAMETERS (mg/kg)						
TOTAL ORGANIC CARBON	37600					
GENERAL CHEMISTRY						
PH	6.75					

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP001F001	S12WP001U001	S12WP002F001	S12DUP006-F	S12WP002U001	S12DUP006
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97
LOCATION:	S12WP01	S12WP01	S12WP02	S12WP02	S12WP02	S12WP02
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S12WP002F001		S12WP002U001
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE		1 U			1 U	1 U
1,1,2,2-TETRACHLOROETHANE		1 U			1 U	1 U
1,1,2-TRICHLOROETHANE		1 U			1 U	1 U
1,1-DICHLOROETHANE		1 U			1 U	1 U
1,1-DICHLOROETHENE		1 U			1 U	1 U
1,2-DIBROMO-3-CHLOROPROPANE		1 U			1 U	1 U
1,2-DIBROMOETHANE		1 U			1 U	1 U
1,2-DICHLOROETHANE		1 U			1 U	1 U
1,2-DICHLOROPROPANE		1 U			1 U	1 U
2-BUTANONE		5 UR			5 UR	5 UR
2-HEXANONE		5 U			5 U	5 U
4-METHYL-2-PENTANONE		5 U			5 U	5 U
ACETONE		5 UR			5 UR	5 UR
BENZENE		1 U			1 U	1 U
BROMOCHLOROMETHANE		1 U			1 U	1 U
BROMODICHLOROMETHANE		1 U			1 U	1 U
BROMOFORM		1 U			1 U	1 U
BROMOMETHANE		1 U			1 U	1 U
CARBON DISULFIDE		1 U			1 U	1 U
CARBON TETRACHLORIDE		1 U			1 U	1 U
CHLOROBENZENE		1 U			1 U	1 U
CHLOROETHANE		1 U			1 U	1 U
CHLOROFORM		1 U			1 U	1 U
CHLOROMETHANE		1 U			1 U	1 U
CIS-1,2-DICHLOROETHENE		306			1 U	1 U
CIS-1,3-DICHLOROPROPENE		1 U			1 U	1 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP001F001	S12WP001U001	S12WP002F001	S12DUP006-F	S12WP002U001	S12DUP006
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97
LOCATION:	S12WP01	S12WP01	S12WP02	S12WP02	S12WP02	S12WP02
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S12WP002F001		S12WP002U001
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE		1 U			1 U	1 U
ETHYLBENZENE		1 U			1 U	1 U
HEXACHLOROBUTADIENE		5 U			5 U	5 U
METHYLENE CHLORIDE		2 U			2 U	2 U
STYRENE		1 U			1 U	1 U
TETRACHLOROETHENE		1 U			1 U	1 U
TOLUENE		1 U			1 U	1 U
TRANS-1,2-DICHLOROETHENE		2			1 U	1 U
TRANS-1,3-DICHLOROPROPENE		1 U			1 U	1 U
TRICHLOROETHENE		12			1 U	1 U
VINYL CHLORIDE		317			1 U	1 U
XYLENES, TOTAL		1 U			1 U	1 U
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE		1 U			1 U	1 U
1,2-DICHLOROBENZENE		1 U			1 U	1 U
1,3-DICHLOROBENZENE		1 U			1 U	1 U
1,4-DICHLOROBENZENE		1 U			1 U	1 U
2,2'-OXYBIS(1-CHLOROPROPANE)		5 U			5 U	5 U
2,4,5-TRICHLOROPHENOL		22 U			20 U	21 U
2,4,6-TRICHLOROPHENOL		5 U			5 U	5 U
2,4-DICHLOROPHENOL		5 U			5 U	5 U
2,4-DIMETHYLPHENOL		5 U			5 U	5 U
2,4-DINITROPHENOL		22 U			20 U	21 U
2,4-DINITROTOLUENE		5 U			5 U	5 U
2,6-DINITROTOLUENE		5 U			5 U	5 U
2-CHLORONAPHTHALENE		5 U			5 U	5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP001F001	S12WP001U001	S12WP002F001	S12DUP006-F	S12WP002U001	S12DUP006
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97
LOCATION:	S12WP01	S12WP01	S12WP02	S12WP02	S12WP02	S12WP02
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S12WP002F001		S12WP002U001
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL		5 U			5 U	5 U
2-METHYLNAPHTHALENE		5 U			5 U	5 U
2-METHYLPHENOL		5 U			5 U	5 U
2-NITROANILINE		22 U			20 U	21 U
2-NITROPHENOL		5 U			5 U	5 U
3,3'-DICHLOROBENZIDINE		5 U			5 U	5 U
3-NITROANILINE		22 U			20 U	21 U
4,6-DINITRO-2-METHYLPHENOL		22 U			20 U	21 U
4-BROMOPHENYL PHENYL ETHER		5 U			5 U	5 U
4-CHLORO-3-METHYLPHENOL		5 U			5 U	5 U
4-CHLOROANILINE		5 U			5 U	5 U
4-CHLOROPHENYL PHENYL ETHER		5 U			5 U	5 U
4-METHYLPHENOL		5 U			5 U	5 U
4-NITROANILINE		22 U			20 U	21 U
4-NITROPHENOL		22 U			20 U	21 U
ACENAPHTHENE		5 U			1 J	1 J
ACENAPHTHYLENE		5 U			5 U	5 U
ANTHRACENE		5 U			5 U	5 U
BENZO(A)ANTHRACENE		5 U			5 U	5 U
BENZO(A)PYRENE		5 U			5 U	5 U
BENZO(B)FLUORANTHENE		5 U			5 U	5 U
BENZO(G,H,I)PERYLENE		5 U			5 U	5 U
BENZO(K)FLUORANTHENE		5 U			5 U	5 U
BIS(2-CHLOROETHOXY)METHANE		5 U			5 U	5 U
BIS(2-CHLOROETHYL)ETHER		5 U			5 U	5 U
BIS(2-ETHYLHEXYL)PHTHALATE		5 U			5 U	5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP001F001	S12WP001U001	S12WP002F001	S12DUP006-F	S12WP002U001	S12DUP006
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97
LOCATION:	S12WP01	S12WP01	S12WP02	S12WP02	S12WP02	S12WP02
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S12WP002F001		S12WP002U001
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE		5 U			5 U	5 U
CHRYSENE		5 U			5 U	5 U
DI-N-BUTYL PHTHALATE		5 U			5 U	5 U
DI-N-OCTYL PHTHALATE		5 U			5 U	5 U
DIBENZO(A,H)ANTHRACENE		5 U			5 U	5 U
DIBENZOFURAN		5 U			5 U	5 U
DIETHYL PHTHALATE		5 U			5 U	5 U
DIMETHYL PHTHALATE		5 U			5 U	5 U
FLUORANTHENE		5 U			5 U	5 U
FLUORENE		5 U			5 U	5 U
HEXACHLOROBENZENE		5 U			5 U	5 U
HEXACHLOROCYCLOPENTADIENE		5 U			5 U	5 U
HEXACHLOROETHANE		5 U			5 U	5 U
INDENO(1,2,3-CD)PYRENE		5 U			5 U	5 U
ISOPHORONE		5 U			5 U	5 U
N-NITROSO-DI-N-PROPYLAMINE		5 U			5 U	5 U
N-NITROSODIPHENYLAMINE		5 U			5 U	5 U
NAPHTHALENE		2 J			5 U	5 U
NITROBENZENE		5 U			5 U	5 U
PENTACHLOROPHENOL		22 U			20 U	21 U
PHENANTHRENE		5 U			5 U	5 U
PHENOL		5 U			5 U	5 U
PYRENE		5 U			5 U	5 U
PESTICIDES/PCBs (µg/L)						
4,4'-DDD		0.022 U			0.02 U	0.02 U
4,4'-DDE		0.022 U			0.02 U	0.02 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP001F001	S12WP001U001	S12WP002F001	S12DUP006-F	S12WP002U001	S12DUP006
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97
LOCATION:	S12WP01	S12WP01	S12WP02	S12WP02	S12WP02	S12WP02
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S12WP002F001		S12WP002U001
PESTICIDES/PCBs (µg/L)						
4,4'-DDT		0.022 U			0.02 U	0.02 U
ALDRIN		0.011 U			0.01 U	0.01 U
ALPHA-BHC		0.011 U			0.01 U	0.01 U
ALPHA-CHLORDANE		0.011 U			0.01 U	0.01 U
AROCLOR-1016		0.22 U			0.2 U	0.2 U
AROCLOR-1221		0.44 U			0.41 U	0.4 U
AROCLOR-1232		0.22 U			0.2 U	0.2 U
AROCLOR-1242		0.22 U			0.2 U	0.2 U
AROCLOR-1248		0.22 U			0.2 U	0.2 U
AROCLOR-1254		0.22 U			0.2 U	0.2 U
AROCLOR-1260		0.22 U			0.2 U	0.2 U
BETA-BHC		0.011 U			0.01 U	0.01 U
DELTA-BHC		0.011 U			0.01 U	0.01 U
DIELDRIN		0.022 U			0.02 U	0.02 U
ENDOSULFAN I		0.011 U			0.01 U	0.01 U
ENDOSULFAN II		0.022 U			0.02 U	0.02 U
ENDOSULFAN SULFATE		0.022 U			0.02 U	0.02 U
ENDRIN		0.022 U			0.02 U	0.02 U
ENDRIN ALDEHYDE		0.022 U			0.02 U	0.02 U
ENDRIN KETONE		0.022 U			0.02 U	0.02 U
GAMMA-BHC (LINDANE)		0.011 U			0.01 U	0.01 U
GAMMA-CHLORDANE		0.011 U			0.01 U	0.01 U
HEPTACHLOR		0.011 U			0.01 U	0.01 U
HEPTACHLOR EPOXIDE		0.011 U			0.01 U	0.01 U
METHOXYCHLOR		0.11 U			0.1 U	0.1 U
TOXAPHENE		1.1 U			1 U	1 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP001F001	S12WP001U001	S12WP002F001	S12DUP006-F	S12WP002U001	S12DUP006
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97	10/14/97
LOCATION:	S12WP01	S12WP01	S12WP02	S12WP02	S12WP02	S12WP02
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S12WP002F001		S12WP002U001
METALS (µg/L)						
ALUMINUM	53.0 B	649 K	47.6 B	44.5 B	4920 K	4210 K
ANTIMONY	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
ARSENIC	3.3 U	3.3 U	3.3 U	3.3 U	4.8	6.1
BARIUM	127	133	94.2	94.6	119	114
BERYLLIUM	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CADMIUM	0.39 B	2.2 B	0.3 U	0.3 U	4.5 K	4.2 K
CALCIUM	46400	46400	41100	41800	42600	42200
CHROMIUM	0.92 K	2.4 K	0.5 U	0.5 U	8.2 K	7.3 K
COBALT	1.9 B	2.0 B	1.2 B	1.7 B	3.5 B	3.3 B
COPPER	14.1 K	16.6 K	11.7 K	9.5 B	27.5 K	31.6 K
CYANIDE		5.0 U			5.0 U	5.0 U
IRON	43700	45700	22400	22700	31700	30400
LEAD	1.3 K	21.6	1.0 U	1.0 U	34.5	32.9
MAGNESIUM	7450 K	7480 K	10300	10400	11000	10800
MANGANESE	674	676	598	604	633	624
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.2 K	0.17 K
NICKEL	10.4 K	12.1 K	5.1 B	5.6 B	11.8 K	11.2 K
POTASSIUM	3340 K	3400 K	4760 K	4760 K	5320 K	5140 K
SELENIUM	2.8 UJ	2.8 UJ	2.8 UJ	2.8 UJ	2.8 UJ	2.8 UJ
SILVER	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
SODIUM	57000	57000	78200	78800	81800	79900
THALLIUM	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
VANADIUM	1.1 U	2.8	1.1 U	1.1 U	11.8	10.8
ZINC	59.6	180	663	685	1140	1100

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP003F001	S12WP003U001	S12WP004F001	S12WP004U001	S12GW005F001	S12DUP011-F
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/24/97	10/24/97
LOCATION:	S12WP03	S12WP03	S12WP04	S12WP04	S12WP05	S12WP05
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Filtered
FIELD DUPLICATE OF:						S12GW005F001
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE		1 U		1 U		
1,1,2,2-TETRACHLOROETHANE		1 U		1 U		
1,1,2-TRICHLOROETHANE		1 U		1 U		
1,1-DICHLOROETHANE		1 U		1 U		
1,1-DICHLOROETHENE		1 U		1 U		
1,2-DIBROMO-3-CHLOROPROPANE		1 U		1 U		
1,2-DIBROMOETHANE		1 U		1 U		
1,2-DICHLOROETHANE		1 U		1 U		
1,2-DICHLOROPROPANE		1 U		1 U		
2-BUTANONE		5 UR		5 UR		
2-HEXANONE		5 U		5 U		
4-METHYL-2-PENTANONE		5 U		5 U		
ACETONE		5 UR		5 UR		
BENZENE		1 U		1 U		
BROMOCHLOROMETHANE		1 U		1 U		
BROMODICHLOROMETHANE		1 U		1 U		
BROMOFORM		1 U		1 U		
BROMOMETHANE		1 U		1 U		
CARBON DISULFIDE		1 U		1 U		
CARBON TETRACHLORIDE		1 U		1 U		
CHLOROBENZENE		1 U		1 U		
CHLOROETHANE		1 U		1 U		
CHLOROFORM		1 U		1 U		
CHLOROMETHANE		1 U		1 U		
CIS-1,2-DICHLOROETHENE		1 U		1 U		
CIS-1,3-DICHLOROPROPENE		1 U		1 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP003F001	S12WP003U001	S12WP004F001	S12WP004U001	S12GW005F001	S12DUP011-F
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/24/97	10/24/97
LOCATION:	S12WP03	S12WP03	S12WP04	S12WP04	S12WP05	S12WP05
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Filtered
FIELD DUPLICATE OF:						S12GW005F001
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE		1 U		1 U		
ETHYLBENZENE		1 U		1 U		
HEXACHLOROBUTADIENE		6 U		5 U		
METHYLENE CHLORIDE		2 U		2 U		
STYRENE		1 U		1 U		
TETRACHLOROETHENE		1 U		1 U		
TOLUENE		1 U		1 U		
TRANS-1,2-DICHLOROETHENE		1 U		1 U		
TRANS-1,3-DICHLOROPROPENE		1 U		1 U		
TRICHLOROETHENE		1 U		1 U		
VINYL CHLORIDE		1 U		1 U		
XYLENES, TOTAL		1 U		1 U		
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE		1 U		1 U		
1,2-DICHLOROBENZENE		1 U		1 U		
1,3-DICHLOROBENZENE		1 U		1 U		
1,4-DICHLOROBENZENE		1 U		1 U		
2,2'-OXYBIS(1-CHLOROPROPANE)		6 U		5 U		
2,4,5-TRICHLOROPHENOL		22 U		20 U		
2,4,6-TRICHLOROPHENOL		6 U		5 U		
2,4-DICHLOROPHENOL		6 U		5 U		
2,4-DIMETHYLPHENOL		6 U		5 U		
2,4-DINITROPHENOL		22 U		20 U		
2,4-DINITROTOLUENE		6 U		5 U		
2,6-DINITROTOLUENE		6 U		5 U		
2-CHLORONAPHTHALENE		6 U		5 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP003F001	S12WP003U001	S12WP004F001	S12WP004U001	S12GW005F001	S12DUP011-F
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/24/97	10/24/97
LOCATION:	S12WP03	S12WP03	S12WP04	S12WP04	S12WP05	S12WP05
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Filtered
FIELD DUPLICATE OF:						S12GW005F001
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL		6 U		5 U		
2-METHYLNAPHTHALENE		6 U		5 U		
2-METHYLPHENOL		6 U		5 U		
2-NITROANILINE		22 U		20 U		
2-NITROPHENOL		6 U		5 U		
3,3'-DICHLOROBENZIDINE		6 U		5 U		
3-NITROANILINE		22 U		20 U		
4,6-DINITRO-2-METHYLPHENOL		22 U		20 U		
4-BROMOPHENYL PHENYL ETHER		6 U		5 U		
4-CHLORO-3-METHYLPHENOL		6 U		5 U		
4-CHLOROANILINE		6 U		5 U		
4-CHLOROPHENYL PHENYL ETHER		6 U		5 U		
4-METHYLPHENOL		6 U		5 U		
4-NITROANILINE		22 U		20 U		
4-NITROPHENOL		22 U		20 U		
ACENAPHTHENE		6 U		5 U		
ACENAPHTHYLENE		6 U		5 U		
ANTHRACENE		6 U		5 U		
BENZO(A)ANTHRACENE		6 U		5 U		
BENZO(A)PYRENE		6 U		5 U		
BENZO(B)FLUORANTHENE		6 U		5 U		
BENZO(G,H,I)PERYLENE		6 U		5 U		
BENZO(K)FLUORANTHENE		6 U		5 U		
BIS(2-CHLOROETHOXY)METHANE		6 U		5 U		
BIS(2-CHLOROETHYL)ETHER		6 U		5 U		
BIS(2-ETHYLHEXYL)PHTHALATE		6 U		5 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP003F001	S12WP003U001	S12WP004F001	S12WP004U001	S12GW005F001	S12DUP011-F
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/24/97	10/24/97
LOCATION:	S12WP03	S12WP03	S12WP04	S12WP04	S12WP05	S12WP05
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Filtered
FIELD DUPLICATE OF:						S12GW005F001
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE		6 U		5 U		
CHRYSENE		6 U		5 U		
DI-N-BUTYL PHTHALATE		6 U		5 U		
DI-N-OCTYL PHTHALATE		6 U		5 U		
DIBENZO(A,H)ANTHRACENE		6 U		5 U		
DIBENZOFURAN		6 U		5 U		
DIETHYL PHTHALATE		6 U		5 U		
DIMETHYL PHTHALATE		6 U		5 U		
FLUORANTHENE		6 U		5 U		
FLUORENE		6 U		5 U		
HEXACHLOROBENZENE		6 U		5 U		
HEXACHLOROCYCLOPENTADIENE		6 U		5 U		
HEXACHLOROETHANE		6 U		5 U		
INDENO(1,2,3-CD)PYRENE		6 U		5 U		
ISOPHORONE		6 U		5 U		
N-NITROSO-DI-N-PROPYLAMINE		6 U		5 U		
N-NITROSODIPHENYLAMINE		17		5 U		
NAPHTHALENE		6 U		5 U		
NITROBENZENE		6 U		5 U		
PENTACHLOROPHENOL		22 U		20 U		
PHENANTHRENE		6 U		5 U		
PHENOL		6 U		5 U		
PYRENE		6 U		5 U		
PESTICIDES/PCBs (µg/L)						
4,4'-DDD		0.022 U		0.02 U		
4,4'-DDE		0.022 U		0.02 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP003F001	S12WP003U001	S12WP004F001	S12WP004U001	S12GW005F001	S12DUP011-F
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/24/97	10/24/97
LOCATION:	S12WP03	S12WP03	S12WP04	S12WP04	S12WP05	S12WP05
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Filtered
FIELD DUPLICATE OF:						S12GW005F001
PESTICIDES/PCBs (µg/L)						
4,4'-DDT		0.022 U		0.02 U		
ALDRIN		0.011 U		0.01 U		
ALPHA-BHC		0.011 U		0.01 U		
ALPHA-CHLORDANE		0.011 U		0.01 U		
AROCLOR-1016		0.22 U		0.2 U		
AROCLOR-1221		0.44 U		0.4 U		
AROCLOR-1232		0.22 U		0.2 U		
AROCLOR-1242		0.22 U		0.2 U		
AROCLOR-1248		0.22 U		0.2 U		
AROCLOR-1254		0.22 U		0.2 U		
AROCLOR-1260		0.22 U		0.2 U		
BETA-BHC		0.011 U		0.01 U		
DELTA-BHC		0.011 U		0.01 U		
DIELDRIN		0.022 U		0.02 U		
ENDOSULFAN I		0.011 U		0.01 U		
ENDOSULFAN II		0.022 U		0.02 U		
ENDOSULFAN SULFATE		0.022 U		0.02 U		
ENDRIN		0.022 U		0.02 U		
ENDRIN ALDEHYDE		0.022 U		0.02 U		
ENDRIN KETONE		0.022 U		0.02 U		
GAMMA-BHC (LINDANE)		0.011 U		0.01 U		
GAMMA-CHLORDANE		0.011 U		0.01 U		
HEPTACHLOR		0.011 U		0.01 U		
HEPTACHLOR EPOXIDE		0.011 U		0.01 U		
METHOXYCHLOR		0.11 U		0.1 U		
TOXAPHENE		1.1 U		1 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12WP003F001	S12WP003U001	S12WP004F001	S12WP004U001	S12GW005F001	S12DUP011-F
SAMPLE DATE:	10/14/97	10/14/97	10/14/97	10/14/97	10/24/97	10/24/97
LOCATION:	S12WP03	S12WP03	S12WP04	S12WP04	S12WP05	S12WP05
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Filtered
FIELD DUPLICATE OF:						S12GW005F001
METALS (µg/L)						
ALUMINUM	37.5 B	135 B	78.4 B	148 B	44.2 B	58.9 B
ANTIMONY	2.6 U	2.6 U	2.6 U	2.6 U	2.8 U	2.8 U
ARSENIC	3.8	3.3	31.3	30.0	34.2 K	34.2 K
BARIUM	595	249	606	248	346 J	487 J
BERYLLIUM	0.1 U	0.1 U	0.1 U	0.1 U	0.1 UL	0.1 UL
CADMIUM	0.48 B	1.8 B	0.4 B	0.3 U	0.61 B	0.76 B
CALCIUM	69200	69500	180000	176000	116000	124000
CHROMIUM	0.5 U	0.5 U	2.5 K	2.4 K	0.71 B	0.79 B
COBALT	0.73 B	0.82 B	2.8 B	3.0 B	1.0 B	0.64 B
COPPER	10.2 B	10.8 K	9.1 B	11.0 K	3.7 B	3.9 B
CYANIDE		5.0 U		5.0 U		
IRON	78200	83700	81700	81700	63500	67800
LEAD	1.0 U	2.9 K	1.0 U	1.6 K	1.1 B	1.4 B
MAGNESIUM	14800	14700	28100	27200	23100	24600
MANGANESE	708	722	2210	2190	1280 J	1370 J
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	3.0 B	4.2 B	5.9 B	5.8 B	2.2 B	1.6 B
POTASSIUM	6270 K	6290 K	6070 K	5720 K	10600	10900
SELENIUM	2.8 UJ	2.8 UJ	2.8 UJ	2.8 UJ	2.3 UL	2.3 UL
SILVER	0.8 U	0.8 U	0.8 U	0.8 U	0.94 B	0.9 U
SODIUM	55300	44900	54900	40300	58000	62000
THALLIUM	2.9 U	2.9 U	2.9 UL	2.9 UL	5.0 B	3.5 B
VANADIUM	1.1 U	1.1 U	2.6 L	2.8 L	1.0 UL	1.0 UL
ZINC	250	189	153	8.8 B	37.0 K	81.8

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12GW005U001	S12DUP011	S12GW006F001	S12GW006U001		
SAMPLE DATE:	10/24/97	10/24/97	10/24/97	10/24/97		
LOCATION:	S12WP05	S12WP05	S12WP06	S12WP06		
FILTERING:	Unfiltered	Unfiltered	Filtered	Unfiltered		
FIELD DUPLICATE OF:		S12GW005U001				
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE	1 U	1 U		1 U		
1,1,2,2-TETRACHLOROETHANE	1 U	1 U		1 U		
1,1,2-TRICHLOROETHANE	1 U	1 U		1 U		
1,1-DICHLOROETHANE	1 U	1 U		1 U		
1,1-DICHLOROETHENE	1 U	1 U		1 U		
1,2-DIBROMO-3-CHLOROPROPANE	1 U	1 U		1 U		
1,2-DIBROMOETHANE	1 U	1 U		1 U		
1,2-DICHLOROETHANE	1 U	1 U		1 U		
1,2-DICHLOROPROPANE	1 U	1 U		1 U		
2-BUTANONE	5 UR	5 UR		5 UR		
2-HEXANONE	5 U	5 U		5 U		
4-METHYL-2-PENTANONE	5 U	5 U		5 U		
ACETONE	5 UR	5 UR		5 UR		
BENZENE	1 U	1 U		1 U		
BROMOCHLOROMETHANE	1 U	1 U		1 U		
BROMODICHLOROMETHANE	1 U	1 U		1 U		
BROMOFORM	1 U	1 U		1 U		
BROMOMETHANE	1 U	1 U		1 U		
CARBON DISULFIDE	1 U	1 U		1 U		
CARBON TETRACHLORIDE	1 U	1 U		1 U		
CHLOROBENZENE	1 U	1 U		1 U		
CHLOROETHANE	1	1		1 U		
CHLOROFORM	1 U	1 U		1 U		
CHLOROMETHANE	1 U	1 U		1 U		
CIS-1,2-DICHLOROETHENE	1 U	1 U		1 U		
CIS-1,3-DICHLOROPROPENE	1 U	1 U		1 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12GW005U001	S12DUP011	S12GW006F001	S12GW006U001		
SAMPLE DATE:	10/24/97	10/24/97	10/24/97	10/24/97		
LOCATION:	S12WP05	S12WP05	S12WP06	S12WP06		
FILTERING:	Unfiltered	Unfiltered	Filtered	Unfiltered		
FIELD DUPLICATE OF:		S12GW005U001				
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE	1 U	1 U		1 U		
ETHYLBENZENE	1 U	1 U		1 U		
HEXACHLOROBUTADIENE	5 U	5 U		7 U		
METHYLENE CHLORIDE	2 U	2 U		2 U		
STYRENE	1 U	1 U		1 U		
TETRACHLOROETHENE	1 U	1 U		1 U		
TOLUENE	1 U	1 U		1 U		
TRANS-1,2-DICHLOROETHENE	1 U	1 U		1 U		
TRANS-1,3-DICHLOROPROPENE	1 U	1 U		1 U		
TRICHLOROETHENE	1 U	1 U		1 U		
VINYL CHLORIDE	1 U	1 U		1 U		
XYLENES, TOTAL	1 U	1 U		1 U		
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE	1 U	1 U		1 U		
1,2-DICHLOROBENZENE	1 U	1 U		1 U		
1,3-DICHLOROBENZENE	1 U	1 U		1 U		
1,4-DICHLOROBENZENE	1 U	1 U		1 U		
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U		7 U		
2,4,5-TRICHLOROPHENOL	21 U	21 U		27 U		
2,4,6-TRICHLOROPHENOL	5 U	5 U		7 U		
2,4-DICHLOROPHENOL	5 U	5 U		7 U		
2,4-DIMETHYLPHENOL	5 U	5 U		7 U		
2,4-DINITROPHENOL	21 U	21 U		27 U		
2,4-DINITROTOLUENE	5 U	5 U		7 U		
2,6-DINITROTOLUENE	5 U	5 U		7 U		
2-CHLORONAPHTHALENE	5 U	5 U		7 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12GW005U001	S12DUP011	S12GW006F001	S12GW006U001		
SAMPLE DATE:	10/24/97	10/24/97	10/24/97	10/24/97		
LOCATION:	S12WP05	S12WP05	S12WP06	S12WP06		
FILTERING:	Unfiltered	Unfiltered	Filtered	Unfiltered		
FIELD DUPLICATE OF:		S12GW005U001				
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL	5 U	5 U		7 U		
2-METHYLNAPHTHALENE	5 U	5 U		7 U		
2-METHYLPHENOL	5 U	5 U		7 UJ		
2-NITROANILINE	21 U	21 U		27 U		
2-NITROPHENOL	5 U	5 U		7 U		
3,3'-DICHLOROBENZIDINE	5 U	5 U		7 U		
3-NITROANILINE	21 U	21 U		27 U		
4,6-DINITRO-2-METHYLPHENOL	21 U	21 U		27 U		
4-BROMOPHENYL PHENYL ETHER	5 U	5 U		7 U		
4-CHLORO-3-METHYLPHENOL	5 U	5 U		7 U		
4-CHLOROANILINE	5 U	5 U		7 U		
4-CHLOROPHENYL PHENYL ETHER	5 U	5 U		7 U		
4-METHYLPHENOL	5 U	5 U		2 J		
4-NITROANILINE	21 U	21 U		27 U		
4-NITROPHENOL	21 U	21 U		27 U		
ACENAPHTHENE	4 J	4 J		7 U		
ACENAPHTHYLENE	5 U	5 U		7 U		
ANTHRACENE	5 U	5 U		7 U		
BENZO(A)ANTHRACENE	5 U	5 U		7 U		
BENZO(A)PYRENE	5 U	5 U		7 U		
BENZO(B)FLUORANTHENE	5 U	5 U		7 U		
BENZO(G,H,I)PERYLENE	5 U	5 U		7 U		
BENZO(K)FLUORANTHENE	5 U	5 U		7 U		
BIS(2-CHLOROETHOXY)METHANE	5 U	5 U		7 U		
BIS(2-CHLOROETHYL)ETHER	5 U	5 U		7 U		
BIS(2-ETHYLHEXYL)PHTHALATE	5 U	2 J		7 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12GW005U001	S12DUP011	S12GW006F001	S12GW006U001		
SAMPLE DATE:	10/24/97	10/24/97	10/24/97	10/24/97		
LOCATION:	S12WP05	S12WP05	S12WP06	S12WP06		
FILTERING:	Unfiltered	Unfiltered	Filtered	Unfiltered		
FIELD DUPLICATE OF:		S12GW005U001				
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE	5 U	5 U		7 U		
CHRYSENE	5 U	5 U		7 U		
DI-N-BUTYL PHTHALATE	5 U	5 U		7 U		
DI-N-OCTYL PHTHALATE	5 U	5 U		7 U		
DIBENZO(A,H)ANTHRACENE	5 U	5 U		7 U		
DIBENZOFURAN	5 U	5 U		7 U		
DIETHYL PHTHALATE	5 U	5 U		7 U		
DIMETHYL PHTHALATE	5 U	5 U		7 U		
FLUORANTHENE	5 U	5 U		7 U		
FLUORENE	2 J	2 J		7 U		
HEXACHLOROBENZENE	5 U	5 U		7 U		
HEXACHLOROCYCLOPENTADIENE	5 U	5 U		7 U		
HEXACHLOROETHANE	5 U	5 U		7 U		
INDENO(1,2,3-CD)PYRENE	5 U	5 U		7 U		
ISOPHORONE	5 U	5 U		7 U		
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U		7 U		
N-NITROSODIPHENYLAMINE	5 U	5 U		7 U		
NAPHTHALENE	5 U	5 U		7 U		
NITROBENZENE	5 U	5 U		7 U		
PENTACHLOROPHENOL	21 U	21 U		27 U		
PHENANTHRENE	5 U	5 U		7 U		
PHENOL	5 U	5 U		7 U		
PYRENE	5 U	5 U		7 U		
PESTICIDES/PCBs (µg/L)						
4,4'-DDD	0.021 U	0.021 U		0.026 U		
4,4'-DDE	0.021 U	0.021 U		0.026 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12GW005U001	S12DUP011	S12GW006F001	S12GW006U001		
SAMPLE DATE:	10/24/97	10/24/97	10/24/97	10/24/97		
LOCATION:	S12WP05	S12WP05	S12WP06	S12WP06		
FILTERING:	Unfiltered	Unfiltered	Filtered	Unfiltered		
FIELD DUPLICATE OF:		S12GW005U001				
PESTICIDES/PCBs (µg/L)						
4,4'-DDT	0.021 U	0.021 U		0.026 U		
ALDRIN	0.01 U	0.011 U		0.013 U		
ALPHA-BHC	0.01 U	0.011 U		0.013 U		
ALPHA-CHLORDANE	0.004 J	0.003 J		0.013 U		
AROCLOR-1016	0.21 U	0.21 U		0.26 U		
AROCLOR-1221	0.42 U	0.42 U		0.51 U		
AROCLOR-1232	0.21 U	0.21 U		0.26 U		
AROCLOR-1242	0.21 U	0.21 U		0.26 U		
AROCLOR-1248	0.21 U	0.21 U		0.26 U		
AROCLOR-1254	0.21 U	0.21 U		0.26 U		
AROCLOR-1260	0.21 U	0.21 U		0.26 U		
BETA-BHC	0.01 U	0.011 U		0.013 U		
DELTA-BHC	0.01 U	0.011 U		0.013 U		
DIELDRIN	0.005 J	0.003 J		0.026 U		
ENDOSULFAN I	0.01 U	0.011 U		0.013 U		
ENDOSULFAN II	0.021 U	0.021 U		0.026 U		
ENDOSULFAN SULFATE	0.021 U	0.021 U		0.026 U		
ENDRIN	0.021 U	0.021 U		0.026 U		
ENDRIN ALDEHYDE	0.021 U	0.021 U		0.026 U		
ENDRIN KETONE	0.021 U	0.021 U		0.026 U		
GAMMA-BHC (LINDANE)	0.01 U	0.011 U		0.013 U		
GAMMA-CHLORDANE	0.002 J	0.011 U		0.013 U		
HEPTACHLOR	0.01 U	0.011 U		0.013 U		
HEPTACHLOR EPOXIDE	0.01 U	0.011 U		0.003 J		
METHOXYCHLOR	0.1 U	0.1 U		0.13 U		
TOXAPHENE	1 U	1 U		1.3 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S12GW005U001	S12DUP011	S12GW006F001	S12GW006U001		
SAMPLE DATE:	10/24/97	10/24/97	10/24/97	10/24/97		
LOCATION:	S12WP05	S12WP05	S12WP06	S12WP06		
FILTERING:	Unfiltered	Unfiltered	Filtered	Unfiltered		
FIELD DUPLICATE OF:		S12GW005U001				
METALS (µg/L)						
ALUMINUM	726	3860	57.1 B	4620		
ANTIMONY	2.8 U	2.8 U	2.8 U	2.8 U		
ARSENIC	32.6 K	32.8 K	24.6 K	30.2 K		
BARIUM	244 J	246 J	535 J	356 J		
BERYLLIUM	0.1 UL	0.1 UL	0.1 UL	0.1 UL		
CADMIUM	0.95 B	1.1 B	0.42 B	0.89 B		
CALCIUM	118000	114000	184000	193000		
CHROMIUM	1.7 B	4.8 K	1.1 B	8.1 K		
COBALT	1.0 B	1.8 B	10.0 B	14.4		
COPPER	4.7 B	7.2 B	3.0 B	8.4 B		
CYANIDE	5.0 U	5.0 U		5.0 U		
IRON	65300	66400	56900	69000		
LEAD	5.6 B	5.5 B	1.3 B	17.3 K		
MAGNESIUM	23400	23000	31000	33100		
MANGANESE	1300 J	1270 J	4240 J	4470 J		
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U		
NICKEL	3.2 B	4.7 B	15.4	21.8		
POTASSIUM	10700	10800	13800	15200		
SELENIUM	2.3 UL	2.3 UL	2.3 UL	2.3 UL		
SILVER	0.9 U	0.92 B	0.9 U	0.9 U		
SODIUM	54200	53000	40300	35900		
THALLIUM	4.8 B	4.2 B	4.5 B	3.6 B		
VANADIUM	1.4 B	6.1 B	1.0 UL	11.7 B		
ZINC	14.2 B	21.9 K	95.1	46.6 K		

APPENDIX H.2.2

SITE 39/41 OCTOBER 1997 ANALYTICAL DATABASE

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001	S41SS0050001	S41SS0060001
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41SS01	S41SS02	S41SS03	S41SS04	S41SS05	S41SS06
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
1,1,2,2-TETRACHLOROETHANE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
1,1,2-TRICHLOROETHANE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
1,1-DICHLOROETHANE	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
1,1-DICHLOROETHENE	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
1,2-DICHLOROETHANE	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
1,2-DICHLOROETHENE (TOTAL)	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
1,2-DICHLOROPROPANE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
2-BUTANONE	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
2-HEXANONE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
4-METHYL-2-PENTANONE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
ACETONE	11 U	12 UJ	12 U	18 UJ	14 UJ	120 J
BENZENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
BROMODICHLOROMETHANE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
BROMOFORM	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
BROMOMETHANE	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
CARBON DISULFIDE	11 UJ	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
CARBON TETRACHLORIDE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
CHLOROBENZENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
CHLOROETHANE	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
CHLOROFORM	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
CHLOROMETHANE	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
CIS-1,3-DICHLOROPROPENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
DIBROMOCHLOROMETHANE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
ETHYLBENZENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
HEXACHLOROBUTADIENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001	S41SS0050001	S41SS0060001
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41SS01	S41SS02	S41SS03	S41SS04	S41SS05	S41SS06
FIELD DUPLICATE OF:						
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	9 B	11 B	9 B	14 B	16 B	15 B
STYRENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
TETRACHLOROETHENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
TOLUENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
TRANS-1,3-DICHLOROPROPENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
TRICHLOROETHENE	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
VINYL CHLORIDE	11 U	12 UJ	12 U	18 UJ	14 UJ	10 UJ
XYLENES, TOTAL	11 U	12 UJ	12 UJ	18 UJ	14 UJ	10 UJ
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	120 J	400 UJ	400 UJ	610 UJ	50 L	900 J
1,2-DICHLOROBENZENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
1,3-DICHLOROBENZENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
1,4-DICHLOROBENZENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2,4,5-TRICHLOROPHENOL	960 UJ	990 UJ	990 UJ	1500 UJ	1200 UR	850 UJ
2,4,6-TRICHLOROPHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2,4-DICHLOROPHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2,4-DIMETHYLPHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2,4-DINITROPHENOL	960 UJ	990 UJ	990 UJ	1500 UJ	1200 UR	850 UJ
2,4-DINITROTOLUENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2,6-DINITROTOLUENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2-CHLORONAPHTHALENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2-CHLOROPHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2-METHYLNAPHTHALENE	380 UJ	400 UJ	400 UJ	69 J	690 L	130 J
2-METHYLPHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
2-NITROANILINE	960 UJ	990 UJ	990 UJ	1500 UJ	1200 UR	850 UJ

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001	S41SS0050001	S41SS0060001
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41SS01	S41SS02	S41SS03	S41SS04	S41SS05	S41SS06
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
3,3'-DICHLOROBENZIDINE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
3-NITROANILINE	960 UJ	990 UJ	990 UJ	1500 UJ	1200 UR	850 UJ
4,6-DINITRO-2-METHYLPHENOL	960 UJ	990 UJ	990 UJ	1500 UJ	1200 UR	850 UJ
4-BROMOPHENYL PHENYL ETHER	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
4-CHLORO-3-METHYLPHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
4-CHLOROANILINE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
4-CHLOROPHENYL PHENYL ETHER	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
4-METHYLPHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
4-NITROANILINE	960 UJ	990 UJ	990 UJ	1500 UJ	1200 UR	850 UJ
4-NITROPHENOL	960 UJ	990 UJ	990 UJ	1500 UJ	1200 UR	850 UJ
ACENAPHTHENE	380 UJ	400 UJ	400 UJ	610 UJ	560 L	130 J
ACENAPHTHYLENE	380 UJ	400 UJ	400 UJ	610 UJ	47 L	340 UJ
ANTHRACENE	57 J	61 J	61 J	62 J	370 L	95 J
BENZO(A)ANTHRACENE	370 J	560 J	870 J	370 J	2800 L	350 J
BENZO(A)PYRENE	280 J	520 J	640 J	330 J	2000 L	290 J
BENZO(B)FLUORANTHENE	550 J	1500 J	1400 J	1100 J	2900 L	780 J
BENZO(G,H,I)PERYLENE	230 J	690 J	670 J	370 J	1500 L	310 J
BENZO(K)FLUORANTHENE	130 J	280 J	540 J	260 J	2100 L	220 J
BIS(2-CHLOROETHOXY)METHANE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
BIS(2-CHLOROETHYL)ETHER	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	43 J	45 J	47 J	610 UJ	110 L	94 J
BUTYLBENZYL PHTHALATE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
CARBAZOLE	41 J	400 UJ	400 UJ	610 UJ	130 L	65 J
CHRYSENE	380 J	850 J	1000 J	780 J	2900 L	530 J
DI-N-BUTYL PHTHALATE	44 J	400 UJ	45 J	64 J	470 UR	340 UJ

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001	S41SS0050001	S41SS0060001
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41SS01	S41SS02	S41SS03	S41SS04	S41SS05	S41SS06
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
DIBENZO(A,H)ANTHRACENE	93 J	340 J	310 J	190 J	850 L	120 J
DIBENZOFURAN	380 UJ	50 J	41 J	160 J	570 L	130 J
DIETHYL PHTHALATE	140 J	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
DIMETHYL PHTHALATE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
FLUORANTHENE	560 J	550 J	570 J	600 J	2900 L	910 J
FLUORENE	380 UJ	400 UJ	400 UJ	610 UJ	310 L	66 J
HEXACHLOROBENZENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
HEXACHLOROCYCLOPENTADIENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
HEXACHLOROETHANE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
INDENO(1,2,3-CD)PYRENE	260 J	680 J	670 J	370 J	1600 L	290 J
ISOPHORONE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
N-NITROSO-DI-N-PROPYLAMINE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
N-NITROSODIPHENYLAMINE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
NAPHTHALENE	380 UJ	400 UJ	48 J	63 J	980 L	230 J
NITROBENZENE	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
PENTACHLOROPHENOL	960 UJ	990 UJ	990 UJ	1500 UJ	1200 UR	850 UJ
PHENANTHRENE	240 J	270 J	270 J	380 J	1800 L	720 J
PHENOL	380 UJ	400 UJ	400 UJ	610 UJ	470 UR	340 UJ
PYRENE	440 J	670 J	930 J	550 J	6100 L	680 J
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
4,4'-DDE	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
4,4'-DDT	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
ALDRIN	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
ALPHA-BHC	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001	S41SS0050001	S41SS0060001
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41SS01	S41SS02	S41SS03	S41SS04	S41SS05	S41SS06
FIELD DUPLICATE OF:						
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
AROCLOR-1016	38 UJ	40 UJ	39 UJ	61 UJ	47 UJ	34 UJ
AROCLOR-1221	77 UJ	79 UJ	79 UJ	120 UJ	94 UJ	68 UJ
AROCLOR-1232	38 UJ	40 UJ	39 UJ	61 UJ	47 UJ	34 UJ
AROCLOR-1242	38 UJ	40 UJ	39 UJ	61 UJ	47 UJ	34 UJ
AROCLOR-1248	38 UJ	40 UJ	39 UJ	61 UJ	47 UJ	34 UJ
AROCLOR-1254	38 UJ	40 UJ	39 UJ	61 UJ	47 UJ	34 UJ
AROCLOR-1260	11000 J	650 J	330 J	890 J	13000 J	21000 J
BETA-BHC	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
DELTA-BHC	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
DIELDRIN	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
ENDOSULFAN I	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
ENDOSULFAN II	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
ENDOSULFAN SULFATE	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
ENDRIN	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
ENDRIN ALDEHYDE	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
ENDRIN KETONE	3.8 UJ	4 UJ	3.9 UJ	6.1 UJ	4.7 UJ	3.4 UJ
GAMMA-BHC (LINDANE)	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
GAMMA-CHLORDANE	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
HEPTACHLOR	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
HEPTACHLOR EPOXIDE	1.9 UJ	2 UJ	2 UJ	3 UJ	2.4 UJ	1.7 UJ
METHOXYCHLOR	19 UJ	20 UJ	20 UJ	30 UJ	24 UJ	17 UJ
TOXAPHENE	190 UJ	200 UJ	200 UJ	300 UJ	240 UJ	170 UJ
ENERGETICS (µg/kg)						
1,3,5-TRINITROBENZENE	40.2 U	40.2 U	40.2 UL	40.2 U	40.2 UL	40.2 U
1,3-DINITROBENZENE	37.2 U	37.2 U	37.2 UL	37.2 U	37.2 UL	37.2 U

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001	S41SS0050001	S41SS0060001
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41SS01	S41SS02	S41SS03	S41SS04	S41SS05	S41SS06
FIELD DUPLICATE OF:						
ENERGETICS (µg/kg)						
2,4,6-TRINITROTOLUENE	35.6 U	35.6 U	35.6 UL	35.6 U	35.6 UL	35.6 U
2-AMINO-4,6-DINITROTOLUENE	46.7 U	46.7 U	46.7 UL	46.7 U	46.7 UL	46.7 U
2-NITROTOLUENE	81.4 U	81.4 U	81.4 UL	81.4 U	81.4 UL	81.4 U
3-NITROTOLUENE	81.8 U	81.8 U	81.8 UL	81.8 U	81.8 UL	81.8 U
4-AMINO-2,6-DINITROTOLUENE	40.9 U	40.9 U	40.9 UL	40.9 U	40.9 UL	40.9 U
4-NITROTOLUENE	87.2 U	87.2 U	87.2 UL	87.2 U	87.2 UL	87.2 U
HMX	70.5 U	70.5 U	70.5 UL	70.5 U	70.5 UL	70.5 U
NITROCELLULOSE	28900	17500 U	24400	16900 U	17300 U	31600
NITROGLYCERIN	10000 U	10000 U	10000 U	10000 U	10000 U	10000 U
NITROGUANIDINE	62.5 U	62.5 U	62.5 U	62.5 U	62.5 U	115.4
RDX	50.9 U	50.9 U	50.9 UL	50.9 U	50.9 UL	50.9 U
TETRYL	163 U	163 U	163 UL	163 U	163 UL	163 U
METALS (mg/kg)						
ALUMINUM	4660 J	3840 J	3770 J	4240 J	5790 J	9920 J
ANTIMONY	0.59 UL	0.61 UL	0.9 L	2.0 L	10.6 L	2.6 UL
ARSENIC	115 L	77.1 L	104 L	216 L	138 L	39.3 L
BARIUM	40.2 L	53.1 L	51.9 L	75.8 L	80.0 L	192 L
BERYLLIUM	0.12 B	0.15 B	0.28 B	0.19 B	0.35 B	0.1 UL
CADMIUM	1.7 J	0.63 J	0.56 J	2.6 J	8.0 J	11.4 J
CALCIUM	4420	1730 K	1730 K	7410	2770	111000
CHROMIUM	10.6 J	11.0 J	13.4 J	14.6 J	26.7 J	22.1 J
COBALT	4.3 J	2.8 J	5.0 J	4.8 J	5.9 J	3.8 J
COPPER	18.7 L	10.6 L	14.5 J	22.6 L	105 L	49.7 L
CYANIDE	0.17 U	0.29	0.22 U	0.38 U	0.22 U	0.27
IRON	21200	10700	23500	38200	46300	13300
LEAD	32.2	27.6	31.3	77.9	3540	91.1

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001	S41SS0050001	S41SS0060001
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41SS01	S41SS02	S41SS03	S41SS04	S41SS05	S41SS06
FIELD DUPLICATE OF:						
METALS (mg/kg)						
MAGNESIUM	489 K	431 K	570 K	614 K	545 K	4940
MANGANESE	90.3 L	98.3 L	114 L	137 L	204 L	172 L
MERCURY	0.49	0.27	0.63	0.44	0.78	0.5
NICKEL	7.1 B	9.6 B	13.1 B	12.3 B	20.3 B	17.3 B
POTASSIUM	514	465	687	693	623	503
SELENIUM	1.1 J	0.66 UJ	1.6 J	3.3 L	2.2 L	2.8 UJ
SILVER	0.18 UJ	0.19 UJ	0.19 UJ	0.29 UJ	0.64 B	0.79 UJ
SODIUM	55.7 B	79.4 B	90.1 B	223 B	149 B	198 U
THALLIUM	0.79 B	0.68 UL	0.68 UL	1.5 B	0.81 UL	4.3 B
VANADIUM	18.5 L	16.9 L	18.8 L	21.5 L	30.1 L	17.0 L
ZINC	35.1 L	38.3 L	37.5 L	309 L	423 L	343 L
GENERAL CHEMISTRY						
PH	8.65	6.07	6.49	6.9	7.36	11.9

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0070001	S41SS0080001	S41DUP009	S41SS0090001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97		
LOCATION:	S41SS07	S41SS08	S41SS08	S41SS09		
FIELD DUPLICATE OF:			S41SS0080001			
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	23 UJ	13 UJ	14 U	12 UJ		
1,1,2,2-TETRACHLOROETHANE	23 UJ	13 UJ	14 U	12 UJ		
1,1,2-TRICHLOROETHANE	23 UJ	13 UJ	14 U	12 UJ		
1,1-DICHLOROETHANE	23 UJ	13 UJ	14 U	12 UJ		
1,1-DICHLOROETHENE	23 UJ	13 UJ	14 U	12 UJ		
1,2-DICHLOROETHANE	23 UJ	13 UJ	14 U	12 UJ		
1,2-DICHLOROETHENE (TOTAL)	23 UJ	13 UJ	14 U	12 UJ		
1,2-DICHLOROPROPANE	23 UJ	13 UJ	14 U	12 UJ		
2-BUTANONE	23 UJ	13 UJ	14 U	12 UJ		
2-HEXANONE	23 UJ	13 UJ	14 U	12 UJ		
4-METHYL-2-PENTANONE	23 UJ	13 UJ	14 U	12 UJ		
ACETONE	23 UJ	13 UJ	14 U	12 UJ		
BENZENE	23 UJ	13 UJ	14 U	12 UJ		
BROMODICHLOROMETHANE	23 UJ	13 UJ	14 U	12 UJ		
BROMOFORM	23 UJ	13 UJ	14 U	12 UJ		
BROMOMETHANE	23 UJ	13 UJ	14 U	12 UJ		
CARBON DISULFIDE	23 UJ	13 UJ	14 UJ	12 UJ		
CARBON TETRACHLORIDE	23 UJ	13 UJ	14 U	12 UJ		
CHLOROBENZENE	23 UJ	13 UJ	14 U	12 UJ		
CHLOROETHANE	23 UJ	13 UJ	14 U	12 UJ		
CHLOROFORM	23 UJ	13 UJ	14 U	12 UJ		
CHLOROMETHANE	23 UJ	13 UJ	14 U	12 UJ		
CIS-1,3-DICHLOROPROPENE	23 UJ	13 UJ	14 U	12 UJ		
DIBROMOCHLOROMETHANE	23 UJ	13 UJ	14 U	12 UJ		
ETHYLBENZENE	23 UJ	13 UJ	14 U	12 UJ		
HEXACHLOROBUTADIENE	790 UJ	420 UJ	470 UJ	410 UJ		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0070001	S41SS0080001	S41DUP009	S41SS0090001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97		
LOCATION:	S41SS07	S41SS08	S41SS08	S41SS09		
FIELD DUPLICATE OF:			S41SS0080001			
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	43 B	12 B	15 B	16 B		
STYRENE	23 UJ	13 UJ	14 U	12 UJ		
TETRACHLOROETHENE	23 UJ	13 UJ	14 U	12 UJ		
TOLUENE	23 UJ	13 UJ	14 U	12 UJ		
TRANS-1,3-DICHLOROPROPENE	23 UJ	13 UJ	14 U	12 UJ		
TRICHLOROETHENE	23 UJ	13 UJ	14 U	12 UJ		
VINYL CHLORIDE	23 UJ	13 UJ	14 U	12 UJ		
XYLENES, TOTAL	23 UJ	13 UJ	14 U	12 UJ		
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	140 J	4800 J	2900 J	280 J		
1,2-DICHLOROBENZENE	790 UJ	420 UJ	470 UJ	410 UJ		
1,3-DICHLOROBENZENE	790 UJ	420 UJ	470 UJ	410 UJ		
1,4-DICHLOROBENZENE	790 UJ	420 UJ	470 UJ	410 UJ		
2,2'-OXYBIS(1-CHLOROPROPANE)	790 UJ	420 UJ	470 UJ	410 UJ		
2,4,5-TRICHLOROPHENOL	2000 UJ	1100 UJ	1200 UJ	1000 UJ		
2,4,6-TRICHLOROPHENOL	790 UJ	420 UJ	470 UJ	410 UJ		
2,4-DICHLOROPHENOL	790 UJ	420 UJ	470 UJ	410 UJ		
2,4-DIMETHYLPHENOL	790 UJ	420 UJ	470 UJ	410 UJ		
2,4-DINITROPHENOL	2000 UJ	1100 UJ	1200 UJ	1000 UJ		
2,4-DINITROTOLUENE	790 UJ	420 UJ	470 UJ	410 UJ		
2,6-DINITROTOLUENE	790 UJ	420 UJ	470 UJ	410 UJ		
2-CHLORONAPHTHALENE	790 UJ	420 UJ	470 UJ	410 UJ		
2-CHLOROPHENOL	790 UJ	420 UJ	470 UJ	410 UJ		
2-METHYLNAPHTHALENE	470 J	47 J	68 J	96 J		
2-METHYLPHENOL	790 UJ	420 UJ	470 UJ	410 UJ		
2-NITROANILINE	2000 UJ	1100 UJ	1200 UJ	1000 UJ		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0070001	S41SS0080001	S41DUP009	S41SS0090001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97		
LOCATION:	S41SS07	S41SS08	S41SS08	S41SS09		
FIELD DUPLICATE OF:			S41SS0080001			
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	790 UJ	420 UJ	470 UJ	410 UJ		
3,3'-DICHLOROBENZIDINE	790 UJ	420 UJ	470 UJ	410 UJ		
3-NITROANILINE	2000 UJ	1100 UJ	1200 UJ	1000 UJ		
4,6-DINITRO-2-METHYLPHENOL	2000 UJ	1100 UJ	1200 UJ	1000 UJ		
4-BROMOPHENYL PHENYL ETHER	790 UJ	420 UJ	470 UJ	410 UJ		
4-CHLORO-3-METHYLPHENOL	790 UJ	420 UJ	470 UJ	410 UJ		
4-CHLOROANILINE	790 UJ	420 UJ	470 UJ	410 UJ		
4-CHLOROPHENYL PHENYL ETHER	790 UJ	420 UJ	470 UJ	410 UJ		
4-METHYLPHENOL	200 J	420 UJ	470 UJ	410 UJ		
4-NITROANILINE	2000 UJ	1100 UJ	1200 UJ	1000 UJ		
4-NITROPHENOL	2000 UJ	1100 UJ	1200 UJ	1000 UJ		
ACENAPHTHENE	420 J	420 UJ	470 UJ	410 UJ		
ACENAPHTHYLENE	790 UJ	420 UJ	470 UJ	410 UJ		
ANTHRACENE	940 J	420 UJ	470 UJ	410 UJ		
BENZO(A)ANTHRACENE	1700 J	64 J	81 J	110 J		
BENZO(A)PYRENE	1600 J	49 J	67 J	88 J		
BENZO(B)FLUORANTHENE	3400 J	110 J	130 J	230 J		
BENZO(G,H,I)PERYLENE	1400 J	59 J	71 J	110 J		
BENZO(K)FLUORANTHENE	1100 J	420 UJ	470 UJ	410 UJ		
BIS(2-CHLOROETHOXY)METHANE	790 UJ	420 UJ	470 UJ	410 UJ		
BIS(2-CHLOROETHYL)ETHER	790 UJ	420 UJ	470 UJ	410 UJ		
BIS(2-ETHYLHEXYL)PHTHALATE	170 J	1200 J	430 J	2100 J		
BUTYLBENZYL PHTHALATE	790 UJ	420 UJ	470 UJ	410 UJ		
CARBAZOLE	240 J	420 UJ	470 UJ	410 UJ		
CHRYSENE	2600 J	210 J	170 J	320 J		
DI-N-BUTYL PHTHALATE	84 J	55 J	65 J	440 J		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0070001	S41SS0080001	S41DUP009	S41SS0090001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97		
LOCATION:	S41SS07	S41SS08	S41SS08	S41SS09		
FIELD DUPLICATE OF:			S41SS0080001			
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	790 UJ	420 UJ	470 UJ	410 UJ		
DIBENZO(A,H)ANTHRACENE	650 J	420 UJ	470 UJ	410 UJ		
DIBENZOFURAN	590 J	420 UJ	470 UJ	410 UJ		
DIETHYL PHTHALATE	120 J	420 UJ	470 UJ	98 J		
DIMETHYL PHTHALATE	790 UJ	420 UJ	470 UJ	410 UJ		
FLUORANTHENE	2900 J	97 J	110 J	170 J		
FLUORENE	340 J	420 UJ	470 UJ	410 UJ		
HEXACHLOROBENZENE	790 UJ	420 UJ	470 UJ	410 UJ		
HEXACHLOROCYCLOPENTADIENE	790 UJ	420 UJ	470 UJ	410 UJ		
HEXACHLOROETHANE	790 UJ	420 UJ	470 UJ	410 UJ		
INDENO(1,2,3-CD)PYRENE	1400 J	50 J	66 J	120 J		
ISOPHORONE	790 UJ	420 UJ	470 UJ	410 UJ		
N-NITROSO-DI-N-PROPYLAMINE	790 UJ	420 UJ	470 UJ	410 UJ		
N-NITROSODIPHENYLAMINE	790 UJ	420 UJ	470 UJ	410 UJ		
NAPHTHALENE	740 J	420 UJ	470 UJ	410 UJ		
NITROBENZENE	790 UJ	420 UJ	470 UJ	410 UJ		
PENTACHLOROPHENOL	2000 UJ	1100 UJ	1200 UJ	1000 UJ		
PHENANTHRENE	1900 J	150 J	190 J	220 J		
PHENOL	790 UJ	420 UJ	470 UJ	410 UJ		
PYRENE	3500 J	140 J	160 J	190 J		
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
4,4'-DDE	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
4,4'-DDT	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
ALDRIN	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
ALPHA-BHC	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0070001	S41SS0080001	S41DUP009	S41SS0090001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97		
LOCATION:	S41SS07	S41SS08	S41SS08	S41SS09		
FIELD DUPLICATE OF:			S41SS0080001			
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
AROCLOR-1016	78 UJ	42 UJ	47 UJ	41 UJ		
AROCLOR-1221	160 UJ	85 UJ	95 UJ	81 UJ		
AROCLOR-1232	78 UJ	42 UJ	47 UJ	41 UJ		
AROCLOR-1242	78 UJ	42 UJ	47 UJ	41 UJ		
AROCLOR-1248	78 UJ	42 UJ	47 UJ	41 UJ		
AROCLOR-1254	78 UJ	42 UJ	47 UJ	41 UJ		
AROCLOR-1260	12000 J	180000 J	130000 J	16000 J		
BETA-BHC	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
DELTA-BHC	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
DIELDRIN	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
ENDOSULFAN I	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
ENDOSULFAN II	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
ENDOSULFAN SULFATE	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
ENDRIN	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
ENDRIN ALDEHYDE	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
ENDRIN KETONE	7.8 UJ	4.2 UJ	4.7 UJ	4.1 UJ		
GAMMA-BHC (LINDANE)	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
GAMMA-CHLORDANE	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
HEPTACHLOR	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
HEPTACHLOR EPOXIDE	3.9 UJ	2.1 UJ	2.4 UJ	2 UJ		
METHOXYCHLOR	39 UJ	21 UJ	24 UJ	20 UJ		
TOXAPHENE	390 UJ	210 UJ	240 UJ	200 UJ		
ENERGETICS (µg/kg)						
1,3,5-TRINITROBENZENE	40.2 U	40.2 UL	40.2 U	40.2 U		
1,3-DINITROBENZENE	37.2 U	37.2 UL	37.2 U	37.2 U		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0070001	S41SS0080001	S41DUP009	S41SS0090001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97		
LOCATION:	S41SS07	S41SS08	S41SS08	S41SS09		
FIELD DUPLICATE OF:			S41SS0080001			
ENERGETICS (µg/kg)						
2,4,6-TRINITROTOLUENE	35.6 U	35.6 UL	35.6 U	35.6 U		
2-AMINO-4,6-DINITROTOLUENE	46.7 U	46.7 UL	46.7 U	46.7 U		
2-NITROTOLUENE	81.4 U	81.4 UL	81.4 U	81.4 U		
3-NITROTOLUENE	81.8 U	81.8 UL	81.8 U	81.8 U		
4-AMINO-2,6-DINITROTOLUENE	40.9 U	40.9 UL	40.9 U	40.9 U		
4-NITROTOLUENE	87.2 U	87.2 UL	87.2 U	87.2 U		
HMX	70.5 U	70.5 UL	70.5 U	70.5 U		
NITROCELLULOSE	33200	29100	17400 U	17500 U		
NITROGLYCERIN	10000 U	10000 U	10000 U	10000 U		
NITROGUANIDINE	288.4	62.5 U	62.5 U	62.5 U		
RDX	50.9 U	50.9 UL	50.9 U	50.9 U		
TETRYL	163 U	163 UL	163 U	163 U		
METALS (mg/kg)						
ALUMINUM	13800 J	3740 J	4370 J	3710 J		
ANTIMONY	5.9 UL	0.94 L	2.0 L	1.3 L		
ARSENIC	176 L	21.8 L	26.7 L	46.2 L		
BARIUM	148 L	62.6 L	57.7 L	68.2 L		
BERYLLIUM	0.23 UL	0.28 B	0.52 L	0.46 L		
CADMIUM	45.6 J	10.7 J	13.4 J	13.8 J		
CALCIUM	137000	1030 K	1380 K	2900		
CHROMIUM	88.2 J	45.1 J	26.5 J	33.9 J		
COBALT	8.8 J	9.4 J	6.6 J	12.1 J		
COPPER	189 L	72.7 L	76.7 L	86.6 L		
CYANIDE	0.52	0.28 U	0.3 U	0.33		
IRON	39300	53000	32500	39700		
LEAD	457	187	265	251		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41SS0070001	S41SS0080001	S41DUP009	S41SS0090001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97		
LOCATION:	S41SS07	S41SS08	S41SS08	S41SS09		
FIELD DUPLICATE OF:			S41SS0080001			
METALS (mg/kg)						
MAGNESIUM	9460	421 K	521 K	726 K		
MANGANESE	754 L	238 L	136 L	243 L		
MERCURY	3.9	0.29	0.29	0.15		
NICKEL	44.3 J	21.7 B	19.9 B	23.9 B		
POTASSIUM	702	404	437	600		
SELENIUM	6.3 UJ	0.7 UJ	1.1 J	2.2 J		
SILVER	4.0 J	1.8 J	1.6 J	0.82 B		
SODIUM	452 U	139 B	100 B	161 B		
THALLIUM	6.6 UL	0.73 UL	0.8 UL	0.71 UL		
VANADIUM	29.8 L	19.2 L	22.0 L	23.9 L		
ZINC	536 L	282 L	278 L	352 L		
GENERAL CHEMISTRY						
PH	11.46	5.56	5.43	6.88		

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SW0010001 10/21/97 S39SD/SW01	S39SW0020001 10/21/97 S39SD03/SW02	S39DUP008 10/21/97 S39SD03/SW02 S39SW0020001	S39SW0030001 10/21/97 S39SD05/SW03	S39SW0040001 10/21/97 S39SD06/SW04	S39SW0060001 10/21/97 S39SD08/SW06
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DIBROMO-3-CHLOROPROPANE	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
1,2-DIBROMOETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROPROPANE	1 U	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
2-HEXANONE	5 U	5 U	5 U	5 U	5 U	5 U
4-METHYL-2-PENTANONE	5 U	5 U	5 U	5 U	5 U	5 U
ACETONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
BENZENE	1 U	1 U	1 U	1 U	1 U	1 U
BROMOCHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
BROMODICHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
BROMOFORM	1 U	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	1 U	1 U	1 U	1 U	1 U	1 U
CARBON TETRACHLORIDE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,2-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U
DIBROMOCHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SW0010001 10/21/97 S39SD/SW01	S39SW0020001 10/21/97 S39SD03/SW02	S39DUP008 10/21/97 S39SD03/SW02 S39SW0020001	S39SW0030001 10/21/97 S39SD05/SW03	S39SW0040001 10/21/97 S39SD06/SW04	S39SW0060001 10/21/97 S39SD08/SW06
VOLATILES (µg/L)						
ETHYLBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
HEXACHLOROBUTADIENE	5 U	6 U	6 U	5 U	5 U	5 U
METHYLENE CHLORIDE	1 B	1 B	1 B	1 B	1 B	1 B
STYRENE	1 U	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1
VINYL CHLORIDE	1 U	1 U	1 U	1 U	1 U	1 U
XYLENES, TOTAL	1 U	1 U	1 U	1 U	1 U	1 U
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
1,3-DICHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
1,4-DICHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	6 U	6 U	5 U	5 U	5 U
2,4,5-TRICHLOROPHENOL	20 U	22 U	22 U	21 U	20 U	20 U
2,4,6-TRICHLOROPHENOL	5 U	6 U	6 U	5 U	5 U	5 U
2,4-DICHLOROPHENOL	5 U	6 U	6 U	5 U	5 U	5 U
2,4-DIMETHYLPHENOL	5 U	6 U	6 U	5 U	5 U	5 U
2,4-DINITROPHENOL	20 U	22 U	22 U	21 U	20 U	20 U
2,4-DINITROTOLUENE	5 U	6 U	6 U	5 U	5 U	5 U
2,6-DINITROTOLUENE	5 U	6 U	6 U	5 U	5 U	5 U
2-CHLORONAPHTHALENE	5 U	6 U	6 U	5 U	5 U	5 U
2-CHLOROPHENOL	5 U	6 U	6 U	5 U	5 U	5 U
2-METHYLNAPHTHALENE	5 U	6 U	6 U	5 U	5 U	5 U

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S39SW0010001	S39SW0020001	S39DUP008	S39SW0030001	S39SW0040001	S39SW0060001
SAMPLE DATE:	10/21/97	10/21/97	10/21/97	10/21/97	10/21/97	10/21/97
LOCATION:	S39SD/SW01	S39SD03/SW02	S39SD03/SW02	S39SD05/SW03	S39SD06/SW04	S39SD08/SW06
FIELD DUPLICATE OF:			S39SW0020001			
SEMIVOLATILES (µg/L)						
2-METHYLPHENOL	5 U	6 U	6 U	5 U	5 U	5 U
2-NITROANILINE	20 U	22 U	22 U	21 U	20 U	20 U
2-NITROPHENOL	5 U	6 U	6 U	5 U	5 U	5 U
3,3'-DICHLOROBENZIDINE	5 U	6 U	6 U	5 U	5 U	5 U
3-NITROANILINE	20 U	22 U	22 U	21 U	20 U	20 U
4,6-DINITRO-2-METHYLPHENOL	20 U	22 U	22 U	21 U	20 U	20 U
4-BROMOPHENYL PHENYL ETHER	5 U	6 U	6 U	5 U	5 U	5 U
4-CHLORO-3-METHYLPHENOL	5 U	6 U	6 U	5 U	5 U	5 U
4-CHLOROANILINE	5 U	6 U	6 U	5 U	5 U	5 U
4-CHLOROPHENYL PHENYL ETHER	5 U	6 U	6 U	5 U	5 U	5 U
4-METHYLPHENOL	5 U	6 U	6 U	5 U	5 U	5 U
4-NITROANILINE	20 U	22 U	22 U	21 U	20 U	20 U
4-NITROPHENOL	20 U	22 U	22 U	21 U	20 U	20 U
ACENAPHTHENE	5 U	6 U	6 U	5 U	5 U	5 U
ACENAPHTHYLENE	5 U	6 U	6 U	5 U	5 U	5 U
ANTHRACENE	5 U	6 U	6 U	5 U	5 U	5 U
BENZO(A)ANTHRACENE	5 U	6 U	6 U	5 U	5 U	5 U
BENZO(A)PYRENE	5 U	6 U	6 U	5 U	5 U	5 U
BENZO(B)FLUORANTHENE	5 U	6 U	6 U	5 U	5 U	5 U
BENZO(G,H,I)PERYLENE	5 U	6 U	6 U	5 U	5 U	5 U
BENZO(K)FLUORANTHENE	5 U	6 U	6 U	5 U	5 U	5 U
BIS(2-CHLOROETHOXY)METHANE	5 U	6 U	6 U	5 U	5 U	5 U
BIS(2-CHLOROETHYL)ETHER	5 U	6 U	6 U	5 U	5 U	5 U
BIS(2-ETHYLHEXYL)PHTHALATE	5 U	1 J	6 U	5 U	1 J	5 U
BUTYLBENZYL PHTHALATE	5 U	6 U	6 U	5 U	5 U	5 U
CHRYSENE	5 U	6 U	6 U	5 U	5 U	5 U
DI-N-BUTYL PHTHALATE	6 B	6 U	6 U	5 U	5 U	3 B

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SW0010001 10/21/97 S39SD/SW01	S39SW0020001 10/21/97 S39SD03/SW02	S39DUP008 10/21/97 S39SD03/SW02 S39SW0020001	S39SW0030001 10/21/97 S39SD05/SW03	S39SW0040001 10/21/97 S39SD06/SW04	S39SW0060001 10/21/97 S39SD08/SW06
SEMIVOLATILES (µg/L)						
DI-N-OCTYL PHTHALATE	5 UJ	6 UJ	6 UJ	5 UJ	5 UJ	5 UJ
DIBENZO(A,H)ANTHRACENE	5 U	6 U	6 U	5 U	5 U	5 U
DIBENZOFURAN	5 U	6 U	6 U	5 U	5 U	5 U
DIETHYL PHTHALATE	5 U	6 U	6 U	5 U	5 U	5 U
DIMETHYL PHTHALATE	5 U	6 U	6 U	5 U	5 U	5 U
FLUORANTHENE	5 U	6 U	6 U	5 U	5 U	5 U
FLUORENE	5 U	6 U	6 U	5 U	5 U	5 U
HEXACHLOROBENZENE	5 U	6 U	6 U	5 U	5 U	5 U
HEXACHLOROCYCLOPENTADIENE	5 UJ	6 UJ	6 UJ	5 UJ	5 UJ	5 UJ
HEXACHLOROETHANE	5 U	6 U	6 U	5 U	5 U	5 U
INDENO(1,2,3-CD)PYRENE	5 U	6 U	6 U	5 U	5 U	5 U
ISOPHORONE	5 U	6 U	6 U	5 U	5 U	5 U
N-NITROSO-DI-N-PROPYLAMINE	5 U	6 U	6 U	5 U	5 U	5 U
N-NITROSODIPHENYLAMINE	5 U	6 U	6 U	5 U	5 U	5 U
NAPHTHALENE	5 U	6 U	6 U	5 U	5 U	5 U
NITROBENZENE	5 U	6 U	6 U	5 U	5 U	5 U
PENTACHLOROPHENOL	20 U	22 U	22 U	21 U	20 U	20 U
PHENANTHRENE	5 U	6 U	6 U	5 U	5 U	5 U
PHENOL	5 U	6 U	6 U	5 U	5 U	5 U
PYRENE	5 U	6 U	6 U	5 U	5 U	5 U
METALS (µg/L)						
ALUMINUM	139 B	410	918	133 B	131 B	190 B
ANTIMONY	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
ARSENIC	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
BARIUM	72.3	64.7	64.8	72.8	74.2	63.9
BERYLLIUM	0.1 U	0.14 B	0.11 B	0.1 U	0.1 U	0.1 U
CADMIUM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S39SW0010001	S39SW0020001	S39DUP008	S39SW0030001	S39SW0040001	S39SW0060001
SAMPLE DATE:	10/21/97	10/21/97	10/21/97	10/21/97	10/21/97	10/21/97
LOCATION:	S39SD/SW01	S39SD03/SW02	S39SD03/SW02	S39SD05/SW03	S39SD06/SW04	S39SD08/SW06
FIELD DUPLICATE OF:			S39SW0020001			
METALS (µg/L)						
CALCIUM	34200	26900	26600	34400	34300	31100
CHROMIUM	0.52 B	0.72 B	2.4 B	1.8 B	0.5 U	0.9 B
COBALT	0.55 B	4.4 B	6.3	0.5 B	0.4 U	0.52 B
COPPER	2.8 B	4.5 B	6.0 B	6.1 B	2.5 B	4.5 B
CYANIDE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
IRON	300 K	1060 K	1620 K	326 K	382 K	410 K
LEAD	1.6 B	5.2 L	5.0 L	2.1 B	1.9 B	4.1 B
MAGNESIUM	34200	27300	25500	34300	33900	28500
MANGANESE	75.8	153	202	78.0	83.4	67.2
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	3.1	2.4	4.0	2.5	1.9	2.9
POTASSIUM	12400	10400	9360	12400	12400	11000
SELENIUM	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
SILVER	0.8 U	1.1	6.0	0.8 U	0.8 U	0.8 U
SODIUM	210000 J	172000 J	155000 J	211000 J	210000 J	181000 J
THALLIUM	2.9 UL	2.9 UL	2.9 UL	2.9 UL	2.9 UL	2.9 UL
VANADIUM	1.1 U	1.1 U	2.5	1.1 U	1.1 U	1.1 U
ZINC	8.2 B	31.5	42.5	11.2 B	6.5 B	16.0

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SW0050001 10/21/97 S39SW05					
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE	1 U					
1,1,2,2-TETRACHLOROETHANE	1 U					
1,1,2-TRICHLOROETHANE	1 U					
1,1-DICHLOROETHANE	1 U					
1,1-DICHLOROETHENE	1 U					
1,2-DIBROMO-3-CHLOROPROPANE	1 UJ					
1,2-DIBROMOETHANE	1 U					
1,2-DICHLOROETHANE	1 U					
1,2-DICHLOROPROPANE	1 U					
2-BUTANONE	5 UR					
2-HEXANONE	5 U					
4-METHYL-2-PENTANONE	5 U					
ACETONE	5 UR					
BENZENE	1 U					
BROMOCHLOROMETHANE	1 U					
BROMODICHLOROMETHANE	1 U					
BROMOFORM	1 U					
BROMOMETHANE	1 U					
CARBON DISULFIDE	1 U					
CARBON TETRACHLORIDE	1 U					
CHLOROBENZENE	1 U					
CHLOROETHANE	1 U					
CHLOROFORM	1 U					
CHLOROMETHANE	1 U					
CIS-1,2-DICHLOROETHENE	1 U					
CIS-1,3-DICHLOROPROPENE	1 U					
DIBROMOCHLOROMETHANE	1 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SW0050001 10/21/97 S39SW05					
VOLATILES (µg/L)						
ETHYLBENZENE	1 U					
HEXACHLOROBUTADIENE	5 U					
METHYLENE CHLORIDE	1 B					
STYRENE	1 U					
TETRACHLOROETHENE	1 U					
TOLUENE	1 U					
TRANS-1,2-DICHLOROETHENE	1 U					
TRANS-1,3-DICHLOROPROPENE	1 U					
TRICHLOROETHENE	1 U					
VINYL CHLORIDE	1 U					
XYLENES, TOTAL	1 U					
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE	1 U					
1,2-DICHLOROBENZENE	1 U					
1,3-DICHLOROBENZENE	1 U					
1,4-DICHLOROBENZENE	1 U					
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U					
2,4,5-TRICHLOROPHENOL	20 U					
2,4,6-TRICHLOROPHENOL	5 U					
2,4-DICHLOROPHENOL	5 U					
2,4-DIMETHYLPHENOL	5 U					
2,4-DINITROPHENOL	20 U					
2,4-DINITROTOLUENE	5 U					
2,6-DINITROTOLUENE	5 U					
2-CHLORONAPHTHALENE	5 U					
2-CHLOROPHENOL	5 U					
2-METHYLNAPHTHALENE	5 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SW0050001 10/21/97 S39SW05					
SEMIVOLATILES (µg/L)						
2-METHYLPHENOL	5 U					
2-NITROANILINE	20 U					
2-NITROPHENOL	5 U					
3,3'-DICHLOROBENZIDINE	5 U					
3-NITROANILINE	20 U					
4,6-DINITRO-2-METHYLPHENOL	20 U					
4-BROMOPHENYL PHENYL ETHER	5 U					
4-CHLORO-3-METHYLPHENOL	5 U					
4-CHLOROANILINE	5 U					
4-CHLOROPHENYL PHENYL ETHER	5 U					
4-METHYLPHENOL	5 U					
4-NITROANILINE	20 U					
4-NITROPHENOL	20 U					
ACENAPHTHENE	5 U					
ACENAPHTHYLENE	5 U					
ANTHRACENE	5 U					
BENZO(A)ANTHRACENE	5 U					
BENZO(A)PYRENE	5 U					
BENZO(B)FLUORANTHENE	5 U					
BENZO(G,H,I)PERYLENE	5 U					
BENZO(K)FLUORANTHENE	5 U					
BIS(2-CHLOROETHOXY)METHANE	5 U					
BIS(2-CHLOROETHYL)ETHER	5 U					
BIS(2-ETHYLHEXYL)PHTHALATE	5 U					
BUTYLBENZYL PHTHALATE	5 U					
CHRYSENE	5 U					
DI-N-BUTYL PHTHALATE	14 B					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SW0050001 10/21/97 S39SW05					
SEMIVOLATILES (µg/L)						
DI-N-OCTYL PHTHALATE	5 UJ					
DIBENZO(A,H)ANTHRACENE	5 U					
DIBENZOFURAN	5 U					
DIETHYL PHTHALATE	5 U					
DIMETHYL PHTHALATE	5 U					
FLUORANTHENE	5 U					
FLUORENE	5 U					
HEXACHLOROBENZENE	5 U					
HEXACHLOROCYCLOPENTADIENE	5 UJ					
HEXACHLOROETHANE	5 U					
INDENO(1,2,3-CD)PYRENE	5 U					
ISOPHORONE	5 U					
N-NITROSO-DI-N-PROPYLAMINE	5 U					
N-NITROSODIPHENYLAMINE	5 U					
NAPHTHALENE	5 U					
NITROBENZENE	5 U					
PENTACHLOROPHENOL	20 U					
PHENANTHRENE	5 U					
PHENOL	5 U					
PYRENE	5 U					
METALS (µg/L)						
ALUMINUM	292 K					
ANTIMONY	2.6 U					
ARSENIC	3.3 U					
BARIUM	76.8					
BERYLLIUM	0.1 U					
CADMIUM	0.3 U					

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SW0050001 10/21/97 S39SW05					
METALS (µg/L)						
CALCIUM	33800					
CHROMIUM	1.3 B					
COBALT	0.94 B					
COPPER	3.6 B					
CYANIDE	5.0 U					
IRON	976 K					
LEAD	2.7 B					
MAGNESIUM	33100					
MANGANESE	143					
MERCURY	0.1 U					
NICKEL	3.0					
POTASSIUM	12200					
SELENIUM	2.8 U					
SILVER	0.8 U					
SODIUM	206000 J					
THALLIUM	2.9 UL					
VANADIUM	1.3					
ZINC	90.4					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0010001 10/21/97 S39SD/SW01	S39SD0020001 10/21/97 S39SD02	S39SD0030001 10/21/97 S39SD03/SW02	S39SD0040001 10/21/97 S39SD04	S39SD0050001 10/21/97 S39SD05/SW03	S39SD0060001 10/21/97 S39SD06/SW04
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	13 U	12 U	12 U	12 U	14 U	19 U
1,1,2,2-TETRACHLOROETHANE	13 U	12 U	12 U	12 U	14 U	19 U
1,1,2-TRICHLOROETHANE	13 U	12 U	12 U	12 U	14 U	19 U
1,1-DICHLOROETHANE	13 U	12 U	12 U	12 U	14 U	19 U
1,1-DICHLOROETHENE	13 U	12 U	12 U	12 U	14 U	19 U
1,2-DICHLOROETHANE	13 U	12 U	12 U	12 U	14 U	19 U
1,2-DICHLOROETHENE (TOTAL)	13 U	12 U	12 U	12 U	14 U	19 U
1,2-DICHLOROPROPANE	13 U	12 U	12 U	12 U	14 U	19 U
2-BUTANONE	13 U	12 U	12 U	12 U	14 U	19 U
2-HEXANONE	13 U	12 U	12 U	12 U	14 U	19 U
4-METHYL-2-PENTANONE	13 U	12 U	12 U	12 U	14 U	19 U
ACETONE	13 U	12 U	12 U	12 U	14 U	160 B
BENZENE	13 U	12 U	12 U	12 U	14 U	19 U
BROMODICHLOROMETHANE	13 U	12 U	12 U	12 U	14 U	19 U
BROMOFORM	13 U	12 U	12 U	12 U	14 U	19 U
BROMOMETHANE	13 U	12 U	12 U	12 U	14 U	19 U
CARBON DISULFIDE	13 U	12 U	12 U	12 U	4 J	10 J
CARBON TETRACHLORIDE	13 U	12 U	12 U	12 U	14 U	19 U
CHLOROBENZENE	13 U	12 U	12 U	12 U	14 U	19 U
CHLOROETHANE	13 U	12 U	12 U	12 U	14 U	19 U
CHLOROFORM	13 U	12 U	12 U	12 U	14 U	19 U
CHLOROMETHANE	13 U	12 U	12 U	12 U	14 U	19 U
CIS-1,3-DICHLOROPROPENE	13 U	12 U	12 U	12 U	14 U	19 U
DIBROMOCHLOROMETHANE	13 U	12 U	12 U	12 U	14 U	19 U
ETHYLBENZENE	13 U	12 U	12 U	12 U	14 U	19 U
HEXACHLOROBUTADIENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
METHYLENE CHLORIDE	7 B	7 B	8 B	8 B	9 B	13 B

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0010001 10/21/97 S39SD/SW01	S39SD0020001 10/21/97 S39SD02	S39SD0030001 10/21/97 S39SD03/SW02	S39SD0040001 10/21/97 S39SD04	S39SD0050001 10/21/97 S39SD05/SW03	S39SD0060001 10/21/97 S39SD06/SW04
VOLATILES (µg/kg)						
STYRENE	13 U	12 U	12 U	12 U	14 U	19 U
TETRACHLOROETHENE	13 U	12 U	12 U	12 U	14 U	19 U
TOLUENE	13 U	12 U	12 U	12 U	14 U	19 U
TRANS-1,3-DICHLOROPROPENE	13 U	12 U	12 U	12 U	14 U	19 U
TRICHLOROETHENE	13 U	12 U	12 U	12 U	14 U	19 U
VINYL CHLORIDE	13 U	12 U	12 U	12 U	14 U	19 U
XYLENES, TOTAL	13 U	12 U	12 U	12 U	14 U	19 U
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
1,2-DICHLOROBENZENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
1,3-DICHLOROBENZENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
1,4-DICHLOROBENZENE	420 UR	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2,4,5-TRICHLOROPHENOL	1100 UJ	970 UJ	1000 UJ	1000 UJ	1200 UJ	1500 UJ
2,4,6-TRICHLOROPHENOL	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2,4-DICHLOROPHENOL	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2,4-DIMETHYLPHENOL	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2,4-DINITROPHENOL	1100 UJ	970 UJ	1000 UJ	1000 UJ	1200 UJ	1500 UJ
2,4-DINITROTOLUENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2,6-DINITROTOLUENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2-CHLORONAPHTHALENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2-CHLOROPHENOL	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2-METHYLNAPHTHALENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2-METHYLPHENOL	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
2-NITROANILINE	1100 UJ	970 UJ	1000 UJ	1000 UJ	1200 UJ	1500 UJ
2-NITROPHENOL	420 UJ	390 UJ	410 UJ	410 UJ	1200 UJ	620 UJ
3,3'-DICHLOROBENZIDINE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0010001 10/21/97 S39SD/SW01	S39SD0020001 10/21/97 S39SD02	S39SD0030001 10/21/97 S39SD03/SW02	S39SD0040001 10/21/97 S39SD04	S39SD0050001 10/21/97 S39SD05/SW03	S39SD0060001 10/21/97 S39SD06/SW04
SEMIVOLATILES (µg/kg)						
3-NITROANILINE	1100 UJ	970 UJ	1000 UJ	1000 UJ	1200 UJ	1500 UJ
4,6-DINITRO-2-METHYLPHENOL	1100 UJ	970 UJ	1000 UJ	1000 UJ	1200 UJ	1500 UJ
4-BROMOPHENYL PHENYL ETHER	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
4-CHLORO-3-METHYLPHENOL	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
4-CHLOROANILINE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
4-CHLOROPHENYL PHENYL ETHER	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
4-METHYLPHENOL	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
4-NITROANILINE	1100 UJ	970 UJ	1000 UJ	1000 UJ	1200 UJ	1500 UJ
4-NITROPHENOL	1100 UJ	970 UJ	1000 UJ	1000 UJ	1200 UJ	1500 UJ
ACENAPHTHENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
ACENAPHTHYLENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
ANTHRACENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
BENZO(A)ANTHRACENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
BENZO(A)PYRENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
BENZO(B)FLUORANTHENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	110 J
BENZO(G,H,I)PERYLENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
BENZO(K)FLUORANTHENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
BIS(2-CHLOROETHOXY)METHANE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
BIS(2-CHLOROETHYL)ETHER	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	420 UJ	390 UJ	48 J	410 J	480 UJ	86 J
BUTYLBENZYL PHTHALATE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
CARBAZOLE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
CHRYSENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	120 J
DI-N-BUTYL PHTHALATE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	470 J
DI-N-OCTYL PHTHALATE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
DIBENZO(A,H)ANTHRACENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
DIBENZOFURAN	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0010001 10/21/97 S39SD/SW01	S39SD0020001 10/21/97 S39SD02	S39SD0030001 10/21/97 S39SD03/SW02	S39SD0040001 10/21/97 S39SD04	S39SD0050001 10/21/97 S39SD05/SW03	S39SD0060001 10/21/97 S39SD06/SW04
SEMIVOLATILES (µg/kg)						
DIETHYL PHTHALATE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
DIMETHYL PHTHALATE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
FLUORANTHENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	97 J
FLUORENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
HEXACHLOROBENZENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
HEXACHLOROCYCLOPENTADIENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
HEXACHLOROETHANE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
INDENO(1,2,3-CD)PYRENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
ISOPHORONE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
N-NITROSO-DI-N-PROPYLAMINE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
N-NITROSODIPHENYLAMINE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	180 J
NAPHTHALENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
NITROBENZENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
PENTACHLOROPHENOL	1100 UJ	970 UJ	1000 UJ	1000 UJ	1200 UJ	1500 UJ
PHENANTHRENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	77 J
PHENOL	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	620 UJ
PYRENE	420 UJ	390 UJ	410 UJ	410 UJ	480 UJ	110 J
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
4,4'-DDE	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
4,4'-DDT	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
ALDRIN	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
ALPHA-BHC	2.1 UJ	1.9 UJ	0.7 J	2 UJ	2.4 UJ	3.1 UJ
ALPHA-CHLORDANE	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
AROCLOR-1016	42 UJ	39 UJ	41 UJ	40 UJ	48 UJ	61 UJ
AROCLOR-1221	84 UJ	78 UJ	81 UJ	81 UJ	96 UJ	120 UJ
AROCLOR-1232	42 UJ	39 UJ	41 UJ	40 UJ	48 UJ	61 UJ

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0010001 10/21/97 S39SD/SW01	S39SD0020001 10/21/97 S39SD02	S39SD0030001 10/21/97 S39SD03/SW02	S39SD0040001 10/21/97 S39SD04	S39SD0050001 10/21/97 S39SD05/SW03	S39SD0060001 10/21/97 S39SD06/SW04
PESTICIDES/PCBs (µg/kg)						
AROCLOR-1242	42 UJ	39 UJ	41 UJ	40 UJ	48 UJ	61 UJ
AROCLOR-1248	42 UJ	39 UJ	41 UJ	40 UJ	48 UJ	61 UJ
AROCLOR-1254	42 UJ	39 UJ	41 UJ	40 UJ	48 UJ	61 UJ
AROCLOR-1260	42 UJ	39 UJ	41 UJ	40 UJ	48 UJ	61 UJ
BETA-BHC	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
DELTA-BHC	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
DIELDRIN	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
ENDOSULFAN I	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
ENDOSULFAN II	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
ENDOSULFAN SULFATE	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
ENDRIN	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
ENDRIN ALDEHYDE	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
ENDRIN KETONE	4.2 UJ	3.9 UJ	4.1 UJ	4 UJ	4.8 UJ	6.1 UJ
GAMMA-BHC (LINDANE)	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
GAMMA-CHLORDANE	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
HEPTACHLOR	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
HEPTACHLOR EPOXIDE	2.1 UJ	1.9 UJ	2 UJ	2 UJ	2.4 UJ	3.1 UJ
METHOXYCHLOR	21 UJ	19 UJ	20 UJ	20 UJ	24 UJ	31 UJ
TOXAPHENE	210 UJ	190 UJ	200 UJ	200 UJ	240 UJ	310 UJ
ENERGETICS (µg/kg)						
1,3,5-TRINITROBENZENE	40.2 U	40.2 U	40.2 U	40.2 U	40.2 U	40.2 U
1,3-DINITROBENZENE	37.2 U	37.2 U	37.2 U	37.2 U	37.2 U	37.2 U
2,4,6-TRINITROTOLUENE	35.6 U	35.6 U	35.6 U	35.6 U	35.6 U	35.6 U
2-AMINO-4,6-DINITROTOLUENE	46.7 U	46.7 U	46.7 U	46.7 U	46.7 U	46.7 U
2-NITROTOLUENE	81.4 U	81.4 U	81.4 U	81.4 U	81.4 U	81.4 U
3-NITROTOLUENE	81.8 U	81.8 U	81.8 U	81.8 U	81.8 U	81.8 U
4-AMINO-2,6-DINITROTOLUENE	40.9 U	40.9 U	40.9 U	40.9 U	40.9 U	40.9 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0010001 10/21/97 S39SD/SW01	S39SD0020001 10/21/97 S39SD02	S39SD0030001 10/21/97 S39SD03/SW02	S39SD0040001 10/21/97 S39SD04	S39SD0050001 10/21/97 S39SD05/SW03	S39SD0060001 10/21/97 S39SD06/SW04
ENERGETICS (µg/kg)						
4-NITROTOLUENE	87.2 U	87.2 U	87.2 U	87.2 U	87.2 U	87.2 U
HMX	70.5 U	70.5 U	70.5 U	70.5 U	70.5 U	70.5 U
NITROCELLULOSE	14500 U	16400 U	23500	139000	27400	158000
NITROGLYCERIN	10000 U	10000 U	10000 U	10000 U	10000 U	10000 U
NITROGUANIDINE	62.5 U	62.5 U	62.5 U	62.5 U	62.5 U	62.5 U
RDX	50.9 U	50.9 U	50.9 U	50.9 U	50.9 U	50.9 U
TETRYL	163 U	163 U	163 U	163 U	163 U	163 U
METALS (mg/kg)						
ALUMINUM	3670	1310	990	834	3000	1920
ANTIMONY	0.64 UL	0.6 UL	0.63 UL	0.69 L	0.74 UL	0.94 UL
ARSENIC	3.2	3.6	3.6 K	1.8	1.6	5.0
BARIUM	16.3	35.4	7.8	7.6	22.4	32.7
BERYLLIUM	0.18	0.44	0.61	0.29	0.17	0.19
CADMIUM	0.07 U	0.21	0.81 K	0.28 B	0.21 B	0.15 B
CALCIUM	230 K	262 K	220 K	151 B	604 K	836 K
CHROMIUM	7.4 J	8.9 J	27.8 J	12.3 J	5.9 J	5.4 J
COBALT	24.1	34.7	13.8	8.1	5.0	2.6
COPPER	5.4	4.8	27.6	6.7	3.8	6.6
CYANIDE	0.18 U	0.25 U	0.27 U	0.17 U	0.28 U	0.31 U
IRON	11300	9860	20700	14200	4960	5510
LEAD	7.5	15.6	87.9	15.9	6.7	14.5
MAGNESIUM	247 J	148 J	1900 J	1910 J	465 J	347 J
MANGANESE	162	620	121	83.3	48.7	46.6
MERCURY	0.02	0.02	0.1	0.05	0.03	0.29
NICKEL	4.4	7.7	39.8	21.1	4.5	4.2
POTASSIUM	304 J	195 J	102 J	111 J	408 J	205 J
SELENIUM	0.68 U	0.65 U	0.68 UL	0.68 U	0.8 U	1.0 U

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0010001 10/21/97 S39SD/SW01	S39SD0020001 10/21/97 S39SD02	S39SD0030001 10/21/97 S39SD03/SW02	S39SD0040001 10/21/97 S39SD04	S39SD0050001 10/21/97 S39SD05/SW03	S39SD0060001 10/21/97 S39SD06/SW04
METALS (mg/kg)						
SILVER	0.2 U	2.6	66.4	308	0.27	1.7
SODIUM	106 B	132 B	100 B	168 B	203 B	235 B
THALLIUM	0.71 UL	0.67 UL	0.7 UL	0.7 UL	0.82 UL	1.0 UL
VANADIUM	11.2	8.7	8.1	9.3	8.9	6.8
ZINC	18.7 K	65.2 K	151 K	63.4 K	21.0 K	27.3 K
AVS/SIMULTANEOUSLY EXTRACTED METALS (mg/kg)						
ACID VOLATILE SULFIDE	0.43 U	0.64	1.04	2.54	5.02	8.35
CADMIUM(SEM)	0.16 U	0.15 U	0.41 J	0.15 U	0.18 U	0.23 U
COPPER(SEM)	1.2	2.2	12.2	2.5	3.0	8.7
LEAD(SEM)	4.5	12.0	54.1	9.5	9.3	25.4
MERCURY(SEM)	0.02 B	0.02 B	0.01 U	0.01 U	0.01 U	0.01 U
NICKEL(SEM)	1.3 U	1.7 K	4.6 B	1.2 U	2.1	2.5
ZINC(SEM)	7.1	16.8	90.9	25.2	17.3	101
MISCELLANEOUS PARAMETERS (mg/kg)						
TOTAL ORGANIC CARBON	1480	1070	1400	1460	9800	29200
GENERAL CHEMISTRY						
PH	6.37	7.06	6.74	6.61	7.21	6.55

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0070001 10/21/97 S39SD07/SW05	S39SD0080001 10/21/97 S39SD08/SW06				
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	31 U	25 UJ				
1,1,2,2-TETRACHLOROETHANE	31 U	25 UJ				
1,1,2-TRICHLOROETHANE	31 U	25 UJ				
1,1-DICHLOROETHANE	31 U	25 UJ				
1,1-DICHLOROETHENE	31 U	25 UJ				
1,2-DICHLOROETHANE	31 U	25 UJ				
1,2-DICHLOROETHENE (TOTAL)	31 U	25 UJ				
1,2-DICHLOROPROPANE	31 U	25 UJ				
2-BUTANONE	390	200 J				
2-HEXANONE	31 U	25 UJ				
4-METHYL-2-PENTANONE	31 U	25 UJ				
ACETONE	2400 J	1100 J				
BENZENE	31 U	25 UJ				
BROMODICHLOROMETHANE	31 U	25 UJ				
BROMOFORM	31 U	25 UJ				
BROMOMETHANE	31 U	25 UJ				
CARBON DISULFIDE	23 J	14 J				
CARBON TETRACHLORIDE	31 U	25 UJ				
CHLOROBENZENE	31 U	25 UJ				
CHLOROETHANE	31 U	25 UJ				
CHLOROFORM	31 U	25 UJ				
CHLOROMETHANE	31 U	25 UJ				
CIS-1,3-DICHLOROPROPENE	31 U	25 UJ				
DIBROMOCHLOROMETHANE	31 U	25 UJ				
ETHYLBENZENE	31 U	25 UJ				
HEXACHLOROBUTADIENE	1000 UJ	830 UJ				
METHYLENE CHLORIDE	23 B	22 B				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0070001 10/21/97 S39SD07/SW05	S39SD0080001 10/21/97 S39SD08/SW06				
VOLATILES (µg/kg)						
STYRENE	31 U	25 UJ				
TETRACHLOROETHENE	31 U	25 UJ				
TOLUENE	31 U	25 UJ				
TRANS-1,3-DICHLOROPROPENE	31 U	25 UJ				
TRICHLOROETHENE	31 U	25 UJ				
VINYL CHLORIDE	31 U	25 UJ				
XYLENES, TOTAL	31 U	25 UJ				
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	1000 UJ	830 UJ				
1,2-DICHLOROBENZENE	1000 UJ	830 UJ				
1,3-DICHLOROBENZENE	1000 UJ	830 UJ				
1,4-DICHLOROBENZENE	1000 UJ	830 UJ				
2,2'-OXYBIS(1-CHLOROPROPANE)	1000 UJ	830 UJ				
2,4,5-TRICHLOROPHENOL	2600 UJ	2100 UJ				
2,4,6-TRICHLOROPHENOL	1000 UJ	830 UJ				
2,4-DICHLOROPHENOL	1000 UJ	830 UJ				
2,4-DIMETHYLPHENOL	1000 UJ	830 UJ				
2,4-DINITROPHENOL	2600 UJ	2100 UJ				
2,4-DINITROTOLUENE	1000 UJ	830 UJ				
2,6-DINITROTOLUENE	1000 UJ	830 UJ				
2-CHLORONAPHTHALENE	1000 UJ	830 UJ				
2-CHLOROPHENOL	1000 UJ	830 UJ				
2-METHYLNAPHTHALENE	1000 UJ	830 UJ				
2-METHYLPHENOL	1000 UJ	830 UJ				
2-NITROANILINE	2600 UJ	2100 UJ				
2-NITROPHENOL	1000 UJ	830 UJ				
3,3'-DICHLOROBENZIDINE	1000 UJ	830 UJ				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0070001 10/21/97 S39SD07/SW05	S39SD0080001 10/21/97 S39SD08/SW06				
SEMIVOLATILES (µg/kg)						
3-NITROANILINE	2600 UJ	2100 UJ				
4,6-DINITRO-2-METHYLPHENOL	2600 UJ	2100 UJ				
4-BROMOPHENYL PHENYL ETHER	1000 UJ	830 UJ				
4-CHLORO-3-METHYLPHENOL	1000 UJ	830 UJ				
4-CHLOROANILINE	1000 UJ	830 UJ				
4-CHLOROPHENYL PHENYL ETHER	1000 UJ	830 UJ				
4-METHYLPHENOL	1000 UJ	830 UJ				
4-NITROANILINE	2600 UJ	2100 UJ				
4-NITROPHENOL	2600 UJ	2100 UJ				
ACENAPHTHENE	1000 UJ	830 UJ				
ACENAPHTHYLENE	1000 UJ	830 UJ				
ANTHRACENE	1000 UJ	830 UJ				
BENZO(A)ANTHRACENE	1000 UJ	95 J				
BENZO(A)PYRENE	1000 UJ	830 UJ				
BENZO(B)FLUORANTHENE	130 J	130 J				
BENZO(G,H,I)PERYLENE	1000 UJ	830 UJ				
BENZO(K)FLUORANTHENE	1000 UJ	830 UJ				
BIS(2-CHLOROETHOXY)METHANE	1000 UJ	830 UJ				
BIS(2-CHLOROETHYL)ETHER	1000 UJ	830 UJ				
BIS(2-ETHYLHEXYL)PHTHALATE	1000 UJ	88 J				
BUTYLBENZYL PHTHALATE	1000 UJ	830 UJ				
CARBAZOLE	1000 UJ	830 UJ				
CHRYSENE	160 J	100 J				
DI-N-BUTYL PHTHALATE	620 J	640 J				
DI-N-OCTYL PHTHALATE	1000 UJ	830 UJ				
DIBENZO(A,H)ANTHRACENE	1000 UJ	830 UJ				
DIBENZOFURAN	1000 UJ	830 UJ				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0070001 10/21/97 S39SD07/SW05	S39SD0080001 10/21/97 S39SD08/SW06				
SEMIVOLATILES (µg/kg)						
DIETHYL PHTHALATE	1000 UJ	830 UJ				
DIMETHYL PHTHALATE	1000 UJ	830 UJ				
FLUORANTHENE	190 J	170 J				
FLUORENE	1000 UJ	830 UJ				
HEXACHLOROBENZENE	1000 UJ	830 UJ				
HEXACHLOROCYCLOPENTADIENE	1000 UJ	830 UJ				
HEXACHLOROETHANE	1000 UJ	830 UJ				
INDENO(1,2,3-CD)PYRENE	1000 UJ	830 UJ				
ISOPHORONE	1000 UJ	830 UJ				
N-NITROSO-DI-N-PROPYLAMINE	1000 UJ	830 UJ				
N-NITROSODIPHENYLAMINE	2000 J	3100 J				
NAPHTHALENE	1000 UJ	830 UJ				
NITROBENZENE	1000 UJ	830 UJ				
PENTACHLOROPHENOL	2600 UJ	2100 UJ				
PHENANTHRENE	150 J	150 J				
PHENOL	1000 UJ	830 UJ				
PYRENE	240 J	160 J				
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	7.7 J	6 J				
4,4'-DDE	6 J	4.1 J				
4,4'-DDT	11 UJ	8.3 UJ				
ALDRIN	5.3 UJ	4.1 UJ				
ALPHA-BHC	5.3 UJ	4.1 UJ				
ALPHA-CHLORDANE	5.3 UJ	4.1 UJ				
AROCLOR-1016	110 UJ	83 UJ				
AROCLOR-1221	210 UJ	170 UJ				
AROCLOR-1232	110 UJ	83 UJ				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0070001 10/21/97 S39SD07/SW05	S39SD0080001 10/21/97 S39SD08/SW06				
PESTICIDES/PCBs (µg/kg)						
AROCLOR-1242	110 UJ	83 UJ				
AROCLOR-1248	110 UJ	83 UJ				
AROCLOR-1254	110 UJ	83 UJ				
AROCLOR-1260	110 UJ	83 UJ				
BETA-BHC	5.3 UJ	4.1 UJ				
DELTA-BHC	5.3 UJ	4.1 UJ				
DIELDRIN	11 UJ	8.3 UJ				
ENDOSULFAN I	5.3 UJ	4.1 UJ				
ENDOSULFAN II	11 UJ	8.3 UJ				
ENDOSULFAN SULFATE	11 UJ	8.3 UJ				
ENDRIN	11 UJ	8.3 UJ				
ENDRIN ALDEHYDE	11 UJ	8.3 UJ				
ENDRIN KETONE	11 UJ	8.3 UJ				
GAMMA-BHC (LINDANE)	5.3 UJ	4.1 UJ				
GAMMA-CHLORDANE	5.3 UJ	4.1 UJ				
HEPTACHLOR	5.3 UJ	4.1 UJ				
HEPTACHLOR EPOXIDE	5.3 UJ	4.1 UJ				
METHOXYCHLOR	53 UJ	41 UJ				
TOXAPHENE	530 UJ	410 UJ				
ENERGETICS (µg/kg)						
1,3,5-TRINITROBENZENE	40.2 U	40.2 U				
1,3-DINITROBENZENE	37.2 U	37.2 U				
2,4,6-TRINITROTOLUENE	35.6 U	35.6 U				
2-AMINO-4,6-DINITROTOLUENE	46.7 U	46.7 U				
2-NITROTOLUENE	81.4 U	81.4 U				
3-NITROTOLUENE	81.8 U	81.8 U				
4-AMINO-2,6-DINITROTOLUENE	40.9 U	40.9 U				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0070001 10/21/97 S39SD07/SW05	S39SD0080001 10/21/97 S39SD08/SW06				
ENERGETICS (µg/kg)						
4-NITROTOLUENE	87.2 U	87.2 U				
HMX	70.5 U	70.5 U				
NITROCELLULOSE	1460000	1580000				
NITROGLYCERIN	10000 U	10000 U				
NITROGUANIDINE	62.5 U	62.5 U				
RDX	50.9 U	50.9 U				
TETRYL	163 U	163 U				
METALS (mg/kg)						
ALUMINUM	19600	13400				
ANTIMONY	1.6 UL	1.3 UL				
ARSENIC	16.6	12.2				
BARIUM	98.9	92.6				
BERYLLIUM	1.0	0.44				
CADMIUM	0.8 B	0.88				
CALCIUM	2930 K	4730				
CHROMIUM	32.3 J	24.3 J				
COBALT	15.7	10.4				
COPPER	49.1	28.2				
CYANIDE	0.72 U	0.61 U				
IRON	43800	23600				
LEAD	58.1	61.4				
MAGNESIUM	2290 J	2180 J				
MANGANESE	384	310				
MERCURY	8.7	2.0				
NICKEL	25.6	17.1				
POTASSIUM	1350 J	1160 J				
SELENIUM	1.8 U	1.4 U				

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S39SD0070001 10/21/97 S39SD07/SW05	S39SD0080001 10/21/97 S39SD08/SW06				
METALS (mg/kg)						
SILVER	26.8	6.8				
SODIUM	329 B	364 B				
THALLIUM	1.8 UL	1.4 UL				
VANADIUM	49.7	33.5				
ZINC	273 K	188 K				
AVS/SIMULTANEOUSLY EXTRACTED METALS (mg/kg)						
ACID VOLATILE SULFIDE	700	1260				
CADMIUM(SEM)	0.4 U	0.72 J				
COPPER(SEM)	2.0 U	10.2				
LEAD(SEM)	60.5	57.9				
MERCURY(SEM)	0.02 U	0.01 U				
NICKEL(SEM)	9.9	7.2 B				
ZINC(SEM)	225	88.1				
MISCELLANEOUS PARAMETERS (mg/kg)						
TOTAL ORGANIC CARBON	40500	37700				
GENERAL CHEMISTRY						
PH	6.85	6.99				

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW001F001	S41GW001U001	S41GW002F001	S41GW002U001	S41GW003F001	S41GW003U001
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41MW01	S41MW01	S41MW02	S41MW02	S41MW03	S41MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE		1 U		1 U		1 U
1,1,2,2-TETRACHLOROETHANE		1 U		1 U		1 U
1,1,2-TRICHLOROETHANE		1 U		1 U		1 U
1,1-DICHLOROETHANE		1 U		1 U		1 U
1,1-DICHLOROETHENE		1 U		1 U		1 U
1,2-DIBROMO-3-CHLOROPROPANE		1 U		1 U		1 U
1,2-DIBROMOETHANE		1 U		1 U		1 U
1,2-DICHLOROETHANE		1 U		1 U		1 U
1,2-DICHLOROPROPANE		1 U		1 U		1 U
2-BUTANONE		5 UR		5 UR		5 UR
2-HEXANONE		5 U		5 U		5 U
4-METHYL-2-PENTANONE		5 U		5 U		5 U
ACETONE		5 UR		5 UR		4 J
BENZENE		1 U		1 U		1 U
BROMOCHLOROMETHANE		1 U		1 U		1 U
BROMODICHLOROMETHANE		1 U		1 U		1 U
BROMOFORM		1 U		1 U		1 U
BROMOMETHANE		1 U		1 U		1 U
CARBON DISULFIDE		1 U		1 U		1 U
CARBON TETRACHLORIDE		1 U		1 U		1 U
CHLOROBENZENE		1 U		1 U		1 U
CHLOROETHANE		1 U		1 U		1 U
CHLOROFORM		1 U		1 U		1 U
CHLOROMETHANE		1 U		1 U		1 U
CIS-1,2-DICHLOROETHENE		1 U		1 U		2
CIS-1,3-DICHLOROPROPENE		1 U		1 U		1 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW001F001	S41GW001U001	S41GW002F001	S41GW002U001	S41GW003F001	S41GW003U001
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41MW01	S41MW01	S41MW02	S41MW02	S41MW03	S41MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE		1 U		1 U		1 U
ETHYLBENZENE		1 U		1 U		1 U
HEXACHLOROBUTADIENE		5 U		5 U		5 U
METHYLENE CHLORIDE		2 U		2 U		2 U
STYRENE		1 U		1 U		1 U
TETRACHLOROETHENE		1 U		1 U		1 U
TOLUENE		1 U		1 U		1 U
TRANS-1,2-DICHLOROETHENE		1 U		1 U		1 U
TRANS-1,3-DICHLOROPROPENE		1 U		1 U		1 U
TRICHLOROETHENE		8		1 U		32
VINYL CHLORIDE		1 U		1 U		1 U
XYLENES, TOTAL		1 U		1 U		1 U
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE		1 U		1 U		1 U
1,2-DICHLOROBENZENE		1 U		1 U		1 U
1,3-DICHLOROBENZENE		1 U		1 U		1 U
1,4-DICHLOROBENZENE		1 U		1 U		1 U
2,2'-OXYBIS(1-CHLOROPROPANE)		5 U		5 U		5 U
2,4,5-TRICHLOROPHENOL		21 U		20 U		21 U
2,4,6-TRICHLOROPHENOL		5 U		5 U		5 U
2,4-DICHLOROPHENOL		5 U		5 U		5 U
2,4-DIMETHYLPHENOL		5 U		5 U		5 U
2,4-DINITROPHENOL		21 U		20 U		21 U
2,4-DINITROTOLUENE		5 U		5 U		5 U
2,6-DINITROTOLUENE		5 U		5 U		5 U
2-CHLORONAPHTHALENE		5 U		5 U		5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW001F001	S41GW001U001	S41GW002F001	S41GW002U001	S41GW003F001	S41GW003U001
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41MW01	S41MW01	S41MW02	S41MW02	S41MW03	S41MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL		5 U		5 U		5 U
2-METHYLNAPHTHALENE		5 U		5 U		5 U
2-METHYLPHENOL		5 U		5 U		5 U
2-NITROANILINE		21 U		20 U		21 U
2-NITROPHENOL		5 U		5 U		5 U
3,3'-DICHLOROBENZIDINE		5 U		5 U		5 U
3-NITROANILINE		21 U		20 U		21 U
4,6-DINITRO-2-METHYLPHENOL		21 U		20 U		21 U
4-BROMOPHENYL PHENYL ETHER		5 U		5 U		5 U
4-CHLORO-3-METHYLPHENOL		5 U		5 U		5 U
4-CHLOROANILINE		5 U		5 U		5 U
4-CHLOROPHENYL PHENYL ETHER		5 U		5 U		5 U
4-METHYLPHENOL		5 U		5 U		5 U
4-NITROANILINE		21 U		20 U		21 U
4-NITROPHENOL		21 U		20 U		21 U
ACENAPHTHENE		5 U		5 U		5 U
ACENAPHTHYLENE		5 U		5 U		5 U
ANTHRACENE		5 U		5 U		5 U
BENZO(A)ANTHRACENE		5 U		5 U		5 U
BENZO(A)PYRENE		5 U		5 U		5 U
BENZO(B)FLUORANTHENE		5 U		5 U		5 U
BENZO(G,H,I)PERYLENE		5 U		5 U		5 U
BENZO(K)FLUORANTHENE		5 UJ		5 UJ		5 UJ
BIS(2-CHLOROETHOXY)METHANE		5 U		5 U		5 U
BIS(2-CHLOROETHYL)ETHER		5 U		5 U		5 U
BIS(2-ETHYLHEXYL)PHTHALATE		5 U		5 U		3 J

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW001F001	S41GW001U001	S41GW002F001	S41GW002U001	S41GW003F001	S41GW003U001
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41MW01	S41MW01	S41MW02	S41MW02	S41MW03	S41MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE		5 U		5 U		5 U
CHRYSENE		5 U		5 U		5 U
DI-N-BUTYL PHTHALATE		25 B		5 U		27 B
DI-N-OCTYL PHTHALATE		5 UJ		5 UJ		5 UJ
DIBENZO(A,H)ANTHRACENE		5 U		5 U		5 U
DIBENZOFURAN		5 U		5 U		5 U
DIETHYL PHTHALATE		5 U		5 U		5 U
DIMETHYL PHTHALATE		5 U		5 U		5 U
FLUORANTHENE		5 U		5 U		5 U
FLUORENE		5 U		5 U		5 U
HEXACHLOROBENZENE		5 U		5 U		5 U
HEXACHLOROCYCLOPENTADIENE		5 UJ		5 UJ		5 UJ
HEXACHLOROETHANE		5 U		5 U		5 U
INDENO(1,2,3-CD)PYRENE		5 U		5 U		5 U
ISOPHORONE		5 U		5 U		5 U
N-NITROSO-DI-N-PROPYLAMINE		5 U		5 U		5 U
N-NITROSODIPHENYLAMINE		5 U		5 U		5 U
NAPHTHALENE		5 U		5 U		5 U
NITROBENZENE		5 U		5 U		5 U
PENTACHLOROPHENOL		21 U		20 U		21 U
PHENANTHRENE		5 U		5 U		5 U
PHENOL		5 U		5 U		5 U
PYRENE		5 U		5 U		5 U
PESTICIDES/PCBs (µg/L)						
4,4'-DDD		0.021 U		0.021 U		0.021 U
4,4'-DDE		0.021 U		0.021 U		0.021 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FILTERING: FIELD DUPLICATE OF:	S41GW001F001 10/22/97 S41MW01 Filtered	S41GW001U001 10/22/97 S41MW01 Unfiltered	S41GW002F001 10/22/97 S41MW02 Filtered	S41GW002U001 10/22/97 S41MW02 Unfiltered	S41GW003F001 10/22/97 S41MW03 Filtered	S41GW003U001 10/22/97 S41MW03 Unfiltered
PESTICIDES/PCBs (µg/L)						
4,4'-DDT		0.021 U		0.021 U		0.021 U
ALDRIN		0.01 U		0.011 U		0.01 U
ALPHA-BHC		0.01 U		0.011 U		0.01 U
ALPHA-CHLORDANE		0.01 U		0.011 U		0.01 U
AROCLOR-1016		0.21 U		0.21 U		0.21 U
AROCLOR-1221		0.41 U		0.43 U		0.41 U
AROCLOR-1232		0.21 U		0.21 U		0.21 U
AROCLOR-1242		0.21 U		0.21 U		0.21 U
AROCLOR-1248		0.21 U		0.21 U		0.21 U
AROCLOR-1254		0.21 U		0.21 U		0.21 U
AROCLOR-1260		0.21 U		0.21 U		0.21 U
BETA-BHC		0.01 U		0.011 U		0.01 U
DELTA-BHC		0.01 U		0.011 U		0.01 U
DIELDRIN		0.021 U		0.021 U		0.021 U
ENDOSULFAN I		0.01 U		0.011 U		0.01 U
ENDOSULFAN II		0.021 U		0.021 U		0.021 U
ENDOSULFAN SULFATE		0.021 U		0.021 U		0.021 U
ENDRIN		0.021 U		0.021 U		0.021 U
ENDRIN ALDEHYDE		0.021 U		0.021 U		0.021 U
ENDRIN KETONE		0.021 U		0.021 U		0.021 U
GAMMA-BHC (LINDANE)		0.01 U		0.011 U		0.01 U
GAMMA-CHLORDANE		0.01 U		0.011 U		0.01 U
HEPTACHLOR		0.01 U		0.011 U		0.01 U
HEPTACHLOR EPOXIDE		0.01 U		0.011 U		0.01 U
METHOXYCHLOR		0.1 U		0.11 U		0.1 U
TOXAPHENE		1 U		1.1 U		1 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW001F001	S41GW001U001	S41GW002F001	S41GW002U001	S41GW003F001	S41GW003U001
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41MW01	S41MW01	S41MW02	S41MW02	S41MW03	S41MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
ENERGETICS (µg/L)						
1,3,5-TRINITROBENZENE		0.6 U		0.6 U		0.6 U
1,3-DINITROBENZENE		0.6 U		0.6 U		0.6 U
2,4,6-TRINITROTOLUENE		0.6 U		0.6 U		0.6 U
2-AMINO-4,6-DINITROTOLUENE		0.6 U		0.6 U		0.6 U
2-NITROTOLUENE		1.3 U		1.3 U		1.3 U
3-NITROTOLUENE		1.3 U		1.3 U		1.3 U
4-AMINO-2,6-DINITROTOLUENE		0.6 U		0.6 U		0.6 U
4-NITROTOLUENE		1.3 U		1.3 U		1.3 U
HMX		1.3 U		1.3 U		1.3 U
RDX		1.3 U		1.3 U		1.3 U
TETRYL		1.3 U		1.3 U		1.3 U
METALS (µg/L)						
ALUMINUM	98.2 B	121 B	73.3 B	907	2760	3230
ANTIMONY	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
ARSENIC	3.3 U	3.3 U	4.4 L	37.6	3.3 U	3.3 U
BARIUM	204	23.6	376	142	205	16.7
BERYLLIUM	2.8	2.9	0.37 B	4.3	4.3	4.8
CADMIUM	0.97 B	0.95 B	0.74 B	1.2 B	0.91 B	1.5 B
CALCIUM	15400	14900	6320 K	6490 K	33400	38100
CHROMIUM	0.5 U	0.5 U	0.51 B	3.1 B	0.74 B	0.5 U
COBALT	159	158	35.4 B	39.0 B	212	248
COPPER	10.9 B	11.8 B	5.8 B	13.1 B	21.4 B	
CYANIDE		5.0 U		5.0 U		5.0 U
IRON	27.4 B	145 B	22200	49600	26.8 B	10.0 U
LEAD	1.0 UJ	1.0 UJ	1.0 UJ	1.0 B	1.0 B	1.0 UJ
MAGNESIUM	11700	11500	3740 K	3950 K	10600	12500

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW001F001	S41GW001U001	S41GW002F001	S41GW002U001	S41GW003F001	S41GW003U001
SAMPLE DATE:	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97	10/22/97
LOCATION:	S41MW01	S41MW01	S41MW02	S41MW02	S41MW03	S41MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
METALS (µg/L)						
MANGANESE	409	407	460	506	463	535
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	78.1 B	78.0 B	11.5 B	13.9 B	93.9 B	108 B
POTASSIUM	4990	4910	2590	2780	5930	6620
SELENIUM	2.8 U	2.8 UJ	2.8 UJ	2.8 UJ	2.8 UJ	2.8 UJ
SILVER	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
SODIUM	44600	39000	25800	22300	34800	34500
THALLIUM	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
VANADIUM	1.1 U	1.1 U	1.1 U	7.8	1.1 U	1.1 U
ZINC	327	238	137	41.5 B	362	296

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW004F001	S41DUP010-F	S41GW004U001	S41DUP010		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S41PW07	S41PW07	S41PW07	S41PW07		
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered		
FIELD DUPLICATE OF:		S41GW004F001		S41GW004U001		
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE			1 U	1 U		
1,1,2,2-TETRACHLOROETHANE			1 U	1 U		
1,1,2-TRICHLOROETHANE			1 U	1 U		
1,1-DICHLOROETHANE			1 U	1 U		
1,1-DICHLOROETHENE			1 U	1 U		
1,2-DIBROMO-3-CHLOROPROPANE			1 U	1 U		
1,2-DIBROMOETHANE			1 U	1 U		
1,2-DICHLOROETHANE			1 U	1 U		
1,2-DICHLOROPROPANE			1 U	1 U		
2-BUTANONE			5 UR	5 UR		
2-HEXANONE			5 U	5 U		
4-METHYL-2-PENTANONE			5 U	5 U		
ACETONE			5 UR	5 UR		
BENZENE			1 U	1 U		
BROMOCHLOROMETHANE			1 U	1 U		
BROMODICHLOROMETHANE			1 U	1 U		
BROMOFORM			1 U	1 U		
BROMOMETHANE			1 U	1 U		
CARBON DISULFIDE			1 U	1 U		
CARBON TETRACHLORIDE			1 U	1 U		
CHLOROBENZENE			1 U	1 U		
CHLOROETHANE			1 U	1 U		
CHLOROFORM			1 U	1 U		
CHLOROMETHANE			1 U	1 U		
CIS-1,2-DICHLOROETHENE			1 U	1 U		
CIS-1,3-DICHLOROPROPENE			1 U	1 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW004F001	S41DUP010-F	S41GW004U001	S41DUP010		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S41PW07	S41PW07	S41PW07	S41PW07		
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered		
FIELD DUPLICATE OF:		S41GW004F001		S41GW004U001		
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE			1 U	1 U		
ETHYLBENZENE			1 U	1 U		
HEXACHLOROBUTADIENE			5 U	5 U		
METHYLENE CHLORIDE			2 U	2 U		
STYRENE			1 U	1 U		
TETRACHLOROETHENE			1 U	1 U		
TOLUENE			1 U	1 U		
TRANS-1,2-DICHLOROETHENE			1 U	1 U		
TRANS-1,3-DICHLOROPROPENE			1 U	1 U		
TRICHLOROETHENE			1 U	1 U		
VINYL CHLORIDE			1 U	1 U		
XYLENES, TOTAL			1 U	1 U		
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE			1 U	1 U		
1,2-DICHLOROBENZENE			1 U	1 U		
1,3-DICHLOROBENZENE			1 U	1 U		
1,4-DICHLOROBENZENE			1 U	1 U		
2,2'-OXYBIS(1-CHLOROPROPANE)			5 U	5 U		
2,4,5-TRICHLOROPHENOL			21 U	20 U		
2,4,6-TRICHLOROPHENOL			5 U	5 U		
2,4-DICHLOROPHENOL			5 U	5 U		
2,4-DIMETHYLPHENOL			5 U	5 U		
2,4-DINITROPHENOL			21 U	20 U		
2,4-DINITROTOLUENE			5 U	5 U		
2,6-DINITROTOLUENE			5 U	5 U		
2-CHLORONAPHTHALENE			5 U	5 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW004F001	S41DUP010-F	S41GW004U001	S41DUP010		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S41PW07	S41PW07	S41PW07	S41PW07		
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered		
FIELD DUPLICATE OF:		S41GW004F001		S41GW004U001		
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL			5 U	5 U		
2-METHYLNAPHTHALENE			5 U	5 U		
2-METHYLPHENOL			5 U	5 U		
2-NITROANILINE			21 U	20 U		
2-NITROPHENOL			5 U	5 U		
3,3'-DICHLOROBENZIDINE			5 U	5 U		
3-NITROANILINE			21 U	20 U		
4,6-DINITRO-2-METHYLPHENOL			21 U	20 U		
4-BROMOPHENYL PHENYL ETHER			5 U	5 U		
4-CHLORO-3-METHYLPHENOL			5 U	5 U		
4-CHLOROANILINE			5 U	5 U		
4-CHLOROPHENYL PHENYL ETHER			5 U	5 U		
4-METHYLPHENOL			5 U	5 U		
4-NITROANILINE			21 U	20 U		
4-NITROPHENOL			21 U	20 U		
ACENAPHTHENE			5 U	5 U		
ACENAPHTHYLENE			5 U	5 U		
ANTHRACENE			5 U	5 U		
BENZO(A)ANTHRACENE			5 U	5 U		
BENZO(A)PYRENE			5 U	5 U		
BENZO(B)FLUORANTHENE			5 U	5 U		
BENZO(G,H,I)PERYLENE			5 U	5 U		
BENZO(K)FLUORANTHENE			5 U	5 U		
BIS(2-CHLOROETHOXY)METHANE			5 U	5 U		
BIS(2-CHLOROETHYL)ETHER			5 U	5 U		
BIS(2-ETHYLHEXYL)PHTHALATE			5 U	5 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW004F001	S41DUP010-F	S41GW004U001	S41DUP010		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S41PW07	S41PW07	S41PW07	S41PW07		
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered		
FIELD DUPLICATE OF:		S41GW004F001		S41GW004U001		
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE			5 U	5 U		
CHRYSENE			5 U	5 U		
DI-N-BUTYL PHTHALATE			5 U	5 U		
DI-N-OCTYL PHTHALATE			5 U	5 U		
DIBENZO(A,H)ANTHRACENE			5 U	5 U		
DIBENZOFURAN			5 U	5 U		
DIETHYL PHTHALATE			5 U	5 U		
DIMETHYL PHTHALATE			5 U	5 U		
FLUORANTHENE			5 U	5 U		
FLUORENE			5 U	5 U		
HEXACHLOROBENZENE			5 U	5 U		
HEXACHLOROCYCLOPENTADIENE			5 U	5 U		
HEXACHLOROETHANE			5 U	5 U		
INDENO(1,2,3-CD)PYRENE			5 U	5 U		
ISOPHORONE			5 U	5 U		
N-NITROSO-DI-N-PROPYLAMINE			5 U	5 U		
N-NITROSODIPHENYLAMINE			5 U	5 U		
NAPHTHALENE			5 U	5 U		
NITROBENZENE			5 U	5 U		
PENTACHLOROPHENOL			21 U	20 U		
PHENANTHRENE			5 U	5 U		
PHENOL			5 U	5 U		
PYRENE			5 U	5 U		
PESTICIDES/PCBs (µg/L)						
4,4'-DDD			0.021 U	0.021 U		
4,4'-DDE			0.021 U	0.021 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW004F001	S41DUP010-F	S41GW004U001	S41DUP010		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S41PW07	S41PW07	S41PW07	S41PW07		
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered		
FIELD DUPLICATE OF:		S41GW004F001		S41GW004U001		
PESTICIDES/PCBs (µg/L)						
4,4'-DDT			0.021 U	0.021 U		
ALDRIN			0.01 U	0.01 U		
ALPHA-BHC			0.01 U	0.01 U		
ALPHA-CHLORDANE			0.01 U	0.01 U		
AROCLOR-1016			0.21 U	0.21 U		
AROCLOR-1221			0.41 U	0.42 U		
AROCLOR-1232			0.21 U	0.21 U		
AROCLOR-1242			0.21 U	0.21 U		
AROCLOR-1248			0.21 U	0.21 U		
AROCLOR-1254			0.21 U	0.21 U		
AROCLOR-1260			0.21 U	0.21 U		
BETA-BHC			0.01 U	0.01 U		
DELTA-BHC			0.01 U	0.01 U		
DIELDRIN			0.021 U	0.021 U		
ENDOSULFAN I			0.01 U	0.01 U		
ENDOSULFAN II			0.021 U	0.021 U		
ENDOSULFAN SULFATE			0.021 U	0.021 U		
ENDRIN			0.021 U	0.021 U		
ENDRIN ALDEHYDE			0.021 U	0.021 U		
ENDRIN KETONE			0.021 U	0.021 U		
GAMMA-BHC (LINDANE)			0.01 U	0.01 U		
GAMMA-CHLORDANE			0.01 U	0.01 U		
HEPTACHLOR			0.01 U	0.01 U		
HEPTACHLOR EPOXIDE			0.01 U	0.01 U		
METHOXYCHLOR			0.1 U	0.1 U		
TOXAPHENE			1 U	1 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW004F001	S41DUP010-F	S41GW004U001	S41DUP010		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S41PW07	S41PW07	S41PW07	S41PW07		
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered		
FIELD DUPLICATE OF:		S41GW004F001		S41GW004U001		
ENERGETICS (µg/L)						
1,3,5-TRINITROBENZENE			0.6 U	0.6 U		
1,3-DINITROBENZENE			0.6 U	0.6 U		
2,4,6-TRINITROTOLUENE			0.6 U	0.6 U		
2-AMINO-4,6-DINITROTOLUENE			0.6 U	0.6 U		
2-NITROTOLUENE			1.3 U	1.3 U		
3-NITROTOLUENE			1.3 U	1.3 U		
4-AMINO-2,6-DINITROTOLUENE			0.6 U	0.6 U		
4-NITROTOLUENE			1.3 U	1.3 U		
HMX			1.3 U	1.3 U		
NITROCELLULOSE			180 U	180 U		
NITROGLYCERIN			26 U	26 U		
NITROGUANIDINE			5 U	5 U		
RDX			1.3 U	1.3 U		
TETRYL			1.3 U	1.3 U		
METALS (µg/L)						
ALUMINUM	35.7 B	28.5 B	27.8 B	92.9 B		
ANTIMONY	2.8 U	2.8 U	3.9 B	2.8 U		
ARSENIC	3.0 U	3.0 U	3.0 U	3.0 U		
BARIUM	72.4 J	209 J	11.4 J	12.8 J		
BERYLLIUM	0.1 U	0.1 U	0.1 U	0.1 U		
CADMIUM	0.3 U	0.3 U	0.3 U	0.72 B		
CALCIUM	707 B	607 B	381 B	480 B		
CHROMIUM	0.5 U	0.5 U	0.8 B	1.4 B		
COBALT	0.6 U	0.6 U	0.6 U	0.81 B		
COPPER	9.0 B	6.6 B	3.7 B	4.2 B		
CYANIDE			5.0 U	5.0 U		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 39/41 - ORGANICS PLANT/SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S41GW004F001	S41DUP010-F	S41GW004U001	S41DUP010		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S41PW07	S41PW07	S41PW07	S41PW07		
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered		
FIELD DUPLICATE OF:		S41GW004F001		S41GW004U001		
METALS (µg/L)						
IRON	61.0 B	51.9 B	61.3 B	95.9 B		
LEAD	3.4 B	5.6 B	2.5 B	11.3 K		
MAGNESIUM	363 K	308 B	280 B	329 K		
MANGANESE	14.1 J	12.6 J	14.0 J	15.5 J		
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U		
NICKEL	1.0 U	1.5 B	1.2 B	1.4 B		
POTASSIUM	2640 J	2760 J	2570 J	2760 J		
SELENIUM	2.3 U	2.3 U	2.3 U	2.3 U		
SILVER	0.9 U	0.9 U	0.9 U	0.9 U		
SODIUM	79800	77300	71300	77500		
THALLIUM	2.3 U	3.2 B	3.1 B	4.2 B		
VANADIUM	1.0 U	1.0 U	1.0 U	1.0 U		
ZINC	34.0 K	54.3	3.0 B	4.1 B		

APPENDIX H.2.3

SITE 42 OCTOBER 1997 ANALYTICAL DATABASE

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42SS0010001	S42SS0020001	S42SS0030001	S42DUP002		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/10/97	10/10/97	10/10/97	10/10/97		
LOCATION:	S42SS01	S42SS02	S42SS03	S42SS03		
FIELD DUPLICATE OF:				S42SS0030001		
VOLATILES (µg/kg)						
1,1,1-TRICHLOROETHANE	12 UJ	11 U	11 U	11 U		
1,1,2,2-TETRACHLOROETHANE	12 UJ	11 U	11 U	11 U		
1,1,2-TRICHLOROETHANE	12 UJ	11 U	11 U	11 U		
1,1-DICHLOROETHANE	12 U	11 U	11 U	11 U		
1,1-DICHLOROETHENE	12 U	11 U	11 U	11 U		
1,2-DICHLOROETHANE	12 U	11 U	11 U	11 U		
1,2-DICHLOROETHENE (TOTAL)	12 U	11 U	11 U	11 U		
1,2-DICHLOROPROPANE	12 UJ	11 U	11 U	11 U		
2-BUTANONE	12 UJ	11 U	11 U	11 U		
2-HEXANONE	12 UJ	11 UJ	11 U	11 U		
4-METHYL-2-PENTANONE	12 UJ	11 UJ	11 U	11 U		
ACETONE	12 U	11 U	11 U	11 U		
BENZENE	12 UJ	11 U	11 U	11 U		
BROMODICHLOROMETHANE	12 UJ	11 U	11 U	11 U		
BROMOFORM	12 UJ	11 U	11 U	11 U		
BROMOMETHANE	12 U	11 U	11 U	11 U		
CARBON DISULFIDE	12 U	11 U	11 U	11 U		
CARBON TETRACHLORIDE	12 UJ	11 U	11 U	11 U		
CHLOROBENZENE	12 UJ	11 UJ	11 U	11 U		
CHLOROETHANE	12 U	11 U	11 U	11 U		
CHLOROFORM	12 U	11 U	11 U	11 U		
CHLOROMETHANE	12 U	11 U	11 U	11 U		
CIS-1,3-DICHLOROPROPENE	12 UJ	11 U	11 U	11 U		
DIBROMOCHLOROMETHANE	12 UJ	11 U	11 U	11 U		
ETHYLBENZENE	12 UJ	11 UJ	11 U	11 U		
HEXACHLOROBUTADIENE	400 UJ	370 UJ	360 UJ	360 UJ		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42SS0010001	S42SS0020001	S42SS0030001	S42DUP002		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/10/97	10/10/97	10/10/97	10/10/97		
LOCATION:	S42SS01	S42SS02	S42SS03	S42SS03		
FIELD DUPLICATE OF:				S42SS0030001		
VOLATILES (µg/kg)						
METHYLENE CHLORIDE	7 B	8 B	5 B	5 B		
STYRENE	12 UJ	11 UJ	11 U	11 U		
TETRACHLOROETHENE	12 UJ	11 UJ	11 U	11 U		
TOLUENE	12 UJ	11 UJ	11 U	11 U		
TRANS-1,3-DICHLOROPROPENE	12 UJ	11 U	11 U	11 U		
TRICHLOROETHENE	12 UJ	11 U	11 U	11 U		
VINYL CHLORIDE	12 U	11 U	11 U	11 U		
XYLENES, TOTAL	12 UJ	11 UJ	11 U	11 U		
SEMIVOLATILES (µg/kg)						
1,2,4-TRICHLOROBENZENE	400 UJ	370 UJ	360 UJ	360 UJ		
1,2-DICHLOROBENZENE	400 UJ	370 UJ	360 UJ	360 UJ		
1,3-DICHLOROBENZENE	400 UJ	370 UJ	360 UJ	360 UJ		
1,4-DICHLOROBENZENE	400 UJ	370 UJ	360 UJ	360 UJ		
2,2'-OXYBIS(1-CHLOROPROPANE)	400 UJ	370 UJ	360 UJ	360 UJ		
2,4,5-TRICHLOROPHENOL	1000 UJ	930 UJ	900 UJ	910 UJ		
2,4,6-TRICHLOROPHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
2,4-DICHLOROPHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
2,4-DIMETHYLPHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
2,4-DINITROPHENOL	1000 UJ	930 UJ	900 UJ	910 UJ		
2,4-DINITROTOLUENE	400 UJ	370 UJ	360 UJ	360 UJ		
2,6-DINITROTOLUENE	400 UJ	370 UJ	360 UJ	360 UJ		
2-CHLORONAPHTHALENE	400 UJ	370 UJ	360 UJ	360 UJ		
2-CHLOROPHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
2-METHYLNAPHTHALENE	400 UJ	370 UJ	360 UJ	360 UJ		
2-METHYLPHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
2-NITROANILINE	1000 UJ	930 UJ	900 UJ	910 UJ		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42SS0010001	S42SS0020001	S42SS0030001	S42DUP002		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/10/97	10/10/97	10/10/97	10/10/97		
LOCATION:	S42SS01	S42SS02	S42SS03	S42SS03		
FIELD DUPLICATE OF:				S42SS0030001		
SEMIVOLATILES (µg/kg)						
2-NITROPHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
3,3'-DICHLOROBENZIDINE	400 UJ	370 UJ	360 UJ	360 UJ		
3-NITROANILINE	1000 UJ	930 UJ	900 UJ	910 UJ		
4,6-DINITRO-2-METHYLPHENOL	1000 UJ	930 UJ	900 UJ	910 UJ		
4-BROMOPHENYL PHENYL ETHER	400 UJ	370 UJ	360 UJ	360 UJ		
4-CHLORO-3-METHYLPHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
4-CHLOROANILINE	400 UJ	370 UJ	360 UJ	360 UJ		
4-CHLOROPHENYL PHENYL ETHER	400 UJ	370 UJ	360 UJ	360 UJ		
4-METHYLPHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
4-NITROANILINE	1000 UJ	930 UJ	900 UJ	910 UJ		
4-NITROPHENOL	1000 UJ	930 UJ	900 UJ	910 UJ		
ACENAPHTHENE	400 UJ	370 UJ	360 UJ	360 UJ		
ACENAPHTHYLENE	400 UJ	370 UJ	360 UJ	360 UJ		
ANTHRACENE	400 UJ	370 UJ	360 UJ	360 UJ		
BENZO(A)ANTHRACENE	400 UJ	42 J	360 UJ	360 UJ		
BENZO(A)PYRENE	400 UJ	42 J	360 UJ	360 UJ		
BENZO(B)FLUORANTHENE	400 UJ	76 J	45 J	50 J		
BENZO(G,H,I)PERYLENE	400 UJ	370 UJ	360 UJ	360 UJ		
BENZO(K)FLUORANTHENE	400 UJ	370 UJ	360 UJ	360 UJ		
BIS(2-CHLOROETHOXY)METHANE	400 UJ	370 UJ	360 UJ	360 UJ		
BIS(2-CHLOROETHYL)ETHER	400 UJ	370 UJ	360 UJ	360 UJ		
BIS(2-ETHYLHEXYL)PHTHALATE	400 UJ	370 UJ	360 UJ	360 UJ		
BUTYLBENZYL PHTHALATE	400 UJ	370 UJ	360 UJ	360 UJ		
CARBAZOLE	400 UJ	370 UJ	360 UJ	360 UJ		
CHRYSENE	400 UJ	44 J	55 J	360 UJ		
DI-N-BUTYL PHTHALATE	400 UJ	370 UJ	360 UJ	360 UJ		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42SS0010001	S42SS0020001	S42SS0030001	S42DUP002		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/10/97	10/10/97	10/10/97	10/10/97		
LOCATION:	S42SS01	S42SS02	S42SS03	S42SS03		
FIELD DUPLICATE OF:				S42SS0030001		
SEMIVOLATILES (µg/kg)						
DI-N-OCTYL PHTHALATE	400 UJ	370 UJ	360 UJ	360 UJ		
DIBENZO(A,H)ANTHRACENE	400 UJ	370 UJ	360 UJ	360 UJ		
DIBENZOFURAN	400 UJ	370 UJ	360 UJ	360 UJ		
DIETHYL PHTHALATE	400 UJ	370 UJ	360 UJ	360 UJ		
DIMETHYL PHTHALATE	400 UJ	370 UJ	360 UJ	360 UJ		
FLUORANTHENE	51 J	60 J	360 UJ	360 UJ		
FLUORENE	400 UJ	370 UJ	360 UJ	360 UJ		
HEXACHLOROBENZENE	400 UJ	370 UJ	360 UJ	360 UJ		
HEXACHLOROCYCLOPENTADIENE	400 UJ	370 UJ	360 UJ	360 UJ		
HEXACHLOROETHANE	400 UJ	370 UJ	360 UJ	360 UJ		
INDENO(1,2,3-CD)PYRENE	400 UJ	370 UJ	360 UJ	360 UJ		
ISOPHORONE	400 UJ	370 UJ	360 UJ	360 UJ		
N-NITROSO-DI-N-PROPYLAMINE	400 UJ	370 UJ	360 UJ	360 UJ		
N-NITROSODIPHENYLAMINE	400 UJ	370 UJ	360 UJ	360 UJ		
NAPHTHALENE	400 UJ	370 UJ	360 UJ	360 UJ		
NITROBENZENE	400 UJ	370 UJ	360 UJ	360 UJ		
PENTACHLOROPHENOL	1000 UJ	930 UJ	900 UJ	910 UJ		
PHENANTHRENE	400 UJ	370 UJ	360 UJ	360 UJ		
PHENOL	400 UJ	370 UJ	360 UJ	360 UJ		
PYRENE	76 J	63 J	360 UJ	360 UJ		
PESTICIDES/PCBs (µg/kg)						
4,4'-DDD	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
4,4'-DDE	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
4,4'-DDT	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
ALDRIN	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
ALPHA-BHC	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42SS0010001	S42SS0020001	S42SS0030001	S42DUP002		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/10/97	10/10/97	10/10/97	10/10/97		
LOCATION:	S42SS01	S42SS02	S42SS03	S42SS03		
FIELD DUPLICATE OF:				S42SS0030001		
PESTICIDES/PCBs (µg/kg)						
ALPHA-CHLORDANE	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
AROCLOR-1016	40 UJ	37 UJ	36 UJ	36 UJ		
AROCLOR-1221	81 UJ	74 UJ	72 UJ	72 UJ		
AROCLOR-1232	40 UJ	37 UJ	36 UJ	36 UJ		
AROCLOR-1242	40 UJ	37 UJ	36 UJ	36 UJ		
AROCLOR-1248	40 UJ	37 UJ	36 UJ	36 UJ		
AROCLOR-1254	40 UJ	37 UJ	36 UJ	36 UJ		
AROCLOR-1260	40 UJ	37 UJ	36 UJ	36 UJ		
BETA-BHC	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
DELTA-BHC	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
DIELDRIN	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
ENDOSULFAN I	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
ENDOSULFAN II	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
ENDOSULFAN SULFATE	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
ENDRIN	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
ENDRIN ALDEHYDE	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
ENDRIN KETONE	4 UJ	3.7 UJ	3.6 UJ	3.6 UJ		
GAMMA-BHC (LINDANE)	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
GAMMA-CHLORDANE	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
HEPTACHLOR	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
HEPTACHLOR EPOXIDE	2 UJ	1.9 UJ	1.8 UJ	1.8 UJ		
METHOXYCHLOR	20 UJ	19 UJ	18 UJ	18 UJ		
TOXAPHENE	200 UJ	190 UJ	180 UJ	180 UJ		
GENERAL CHEMISTRY						
PH	5.37	5.13	5.13	5.28		

SUMMARY OF SURFACE WATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FIELD DUPLICATE OF:	S42SW0040001 10/10/97 S42SD01/SW04	S42SW0010001 10/10/97 S42SW01	S42SW0020001 10/10/97 S42SW02	S42DUP003 10/10/97 S42SW02 S42SW0020001	S42SW0030001 10/10/97 S42SW03	
METALS (µg/L)						
ALUMINUM	169 K	1790	132 B	176 K	492	
ANTIMONY	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	
ARSENIC	3.3 U	3.3 U	3.3 U	3.3 U	4.2	
BARIUM	22.6 L	111 L	37.8 L	37.4 L	87.3 L	
BERYLLIUM	0.1 UL	0.23 B	0.1 UL	0.1 UL	0.1 UL	
CADMIUM	0.3 U	0.58 B	0.3 U	0.3 U	1.3 B	
CALCIUM	5530 K	4380 K	14400	13500	18000	
CHROMIUM	0.5 UL	2.1 B	0.5 UL	0.5 UL	0.91 B	
COBALT	0.88 B	4.5 L	1.3 B	1.3 B	4.7 L	
COPPER	12.8 L	104 L	7.3 L	6.2 L	13.9 L	
CYANIDE	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	
IRON	2860 L	11400 L	5740 L	6420 L	21800 L	
LEAD	2.5	15.4	1.0 U	1.3	8.8	
MAGNESIUM	1170 K	1030 K	2690 K	2500 K	3600 K	
MANGANESE	236 L	1520 L	304 L	312 L	992 L	
MERCURY	0.1 U	0.17	0.1 U	0.1 U	0.1 B	
NICKEL	1.7 B	2.7 B	1.1 UJ	1.2 B	3.5 B	
POTASSIUM	3380	1720	2030	1940	2600	
SELENIUM	2.8 UL	2.8 U	2.8 U	2.8 U	2.8 U	
SILVER	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	
SODIUM	82600	8210 K	8310 K	8160 K	13000	
THALLIUM	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	
VANADIUM	1.4 L	5.4 L	1.1 L	1.1 UL	3.4 L	
ZINC	20.5 J	221 J	8.2 J	11.0 J	52.1 J	

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42SD0010001	S42SD0020001	S42SD0030001	S42SD0040001	S42SD0050001	S42SD0060001
SAMPLE DATE:	10/10/97	10/10/97	10/10/97	10/10/97	10/10/97	10/10/97
LOCATION:	S42SD01/SW04	S42SD02	S42SD03	S42SD04	S42SD05	S42SD06
FIELD DUPLICATE OF:						
METALS (mg/kg)						
ALUMINUM	18400	9110	5920	4930	14200	5050
ANTIMONY	1.2 UL	0.99 UL	0.6 UL	0.68 UL	0.69 UL	0.74 UL
ARSENIC	7.6 K	5.0	3.4	2.3	6.3 K	2.7 K
BARIUM	181	87.8	27.1	29.2	71.4	68.5
BERYLLIUM	0.44	0.42	0.27	0.11 B	0.48	0.14 B
CADMIUM	3.4 K	2.5	0.17 B	0.4 K	0.22 B	0.8 K
CALCIUM	3190 K	2190 K	275 K	500 K	859 K	2220 K
CHROMIUM	29.0	15.3	15.6	14.0	20.9	11.7
COBALT	16.7 J	15.3 J	7.2 J	5.3 J	8.8 J	7.1 J
COPPER	103	35.6	6.0	5.7	13.4	12.1
CYANIDE	0.47 U	0.46 U	0.26 U	0.24 U	0.29 U	0.31 U
IRON	66900	23600	13800	10300	29400	22300
LEAD	44.9 K	32.0 K	8.5 K	7.3 K	13.4 K	9.6 K
MAGNESIUM	1960 K	829 K	1180 K	925 K	1400 K	1980 K
MANGANESE	946 L	667 L	70.7 L	49.6 L	236 L	1000 L
MERCURY	0.35	0.15	0.01	0.02	0.05	0.05
NICKEL	25.0	15.7 K	14.2 K	14.8 K	13.0 K	11.1 K
POTASSIUM	1710	760	488	441	1350	591
SELENIUM	1.3 UL	1.1 U	0.65 U	0.73 U	0.74 UL	0.79 U
SILVER	16.9	8.8	3.7	9.6	1.0	9.5
SODIUM	742 K	148 B	115 B	80.2 B	150 B	178 B
THALLIUM	1.3 UL	1.1 U	0.67 U	0.76 U	0.77 UL	0.82 UL
VANADIUM	46.9	28.1	25.3	15.1	34.6	14.2
ZINC	275	155	21.3 K	23.7 K	43.3	54.7
AVS/SIMULTANEOUSLY EXTRACTED METALS (mg/kg)						
ACID VOLATILE SULFIDE	5.19	5.53	0.4 U	1.06	0.46 U	0.5 U
CADMIUM(SEM)	3.1 J	2.0 J	0.14 U	0.27 J	0.39 J	0.7 J

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42SD0010001	S42SD0020001	S42SD0030001	S42SD0040001	S42SD0050001	S42SD0060001
SAMPLE DATE:	10/10/97	10/10/97	10/10/97	10/10/97	10/10/97	10/10/97
LOCATION:	S42SD01/SW04	S42SD02	S42SD03	S42SD04	S42SD05	S42SD06
FIELD DUPLICATE OF:						
AVS/SIMULTANEOUSLY EXTRACTED METALS (mg/kg)						
COPPER(SEM)	84.6	32.4	4.5	3.4	11.1	9.0
LEAD(SEM)	35.8	25.7	2.1	4.9	7.9	8.4
MERCURY(SEM)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
NICKEL(SEM)	35.7	103	20.4	1.9 K	30.2	4.5
ZINC(SEM)	186	89.3	3.7	15.8	12.5	46.5
MISCELLANEOUS PARAMETERS (mg/kg)						
TOTAL ORGANIC CARBON	33700	21800	1720	5180	2700	9550

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42DUP001					
SAMPLE DATE:	10/10/97					
LOCATION:	S42SD06					
FIELD DUPLICATE OF:	S42SD0060001					
METALS (mg/kg)						
ALUMINUM	6910					
ANTIMONY	0.7 UL					
ARSENIC	2.5					
BARIUM	72.1					
BERYLLIUM	0.2					
CADMIUM	1.0 K					
CALCIUM	3780 K					
CHROMIUM	15.2					
COBALT	9.2 J					
COPPER	12.2					
CYANIDE	0.29 U					
IRON	17900					
LEAD	12.9 K					
MAGNESIUM	3100 K					
MANGANESE	390 L					
MERCURY	0.04					
NICKEL	18.8					
POTASSIUM	720					
SELENIUM	0.76 U					
SILVER	17.9					
SODIUM	185 B					
THALLIUM	0.78 U					
VANADIUM	19.1					
ZINC	64.1					
AVS/SIMULTANEOUSLY EXTRACTED METALS (mg/kg)						
ACID VOLATILE SULFIDE	0.47 U					
CADMIUM(SEM)	1.2 J					

SUMMARY OF SEDIMENT ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42DUP001					
SAMPLE DATE:	10/10/97					
LOCATION:	S42SD06					
FIELD DUPLICATE OF:	S42SD0060001					
AVS/SIMULTANEOUSLY EXTRACTED METALS (mg/kg)						
COPPER(SEM)	10.7					
LEAD(SEM)	7.0					
MERCURY(SEM)	0.01 U					
NICKEL(SEM)	25.1					
ZINC(SEM)	45.0					
MISCELLANEOUS PARAMETERS (mg/kg)						
TOTAL ORGANIC CARBON	9960					

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW002F001	S42MW002U001	S42MW003F001	S42DUP004-F	S42MW003U001	S42DUP004
SAMPLE DATE:	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97
LOCATION:	S42MW02	S42MW02	S42MW03	S42MW03	S42MW03	S42MW03
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S42MW003F001		S42MW003U001
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE		1 U			1 U	1 U
1,1,2,2-TETRACHLOROETHANE		1 U			1 U	1 U
1,1,2-TRICHLOROETHANE		1 U			1 U	1 U
1,1-DICHLOROETHANE		1 U			1 U	1 U
1,1-DICHLOROETHENE		1 U			1 U	1 U
1,2-DIBROMO-3-CHLOROPROPANE		1 U			1 U	1 U
1,2-DIBROMOETHANE		1 U			1 U	1 U
1,2-DICHLOROETHANE		1 U			1 U	1 U
1,2-DICHLOROPROPANE		1 U			1 U	1 U
2-BUTANONE		5 UR			5 UR	5 UR
2-HEXANONE		5 U			5 U	5 U
4-METHYL-2-PENTANONE		5 U			5 U	5 U
ACETONE		5 UR			5 UR	5 UR
BENZENE		1 U			1 U	1 U
BROMOCHLOROMETHANE		1 U			1 U	1 U
BROMODICHLOROMETHANE		1 U			1 U	1 U
BROMOFORM		1 U			1 U	1 U
BROMOMETHANE		1 U			1 U	1 U
CARBON DISULFIDE		1 U			1 U	1 U
CARBON TETRACHLORIDE		1 U			1 U	1 U
CHLOROBENZENE		1			1 U	1 U
CHLOROETHANE		1 U			1 U	1 U
CHLOROFORM		1 U			1 U	1 U
CHLOROMETHANE		1 U			1 U	1 U
CIS-1,2-DICHLOROETHENE		1			1 U	1 U
CIS-1,3-DICHLOROPROPENE		1 U			1 U	1 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW002F001	S42MW002U001	S42MW003F001	S42DUP004-F	S42MW003U001	S42DUP004
SAMPLE DATE:	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97
LOCATION:	S42MW02	S42MW02	S42MW03	S42MW03	S42MW03	S42MW03
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S42MW003F001		S42MW003U001
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE		1 U			1 U	1 U
ETHYLBENZENE		1 U			1 U	1 U
HEXACHLOROBUTADIENE		6 U			6 U	5 U
METHYLENE CHLORIDE		2 U			2 U	2 U
STYRENE		1 U			1 U	1 U
TETRACHLOROETHENE		1 U			1 U	1 U
TOLUENE		1 U			1 U	1 U
TRANS-1,2-DICHLOROETHENE		1 U			1 U	1 U
TRANS-1,3-DICHLOROPROPENE		1 U			1 U	1 U
TRICHLOROETHENE		1 U			1 U	1 U
VINYL CHLORIDE		1 U			1 U	1 U
XYLENES, TOTAL		1 U			1 U	1 U
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE		1 U			1 U	1 U
1,2-DICHLOROBENZENE		1 U			1 U	1 U
1,3-DICHLOROBENZENE		1 U			1 U	1 U
1,4-DICHLOROBENZENE		1 U			1 U	1 U
2,2'-OXYBIS(1-CHLOROPROPANE)		6 U			6 U	5 U
2,4,5-TRICHLOROPHENOL		22 U			22 U	21 U
2,4,6-TRICHLOROPHENOL		6 U			6 U	5 U
2,4-DICHLOROPHENOL		6 U			6 U	5 U
2,4-DIMETHYLPHENOL		6 U			6 U	5 U
2,4-DINITROPHENOL		22 U			22 U	21 U
2,4-DINITROTOLUENE		6 U			6 U	5 U
2,6-DINITROTOLUENE		6 U			1 J	5 U
2-CHLORONAPHTHALENE		6 U			6 U	5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW002F001	S42MW002U001	S42MW003F001	S42DUP004-F	S42MW003U001	S42DUP004
SAMPLE DATE:	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97
LOCATION:	S42MW02	S42MW02	S42MW03	S42MW03	S42MW03	S42MW03
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S42MW003F001		S42MW003U001
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL		6 U			6 U	5 U
2-METHYLNAPHTHALENE		6 U			6 U	5 U
2-METHYLPHENOL		6 U			6 U	5 U
2-NITROANILINE		22 U			22 U	21 U
2-NITROPHENOL		6 U			6 U	5 U
3,3'-DICHLOROBENZIDINE		6 U			6 U	5 U
3-NITROANILINE		22 U			22 U	21 U
4,6-DINITRO-2-METHYLPHENOL		22 U			22 U	21 U
4-BROMOPHENYL PHENYL ETHER		6 U			6 U	5 U
4-CHLORO-3-METHYLPHENOL		6 U			6 U	5 U
4-CHLOROANILINE		6 U			6 U	5 U
4-CHLOROPHENYL PHENYL ETHER		6 U			6 U	5 U
4-METHYLPHENOL		6 U			6 U	5 U
4-NITROANILINE		22 U			22 U	21 U
4-NITROPHENOL		22 U			22 U	21 U
ACENAPHTHENE		6 U			6 U	5 U
ACENAPHTHYLENE		6 U			6 U	5 U
ANTHRACENE		6 U			6 U	5 U
BENZO(A)ANTHRACENE		6 U			6 U	5 U
BENZO(A)PYRENE		6 U			6 U	5 U
BENZO(B)FLUORANTHENE		6 U			6 U	5 U
BENZO(G,H,I)PERYLENE		6 U			6 U	5 U
BENZO(K)FLUORANTHENE		6 U			6 U	5 U
BIS(2-CHLOROETHOXY)METHANE		6 U			6 U	5 U
BIS(2-CHLOROETHYL)ETHER		6 U			6 U	5 U
BIS(2-ETHYLHEXYL)PHTHALATE		6 U			6 U	5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW002F001	S42MW002U001	S42MW003F001	S42DUP004-F	S42MW003U001	S42DUP004
SAMPLE DATE:	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97
LOCATION:	S42MW02	S42MW02	S42MW03	S42MW03	S42MW03	S42MW03
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S42MW003F001		S42MW003U001
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE		6 U			6 U	5 U
CHRYSENE		6 U			6 U	5 U
DI-N-BUTYL PHTHALATE		21			19 B	9 B
DI-N-OCTYL PHTHALATE		6 U			6 U	5 U
DIBENZO(A,H)ANTHRACENE		6 U			6 U	5 U
DIBENZOFURAN		6 U			6 U	5 U
DIETHYL PHTHALATE		6 U			6 U	5 U
DIMETHYL PHTHALATE		6 U			6 U	5 U
FLUORANTHENE		6 U			6 U	5 U
FLUORENE		6 U			6 U	5 U
HEXACHLOROBENZENE		6 U			6 U	5 U
HEXACHLOROCYCLOPENTADIENE		6 U			6 U	5 U
HEXACHLOROETHANE		6 U			6 U	5 U
INDENO(1,2,3-CD)PYRENE		6 U			6 U	5 U
ISOPHORONE		6 U			6 U	5 U
N-NITROSO-DI-N-PROPYLAMINE		6 U			6 U	5 U
N-NITROSODIPHENYLAMINE		6 U			6 U	5 U
NAPHTHALENE		6 U			6 U	5 U
NITROBENZENE		6 U			6 U	5 U
PENTACHLOROPHENOL		22 U			22 U	21 U
PHENANTHRENE		6 U			6 U	5 U
PHENOL		5 J			6 U	5 U
PYRENE		6 U			6 U	5 U
METALS (µg/L)						
ALUMINUM	20.0 U	20.0 U	20.0 U	20.0 U	20.8 K	20.0 U
ANTIMONY	2.6 UR	2.6 UR	2.6 UR	2.6 UR	2.6 UR	2.6 UR

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW002F001	S42MW002U001	S42MW003F001	S42DUP004-F	S42MW003U001	S42DUP004
SAMPLE DATE:	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97	10/11/97
LOCATION:	S42MW02	S42MW02	S42MW03	S42MW03	S42MW03	S42MW03
FILTERING:	Filtered	Unfiltered	Filtered	Filtered	Unfiltered	Unfiltered
FIELD DUPLICATE OF:				S42MW003F001		S42MW003U001
METALS (mg/L)						
ARSENIC	8.3 J	5.8 J	10.0 J	13.0 J	3.3 UR	12.5 J
BARIUM	374 L	101 L	394 L	373 L	23.3 L	288 L
BERYLLIUM	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CADMIUM	0.55 B	0.45 B	0.64 B	0.81 B	0.3 U	0.7 B
CALCIUM	6370 K	4480 K	17000	17700	4160 K	16800
CHROMIUM	0.5 UL	0.5 UL	0.63 B	0.5 UL	0.5 UL	0.5 UL
COBALT	4.1	7.1	7.5	7.5	0.91 B	8.1
COPPER	3.6 B	2.1 B	3.9 B	2.7 B	1.8 B	3.8 B
CYANIDE		5.0 U			5.0 U	5.0 U
IRON	30900 L	21200 L	27600 L	31400 L	1200 L	33400 L
LEAD	1.0 UR	1.0 UR	1.0 UR	1.0 UR	1.0 UR	1.0 UR
MAGNESIUM	2600 K	2340 K	5280 K	5520 K	1050 K	5250 K
MANGANESE	689	556	5120	5610	79.3	5720
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	6.1 K	9.4 K	1.2 K	1.2 K	4.2 K	1.1 U
POTASSIUM	1020	527	1160	1030 UL	557	880
SELENIUM	2.8 UL	2.8 UL	2.8 UL	2.8 UL	2.8 UR	2.8 UL
SILVER	0.8 UL	0.8 UL	0.8 UL	0.8 UL	0.8 UL	0.8 UL
SODIUM	33600	36300	12600	12700	10600	10400
THALLIUM	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
VANADIUM	1.1 UL	1.1 UL	1.1 UL	1.1 UL	1.1 UR	1.1 UL
ZINC	116 J	11.8 K	51.6	41.8 J	7.8 K	2.9 K

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW004F001	S42DUP005-F	S42MW004U001	S42DUP005	S42MW006F001	S42MW006U001
SAMPLE DATE:	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97
LOCATION:	S42MW04	S42MW04	S42MW04	S42MW04	S42MW06	S42MW06
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:		S42MW004F001		S42MW004U001		
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE			1 U	1 U		1 U
1,1,2,2-TETRACHLOROETHANE			1 U	1 U		1 U
1,1,2-TRICHLOROETHANE			2	2		1 U
1,1-DICHLOROETHANE			1 U	1 U		1 U
1,1-DICHLOROETHENE			2	1		1 U
1,2-DIBROMO-3-CHLOROPROPANE			1 U	1 U		1 U
1,2-DIBROMOETHANE			1 U	1 U		1 U
1,2-DICHLOROETHANE			1 U	1 U		1 U
1,2-DICHLOROPROPANE			1 U	1 U		1 U
2-BUTANONE			5 UR	5 UR		5 UR
2-HEXANONE			5 U	5 U		5 U
4-METHYL-2-PENTANONE			5 U	5 U		5 U
ACETONE			5 UR	5 UR		5 UR
BENZENE			1 U	1 U		1 U
BROMOCHLOROMETHANE			1 U	1 U		1 U
BROMODICHLOROMETHANE			1 U	1 U		1 U
BROMOFORM			1 U	1 U		1 U
BROMOMETHANE			1 U	1 U		1 U
CARBON DISULFIDE			1 U	1 U		1 U
CARBON TETRACHLORIDE			1 U	1 U		1 U
CHLOROBENZENE			1 U	1 U		1 U
CHLOROETHANE			1 U	1 U		1 U
CHLOROFORM			1 U	1 U		1 U
CHLOROMETHANE			1 U	1 U		1 U
CIS-1,2-DICHLOROETHENE			122 J	117 J		1 U
CIS-1,3-DICHLOROPROPENE			1 U	1 U		1 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW004F001	S42DUP005-F	S42MW004U001	S42DUP005	S42MW006F001	S42MW006U001
SAMPLE DATE:	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97
LOCATION:	S42MW04	S42MW04	S42MW04	S42MW04	S42MW06	S42MW06
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:		S42MW004F001		S42MW004U001		
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE			1 U	1 U		1 U
ETHYLBENZENE			1 U	1 U		1 U
HEXACHLOROBUTADIENE			5 U	5 U		5 U
METHYLENE CHLORIDE			2 U	2 U		2 U
STYRENE			1 U	1 U		1 U
TETRACHLOROETHENE			2	2		1 U
TOLUENE			1 U	1 U		1 U
TRANS-1,2-DICHLOROETHENE			2	2		1 U
TRANS-1,3-DICHLOROPROPENE			1 U	1 U		1 U
TRICHLOROETHENE			4780	5210		1 U
VINYL CHLORIDE			9	9		1 U
XYLENES, TOTAL			1 U	1 U		1 U
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE			1 U	1 U		1 U
1,2-DICHLOROBENZENE			1 U	1 U		1 U
1,3-DICHLOROBENZENE			1 U	1 U		1 U
1,4-DICHLOROBENZENE			1 U	1 U		1 U
2,2'-OXYBIS(1-CHLOROPROPANE)			5 U	5 U		5 U
2,4,5-TRICHLOROPHENOL			21 U	21 U		21 U
2,4,6-TRICHLOROPHENOL			5 U	5 U		5 U
2,4-DICHLOROPHENOL			5 U	5 U		5 U
2,4-DIMETHYLPHENOL			5 U	5 U		5 U
2,4-DINITROPHENOL			21 U	21 U		21 U
2,4-DINITROTOLUENE			5 U	5 U		5 U
2,6-DINITROTOLUENE			5 U	5 U		5 U
2-CHLORONAPHTHALENE			5 U	5 U		5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW004F001	S42DUP005-F	S42MW004U001	S42DUP005	S42MW006F001	S42MW006U001
SAMPLE DATE:	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97
LOCATION:	S42MW04	S42MW04	S42MW04	S42MW04	S42MW06	S42MW06
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:		S42MW004F001		S42MW004U001		
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL			5 U	5 U		5 U
2-METHYLNAPHTHALENE			5 U	5 U		5 U
2-METHYLPHENOL			5 U	5 U		5 U
2-NITROANILINE			21 U	21 U		21 U
2-NITROPHENOL			5 U	5 U		5 U
3,3'-DICHLOROBENZIDINE			5 U	5 U		5 U
3-NITROANILINE			21 U	21 U		21 U
4,6-DINITRO-2-METHYLPHENOL			21 U	21 U		21 U
4-BROMOPHENYL PHENYL ETHER			5 U	5 U		5 U
4-CHLORO-3-METHYLPHENOL			5 U	5 U		5 U
4-CHLOROANILINE			5 U	5 U		5 U
4-CHLOROPHENYL PHENYL ETHER			5 U	5 U		5 U
4-METHYLPHENOL			5 U	5 U		5 U
4-NITROANILINE			21 U	21 U		21 U
4-NITROPHENOL			21 U	21 U		21 U
ACENAPHTHENE			5 U	5 U		5 U
ACENAPHTHYLENE			5 U	5 U		5 U
ANTHRACENE			5 U	5 U		5 U
BENZO(A)ANTHRACENE			5 U	5 U		5 U
BENZO(A)PYRENE			5 U	5 U		5 U
BENZO(B)FLUORANTHENE			5 U	5 U		5 U
BENZO(G,H,I)PERYLENE			5 U	5 U		5 U
BENZO(K)FLUORANTHENE			5 U	5 U		5 U
BIS(2-CHLOROETHOXY)METHANE			5 U	5 U		5 U
BIS(2-CHLOROETHYL)ETHER			5 U	5 U		5 U
BIS(2-ETHYLHEXYL)PHTHALATE			5 U	5 U		5 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW004F001	S42DUP005-F	S42MW004U001	S42DUP005	S42MW006F001	S42MW006U001
SAMPLE DATE:	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97
LOCATION:	S42MW04	S42MW04	S42MW04	S42MW04	S42MW06	S42MW06
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:		S42MW004F001		S42MW004U001		
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE			5 U	5 U		5 U
CHRYSENE			5 U	5 U		5 U
DI-N-BUTYL PHTHALATE			6 B	3 B		10 B
DI-N-OCTYL PHTHALATE			5 U	5 U		5 U
DIBENZO(A,H)ANTHRACENE			5 U	5 U		5 U
DIBENZOFURAN			5 U	5 U		5 U
DIETHYL PHTHALATE			5 U	5 U		5 U
DIMETHYL PHTHALATE			5 U	5 U		5 U
FLUORANTHENE			5 U	5 U		5 U
FLUORENE			5 U	5 U		5 U
HEXACHLOROBENZENE			5 U	5 U		5 U
HEXACHLOROCYCLOPENTADIENE			5 U	5 U		5 U
HEXACHLOROETHANE			5 U	5 U		5 U
INDENO(1,2,3-CD)PYRENE			5 U	5 U		5 U
ISOPHORONE			5 U	5 U		5 U
N-NITROSO-DI-N-PROPYLAMINE			5 U	5 U		5 U
N-NITROSODIPHENYLAMINE			5 U	5 U		5 U
NAPHTHALENE			5 U	5 U		5 U
NITROBENZENE			5 U	5 U		5 U
PENTACHLOROPHENOL			21 U	21 U		21 U
PHENANTHRENE			5 U	5 U		5 U
PHENOL			5 U	5 U		5 U
PYRENE			5 U	5 U		5 U
METALS (µg/L)						
ALUMINUM	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
ANTIMONY	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW004F001	S42DUP005-F	S42MW004U001	S42DUP005	S42MW006F001	S42MW006U001
SAMPLE DATE:	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97	10/12/97
LOCATION:	S42MW04	S42MW04	S42MW04	S42MW04	S42MW06	S42MW06
FILTERING:	Filtered	Filtered	Unfiltered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:		S42MW004F001		S42MW004U001		
METALS (mg/L)						
ARSENIC	3.3 U	3.3 U	3.3 U	3.3 U	3.3	3.3 U
BARIUM	236	183 B	84.2	85.5	270	23.0
BERYLLIUM	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CADMIUM	0.3 U	0.3 U	0.35 B	0.3 U	0.3 U	0.3 U
CALCIUM	7180 K	8730 K	7520 K	7610 K	4290 K	4200 K
CHROMIUM	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
COBALT	0.62 B	0.91 B	1.0 B	0.77 B	0.45 B	0.79 B
COPPER	3.6 B	3.7 B	3.0 B	2.1 B	3.8 B	4.7 B
CYANIDE			5.0 U	5.0 U		5.0 U
IRON	711 J	926 J	1280 J	1340 J	1120 J	1220 J
LEAD	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MAGNESIUM	1690 K	2060 K	1730 K	1730 K	1070 K	1060 K
MANGANESE	190 J	233 J	202 J	204 J	71.2 J	79.2 J
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	10.2 K	12.4 K	11.6 K	11.5 K	4.3 K	3.9 K
POTASSIUM	1820	2100	1970	1960	703	575
SELENIUM	2.8 UL	2.8 UL	2.8 UL	2.8 UL	2.8 UL	2.8 UL
SILVER	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
SODIUM	15400 J	18200 J	13500 J	13400 J	13300 J	11100 J
THALLIUM	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
VANADIUM	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
ZINC	80.0	56.7	9.3 B	8.7 B	115	7.2 B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FILTERING: FIELD DUPLICATE OF:	S42MW007F001 10/14/97 S42MW07 Filtered	S42MW007U001 10/14/97 S42MW07 Unfiltered				
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE		7				
1,1,2,2-TETRACHLOROETHANE		1 U				
1,1,2-TRICHLOROETHANE		1 U				
1,1-DICHLOROETHANE		3				
1,1-DICHLOROETHENE		1 U				
1,2-DIBROMO-3-CHLOROPROPANE		1 U				
1,2-DIBROMOETHANE		1 U				
1,2-DICHLOROETHANE		1 U				
1,2-DICHLOROPROPANE		1 U				
2-BUTANONE		5 UR				
2-HEXANONE		5 U				
4-METHYL-2-PENTANONE		5 U				
ACETONE		5 UR				
BENZENE		1 U				
BROMOCHLOROMETHANE		1 U				
BROMODICHLOROMETHANE		1 U				
BROMOFORM		1 U				
BROMOMETHANE		1 U				
CARBON DISULFIDE		1 U				
CARBON TETRACHLORIDE		1 U				
CHLOROBENZENE		1 U				
CHLOROETHANE		1 U				
CHLOROFORM		1 U				
CHLOROMETHANE		1 U				
CIS-1,2-DICHLOROETHENE		1 U				
CIS-1,3-DICHLOROPROPENE		1 U				

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW007F001	S42MW007U001				
SAMPLE DATE:	10/14/97	10/14/97				
LOCATION:	S42MW07	S42MW07				
FILTERING:	Filtered	Unfiltered				
FIELD DUPLICATE OF:						
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE		1 U				
ETHYLBENZENE		1 U				
HEXACHLOROBUTADIENE		6 U				
METHYLENE CHLORIDE		2 U				
STYRENE		1 U				
TETRACHLOROETHENE		1 U				
TOLUENE		1 U				
TRANS-1,2-DICHLOROETHENE		1 U				
TRANS-1,3-DICHLOROPROPENE		1 U				
TRICHLOROETHENE		6				
VINYL CHLORIDE		1 U				
XYLENES, TOTAL		1 U				
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE		1 U				
1,2-DICHLOROBENZENE		1 U				
1,3-DICHLOROBENZENE		1 U				
1,4-DICHLOROBENZENE		1 U				
2,2'-OXYBIS(1-CHLOROPROPANE)		6 U				
2,4,5-TRICHLOROPHENOL		25 U				
2,4,6-TRICHLOROPHENOL		6 U				
2,4-DICHLOROPHENOL		6 U				
2,4-DIMETHYLPHENOL		6 U				
2,4-DINITROPHENOL		25 U				
2,4-DINITROTOLUENE		6 U				
2,6-DINITROTOLUENE		6 U				
2-CHLORONAPHTHALENE		6 U				

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER: SAMPLE DATE: LOCATION: FILTERING: FIELD DUPLICATE OF:	S42MW007F001 10/14/97 S42MW07 Filtered	S42MW007U001 10/14/97 S42MW07 Unfiltered				
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL		6 U				
2-METHYLNAPHTHALENE		6 U				
2-METHYLPHENOL		6 U				
2-NITROANILINE		25 U				
2-NITROPHENOL		6 U				
3,3'-DICHLOROBENZIDINE		6 U				
3-NITROANILINE		25 U				
4,6-DINITRO-2-METHYLPHENOL		25 U				
4-BROMOPHENYL PHENYL ETHER		6 U				
4-CHLORO-3-METHYLPHENOL		6 U				
4-CHLOROANILINE		6 U				
4-CHLOROPHENYL PHENYL ETHER		6 U				
4-METHYLPHENOL		6 U				
4-NITROANILINE		25 U				
4-NITROPHENOL		25 U				
ACENAPHTHENE		6 U				
ACENAPHTHYLENE		6 U				
ANTHRACENE		6 U				
BENZO(A)ANTHRACENE		6 U				
BENZO(A)PYRENE		6 U				
BENZO(B)FLUORANTHENE		6 U				
BENZO(G,H,I)PERYLENE		6 U				
BENZO(K)FLUORANTHENE		6 U				
BIS(2-CHLOROETHOXY)METHANE		6 U				
BIS(2-CHLOROETHYL)ETHER		6 U				
BIS(2-ETHYLHEXYL)PHTHALATE		2 J				

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW007F001	S42MW007U001				
SAMPLE DATE:	10/14/97	10/14/97				
LOCATION:	S42MW07	S42MW07				
FILTERING:	Filtered	Unfiltered				
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE		6 U				
CHRYSENE		6 U				
DI-N-BUTYL PHTHALATE		6 U				
DI-N-OCTYL PHTHALATE		6 U				
DIBENZO(A,H)ANTHRACENE		6 U				
DIBENZOFURAN		6 U				
DIETHYL PHTHALATE		6 U				
DIMETHYL PHTHALATE		6 U				
FLUORANTHENE		6 U				
FLUORENE		6 U				
HEXACHLOROBENZENE		6 U				
HEXACHLOROCYCLOPENTADIENE		6 U				
HEXACHLOROETHANE		6 U				
INDENO(1,2,3-CD)PYRENE		6 U				
ISOPHORONE		6 U				
N-NITROSO-DI-N-PROPYLAMINE		6 U				
N-NITROSODIPHENYLAMINE		6 U				
NAPHTHALENE		6 U				
NITROBENZENE		6 U				
PENTACHLOROPHENOL		25 U				
PHENANTHRENE		6 U				
PHENOL		6 U				
PYRENE		6 U				
METALS (µg/L)						
ALUMINUM	67700 K	590000 K				
ANTIMONY	2.6 U	13.0 U				

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 42 - OLSON ROAD LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S42MW007F001	S42MW007U001				
SAMPLE DATE:	10/14/97	10/14/97				
LOCATION:	S42MW07	S42MW07				
FILTERING:	Filtered	Unfiltered				
FIELD DUPLICATE OF:						
METALS (mg/L)						
ARSENIC	11.8	102 K				
BARIUM	917	5520				
BERYLLIUM	3.8	47.2				
CADMIUM	0.7 B	7.1 K				
CALCIUM	9740 K	92400				
CHROMIUM	87.9	839				
COBALT	31.6	357				
COPPER	114	700				
CYANIDE		5.0 U				
IRON	76400	782000				
LEAD	50.0	575				
MAGNESIUM	10400	108000				
MANGANESE	472	5270				
MERCURY	0.12 K	2.2 K				
NICKEL	90.4	958				
POTASSIUM	5960 K	26200				
SELENIUM	2.8 UJ	14.0 UJ				
SILVER	0.8 U	4.0 U				
SODIUM	94400	94300				
THALLIUM	2.9 U	14.5 UL				
VANADIUM	102	854				
ZINC	419	2460				

APPENDIX H.2.4

SITE 44 OCTOBER 1997 ANALYTICAL DATABASE

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S44SS0010001	S44SS0020001	S44SS0030001	S44SS0040001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S44SS01	S44SS02	S44SS03	S44SS04		
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/kg)						
2,4-DINITROTOLUENE	51.6 U	51.6 UL	51.6 UJ	51.6 U		
2,6-DINITROTOLUENE	47.6 U	47.6 UJ	47.6 UJ	47.6 U		
NITROBENZENE	35.2 U	35.2 UJ	35.2 UJ	35.2 U		
ENERGETICS (µg/kg)						
1,3,5-TRINITROBENZENE	40.2 U	40.2 UL	40.2 UL	40.2 U		
1,3-DINITROBENZENE	37.2 U	37.2 UL	37.2 UJ	37.2 U		
2,4,6-TRINITROTOLUENE	92 U	92 UL	92 UJ	92 U		
2-AMINO-4,6-DINITROTOLUENE	46.7 U	46.7 UJ	46.7 UJ	46.7 U		
2-NITROTOLUENE	81.4 U	81.4 UJ	81.4 UJ	81.4 U		
3-NITROTOLUENE	81.8 U	81.8 UJ	81.8 UJ	81.8 U		
4-AMINO-2,6-DINITROTOLUENE	40.9 U	40.9 UJ	40.9 UJ	40.9 U		
4-NITROTOLUENE	87.2 U	87.2 UJ	87.2 UJ	87.2 U		
HMX	73 U	73 UJ	73 UJ	73 U		
NITROCELLULOSE	17100 U	21500	25300	20300		
NITROGLYCERIN	10000 U	10000 U	10000 U	10000 U		
NITROGUANIDINE	62.5 U	62.5 U	62.5 U	62.5 U		
RDX	50.9 U	50.9 UJ	50.9 UJ	50.9 U		
TETRYL	163 U	163 UJ	163 UJ	163 U		
METALS (mg/kg)						
ALUMINUM	7040	8060	4890	5680		
ANTIMONY	0.64 UL	1.3 B	0.65 UL	0.75 UL		
ARSENIC	3.3 L	4.4 L	2.9 L	4.4 L		
BARIUM	32.9	38.6	31.8	16.6		
BERYLLIUM	0.02 U	0.02 U	0.02 U	0.03 U		
CADMIUM	0.36 B	1.6 L	0.42 B	0.44 B		
CALCIUM	350 K	704 K	653 K	249 K		

SUMMARY OF SURFACE SOIL ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S44SS0010001	S44SS0020001	S44SS0030001	S44SS0040001		
DEPTH (feet):	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'		
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97		
LOCATION:	S44SS01	S44SS02	S44SS03	S44SS04		
FIELD DUPLICATE OF:						
METALS (mg/kg)						
CHROMIUM	12.3	16.8	10.5	18.8		
COBALT	4.0	3.4	4.7	2.3 B		
COPPER	8.9 J	21.2 J	8.4 J	8.8 J		
CYANIDE	0.27 U	0.21 U	0.22 U	0.2 U		
IRON	12100	12000	11200	15700		
LEAD	21.2 L	49.0 L	15.3 L	7.2 L		
MAGNESIUM	562 K	956 K	531 K	1440 K		
MANGANESE	173	60.8	200	31.5		
MERCURY	0.04	0.06	0.03	0.02 U		
NICKEL	4.4	7.1	6.0	13.1		
POTASSIUM	551 J	673 J	371 J	681 J		
SELENIUM	0.53 UJ	0.61 J	0.62 J	0.95 J		
SILVER	0.21 U	0.21 U	0.21 B	0.24 U		
SODIUM	99.4 B	125 B	89.4 B	102 B		
THALLIUM	0.53 UL	0.53 UL	0.53 UL	0.61 UL		
VANADIUM	21.8	32.7	19.8	25.0		
ZINC	20.6 J	116 J	19.6 J	11.2 J		

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S44GW001F001	S44GW001U001	S44GW002F001	S44GW002U001	S44GW003F001	S44GW003U001
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97
LOCATION:	S44MW01	S44MW01	S44MW02	S44MW02	S44MW03	S44MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
VOLATILES (µg/L)						
1,1,1-TRICHLOROETHANE		1 U		1 U		1 U
1,1,2,2-TETRACHLOROETHANE		1 U		1 U		1 U
1,1,2-TRICHLOROETHANE		1 U		1 U		1 U
1,1-DICHLOROETHANE		1 U		1 U		1 U
1,1-DICHLOROETHENE		1 U		1 U		1 U
1,2-DIBROMO-3-CHLOROPROPANE		1 U		1 U		1 U
1,2-DIBROMOETHANE		1 U		1 U		1 U
1,2-DICHLOROETHANE		1 U		1 U		1 U
1,2-DICHLOROPROPANE		1 U		1 U		1 U
2-BUTANONE		5 UR		5 UR		5 UR
2-HEXANONE		5 U		5 U		5 U
4-METHYL-2-PENTANONE		5 U		5 U		5 U
ACETONE		5 UR		5 UR		5 UR
BENZENE		1 U		1 U		1 U
BROMOCHLOROMETHANE		1 U		1 U		1 U
BROMODICHLOROMETHANE		1 U		1 U		1 U
BROMOFORM		1 U		1 U		1 U
BROMOMETHANE		1 U		1 U		1 U
CARBON DISULFIDE		1 U		1 U		1 U
CARBON TETRACHLORIDE		1 U		1 U		1 U
CHLOROBENZENE		1 U		1 U		1 U
CHLOROETHANE		1 U		1 U		1 U
CHLOROFORM		1 U		1 U		1 U
CHLOROMETHANE		1 U		1 U		1 U
CIS-1,2-DICHLOROETHENE		1 U		1 U		1 U
CIS-1,3-DICHLOROPROPENE		1 U		1 U		1 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S44GW001F001	S44GW001U001	S44GW002F001	S44GW002U001	S44GW003F001	S44GW003U001
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97
LOCATION:	S44MW01	S44MW01	S44MW02	S44MW02	S44MW03	S44MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
VOLATILES (µg/L)						
DIBROMOCHLOROMETHANE		1 U		1 U		1 U
ETHYLBENZENE		1 U		1 U		1 U
HEXACHLOROBUTADIENE		5 U		5 U		6 U
METHYLENE CHLORIDE		2 U		2 U		2 U
STYRENE		1 U		1 U		1 U
TETRACHLOROETHENE		1 U		1 U		1 U
TOLUENE		1 U		1 U		1 U
TRANS-1,2-DICHLOROETHENE		1 U		1 U		1 U
TRANS-1,3-DICHLOROPROPENE		1 U		1 U		1 U
TRICHLOROETHENE		1 U		1		1 U
VINYL CHLORIDE		1 U		1 U		1 U
XYLENES, TOTAL		1 U		1 U		1 U
SEMIVOLATILES (µg/L)						
1,2,4-TRICHLOROBENZENE		1 U		1 U		1 U
1,2-DICHLOROBENZENE		1 U		1 U		1 U
1,3-DICHLOROBENZENE		1 U		1 U		1 U
1,4-DICHLOROBENZENE		1 U		1 U		1 U
2,2'-OXYBIS(1-CHLOROPROPANE)		5 U		5 U		6 U
2,4,5-TRICHLOROPHENOL		21 U		21 U		22 U
2,4,6-TRICHLOROPHENOL		5 U		5 U		6 U
2,4-DICHLOROPHENOL		5 U		5 U		6 U
2,4-DIMETHYLPHENOL		5 U		5 U		6 U
2,4-DINITROPHENOL		21 U		21 U		22 U
2,4-DINITROTOLUENE		5 U		5 U		6 U
2,6-DINITROTOLUENE		5 U		5 U		6 U
2-CHLORONAPHTHALENE		5 U		5 U		6 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S44GW001F001	S44GW001U001	S44GW002F001	S44GW002U001	S44GW003F001	S44GW003U001
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97
LOCATION:	S44MW01	S44MW01	S44MW02	S44MW02	S44MW03	S44MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/L)						
2-CHLOROPHENOL		5 U		5 U		6 U
2-METHYLNAPHTHALENE		5 U		5 U		6 U
2-METHYLPHENOL		5 U		5 U		6 U
2-NITROANILINE		21 U		21 U		22 U
2-NITROPHENOL		5 U		5 U		6 U
3,3'-DICHLOROBENZIDINE		5 U		5 U		6 U
3-NITROANILINE		21 U		21 U		22 U
4,6-DINITRO-2-METHYLPHENOL		21 U		21 U		22 U
4-BROMOPHENYL PHENYL ETHER		5 U		5 U		6 U
4-CHLORO-3-METHYLPHENOL		5 U		5 U		6 U
4-CHLOROANILINE		5 U		5 U		6 U
4-CHLOROPHENYL PHENYL ETHER		5 U		5 U		6 U
4-METHYLPHENOL		5 U		5 U		6 U
4-NITROANILINE		21 U		21 U		22 U
4-NITROPHENOL		21 U		21 U		22 U
ACENAPHTHENE		5 U		5 U		6 U
ACENAPHTHYLENE		5 U		5 U		6 U
ANTHRACENE		5 U		5 U		6 U
BENZO(A)ANTHRACENE		5 U		5 U		6 U
BENZO(A)PYRENE		5 U		5 U		6 U
BENZO(B)FLUORANTHENE		5 U		5 U		6 U
BENZO(G,H,I)PERYLENE		5 U		5 U		6 U
BENZO(K)FLUORANTHENE		5 U		5 U		6 U
BIS(2-CHLOROETHOXY)METHANE		5 U		5 U		6 U
BIS(2-CHLOROETHYL)ETHER		5 U		5 U		6 U
BIS(2-ETHYLHEXYL)PHTHALATE		5 U		5 U		6 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S44GW001F001	S44GW001U001	S44GW002F001	S44GW002U001	S44GW003F001	S44GW003U001
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97
LOCATION:	S44MW01	S44MW01	S44MW02	S44MW02	S44MW03	S44MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
SEMIVOLATILES (µg/L)						
BUTYLBENZYL PHTHALATE		5 U		5 U		6 U
CHRYSENE		5 U		5 U		6 U
DI-N-BUTYL PHTHALATE		5 U		5 U		6 U
DI-N-OCTYL PHTHALATE		5 U		5 U		6 U
DIBENZO(A,H)ANTHRACENE		5 U		5 U		6 U
DIBENZOFURAN		5 U		5 U		6 U
DIETHYL PHTHALATE		5 U		5 U		6 U
DIMETHYL PHTHALATE		5 U		5 U		6 U
FLUORANTHENE		5 U		5 U		6 U
FLUORENE		5 U		5 U		6 U
HEXACHLOROBENZENE		5 U		5 U		6 U
HEXACHLOROCYCLOPENTADIENE		5 U		5 U		6 U
HEXACHLOROETHANE		5 U		5 U		6 U
INDENO(1,2,3-CD)PYRENE		5 U		5 U		6 U
ISOPHORONE		5 U		5 U		6 U
N-NITROSO-DI-N-PROPYLAMINE		5 U		5 U		6 U
N-NITROSODIPHENYLAMINE		5 U		5 U		6 U
NAPHTHALENE		5 U		5 U		6 U
NITROBENZENE		5 U		5 U		6 U
PENTACHLOROPHENOL		21 U		21 U		22 U
PHENANTHRENE		5 U		5 U		6 U
PHENOL		5 U		5 U		6 U
PYRENE		5 U		5 U		6 U
ENERGETICS (µg/L)						
1,3,5-TRINITROBENZENE		0.6 U		0.6 U		0.6 U
1,3-DINITROBENZENE		0.6 U		0.6 U		0.6 U

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S44GW001F001	S44GW001U001	S44GW002F001	S44GW002U001	S44GW003F001	S44GW003U001
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97
LOCATION:	S44MW01	S44MW01	S44MW02	S44MW02	S44MW03	S44MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
ENERGETICS (µg/L)						
2,4,6-TRINITROTOLUENE		0.6 U		0.6 U		0.6 U
2-AMINO-4,6-DINITROTOLUENE		0.6 U		0.6 U		0.6 U
2-NITROTOLUENE		1.3 U		1.3 U		1.3 U
3-NITROTOLUENE		1.3 U		1.3 U		1.3 U
4-AMINO-2,6-DINITROTOLUENE		0.6 U		0.6 U		0.6 U
4-NITROTOLUENE		1.3 U		1.3 U		1.3 U
HMX		1.3 U		1.3 U		1.3 U
NITROCELLULOSE		180 U		180 U		180 U
NITROGLYCERIN		26 U		26 U		26 U
NITROGUANIDINE		5 U		5 U		5 U
RDX		1.3 U		1.3 U		1.3 U
TETRYL		1.3 U		1.3 U		1.3 U
METALS (µg/L)						
ALUMINUM	70.7 B	197 B	41.2 B	74.7 B	802	345 K
ANTIMONY	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U	2.8 U
ARSENIC	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
BARIUM	230 J	28.1 J	48.9 J	43.1 J	212 J	17.1 J
BERYLLIUM	0.1 U	0.1 U	0.1 UL	0.1 U	0.1 U	0.1 U
CADMIUM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.33 B
CALCIUM	3670 K	3450 K	4270 K	4650 K	7320 K	6900 K
CHROMIUM	0.5 U	0.5 U	0.5 U	0.76 B	2.2 B	1.3 B
COBALT	3.9 B	4.4 B	0.74 B	0.81 B	0.68 B	0.6 U
COPPER	2.4 B	2.8 B	9.2 B	3.0 B	4.4 B	3.7 B
CYANIDE		5.0 U		5.0 U		5.0 U
IRON	2520	3040	20400	24100	1300	989
LEAD	1.7 B	1.6 B	1.0 U	1.4 B	2.8 B	2.2 B

SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - OCTOBER 1997 DATA
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

SAMPLE NUMBER:	S44GW001F001	S44GW001U001	S44GW002F001	S44GW002U001	S44GW003F001	S44GW003U001
SAMPLE DATE:	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97	10/23/97
LOCATION:	S44MW01	S44MW01	S44MW02	S44MW02	S44MW03	S44MW03
FILTERING:	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered
FIELD DUPLICATE OF:						
METALS (µg/L)						
MAGNESIUM	2860 K	3030 K	2420 K	2680 K	3350 K	3220 K
MANGANESE	164 J	172 J	306 J	359 J	31.2 J	29.9 J
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	3.1 B	3.2 B	1.7 B	2.1 B	1.6 B	1.4 B
POTASSIUM	1320 J	1260 J	1090 J	1120 J	2490 J	2440 J
SELENIUM	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
SILVER	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	1.4 B
SODIUM	9430 K	3970 B	10200	7920 K	12200	5720 K
THALLIUM	2.3 U	2.3 U	2.3 U	2.3 U	2.5 B	3.4 B
VANADIUM	1.0 U	1.0 U	1.0 U	1.0 UL	3.5 B	2.5 B
ZINC	124	9.9 B	30.1 K	6.1 B	108	6.4 B

APPENDIX I

DATA VALIDATION MEMORANDA

Brown & Root Environmental

INTERNAL CORRESPONDENC

C-49-09-7-111

TO: GEORGE LATULIPPE

DATE: DECEMBER 2, 1997

FROM: CRAIG FARKOS

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - VOLATILE AND SEMIVOLATILE ORGANIC COMPOUNDS PESTICIDES/PCBS
CTO 0245, NSWC INDIAN HEAD, MARYLAND
SDG 2

SAMPLES:

4/Soil

S42SS001001 S42SS002001 S42SS003001 S42DUP002

2/Aqueous

RB101097-1 TB101097-1

Overview

The sample set for the CTO 0245 NSWC Indian Head SDG 2, consists of four (4) soil samples, one (1) aqueous rinsate blank (designated RB) and one (1) aqueous trip blank (designated TB). Soil samples were analyzed for volatile, semivolatile organic compounds and pesticides/PCBs. The trip blank was analyzed for volatile organic compounds, only. The rinsate blank was analyzed for volatile, semivolatile organic compounds and pesticides/PCBs.

The samples were collected by Brown and Root Environmental on October 10, 1997 and analyzed by General Physics Environmental Services. The volatile and semivolatile organic compound analyses for soil were analyzed using EPA Method OLM03.1. The volatile and semivolatile organic compound analyses for aqueous samples were analyzed using EPA Method OLC02.0. Pesticides/PCBs in soil and aqueous samples were analyzed using EPA Method OLC2.0 and OLM03.2.

Summary

All compounds were successfully analyzed with the exception of those results that were rejected. The findings offered in this report are based upon a general review of all available data including data completeness, holding times until extraction/ analysis, GC/MS tuning and calibration data, laboratory and field quality control blank results, matrix spike/matrix spike duplicate analyses, surrogate spike recoveries, internal standards performance, field duplicate precision, laboratory control sample analyses, compound identification and quantitation, detection limits, and Tentatively Identified Compound (TIC) evaluation.

Areas of concern with respect to data quality are listed below.

Major Problems

- Volatile initial and continuing calibration Relative Response Factors (RRFs) for acetone, and 2-butanone in the aqueous samples were less than the 0.050 validation quality control criteria.

Failure to meet this quality control criterion indicates that the laboratory's instruments could not achieve satisfactory sensitivity for these compounds therefore, the associated positive and nondetected results for these compounds are severely compromised. Nondetected results reported for these compounds in the affected samples are considered to be unreliable and are rejected, (UR). The positive results reported for unknowns are qualified as biased low (L).

- All holding times for soil semivolatile organic compounds and pesticides exceeded the established limits. All affected results are qualified as estimated (J/UJ). The direction of bias cannot be determined.

Minor Problems

- Internal standard areas for the second and/or third internal standards failed in samples S42SS001001 and S42SS002001. The samples were subsequently reanalyzed yielding a similar noncompliance in sample S42SS001001(third IS out) and improvement in sample S42SS002001. Therefore, the reanalysis of sample S42SS001001 and the original analysis of sample S42SS002001 were used in validation. Nondetected results associated with the noncompliant internal standards were qualified as estimated (UJ). The direction of bias cannot be determined.

Notes

The relative percent difference (RPD) for 1,1-Dichloroethene exceeded the upper quality control limit. No action was taken as a result of this exception.

The MS/MSD RPDs for 1,4-Dichlorobenzene and 1,2,4-Trichlorobenzene exceeded QL limits. No action was taken as a result of this exception.

Several continuing calibration %Ds for semivolatile compounds exceeded the 25% validation quality control criterion. No actions were warranted as a result of these noncompliances since no positive results were reported for these compounds in the affected samples.

Two continuing calibration %Ds for pesticide compounds exceeded the 25% validation quality control criterion. No actions were warranted as a result of these noncompliances since no positive results were reported for these compounds in the affected samples.

The semivolatile compound Di-n-butylphthalate was detected in one of the aqueous laboratory blank samples. No action was warranted as a result of this noncompliance since no positive results were reported for this compound in the affected samples.

The laboratory spike recovery percentages for three pesticide/PCBs exceeded the recommended Quality Control limits. No qualification was made on reported results for these environmental samples.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-97-184

TO: **GEORGE LATULIPPE**

DATE: FEBRUARY 26, 1998

FROM: **DAVID G. OLSON**

COPIES: DV FILE

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS**
CTO 245 - NSWC, INDIAN HEAD, MARYLAND
SDG - 1

SAMPLES: 13/Aqueous/

S12SW0050001	S12SW0010001	S42MW0020001	S42MW003F001
S12SW0040001	S12SW0060001	S42MW002F001	S42DUP004
S12SW0030001	S12DUP001	S42MW003U001	S42DUP004 (Filtered)
S12SW0020001			

Overview

The sample set for SDG - 1, NSWC, Indian Head, Maryland consists of thirteen (13) aqueous environmental samples. Three field duplicate pairs (S12DUP001/S12SW0060001; S42DUP004/S42MW003U001; S42DUP004F/S42MW003F001) were included within this SDG.

The above samples were analyzed for Target Analyte List (TAL) metals. The samples were collected by Brown and Root Environmental on October 7 and 11, 1997 and analyzed by GP Environmental Service under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using Contract Laboratory Program (CLP) Statement of Work (SOW) ILM04.0 analytical and reporting protocols.

Summary

All analytes were successfully analyzed with the exception of those qualified as rejected (UR). The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, interference check sample (ICS) results, matrix spike recoveries, post digestion spike recoveries, laboratory duplicate results, laboratory control sample (LCS) results, Inductively Coupled Plasma (ICP) serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury, were conducted using ICP methodologies. Mercury analysis was conducted using cold vapor AA.

Areas of concern with respect to data quality are listed below.

Major Problems

- The Matrix Spike (MS) Percent Recovery (%R) for antimony, arsenic, barium, iron, lead, selenium and vanadium were extremely low. Positive and nondetected results reported for the aforementioned analytes were qualified as either biased extremely low, "L", or rejected as unusable, "UR", respectively.

Minor Problems

- The Contract Required Detection Limit (CRDL) Percent Recoveries (%Rs) for aluminum, calcium, iron, magnesium, nickel, and zinc were above the quality control limits. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased high, "K".

- The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for arsenic was above and below quality control. Positive results < 2X CRDL were qualified as estimated, "J".

- The following contaminants were detected in the laboratory method/preparation/ rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - Aqueous
beryllium	0.1 µg/L	0.5 µg/L
cadmium	0.3 µg/L	1.5 µg/L
calcium	61.4 µg/L	307.0 µg/L
chromium	0.5 µg/L	2.5 µg/L
cobalt	0.6 µg/L	3.0 µg/L
copper	0.9 µg/L	4.5 µg/L
magnesium	28.6 µg/L	143.0 µg/L
manganese	1.0 µg/L	5.0 µg/L
potassium	27.5 µg/L	137.5 µg/L
sodium	246.7 µg/L	1233.5 µg/L

Samples Affected: All

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, weight, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for cadmium, chromium, cobalt, and copper have been qualified, "B", as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field quality control blank contamination.

- The Matrix Spike (MS) Percent Recoveries (%Rs) for chromium and silver were below the 75% quality control limit. Positive results not qualified for blank contamination and nondetected result reported for the aforementioned analytes were qualified as biased low, "L" and "UL", respectively.

- The arsenic results for samples S12SW0050001, S42DUP004, S42DUP004-F, S42MW002F001, S12DUP001, S12SW0030001, S42MW002U001, and S42MW003F001 were qualified estimated (J) as a result of a CRDL %R and a low MS %R. The direction of bias is unknown.

- The iron result for sample S12SW0040001 was biased high (K) due to the CRDL %R being above the quality control limit and the same result was biased low (L) due to an extremely low MS %R. The positive results was qualified estimated (J) as a result of these conflicting noncompliances.

Notes

The CRDL %Rs for chromium and sodium were above the quality control limits. However, no validation actions were warranted as all results for sodium were > 2X CRDL and all results for chromium were qualified as blank contamination or nondetects.

The matrix spike was outside of the control limits for antimony, arsenic, barium, chromium, iron, lead, selenium, silver, and vanadium. A post digestion analytical spike was performed with all recoveries within QC criteria however per Region III guidance these data were not used to qualify sample results.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/ preparation blanks.

Other Factors Affecting Data Quality: The MS %Rs for antimony, thallium, and cyanide were outside the quality control limits. Laboratory duplicate imprecision was noted for aluminum, arsenic, chromium, cobalt, lead, nickel, and zinc. The interfering analyte iron was present in samples S42DUP004, S42DUP004-F, S42MW002F001, S42MW002U001, and S42MW003F001. The arsenic results for samples S12SW005001, S42DUP004, S42DUP004-F, S42MW002F001, S12DUP001, S12SW003001, S42MW002U001, and S42MW003F001 were qualified estimated (J) as a result of conflicting noncompliances. The iron result for sample S12SW0040001 was qualified estimated (J) as a result of conflicting noncompliances.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
David G. Olson
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

R	-	Nondetected result is considered unusable and rejected as a result of extremely low aqueous MS %R.
U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
K	-	Positive result is considered biased high as a result of CRDL %R or ICP Interference.
L	-	Positive result is considered biased low as a result of CRDL %R or low MS %R.
J	-	Positive result is considered estimated as a result of duplicate imprecision.
UL	-	Nondetected result is considered biased low as a result of CRDL %R or ICP interference or low MS %R.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-97-191

TO: **MR. GEORGE LATULIPPE**

DATE: FEBRUARY 6, 1998

FROM: **KATE LANDKROHN**

COPIES: DV FILE

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 2

SAMPLES: 7 Soil

S42DUP001	S42SD0010001	S42SD0020001	S42SD0030001
S42SD0040001	S42SD0050001	S42SD0060001	

6 Aqueous

S42SDUP003	S42SW0010001	S42SW0020001	S42SW0030001
S42SW0040001	RB1010971		

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 2 consists of six (6) aqueous and seven (7) soil environmental samples. Field duplicate pairs S42SD0060001/S42DUP001and S42SW0020001/ S42DUP003 were included within this SDG. A Matrix Spike (MS) was not selected by the field crew for this SDG; however, the laboratory selected the following samples for MS analyses: S42SD006001 and S42SW0040001 for Target Analyte List (TAL) metals (except mercury); S42SD0060001 and S42SW0030001 for mercury; and S42SD0060001 for cyanide.

The above samples were analyzed for Target Analyte List (TAL) metals. The samples were collected by Brown and Root Environmental on October 10, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using Contract Laboratory Program (CLP) Statement of Work (SOW) ILM04.0 analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, interference check sample (ICS) results, matrix spike recoveries, post digestion spike recoveries, laboratory duplicate results, laboratory control sample (LCS) results, Inductively Coupled Plasma (ICP) serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury, were conducted using ICP methodologies. Mercury analysis was conducted using cold vapor AA.

Areas of concern with respect to data quality are listed below.

Major Problems

- The Matrix Spike (MS) percent recovery (%R) for the aqueous matrix was below the lower quality control limit (<30%) for iron. Nondetected results for the aforementioned analyte were qualified as unusable, (UR). Positive results reported for the aforementioned analyte were qualified as biased extremely low, (L).

Minor Problems

- The Contract Required Detection Limit (CRDL) %Rs for aluminum, cadmium, calcium, chromium, magnesium, nickel, sodium, and zinc were above the quality control limits. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased high, (K).

- The following contaminants were detected in the laboratory method/preparation/rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - Aqueous	Action Level - Soil
Aluminum	31.5 µg/L	157.5 µg/L	31.5 mg/Kg
Barium(3)	0.169 mg/Kg	NA	0.845 mg/Kg
Beryllium	0.1 µg/L	0.5 µg/L	0.1 mg/Kg
Cadmium	0.3 µg/L	1.5 µg/L	0.3 mg/Kg
Calcium	176 µg/L	880 µg/L	176 mg/Kg
Chromium	0.5 µg/L	2.5 µg/L	0.5 mg/Kg
Cobalt	0.7 µg/L	3.5 µg/L	0.7 mg/Kg
Copper	1.1 µg/L	5.5 µg/L	NA
Copper (3)	3.7 µg/L	NA	3.7 mg/Kg
Iron	13.8 µg/L	69 µg/L	NA
Iron(2)	7.38 mg/kg	NA	36.9 mg/Kg
Magnesium	42.8 µg/L	214 µg/L	42.8 mg/Kg
Manganese	1.0 µg/L	5.0 µg/L	1.0 mg/Kg
Nickel	1.2 µg/L	6.0 µg/L	1.2 mg/Kg
Potassium	27.5 µg/L	137.5 µg/L	NA
Potassium(2)	13.36 mg/kg	NA	66.8 mg/Kg
Sodium (1)	246.7 µg/L	1233.5 µg/L	270.9 mg/Kg
Sodium(2)	54.18 mg/kg	NA	270.9 mg/Kg
Zinc (3)	2.0 µg/L	NA	2.0 mg/Kg

Samples Affected: All

(1) Maximum concentration found in an aqueous preparation blank.
(2) Maximum concentration found in the soil preparation blank.
(3) Maximum concentration found in the rinsate blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, weight, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for aluminum, beryllium, cadmium, chromium, calcium, cobalt, copper, magnesium, nickel, potassium, and sodium have been qualified, (B), as a result

of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field quality control blank contamination.

- The interfering analyte iron was present in samples S42SD0010001, S42SD0050001 and S42SD0060001 at a concentration comparable to the level of iron in the interference check sample (ICS) solution. Several analytes namely, antimony, arsenic, barium, cadmium, chromium, cobalt, lead, manganese, nickel, selenium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for arsenic, cadmium, selenium, and thallium. The possibility of suppressive affects may be present for selenium and thallium in the affected sample; nondetected results were qualified as biased low, (UL). The possibility of positive interference may be present for arsenic and cadmium; positive results reported were qualified as biased high, (K), for these analytes.

- The Matrix Spike (MS) %Rs for the aqueous matrix were below the lower quality control limits for barium, beryllium, chromium, cobalt, copper, manganese, and vanadium. Positive and nondetected results for the aforementioned analytes were qualified as biased low, (L) and (UL), respectively.

- The MS %Rs for the aqueous matrix were below the lower quality control limit for nickel and zinc. Positive and nondetected results for the aforementioned analytes were qualified as estimated, (J) and (UJ), respectively as a result of conflictng noncompliances.

- The MS %R for the soil matrix was above the upper quality control limits for lead. Positive results reported for the aforementioned analyte were qualified as biased high, (K).

- The MS %R for the soil matrix was below the lower quality control limit for antimony. Nondetected results reported for the aforementioned analyte were qualified as biased low, (UL).

- The ICP Serial Dilution percent difference (%D) for the soil matrix was above the quality control limits for cobalt. Positive results of the aforementioned analyte were qualified as estimated, (J).

Notes

The CRDL %Rs for iron and selenium were above the quality control limits. However, no validation actions were warranted as all results were > 2X CRDL, were qualified as blank contamination, or were nondetected.

The MS %R calculations were incorrect. Corrected %R results have been provided on Form 5B.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/preparation/rinsate blanks. The MS %R calculations were incorrect.

Other Factors Affecting Data Quality: The interfering analyte iron was present in samples S42SD0010001 and S42SD0050001. The MS %Rs for the aqueous matrix were below the lower quality control limits for barium, beryllium, chromium, cobalt, copper, iron, manganese, vanadium, and zinc. The MS %Rs for the soil matrix was above the upper quality control limits for lead and below the lower quality control limits for antimony. ICP Serial Dilution %Ds were greater than 10% for cobalt.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
UR	-	Nondetected result is considered unusable as a result of extremely low MS %R.
J	-	Positive result is considered estimated as a result of high ICP serial dilution %D or conflicting directional bias as a result of MS %R.
UJ	-	Nondetected result is considered estimated as a result of ICP Serial Dilution %Ds.
K	-	Positive result is considered biased high as a result of high CRDL %R, ICP ICS Interference, or high MS %R.
UL	-	Nondetected result is considered biased low as a result of low ICP ICS Interference, low LCS %R, or low MS %R.
L	-	Positive result is considered biased low as a result of low MS %R or ICP ICS Interference.

Brown & Root Environmental

INTERNAL CORRESPONDENC

C-49-11-7-092

TO:	GEORGE LATULIPPE	DATE:	FEBRUARY 6, 1998
FROM:	BONNI J. SMATHERS	COPIES:	DV FILE
SUBJECT:	ORGANIC DATA VALIDATION - VOA/SVOA/PEST/PCB CTO 245, NSWC INDIAN HEAD SDG 3		
SAMPLES:	5/Aqueous/		

S42DUP005	S42MW004U001	S42MW006U001
RB1013971	TB1012971	

Overview

The sample set for the CTO 245 NSWC Indian Head site, SDG 3, consists of three (3) aqueous samples, one (1) rinsate blank, and one (1) trip blank. The samples, with the exception of the trip blank, were analyzed for Target Compound List (TCL) volatile and semivolatile organic compounds. Only sample RB1013971 was analyzed for volatile, semivolatile and pesticide/PCB organic compounds. The Matrix Spike/Matrix Spike Duplicate analyses and the duplicate analyses were shared with Work Order 9710046 and performed on sample S12SW0050001. One field duplicate pair (S42DUP005 / S42MW004U001) was included in this SDG.

The samples were collected by Brown and Root Environmental on October 12th and 13th, 1997 and analyzed by G.P. Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using the Contract Laboratory Program (CLP) Statement of Work (SOW) OLC2.0 and OLM03.1 analytical and reporting protocols.

Summary

All compounds were successfully analyzed, with the exception of those results considered unreliable, (UR). The findings offered in this report are based upon a general review of all available data including data completeness, holding times until analysis, GC/MS tuning and calibration data, laboratory and field blank results, surrogate spike recoveries, laboratory control sample results, internal standards performance, field duplicate precision, tentatively identified compounds, compound identification and compound quantitation. Areas of concern with respect to data quality are listed below.

Major Problems

- Initial and Continuing Calibration Relative Response Factors (RRFs) for acetone and 2-butanone were less than 0.05. This noncompliance indicates a lack of instrument response. Positive results for acetone were qualified as biased low, (L), and nondetected results reported for these compounds were considered unreliable and were rejected, (UR), in the affected samples.

Minor Problems

- The following table summarizes the maximum concentration of volatile and semivolatile compounds detected in the laboratory method and field quality control blanks analyzed in this SDG:

Compound	Maximum Concentration	Action Level
Di-n-butyl phthalate*	28 µg/L	280 µg/L

Samples Affected: All samples.

* - Maximum concentration detected in a field quality control blank.

The aliquots used for analysis and dilution factors were considered during the application of the action levels. Positive results reported for di-n-butylphthalate that were reported in samples at concentrations less than the validation action level were considered false positives and were qualified, (B). No positive results were reported above the validation action level. It should be noted that field quality control blanks are not qualified based on field quality control blank contamination.

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J).

Notes

Continuing calibration Percent Differences (%Ds) greater than 25% were reported for carbon disulfide, chloromethane, and 1,2-dibromo-3-chloropropane. Positive results only are affected by this noncompliance. Therefore, no action was necessary since only nondetected results for the aforementioned compounds were reported in the affected samples.

A continuing calibration verification Percent Difference (%D) greater than 25% was reported for 4,4'-DDT. Positive results are affected by this noncompliance. Therefore, no action was necessary since the result for 4,4'-DDT was nondetected in the affected sample.

The pesticide Laboratory Control Sample reported a high Percent Recovery (%R) for the surrogate decachlorobiphenyl. No validation action was taken, however since quality control samples are not subject to qualification.

The aqueous pesticide Laboratory Control Standard (LCS) sample PBLK1294 yielded high %Rs for Heptachlor epoxide, Endrin, and Endosulfan sulfate. No action was taken since Region III validation protocol does not qualify based solely on LCS noncompliances.

The Laboratory Control Samples had high %Ds between positive results on columns 1 and 2 for several single component pesticide compounds. In accordance with Region III validation protocol, no validation action was taken based on this LCS noncompliance alone.

The volatile analyses of samples S42DUP005 and S42MW004U0001 reported results at a concentration which exceeded the linear calibration range of the instrument. As a result, these samples were reanalyzed at a dilution. The original analyses, with the exception of the results which exceeded the linear calibration range were used in validation. The diluted results were transposed over the undiluted result and used in validation.

The reanalysis of sample S42MW006U001 was used in validation. The reanalysis was selected since the initial analysis was cross contaminated from sample S42MW004U001.

No other problems were noted.

Executive Summary

Laboratory Performance: Continuing calibration noncompliances were noted for several volatile compounds. Initial and Continuing RRFs less than 0.05 were reported for acetone and 2-butanone. Di-n-butyl phthalate were detected in the laboratory method blanks.

Other Factors Affecting Data Quality: Di-n-butylphthalate was detected in the field quality control samples.

MEMO TO: **G. LATULIPPE**
DATE: **FEBRUARY 6, 1998 - PAGE 4**

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation" (9/94), as amended for use within EPA Region III, and the NFESC guidelines entitled "Navy Installation Restoration Program Laboratory Quality Assurance Guide (February, 1996).

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Bonni J. Smathers
Brown and Root Environmental

Bonni J. Smathers
Industrial Hygienist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination, and should not be considered present.
J	-	Positive result is considered estimated due to various technical noncompliances or is reported at a concentration below the CRQL.
L	-	Positive result is considered biased low due to various technical noncompliances.

Summary of Tentatively Identified Compounds (TICs) Remaining after Data Qualification

Fraction	TIC
Volatile	None identified
Semivolatile	Unknown

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-97-185

TO: **MR. GEORGE LATULIPPE**

DATE: FEBRUARY 6, 1998

FROM: **KATE LANDKROHN**

COPIES: **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 3

SAMPLES: 8 Aqueous

S42MW004U001	S42MW006U001	S42DUP005	RB1013971
S42MW004F001	S42MW006F001	S42DUP005-F	RB1013971-F

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 3 consists of eight (8) aqueous environmental samples. Field duplicate pairs S42MW004U001/S42DUP005 and S42MW004F001/ S42DUP005-F were included within this SDG. A Matrix Spike (MS) was not selected by the field crew for this SDG; however, the laboratory selected the following samples for MS analyses: S42MW004U001 for Target Analyte List (TAL) metals (except mercury); S42MW004F001or mercury; and batch sample 9710062-01F for cyanide.

The above samples were analyzed for Target Analyte List (TAL) metals. The samples were collected by Brown and Root Environmental on October 12 and 13, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using Contract Laboratory Program (CLP) Statement of Work (SOW) ILM04.0 analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, interference check sample (ICS) results, matrix spike recoveries, post digestion spike recoveries, laboratory duplicate results, laboratory control sample (LCS) results, Inductively Coupled Plasma (ICP) serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury, were conducted using ICP methodologies. Mercury analysis was conducted using cold vapor AA.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) percent recoveries (%Rs) for calcium, magnesium, and nickel were above the quality control limits. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased high, (K).

- The following contaminants were detected in the laboratory method/preparation/rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level
barium(1)	1.1 ug/L	5.5 ug/L
barium (2)	40.9 ug/L	204.5 ug/L
cadmium	0.3 ug/L	1.5 ug/L
calcium(1)	253.0 ug/L	1265 ug/L
chromium	0.5 ug/L	2.5 ug/L
cobalt	0.8 ug/L	4.0 ug/L
copper	3.9 ug/L	19.5 ug/L
magnesium(1)	48.8 ug/L	244 ug/L
manganese	1.0 ug/L	5.0 ug/L
potassium(1)	27.8 ug/L	139.0 ug/L
silver	0.8 ug/L	4.0 ug/L
zinc(1)	3.2 ug/L	16.0 ug/L

Samples Affected: All

(1) Maximum concentration found in an aqueous preparation blank.
(2) Maximum concentration found in an filtered rinsate blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for barium, cadmium, calcium, cobalt, copper, magnesium, potassium, and zinc have been qualified, (B), as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field quality control blank contamination.

- The ICP Interference Check Sample %Rs for selenium were reported at 79.0% for the initial ICS and at 81.0% for the final ICS. It is unclear when the results for this analyte became noncompliant during the analytical run and nondetected results for the aforementioned analyte were qualified as biased low, (UL).

- The duplicate relative percent differences (RPDs) were above the quality control limits for iron and manganese. Positive and nondetected results for the aforementioned analytes were qualified as estimated, (J) and (UJ), respectively.

- The Matrix Spike (MS) %R was above the upper quality control limits for iron. Positive results for the aforementioned analyte were qualified as estimated, (J), due to conflicting directional bias.

- The ICP Serial Dilution %R were above the quality control limits for sodium. Positive results for the aforementioned analyte were qualified as estimated, (J). The direction of bias cannot be determined.

Notes

Notes

The CRDL %Rs for aluminum, arsenic, chromium, iron, and nickel were above the quality control limits. However, no validation actions were warranted as all results were > 2X CRDL, were qualified as blank contamination, or were nondetected.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/ preparation blanks.

Other Factors Affecting Data Quality: ICP ICS %Rs were below the quality control limits for selenium. Duplicate RPDs were greater than the 20% quality control limit for iron and manganese. MS %R was greater than the 125% quality control limit for iron. The ICP Serial Dilution %R was greater than the 10% quality control limit for sodium.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
UL	-	Nondetected result is considered biased low as a result of low ICP ICS %R.
K	-	Positive result is considered biased high as a result of CRDL %R.
J	-	Positive result is considered estimated as a result of duplicate imprecision, high ICP serial dilution %R, or conflicting directional bias as a result of MS and duplicate results.
UJ	-	Nondetected result is considered estimated as a result of duplicate imprecision.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-97-186

TO: **MR. GEORGE LATULIPPE** **DATE: FEBRUARY 6, 1998**

FROM: **KATE LANDKROHN** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 4

SAMPLES: 19 Aqueous

S12WP001F001	S12DUP006-F	S42MW007F001	S12SW0040001
S12WP001U001	S12WP003F001	S42MW007U001	S12SW0050001
S12WP002F001	S12WP003U001	S12SW0010001	S12SW0060001
S12WP002U001	S12WP004F001	S12SW0020001	S12DUP001
S12DUP006	S12WP004U001	S12SW0030001	

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 4 consists of nineteen (19) aqueous environmental samples. Field duplicate pairs S12SW0060001/S12DUP001, S12WP002U001/ S12DUP006, and S12WP002F001/S12DUP006-F were included within this SDG. A Matrix Spike (MS) was not selected by the field crew for this SDG; however, the laboratory selected the following samples for MS analyses: S12WP002U001 for Target Analyte List (TAL) metals (except mercury); SWP002FOO1 for mercury; and batch sample 9710074-01K for cyanide.

The above samples were analyzed for TAL metals and cyanide. The samples were collected by Brown and Root Environmental on October 14, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using Contract Laboratory Program (CLP) Statement of Work (SOW) ILM04.0 analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, interference check sample (ICS) results, matrix spike recoveries, post digestion spike recoveries, laboratory duplicate results, laboratory control sample (LCS) results, Inductively Coupled Plasma (ICP) serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury and cyanide, were conducted using ICP methodologies. Mercury analysis was conducted using cold vapor AA. Cyanide analyses were conducted using wet chemistry methods.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) percent recoveries (%Rs) were above the quality control limits for cadmium, calcium, chromium, copper, lead, magnesium, nickel, and potassium. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased high, (K).

- The CRDL %Rs for selenium exhibited recoveries both above and below the quality control limits. Nondetected results reported for the aforementioned analyte were qualified as estimated (UJ) as a result of conflicting noncompliances.

- The following contaminants were detected in the laboratory method/preparation/rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level
aluminum[1]	40.4 ug/L	202 ug/L
barium[1]	0.7 ug/L	3.5 ug/L
calcium	120.3 ug/L	601.5 ug/L
cadmium	0.7 ug/L	3.5 ug/L
cobalt	0.7 ug/L	3.5 ug/L
copper[1]	2.1 ug/L	10.5 ug/L
iron[1]	78.5 ug/L	392.5 ug/L
magnesium	60.2 ug/L	301 ug/L
manganese[1]	1.0 ug/L	5.0 ug/L
nickel	1.2 ug/L	6.0 ug/L
zinc[1]	2.1 ug/L	10.5 ug/L

Samples Affected: All

[1] Maximum concentration found in an aqueous preparation blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for aluminum, cadmium, cobalt, copper, nickel, and zinc have been qualified, (B), as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field quality control blank contamination.

- The interfering analyte calcium was present in sample S12WP004F001 at a concentration comparable to the level of calcium in the interference check sample (ICS) solution. Several analytes namely, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, manganese, nickel, selenium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for cadmium, chromium, cobalt, copper, nickel, selenium, thallium, and vanadium. The possibility of suppressive affects may be present for selenium, thallium, and vanadium in the affected sample; positive and nondetected results were qualified as biased low, (L) and (UL), respectively for these analytes. The possibility of positive affects may be present for cadmium and copper; positive results

reported were qualified as biased high, (K), for these analytes. The positive results for cobalt, copper, and nickel received no flags as the results were qualified as a result of blank contamination.

- The interfering analyte calcium was present in sample S12WP004U001 at a concentration comparable to the level of calcium in the interference check sample (ICS) solution. Several analytes namely, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, manganese, nickel, selenium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for chromium, cobalt, copper, nickel, selenium, thallium, and vanadium. The possibility of suppressive affects may be present for selenium, thallium, and vanadium in the affected sample; positive and nondetected results were qualified as biased low, (L) and (UL), respectively for these analytes. The possibility of positive affects may be present for chromium and copper; positive results reported were qualified as biased high, (K), for these analytes. The positive results for cobalt and nickel received no flags as the results were qualified as a result of blank contamination.

- The interfering analytes aluminum and iron were present in sample S42MW007F001 at a concentration comparable to the level of aluminum and iron in the interference check sample (ICS) solution. Several analytes namely, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, manganese, nickel, selenium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for arsenic, cadmium, selenium, and thallium. The possibility of suppressive affects may be present for selenium and thallium in the affected sample; nondetected results were qualified as biased low, (UL), for these analytes. The possibility of positive affects may be present for arsenic and cadmium; positive results reported were qualified as biased high, (K), for these analytes.

- The interfering analytes aluminum, iron, and magnesium were present in sample S42MW007U001 at a concentration comparable to the level of aluminum, iron, calcium, and magnesium in the interference check sample (ICS) solution. Several analytes namely, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, manganese, nickel, selenium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for arsenic, cadmium, selenium, and thallium. The possibility of suppressive affects may be present for selenium and thallium in the affected sample; nondetected results were qualified as biased low, (UL), for these analytes. The possibility of positive affects may be present for arsenic and cadmium; positive results reported were qualified as biased high, (K), for these analytes.

- The Matrix Spike (MS) percent recovery (%R) for aluminum was above the 125% quality control limit. Positive results reported for the aforementioned analyte were qualified as biased high, (K).

Notes

Sample S42MW007U001 was analyzed at a 5X dilution. No notation was provided by the laboratory on the Form Is.

The CRDL %Rs for aluminum, iron, manganese, selenium, silver, sodium, and zinc were above the quality control limits. However, no validation actions were warranted as all results were > 2X CRDL, were qualified as blank contamination, or were nondetected.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/ preparation blanks.

Other Factors Affecting Data Quality: The interfering analyte iron was present in all samples in this SDG. The interfering analyte aluminum was present in samples S42MW007F001 and S42MW007U001. The interfering analyte calcium was present in samples S12WP003F001, S12WP003U001, S12WP004F001, S12WP004U001, and S42MW007U001. The interfering analyte magnesium was present in sample S42MW007U001. The MS %R was greater than 125% for aluminum.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
UL	-	Nondetected result is considered biased low as a result of ICP interference.
K	-	Positive result is considered biased high as a result of CRDL %R, ICP interference, or MS %R.
L	-	Positive result is considered biased low as a result of ICP interference.

Brown & Root Environmental

INTERNAL CORRESPONDENC

TO: GEORGE LATULIPPE

DATE: JANUARY 23, 1998

FROM: CRAIG FARKOS

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - VOLATILE AND SEMIVOLATILE ORGANIC COMPOUNDS PESTICIDES/PCBS
CTO 0245, NSWC INDIAN HEAD, MARYLAND
SDG 4

SAMPLES:

7/Aqueous/

S12WP001U001	S12WP002U001	S12WP003U001	S12WP004U001
S42MW007U001	S12DUP006	TB1014971	

Overview

The sample set for the CTO 0245 NSWC Indian Head SDG 4, consists of seven (7) aqueous environmental samples (including one field duplicate pair (S12WP001U001/S12WP001U001DL), and one (1) aqueous trip blanks (designated TB). Aqueous environmental samples were analyzed for volatile and semivolatile organic compounds. The trip blank was analyzed for organic compounds, only. Samples S12WP001U001, S12WP002U001, S12WO003U001, S12WP004U001, S12DUP006 were analyzed for Pesticides/PCBs.

The samples were collected by Brown and Root Environmental on October 14, 1997 and analyzed by General Physics Environmental Services. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) using CLP Methods OLC2.0 and OLM03.2 analytical and reporting procedures.

Summary

All compounds were successfully analyzed with the exception of those results that were rejected. The findings offered in this report are based upon a general review of all available data including data completeness, holding times until extraction/ analysis, GC/MS tuning and calibration data, laboratory and field quality control blank results, matrix spike/matrix spike duplicate analyses, surrogate spike recoveries, internal standards performance, field duplicate precision, laboratory control sample analyses, compound identification and quantitation, detection limits, and Tentatively Identified Compound (TIC) evaluation.

Areas of concern with respect to data quality are listed below.

Major Problems

- Volatile fraction initial and continuing calibration Relative Response Factors (RRFs) for acetone, and 2-butanone were less than the 0.050 validation quality control criteria. Failure to meet this quality control criterion indicates that the laboratory's instruments could not achieve satisfactory sensitivity for these compounds therefore, the associated positive and nondetected results for these compounds are severely compromised. Only nondetects were reported for these compounds in the affected samples. Nondetected results reported for these compounds in the affected samples are considered to be unreliable and are rejected, (UR). These results are biased very low.

Notes

The water pesticide surrogate % recovered for environmental samples S12WP001U001 and S12WP004U001 were below the minimum advised limit of 60% in two separate columns.Only nondetects were reported for the target compounds examined under this analysis. No qualification was made on reported results for these environmental samples.

Several continuing calibration %Ds for volatile and semivolatile compounds exceeded the 25% validation quality control criterion. No actions were warranted as result of these noncompliances since no positive results were reported for these compounds in the affected samples.

Resolution percentages (%) for decachlorobiphenyl in several standard mixture analyses for pesticides/PCBs were not provided by the laboratory.

The water pesticide surrogate % recovered for environmental samples PBLKA, S12DUP006 and S12WP003U001 were below the minimum advised limit of 60% on one column. Only nondetects were reported for the target compounds examined under this analysis. No qualification was made on reported results for these environmental samples.

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation", as amended for use within EPA Region III, and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown & Root Environmental

Craig Farkos
Engineer

Brown & Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Brown & Root Environmental **INTERNAL CORRESPONDENCE**

C-49-09-7-113

TO:	**G. LATULIPPE**	**DATE:**	**DECEMBER 5, 1997**
FROM:	**DANIEL MENICUCCI**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION - EXPLOSIVES CTO 245 INDIAN HEAD, MARYLAND SDG - 5**		
SAMPLES:	12/Soil		

S12SD0010001	S12SD0020001	S12SD0030001	S12SD0040001
S12DUP007	S12SD0050001	S12SD0060001	S12SS0010001
S12SS0020001	S12SS0030001	S12SS0040001	S12SS0050001

Overview

The sample set for CTO 245 Indian Head, Maryland, SDG 5, consists of twelve (12) soil environmental samples. One field duplicate pair S12SD0040001 / S12DUP007 was included in this SDG. The field crew specified sample S12SD0040001 for Matrix Spike/ Matrix Spike Duplicate analysis in this SDG

The samples were collected by Brown and Root Environmental on October 20th, 1997 and analyzed by GP Environmental Services Incorporated under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The explosive and nitroglycerine analyses were conducted according to SW-846 Method 8330. Nitroguanidine analyses were conducted according to modified USAEC methodology.

Summary

The findings offered in this report were based upon a general review of all available data including data completeness, holding times, calibration data, laboratory and field quality control blank results, Matrix Spike (MS)/ Matrix Spike Duplicate (MSD) analyses, surrogate spike recoveries, Laboratory Control Sample (LCS) analyses, field duplicate results, compound identification and quantification and detection limits.

Areas of concern with respect to data quality are listed below.

Minor Problems

The surrogate 4-Nitroaniline contained percent recoveries below the quality control limit for samples S12SS0050001 and S12SD0060001. Nondetected compounds in the samples were qualified as biased low (UL).

Notes

The matrix spike / matrix spike (MS/MSD) duplicate analysis of sample S12SD0040001 contained a high MS and MSD recovery for Nitrobenzene. As per Region III guidance, no qualifications are made for MS / MSD noncompliance alone.

The lab control standard sample NLCSB contained percent recoveries for Tetryl and Nitrobenzene outside the quality control limit. As per Region III guidance, no qualifications are made for LCS noncompliances alone.

Several compounds contained concentrations reported on the spreadsheets that differed from those reported on the Form 1's. The correct concentrations were determined and were used to correct the spreadsheets.

Executive Summary

Laboratory Performance: Several compounds had incorrect concentrations reported on the spreadsheets.

Other Factors Affecting Data: Low surrogate recoveries were reported in two samples.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", September 1994 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide " (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Daniel J Menicucci
Data Validator
Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer
Brown and Root Environmental

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

DATA QUALIFIER TABLE:

U	-	Value is a nondetected results as reported by the laboratory.
UL	-	Nondetected result is considered biased low.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-97-194

TO: **MR. GEORGE LATULIPPE** **DATE: FEBRUARY 6, 1998**

FROM: **KATE LANDKROHN** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TOTAL ORGANIC CARBON, pH, AND NITROCELLULOSE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 5

SAMPLES: 12 Soils

S12SD0010001	S12SD0040001	S12SD0060001	S12SS0030001
S12SD0020001	S12DUP007	S12SS0010001	S12SS0040001
S12SD0030001	S12SD0050001	S12SS0020001	S12SS0050001

1 Aqueous

RB1020971

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 5 consists of one (1) aqueous and twelve (12) soil environmental samples. Field duplicate pair S12SD0040001/S12DUP007 was included within this SDG. Sample S12SD0040001 was selected for Matrix Spike (MS) analyses by the field crew for this SDG for Total Organic Carbon (TOC) and nitrocellulose. Sample S12SD0040001 was also used for duplicate analyses for pH and percent solids analysis.

The above samples were analyzed for nitrocellulose, percent solids, pH, and TOC. The samples were collected by Brown and Root Environmental on October 20, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using method specific analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, matrix spike recoveries, laboratory duplicate results, detection limits and analyte quantitation.

All analyses were conducted using wet chemistry methods.

No areas of concern with respect to data quality were noted.

Executive Summary

Laboratory Performance: No problems noted.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U - Value is a nondetect as reported by the laboratory.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-09-7-111

TO: GEORGE LATULIPPE

DATE: JANUARY 23, 1998

FROM: CRAIG FARKOS

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - VOLATILE AND SEMIVOLATILE ORGANIC COMPOUNDS PESTICIDES/PCBS
CTO 0245, NSWC INDIAN HEAD, MARYLAND
SDG 5,

SAMPLES:

12/Soil

S12SS0010001	S12SS0020001	S12SS0030001	S12SS0040001
S12SS0050001	S12SD0010001	S12SD0020001	S12SD0030001
S12SD0040001	S12SD0050001	S12SD0060001	S12DUP007

2/Aqueous

RB102097-1	TB102097-1

Overview

The sample set for the CTO 0245 NSWC Indian Head SDG 5, consists of twelve (12) soil samples, one (1) aqueous rinsate blank (designated RB) and one (1) aqueous trip blank (designated TB). Soil samples were analyzed for volatile, semivolatile organic compounds and pesticides/PCBs. The trip blank was analyzed for volatile organic compounds only. The rinsate blank was analyzed for volatile, semivolatile organic compounds and pesticides/PCBs.

The samples were collected by Brown and Root Environmental on October 20, 1997 and analyzed by General Physics Environmental Services. The volatile and semivolatile organic compound analyses for soil were analyzed using CLP Method OLM03.1. The volatile and semivolatile organic compound analyses for aqueous samples were analyzed using CLP Method, OLC02.0. Pesticides/PCBs in soil and aqueous samples were analyzed using CLP Method OLC2.0 and OLM03.2.

Summary

All compounds were successfully analyzed with the exception of those results that were rejected. The findings offered in this report are based upon a general review of all available data including data completeness, holding times until extraction/ analysis, GC/MS tuning and calibration data, laboratory and field quality control blank results, matrix spike/matrix spike duplicate analyses, surrogate spike recoveries, internal standards performance, field duplicate precision, laboratory control sample analyses, compound identification and quantitation, detection limits, and Tentatively Identified Compound (TIC) evaluation.

Areas of concern with respect to data quality are listed below.

Major Problems

- Volatile fraction initial and continuing calibration Relative Response Factors (RRFs) for acetone, and 2-butanone in the aqueous samples were less than the 0.050 validation quality control criteria. Failure to meet this quality control criterion indicates that the laboratory's instruments could not achieve satisfactory sensitivity for these compounds therefore, the associated positive and nondetected results for these compounds are severely compromised. Detected results reported for these compounds in the affected samples are considered to be unreliable and are biased low (L). Nondetected results reported for these compounds in the affected samples are considered to be unreliable and are rejected, (UR). These results are biased very low.

Minor Problems

- Pesticide/PCB samples S12SS0040001, S12SS0030001, S12SS0020001, S12SD0050001, S12SD0040001, S12SD0030001, S12SD0010001, S12SD0020001 contained %Ds between analytical columns which exceeded 25%. Compounds that had %Ds greater than 25% were qualified as estimated (J).

- The internal standard (IS) area counts for soil sample S12SD0060001 were below the -50% of the area for 1 out of 3 examined standards. All nondetect results quanitated relative to the noncompliant internal standard were qualified as estimated (UJ). All positive results were qualified as estimated (J).

- Continuing calibration %Ds for semivolatile compounds benzo(g,h,l)perylene and indeno(1,2,3-cd)pyrene exceeded the 25% validation quality control criterion. Positive results for these compounds in samples S12DUP007, S12SD0060001 and S12SS0010001 were qualified as estimated (J).

- Continuing calibration %Ds for carbon disulfide exceeded the 50% validation quality control criterion. Nondetected results in samples S12DUP007, S12SD0060001 and S12SS0010001. were qualified as estimated (UJ).

- The holding time until extraction for all soil samples analyzed for both semivolatile and pesticide samples exceeded the 7-day quality control criterion established from the time of collection. All positive results for affected soil samples were qualified as estimated (J). All nondetect results for affected soil samples were qualified as estimated (UJ).

- The following table summarizes the maximum concentration of compounds detected in the laboratory method analyzed in this SDG:

Compound	Maximum Concentration	Action Level
Diethylphthalate	1 ug/L	10 ug/L
Di-n-butylphthalate	26 ug/L	260 ug/L
Acetone	9 ug/L	90 ug/L
Methylene Chloride	4 ug/kg	40 ug/kg

The aliquots used for analysis, % solids and dilution factors were considered during the application of action levels. Positive results for methylene chloride and acetone that were reported in samples at concentrations less than the validation action level were considered false positive and were qualified (B).

Notes

The volatile system monitoring compound (SMC) recovery exceeded the recommended quality control limit in sample S12SS004001. No validation action was required.

Several continuing calibration %Ds for volatile and semivolatile compounds exceeded the 25% validation quality control criterion. No actions were warranted as a result of these noncompliances since no positive results were reported for these compounds in the affected samples.

Surrogate recoveries in several semivolatile samples were below the minimum QC limits. No analytical results were qualified since the violations occurred in only one fraction in each analyzed sample. The percent recoveries in each case were greater than 10%.

Surrogate recovery in two pesticide/PCB samples (S12SD0060001, S12SD0020001) exceeded the maximum QC limits for DCB1 and DCB2. No analytical results were qualified since the violations occurred in only one column in each analyzed sample and the percent recovery in each case was greater than 10%.

The MS percent recovery for 1,4-Dichlorobenzene and 1,2,4-Trichlorobenzene fell below the advisory QC limits. No qualification was taken in the unspiked sample.

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation", as amended for use within EPA Region III, and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown & Root Environmental

Craig Farkos
Engineer

Brown & Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Summary

U	-	Nondetect as reported by the laboratory.
B	-	Positive result qualified as a result of method or field quality control blank contamination.
UR	-	Nondetected results qualified as unusable due to various technical reasons (i.e. calibration noncompliances, holding times, internal standard areas).
UJ	-	Nondetected results qualified as estimated due to various technical reasons (i.e. calibration noncompliances, holding times, internal standard areas).
J	-	Estimate positive results for various technical reasons (i.e. calibration noncompliances, holding times, internal standard areas , and values less than the CRQL).

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-97-187

TO: **MR. GEORGE LATULIPPE** **DATE: FEBRUARY 6, 1998**

FROM: **KATE LANDKROHN** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TOTAL ORGANIC CARBON AND pH**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 2

SAMPLES: 11 Soils

S42DUP001	S42SD0020001	S42SD0050001	S42SS0020001
S42DUP002	S42SD0030001	S42SD0060001	S42SS0030001
S42SD0010001	S42SD0040001	S42SS0010001	

1 Aqueous

RB-101097-1

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 2 consists of one (1) aqueous and eleven (11) soil environmental samples. Field duplicate pairs S42SD0060001/S42DUP001 and S42SS0030001/S42DUP002 were included within this SDG. A Matrix Spike (MS) was not selected by the field crew for this SDG; however, the laboratory selected sample S42SD0060001 for MS analyses for Total Organic Carbon (TOC) analysis. Sample S42DUP002 was selected for duplicate analysis for pH analysis.

The above samples were analyzed for TOC and pH. The samples were collected by Brown and Root Environmental on October 10, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using method specific analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, matrix spike recoveries, laboratory duplicate results, detection limits and analyte quantitation.

All analyses were conducted using wet chemistry methods.

No areas of concern with respect to data quality were noted.

Executive Summary

Laboratory Performance: No problems noted.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Summary

U	-	Nondetect as reported by the laboratory.
B	-	Positive result qualified as a result of method or field quality control blank contamination.
UR	-	Nondetected results qualified as unusable due to poor surrogate recoveries.
UJ	-	Nondetected results qualified as estimated due to various technical reasons (i.e. calibration noncompliances, holding times, internal standard areas).
J	-	Estimate positive results for various technical reasons (i.e. calibration noncompliances, holding times, internal standard areas , and values less than the CRQL).
K	-	Estimate positive results as biased high due to high surrogate recoveries.

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation", as amended for use within EPA Region III, and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996)

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown & Root Environmental

Craig Farkos
Engineer

Brown & Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Brown & Root Environmental

INTERNAL CORRESPONDENCE

TO: **MR. GEORGE LATULIPPE** **DATE: FEBRUARY 6, 1998**

FROM: **KATE LANDKROHN** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 5

SAMPLES: 12 Soils

S12SD0010001	S12SD0040001	S12SD0060001	S12SS0030001
S12SD0020001	S12DUP007	S12SS0010001	S12SS0040001
S12SD0030001	S12SD0050001	S12SS0020001	S12SS0050001

1 Aqueous

RB1020971

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 5 consists of one (1) aqueous and twelve (12) soil environmental samples. Field duplicate pair S12SD0040001/S12DUP007 was included within this SDG. Sample S39SW0020001 was identified by the field crew for Matrix Spike (MS) analyses on the aqueous samples. Soil sample S39SD0010001 was identified by the laboratory for Matrix Spike (MS) analyses for all analytes except cyanide.

The above samples were analyzed for TAL metals and cyanide. The samples were collected by Brown and Root Environmental on October 20, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using Contract Laboratory Program (CLP) Statement of Work (SOW) ILM03.0 analytical and reporting protocols.

Summary

All analytes were successfully analyzed with the exception of those qualified as rejected. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, interference check sample (ICS) results, matrix spike recoveries, post digestion spike recoveries, laboratory duplicate results, laboratory control sample (LCS) results, Inductively Coupled Plasma (ICP) serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury and cyanide, were conducted using ICP methodologies. Mercury analysis was conducted using cold vapor AA. Cyanide analyses were conducted using wet chemistry methods.

Areas of concern with respect to data quality are listed below.

Major Problems

The Matrix Spike (MS) percent recovery (%R) in the soil matrix for antimony was extremely low (<30%). Nondetected results reported for the aforementioned analyte were qualified as unusable, (UR). Positive results reported for the aforementioned analyte were qualified as biased extremely low, (L).

Minor Problems

Holding times for cyanide were greater than 14 days. Positive and nondetected results were qualified as biased low, (L) and (UL), respectively.

The Contract Required Detection Limit (CRDL) percent recoveries (%Rs) were above the quality control limits for calcium, magnesium, and sodium. Positive results < 2X CRDL reported for calcium and sodium were qualified as biased high, (K). Positive results < 2X CRDL reported for magnesium were qualified as estimated, (J), due to conflicting directional bias.

The Contract Required Detection Limit (CRDL) percent recoveries (%Rs) were below the quality control limits for lead and thallium. Nondetected results reported for the aforementioned analytes were qualified as biased low, (UL).

The following contaminants were detected in the laboratory method/preparation/rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - aqueous	Action Level - soil
aluminum	52.2 ug/L	2625 ug/L	35.8 mg/kg
barium(1)	0.9 ug/L	4.5 ug/L	NA
barium(3)	0.44 ug/L	NA	0.44 mg/kg
calcium(1)	151.6 ug/L	908 ug/L	NA
calcium(3)	91.4 ug/L	NA	91.4 mg/kg
chromium	0.7 ug/L	3.5 ug/L	0.7 mg/kg
chromium(3)	0.69 ug/L	NA	0.69 mg/kg
cobalt	0.9 ug/L	4.5 ug/L	0.9 mg/kg
copper	1.3 ug/L	6.5 ug/L	1.3 mg/kg
iron(2)	1.076 mg/kg	NA	5.38 mg/kg
magnesium(1)	62.2 ug/L	311 ug/L	NA
magnesium(2)	16.1 mg/kg	NA	80.5 mg/kg
manganese(2)	0.048 mg/kg	NA	0.24 mg/kg
potassium(1)	22.8 ug/L	114 ug/L	NA
potassium(2)	7.346 mg/kg	NA	36.73 mg/kg
sodium(1)	365.0 ug/L	1825 ug/L	NA
sodium(2)	171.0 mg/kg	NA	855 mg/kg
zinc(1)	2.3 ug/L	11.5 ug/L	NA

Samples Affected: All

(1) Maximum concentration found in an aqueous preparation blank.
(2) Maximum concentration found in soil preparation blank.
(3) Maximum concentration found in rinsate blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, weight, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for sodium have been qualified, (B), as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field quality control blank contamination.

The interfering analyte iron was present in sample S12SD0010001 and S12SD0020001 at a concentration comparable to the level of iron in the interference check sample (ICS) solution. Several analytes namely, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, nickel, potassium, selenium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for arsenic, cadmium, and selenium. The possibility of suppressive affects may be present for selenium in the affected samples; the nondetected result was qualified as biased low, (UL), for this analyte. The possibility of positive affects may be present for arsenic and cadmium; positive results reported were qualified as biased high, (K), for these analytes.

The duplicate sample relative percent difference (RPD) was greater than the quality control limit for manganese for the soil matrix. Positive results reported for the aforementioned analyte were qualified as estimated, (J).

The MS %R in the soil matrix for manganese was below the lower quality control limit. Positive results reported for the aforementioned analyte were qualified as estimated, (J), due to conflicting directional bias.

The MS %R in the soil matrix for nickel was above the quality control limits Positive results reported for the aforementioned analyte were qualified as estimated, (J), due to conflicting directional bias.

ICP Serial Dilution percent differences (%D) for the soil matrix were above the quality control limits for aluminum, chromium, lead, magnesium, manganese, nickel, and potassium. Positive results reported for the aforementioned analytes were qualified as estimated, (J).

Notes

The CRDL %Rs for aluminum and iron were above the quality control limits. However, no validation actions were warranted as all results were > 2X CRDL, were qualified as blank contamination, or were nondetected.

Duplicate sample, matrix spike, and ICP serial analyses for the aqueous matrix were not reported for this SDG.

Executive Summary

Laboratory Performance: Holding times were exceeded for cyanide analyses. The CRDL Standard analysis recoveries for several analytes were outside quality control limits. One analyte was present in the laboratory method/ preparation/rinsate blanks. No duplicate sample, matrix spike, and ICP Serial Dilution results were reported for the aqueous matrix.

Other Factors Affecting Data Quality: The interfering analyte iron was present in samples S12SD0010001 and S12SD0020001 in this SDG. The duplicate sample RPD in the soil matrix exceeded the 35% quality control limit for manganese. The MS %Rs in the soil matrix for antimony, manganese and nickel did not meet the quality control limits. The ICP Serial Dilution %Ds for the soil matrix did not meet the quality control limits for aluminum, chromium, lead, magnesium, manganese, nickel, and potassium.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
UL	-	Nondetected result is considered biased low as a result of missed holding times, CRDL %Rs, or ICP ICS Interference.
K	-	Positive result is considered biased high as a result of CRDL %Rs or ICP ICS Interference.
L	-	Positive result is considered biased low as a result of CRDL %Rs or ICP ICS Interference.
J	-	Positive result is considered estimated as a result of duplicate sample RPD, ICP Serial Dilution %Ds, or conflicting directional bias as a result of CRDL %Rs or MS %Rs.

Brown & Root Environmental **INTERNAL CORRESPONDENCE**

C-49-09-7-113

TO:	**G. LATULIPPE**	**DATE:**	**DECEMBER 10, 1997**
FROM:	**DANIEL MENICUCCI**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION - EXPLOSIVES; CTO 245 INDIAN HEAD, MARYLAND SDG - 7**		

SAMPLES: 10/Soil

S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001
S41SS0050001	S41SS0060001	S41SS0070001	S41SS0080001
S41SS0090001	S41DUP009		

4/Aqueous

S41GW003U001	S41GW002U001	S41GW001U001	RB1022971

Overview

The sample set for CTO 245 Indian Head, Maryland, SDG 7, consists of ten (10) soil and four (4) aqueous environmental samples. The field crew specified samples 9710131 and S41SS0080001 for Matrix Spike/ Matrix Spike Duplicate analysis in this SDG. One field duplicate pair S41SS0080001 / S41DUP009 was specified in this SDG.

The samples were collected by Brown and Root Environmental on October 21st, 1997 and analyzed by GP Environmental Services Incorporated under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All samples were analyzed for explosives and all soil samples were additionally analyzed for Nitroglycerine and Nitroguanidine. The explosive and nitroglycerine analyses were conducted according to SW-846 Method 8330. The nitroguanidine analysis was conducted according to a modified USAEC methodology.

Summary

The findings offered in this report were based upon a general review of all available data including data completeness, holding times, calibration data, laboratory and field quality control blank results, Matrix Spike (MS) / Matrix Spike Duplicate (MSD) analyses, surrogate spike recoveries, Laboratory Control Sample (LCS) analyses, field duplicate results, compound identification and quantification and detection limits.

Areas of concern with respect to data quality are listed below.

Minor Problems

The surrogate 4-Nitroaniline contained low percent recoveries in samples S41SS0030001, S41SS0050001 and S41SS0080001. Nondetected explosive compounds were qualified as biased low (UL).

Notes

The matrix spike / matrix spike (MS/MSD) duplicate analysis of sample S41SS080001 contained five relative percent differences, three matrix spike and two matrix spike duplicate recoveries outside the quality control limit. As per Region III guidance, no qualifications are made for MS / MSD noncompliances alone.

The lab control standard sample NLCSB contained percent recoveries for Tetryl and Nitrobenzene outside the quality control limit. As per Region III guidance, no qualifications are made for LCS noncompliances alone.

The compound HMX was reported differently on the spreadsheets than on the Form 1's. The correct concentrations were determined and were used to correct the spreadsheets.

Executive Summary

Laboratory Performance: Several compounds had incorrect concentrations reported on the spreadsheets.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", September 1994 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide " (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Daniel J Menicucci
Data Validator
Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer
Brown and Root Environmental

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

DATA QUALIFIER TABLE:

U - Value is a nondetected results as reported by the laboratory.

Brown & Root Environmental **INTERNAL CORRESPONDENCE**

C-49-12-7-113

TO:	**G. LATULIPPE**	**DATE:**	**DECEMBER 5, 1997**
FROM:	**DANIEL MENICUCCI**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION - EXPLOSIVES; CTO 245 INDIAN HEAD, MARYLAND SDG - 6**		
SAMPLES:	8/Soil		

S39SD0010001	S39SD0020001	S39SD0030001	S39SD0040001
S39SD0050001	S39SD0060001	S39SD0070001	S39SD0080001

Overview

The sample set for CTO 245 Indian Head, Maryland, SDG 6, consists of eight (8) soil environmental samples. The field crew specified sample S41SS0080001 for Matrix Spike/ Matrix Spike Duplicate analysis in this SDG

The samples were collected by Brown and Root Environmental on October 21st, 1997 and analyzed by GP Environmental Services Incorporated under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The explosive and nitroglycerine analyses were conducted according to SW-846 Method 8330. The nitroguanidine analyses were conducted according to modified USACE methodology.

Summary

The findings offered in this report were based upon a general review of all available data including data completeness, holding times, calibration data, laboratory and field quality control blank results, Matrix Spike (MS)/ Matrix Spike Duplicate (MSD) analyses, surrogate spike recoveries, Laboratory Control Sample (LCS) analyses, field duplicate results, compound identification and quantification and detection limits.

Areas of concern with respect to data quality are listed below.

Notes

The matrix spike / matrix spike (MS/MSD) duplicate analysis of sample S41SS080001 contained five relative percent differences, three matrix spike and two matrix spike duplicate recoveries outside the quality control limit. As per Region III guidance, no qualifications are made for MS / MSD noncompliance alone.

The lab control standard sample NLCSB contained percent recoveries for Tetryl and Nitrobenzene outside the quality control limit. As per Region III guidance, no qualifications are made for LCS noncompliances alone.

Several compounds contained concentrations reported on the spreadsheets that differed from those reported on the Form 1's. The correct concentrations were determined and were used to correct the spreadsheets.

DATA QUALIFIER TABLE:

U	-	Value is a nondetected results as reported by the laboratory.
UL	-	Nondetected result is considered biased low.

Executive Summary

Laboratory Performance: Several compounds had incorrect concentrations reported on the spreadsheets.

Other Factors Affecting Data: Three explosive samples contained low surrogate recoveries.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", September 1994 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide " (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Daniel J Menicucci
Data Validator
Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer
Brown and Root Environmental

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Brown & Root Environmental

INTERNAL CORRESPONDENC

C-49-11-7-139

TO:	**G. LATULLIPE**	**DATE:**	**JANUARY 21,1998**
FROM:	**PAMELA A. KORYAK**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOLATILE, SEMIVOLATILE AND PESTICIDE/PCBs**
CTO 245, NSWC INDIAN HEAD, MARYLAND
SDG 1

SAMPLES: 12/Aqueous/VOA

S12SW0010001	S12SW0020001	S12SW0030001
S12SW0040001	S12SW0050001	S12SW0060001
S12DUP001	S42DUP004	S42MWOO2U001
S42MW002U001	S42MW003U001	TB1007971
TB1011971		

10/Aqueous/SVOA

S12SW0010001	S12SW0020001	S12SW0030001
S12SW0040001	S12SW0050001	S12SW0060001
S12DUP001	S42DUP004	S42MW002U001
S42MW003U001		

7/Aqueous/PEST/PCBs

S12SW0010001	S12SW0020001	S12SW0030001
S12SW0040001	S12SW0050001	S12SW0060001
S12DUP001		

Overview

The sample set for the CTO 245 NSWC Indian Head Naval Base site, SDG 1, consists of twelve (12) aqueous environmental samples and two (2) trip blanks (designated-TB). The samples were analyzed for volatile, semivolatile, and pesticide/PCB organic compounds. The laboratory designated one sample (S12SW0050001) for Matrix Spike/Matrix Spike Duplicate analyses. Two field duplicate pairs (S12DUP001/S12SW0060001 and S42DUP004/S42MW003U001) were included in this SDG.

The samples were collected by Brown and Root Environmental on October 7th and 11th, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatile and semivolatile analyses were conducted

using EPA CLP low level OLC2.0 methods. The samples were analyzed for pesticide/PCB compounds using EPA method OLC2.0.

Summary

All compounds were successfully analyzed with the exception of those qualified as rejected,(UR). The findings offered in this report are based upon a general review of all available data including data completeness, holding times until analysis, GC/MS tuning and calibration data, laboratory and field blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standards performance, tentatively identified compounds, compound identification and compound quantitation. Areas of concern with respect to data quality are listed below.

Major Problems

- The initial and continuing calibration Relative Response Factors (RRFs) for acetone and 2-butanone were less than 0.05. Only nondetected results were reported for these compounds in the affected samples. The results reported for these compounds in the affected samples were qualified as rejected, UR. The positive result in sample S12SW0060001 for acetone was qualified as biased low, (L).

Minor Problems

- The following table summarizes the maximum concentrations of volatile and semivolatile compounds detected in laboratory method and/or field quality control blanks analyzed in this SDG.

Compound	Maximum Concentration	Action Level
methylene chloride*	1 µg/L	10 µg/L
di-n-butyl phthalate	2 µg/L	20 µg/L

*- Maximum concentration determined from field quality control blanks.

Aliquot size and dilution factors were considered during application of all action levels. Positive results reported for these compounds in the associated samples at concentrations less than the respective action levels are considered false positives and are qualified, (B). Note that field quality control blanks are not qualified based on field quality control blank contamination.

- The Performance Evaluation Mix %D for beta-BHC exceeded the 25% quality control limit. Only nondetected results were reported for this compound in the affected samples and these results were qualified as estimated, UJ.

- The %Ds between columns for Heptachlor epoxide and Endosulfan II were greater than

25%. The chromatograms associated blanks did not indicate background noise, therefore, the positive results were qualified as estimated, J. The direction of bias could not be determined.

- Positive results reported at concentrations below the CRQL are considered to be estimated and are qualified (J). The direction of the bias cannot be determined.

Notes

Continuing calibration %Ds greater than 25% were reported for 1,2-dibromo-3-chloropropane. Only nondetected results were reported for these compounds in the affected samples. According to guidance no action was taken.

Initial calibration Percent Relative Standard Deviations (%RSDs) greater than 20% were reported for 4,4'-DDT for INDAM-204 in column RTX-1701. Only nondetected results were reported in the affected samples. According to guidance, no action was taken.

Executive Summary

Laboratory Performance: The initial and continuing calibration RRFs for acetone and 2-butanone were less than 0.05. Continuing calibration %Ds for a semivolatile compound were greater than 25%. Methylene chloride was detected in aqueous field blanks. Di-n-butylphthalate was detected in the method blank. The PEM %D for beta-BHC exceeded 25%. The %Ds between columns for hepatachlor epoxide and Endosulfan II exceeded 25%.

Other Factors Affecting Data Quality: Positive results reported at concentrations below the CRQL are considered to be estimated.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Review"(9/94), as amended for use within EPA Region III, and the NFESC guidelines entitled "Navy Installation Restoration Program Laboratory Quality Assurance Guide"(February, 1996).

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Pamela A. Koryak
Risk Assessor/Data Validator

Brown and Root Environmental
Joseph A. Samchuck
Data Validation Quality Assurance Officer

MEMO TO: **G. LATULLIPE**
DATE: **JANUARY 21, 1998- PAGE 4**

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Brown & Root Environmental

INTERNAL CORRESPONDENC

TO:	~~MR. GEORGE LATULIPPE~~	DATE:	JANUARY 26, 1998
FROM:	LINDA KARSONOVICH	COPIES:	DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA/SVOA/PEST/PCB ORGANICS
CTO 245, NSWC INDIAN HEAD
SDG 6

SAMPLES: Volatile/Semivolatile

9/Water/

S39SW0010001	S39SW0020001
S39SW0030001	S39SW0040001
S39SW0050001	S39SW0060001
S39DUP0008	TB1021971
RB1021971	

8/Soil/

S39SD0010001	S39SD0020001
S39SD0030001	S39SD0040001
S39SD0050001	S39SD0060001
S39SD0070001	S39SD0080001

Pesticide/PCB

1/Water	RB1021971

8/Soil

S39SD0010001	S39SD0020001
S39SD0030001	S39SD0040001
S39SD0050001	S39SD0060001
S39SD0070001	S39SD0080001

OVERVIEW

The sample set for CTO 245, SDG 6, NSWC Indian Head consists of seven (7) aqueous environmental samples, eight (8) solid environmental, and two (2) aqueous quality control samples. The samples were analyzed for Target Compound List (TCL) volatile, semivolatile, and chlorinated pesticides/polychlorinated biphenyls (Pest/PCBs). Sample TB1021971 was analyzed for volatiles only. The field crew did designate samples for Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses. The laboratory analyzed MS/MSD and blank spike samples. One field duplicate pair was included in this SDG S39DUP0008 and S39SW0020001.

The samples were collected by Brown and Root Environmental on October 21st, 1997 and analyzed by GP Environmental Services, Inc. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using CLP Statement of Work (SOW) OLMO2.0 low concentration analytical and reporting protocols.

All samples were successfully analyzed with the exception of those compounds qualified as rejected. The findings offered in this report are based upon a general review of all available data including: data completeness, holding times, GC/MS tuning and system performance, initial/continuing calibrations, laboratory method and field quality control blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, blank spike/blank spike duplicate results, internal standard performance, compound identification, compound quantitation, detection limits, and tentatively identified compounds. Areas of concern are listed below.

Major Problems

- Initial and/or continuing calibration percent relative response factors (RRFs) did not meet the 0.050 quality control limit for acetone and 2-butanone. Nondetected and positive results were affected. Nondetected results were rejected, (UR), and positive results were qualified as biased , (L).

- MS/MSD S39SD0010001 had recoveries of less than 10% for 1,4-dichlorobenzene. The associated surrogate, 1,2-dichlorobenzene-d4 also had recoveries of less than 10%. The compound was rejected, (UR), in the native sample due to a combination of low MS/MSD recovery and low surrogate recovery

Minor Problems

- Holding times were exceeded for the extraction of all semivolatile and pest/PCB soil samples. All nondetected and positive results for the soil samples were qualified as estimated, (UJ) and (J). The direction of bias cannot be determined.

- Continuing calibration percent differences (%Ds) exceeded 50% for hexachlorocyclopentadiene and di-n-octyl phthalate. Nondetected results were qualified as estimated, (UJ). The direction of bias cannot be determined.

- The following table summarizes the maximum concentration of volatile and semivolatile compounds detected in the laboratory method and/or field quality control blanks (designated *) analyzed in this SDG.

Compound	Maximum Concentration	Action Level
Methylene Chloride	1 µg/L	10 µg/L
Methylene Chloride	4 µg/Kg	40 µg/Kg
*2-Butanone	8 µg/Kg	80 µg/Kg
*Acetone	9 µg/Kg	90 µg/Kg
Di-n-butyl phthalate	26 µg/L	260 µg/L
*Bis(2-ethylhexyl) phthalate	1 µg/Kg	10 µg/Kg
*Diethyl phthalate	2 µg/Kg	20 µg/Kg
*Dimethyl phthalate	1 µg/Kg	10 µg/Kg
*Phenol	2 µg/Kg	10 µg/Kg

  Dilution factors, percent solids, and aliquots used for analysis were taken into consideration during the application of all action levels. Positive results reported as false positives as a result of blank contamination for methylene chloride and di-n-butyl phthalate were qualified as B.

- The volatile fraction of sample S39SD0080001 had low internal standard recoveries for all three internal standards. All nondetected and positive results were qualified as estimated, (UJ) and (J). The direction of bias cannot be determined.

- Recoveries below the lower quality control limit were reported for the compound 1,2,4-trichlorobenzene in MS/MSD S39SD0010001. The associated surrogate, 1,2-dichlorobenzene-d4, had recoveries of less than 10%. The result for 1,2,4-trichlorobenzene was qualified as estimated, (UJ), in the native sample. The direction of bias cannot be determined.

- Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J). The direction of bias cannot be determined.

- Samples S39SD0070001 and S39SD0080001 had high concentrations of acetone. The laboratory reanalyzed the samples at a 5X dilution; however, acetone was not detected. The acetone results were reported from the undiluted sample. The positive results reported for acetone were qualified as estimated, (J), due to exceeding the linear range of the instrument.

- Surrogate recovery below the lower quality control limit was reported for TCX and DCB in sample S39SD0060001. No validation action was required as the sample was previously qualified due to holding time non-compliance.

- Percent difference between columns exceeded 25% for the compounds p,p'-DDE and a-BHC in some samples. No validation action was required as the samples were previously qualified due to holding time non-compliance.

Notes

- Continuing calibration percent differences (%Ds) exceeded the 25% quality control limit for chloromethane, carbon disulfide, 1,2-dibromo-3-chloropropane, vinyl chloride, 2-hexanone, hexachlorocyclopentadiene, 3,3'-dichlorobenzidine, di-n-octyl phthalate, benzo(k)fluoranthene, 2,4-dimethylphenol, 2,4-dinitrophenol, 4-nitrophenol, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, benzo(g,h,I)perylene, 4-nitroaniline, and 4-methyl-2-pentanone. No validation action was required as these compounds were not detected in the samples.

- The surrogate 1,2-dichlorobenzene-d4 had low recoveries (4%-19%) in all of the soil samples except S39SD0060001. No action was taken on this basis as the surrogate is advisory only. Sample S39SD0010001 had low recovery of 2-fluorobiphenyl (29%). Sample S39SD0060001 had high recovery of 2,4,6-tribromophenol (123%). No validation action was required as the samples were previously qualified due to holding time non-compliance.

- Recoveries below the lower control limit were reported for the compounds bis(2-chloroethyl)ether and benzo(a)pyrene in MS/MSD S39SW0020001. No validation action was required on this basis.

- The compound p,p'-DDT had initial calibration %RSDs outside the quality control limit on the confirmation column. However, no action was taken as only one compound was outside the criteria and the %RSD was less than 30%.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone and 2-butanone had RRFs less than 0.050 in the initial and/or continuing calibrations in the volatile fraction. All semivolatile and Pest/PCB soil samples exceeded the holding time quality control limit. Several compounds in both the volatile and semivolatile fraction exceeded the 25%D continuing calibration criteria. Several compounds were detected in the laboratory method blanks and/or field quality control blanks. Sample S39SD0080001 had low internal standard recoveries in the volatile fraction. The surrogate 1,2-dichlorobenzene had consistently poor recoveries in the semivolatile soil samples. The compounds 1,4-dichlorobenzene and 1,2,4-trichlorobenzene were qualified due to a combination of low surrogate and MS/MSD recovery in the semivolatile fraction.

Other Factors Affecting Data Quality: Methylene chloride, acetone, 2-butanone, bis(2-ethylhexyl)phthalate, diethyl phthalate, dimethylphthalate, and phenol were detected in the rinseate and travel blanks.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94) and the NFESC guidelines "Navy Installation Restoration Program Laboratory Quality Assurance Guide" (February, 1996). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Linda Karsonovich
Chemist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Summary of Tentatively Identified Compounds (TICs)

Fraction	TIC
Volatile	Unknown(s)
	None
Semivolatile	Unknown(s)
	unknown phthalate hexadecanoic acid octadecanoic acid sulfur, mol (S8) unknown PAH unknown organic acid docosanic acid

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-12-7-154

TO: GEORGE LATULIPPE

DATE: DECEMBER 18, 1997

FROM: DANA PIETO

CC: DV FILE

SUBJECT: **ORGANIC DATA VALIDATION - VOCs, SVOCs, & PEST/PCBs**
CTO 245, NSWC INDIAN HEAD, MARYLAND
SDG 7

SAMPLES: 15 Soils:

S41SS0010001	S41SS0020001	S41SS0030001	S41SS0040001
S41SS0050001	S41SS0060001	S41SS0070001	S41SS0080001
S41SS0090001	S41DUP09		

5 Aqueous:

S41GW001U001	S41GW002U001	S41GW003U001	RB1022971
TB1022971			

Overview

The sample set for CTO 245 NSWC Indian Head, SDG 7, consists of ten soil and five aqueous environmental samples including one trip blank (designated TB). All samples were analyzed for Target Compound List (TCL) volatile, semivolatile, and pesticide/PCB organic compounds. One field duplicate pair (samples S41SS0080001/S41DUP09) were included in this SDG.

The samples were collected by Brown & Root Environmental on October 22, 1997, and analyzed by GP Environmental Services. The volatile, semivolatile, and pesticide/PCB compound analyses were analyzed under Naval Facilities Engineering Service Center (NFESC). All analyses were conducted using the U.S. EPA Contract Laboratory Program (CLP) (OLM03.1 and 03.2, OLC02.0) analytical and reporting protocols.

Summary

All compounds were successfully analyzed with the exception of those results that were rejected. The findings offered in this report are based upon a general review of all available data including data completeness, holding times until extraction/analysis, CG/MS tuning and calibration data, laboratory and field quality control blank results, matrix spike/matrix spike duplicates analyses, surrogate spike recoveries, internal standards performance, field duplicate precision, laboratory control sample analyses, compound identification and quantitation, detection limits, and Tentatively Identified Compound (TIC) evaluation.

Areas of concern with respect to data quality are listed below.

Major Problems

- The initial and continuing calibration relative response factors (RRFs) in samples S41GW001U001, S41GW002U001, S41GW003U001, 241GW003U001DL, TB-102297-1, and RB-102297-1 were below 0.050 for acetone and 2-butanone. Positive results were qualified biased low, (L), and nondetected results were qualified as rejected, (UR).

nondetected results were qualified as rejected, (UR).

- The soil semivolatile surrogate recoveries for each surrogate was below the quality control limits for sample S41SS0050001. Positive results for the sample were qualified biased low, (L), and nondetected results were qualified as rejected, (UR).

Minor Problems

- The holding time for semivolatiles and pesticides/PCBs exceeded the 7-day limit for all soil samples. Positive results were qualified as estimated, (J), and nondetected results were qualified as estimated, (UJ).

- The following volatile compounds were detected in the laboratory method blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level	Soil Action Level
Methylene chloride	7 µg/kg	---	70 µg/kg
Di-n-butyl phthalate	26 µg/L	260 µg/L	---

Samples Affected: All

Sample aliquot, dilution factors, and percent moisture were taken into consideration during the application of the action level. Positive results for the compound reported at concentrations below the detection limit were replaced with revised detection limits and qualified as nondetects, (U). Positive results for the compound reported at concentrations above the detection limit were qualified nondetected, (U). It should be noted that field quality control blanks are not qualified based on field quality control blank contamination.

- The volatile continuing calibration Percent Difference (%D) for acetone, carbon disulfide, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone exceeded the 25% quality control limit for all soil and re-evaluated samples. The %D for chloromethane, vinyl chloride, carbon disulfide, 2-butanone, 4-methyl-2-pentanone, 2-hexanone, bromoform, and 1,2-dibromo-3-chloropropane exceeded the 25% quality control limit for all water samples. Positive results were qualified as estimated, (J), and nondetected results were not qualified.

- The volatile continuing calibration %Ds for carbon disulfide and 2-butanone were greater than 50%, therefore, nondetected results were qualified as estimated, (UJ).

- The semivolatile continuing calibration %D for hexachlorocyclopentadiene, di-n-octylphthalate, benzo[k]fluoranthene exceeded the 50% quality control limit for all water samples. Nondetected results were qualified as estimated, (UJ).

- The volatile system monitoring compound recoveries contained surrogates 1,2-dichloroethane and toluene-d8 that were above the quality control limits in samples S41SS0040001, S41SS0050001, and S41SS0090001. Nondetected results were qualified as estimated, (UJ).

- Samples S41SS0020001, S41SS0040001, S41SS0050001, S41SS0080001, and S41SS0090001 had high surrogate recoveries and low internal standard areas. Samples S41S0030001, S41SS0060001, S41SS0070001, and S41DUP09 had low internal standard areas. Positive results

were qualified as estimated, (J), and nondetected results were qualified as estimated, (UJ). Re-evaluated samples also contained internal standards that were below the quality control limits, therefore, the original samples were used for quantitation.

- The pesticide continuing calibration %D for delta-BHC exceeded the 25% quality control limit for all water samples. Nondetected results were qualified as estimated, (UJ).

- Several %Ds for Aroclor 1260 exceeded the 25% validation quality control criterion in samples S41SS0020001, S41SS0030001, and S41SS0040001. Positive results were qualified as estimated, (J) and nondetected results were not qualified. Imprecision was noted between analytical columns for the Laboratory Control Samples (LCSs) and MS/MSD samples.

Notes

The sample S41DUP09 on the chain of custodies was labeled S41DUP009 on the Form I's. The appropriate changes were made.

Several continuing calibration Percent Differences (%Ds) for semivolatile compounds exceeded the 25% validation quality control criterion. No actions were warranted as a result of these noncompliances since the holding time was exceeded and the samples had already been qualified.

The semivolatile matrix spike duplicate (MSD) percent recovery and relative percent difference (RPD) for 1,2,4-trichlorobenzene were above the recommended quality control limit. No action was taken for these noncompliances.

The semivolatile analyses of samples S41SS0050001RE and S41SS0050001REDL were above the area limits for chrysene-d12 and perylene-d12. Appendix A Table A.10 was consulted for both internal standards, however, no actions were warranted as a result of these noncompliances since the holding time was exceeded and the samples had already been qualified.

Pyrene exceeded the instrument's linear calibration range in sample S41SS0050001RE. These samples were diluted 2-fold and reanalyzed. The dilution results for this compound only were transposed over to the re-analyzed sample results and used in validation of this SDG.

Aroclor-1260 exceeded the instrument's linear calibration range in samples S41SS0010001, S41SS0050001, S41SS0060001, and S41SS0090001. These samples were diluted 100-fold and reanalyzed. The dilution results for this PCB only were transposed over to the original sample results and used in validation of this SDG.

Aroclor-1260 exceeded the instrument's linear calibration range in sample S41SS0070001. The sample was diluted 10-fold and reanalyzed. The dilution result for this PCB only was transposed over to the original sample result and used in validation of this SDG.

Aroclor-1260 exceeded the instrument's linear calibration range in samples S41SS0080001 and S41DUP09. These samples were diluted 1000-fold and reanalyzed. The dilution results for this PCB only were transposed over to the original sample results and used in validation of this SDG.

The pesticide surrogates had percent recoveries that were above the quality control limits. No actions were warranted as a result of these noncompliances since the holding time was exceeded and the samples had already been qualified.

The pesticide matrix spike/matrix spike duplicate (MS/MSD) for sample S41SS0080001 contained an MS/MSD % recovery (%R) that was above the quality control limits for dieldrin, and below the quality control limits for 4,4'-DDT. The sample S41SS0080001DL contained a MS/MSD %R that was below the quality

control limits for gamma-BHC, heptachlor, aldrin, dieldrin, endrin, and 4,4'-DDT. No action was taken for these noncompliances.

The initial calibration Relative Percent Standard Deviation (%RSD) for the pesticide compound 4,4'-DDT exceeded the 20% validation quality control criterion. No action was warranted as a result of this noncompliance.

Several pesticide calibration verification summaries for performance evaluation mixtures (PEMs) had a percent endrin breakdown that was greater than 20% and a combined percent breakdown of greater than 30%. No actions were warranted as a result of these noncompliances since the holding time was exceeded and the samples had already been qualified.

Several continuing calibration %Ds for pesticides exceeded the 50% validation quality control criterion. No actions were warranted as a result of these noncompliances since the holding time was exceeded and the samples had already been qualified.

No other problems were noted.

Executive Summary

***Laboratory Performance*:** Several volatile initial calibration RRFs were noted. Several volatile, semivolatile, and pesticide initial and continuing calibration noncompliances were present. Methylene chloride was detected in laboratory method blanks for volatiles. Several samples were qualified for internal standard area noncompliances. Several samples were qualified for surrogate recovery noncompliances.

MEMO TO: GEORGE LATULIPPE
DATE: DECEMBER 18, 1997 - PAGE 5

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation", as amended for use within EPA Region III, and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Dana L. Pieto

Dana L. Pieto

Brown & Root Environmental
Data Validator

Joseph A. Samchuck

Brown & Root Environmental
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key:

U	-	Value is a nondetected result as reported by the laboratory and should not be considered present.
J	-	Positive result is estimated as result of continuing calibration %D > 25% and/or value below the CRQL.
B	-	Nondetected blank (for Region III) as a result of blank contamination and should not be considered present.
UR	-	Value is rejected as a result of surrogate spike noncompliance or as a result of initial or continuing calibration RRFs <0.05.
UJ	-	Nondetected result is considered to be estimated as a result of volatiles and semivolatiles continuing calibration %D > 25% or as a result of exceeding the holding time for semivolatiles and pesticides.
L	-	Value is biased low as a result of surrogate spike noncompliance or a continuing calibration RRF <0.05.

Summary of Tentatively Identified Compounds (TICs)
Remaining After Data Qualification

Fraction	Named TIC
Volatiles	Unknown(s)
	Unknown alkane(s)
	Benzene derivative
Semivolatile	Unknown(s)
	Unknown phthalate
	Unknown PAH(s)
	Octadecanoic acid
	Unknown PCB(s)
	Unknown organic acid(s)
	Hexadecanoic acid
	Docosanoic acid
	Unknown dimethylnaphthalene isomer(s)
	9H-Fluoren-9-one
	Acetophenone
	1-Methyl-naphthalene
	Biphenyl(s)
	4-Methyl-dibenzofuran
	Unknown trichlorobenzene isomer(s)
	Unknown tetrachlorobenzene isomer(s)
	Unknown trimethylnaphthalene isomer(s)
	5-Ethyl-1-nonene
	2-tert-1,2,4-Oxadiazolidin-5-one
	Hexanedioic acid, dioctyl ester

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-97-193

TO: **MR. GEORGE LATULIPPE** **DATE: FEBRUARY 6, 1998**

FROM: **KATE LANDKROHN** **COPIES: DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 6

SAMPLES: 8 Soil

S39SD0010001	S39SD0030001	S39SD0050001	S39SD0070001
S39SD0020001	S39SD0040001	S39SD0060001	S39SD0080001

8 Aqueous

RB1021971	S39SW0020001	S39SW0030001	S39SW0050001
S39SW0010001	S39DUP008	S39SW0040001	S39SW0060001

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 6 consists of seven (7) aqueous environmental samples, eight (8) soil environmental samples, and one (1) rinsate blank (RB1021971). Field duplicate pair S39SW0020001/S12DUP008 was included within this SDG. Sample S39SW0020001 was identified by the field crew for Matrix Spike (MS) analyses on the aqueous samples. Soil sample S39SD0010001 was identified by the laboratory for Matrix Spike (MS) analyses for all analytes except cyanide.

The above samples were analyzed for TAL metals and cyanide. The samples were collected by Brown and Root Environmental on October 21, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using Contract Laboratory Program (CLP) Statement of Work (SOW) ILM04.0 analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, interference check sample (ICS) results, matrix spike recoveries, post digestion spike recoveries, laboratory duplicate results, laboratory control sample (LCS) results, Inductively Coupled Plasma (ICP) serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury and cyanide, were conducted using ICP methodologies. Mercury analysis was conducted using cold vapor AA. Cyanide analyses were conducted using wet chemistry methods.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) percent recoveries (%Rs) were above the 110% quality control limits for aluminum and calcium. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased high, (K).

- The CRDL %R was below the 90% quality control limits for lead and thallium. Positive results <2X CRDL and nondetects reported for the aforementioned analytes were qualified as biased low, (L) and (UL), respectively.

- The CRDL %R was above the 110% quality control limit for magnesium. Positive results < 2X CRDL reported for the aforementioned analyte were qualified as estimated, (J), due to conflicting directional bias.

- The following contaminants were detected in the laboratory method/preparation/rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - aqueous	Action Level - soil
aluminum	52.2 ug/L	261 ug/L	52.2 mg/kg
barium(1)	0.9 ug/L	4.5 ug/L	0.9 mg/kg
beryllium	0.1 ug/L	0.5 ug/L	0.1 mg/kg
cadmium	0.3 ug/L	1.5 ug/L	0.3 mg/kg
calcium(1)	151.6 ug/L	758 ug/L	NA
calcium(2)	16.10 mg/kg	NA	80.5 mg/kg
chromium	0.7 ug/L	3.5 ug/L	0.7 mg/kg
cobalt	0.9 ug/L	4.5 ug/L	0.9 mg/kg
copper	1.3 ug/L	6.5 ug/L	1.3 mg/kg
iron	12.8 ug/L	64 ug/L	12.8 mg/kg
lead(1)	1.0 ug/L	5.0 ug/L	NA
magnesium(1)	62.2 ug/L	311 ug/L	NA
magnesium(2)	16.10 mg/kg	NA	80.5 mg/kg
manganese	0.3 ug/L	1.5 ug/L	0.3 mg/kg
potassium(1)	22.8 ug/L	114 ug/L	NA
potassium(2)	7.346 mg/kg	NA	36.73 mg/kg
sodium(1)	365.0 ug/L	1825 ug/L	NA
sodium(2)	171.0 mg/kg	NA	855 mg/kg
zinc(1)	2.3 ug/L	11.5 ug/L	NA

Samples Affected: All

(1) Maximum concentration found in an aqueous preparation blank.
(2) Maximum concentration found in soil preparation blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, weight, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for aluminum, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, potassium, sodium, and zinc have been qualified, (B), as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or

were nondetects. It should be noted that field quality control samples are not qualified for field quality control blank contamination.

- The interfering analyte iron was present in sample S39SD0030001 at a concentration comparable to the level of iron in the interference check sample (ICS) solution. Several analytes namely, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, nickel, potassium, selenium, sodium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for arsenic, cadmium, potassium, sodium, and selenium. The possibility of suppressive affects may be present for selenium in the affected sample. The nondetected result was qualified as biased low, (UL). The positive results reported for arsenic and cadmium were qualified as biased high, (K). The positive result reported for potassium was qualified as estimated "J" as a result of conflicting noncompliance. The positive result for sodium received no flag as the result was qualified as a result of blank contamination.

- The interfering analyte iron was present in samples S39SD0070001 and S39SD0070001 at a concentration comparable to the level of iron in the interference check sample (ICS) solution. Several analytes namely, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, nickel, potassium, selenium, sodium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for cadmium, selenium, sodium. The possibility of suppressive affects may be present for selenium in the affected samples; the nondetected result was qualified as biased low, (UL), for this analyte. The possibility of positive affects may be present for cadmium; positive results reported were qualified as biased high, (K), for this analyte. The positive result for sodium received no flag as the result was qualified as a result of blank contamination.

- The MS %R in the soil matrix for antimony was below the 75% quality control limit. Positive and nondetected results reported for the aforementioned analyte were qualified as biased low, (L) and (UL), respectively.

- The MS %R in the soil matrix for zinc was above the 125% quality control limit. Positive results reported for the aforementioned analyte were qualified as biased high, (K).

- The MS %R in the aqueous matrix for iron was above the 125% quality control limit. Positive results reported for the aforementioned analyte were qualified as biased high, (K).

- ICP Serial Dilution percent differences (%Ds) for the soil matrix were > 10% the quality control limits for chromium, magnesium and potassium. Positive results reported for the aforementioned analytes were qualified as estimated, (J).

- ICP Serial Dilution %D for the aqueous matrix were > 10% quality control limits for sodium. Positive results reported for the aforementioned analyte were qualified as estimated, (J).

Notes:

The CRDL % Rs for iron and sodium were outside the 90-110% quality control limits. However, no validation actions were warranted as the sample results were either > 2 X CRDL or were qualified as blank contamination.

A comparison of field duplicate pair, S39SW0020001/S12DUO008, is contained in Appendix C. However, no validation actions are required as per Region III guidance.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/ preparation blanks.

Other Factors Affecting Data Quality: The interfering analyte iron was present in sample S39SD0030001. The MS %Rs in the soil matrix for antimony and zinc did not meet the quality control limits. The MS %Rs in the aqueous matrix for iron did not meet the quality control limits. The ICP Serial Dilution %Ds for the soil matrix did not meet the quality control limits for chromium, magnesium, and potassium. The ICP Serial Dilution %Ds for the aqueous matrix did not meet the quality control limits for sodium.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
UL	-	Nondetected result is considered biased low as a result of CRDL %Rs, ICP ICS Interference, or low MS %Rs.
K	-	Positive result is considered biased high as a result of CRDL %Rs, ICP ICS Interference, or high MS %Rs.
L	-	Positive result is considered biased low as a result of CRDL %Rs or low MS %Rs.
J	-	Positive result is considered estimated as a result of ICP Serial Dilution %Ds, CRDL %Rs or ICP ICS Interference.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-98-004

TO: **GEORGE LATULIPPE** **DATE: JANUARY 12, 1998**

FROM: **DAVID G. OLSON** **COPIES: DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE**
CTO 245 - NSWC, INDIAN HEAD, MARYLAND
SDG - 7

SAMPLES:

10/Soil/

S41SS0010001	S41SS0050001	S41SS0080001
S41SS0020001	S41SS0060001	S41SS0090001
S41SS0030001	S41SS0070001	S41DUP009
S41SS0040001		

7/Aqueous/

S41GW001F001	S41GW002U001	RB1022971
S41GW001U001	S41GW003F001	
S41GW002F001	S41GW003U001	

Overview

The sample set for SDG - 7, NSWC, Indian Head, Maryland consists of ten (10) soil environmental samples, six (6) aqueous environmental samples, and one (1) rinsate blank (RB1022971). The field crew selected soil sample S41SS0080001 for matrix spike (MS), matrix spike duplicate (MSD) analysis. In addition, the laboratory performed an MS/MSD analysis on sample S41GW003F001 for all required aqueous analytes except mercury and cyanide. The laboratory performed an MS/MSD analysis on aqueous sample S41GW003U001 for mercury and cyanide. One field duplicate pair (S41DUP009/S41SS0080001) was included within this SDG.

The above samples, with the exception of S41GW001F001, S41GW003F001 and S41GW002F001, were analyzed for Target Analyte List (TAL) metals and cyanide. Samples S41GW001F001, S41GW003F001 and S41GW002F001 were analyzed for TAL metals only. The samples were collected by Brown and Root Environmental on October 22, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using Contract Laboratory Program (CLP) Statement of Work (SOW) ILM04.0 analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, interference check sample (ICS) results, matrix spike recoveries, post digestion spike recoveries, laboratory duplicate results, laboratory control sample (LCS) results, Inductively Coupled Plasma (ICP) serial dilution results, detection limits and analyte quantitation.

All metal analyses, with the exception of mercury, were conducted using ICP methodologies. Mercury analysis was conducted using cold vapor AA. Cyanide analysis was conducted using a colorimetric manual distillation method (MCAWW 335.2).

Areas of concern with respect to data quality are listed below.

Major Problems

- The Matrix Spike (MS) Percent Recoveries (%Rs) for manganese and zinc in the soil matrix were < 30% quality control limit. Positive results reported for the aforementioned analytes were qualified as biased extremely low, "L".

- The MS %R for chromium in the soil matrix was < 30% quality control limit. All positive results reported for the aforementioned analyte were qualified as estimated, "J", as a result of conflicting noncompliances.

Minor Problems

- The Contract Required Detection Limit (CRDL) Percent Recoveries (%Rs) for calcium and magnesium were >110% quality control limit. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased high, "K".

- The CRDL %Rs for arsenic and sodium were <90% quality control limit. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased low, "L".

- The CRDL %Rs for lead and selenium exhibited recoveries both above and below the 90-110% quality control limits. Positive results < 2X CRDL and nondetects reported for the aforementioned analytes were qualified as estimated, "J" and "UJ", respectively, as a result of conflicting noncompliances.

- The following contaminants were detected in the laboratory method/preparation/ rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - Aqueous	Action Level - Soil
aluminum	63.1 mg/L	315.5 µg/L	63.1 mg/kg
barium (1)	0.22 mg/kg	N/A	1.1 mg/kg
barium (2)	1.3 µg/L	6.5 µg/L	N/A
beryllium	0.3 µg/L	1.5 µg/L	0.3 mg/kg
cadmium	0.4 µg/L	2.0 µg/L	0.40 mg/kg
calcium (1)	26.4 mg/kg	N/A	132.0 mg/kg
calcium (2)	165.7 µg/L	828.5 µg/L	N/A
chromium	7.8 µg/L	39 µg/L	7.8 mg/kg
cobalt	0.8 µg/L	4.0 µg/L	0.8 mg/kg
copper (3)	6.1 µg/L	30.5 µg/L	6.1 mg/kg
iron	43.8 µg/L	219 µg/L	43.8 mg/kg
lead	1.3 µg/L	6.5 µg/L	1.3 mg/kg
magnesium	91.0 µg/L	455 µg/L	91.0 mg/kg

manganese	6.1 µg/L	30.5 µg/L	6.1 mg/kg
nickel	23.1 µg/L	115.5 µg/L	23.1 mg/kg
potassium (3)	200 µg/L	1000 ug/L	200 mg/kg
silver	0.9 µg/L	4.5 µg/L	0.9 mg/kg
sodium (3)	678 µg/L	3390 ug/L	678.0 mg/kg
thallium	5.6 µg/L	28.0 µg/L	5.6 mg/kg
zinc (3)	15.8 µg/L	N/A	15.8 mg/kg

(1) Maximum concentration found in the soil preparation blank.
(2) Maximum concentration found in the aqueous preparation blank.
(3) Maximum concentration found in the rinsate blank

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, weight, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for aluminum, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, silver, sodium, thallium, and zinc, have been qualified, "B", as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field quality control contamination.

- The interfering analyte calcium was present in sample S41SS0060001 at a concentration which was comparable to the level of calcium in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, chromium, cobalt, copper, lead, nickel, potassium, selenium, silver, thallium, vanadium, and zinc were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (IDL). Interference affects exist for cadmium, cobalt, selenium, silver and thallium. The positive results and nondetects reported for cadmium, cobalt and selenium were qualified as estimated, "J" and "UJ", respectively, as a result of conflicting noncompliances. The positive result reported for thallium was qualified as a result of blank contamination.

- The interfering analyte calcium was present in sample S41SS0070001 at a concentration comparable to the level of calcium in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, chromium, cobalt, copper, lead, nickel, potassium, selenium, silver, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the IDL. Interference affects exist for selenium and thallium. The possibility of suppressive affects may be present for thallium. The nondected result was qualified as biased low, (UL). The nondetected result reported for selenium was qualified as estimated, "UJ", as a result of conflicting noncompliances.

- The interfering analyte iron was present in sample S41DUP009 at a concentration comparable to the level of iron in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, chromium, cobalt, copper, lead, nickel, potassium, selenium, silver, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the IDL. Interference affects exist for cadmium, selenium and thallium. The possibility of suppressive affects may be present for thallium. The nondetected result was qualified as biased low, (UL). The positive results reported for cadmium and selenium were qualified as estimated, "J", as a result of conflicting noncompliances.

- The interfering analyte iron was present in sample S41SS0090001 at a concentration comparable to the level of iron in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, chromium, cobalt, copper, lead, nickel, potassium, selenium, silver, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the IDL. Interference affects exist for cadmium, selenium, silver and thallium. The possibility of suppressive affects may be present for thallium. The nondetected result was qualified as biased low, (UL). The positive results reported for cadmium and selenium were qualified as estimated, "J", as a result of conflicting noncompliances. The positive result reported for silver was qualified as a result of blank contamination.

- The interfering analyte iron was present in sample S41SS0040001 at a concentration comparable to the level of iron in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, chromium, cobalt, copper, lead, nickel, potassium, selenium, silver, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the IDL. Interference affects exist for cadmium, selenium, silver and thallium. The possibility of suppressive affects may be present for selenium. The positive result was qualified as biased low, "L". The positive result reported for cadmium and the nondetected result reported for silver were qualified as estimated, "J" and "UJ", respectively, as a result of conflicting noncompliances. The positive result reported for thallium was qualified as a result of blank contamination.

- The interfering analyte iron was present in sample S41SS0050001 at a concentration comparable to the level of iron in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, chromium, cobalt, copper, lead, nickel, potassium, selenium, silver, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the IDL. Interference affects exist for cadmium, selenium, silver and thallium. The possibility of suppressive affects may be present for selenium and thallium. The positive result reported for selenium and the nondetected result reported for thallium were qualified as biased low, "L" and "UL", respectively. The positive result reported for cadmium was qualified as estimated, "J", as a result of conflicting noncompliances. The positive result reported for silver was qualified as a result of blank contamination.

- The interfering analyte iron was present in sample S41SS0080001 at a concentration comparable to the level of iron in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, chromium, cobalt, copper, lead, nickel, potassium, selenium, silver, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the IDL. Interference affects exist for cadmium, selenium, silver and thallium. The possibility of suppressive affects may be present for thallium. The nondetected result reported for thallium was qualified as biased low, "UL". The positive results reported for cadmium and silver and the nondetected result reported for selenium were qualified as estimated, "J" and "UJ", respectively, as a result of conflicting noncompliances.

- Laboratory duplicate imprecision was noted for aluminum affecting the soil matrix. The positive results reported for the aforementioned analyte in the affected samples were qualified as estimated, "J". The direction of bias could not be determined.

- The MS %Rs for the soil matrix were < 75% quality control limit for antimony, arsenic, barium, beryllium, copper, thallium and vanadium. Positive results and nondetects reported for the aforementioned analytes were qualified as biased low, "L" and "UL", respectively.

- The MS %Rs for cadmium, cobalt, nickel and silver affecting the soil matrix were < 75% quality control limit. The positive results and nondetects reported for the aforementioned analytes were qualified as estimated, "J" and "UJ", respectively, as a result of conflicting noncompliances.

- The ICP Serial Dilution Percent Differences (%Ds) for chromium and nickel affecting the soil matrix were > 10% quality control limit. Positive results reported for the aforementioned analytes were qualified as estimated, "J". The direction of bias could not be determined.

Notes

The CRDL %Rs for aluminum, iron and thallium were above the quality control limit. However, no validation actions were warranted as all results were either >2X CRDL, were nondetects, or were qualified for blank contamination.

The MS %R for the aqueous matrix was above the upper quality control limit for selenium, however no validation actions were warranted as all results were nondetects.

The ICP Serial Dilution percent difference (%D) for the aqueous matrix was above the quality control limit for nickel, however no validation actions were warranted as all results were qualified for blank contamination.

A comparison of field duplicate pair, S41SS0080001 / S41DUP009, is contained in Appendix C. However, no validation actions are required as per Region III guidance.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/ preparation/rinsate blanks. Duplicate imprecision was noted for aluminum in the soil matrix.

Other Factors Affecting Data Quality: The matrix spike %Rs for chromium, manganese and zinc in the soil matrix were < 30% quality control limit. The interfering analytes calcium and/or iron were present in samples S41SS0060001, S41SS0070001, S41SS0080001, S41DUP009, S41SS0090001, S41S0010001, S41SS0030001, S41SS0040001 and S41SS0050001. The MS %Rs for the soil matrix was below the lower quality control limit for antimony, arsenic, barium, beryllium, cadmium, cobalt, copper, nickel, silver, thallium and vanadium. The ICP Serial Dilution %Ds for chromium and nickel affecting the soil matrix were > 10% quality control limit.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

David G. Olson
Environmental Scientist

Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
J	-	Positive result is considered estimated as a result of validation noncompliances.
UJ	-	Nondetected result is considered estimated as a result of validation noncompliances
K	-	Positive result is considered biased high as a result of validation noncompliances
UL	-	Nondetected result is considered biased low as a result of validation noncompliances
L	-	Positive result is considered biased low as a result of validation noncompliances.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-98 -007

TO: **MR. GEORGE LATULIPPE** **DATE: JANUARY 15, 1998**

FROM: **KATE LANDKROHN** **COPIES: DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - pH, PERCENT SOLIDS, AND NITROCELLULOSE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 7

SAMPLES: 10 Soil

S41SS0010001	S41SS0040001	S41SS0070001	S41DUP009
S41SS0020001	S41SS0050001	S41SS0080001	
S41SS0030001	S41SS0060001	S41SS0090001	

7 Aqueous

S41GW003U001	S41GW002U001	S41GW001U001	RB-102297-1
S41GW003F001	S41GW002F001	S41GW001F001	

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 7 consists of seven (7) aqueous and ten (10) soil environmental samples. Field duplicate pair S41SS0080001/S41DUP009 was included within this SDG. Sample S41SS0080001 was selected for Matrix Spike (MS) analyses by the field crew for this SDG.

Ten (10) soil environmental samples were analyzed for pH, percent solids, and nitrocellulose. The samples were collected by Brown and Root Environmental on October 22, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using method specific analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, matrix spike recoveries, laboratory duplicate results, detection limits and analyte quantitation.

All analyses were conducted using wet chemistry methods.

No areas of concern with respect to data quality were noted.

Notes

The laboratory did not provide an electronic deliverable for this SDG.

Executive Summary

Laboratory Performance: No problems noted.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Kathy Landkrohn

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U - Value is a nondetect as reported by the laboratory.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-97-195

TO: **MR. GEORGE LATULIPPE** **DATE: FEBRUARY 6, 1998**

FROM: **KATE LANDKROHN** **COPIES: DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TOTAL ORGANIC CARBON, pH, AND NITROCELLULOSE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 6

SAMPLES: 8 Soil

S39SD0010001	S39SD0030001	S39SD0050001	S39SD0070001
S39SD0020001	S39SD0040001	S39SD0060001	S39SD0080001

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 6 consists eight (8) soil environmental samples. Field duplicate pair S39SW0020001/S12DUP008 was included within this SDG. A Matrix Spike (MS) was not selected by the field crew for this SDG; however, the laboratory selected the following samples for MS and duplicate analyses: batch sample 9710110-04 for MS analysis for Total Organic Carbon (TOC), batch sample 9710132-08 for MS analysis for nitrocellulose, sample S39SD0080001 for duplicate analysis on percent solids and pH analyses.

The eight (8) soils samples were analyzed for nitrocellulose, percent solids, pH, and TOC. The samples were collected by Brown and Root Environmental on October 21, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using method specific analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, matrix spike recoveries, laboratory duplicate results, detection limits and analyte quantitation.

All analyses were conducted using wet chemistry methods.

No areas of concern with respect to data quality were noted.

Executive Summary

Laboratory Performance: No problems noted.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U - Value is a nondetect as reported by the laboratory.

Brown & Root Environmental INTERNAL CORRESPONDENC

C-49-08-7-134

~~TO: MR. GEORGE LATULLIPE~~ DATE: DECEMBER 15, 1997

FROM: BONNI J. SMATHERS COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION-VOA/SVOA/PEST/PCB
CTO 245, NSWC, INDIAN HEAD
9710158 - SDG 8

SAMPLES:

9/Aqueous/

S12GW005U001	S12DUP011	S12GW006U001
S41GW004U001	S41DUP010	S44GW001U001
S44GW002U001	S44GW003U001	TB-102397-1

Overview

The sample set for the CTO 245 NSWC, Indian Head site, SDG 8, consists of nine (8) aqueous and one (1) trip blank. The samples were analyzed for Target Compound List (TCL) volatile, semivolatile, and/or pesticide/PCB organic compounds. Matrix Spike/Matrix Spike Duplicate and duplicate analyses were shared with Work Order 9710133. Sample 08-GW-34 was designated by the field crew for Matrix Spike/Matrix Spike Duplicate analyses.

The samples were collected by Brown and Root Environmental on October 23rd and 24th, 1997 and analyzed by G.P. Environmental Services, Inc. under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using OLC2.0 and OLM03.1 analytical and reporting protocols.

Summary

All compounds were successfully analyzed, with the exception of those results considered unreliable, (UR). The findings offered in this report are based upon a general review of all available data including data completeness, holding times until analysis, GC/MS tuning and calibration data, laboratory and field blank results, surrogate spike recoveries, matrix spike/matrix spike duplicate results, internal standards performance, tentatively identified compounds, compound identification and compound quantitation. Areas of concern with respect to data quality are listed below.

Major Problems

- Initial and Continuing Calibration Relative Response Factors (RRFs) for acetone and 2-butanone were less than 0.050. This noncompliance indicates a lack of instrument response. Positive and nondetected results are affected by this noncompliance. Therefore, nondetected results reported for the aforementioned compounds in the affected samples were considered unreliable and were rejected, (UR).

Minor Problems

- Samples S12GW006U001, S12GW005U001, and S12DUP011 had high %Ds between positive results on columns 1 and 2 for several single component pesticide compounds. As a result, the positive results for the affected pesticides were qualified as estimated, (J), in the aforementioned samples.

- Positive results reported at concentrations below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J).

Notes

The volatile compounds bromomethane, chloromethane, methylene chloride, and vinyl chloride had continuing calibration Percent Differences (%Ds) greater than 25%. Continuing calibration %Ds were also greater than 25% for the semivolatile compound 3,3'-dichlorobenzidine. These noncompliances affect positive results only. Since only nondetected results were reported for these compounds in the affected samples, no action was taken.

The Laboratory Control Samples had high %Ds between positive results on columns 1 and 2 for several single component pesticide compounds. No action was taken, however, since Region III validation protocol does not qualify based solely on this noncompliance.

No other problems were noted.

Executive Summary

Laboratory Performance: Initial and Continuing Calibration Relative Response Factors (RRFs) for acetone and 2-butanone were less than 0.050. The volatile compounds bromomethane, chloromethane, methylene chloride, and vinyl chloride had continuing calibration Percent Differences (%Ds) greater than the 25% quality control limit. The semivolatile compound 3,3'-dichlorobenzidine also had %D greater than the 25% quality control limit. High %Ds were reported for several single component pesticide compounds were reported.

Other Factors Affecting Data Quality: None.

MEMO TO: MR. GEORGE LATULLIPE
DATE: DECEMBER 15, 1997 - PAGE 3

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Review", as amended for use within EPA Region III, and the NFESC guidelines entitled "Navy Installation Restoration Program Laboratory Quality Assurance Guide"(February, 1996).

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental

Bonni J. Smathers
Industrial Hygienist/Data Validator

Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Summary of Tentatively Identified Compounds (TICs)
Remaining after Data Qualification

Fraction	TIC
Volatile	None reported
Semivolatile	Unknown(s)

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
J	-	Positive value is considered estimated since it is reported at a concentration less than the CRQL or due to a technical noncompliance.
UJ	-	Nondetected result is considered estimated due to various technical noncompliances.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-98 -001

TO: **MR. GEORGE LATULIPPE** **DATE: JANUARY 5, 1998**

FROM: **KATE LANDKROHN** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 8

SAMPLES: 4 Soil

S44SS0010001	S44SS0020001	S44SS0030001	S44SS0040001

17 Aqueous

RB1023971	S12GW006F001	S41DUP010	S44GW003F001
S12GW005F001	S12GW006U001	S44GW001F001	S44GW003U001
S12DUP011F	S41GW004F001	S44GW001U001	
S12GW005U001	S41DUP010F	S44GW002F001	
S12DUP011	S41GW004U001	S44GW002U001	

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 8 consists of sixteen (16) aqueous environmental samples, four (4) soil environmental samples and one (1) rinsate blank (RB1023971). Field duplicate pairs S41GW004(U/F)001/S41DUP010(/F) and S12GW005(U/F)001/S12DUP011(/F) were included within this SDG. A Matrix Spike (MS) was not selected by the field crew for this SDG; however, the laboratory selected the following samples for MS analyses: S44SS0010001 (for all soils analyses except cyanide), S41GW004F001 (for all aqueous analyses except mercury and cyanide), S41GW004UOO1 (for aqueous mercury), S44SS0040001 (for soils mercury), S41DUP010 (for aqueous silver analyses), batch sample 9710132-12F (for aqueous cyanide).

The above samples, with the exception of those designated with F, were analyzed for TAL metals and cyanide. The samples designated F were analyzed for TAL metals only. The samples were collected by Brown and Root Environmental on October 23 and 24, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using Contract Laboratory Program (CLP) Statement of Work (SOW) ILM04.0 analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, interference check sample (ICS) results, matrix spike recoveries, post digestion spike recoveries, laboratory duplicate results, laboratory control sample (LCS) results, Inductively Coupled Plasma (ICP) serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury and cyanide, were conducted using ICP methodologies. Mercury analysis was conducted using cold vapor AA. Cyanide analyses were conducted using wet chemistry methods.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) percent recoveries (%Rs) were > 110% quality control limit for aluminum, calcium, chromium, magnesium, sodium, and zinc. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as biased high, (K).

- The CRDL %Rs were > 110% quality control limit for potassium and selenium. Positive results < 2X CRDL reported for the aforementioned analytes were qualified as estimated, (J), due to conflicting directional bias.

- The following contaminants were detected in the laboratory method/preparation/rinsate blanks at the following maximum concentrations :

Analyte	Maximum Concentration	Action Level - aqueous	Action Level - soil
aluminum	41.5 ug/L	207.5 ug/L	41.5 mg/kg
antimony	7.1 ug/L	35.5 ug/L	7.1 mg/kg
barium(1)	1.4 ug/L	7.0 ug/L	NA
barium(2)	0.252 mg/kg	NA	1.26 mg/kg
beryllium	0.1 ug/L	0.5 ug/L	0.1 mg/kg
cadmium	0.8 ug/L	4.0 ug/L	0.8 mg/kg
calcium(1)	176.7 ug/L	883.5 ug/L	NA
calcium(2)	43.180 mg/kg	NA	215.9 mg/kg
chromium	0.8 ug/L	4.0 ug/L	NA
chromium(2)	0.191 mg/kg	NA	0.995 mg/kg
cobalt	2.5 ug/L	12.5 ug/L	2.5 mg/kg
copper	3.6 ug/L	18 ug/L	NA
copper(2)	1.069 mg/kg	NA	5.345 mg/kg
iron	30.2 ug/L	151 ug/L	NA
iron(2)	7.428 mg/kg	NA	37.14 mg/kg
lead	1.5 ug/L	7.5 ug/L	1.5 mg/kg
magnesium	62.7 ug/L	313.5 ug/L	62.7 mg/kg
manganese	0.7 ug/L	3.5 ug/L	NA
manganese(2)	0.204 mg/kg	NA	1.02 mg/kg
nickel	2.6 ug/L	13.0 ug/L	2.6 mg/kg
potassium	123.6 ug/L	618 ug/L	123.6 mg/kg
silver	4.5 ug/L	22.5 ug/L	4.5 mg/kg
sodium(1)	1107.0 ug/L	5535 ug/L	NA
sodium(2)	82.440 mg/kg	NA	412.2 mg/kg
thallium	3.5 ug/L	17.5 ug/L	3.5 mg/kg
vanadium	3.3 ug/L	16.5 ug/L	3.3 mg/kg

zinc	3.0 ug/L	15.0 ug/L	NA
zinc[2]	1.58 mg/kg	NA	7.9 mg/kg

Samples Affected: All

(1) Maximum concentration found in an aqueous preparation blank.
(2) Maximum concentration found in soil preparation blank.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size, weight, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action levels for aluminum, antimony, barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, silver, sodium, thallium, vanadium and zinc have been qualified, (B), as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects. It should be noted that field quality control samples are not qualified for field quality control blank contamination.

- The interfering analyte calcium was present in sample S12GW005F001 at a concentration comparable to the level of calcium in the interference check sample (ICS) solution. Several analytes namely, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for beryllium, cadmium, chromium, cobalt, copper, nickel, selenium, silver, thallium, vanadium and zinc. The possibility of suppressive affects may be present for beryllium, selenium, and vanadium in the affected sample; nondetected results were qualified as biased low, (UL), for these analytes. The positive result reported for zinc was qualified as biased high, (K). Positive results for cadmium, chromium, cobalt, copper, nickel, silver and thallium received no flags as the results were qualified as a result of blank contamination.

- The interfering analyte calcium was present in sample S12GW005U001 at a concentration comparable to the level of calcium in the interference check sample (ICS) solution. Several analytes namely, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for beryllium, cadmium, chromium, cobalt, copper, nickel, selenium, thallium, vanadium, and zinc. Suppressive affects may be present for beryllium and selenium in the affected sample; nondetected results were qualified as biased low, (UL). Positive results for cadmium, chromium, cobalt, copper, nickel, thallium, vanadium and zinc received no flags as the results were qualified as a result of blank contamination.

- The interfering analyte calcium was present in sample S12DUP011 at a concentration comparable to the level of calcium in the interference check sample (ICS) solution. Several analytes namely, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for beryllium, cadmium, cobalt, copper,

nickel, selenium, silver, thallium, vanadium, and zinc. The possibility of suppressive affects may be present for beryllium and selenium in the affected sample; nondetected results were qualified as biased low, (UL). The positive result reported for zinc was qualified as biased high, (K). Positive results for cadmium, cobalt, copper, nickel, silver, thallium and vanadium received no flags as the results were qualified as a result of blank contamination.

- The interfering analyte calcium was present in sample S12GW006F001 at a concentration comparable to the level of calcium in the interference check sample (ICS) solution. Several analytes namely, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for beryllium, cadmium, chromium, cobalt, copper, selenium, thallium, and vanadium. Suppressive affects may be present for beryllium, selenium, and vanadium in the affected sample; nondetected results were qualified as biased low, (UL), for these analytes. Positive results for cadmium, chromium, cobalt, copper and thallium received no flags as the results were qualified as a result of blank contamination.

- The interfering analyte calcium was present in sample S12GW006U001 at a concentration comparable to the level of calcium in the interference check sample (ICS) solution. Several analytes namely, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for beryllium, cadmium, copper, selenium, thallium, vanadium, and zinc. Suppressive affects may be present for beryllium and selenium in the affected sample; nondetected results were qualified as biased low, (UL). The positive result reported for zinc was qualified as biased high, (K). Positive results for cadmium, copper, thallium and vanadium received no flags as the results were qualified as a result of blank contamination.

- The interfering analyte calcium was present in sample S12DUP011F at a concentration comparable to the level of calcium in the interference check sample (ICS) solution. Several analytes namely, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, manganese, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc were present in the ICS solution at a concentration which exceeded the instrument detection limit (IDL). Interference affects exist for beryllium, cadmium, chromium, cobalt, copper, nickel, selenium, thallium and vanadium. Suppressive affects may be present for beryllium, selenium, and vanadium in the affected sample; nondetected results were qualified as biased low, (UL), for these analytes. Positive results for cadmium, chromium, cobalt, copper, nickel and thallium received no flags as the results were qualified as a result of blank contamination.

- The Matrix Spike (MS) %Rs for antimony, arsenic, cadmium, lead, and thallium in the soil matrix were < 75% quality control limit. Positive and nondetected results reported for the aforementioned analytes were qualified as biased low, (L) and (UL), respectively.

- The MS %R for selenium in the soil matrix was < 75% quality control limits. Positive results and nondetects were qualified as estimated, (J) and (UJ), respectively, due to conflicting directional bias.

- The MS %Rs for arsenic and lead in the aqueous matrix were > 125% quality control limit. Positive results reported for the aforementioned analytes were qualified as biased high, (K).

- ICP Serial Dilution percent differences (%Ds) for the soil matrix were above the quality control limits for copper, potassium, and zinc. Positive results reported for copper, potassium and zinc were qualified as estimated, (J).

- ICP Serial Dilution %Ds for the aqueous matrix were above the quality control limits for barium and manganese. Positive results reported for the aforementioned analytes were qualified as estimated, (J).

Notes

The CRDL %Rs for iron and thallium were above the quality control limits. However, no validation actions were warranted as all results were > 2X CRDL, or were qualified as blank contamination, or were nondetected.

The MS %Rs for antimony, cadmium, selenium and thallium affecting the aqueous matrix were > 125% quality control limit. However, no validation actions were warranted as all sample results were either nondetects or were qualified as blank contamination.

A comparison of field duplicate pairs, S41GW004(U/F)001 / S41DUP010(/F) and S12GW005(U/F)001 / S12DUP011(/F), is contained in Appendix C. However, no validation actions are required as per Region III guidance.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were outside quality control limits. Several analytes were present in the laboratory method/ preparation blanks.

Other Factors Affecting Data Quality: The interfering analyte calcium was present in samples S12GW005(U/F)001, S12DUP011(/F) and S12GW006(U/F)001 in this SDG. The MS %Rs for antimony, arsenic, cadmium, lead, selenium, and thallium in both the soil and aqueous matrices did not meet the quality control limits. The ICP Serial Dilution %Ds for copper, potassium, and zinc did not meet the quality control limits in the soil matrix. The ICP Serial Dilution %Ds for barium and manganese did not meet the quality control limits in the aqueous matrix.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
UL	-	Nondetected result is considered biased low as a result of validation noncompliances.
K	-	Positive result is considered biased high as a result of validation noncompliances.
L	-	Positive result is considered biased low as a result of validation noncompliances.
J	-	Positive result is considered estimated as a result of validation noncompliances.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

EPC-98 -006

TO: **MR. GEORGE LATULIPPE** **DATE: FEBRUARY 7, 1998**

FROM: **KATE LANDKROHN** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - NITROCELLULOSE**
CTO 245 - NSWC INDIAN HEAD, MARYLAND
SDG - 8

SAMPLES: 4 Soil

S44SS0010001 S44SS0020001 S44SS0030001 S44SS0040001

6 Aqueous

RB1023971 S44GW001U001
S41GW004U001 S44GW002U001
S41DUP010 S44GW003U001

Overview

The sample set for CTO 245, NSWC Indian Head, Maryland, SDG 8 consists of six (6) aqueous and four (4) soil environmental samples. A Matrix Spike (MS) was not selected by the field crew for this SDG.

Four (4) soil and six (6) aqueous environmental samples were analyzed for nitrocellulose. The samples were collected by Brown and Root Environmental on October 23-24, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using method specific analytical and reporting protocols.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation/rinsate blanks, matrix spike recoveries, laboratory duplicate results, detection limits and analyte quantitation.

All analyses were conducted using wet chemistry methods.

No areas of concern with respect to data quality were noted.

Executive Summary

Laboratory Performance: No problems noted.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Kathy A. Landkrohn
Environmental Scientist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U - Value is a nondetect as reported by the laboratory.

Brown & Root Environmental

INTERNAL CORRESPONDENC

TO: GEORGE LATULIPPE

DATE: DECEMBER 15, 1997

FROM: CRAIG FARKOS

CC: DV FILE

SUBJECT: EXPLOSIVES DATA VALIDATION - EXPLOSIVES/NITROAROMATICS, NITROGUANIDINE, NITROGLYCERINE
CTO 0245, NSWC INDIAN HEAD, MARYLAND
SDG 8

SAMPLES:

4/Soil

S44SS0010001	S44SS0020001	S44SS0030001	S44SS0040001

6/Aqueous

S44GW001U001	S44GW002U001	S44GW003U001	S41GW004U001
S41DUP010	RB102397-1		

Overview

The sample set for the CTO 0245 NSWC Indian Head SDG 8, consists of four (4) soil samples, five (5) aqueous samples, and one (1) aqueous rinsate blank (designated RB). Soil samples were analyzed for explosives/nitroaromatics and nitroglycerin. Aqueous samples were analyzed for explosives/nitroaromatics, nitroglycerin and nitroguanidine.

The samples were collected by Brown and Root Environmental on October 23, 1997 and analyzed by General Physics Environmental Services. The samples were analyzed for explosive/nitroaromaromatics and nitroglycerine using modified method 8330. Analyses for nitroguanidine were performed using modified method USAEC.

Summary

All compounds were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times until extraction/analysis, calibration data, laboratory and field quality control blank results, matrix spike/matrix spike duplicate analyses, surrogate spike recoveries, field duplicate precision, laboratory control sample analyses, compound identification and quantitation, detection limits.

Areas of concern with respect to data quality are listed below.

Major Problems

- No major problems were detected for the examined samples.

Minor Problems

- Surrogate recovery in explosives analyses for soil samples S44SS0020001 and S44SS0030001 below the minimum QC limits. Nondetect results reported for these two samples were biased low (UL).

Notes

- The percent recovery (%RSD) of the matrix spike/matrix spike duplicate in soil sample S44SS0020001 analyzed for explosive compounds was outside the advisory QC limits. No qualification were made on reported results for this environmental sample.

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation", as amended for use within EPA Region III, and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown & Root Environmental

Craig Farkos
Engineer

Brown & Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Summary

U - Nondetect as reported by the laboratory.

Brown & Root Environmental INTERNAL CORRESPONDENCE

C-49-01-8-078

TO:	GEORGE LATULIPPE	DATE:	JANUARY 14, 1998
FROM:	SEAN NIXON	COPIES:	DV FILE

SUBJECT: ORGANIC DATA VALIDATION - TCLP HERBICIDES
CTO 245 INDIAN HEAD, MARYLAND
SDG - 9

SAMPLES: 1/Aqueous

IDW-110497

Overview

The sample set for CTO 245 Indian Head, Maryland, Sample Delivery Group (SDG) 9, consists of one (1) aqueous environmental sample. The field crew did not specify the sample for Matrix Spike/ Matrix Spike Duplicate analysis.

The sample were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) Herbicides. The sample was collected by Brown and Root Environmental on November 4, 1997 and analyzed by GP Environmental Services Incorporated under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The Herbicide analysis was conducted according to SW-846 Method 8150.

Summary

All analytes were successfully analyzed. The findings offered in this report were based upon a general review of all available data including data completeness, holding times, calibration data, laboratory and field quality control blank results, Matrix Spike (MS)/ Matrix Spike Duplicate (MSD) analyses, surrogate spike recoveries, Laboratory Control Sample (LCS) analyses, compound identification and quantification, and detection limits.

Areas of concern with respect to data quality are listed below.

Major Problems

- None

Minor Problems

- The 7 day holding time until extraction was exceeded by 3 days. The nondetected results for the TCLP herbicide compounds were qualified as estimated, (UJ).

Notes

The initial calibration contained a Percent Relative Standard Deviation (%RSD) greater than the 20% quality control limit, but less than 40%, for 2,4-D. Since a nondetected result was reported for 2,4-D in the sample, no action was taken.

A continuing calibration contained a Percent Difference (%D) greater than the 15% quality control limit, but less than 30%, for 2,4,5-TP (Silvex). Since a nondetected result was reported for 2,4,5-TP (Silvex) in the sample, no action was taken

The Matrix Spike analysis of the sample yielded a Percent Recovery (%R) (108%) greater than the quality control limit for 2,4-D. Since a nondetected result was reported for 2,4-D in the sample, no action was taken.

The Laboratory Control Sample (LCS) yielded a %R (105%) greater than the quality control limit for 2,4-D. Since a nondetected result was reported for 2,4-D in the sample, no action was taken.

Executive Summary

Laboratory Performance: The 7 day holding time until extraction was exceeded for the sample.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", September 1994 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide " (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Sean T. Nixon
Chemist/Data Validator
Brown and Root Environmental

Joseph A. Samchuck
Data Validation Quality Assurance Officer
Brown and Root Environmental

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

DATA QUALIFIER TABLE:

UJ	-	Nondetected result is considered estimated as a result of various technical noncompliances

Brown & Root Environmental

INTERNAL CORRESPONDENC

C-49-01-8-070

TO:	G. LATULIPPE	DATE:	JANUARY 13, 1998
FROM:	TERRI L. SOLOMON	COPIES:	DV FILE
SUBJECT:	INORGANIC DATA VALIDATION - TCLP METALS CTO 245 -NSWC INDIAN HEAD, MARYLAND SDG - 9		

SAMPLES: 1/Leachate/

IDW-110497

Overview

The sample set for CTO 245, NSWC Indian Head, SDG 9, consists of one (1) leachate sample. No field duplicate pair were included within this SDG.

The sample was analyzed for TCLP metals. The sample was collected by Brown and Root Environmental on November 4 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using SW-846 methodologies. A CLP-like deliverable was provided.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of al available data including data completeness, holding times, calibration data, laboratory method/preparation blanks, ICP Interference, matrix spike results, laboratory duplicate results, laboratory control sample (LCS) results, ICP serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury were conducted using Inductively Coupled Plasma (ICP) methodologies Mercury analyses were conducted using cold vapor AA.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for lead were < 90% quality control limit. The nondetected result reported for the aforementioned analyte was qualified as biased low UL".

Notes

An iIncomplete sample ID was noted on the Form I. The Form I was amended for completeness.

The following contaminant was detected in the laboratory extraction blank at the following maximum concentration:

Analyte	Maximum Concentration	Action Level - Aqueous
barium	344 ug/L	1720 ug/L

Samples Affected: All

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size and dilution factors were taken into consideration when evaluating for blank contamination. No action was taken for the aforementioned analyte since the result was nondetected.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recovery for lead was < 90% quality control limit.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Terri L. Solomon

Brown and Root Environmental
Terri L. Solomon
Chemist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
UL	-	Nondetected result is considered biased low as a result of CRDL %R.

Brown & Root Environmental

INTERNAL CORRESPONDENC

C-49-01-8-071

TO:	G. LATULIPPE	DATE:	JANUARY 13, 1998
FROM:	TERRI L. SOLOMON	COPIES:	DV FILE

SUBJECT: **INORGANIC DATA VALIDATION - REACTIVE CYANIDE, FLASH POINT, pH, REACTIVE SULFIDE**
CTO 245 -NSWC INDIAN HEAD, MARYLAND
SDG - 9

SAMPLES: 1/Soil/

IDW-110497

Overview

The sample set for CTO 245, NSWC Indian Head, SDG 9, consists of one (1) soil sample. No field duplicate pairs were included within this SDG.

The sample was analyzed for reactive cyanide, flash point, pH and reactive sulfide. The sample was collected by Brown and Root Environmental on November 4, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Reactive cyanide analysis was conducted using method MCAWW 335.2. Flash point analysis was conducted using method 1010. PH analysis was conducted using method MCAWW method 150.1. Reactive sulfide analysis was conducted using method MCAWW method 376.1.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation blanks, laboratory duplicate results, laboratory control sample (LCS) results, detection limits and analyte quantitation.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Laboratory Control Standard (LCS) Percent Recovery (%R) for reactive sulfide was < 80% quality control limit. The positive result reported for reactive sulfide was qualified as biased low, "L".

Executive Summary

Laboratory Performance: The LCS %R for reactive sulfide was < 80% quality control limit.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Terri L. Solomon

Brown and Root Environmental
Terri L. Solomon
Chemist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

L - Positive result is considered biased low as a result of LCS %R.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-12-7-215

TO: GEORGE LATULIPPE

DATE: DECEMBER 30, 1997

FROM: DANA PIETO

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - TCLP VOCs, SVOCs, & PESTs
CTO 245, NSWC INDIAN HEAD, MARYLAND
SDG 9

SAMPLES: 1 Aqueous:

IDW-110497

Overview

The sample set for CTO 245 NSWC Indian Head, SDG 9, consists of one aqueous environmental sample. The sample was analyzed for Toxicity Characteristics Leaching Procedure (TCLP) volatile, semivolatile, and pesticide organic compounds.

The sample was collected by Brown & Root Environmental on November 4, 1997, and analyzed by GP Environmental Services. The volatile, semivolatile, and pesticide compound analyses were analyzed under Naval Facilities Engineering Service Center (NFESC). The volatile, semivolatile, and pesticide compound analyses were analyzed under Naval Facilities Engineering Service Center (NFESC), using SW-846 Methods 1311, 8260A, 8270, and 8080, respectively.

Summary

All compounds were successfully analyzed with the exception of those results that were rejected. The findings offered in this report are based upon a general review of all available data including data completeness, holding times until extraction/analysis, GC/MS tuning and calibration data, laboratory and field quality control blank results, matrix spike/matrix spike duplicates analyses, surrogate spike recoveries, internal standards performance, field duplicate precision, laboratory control sample analyses, compound identification and quantitation, and detection limits.

Areas of concern with respect to data quality are listed below.

Major Problems

- The volatile initial and continuing calibration contained relative response factors (RRFs) that were below the 0.050 quality control criterion for 2-butanone. The result is biased extremely low. The nondetected result was qualified as rejected, (UR).

Minor Problems

- The holding time until extraction for semivolatile and pesticide organic compounds exceeded the 7-

day limit by 3 days. Nondetected results were qualified as estimated, (UJ). The direction of bias is unknown.

- The pesticide surrogate tetrachloro-m-xylene had a percent recovery that was below the quality control limits. Nondetected results were qualified as estimated, (UJ). The direction of bias is unknown.

Notes

Several continuing calibration Percent Differences (%Ds) for volatile compounds and the pesticide methoxychlor exceeded the 25% validation quality control criterion. Validation action is not required since the %Ds were less than 50%.

Several Laboratory Control Standard (LCS) percent recoveries (%Rs) for volatiles and pesticides were above the recovery limits. LCS %Rs for semivolatiles were below the recovery limits. No action was taken for these noncompliances.

The pesticide Matrix Spike/Matrix Spike Duplicate (MS/MSD) analysis contained high MS %Rs for gamma-BHC, endrin, and methoxychlor. No action is taken based upon MS noncompliances alone.

No other problems were noted.

Executive Summary

Laboratory Performance: One volatile initial calibration RRF was noted. Several volatile and pesticide continuing calibration noncompliances were present.

MEMO TO: GEORGE LATULIPPE
DATE: DECEMBER 30, 1997 - PAGE 3

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation", as amended for use within EPA Region III, and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Dana L. Pieto

Dana L. Pieto

Brown & Root Environmental
Data Validator

Joseph A. Samchuck

Brown & Root Environmental
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Brown & Root Environmental INTERNAL CORRESPONDENC

C-49-01-8-114

TO:	**G. LATULIPPE**	**DATE:**	**JANUARY 20, 1998**
FROM:	**TERRI L. SOLOMON**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - SIMULTANEOUSLY EXTRACTED METALS AND ACID-VOLATILE SULFIDES**
CTO 245 -NSWC INDIAN HEAD, MARYLAND
SDG - 10

SAMPLES: 22/Soils/

S12SD0010001	S12SD0020001	S12SD0030001	S12SD0040001
S12DUP007	S12SD0050001	S12SD0060001	S39SD0010001
S39SD0020001	S39SD0030001	S39SD0040001	S39SD0050001
S39SD0060001	S39SD0070001	S39SD0080001	S42SD0010001
S42SD0020001	S42SD0030001	S42SD0040001	S42SD0050001
S42SD0060001	S42DUP001		

Overview

The sample set for CTO 245, NSWC Indian Head, SDG 10, consists of twenty-two (22) soil samples. Two field duplicate pairs (S12SD0040001 / S12DUP007 and S42SD0060001 / S42DUP001) was included within this SDG.

All samples were analyzed for simultaneously extracted metals and acid-volatile sulfides. The samples were collected by Brown and Root Environmental on October 10, 20 and 21, 1997 and analyzed by GP Environmental Services under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using an EPA draft method.

Summary

All analytes were successfully analyzed. The findings offered in this report are based upon a general review of all available data including data completeness, holding times, calibration data, laboratory method/preparation blanks, ICP Interference, matrix spike results, post digestion spike results, laboratory duplicate results, laboratory control sample (LCS) results, ICP serial dilution results, detection limits and analyte quantitation.

All analyses, with the exception of mercury were conducted using Inductively Coupled Plasma (ICP) methodologies. Mercury analyses were conducted using cold vapor AA.

Areas of concern with respect to data quality are listed below.

Minor Problems

- The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for nickel was > 110% quality control limit. The positive results < 2X CRDL reported for the aforementioned analyte were qualified as biased high, "K".

- The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level - Soil
cadmium	0.9 ug/L	0.1125 mg/kg
cadmium(2)	1.3 ug/L	0.1625 mg/kg
copper	1.3 ug/L	0.1625 mg/kg
copper(1)	3.2 ug/L	0.4 mg/kg
copper(2)	4.1 ug/L	0.5125 mg/kg
lead	1.3 ug/L	0.1625 mg/kg
lead(1)	2.8 ug/L	0.35 mg/kg
lead(2)	10.5 ug/L	1.3125 mg/kg
mercury(1)	0.4 ug/L	0.05 mg/kg
mercury(2)	1.2 ug/L	0.15 mg/kg
mercury(3)	0.9 ug/L	0.1125 mg/kg
nickel	1.5 ug/L	0.1875 mg/kg
nickel(1)	47.1 ug/L	5.8875 mg/kg
nickel(2)	40.0 ug/L	5.00 mg/kg
zinc(1)	20.4 ug/L	2.55 mg/kg
zinc(2)	50.4 ug/L	6.3 mg/kg
zinc(1)	10.6 ug/L	1.325 mg/kg

Samples Affected: All

(1) Maximum concentration present in a preparation blank affecting samples S42SD0050001, S42SD0010001, S42SD0020001, S42SD0030001 and S42DUP001.
(2) Maximum concentration present in a preparation blank affecting samples S12DUP007, S12SD0030001, S12SD0010001, S12SD0060001, S39SD0080001, S39SD0040001 and S39SD0030001.
(3) Maximum concentration present in a preparation blank affecting samples S12SD0020001, S12SD0040001, S12SD0050001, S39SD0010001, S39SD0020001, S39SD0050001, S39SD0060001, S39SD0070001, S42SD0040001, S42SD0060001.

An action level of 5x the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot size and dilution factors were taken into consideration when evaluating fo blank contamination. Positive results < the action level for mercury and nickel have been qualified, "B", as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects.

- The ICP Serial Dilution Percent Difference (%D) for cadmium was > 10% quality control limit. Positive results reported for the aforementioned analyte were qualified as estimated, "J". The direction of bias could not be determined.

Notes

The post digestion spike recoveries for cadmium, copper, lead, nickel and zinc were > 125% quality control limit. However, no validation actions are required as per Region III guidance.

A comparison of field duplicate pairs, S12SD0040001 / S12DUP007 and S42SD0060001 / S42DUP001, is contained in Appendix C. However, no validation actions are required as per Region III guidance.

Executive Summary

Laboratory Performance: The CRDL Standard analysis recovery for nickel was > 110% quality control limit. Several analytes were present in the laboratory method / preparation blanks.

Other Factors Affecting Data Quality: The ICP Serial Dilution %D for cadmium was > 10% quality control limit.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", April 1993 Revision as amended for use within USEPA Region III, and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Brown and Root Environmental
Terri L. Solomon
Chemist

Brown and Root Environmental
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
B	-	Positive result is considered to be an artifact of blank contamination and should not be considered present.
K	-	Positive result is considered biased high as a result of validation noncompliances.
J	-	Positive result is considered estimated as a result of validation noncompliances.

APPENDIX J

STATISTICAL ANALYSIS OF ENVIRONMENTAL DATA

SITE 12 - TOWN GUT LANDFILL

Table
Background Comparison Tests - Surface Soil Data
Site 12 - Town Gut Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Nitrocellulose	N	0/1	1/5		NA					46200	NA	1	1	0.8333	N				NA		15600			NA							NA
Aluminum	Y	12/12	5/5		NA	7870	3820	1.7959	N	18329	16300	N	3	3	0.0147	Y	0.0068			Y	8.82	9.46	3.2639	1.7613	Y	lognor.	lognor.	0.619	0.176	5.4062	3.8667	N
Arsenic	Y	14/14	5/5		NA	2.18	0.793	1.7709	N	4.25	14.4	Y	5	5	0.0001	Y	0.0001			Y	2.18	8.34			NA	normal	lognor.					NA
Barium	Y	14/14	5/5		NA	3.54	0.548	1.7709	L	144	174	Y	10	5	0.0217	Y	0.0209			Y	3.54	4.2	2.2835	1.7396	Y	lognor.	lognor.	0.548	0.582	0.0209	3.8656	Y
Beryllium	N	12/14	2/5	0.9939	N	0.349	0.213	1.7709	N	0.905	0.56	N	4	1	0.7417	N	0.8804	Geha	Test	N	0.349	0.196			NA	normal	lognor.					NA
Cadmium	Y	6/14	4/5		NA	0.169					3.6	NA	4	4	0.0013	Y	0.0010	Geha	Test	Y	0.169	1.35			NA	nonpar.	lognor.					NA
Calcium	Y	2/12	5/5	0.0034	Y	103					3230	NA	5	5	0.0002	Y	0.0002	Geha	Test	Y	103	2300			NA	nonpar.	lognor.					NA
Chromium	Y	14/14	5/5		NA	12	4.68	1.7709	N	24.2	34.6	Y	7	5	0.0018	Y	0.0015			Y	2.4	3.07	3.0425	1.7396	Y	lognor.	lognor.	0.457	0.279	1.1264	3.8656	Y
Cobalt	Y	14/14	5/5		NA	1.25	0.932	1.7709	L	39.7	13	N	11	5	0.0397	Y	0.0558			N	1.25	1.89	1.4601	1.7396	N	lognor.	lognor.	0.932	0.501	1.7052	3.8656	Y
Copper	Y	12/14	5/5	0.5322	N	1.36	0.601	1.7709	L	18.7	81.3	Y	6	5	0.0005	Y	0.0004			Y	1.36	3.3	5.5282	1.7396	Y	lognor.	lognor.	0.601	0.876	0.8993	3.8656	Y
Cyanide	NA	0/2	1/5		NA						0.34	NA				NA				NA		0.204			NA							NA
Iron	Y	12/12	5/5		NA	9.09	0.577	1.7959	L	43170	23000	N	6	5	0.0010	Y	0.0031			Y	10300	22200			NA	lognor.	normal					NA
Lead	Y	12/14	5/5	0.5322	N	17.8					67.6	NA	6	5	0.0005	Y	0.0016			Y	17.8	39.8			NA	nonpar.	normal					NA
Magnesium	Y	12/12	5/5		NA	576	295	1.7959	N	1382	1540	Y	7	5	0.0034	Y	0.0019			Y	576	1180			NA	normal	normal					NA
Manganese	Y	12/12	5/5		NA	4.75	1.08	1.7959	L	2248	577	N	10	5	0.0407	Y	0.0409			Y	4.75	5.66	1.7808	1.7531	Y	lognor.	lognor.	1.08	0.475	2.7319	3.8667	Y
Mercury	Y	12/14	5/5		NA	0.0399	0.018	1.7709	N	0.087	4	Y	5	5	0.0001	Y	0.0001	Geha	Test	Y	0.0399	0.916			NA	normal	nonpar.					NA
Nickel	Y	14/14	5/5		NA	1.45	0.557	1.7709	L	18.2	13.3	N	4	4	0.0013	Y	0.0006			Y	4.9	11.4			NA	lognor.	normal					NA
Potassium	Y	12/12	5/5		NA	5.99	0.564	1.7959	L	1874	1540	N	4	4	0.0021	Y	0.0011			Y	5.99	6.97	3.6634	1.7531	Y	lognor.	lognor.	0.564	0.268	2.2783	3.8667	Y
Selenium	Y	11/14	5/5	0.3756	N	0.458					1.1	NA	6	5	0.0005	Y	0.0002			Y	0.458	0.958			NA	normal	lognor.					NA
Silver	Y	0/14	3/5		NA						125	NA	3	3	0.0103	Y				NA		25.4			NA							NA
Vanadium	Y	14/14	5/5		NA	2.87	0.425	1.7709	L	53.5	53.1	N	6	5	0.0005	Y	0.0006			Y	2.87	3.69	4.1104	1.7396	Y	lognor.	lognor.	0.425	0.194	2.5445	3.8656	Y
Zinc	Y	14/14	5/5		NA	18.1	7.66	1.7709	N	38.1	261	Y	5	5	0.0001	Y	0.0001			Y	2.79	4.68	7.2107	1.7396	Y	lognor.	lognor.	0.495	0.521	0.0149	3.8656	Y
4,4'-DDD	N	0/10	4/5	0.0037	Y						5.3	NA	2	2	0.0952	N				NA		3.19			NA							NA
4,4'-DDE	Y	2/10	5/5	0.0070	Y	1.72					21	NA	6	5	0.0020	Y	0.0017	Geha	Test	Y	1.72	7.3			NA	nonpar.	lognor.					NA
4,4'-DDT	Y	2/10	5/5	0.0070	Y	2.71					17	NA	6	5	0.0020	Y	0.0017	Geha	Test	Y	2.71	6.92			NA	nonpar.	lognor.					NA
Alpha-Chlordane	N	0/1	2/5	0.6667	N						36	NA	2	2	0.6667	N				NA		8.35			NA							NA
Aroclor-1254	N	0/11	1/5	0.3125	N						230	NA	1	1	0.3125	N				NA		67.1			NA							NA
Dieldrin	NA	0/10	1/5		NA						1.1	NA				NA				NA		2.39			NA							NA
Gamma-Chlordane	N	0/1	2/5	0.6667	N						23	NA	2	2	0.6667	N				NA		5.56			NA							NA
Heptachlor Epoxide	N	0/10	2/5	0.0952	N						4.4	NA	2	2	0.0952	N				NA		1.83			NA							NA
Acenaphthene	NA	0/3	1/5		NA						92	NA				NA				NA		236			NA							NA
Anthracene	N	0/3	1/5		NA						230	NA	1	1	0.6250	N				NA		264			NA							NA
Benz(a)anthracene	N	0/3	3/5		NA						1200	NA	2	2	0.3571	N				NA		434			NA							NA

Table
Background Comparison Tests - Surface Soil Data
Site 12 - Town Gut Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq. Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Benzo(a)pyrene	N	0/3	4/5		NA					1100	NA	2	2	0.3571	N				NA		380			NA							NA
Benzo(b)fluoranthene	N	0/3	5/5		NA					1500	NA	3	3	0.1786	N				NA		493			NA							NA
Benzo(g,h,i)perylene	N	0/3	3/5		NA					740	NA	2	2	0.3571	N				NA		312			NA							NA
Benzo(k)fluoranthene	N	0/3	2/5		NA					700	NA	1	1	0.6250	N				NA		336			NA							NA
Bis(2-ethylhexyl)phthalate	N	1/3	2/5		NA	290				130	NA				NA	0.7321	Geha	Test	N	290	195			NA	lognor.	normal					NA
Carbazole	NA	0/0	1/5		NA					150	NA				NA				NA		248			NA							NA
Chrysene	N	0/3	4/5		NA					1100	NA	3	3	0.1786	N				NA		377			NA							NA
Dibenz(a,h)anthracene	N	0/3	2/5		NA					210	NA	1	1	0.6250	N				NA		222			NA							NA
Dibenzofuran	NA	0/3	1/5		NA					70	NA				NA				NA		232			NA							NA
Fluoranthene	N	0/3	5/5		NA					1700	NA	3	3	0.1786	N				NA		514			NA							NA
Fluorene	NA	0/3	1/5		NA					130	NA				NA				NA		244			NA							NA
Indeno(1,2,3-cd)pyrene	N	0/3	3/5		NA					730	NA	2	2	0.3571	N				NA		316			NA							NA
Phenanthrene	N	0/3	3/5		NA					1300	NA	2	2	0.3571	N				NA		438			NA							NA
Pyrene	N	0/3	5/5		NA					2200	NA	3	3	0.1786	N				NA		649			NA							NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE

REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SURFACE SOIL DATA

SITE 12 - TOWN GUT LANDFILL

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Nitrocellulose	5	4	*nonparametric (assumed lognorm.)	0.5933	0.6639	0.762	4.0527	0.798	15600	77600	46200	46200
Aluminum	5	4	*lognormal	0.9217	0.9243	0.762	2.1558	0.176	13000	15800	16300	16300
Arsenic	5	4	*lognormal	0.8082	0.8959	0.762	2.5714	0.37	8.34	13.5	14.4	14.4
Barium	5	4	*lognormal	0.7336	0.8395	0.762	3.223	0.582	77.8	202	174	174
Beryllium	5	4	*lognormal	0.818	0.8849	0.762	6.3144	1.32	0.196	15.8	0.56	0.56
Cadmium	5	4	*lognormal	0.8472	0.9637	0.762	5.6152	1.16	1.35	42.7	3.6	3.6
Calcium	5	4	*lognormal	0.8883	0.903	0.762	2.7413	0.432	2300	4250	3230	3230
Chromium	5	4	*lognormal	0.7548	0.8113	0.762	2.3562	0.279	22.2	31.1	34.6	34.6
Cobalt	5	4	*lognormal	0.899	0.9263	0.762	2.95	0.501	7.34	15.8	13	13
Copper	5	4	*lognormal	0.7979	0.8086	0.762	4.3787	0.876	37.1	272	81.3	81.3
Cyanide	5	4	*lognormal	0.8381	0.9219	0.762	2.5287	0.353	0.204	0.322	0.34	0.34
Iron	5	4	*normal	0.8626	0.8532	0.762	2.1318	950	22200	23100	23000	23000
Lead	5	4	*normal	0.9356	0.9181	0.762	2.1318	20.6	39.8	59.4	67.6	67.6
Magnesium	5	4	*normal	0.9626	0.9509	0.762	2.1318	311	1180	1470	1540	1540
Manganese	5	4	*lognormal	0.8941	0.9801	0.762	2.8683	0.475	315	636	577	577
Mercury	5	4	*nonparametric (assumed lognorm.)	0.5832	0.7138	0.762	7.5621	1.6	0.916	388	4	4
Nickel	5	4	*normal	0.7985	0.7523	0.762	2.1318	2.47	11.4	13.8	13.3	13.3
Potassium	5	4	*lognormal	0.9446	0.9574	0.762	2.333	0.268	1100	1510	1540	1540
Selenium	5	4	*lognormal	0.8533	0.8664	0.762	2.0974	0.141	0.958	1.11	1.1	1.1
Silver	5	4	*lognormal	0.5604	0.8284	0.762	13.4035	2.88	25.4	15240000000	125	125
Vanadium	5	4	*lognormal	0.8633	0.88	0.762	2.1879	0.194	40.6	50.4	53.1	53.1
Zinc	5	4	*lognormal	0.7123	0.8171	0.762	3.0146	0.521	122	270	261	261
4,4'-DDD	5	4	*lognormal	0.8743	0.8962	0.762	3.9372	0.769	3.19	15.8	5.3	5.3
4,4'-DDE	5	4	*lognormal	0.7815	0.9469	0.762	5.2973	1.09	7.3	149	21	21
4,4'-DDT	5	4	*lognormal	0.8477	0.9119	0.762	4.5086	0.907	6.92	58.6	17	17
Alpha-Chlordane	5	4	*nonparametric (assumed lognorm.)	0.5668	0.6506	0.762	6.9317	1.46	8.35	1230	36	36
Aroclor-1254	5	4	*nonparametric (assumed lognorm.)	0.5681	0.6091	0.762	4.7798	0.971	67.1	662	230	230
Dieldrin	5	4	*normal	0.8134	0.736	0.762	2.1318	0.754	2.39	3.11	1.1	1.1
Gamma-Chlordane	5	4	*nonparametric (assumed lognorm.)	0.5681	0.6523	0.762	6.3721	1.33	5.56	365	23	23
Heptachlor Epoxide	5	4	*lognormal	0.664	0.7785	0.762	3.3221	0.61	1.83	5.08	4.4	4.4
Acenaphthene	5	4	*normal	0.783	0.7025	0.762	2.1318	83.6	236	316	92	92
Anthracene	5	4	*normal	0.9506	0.9466	0.762	2.1318	28.8	264	291	230	230
Benz(a)anthracene	5	4	*lognormal	0.698	0.8822	0.762	4.0503	0.797	434	2230	1200	1200
Benzo(a)pyrene	5	4	*lognormal	0.7749	0.986	0.762	4.9971	1.02	380	5370	1100	1100
Benzo(b)fluoranthene	5	4	*lognormal	0.7796	0.9736	0.762	5.8276	1.21	493	20000	1500	1500
Benzo(g,h,i)perylene	5	4	*lognormal	0.7695	0.9319	0.762	3.5472	0.67	312	1050	740	740
Benzo(k)fluoranthene	5	4	*lognormal	0.769	0.8985	0.762	3.027	0.525	336	754	700	700
Bis(2-ethylhexyl)phthalate	5	4	*normal	0.8684	0.8247	0.762	2.1318	97.7	195	288	130	130
Carbazole	5	4	*normal	0.8615	0.8044	0.762	2.1318	58.9	248	304	150	150
Chrysene	5	4	*lognormal	0.7598	0.9756	0.762	5.0362	1.03	377	5590	1100	1100
Dibenz(a,h)anthracene	5	4	*normal	0.9044	0.8044	0.762	2.1318	80.6	222	299	210	210
Dibenzofuran	5	4	*nonparametric (assumed lognorm.)	0.7617	0.6741	0.762	3.3294	0.612	232	691	70	70
Fluoranthene	5	4	*lognormal	0.7474	0.9452	0.762	6.3299	1.32	514	40700	1700	1700

TABLE

REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SURFACE SOIL DATA

SITE 12 - TOWN GUT LANDFILL

IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Fluorene	5	4	*normal	0.8302	0.7637	0.762	2.1318	67.3	244	308	130	130
Indeno(1,2,3-cd)pyrene	5	4	*lognormal	0.7588	0.9124	0.762	3.4041	0.632	316	947	730	730
Phenanthrene	5	4	*lognormal	0.6733	0.8638	0.762	4.4713	0.898	438	3370	1300	1300
Pyrene	5	4	*lognormal	0.7456	0.9592	0.762	6.7561	1.42	649	97300	2200	2200

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.

Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.

For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.

For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.

*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.

H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.

Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).

The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Groundwater Data
Site 12 - Town Gut Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Aluminum	N	3/4	4/6	0.8333	N	2710					4920	NA	4	3	0.4524	N	0.4381	Geha	Test	N	2710	2040			NA	lognor.	lognor.					NA
Arsenic	Y	0/6	5/6	0.0076	Y						32.8	NA	4	4	0.0303	Y				NA		17.2			NA							NA
Barium	Y	6/6	6/6		NA	3.92	0.83	2.0150	L	254	356	Y	7	6	0.0076	Y	0.0043			Y	64.5	225			NA	lognor.	normal					NA
Cadmium	N	1/6	1/6		NA	1.01					4.5	NA	1	1	0.5000	N	0.5000	Geha	Test	N	1.01	1.24			NA	nonpar.	lognor.					NA
Calcium	Y	4/4	6/6		NA	8.57	0.92	2.3534	L	599450	193000	N	6	6	0.0048	Y	0.0048			Y	8.57	11.4	5.7314	1.8595	Y	lognor.	lognor.	0.92	0.659	0.3814	3.8993	Y
Chromium	N	3/6	5/6		NA	4.35					8.2	NA	8	5	0.2727	N	0.3030	Geha	Test	N	4.35	3.95			NA	lognor.	normal					NA
Cobalt	N	5/6	1/6		NA	5.46					14.4	NA	2	1	0.7727	N	0.9535	Geha	Test	N	5.46	3.29			NA	lognor.	lognor.					NA
Copper	N	2/6	4/6	0.2835	N	5.63					31.6	NA	5	4	0.1212	N	0.0909	Geha	Test	N	5.63	12.5			NA	nonpar.	lognor.					NA
Iron	Y	4/4	6/6		NA	9850	9200	2.3534	N	57199	83700	Y	6	6	0.0048	Y	0.0048			Y	9850	62800			NA	normal	normal					NA
Lead	N	0/6	5/6		NA						34.5	NA	3	3	0.0909	N				NA		13.3			NA							NA
Magnesium	Y	4/4	6/6		NA	7.56	0.542	2.3534	L	31254	33100	Y	6	6	0.0048	Y	0.0048			Y	2160	19400			NA	lognor.	normal					NA
Manganese	Y	4/4	6/6		NA	5.55	0.912	2.3534	L	28160	4470	N	7	6	0.0333	Y	0.0333			Y	5.55	7.13	2.9258	1.8595	Y	lognor.	lognor.	0.912	0.786	0.0736	3.8993	Y
Mercury	N	1/6	1/6	0.7727	N	0.0658					0.2	NA	1	1	0.5000	N	0.5000	Geha	Test	N	0.0658	0.0725			NA	nonpar.	nonpar.					NA
Nickel	N	4/6	3/6		NA	5.28					21.8	NA	4	3	0.2727	N	0.2554	Geha	Test	N	5.28	8.73			NA	lognor.	lognor.					NA
Potassium	Y	4/4	6/6		NA	7.71	0.703	2.3534	L	83058	15200	N	7	6	0.0333	Y	0.0333			Y	7.71	8.83	2.8790	1.8595	Y	lognor.	lognor.	0.703	0.537	0.2470	3.8993	Y
Sodium	Y	4/4	6/6		NA	17000	12200	2.3534	N	79585	81800	Y	6	6	0.0048	Y	0.0048			Y	9.48	10.8	2.8000	2.3534	Y	lognor.	lognor.	0.934	0.29	4.5397	3.8993	N
Vanadium	N	1/6	3/6		NA	4.19					11.8	NA				NA	0.2511	Geha	Test	N	4.19	4.2			NA	lognor.	lognor.					NA
Zinc	Y	1/6	5/6	0.0400	Y	11.8					1140	NA	4	4	0.0303	Y	0.0141	Geha	Test	Y	11.8	259			NA	nonpar.	lognor.					NA
Alpha-Chlordane	NA	0/4	1/6		NA						0.004	NA				NA				NA		0.0052			NA							NA
Dieldrin	N	0/4	1/6	0.6000	N						0.005	NA				NA				NA		0.0098			NA							NA
Gamma-Chlordane	NA	0/4	1/6		NA						0.002	NA				NA				NA		0.0049			NA							NA
Heptachlor Epoxide	NA	0/4	1/6		NA						0.003	NA				NA				NA		0.0049			NA							NA
4-Methylphenol	N	0/2	1/6	0.7500	N						2	NA				NA				NA		2.5			NA							NA
Acenaphthene	N	0/2	2/6	0.5357	N						4	NA	1	1	0.7500	N				NA		2.75			NA							NA
Bis(2-ethylhexyl)phthalate	N	1/2	1/6	0.9643	N	3.25					2	NA				NA	0.6429	Geha	Test	N	3.25	2.67			NA	unknow	lognor.					NA
Fluorene	N	0/2	1/6	0.7500	N						2	NA				NA				NA		2.67			NA							NA
N-Nitrosodiphenylamine (1)	N	0/2	1/6	0.7500	N						17	NA	1	1	0.7500	N				NA		5.08			NA							NA
Naphthalene	N	0/2	1/6	0.7500	N						2	NA				NA				NA		2.67			NA							NA
1,2-Dichloroethene (cis)	NA	0/0	1/6		NA						306	NA				NA				NA		51.4			NA							NA
1,2-Dichloroethene (trans)	N	0/2	1/6		NA						2	NA	1	1	0.7500	N				NA		0.75			NA							NA
Chloroethane	NA	0/2	1/6		NA						1	NA				NA				NA		0.583			NA							NA
Trichloroethene	N	0/2	1/6		NA						12	NA	1	1	0.7500	N				NA		2.42			NA							NA
Vinyl Chloride	N	0/2	1/6		NA						317	NA	1	1	0.7500	N				NA		53.3			NA							NA

Table
Background Comparison Tests - Groundwater Data
Site 12 - Town Gut Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	

Notes: Units are ug/L.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - UNFILTERED GROUNDWATER DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Aluminum	6	5	*lognormal	0.8235	0.8359	0.788	7.5144	1.95	2040	3430000	4920	4920
Arsenic	6	5	*lognormal	0.7678	0.835	0.788	5.2266	1.32	17.2	506	32.8	32.8
Barium	6	5	*normal	0.8973	0.8765	0.788	2.015	88.2	225	297	356	356
Cadmium	6	5	*lognormal	0.7008	0.9717	0.788	4.5359	1.12	1.24	13.2	4.5	4.5
Calcium	6	5	*lognormal	0.8771	0.8956	0.788	3.0535	0.659	107000	275000	193000	193000
Chromium	6	5	*normal	0.8437	0.8339	0.788	2.015	3.21	3.95	6.59	8.2	8.2
Cobalt	6	5	*lognormal	0.5815	0.8761	0.788	4.9177	1.23	3.29	47.1	14.4	14.4
Copper	6	5	*lognormal	0.8975	0.9512	0.788	3.6494	0.855	12.5	55.1	31.6	31.6
Iron	6	5	*normal	0.9135	0.8732	0.788	2.015	20700	62800	79900	83700	83700
Lead	6	5	*lognormal	0.8625	0.8676	0.788	5.1395	1.29	13.3	332	34.5	34.5
Magnesium	6	5	*normal	0.9511	0.9492	0.788	2.015	10000	19400	27700	33100	33100
Manganese	6	5	*lognormal	0.7721	0.8722	0.788	3.4341	0.786	1660	5710	4470	4470
Mercury	6	5	*nonparametric (assumed lognorm.)	0.4963	0.4963	0.788	2.7214	0.534	0.0725	0.137	0.2	0.2
Nickel	6	5	*lognormal	0.8485	0.8554	0.788	4.2709	1.04	8.73	72.7	21.8	21.8
Potassium	6	5	*lognormal	0.879	0.9553	0.788	2.7285	0.537	7770	15300	15200	15200
Sodium	6	5	*lognormal	0.9035	0.9582	0.788	2.209	0.29	52100	69800	81800	81800
Vanadium	6	5	*lognormal	0.8506	0.9669	0.788	4.2257	1.03	4.2	33.8	11.8	11.8
Zinc	6	5	*lognormal	0.6565	0.9751	0.788	7.6762	1.99	259	475000	1140	1140
Alpha-Chlordane	6	5	*normal	0.9241	0.8823	0.788	2.015	0.00099	0.00517	0.00598	0.004	0.004
Dieldrin	6	5	*normal	0.8092	0.7061	0.788	2.015	0.00306	0.00983	0.0124	0.005	0.005
Gamma-Chlordane	6	5	*normal	0.8092	0.7061	0.788	2.015	0.00153	0.00492	0.00618	0.002	0.002
Heptachlor Epoxide	6	5	*nonparametric (assumed lognorm.)	0.701	0.6578	0.788	2.1159	0.232	0.00488	0.00611	0.003	0.003
4-Methylphenol	6	5	*normal	0.8272	0.8216	0.788	2.015	0.316	2.5	2.76	2	2
Acenaphthene	6	5	*normal	0.9449	0.8323	0.788	2.015	1.04	2.75	3.6	4	4
Bis(2-ethylhexyl)phthalate	6	5	*lognormal	0.9157	0.93	0.788	2.0558	0.191	2.67	3.19	2	2
Fluorene	6	5	*lognormal	0.9157	0.93	0.788	2.0558	0.191	2.67	3.19	2	2
N-Nitrosodiphenylamine (1)	6	5	*nonparametric (assumed lognorm.)	0.5389	0.5988	0.788	3.3747	0.767	5.08	15.5	17	17
Naphthalene	6	5	*lognormal	0.9157	0.93	0.788	2.0558	0.191	2.67	3.19	2	2
1,2-Dichloroethene (cis)	6	5	*nonparametric (assumed lognorm.)	0.4963	0.4963	0.788	9.9885	2.62	51.4	5440000	306	306
1,2-Dichloroethene (trans)	6	5	*nonparametric (assumed lognorm.)	0.4963	0.4963	0.788	2.8023	0.566	0.75	1.5	2	2
Chloroethane	6	5	*nonparametric (assumed lognorm.)	0.4963	0.4963	0.788	2.1971	0.283	0.583	0.771	1	1
Trichloroethene	6	5	*nonparametric (assumed lognorm.)	0.4963	0.4963	0.788	5.1571	1.3	2.42	39.3	12	12
Vinyl Chloride	6	5	*nonparametric (assumed lognorm.)	0.4963	0.4963	0.788	10.0418	2.63	53.3	6450000	317	317

Notes:

Units are ug/L.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Sediment Data
Site 12 - Town Gut Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:		Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:		Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:		#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/lo					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:		P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back?	YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance		Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Nitrocellulose	N	0/1	4/6		NA						471000	NA	4	4	0.4286	N				NA		94700			NA							NA
Aluminum	N	12/12	6/6		NA	7870	3820	1.7959	N	18329	10000	N	13	6	0.0924	N	0.3751			N	8.82	9	0.9446	1.7823	N	lognor.	lognor.	0.619	0.13	9.3560	3.8585	N
Antimony	NA	0/13	1/1		NA						2.5	NA	1	1	0.0714	N				NA		2.5			NA							NA
Arsenic	Y	14/14	6/6		NA	2.18	0.793	1.7709	N	4.25	19.7	Y	6	6	<.0001	Y	<.0001			Y	2.18	9.13			NA	normal	lognor.					NA
Barium	Y	14/14	6/6		NA	3.54	0.548	1.7709	L	144	65.6	N	11	6	0.0119	Y	0.0457			Y	3.54	3.88	2.0529	1.7396	Y	lognor.	lognor.	0.548	0.189	5.2321	3.8574	N
Beryllium	N	12/14	4/6	0.9391	N	0.349	0.213	1.7709	N	0.905	0.24	N	13	2	0.9928	N	0.9830			N	0.349	0.12			NA	normal	normal					NA
Cadmium	Y	6/14	4/6		NA	0.169					4	NA	3	3	0.0175	Y	0.0066	Geha	Test	Y	0.169	1.43			NA	nonpar.	lognor.					NA
Calcium	Y	2/12	6/6	0.0015	Y	103					2620	NA	6	6	0.0001	Y	0.0001	Geha	Test	Y	103	1730			NA	nonpar.	lognor.					NA
Chromium	Y	14/14	6/6		NA	12	4.68	1.7709	N	24.2	35.6	Y	7	5	0.0072	Y	0.0055			Y	2.4	2.99	2.8521	1.7341	Y	lognor.	lognor.	0.457	0.33	0.6431	3.8574	Y
Cobalt	Y	14/14	6/6		NA	1.25	0.932	1.7709	L	39.7	8.7	N	12	6	0.0238	Y	0.0733			N	1.25	1.72	1.7374	1.7459	N	lognor.	lognor.	0.932	0.274	6.5464	3.8574	N
Copper	Y	12/14	6/6	0.4789	N	1.36	0.601	1.7709	L	18.7	62	Y	7	6	0.0002	Y	0.0001			Y	1.36	3.15	5.9991	1.7341	Y	lognor.	lognor.	0.601	0.641	0.0280	3.8574	Y
Iron	Y	12/12	6/6		NA	9.09	0.577	1.7959	L	43170	33800	N	8	6	0.0015	Y	0.0012			Y	9.09	9.91	3.1126	1.7459	Y	lognor.	lognor.	0.577	0.395	0.8221	3.8585	Y
Lead	Y	12/14	6/6	0.4789	N	17.8					131	NA	7	6	0.0002	Y	0.0008			Y	17.8	53.5			NA	nonpar.	lognor.					NA
Magnesium	Y	12/12	6/6		NA	576	295	1.7959	N	1382	7480	Y	11	6	0.0249	Y	0.0512			N	576	2420			NA	normal	nonpar.					NA
Manganese	N	12/12	6/6		NA	4.75	1.08	1.7959	L	2248	271	N	13	6	0.0924	N	0.1454			N	197	195			NA	lognor.	normal					NA
Mercury	Y	12/14	6/6		NA	0.0399	0.018	1.7709	N	0.087	1.3	Y	6	6	<.0001	Y	<.0001	Geha	Test	Y	0.0399	0.33			NA	normal	nonpar.					NA
Nickel	Y	14/14	6/6		NA	1.45	0.557	1.7709	L	18.2	97.2	Y	5	5	0.0004	Y	0.0002			Y	1.45	3.02	4.4365	1.7341	Y	lognor.	lognor.	0.557	1.04	2.9996	3.8574	Y
Potassium	N	12/12	6/6		NA	5.99	0.564	1.7959	L	1874	547	N	13	6	0.0924	N	0.5900			N	5.99	6.1	0.6260	1.7823	N	lognor.	lognor.	0.564	0.11	0.052	3.8585	N
Silver	Y	0/14	4/6		NA						1.9	NA	3	3	0.0175	Y				NA		0.638			NA							NA
Vanadium	Y	14/14	6/6		NA	2.87	0.425	1.7709	L	53.5	148	Y	9	6	0.0022	Y	0.0044			Y	19.2	47.3			NA	lognor.	nonpar.					NA
Zinc	Y	14/14	6/6		NA	18.1	7.66	1.7709	N	38.1	123	Y	6	6	<.0001	Y	<.0001			Y	2.79	4.45	7.8120	1.7341	Y	lognor.	lognor.	0.495	0.209	3.6874	3.8574	Y
4,4'-DDD	Y	0/10	5/6	0.0014	Y						33	NA	5	5	0.0014	Y				NA		10.8			NA							NA
4,4'-DDE	Y	2/10	5/6		NA	1.72					41	NA	6	5	0.0076	Y	0.0051	Geha	Test	Y	1.72	11.9			NA	nonpar.	lognor.					NA
4,4'-DDT	Y	2/10	5/6	0.0245	Y	2.71					53	NA	5	4	0.0357	Y	0.0055	Geha	Test	Y	2.71	12.5			NA	nonpar.	lognor.					NA
Alpha-Chlordane	N	0/1	1/6	0.8571	N						2.5	NA	1	1	0.8571	N				NA		1.56			NA							NA
Aroclor-1260	N	0/11	1/6	0.3529	N						100	NA	1	1	0.3529	N				NA		40.6			NA							NA
Dieldrin	N	0/10	1/6		NA						2.4	NA	1	1	0.3750	N				NA		2.79			NA							NA
Endosulfan II	N	0/10	1/6		NA						3.2	NA	1	1	0.3750	N				NA		2.83			NA							NA
Gamma-Chlordane	N	0/1	1/6	0.8571	N						1.8	NA	1	1	0.8571	N				NA		1.45			NA							NA
Acenaphthene	N	0/3	2/6		NA						2600	NA	1	1	0.6667	N				NA		635			NA							NA
Anthracene	N	0/3	2/6		NA						4300	NA	2	2	0.4167	N				NA		956			NA							NA
Benz(a)anthracene	N	0/3	6/6		NA						14000	NA	3	3	0.2381	N				NA		2610			NA							NA
Benzo(a)pyrene	N	0/3	6/6		NA						12000	NA	4	4	0.1190	N				NA		2250			NA							NA
Benzo(b)fluoranthene	Y	0/3	6/6		NA						19000	NA	6	6	0.0119	Y				NA		3550			NA							NA

Table
Background Comparison Tests - Sediment Data
Site 12 - Town Gut Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/lo					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN		Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance		Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Benzo(g,h,i)perylene	N	0/3	5/6		NA						7600	NA	3	3	0.2381	N				NA		1470			NA							NA
Benzo(k)fluoranthene	N	0/3	4/6		NA						5800	NA	3	3	0.2381	N				NA		1170			NA							NA
Bis(2-ethylhexyl)phthalate	N	1/3	1/6		NA	290					110	NA				NA	0.7262	Geha	Test	N	290	682			NA	lognor.	nonpar.					NA
Carbazole	NA	0/0	2/6		NA						2100	NA				NA				NA		557			NA							NA
Chrysene	Y	0/3	6/6		NA						14000	NA	5	5	0.0476	Y				NA		2620			NA							NA
Dibenz(a,h)anthracene	N	0/3	3/6		NA						2300	NA	2	2	0.4167	N				NA		574			NA							NA
Dibenzofuran	N	0/3	2/6		NA						1200	NA	1	1	0.6667	N				NA		400			NA							NA
Fluoranthene	Y	0/3	6/6		NA						22000	NA	6	6	0.0119	Y				NA		4080			NA							NA
Fluorene	N	0/3	2/6		NA						1900	NA	1	1	0.6667	N				NA		520			NA							NA
Indeno(1,2,3-cd)pyrene	N	0/3	5/6		NA						6900	NA	3	3	0.2381	N				NA		1340			NA							NA
Phenanthrene	N	0/3	6/6		NA						17000	NA	3	3	0.2381	N				NA		3060			NA							NA
Pyrene	Y	0/3	6/6		NA						24000	NA	5	5	0.0476	Y				NA		4500			NA							NA
2-Butanone	NA	0/0	3/6		NA						35	NA				NA				NA		16.5			NA							NA

Notes: Units are ug/L.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.
	are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SEDIMENT DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Nitrocellulose	6	5	*lognormal	0.5626	0.9107	0.788	6.3575	1.63	94700	10200000	471000	471000
Aluminum	6	5	*lognormal	0.9553	0.9725	0.788	1.9773	0.13	8170	9180	10000	10000
Antimony	1		*unknown (assumed lognorm.)						2.5		2.5	2.5
Arsenic	6	5	*lognormal	0.7195	0.8508	0.788	2.5589	0.466	9.13	15.6	19.7	19.7
Barium	6	5	*lognormal	0.9363	0.9668	0.788	2.0541	0.189	49	58.5	65.6	65.6
Beryllium	6	5	*normal	0.9241	0.8966	0.788	2.015	0.0566	0.12	0.167	0.24	0.24
Cadmium	6	5	*lognormal	0.8185	0.9417	0.788	5.7051	1.45	1.43	79.3	4	4
Calcium	6	5	*lognormal	0.8704	0.8871	0.788	2.2359	0.306	1730	2370	2620	2620
Chromium	6	5	*lognormal	0.807	0.8952	0.788	2.2786	0.33	20.9	29.4	35.6	35.6
Cobalt	6	5	*lognormal	0.9178	0.9678	0.788	2.1829	0.274	5.78	7.59	8.7	8.7
Copper	6	5	*lognormal	0.8751	0.9815	0.788	3.0033	0.641	27.8	67.7	62	62
Iron	6	5	*lognormal	0.7536	0.7916	0.788	2.4045	0.395	21700	33400	33800	33800
Lead	6	5	*lognormal	0.6945	0.8253	0.788	2.7969	0.564	53.5	108	131	131
Magnesium	6	5	*nonparametric (assumed lognorm.)	0.7122	0.716	0.788	4.5852	1.13	2420	26600	7480	7480
Manganese	6	5	*normal	0.8169	0.7856	0.788	2.015	84.5	195	265	271	271
Mercury	6	5	*nonparametric (assumed lognorm.)	0.5727	0.7605	0.788	4.0587	0.98	0.33	1.83	1.3	1.3
Nickel	6	5	*lognormal	0.75	0.8361	0.788	4.2605	1.04	33.1	254	97.2	97.2
Potassium	6	5	*lognormal	0.7969	0.8281	0.788	1.9534	0.11	447	493	547	547
Silver	6	5	*lognormal	0.7786	0.8817	0.788	4.5052	1.11	0.638	6.54	1.9	1.9
Vanadium	6	5	*nonparametric (assumed lognorm.)	0.539	0.6055	0.788	3.1728	0.7	47.3	124	148	148
Zinc	6	5	*lognormal	0.8831	0.9292	0.788	2.0826	0.209	87.4	107	123	123
4,4'-DDD	6	5	*lognormal	0.7661	0.9504	0.788	3.9817	0.957	10.8	62.3	33	33
4,4'-DDE	6	5	*lognormal	0.6779	0.8779	0.788	4.0502	0.977	11.9	70.2	41	41
4,4'-DDT	6	5	*lognormal	0.619	0.8917	0.788	5.1684	1.3	12.5	259	53	53
Alpha-Chlordane	6	5	*nonparametric (assumed lognorm.)	0.6764	0.7395	0.788	2.1512	0.255	1.56	2	2.5	2.5
Aroclor-1260	6	5	*nonparametric (assumed lognorm.)	0.527	0.5571	0.788	2.6641	0.511	40.6	74	100	100
Dieldrin	6	5	*normal	0.8774	0.8563	0.788	2.015	0.213	2.79	2.97	2.4	2.4
Endosulfan II	6	5	*normal	0.8468	0.8278	0.788	2.015	0.234	2.83	3.02	3.2	3.2
Gamma-Chlordane	6	5	*lognormal	0.8763	0.9034	0.788	1.9785	0.131	1.45	1.63	1.8	1.8
Acenaphthene	6	5	*lognormal	0.5675	0.8022	0.788	4.4003	1.08	635	5100	2600	2600
Anthracene	6	5	*nonparametric (assumed lognorm.)	0.5138	0.5881	0.788	4.5062	1.11	956	7820	4300	4300
Benz(a)anthracene	6	5	*lognormal	0.5441	0.8633	0.788	7.6816	1.99	2610	2790000	14000	14000
Benzo(a)pyrene	6	5	*lognormal	0.5397	0.8757	0.788	7.1547	1.85	2250	852000	12000	12000
Benzo(b)fluoranthene	6	5	*lognormal	0.5347	0.8469	0.788	6.844	1.77	3550	735000	19000	19000
Benzo(g,h,i)perylene	6	5	*lognormal	0.5362	0.8578	0.788	6.2758	1.61	1470	127000	7600	7600
Benzo(k)fluoranthene	6	5	*nonparametric (assumed lognorm.)	0.5264	0.7431	0.788	5.4883	1.39	1170	30700	5800	5800
Bis(2-ethylhexyl)phthalate	6	5	*nonparametric (assumed lognorm.)	0.5512	0.7603	0.788	4.4821	1.1	682	5810	110	110
Carbazole	6	5	*nonparametric (assumed lognorm.)	0.5743	0.7773	0.788	3.9352	0.942	557	2800	2100	2100
Chrysene	6	5	*lognormal	0.5399	0.8784	0.788	7.0933	1.83	2620	883000	14000	14000
Dibenz(a,h)anthracene	6	5	*lognormal	0.5789	0.825	0.788	4.3105	1.05	574	4210	2300	2300
Dibenzofuran	6	5	*lognormal	0.6728	0.8789	0.788	3.574	0.831	400	1560	1200	1200
Fluoranthene	6	5	*lognormal	0.5344	0.8427	0.788	7.1319	1.84	4080	1410000	22000	22000
Fluorene	6	5	*lognormal	0.5924	0.8164	0.788	3.9302	0.941	520	2660	1900	1900
Indeno(1,2,3-cd)pyrene	6	5	*lognormal	0.5359	0.8262	0.788	6.13	1.57	1340	88200	6900	6900
Phenanthrene	6	5	*lognormal	0.5285	0.8169	0.788	8.0302	2.09	3060	5870000	17000	17000

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SEDIMENT DATA
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Pyrene	6	5	*lognormal	0.5463	0.8925	0.788	7.5121	1.95	4500	3500000	24000	24000
2-Butanone	6	5	*lognormal	0.848	0.8927	0.788	3.0483	0.657	16.5	41.6	35	35

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

SITE 39 - ORGANICS PLANT

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SURFACE WATER
SITE 39 - ORGANICS PLANT
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Aluminum	6	5	*lognormal	0.7062	0.7908	0.788	4.0321	0.972	209	1230	918	918
Barium	6	5	*normal	0.8753	0.8661	0.788	2.015	5.25	70.8	75.1	76.8	76.8
Calcium	6	5	*nonparametric (assumed lognorm.)	0.7379	0.7257	0.788	1.9419	0.1	32400	35400	34400	34400
Cobalt	6	5	*nonparametric (assumed lognorm.)	0.543	0.7002	0.788	4.6321	1.15	0.951	9.14	6.3	6.3
Iron	6	5	*lognormal	0.7797	0.8292	0.788	2.9649	0.627	622	1460	1620	1620
Lead	6	5	*lognormal	0.7174	0.8738	0.788	3.1255	0.684	1.88	4.92	5.2	5.2
Magnesium	6	5	*nonparametric (assumed lognorm.)	0.7837	0.7789	0.788	1.9561	0.112	31700	35100	34300	34300
Manganese	6	5	*lognormal	0.8009	0.8365	0.788	2.4055	0.395	104	161	202	202
Nickel	6	5	*normal	0.8602	0.823	0.788	2.015	0.489	2.77	3.17	4	4
Potassium	6	5	*nonparametric (assumed lognorm.)	0.7471	0.7417	0.788	1.9354	0.0941	11700	12700	12400	12400
Silver	6	5	*nonparametric (assumed lognorm.)	0.4963	0.4963	0.788	3.7677	0.891	0.925	3.84	6	6
Sodium	6	5	*nonparametric (assumed lognorm.)	0.7645	0.7594	0.788	1.9493	0.106	197000	216000	211000	211000
Vanadium	6	5	*nonparametric (assumed lognorm.)	0.6895	0.676	0.788	2.6096	0.488	0.838	1.5	2.5	2.5
Zinc	6	5	*lognormal	0.7577	0.9159	0.788	5.2751	1.33	26.1	705	90.4	90.4
Bis(2-ethylhexyl)phthalate	6	5	*nonparametric (assumed lognorm.)	0.6399	0.6399	0.788	2.575	0.473	2	3.55	1	1
Trichloroethene	6	5	*nonparametric (assumed lognorm.)	0.4963	0.4963	0.788	2.1971	0.283	0.583	0.771	1	1

Notes:

Units are ug/L.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Sediment Data
Site 39 - Organics Plant
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/lo					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Nitrocellulose	N	0/1	12/14		NA					1000000	NA	12	12	0.2000	N				NA		305000			NA							NA
Nitroguanidine	N	0/1	2/14	0.8667	N					1880	NA	2	2	0.8667	N				NA		186			NA							NA
Aluminum	Y	12/12	14/14		NA	7870	3820	1.7959	N	18329	19600	Y	1	1	0.5385	N	0.9552			N	8.82	7.88	-2.3614	1.7341	N	lognor.	lognor.	0.619	1.34	6.0762	3.8457	N
Antimony	NA	0/13	1/14		NA					0.69	NA				NA				NA		3.01			NA							NA
Arsenic	Y	14/14	13/14	1.0000	N	2.18	0.793	1.7709	N	4.25	16.6	Y	8	8	0.0010	Y	0.0153			Y	2.18	5.08			NA	normal	lognor.					NA
Barium	Y	14/14	14/14		NA	3.54	0.548	1.7709	L	144	138	N	5	5	0.0204	Y	0.6853			N	3.54	3.37	-0.4871	1.7341	N	lognor.	lognor.	0.548	1.16	6.4175	3.8447	N
Beryllium	Y	12/14	12/14		NA	0.349	0.213	1.7709	N	0.905	1.2	Y	3	3	0.1111	N	0.3401	Geha	Test	N	0.349	0.465			NA	normal	lognor.					NA
Cadmium	N	6/14	4/14		NA	0.169					1	NA				NA	0.1043	Geha	Test	N	0.169	0.75			NA	nonpar.	lognor.					NA
Calcium	Y	2/12	13/14	0.0001	Y	103					4730	NA	8	8	0.0019	Y	0.0001	Geha	Test	Y	103	1530			NA	nonpar.	lognor.					NA
Chromium	Y	14/14	14/14		NA	12	4.68	1.7709	N	24.2	32.3	Y	5	5	0.0204	Y	0.4542			N	2.4	2.47	0.3191	1.7056	N	lognor.	lognor.	0.457	0.753	3.0117	3.8447	Y
Cobalt	Y	14/14	14/14		NA	1.25	0.932	1.7709	L	39.7	34.7	N	17	13	0.0007	Y	0.0004			Y	1.25	2.47	3.9118	1.7056	Y	lognor.	lognor.	0.932	0.714	0.8792	3.8447	Y
Copper	Y	12/14	13/14	0.5000	N	1.36	0.601	1.7709	L	18.7	49.1	Y	9	8	0.0064	Y	0.0020			Y	1.36	2.39	3.0701	1.7247	Y	lognor.	lognor.	0.601	1.1	4.3754	3.8447	N
Iron	Y	12/12	14/14		NA	9.09	0.577	1.7959	L	43170	43800	Y	7	6	0.0600	N	0.1841			N	9.09	9.37	0.9330	1.7109	N	lognor.	lognor.	0.577	0.863	1.7745	3.8457	Y
Lead	Y	12/14	14/14	0.2407	N	17.8					89.6	NA	14	12	0.0002	Y	0.0010			Y	17.8	34.9			NA	nonpar.	lognor.					NA
Magnesium	Y	12/12	14/14		NA	576	295	1.7959	N	1382	3260	Y	7	7	0.0052	Y	0.2771			N	576	1140			NA	normal	nonpar.					NA
Manganese	N	12/12	14/14		NA	4.75	1.08	1.7959	L	2248	1050	N	9	7	0.0847	N	0.1134			N	4.75	5.32	1.3105	1.7109	N	lognor.	lognor.	1.08	1.11	0.0087	3.8457	Y
Mercury	Y	12/14	10/14		NA	0.0399	0.018	1.7709	N	0.087	9.5	Y	4	4	0.0489	Y	0.0421	Geha	Test	Y	0.0399	1.66			NA	normal	nonpar.					NA
Nickel	Y	14/14	11/14		NA	1.45	0.557	1.7709	L	18.2	59.8	Y	7	7	0.0029	Y	0.0184	Geha	Test	Y	4.9	15.8			NA	lognor.	lognor.					NA
Potassium	Y	12/12	11/14	1.0000	N	5.99	0.564	1.7959	L	1874	1350	N	5	5	0.0304	Y	0.7563			N	457	502			NA	lognor.	nonpar.					NA
Silver	Y	0/14	10/14		NA						308	NA	6	6	0.0080	Y				NA		33.8			NA							NA
Sodium	N	6/12	6/14		NA	30.4					253	NA				NA	0.0564	Geha	Test	N	30.4	114			NA	nonpar.	lognor.					NA
Vanadium	N	14/14	14/14		NA	2.87	0.425	1.7709	L	53.5	49.7	N	5	4	0.1630	N	0.9381			N	2.87	2.46	-1.4958	1.7341	N	lognor.	lognor.	0.425	0.917	6.7838	3.8447	N
Zinc	Y	14/14	14/14		NA	18.1	7.66	1.7709	N	38.1	273	Y	10	10	0.0001	Y	0.0001			Y	2.79	4.32	5.4645	1.7291	Y	lognor.	lognor.	0.495	0.917	4.4981	3.8447	N
4,4'-DDD	N	0/10	2/8	0.1830	N						7.7	NA	2	2	0.1830	N				NA		3.41			NA							NA
4,4'-DDE	N	2/10	2/8		NA	1.72					6	NA	3	2	0.4118	N	0.4118	Geha	Test	N	1.72	2.96			NA	nonpar.	lognor.					NA
Alpha-BHC	NA	0/10	1/8		NA						0.7	NA				NA				NA		1.39			NA							NA
1,1-Dimethylhydrazine	NA	0/0	3/6		NA						85500	NA				NA				NA		35500			NA							NA
Acenaphthylene	NA	0/3	1/14		NA						33	NA				NA				NA		333			NA							NA
Anthracene	NA	0/3	1/14		NA						64	NA				NA				NA		334			NA							NA
Benz(a)anthracene	NA	0/3	3/14		NA						95	NA				NA				NA		301			NA							NA
Benzo(a)pyrene	NA	0/3	2/14		NA						95	NA				NA				NA		324			NA							NA
Benzo(b)fluoranthene	NA	0/3	5/14		NA						130	NA				NA				NA		260			NA							NA
Benzo(g,h,i)perylene	NA	0/3	2/14		NA						62	NA				NA				NA		321			NA							NA
Benzo(k)fluoranthene	NA	0/3	2/14		NA						76	NA				NA				NA		323			NA							NA

Table
Background Comparison Tests - Sediment Data
Site 39 - Organics Plant
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/lo					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back?	YN	Back. Freq.	Site Freq.	P Value	YN	Back. Mean@	Std.Dev Back.@	t Value	L,N Q	Back. UTL	Site Max.	YN	r	k	P Value	YN	P Value	Test	Used	YN	Back. Mean@	Site Mean@	t Value	t Table	YN	Back. Distrib.	Site Distrib.	Std.Dev Back.@	Std.Dev Site@	F Value	F Table	YN
Substance																															
Bis(2-ethylhexyl)phthalate	N	1/3	4/14		NA	290					410	NA	2	1	0.9779	N	0.8390	Geha	Test	N	290	166			NA	lognor.	lognor.					NA
Chrysene	NA	0/3	6/14		NA						160	NA				NA				NA		230			NA							NA
Di-n-butylphthalate	N	0/3	3/14		NA						640	NA	3	3	0.5353	N				NA		380			NA							NA
Fluoranthene	NA	0/3	7/14		NA						190	NA				NA				NA		196			NA							NA
Indeno(1,2,3-cd)pyrene	NA	0/3	2/14		NA						49	NA				NA				NA		320			NA							NA
N-Nitrosodiphenylamine (1)	N	0/3	4/14		NA						3100	NA	2	2	0.6691	N				NA		611			NA							NA
Phenanthrene	NA	0/3	5/14		NA						150	NA				NA				NA		261			NA							NA
Pyrene	N	0/3	8/14		NA						240	NA	2	2	0.6691	N				NA		165			NA							NA
2-Butanone	NA	0/0	2/14		NA						390	NA				NA				NA		47.8			NA							NA
Acetone	N	2/3	2/14		NA	5070					2400	NA	2	1	0.9779	N	0.9828	Geha	Test	N	5070	281			NA	lognor.	nonpar.					NA
Carbon Disulfide	N	0/3	5/14		NA						23	NA	1	1	0.8235	N				NA		10.1			NA							NA
Chloromethane	N	0/3	2/14		NA						13	NA	1	1	0.8235	N				NA		8.64			NA							NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.
A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.
UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.
For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:
(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.
(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.
(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.
(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SEDIMENT
SITE 39 - ORGANICS PLANT
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Nitrocellulose	14	13	lognormal	0.5971	0.927	0.874	4.348	1.84	305000	3730000	1000000	1000000
Nitroguanidine	14	13	nonparametric (assumed lognorm.)	0.3581	0.5332	0.874	3.1031	1.18	186	302	1880	302
Aluminum	14	13	lognormal	0.8118	0.9387	0.874	3.3974	1.34	5460	23100	19600	19600
Antimony	14	13	nonparametric (assumed lognorm.)	0.7144	0.8669	0.874	3.4278	1.36	3.01	12	0.69	0.69
Arsenic	14	13	lognormal	0.7909	0.9571	0.874	2.4511	0.781	5.08	8.7	16.6	8.7
Barium	14	13	lognormal	0.8166	0.9125	0.874	3.0566	1.16	50.3	151	138	138
Beryllium	14	13	lognormal	0.8239	0.9272	0.874	2.3774	0.73	0.465	0.762	1.2	0.762
Cadmium	14	13	lognormal	0.8466	0.9391	0.874	3.2897	1.29	0.75	3.08	1	1
Calcium	14	13	lognormal	0.7842	0.9142	0.874	3.4254	1.36	1530	6630	4730	4730
Chromium	14	13	lognormal	0.8957	0.9381	0.874	2.4107	0.753	15.1	26.1	32.3	26.1
Cobalt	14	13	lognormal	0.951	0.9581	0.874	2.3551	0.714	14.5	24.4	34.7	24.4
Copper	14	13	lognormal	0.854	0.915	0.874	2.9674	1.1	17.4	49.7	49.1	49.1
Iron	14	13	lognormal	0.9095	0.9634	0.874	2.5745	0.863	15800	31500	43800	31500
Lead	14	13	lognormal	0.8854	0.9108	0.874	2.6025	0.882	34.9	70.3	89.6	70.3
Magnesium	14	13	nonparametric (assumed lognorm.)	0.8257	0.8655	0.874	3.6359	1.47	1140	7570	3260	3260
Manganese	14	13	lognormal	0.8298	0.926	0.874	2.9866	1.11	346	956	1050	956
Mercury	14	13	nonparametric (assumed lognorm.)	0.5653	0.8628	0.874	5.0466	2.18	1.66	47	9.5	9.5
Nickel	14	13	lognormal	0.8708	0.9351	0.874	2.9279	1.08	15.8	43	59.8	43
Potassium	14	13	nonparametric (assumed lognorm.)	0.8092	0.8562	0.874	2.8428	1.03	502	1210	1350	1210
Silver	14	13	lognormal	0.4601	0.9655	0.874	5.0248	2.17	33.8	1010	308	308
Sodium	14	13	lognormal	0.8999	0.9414	0.874	2.3373	0.701	114	184	253	184
Vanadium	14	13	lognormal	0.8296	0.9189	0.874	2.6578	0.917	17.1	35.1	49.7	35.1
Zinc	14	13	lognormal	0.9002	0.9165	0.874	2.6582	0.917	105	224	273	224
4,4'-DDD	8	7	*nonparametric (assumed lognorm.)	0.718	0.774	0.818	2.4229	0.54	3.41	5.59	7.7	7.7
4,4'-DDE	8	7	*lognormal	0.7607	0.8247	0.818	2.2095	0.41	2.96	4.17	6	6
Alpha-BHC	8	7	*lognormal	0.882	0.9545	0.818	2.2535	0.438	1.39	2.04	0.7	0.7
1,1-Dimethylhydrazine	6	5	*normal	0.8084	0.7398	0.788	2.015	37100	35500	66100	85500	85500
Acenaphthylene	14	13	normal	0.8742	0.8452	0.874	1.7709	206	333	430	33	33
Anthracene	14	13	lognormal	0.8695	0.8781	0.874	2.3544	0.713	334	561	64	64
Benz(a)anthracene	14	13	lognormal	0.851	0.9269	0.874	2.4707	0.794	301	545	95	95
Benzo(a)pyrene	14	13	lognormal	0.8888	0.913	0.874	2.4315	0.768	324	576	95	95
Benzo(b)fluoranthene	14	13	lognormal	0.7732	0.9217	0.874	2.5801	0.867	260	508	130	130
Benzo(g,h,i)perylene	14	13	normal	0.898	0.8771	0.874	1.7709	218	321	424	62	62
Benzo(k)fluoranthene	14	13	lognormal	0.8943	0.8988	0.874	2.5093	0.82	323	618	76	76
Bis(2-ethylhexyl)phthalate	14	13	lognormal	0.8237	0.9701	0.874	2.4776	0.799	166	295	410	295
Chrysene	14	13	lognormal	0.683	0.9015	0.874	2.3931	0.741	230	374	160	160
Di-n-butylphthalate	14	13	nonparametric (assumed lognorm.)	0.7713	0.7765	0.874	2.1699	0.571	380	541	640	541
Fluoranthene	14	13	nonparametric (assumed lognorm.)	0.6146	0.8466	0.874	2.1794	0.578	196	274	190	190
Indeno(1,2,3-cd)pyrene	14	13	normal	0.9009	0.8517	0.874	1.7709	219	320	424	49	49
N-Nitrosodiphenylamine (1)	14	13	nonparametric (assumed lognorm.)	0.5655	0.6989	0.874	2.7105	0.95	611	1120	3100	1120
Phenanthrene	14	13	lognormal	0.7798	0.926	0.874	2.6365	0.904	261	539	150	150
Pyrene	14	13	normal	0.9259	0.8851	0.874	1.7709	56.2	165	191	240	191
2-Butanone	14	13	nonparametric (assumed lognorm.)	0.4467	0.5889	0.874	3.497	1.4	47.8	113	390	113
Acetone	14	13	nonparametric (assumed lognorm.)	0.4731	0.8155	0.874	4.7597	2.04	281	3900	2400	2400
Carbon Disulfide	14	13	nonparametric (assumed lognorm.)	0.7511	0.842	0.874	2.1979	0.594	10.1	14.5	23	14.5

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SEDIMENT
SITE 39 - ORGANICS PLANT
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Chloromethane	14	13	nonparametric (assumed lognorm.)	0.7924	0.8413	0.874	1.9868	0.403	8.64	10.8	13	10.8

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

SITE 41 - SCRAP YARD

Table
Background Comparison Tests - Surface Soil Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Nitrocellulose N	0/1	5/9		NA						33200	NA	5	5	0.5000	N				NA		19100			NA							NA
Nitroguanidine N	0/1	2/9	0.8000	N						288.4	NA	2	2	0.8000	N				NA		69.2			NA							NA
Aluminum N	12/12	10/10		NA	7870	3820	1.7959	N	18329	13800	N	1	1	0.4545	N	0.9393			N	8.82	8.48	-1.3816	1.7247	N	lognor.	lognor.	0.619	0.555	0.1085	3.8482	Y
Antimony N	0/13	5/10		NA						10.6	NA	1	1	0.4348	N				NA		2.38			NA							NA
Arsenic Y	14/14	10/10		NA	2.18	0.793	1.7709	N	4.25	216	Y	10	10	<.0001	Y	<.0001			Y	2.18	108			NA	normal	normal					NA
Barium Y	14/14	10/10		NA	3.54	0.548	1.7709	L	.144	192	Y	11	8	0.0069	Y	0.0025			Y	3.54	4.25	3.1846	1.7171	Y	lognor.	lognor.	0.548	0.53	0.0117	3.8472	Y
Beryllium N	12/14	3/10	0.9995	N	0.349	0.213	1.7709	N	0.905	0.52	N	9	2	0.9755	N	0.9844	Geha	Test	N	0.349	0.191			NA	normal	lognor.					NA
Cadmium Y	6/14	9/10		NA	0.169					45.6	NA	7	7	0.0003	Y	<.0001	Geha	Test	Y	0.169	9.69			NA	nonpar.	lognor.					NA
Calcium Y	2/12	10/10	0.0001	Y	103					137000	NA	10	10	<.0001	Y	<.0001	Geha	Test	Y	103	27900			NA	nonpar.	nonpar.					NA
Chromium Y	14/14	10/10		NA	12	4.68	1.7709	N	24.2	88.2	Y	5	5	0.0059	Y	0.0232			Y	2.4	2.96	2.2033	1.7171	Y	lognor.	lognor.	0.457	0.798	3.2249	3.8472	Y
Cobalt Y	14/14	10/10		NA	1.25	0.932	1.7709	L	39.7	12.1	N	15	9	0.0245	Y	0.0536			N	1.25	1.69	1.5656	1.7291	N	lognor.	lognor.	0.932	0.441	4.8374	3.8472	N
Copper Y	12/14	10/10	0.3297	N	1.36	0.601	1.7709	L	18.7	189	Y	11	10	<.0001	Y	<.0001			Y	1.36	3.66	7.1704	1.7171	Y	lognor.	lognor.	0.601	0.977	2.4452	3.8472	Y
Cyanide NA	0/2	4/10		NA						0.52	NA				NA				NA		0.27			NA							NA
Iron Y	12/12	10/10		NA	9.09	0.577	1.7959	L	43170	53000	Y	8	7	0.0046	Y	0.0023			Y	10300	28300			NA	lognor.	normal					NA
Lead Y	12/14	10/10	0.3297	N	17.8					3540	NA	11	10	<.0001	Y	0.0001			Y	17.8	476			NA	nonpar.	lognor.					NA
Magnesium Y	12/12	10/10		NA	576	295	1.7959	N	1382	9460	Y	16	9	0.1185	N	0.2049			N	576	1880			NA	normal	nonpar.					NA
Manganese N	12/12	10/10		NA	4.75	1.08	1.7959	L	2248	754	N	16	9	0.1185	N	0.2764			N	4.75	5.06	0.7781	1.7247	N	lognor.	lognor.	1.08	0.702	1.6889	3.8482	Y
Mercury Y	12/14	10/10		NA	0.0399	0.018	1.7709	N	0.087	3.9	Y	10	10	<.0001	Y	<.0001	Geha	Test	Y	0.0399	0.773			NA	normal	lognor.					NA
Nickel Y	14/14	2/10	1.0000	N	1.45	0.557	1.7709	L	18.2	44.3	Y	1	1	0.4167	N	0.2124	Geha	Test	N	4.9	11.3			NA	lognor.	lognor.					NA
Potassium N	12/12	10/10		NA	5.99	0.564	1.7959	L	1874	702	N	16	9	0.1185	N	0.1534			N	457	555			NA	lognor.	normal					NA
Selenium Y	11/14	7/10		NA	0.458					3.3	NA				NA	0.0021	Geha	Test	Y	0.458	1.66			NA	normal	lognor.					NA
Silver N	0/14	3/10		NA						4	NA	3	3	0.0593	N				NA		0.865			NA							NA
Vanadium N	14/14	10/10		NA	2.87	0.425	1.7709	L	53.5	30.1	N	16	9	0.0507	N	0.2503			N	19.2	20.3			NA	lognor.	normal					NA
Zinc Y	14/14	10/10		NA	18.1	7.66	1.7709	N	38.1	536	Y	9	9	<.0001	Y	<.0001			Y	18.1	238			NA	normal	normal					NA
Aroclor-1260 Y	0/11	9/10	<.0001	Y						180000	NA	9	9	<.0001	Y				NA		23000			NA							NA
Endrin N	0/10	1/10		NA						91	NA	1	1	0.5000	N				NA		11.2			NA							NA
Heptachlor Epoxide N	0/10	1/10	0.5000	N						5.5	NA	1	1	0.5000	N				NA		1.61			NA							NA
1,2,4-Trichlorobenzene N	0/3	6/10		NA						4800	NA	3	3	0.4196	N				NA		623			NA							NA
2-Methylnaphthalene N	0/3	7/10		NA						690	NA	2	2	0.5769	N				NA		214			NA							NA
4-Methylphenol NA	0/1	1/9		NA						200	NA				NA				NA		208			NA							NA
Acenaphthene N	0/3	3/10		NA						560	NA	2	2	0.5769	N				NA		261			NA							NA
Acenaphthylene NA	0/3	2/10		NA						100	NA				NA				NA		203			NA							NA
Anthracene N	0/3	8/10		NA						940	NA	3	3	0.4196	N				NA		223			NA							NA

Table
Background Comparison Tests - Surface Soil Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Benz(a)anthracene	Y	0/3	10/10		NA					2800	NA	8	8	0.0350	Y				NA		791			NA							NA
Benzo(a)pyrene	Y	0/3	10/10		NA					2000	NA	8	8	0.0350	Y				NA		604			NA							NA
Benzo(b)fluoranthene	Y	0/3	10/10		NA					3400	NA	9	9	0.0140	Y				NA		1250			NA							NA
Benzo(g,h,i)perylene	N	0/3	9/10		NA					1500	NA	7	7	0.0699	N				NA		553			NA							NA
Benzo(k)fluoranthene	N	0/3	8/10		NA					2100	NA	7	7	0.0699	N				NA		567			NA							NA
Bis(2-ethylhexyl)phthalate	N	1/3	8/10		NA	290				2100	NA	2	2	0.5769	N	0.3474	Geha	Test	N	290	391			NA	lognor.	lognor.					NA
Carbazole	NA	0/0	4/10		NA					240	NA				NA				NA		179			NA							NA
Chrysene	Y	0/3	10/10		NA					2900	NA	10	10	0.0035	Y				NA		1080			NA							NA
Di-n-butylphthalate	N	0/3	6/9		NA					440	NA	1	1	0.7500	N				NA		143			NA							NA
Dibenz(a,h)anthracene	N	0/3	7/10		NA					850	NA	5	5	0.1958	N				NA		316			NA							NA
Dibenzofuran	N	0/3	7/10		NA					590	NA	3	3	0.4196	N				NA		221			NA							NA
Diethylphthalate	NA	0/3	3/9		NA					140	NA				NA				NA		182			NA							NA
Fluoranthene	Y	0/3	10/10		NA					2900	NA	9	9	0.0140	Y				NA		1060			NA							NA
Fluorene	N	0/3	3/10		NA					340	NA	2	2	0.5769	N				NA		222			NA							NA
Indeno(1,2,3-cd)pyrene	N	0/3	10/10		NA					1600	NA	7	7	0.0699	N				NA		557			NA							NA
Naphthalene	N	0/3	6/10		NA					980	NA	3	3	0.4196	N				NA		297			NA							NA
Phenanthrene	Y	0/3	10/10		NA					1900	NA	10	10	0.0035	Y				NA		697			NA							NA
Pyrene	Y	0/3	10/10		NA					6100	NA	10	10	0.0035	Y				NA		1430			NA							NA
Acetone	N	2/3	1/10		NA	5070				120	NA	3	1	0.9965	N	0.9889	Geha	Test	N	5070	18.6			NA	lognor.	nonpar.					NA
Carbon Disulfide	NA	0/3	1/10		NA					3	NA				NA				NA		6.58			NA							NA
Toluene	N	0/3	1/10		NA					9	NA	1	1	0.7692	N				NA		7.18			NA							NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.

Table
Background Comparison Tests - Surface Soil Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	

s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SURFACE SOIL
SITE 41 - SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Nitrocellulose	9	8	*normal	0.8302	0.7995	0.829	1.8595	10700	19100	25700	33200	33200
Nitroguanidine	9	8	*nonparametric (assumed lognorm.)	0.5265	0.5684	0.829	2.8353	0.811	69.2	145	288.4	288
Aluminum	10	9	lognormal	0.77	0.9021	0.842	2.2998	0.555	5570	8560	13800	8560
Antimony	10	9	lognormal	0.6374	0.9415	0.842	3.2335	1.06	2.38	7.87	10.6	7.87
Arsenic	10	9	normal	0.9671	0.9362	0.842	1.8331	62.5	108	144	216	144
Barium	10	9	lognormal	0.7878	0.9194	0.842	2.262	0.53	80.6	120	192	120
Beryllium	10	9	lognormal	0.8347	0.9364	0.842	2.7029	0.796	0.191	0.404	0.52	0.404
Cadmium	10	9	lognormal	0.6871	0.9099	0.842	4.3839	1.58	9.69	131	45.6	45.6
Calcium	10	9	nonparametric (assumed lognorm.)	0.5708	0.8243	0.842	4.6207	1.68	27900	347000	137000	137000
Chromium	10	9	lognormal	0.7502	0.9755	0.842	2.7071	0.798	26.2	54.8	88.2	54.8
Cobalt	10	9	lognormal	0.8802	0.9638	0.842	2.1411	0.441	5.96	8.21	12.1	8.21
Copper	10	9	lognormal	0.8251	0.9357	0.842	3.0552	0.977	59.1	170	189	170
Cyanide	10	9	lognormal	0.8745	0.9551	0.842	2.511	0.688	0.27	0.492	0.52	0.492
Iron	10	9	normal	0.89	0.8731	0.842	1.8331	14600	28300	36700	53000	36700
Lead	10	9	lognormal	0.4639	0.8906	0.842	4.4313	1.6	476	4350	3540	3540
Magnesium	10	9	nonparametric (assumed lognorm.)	0.5524	0.6559	0.842	3.2873	1.09	1880	5370	9460	5370
Manganese	10	9	lognormal	0.6371	0.9298	0.842	2.5346	0.702	206	365	754	365
Mercury	10	9	lognormal	0.5193	0.8709	0.842	2.8586	0.878	0.773	1.64	3.9	1.64
Nickel	10	9	lognormal	0.575	0.8703	0.842	2.5109	0.688	11.3	19.3	44.3	19.3
Potassium	10	9	normal	0.9344	0.925	0.842	1.8331	124	555	627	702	627
Selenium	10	9	lognormal	0.938	0.9482	0.842	2.6233	0.752	1.66	3.42	3.3	3.3
Silver	10	9	lognormal	0.6862	0.9039	0.842	3.8599	1.35	0.865	5.31	4	4
Vanadium	10	9	normal	0.9156	0.7626	0.842	1.8331	7.08	20.3	24.4	30.1	24.4
Zinc	10	9	normal	0.8703	0.7941	0.842	1.8331	189	238	347	536	347
Aroclor-1260	10	9	lognormal	0.5035	0.9193	0.842	6.9557	2.64	23000	51300000	180000	180000
Endrin	10	9	nonparametric (assumed lognorm.)	0.3792	0.5389	0.842	3.5129	1.19	11.2	27	91	27
Heptachlor Epoxide	10	9	nonparametric (assumed lognorm.)	0.5471	0.7261	0.842	2.2994	0.555	1.61	2.38	5.5	2.38
1,2,4-Trichlorobenzene	10	9	lognormal	0.506	0.8868	0.842	3.5126	1.19	623	2190	4800	2190
2-Methylnaphthalene	10	9	lognormal	0.7784	0.9606	0.842	2.8929	0.895	214	525	690	525
4-Methylphenol	9	8	*nonparametric (assumed lognorm.)	0.7447	0.8135	0.829	1.8782	0.167	208	233	200	200
Acenaphthene	10	9	lognormal	0.7909	0.8929	0.842	2.132	0.434	261	356	560	356
Acenaphthylene	10	9	normal	0.9331	0.8705	0.842	1.8331	96.5	203	259	100	100
Anthracene	10	9	lognormal	0.6605	0.8829	0.842	2.981	0.94	223	559	940	559
Benz(a)anthracene	10	9	lognormal	0.7814	0.9644	0.842	3.3475	1.12	791	3100	2800	2800
Benzo(a)pyrene	10	9	lognormal	0.7615	0.9594	0.842	3.3526	1.12	604	2330	2000	2000
Benzo(b)fluoranthene	10	9	lognormal	0.8668	0.963	0.842	3.2172	1.06	1250	4450	3400	3400
Benzo(g,h,i)perylene	10	9	lognormal	0.8289	0.9677	0.842	3.1852	1.04	553	1840	1500	1500
Benzo(k)fluoranthene	10	9	lognormal	0.7077	0.9109	0.842	2.8357	0.866	567	1270	2100	1270
Bis(2-ethylhexyl)phthalate	10	9	lognormal	0.6014	0.9079	0.842	3.7266	1.29	391	1880	2100	1880
Carbazole	10	9	normal	0.9355	0.8214	0.842	1.8331	79.9	179	225	240	225
Chrysene	10	9	lognormal	0.8135	0.9697	0.842	2.8519	0.874	1080	2590	2900	2590
Di-n-butylphthalate	9	8	*lognormal	0.7756	0.9133	0.829	2.8054	0.796	143	321	440	440
Dibenz(a,h)anthracene	10	9	lognormal	0.8009	0.9536	0.842	2.5175	0.692	316	571	850	571
Dibenzofuran	10	9	lognormal	0.7879	0.9196	0.842	2.9824	0.941	221	603	590	590

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SURFACE SOIL
SITE 41 - SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Diethylphthalate	9	8	*lognormal	0.9533	0.9793	0.829	2.059	0.341	182	235	140	140
Fluoranthene	10	9	lognormal	0.7715	0.9283	0.842	3.2488	1.07	1060	3790	2900	2900
Fluorene	10	9	normal	0.9083	0.7989	0.842	1.8331	79.5	222	268	340	268
Indeno(1,2,3-cd)pyrene	10	9	lognormal	0.8271	0.9615	0.842	3.2963	1.09	557	2080	1600	1600
Naphthalene	10	9	lognormal	0.7259	0.9236	0.842	3.0152	0.957	297	807	980	807
Phenanthrene	10	9	lognormal	0.7674	0.8804	0.842	2.8942	0.896	697	1690	1900	1690
Pyrene	10	9	lognormal	0.6741	0.9463	0.842	3.4124	1.15	1430	5440	6100	5440
Acetone	10	9	nonparametric (assumed lognorm.)	0.4028	0.5758	0.842	2.9446	0.922	18.6	35.6	120	35.6
Carbon Disulfide	10	9	lognormal	0.9102	0.933	0.842	2.0362	0.355	6.58	8.43	3	3
Toluene	10	9	lognormal	0.865	0.9149	0.842	1.9382	0.262	7.18	8.51	9	8.51

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Surface/Subsurface Soil Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/lo					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Total Petroleum Hydrocarb NA	0/0	4/13		NA						143	NA				NA				NA		18.7			NA							NA
Aluminum N	12/12	13/13		NA	13600	7590	1.7959	N	34406	7070	N	11	1	1.0000	N	1.0000			N	9.33	7.15	-7.1920	1.7139	N	lognor.	lognor.	0.7	0.807	0.2221	3.8461	Y
Arsenic Y	13/14	8/13	0.9942	N	1.26	0.74	1.7709	L	24.4	328	Y	2	2	0.2222	N	0.8342			N	4.53	28.5			NA	lognor.	nonpar.					NA
Barium N	14/14	13/13		NA	3.4	0.71	1.7709	L	191	92.6	N	2	1	0.7407	N	0.9576			N	3.4	2.94	-1.6652	1.7081	N	lognor.	lognor.	0.71	0.719	0.0018	3.8451	Y
Beryllium N	12/14	5/13	0.9988	N	-1.26	0.829	1.7709	L	2.46	0.6	N	5	2	0.8140	N	0.8615	Geha	Test	N	0.379	0.248			NA	lognor.	nonpar.					NA
Cadmium Y	5/14	2/13		NA	0.163					2	NA	1	1	0.4815	N	0.0485	Geha	Test	Y	0.163	0.767			NA	normal	nonpar.					NA
Calcium Y	2/12	8/13		NA	59.4					1430	NA	4	4	0.0565	N	0.0021	Geha	Test	Y	59.4	340			NA	lognor.	lognor.					NA
Chromium N	14/14	8/13	1.0000	N	2.89	0.661	1.7709	L	101	15.7	N	8	1	0.9986	N	1.0000	Geha	Test	N	21.9	4.42			NA	lognor.	lognor.					NA
Cobalt N	14/14	8/13	1.0000	N	12.4					32.1	NA	11	7	0.1730	N	0.0884	Geha	Test	N	12.4	7.1			NA	nonpar.	lognor.					NA
Copper N	12/14	12/13	0.5289	N	1.74	0.873	1.7709	L	56.5	23.9	N	1	1	0.4815	N	0.5675			N	1.74	1.75	0.0186	1.7081	N	lognor.	lognor.	0.873	0.749	0.2808	3.8451	Y
Iron N	12/12	13/13		NA	9.84	0.764	1.7959	L	151453	55600	N	2	1	0.7800	N	0.9989			N	9.84	8.29	-3.7625	1.7139	N	lognor.	lognor.	0.764	1.22	2.2817	3.8461	Y
Lead N	11/14	13/13		NA	8.46					46	NA	2	2	0.2222	N	0.9605	Geha	Test	N	8.46	8.67			NA	lognor.	nonpar.					NA
Magnesium N	12/12	13/13		NA	6.61	0.642	1.7959	L	4307	417	N	15	4	0.9999	N	1.0000			N	6.61	4.92	-5.6544	1.7139	N	lognor.	lognor.	0.642	0.837	0.7612	3.8461	Y
Manganese N	12/12	12/13	1.0000	N	157					369	NA	3	2	0.5313	N	0.9970			N	157	49.1			NA	nonpar.	lognor.					NA
Mercury N	11/14	1/13		NA	0.0303					0.18	NA				NA	0.2147	Geha	Test	N	0.0303	0.0865			NA	lognor.	nonpar.					NA
Nickel N	14/14	3/13	1.0000	N	1.71	0.531	1.7709	L	22.1	5.2	N	13	3	0.9985	N	0.9979	Geha	Test	N	6.37	2.49			NA	lognor.	nonpar.					NA
Potassium N	12/12	10/13	1.0000	N	6.65	0.75	1.7959	L	5998	903	N	17	7	0.9798	N	0.9982	Geha	Test	N	1000	345			NA	lognor.	lognor.					NA
Selenium N	10/14	1/13		NA	0.849					0.7	NA	6	1	0.9899	N	0.9964	Geha	Test	N	0.849	0.264			NA	lognor.	nonpar.					NA
Silver Y	1/14	4/13		NA	0.0895					4.1	NA	3	3	0.0978	N	0.0039	Geha	Test	Y	0.0895	1.08			NA	nonpar.	nonpar.					NA
Vanadium N	14/14	13/13		NA	3.26	0.624	1.7709	L	133	27.4	N	8	1	0.9986	N	0.9999			N	3.26	1.96	-5.5749	1.7081	N	lognor.	lognor.	0.624	0.588	0.0427	3.8451	Y
Zinc N	14/14	13/13		NA	2.89	0.567	1.7709	L	79.5	33.9	N	13	6	0.7202	N	0.9656			N	2.89	2.37	-2.0611	1.7081	N	lognor.	lognor.	0.567	0.732	0.7719	3.8451	Y
4,4'-DDD N	0/10	2/13	0.3083	N						53	NA	1	1	0.5652	N				NA		5.87			NA							NA
4,4'-DDE N	1/10	1/13	0.8221	N	1.1					160	NA	1	1	0.5652	N	0.5754	Geha	Test	N	1.1	14.2			NA	nonpar.	nonpar.					NA
4,4'-DDT N	1/10	3/13	0.4037	N	2.29					980	NA	3	3	0.1615	N	0.1863	Geha	Test	N	2.29	78			NA	lognor.	nonpar.					NA
Endosulfan II N	0/10	1/13	0.5652	N						1.5	NA				NA				NA		1.99			NA							NA
Endrin N	0/10	2/13	0.3083	N						20	NA	2	2	0.3083	N				NA		4.43			NA							NA
Gamma-Chlordane N	0/1	1/13	0.9286	N						1.4	NA	1	1	0.9286	N				NA		1.08			NA							NA
Heptachlor Epoxide N	0/10	1/13	0.5652	N						2.9	NA	1	1	0.5652	N				NA		1.19			NA							NA
2-Methylnaphthalene NA	0/3	1/13		NA						38	NA				NA				NA		192			NA							NA
Acenaphthylene NA	0/3	1/13		NA						82	NA				NA				NA		196			NA							NA
Anthracene NA	0/3	1/13		NA						90	NA				NA				NA		196			NA							NA
Benz(a)anthracene N	0/3	1/13		NA						320	NA	1	1	0.8125	N				NA		214			NA							NA
Benzo(a)pyrene N	0/3	2/13		NA						190	NA	1	1	0.8125	N				NA		197			NA							NA
Benzo(b)fluoranthene N	0/3	2/13		NA						560	NA	2	2	0.6500	N				NA		230			NA							NA

Table
Background Comparison Tests - Surface/Subsurface Soil Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/lo					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back. Freq.	Site Freq.	P Value	YN	Back. Mean@	Std.Dev Back.@	t Value	L,N Q	Back. UTL	Site Max.	YN	r	k	P Value	YN	P Value	Test	Used	YN	Back. Mean@	Site Mean@	t Value	t Table	YN	Back. Distrib.	Site Distrib.	Std.Dev Back.@	Std.Dev Site@	F Value	F Table	YN
Substance																															
Benzo(k)fluoranthene	N	0/3	1/13		NA						420	NA	1	1	0.8125	N				NA		222			NA							NA
Carbazole	NA	0/0	2/13		NA						250	NA				NA				NA		198			NA							NA
Chrysene	N	0/3	1/13		NA						520	NA	1	1	0.8125	N				NA		229			NA							NA
Di-n-butylphthalate	N	0/3	1/13		NA						3300	NA	1	1	0.8125	N				NA		443			NA							NA
Dibenzofuran	NA	0/3	1/13		NA						42	NA				NA				NA		192			NA							NA
Diethylphthalate	N	0/3	1/13		NA						12000	NA	1	1	0.8125	N				NA		1110			NA							NA
Fluoranthene	N	0/3	1/13		NA						640	NA	1	1	0.8125	N				NA		238			NA							NA
Indeno(1,2,3-cd)pyrene	NA	0/3	1/13		NA						120	NA				NA				NA		198			NA							NA
Naphthalene	NA	0/3	1/13		NA						56	NA				NA				NA		194			NA							NA
Phenanthrene	N	0/3	2/13		NA						350	NA	1	1	0.8125	N				NA		212			NA							NA
Pyrene	N	0/3	1/13		NA						520	NA	1	1	0.8125	N				NA		229			NA							NA
Acetone	N	1/3	2/13		NA	602					1200	NA	3	2	0.9286	N	0.8381	Geha	Test	N	602	139			NA	lognor.	nonpar.					NA
Carbon Disulfide	N	0/3	5/13		NA						6	NA	2	2	0.6500	N				NA		5.31			NA							NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.
A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.
UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.
For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:
(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.
(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.
(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.
(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
@	
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SURFACE SOIL/SUBSURFACE SOIL
SITE 41 - SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Nitrocellulose	9	8	*normal	0.8302	0.7995	0.829	1.8595	10700	19100	25700	33200	33200
Nitroguanidine	9	8	*nonparametric (assumed lognorm.)	0.5265	0.5684	0.829	2.8353	0.811	69.2	145	288.4	288
Aluminum	23	22	lognormal	0.8054	0.9683	0.914	2.4807	0.965	3420	6020	13800	6020
Antimony	23	22	nonparametric (assumed lognorm.)	0.6525	0.7829	0.914	2.2608	0.784	2.77	4.35	10.6	4.35
Arsenic	23	22	nonparametric (assumed lognorm.)	0.7593	0.9	0.914	4.7201	2.4	63.1	2270	328	328
Barium	23	22	lognormal	0.8036	0.9714	0.914	2.4186	0.916	49.1	81.4	192	81.4
Beryllium	23	22	lognormal	0.8367	0.929	0.914	2.1789	0.711	0.223	0.314	0.6	0.314
Cadmium	23	22	nonparametric (assumed lognorm.)	0.4735	0.7281	0.914	3.0115	1.34	4.65	8.59	45.6	8.59
Calcium	23	22	lognormal	0.3772	0.9365	0.914	4.3451	2.18	12300	74200	137000	74200
Chromium	23	22	lognormal	0.655	0.9483	0.914	2.8662	1.25	13.9	31.8	88.2	31.8
Cobalt	23	22	lognormal	0.6566	0.9372	0.914	2.2288	0.756	6.6	9.19	32.1	9.19
Copper	23	22	lognormal	0.6422	0.967	0.914	2.9154	1.28	29.9	66.3	189	66.3
Cyanide	23	22	nonparametric (assumed lognorm.)	0.8007	0.7617	0.914	2.2136	0.743	0.518	0.794	0.52	0.52
Iron	23	22	lognormal	0.8297	0.9428	0.914	3.0124	1.34	17200	51100	55600	51100
Lead	23	22	nonparametric (assumed lognorm.)	0.3044	0.8989	0.914	4.1391	2.05	212	942	3540	942
Magnesium	23	22	lognormal	0.4135	0.9291	0.914	2.9979	1.34	920	1770	9460	1770
Manganese	23	22	lognormal	0.6842	0.9549	0.914	3.8051	1.85	117	915	754	754
Mercury	23	22	nonparametric (assumed lognorm.)	0.4202	0.9008	0.914	2.6953	1.13	0.385	0.622	3.9	0.622
Nickel	23	22	nonparametric (assumed lognorm.)	0.5113	0.8584	0.914	2.347	0.857	6.32	8.99	44.3	8.99
Potassium	23	22	normal	0.9654	0.9151	0.914	1.7171	216	436	514	903	514
Selenium	23	22	nonparametric (assumed lognorm.)	0.7308	0.8518	0.914	2.5544	1.02	0.871	1.5	3.3	1.5
Silver	23	22	lognormal	0.7008	0.9281	0.914	2.6002	1.06	0.984	1.89	4.1	1.89
Vanadium	23	22	lognormal	0.8952	0.9176	0.914	2.1926	0.724	13.6	19.7	30.1	19.7
Zinc	23	22	nonparametric (assumed lognorm.)	0.6657	0.8835	0.914	3.4381	1.62	111	401	536	401
4,4'-DDD	23	22	nonparametric (assumed lognorm.)	0.2512	0.4987	0.914	2.1962	0.727	4.31	4.29	53	4.29
4,4'-DDE	23	22	nonparametric (assumed lognorm.)	0.2244	0.3537	0.914	2.4228	0.919	9.02	6.26	160	6.26
4,4'-DDT	23	22	nonparametric (assumed lognorm.)	0.2195	0.4072	0.914	2.9599	1.31	45.1	16.6	980	16.6
Aroclor-1260	23	22	nonparametric (assumed lognorm.)	0.3371	0.7335	0.914	5.9658	3.11	10000	1280000	180000	180000
Endosulfan II	23	22	nonparametric (assumed lognorm.)	0.7048	0.8155	0.914	1.7585	0.192	2.12	2.28	1.5	1.5
Endrin	23	22	nonparametric (assumed lognorm.)	0.3267	0.548	0.914	2.4874	0.97	7.38	8.11	91	8.11
Gamma-Chlordane	23	22	nonparametric (assumed lognorm.)	0.7267	0.8186	0.914	1.7523	0.179	1.11	1.19	1.4	1.19
Heptachlor Epoxide	23	22	nonparametric (assumed lognorm.)	0.4611	0.6201	0.914	1.9089	0.422	1.37	1.58	5.5	1.58
1,2,4-Trichlorobenzene	23	22	nonparametric (assumed lognorm.)	0.3215	0.6685	0.914	2.252	0.777	386	448	4800	448
2-Methylnaphthalene	23	22	nonparametric (assumed lognorm.)	0.7045	0.8408	0.914	2.1424	0.677	202	283	690	283
4-Methylphenol	22	21	nonparametric (assumed lognorm.)	0.7174	0.7942	0.911	1.7248	0.114	205	214	200	200
Acenaphthene	23	22	nonparametric (assumed lognorm.)	0.5859	0.7162	0.914	1.8175	0.293	229	254	560	254
Acenaphthylene	23	22	nonparametric (assumed lognorm.)	0.8116	0.7361	0.914	1.9111	0.425	199	241	100	100
Anthracene	23	22	nonparametric (assumed lognorm.)	0.574	0.8427	0.914	2.1094	0.645	208	277	940	277
Benz(a)anthracene	23	22	nonparametric (assumed lognorm.)	0.5558	0.8657	0.914	2.3155	0.831	465	643	2800	643
Benzo(a)pyrene	23	22	nonparametric (assumed lognorm.)	0.5364	0.846	0.914	2.2728	0.795	374	509	2000	509
Benzo(b)fluoranthene	23	22	nonparametric (assumed lognorm.)	0.6345	0.8253	0.914	2.4972	0.978	674	1060	3400	1060
Benzo(g,h,i)perylene	23	22	nonparametric (assumed lognorm.)	0.5849	0.8166	0.914	2.1942	0.725	355	473	1500	473
Benzo(k)fluoranthene	23	22	nonparametric (assumed lognorm.)	0.4948	0.7166	0.914	2.1097	0.645	372	458	2100	458
Bis(2-ethylhexyl)phthalate	23	22	nonparametric (assumed lognorm.)	0.4476	0.8594	0.914	2.4266	0.922	271	401	2100	401
Carbazole	23	22	nonparametric (assumed lognorm.)	0.8063	0.6593	0.914	1.9858	0.515	189	245	250	245

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IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Chrysene	23	22	nonparametric (assumed lognorm.)	0.6047	0.7813	0.914	2.3608	0.869	597	856	2900	856
Di-n-butylphthalate	22	21	nonparametric (assumed lognorm.)	0.3167	0.7666	0.911	2.3899	0.88	320	413	3300	413
Dibenz(a,h)anthracene	23	22	nonparametric (assumed lognorm.)	0.5767	0.7774	0.914	1.9375	0.458	252	299	850	299
Dibenzofuran	23	22	nonparametric (assumed lognorm.)	0.7062	0.7945	0.914	2.1569	0.691	205	293	590	293
Diethylphthalate	22	21	nonparametric (assumed lognorm.)	0.2333	0.4342	0.911	2.4317	0.913	731	565	12000	565
Fluoranthene	23	22	nonparametric (assumed lognorm.)	0.5833	0.8266	0.914	2.4163	0.914	594	876	2900	876
Fluorene	23	22	nonparametric (assumed lognorm.)	0.7799	0.6777	0.914	1.8205	0.298	211	239	340	239
Indeno(1,2,3-cd)pyrene	23	22	nonparametric (assumed lognorm.)	0.5963	0.8608	0.914	2.2374	0.764	354	483	1600	483
Naphthalene	23	22	nonparametric (assumed lognorm.)	0.5564	0.7838	0.914	2.1343	0.669	239	321	980	321
Phenanthrene	23	22	nonparametric (assumed lognorm.)	0.5468	0.7265	0.914	2.1944	0.725	423	546	1900	546
Pyrene	23	22	nonparametric (assumed lognorm.)	0.4692	0.7653	0.914	2.51	0.988	752	1040	6100	1040
Acetone	23	22	nonparametric (assumed lognorm.)	0.3538	0.6989	0.914	3.2024	1.47	86.8	110	1200	110
Carbon Disulfide	23	22	nonparametric (assumed lognorm.)	0.8406	0.8246	0.914	1.8633	0.361	5.86	6.82	6	6
Toluene	23	22	nonparametric (assumed lognorm.)	0.6318	0.6975	0.914	1.7551	0.185	6.51	6.97	9	6.97

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Groundwater Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq. Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
- Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Aluminum	N	3/4	2/4	0.9286	N	2710					3230	NA	4	2	0.7571	N	0.7000	Geha	Test	N	2710	1060			NA	lognor.	lognor.					NA
Arsenic	N	0/6	1/4	0.4000	N						37.6	NA	1	1	0.4000	N				NA		10.6			NA							NA
Barium	N	6/6	4/4		NA	3.92	0.83	2.0150	L	254	142	N	1	1	0.4000	N	0.8238			N	3.92	3.36	-0.9316	1.8595	N	lognor.	lognor.	0.83	1.1	0.2706	3.8993	Y
Beryllium	Y	0/6	3/4		NA						4.8	NA	3	3	0.0333	Y				NA		3.01			NA							NA
Calcium	N	4/4	3/4	1.0000	N	8.57	0.92	2.3534	L	599540	38100	N	4	3	0.2429	N	0.3429			N	7400	14900			NA	lognor.	normal					NA
Cobalt	N	5/6	2/4		NA	5.46					248	NA	2	2	0.1333	N	0.2429	Geha	Test	N	5.46	106			NA	lognor.	normal					NA
Iron	N	4/4	1/4		NA	9850	9200	2.3534	N	57199	49600	N	1	1	0.5000	N	0.9000	Geha	Test	N	9850	12400			NA	normal	lognor.					NA
Lead	N	0/6	1/4		NA						11.3	NA				NA				NA		1.94			NA							NA
Magnesium	N	4/4	4/4		NA	7.56	0.542	2.3534	L	31254	12500	N	2	2	0.2143	N	0.2429			N	2160	7050			NA	lognor.	normal					NA
Manganese	N	4/4	4/4		NA	5.55	0.912	2.3534	L	28160	535	N	4	3	0.2429	N	0.4429			N	355	366			NA	lognor.	normal					NA
Potassium	N	4/4	4/4		NA	7.71	0.703	2.3534	L	83058	6620	N	5	4	0.0714	N	0.1000			N	2750	4240			NA	lognor.	normal					NA
Sodium	Y	4/4	4/4		NA	17000	12200	2.3534	N	79585	77500	N	3	3	0.0714	N	0.0286			Y	9.48	10.6	2.0541	1.9432	Y	lognor.	lognor.	0.934	0.498	0.9581	3.9200	Y
Vanadium	N	1/6	1/4		NA	4.19					7.8	NA	2	1	0.6667	N	0.6667	Geha	Test	N	4.19	2.35			NA	lognor.	nonpar.					NA
Zinc	N	1/6	2/4		NA	11.8					296	NA	2	2	0.1333	N	0.1333	Geha	Test	N	11.8	139			NA	nonpar.	lognor.					NA
Bis(2-ethylhexyl)phthalate	N	1/2	1/4	0.9333	N	3.25					3	NA				NA	0.6667	Geha	Test	N	3.25	2.63			NA	unknow	nonpar.					NA
1,2-Dichloroethene (cis)	NA	0/0	1/4		NA						2	NA				NA				NA		0.875			NA							NA
Acetone	N	0/2	1/1	0.3333	N						4	NA	1	1	0.3333	N				NA		4			NA							NA
Trichloroethene	N	0/2	2/4		NA						32	NA	2	2	0.4000	N				NA		10.3			NA							NA

Notes: Units are ug/L.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.

Table
Background Comparison Tests - Groundwater Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	

% ND Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.

@ Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)

r,k The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - UNFILTERED GROUNDWATER
SITE 41 - SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Aluminum	4	3	*lognormal	0.8062	0.9155	0.748	14.4777	2.21	1060	3.3144E+11	3230	3230
Arsenic	4	3	*nonparametric (assumed lognorm.)	0.6326	0.6542	0.748	10.3882	1.58	10.6	160000	37.6	37.6
Barium	4	3	*lognormal	0.6984	0.8424	0.748	7.3087	1.1	48.6	5470	142	142
Beryllium	4	3	*normal	0.8968	0.7119	0.748	2.3534	2.13	3.01	5.52	4.8	4.8
Calcium	4	3	*normal	0.9127	0.8945	0.748	2.3534	16600	14900	34400	38100	38100
Cobalt	4	3	*normal	0.9006	0.8776	0.748	2.3534	118	106	245	248	248
Iron	4	3	*lognormal	0.6302	0.8685	0.748	25.9782	3.98	12400	3.75814E+31	49600	49600
Lead	4	3	*nonparametric (assumed lognorm.)	0.6291	0.6291	0.748	8.3603	1.26	1.94	939	11.3	11.3
Magnesium	4	3	*normal	0.8898	0.8182	0.748	2.3534	5930	7050	14000	12500	12500
Manganese	4	3	*normal	0.8074	0.6862	0.748	2.3534	240	366	648	535	535
Potassium	4	3	*normal	0.8811	0.8765	0.748	2.3534	1890	4240	6470	6620	6620
Sodium	4	3	*lognormal	0.8891	0.9665	0.748	3.6482	0.498	42600	125000	77500	77500
Vanadium	4	3	*nonparametric (assumed lognorm.)	0.6349	0.6585	0.748	8.8599	1.34	2.35	2470	7.8	7.8
Zinc	4	3	*lognormal	0.8461	0.889	0.748	15.72	2.4	139	2.1297E+12	296	296
Bis(2-ethylhexyl)phthalate	4	3	*nonparametric (assumed lognorm.)	0.6291	0.6291	0.748	2.2038	0.0912	2.63	2.95	3	3
1,2-Dichloroethene (cis)	4	3	*nonparametric (assumed lognorm.)	0.6291	0.6291	0.748	4.7595	0.693	0.875	6.04	2	2
Acetone	1		*unknown (assumed lognorm.)						4		4	4
Trichloroethene	4	3	*lognormal	0.7845	0.8507	0.748	13.6246	2.08	10.3	310000000	32	32

Notes:

Units are ug/L.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Sediment Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back?	YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance		Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Total Petroleum Hydrocarbo	NA	0/0	7/10		NA						215	NA				NA				NA		64.1			NA							NA
Aluminum	Y	12/12	10/10		NA	7870	3820	1.7959	N	18329	20500	Y	12	9	0.0035	Y	0.0012			Y	7870	13900			NA	normal	normal					NA
Arsenic	Y	14/14	10/10		NA	2.18	0.793	1.7709	N	4.25	8.8	Y	9	9	<.0001	Y	<.0001			Y	2.18	5.35			NA	normal	lognor.					NA
Barium	Y	14/14	10/10		NA	3.54	0.548	1.7709	L	144	182	Y	11	10	<.0001	Y	<.0001			Y	39.1	132			NA	lognor.	normal					NA
Beryllium	Y	12/14	10/10	0.3297	N	0.349	0.213	1.7709	N	0.905	1.6	Y	10	10	<.0001	Y	<.0001			Y	0.349	1.15			NA	normal	lognor.					NA
Cadmium	N	6/14	2/10		NA	0.169					3.8	NA	1	1	0.4167	N	0.0577	Geha	Test	N	0.169	1.96			NA	nonpar.	nonpar.					NA
Calcium	Y	2/12	10/10	0.0001	Y	103					3920	NA	10	10	<.0001	Y	<.0001	Geha	Test	Y	103	3190			NA	nonpar.	normal					NA
Chromium	Y	14/14	10/10		NA	12	4.68	1.7709	N	24.2	43.3	Y	9	9	<.0001	Y	<.0001			Y	12	31.1			NA	normal	normal					NA
Cobalt	Y	14/14	10/10		NA	1.25	0.932	1.7709	L	39.7	30.4	N	10	10	<.0001	Y	<.0001			Y	1.25	3.13	7.4419	1.7709	Y	lognor.	lognor.	0.932	0.151	0.957	3.8472	N
Copper	Y	12/14	10/10	0.3297	N	1.36	0.601	1.7709	L	18.7	44.5	Y	10	10	<.0001	Y	<.0001			Y	1.36	3.59	13.3468	1.7531	Y	lognor.	lognor.	0.601	0.149	3.930	3.8472	N
Iron	Y	12/12	10/10		NA	9.09	0.577	1.7959	L	43170	38200	N	11	10	<.0001	Y	0.0001			Y	10300	29200			NA	lognor.	normal					NA
Lead	Y	12/14	10/10	0.3297	N	17.8					105	NA	11	10	<.0001	Y	0.0002			Y	17.8	44.8			NA	nonpar.	nonpar.					NA
Magnesium	Y	12/12	10/10		NA	576	295	1.7959	N	1382	3400	Y	10	10	<.0001	Y	<.0001			Y	576	2480			NA	normal	normal					NA
Manganese	Y	12/12	10/10		NA	4.75	1.08	1.7959	L	2248	1300	N	11	10	<.0001	Y	0.0001			Y	197	977			NA	lognor.	normal					NA
Mercury	Y	12/14	6/10		NA	0.0399	0.018	1.7709	N	0.087	0.78	Y	3	3	0.0593	N	0.0007	Geha	Test	Y	0.0399	0.359			NA	normal	lognor.					NA
Nickel	Y	14/14	10/10		NA	1.45	0.557	1.7709	L	18.2	31.1	Y	10	10	<.0001	Y	<.0001			Y	1.45	3.04	9.5230	1.7341	Y	lognor.	lognor.	0.557	0.241	5.9390	3.8472	N
Potassium	Y	12/12	10/10		NA	5.99	0.564	1.7959	L	1874	2240	Y	10	10	<.0001	Y	<.0001			Y	5.99	7.29	7.0328	1.7459	Y	lognor.	lognor.	0.564	0.27	4.5284	3.8482	N
Selenium	N	11/14	1/10		NA	0.458					1.7	NA				NA	0.2090	Geha	Test	N	0.458	0.735			NA	normal	nonpar.					NA
Silver	Y	0/14	10/10	<.0001	Y						8.7	NA	10	10	<.0001	Y				NA		5.73			NA							NA
Sodium	Y	6/12	10/10	0.0124	Y	30.4					384	NA	10	10	<.0001	Y	<.0001	Geha	Test	Y	30.4	287			NA	nonpar.	normal					NA
Vanadium	Y	14/14	10/10		NA	2.87	0.425	1.7709	L	53.5	55	Y	10	9	0.0001	Y	0.0001			Y	19.2	42.6			NA	lognor.	normal					NA
Zinc	Y	14/14	10/10		NA	18.1	7.66	1.7709	N	38.1	253	Y	10	10	<.0001	Y	<.0001			Y	18.1	187			NA	normal	normal					NA
4,4'-DDD	N	0/10	4/10	0.0433	Y						7.8	NA	1	1	0.5000	N				NA		5.34			NA							NA
4,4'-DDE	N	2/10	4/10		NA	1.72					4.1	NA	2	1	0.7632	N	0.0724	Geha	Test	N	1.72	4.29			NA	nonpar.	normal					NA
4,4'-DDT	Y	2/10	7/10	0.0349	Y	2.71					11	NA	6	5	0.0704	N	0.0076	Geha	Test	Y	2.71	5.93			NA	nonpar.	lognor.					NA
Endrin	NA	0/10	2/10		NA						2.7	NA				NA				NA		4.86			NA							NA
Gamma-Chlordane	N	0/1	3/10	0.7273	N						1.5	NA				NA				NA		2.33			NA							NA
Benz(a)anthracene	NA	0/3	3/10		NA						240	NA				NA				NA		462			NA							NA
Benzo(a)pyrene	NA	0/3	2/10		NA						170	NA				NA				NA		490			NA							NA
Benzo(b)fluoranthene	NA	0/3	2/10		NA						320	NA				NA				NA		511			NA							NA
Benzo(k)fluoranthene	NA	0/3	1/10		NA						170	NA				NA				NA		541			NA							NA
Bis(2-ethylhexyl)phthalate	N	1/3	1/10		NA	290					100	NA				NA	0.9475	Geha	Test	N	290	281			NA	lognor.	nonpar.					NA
Chrysene	NA	0/3	4/10		NA						250	NA				NA				NA		426			NA							NA

Table
Background Comparison Tests - Sediment Data
Site 41 - Scrap Yard
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Fluoranthene	N	0/3	4/10		NA					590	NA	1	1	0.7692	N				NA		495			NA							NA
N-Nitrosodiphenylamine (1)	N	0/3	3/10		NA					620	NA	2	2	0.5769	N				NA		538			NA							NA
Phenanthrene	NA	0/3	2/10		NA					160	NA				NA				NA		493			NA							NA
Pyrene	N	0/3	4/10		NA					530	NA	1	1	0.7692	N				NA		481			NA							NA
2-Butanone	NA	0/0	4/10		NA					120	NA				NA				NA		131			NA							NA
Acetone	N	2/3	6/10		NA	5070				5800	NA	2	1	0.9615	N	0.8801	Geha	Test	N	5070	1140			NA	lognor.	lognor.					NA
Carbon Disulfide	NA	0/3	2/10		NA					6	NA				NA				NA		214			NA							NA
Chloromethane	NA	0/3	2/10		NA					17	NA				NA				NA		215			NA							NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.
A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.
UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.
For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:
(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.
(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.
(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.
(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SEDIMENT
SITE 41 - SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Total Petroleum Hydrocarbon	10	9	lognormal	0.7779	0.9743	0.842	2.8839	0.891	64.1	157	215	157
Aluminum	10	9	normal	0.9664	0.9463	0.842	1.8331	3750	13900	16100	20500	16100
Arsenic	10	9	lognormal	0.8956	0.9545	0.842	1.9621	0.286	5.35	6.46	8.8	6.46
Barium	10	9	normal	0.9113	0.8424	0.842	1.8331	27.8	132	148	182	148
Beryllium	10	9	lognormal	0.8645	0.8956	0.842	1.8552	0.17	1.15	1.28	1.6	1.28
Cadmium	10	9	nonparametric (assumed lognorm.)	0.5202	0.6045	0.842	1.9322	0.255	1.96	2.3	3.8	2.3
Calcium	10	9	normal	0.8925	0.8166	0.842	1.8331	655	3190	3570	3920	3570
Chromium	10	9	normal	0.9636	0.917	0.842	1.8331	7.03	31.1	35.2	43.3	35.2
Cobalt	10	9	lognormal	0.9495	0.9638	0.842	1.8398	0.151	23.2	25.5	30.4	25.5
Copper	10	9	normal	0.9668	0.9592	0.842	1.8331	5.33	36.6	39.7	44.5	39.7
Iron	10	9	normal	0.9093	0.8369	0.842	1.8331	5660	29200	32400	38200	32400
Lead	10	9	nonparametric (assumed lognorm.)	0.5932	0.7333	0.842	2.0367	0.355	44.8	56.6	105	56.6
Magnesium	10	9	normal	0.9399	0.8552	0.842	1.8331	557	2480	2800	3400	2800
Manganese	10	9	normal	0.8836	0.7966	0.842	1.8331	283	977	1140	1300	1140
Mercury	10	9	lognormal	0.9025	0.9449	0.842	2.3939	0.616	0.359	0.602	0.78	0.602
Nickel	10	9	lognormal	0.9642	0.9768	0.842	1.9181	0.241	21.5	25.1	31.1	25.1
Potassium	10	9	lognormal	0.9822	0.9871	0.842	1.9465	0.27	1510	1800	2240	1800
Selenium	10	9	nonparametric (assumed lognorm.)	0.6463	0.6997	0.842	1.8323	0.141	0.735	0.801	1.7	0.801
Silver	10	9	lognormal	0.9188	0.9578	0.842	1.9368	0.26	5.73	6.79	8.7	6.79
Sodium	10	9	normal	0.9157	0.8114	0.842	1.8331	68.7	287	327	384	327
Vanadium	10	9	normal	0.9666	0.9472	0.842	1.8331	8.08	42.6	47.3	55	47.3
Zinc	10	9	normal	0.9637	0.9616	0.842	1.8331	33.5	187	206	253	206
4,4'-DDD	10	9	nonparametric (assumed lognorm.)	0.8081	0.7797	0.842	2.0173	0.338	5.34	6.77	7.8	6.77
4,4'-DDE	10	9	normal	0.8465	0.8278	0.842	1.8331	1.85	4.29	5.36	4.1	4.1
4,4'-DDT	10	9	lognormal	0.91	0.9551	0.842	2.0762	0.389	5.93	7.83	11	7.83
Endrin	10	9	nonparametric (assumed lognorm.)	0.6501	0.655	0.842	2.2848	0.545	4.86	7.68	2.7	2.7
Gamma-Chlordane	10	9	nonparametric (assumed lognorm.)	0.7498	0.7505	0.842	2.1669	0.461	2.33	3.31	1.5	1.5
Benz(a)anthracene	10	9	nonparametric (assumed lognorm.)	0.6696	0.6785	0.842	2.5132	0.689	462	885	240	240
Benzo(a)pyrene	10	9	nonparametric (assumed lognorm.)	0.6238	0.5843	0.842	2.4105	0.627	490	866	170	170
Benzo(b)fluoranthene	10	9	nonparametric (assumed lognorm.)	0.6698	0.608	0.842	2.1541	0.451	511	729	320	320
Benzo(k)fluoranthene	10	9	nonparametric (assumed lognorm.)	0.5233	0.4664	0.842	2.0822	0.394	541	729	170	170
Bis(2-ethylhexyl)phthalate	10	9	nonparametric (assumed lognorm.)	0.6959	0.755	0.842	3.2513	1.07	281	971	100	100
Chrysene	10	9	nonparametric (assumed lognorm.)	0.6964	0.7218	0.842	2.5499	0.71	426	830	250	250
Fluoranthene	10	9	nonparametric (assumed lognorm.)	0.6235	0.6277	0.842	2.1122	0.419	495	677	590	590
N-Nitrosodiphenylamine (1)	10	9	nonparametric (assumed lognorm.)	0.5307	0.4705	0.842	2.2158	0.497	538	813	620	620
Phenanthrene	10	9	nonparametric (assumed lognorm.)	0.6307	0.5952	0.842	2.3544	0.591	493	829	160	160
Pyrene	10	9	nonparametric (assumed lognorm.)	0.6664	0.6617	0.842	2.1741	0.467	481	691	530	530
2-Butanone	10	9	lognormal	0.5	0.9188	0.842	3.9399	1.38	131	770	120	120
Acetone	10	9	lognormal	0.6666	0.9266	0.842	4.7276	1.72	1140	23900	5800	5800
Carbon Disulfide	10	9	nonparametric (assumed lognorm.)	0.3703	0.7046	0.842	4.7791	1.74	214	1550	6	6
Chloromethane	10	9	nonparametric (assumed lognorm.)	0.3673	0.572	0.842	4.3898	1.58	215	889	17	17

Notes:

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SEDIMENT
SITE 41 - SCRAP YARD
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

SITE 42 - OLSON ROAD LANDFILL

Table
Background Comparison Tests - Surface Soil Data
Site 42 - Olson Road Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
4,4'-DDT	Y	2/10	5/10	0.1749	N	2.71					23	NA	6	5	0.0704	N	0.0383	Geha	Test	Y	2.71	6.02			NA	nonpar.	lognor.					NA
1,4-Dichlorobenzene	N	0/2	1/10	0.8333	N						120	NA				NA				NA		187			NA							NA
4-Methylphenol	N	0/1	1/10		NA						140	NA	1	1	0.9091	N				NA		189			NA							NA
Benz(a)anthracene	NA	0/3	1/10		NA						42	NA				NA				NA		181			NA							NA
Benzo(a)pyrene	NA	0/3	1/10		NA						42	NA				NA				NA		181			NA							NA
Benzo(b)fluoranthene	NA	0/3	2/10		NA						76	NA				NA				NA		171			NA							NA
Chrysene	NA	0/3	2/10		NA						55	NA				NA				NA		169			NA							NA
Fluoranthene	NA	0/3	2/10		NA						60	NA				NA				NA		168			NA							NA
Pyrene	NA	0/3	2/9		NA						76	NA				NA				NA		167			NA							NA
Toluene	NA	0/3	2/10		NA						3	NA				NA				NA		5.1			NA							NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.
A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.
UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.
For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:
(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.
(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.
(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.
(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

Table
Representative Concentration and Statistical Distribution of COPCs - Surface Soil Data
Site 42 - Olson Road Landfill
Ihdiv-Nswc, Indian Head, Maryland

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
4,4'-DDT	10	9	lognormal	0.6962	0.6468	0.842	2.8975	0.898	6.02	14.2	23	14.2
1,4-Dichlorobenzene	10	9	nonparametric (assumed lognorm.)	0.6878	0.629	0.842	1.8457	0.158	187	206	120	120
4-Methylphenol	10	9	nonparametric (assumed lognorm.)	0.7779	0.7332	0.842	1.8107	0.112	189	202	140	140
Benz(a)anthracene	10	9	nonparametric (assumed lognorm.)	0.5399	0.4527	0.842	2.2064	0.49	181	272	42	42
Benzo(a)pyrene	10	9	nonparametric (assumed lognorm.)	0.5399	0.4527	0.842	2.2064	0.49	181	272	42	42
Benzo(b)fluoranthene	10	9	nonparametric (assumed lognorm.)	0.6457	0.6042	0.842	2.2446	0.517	171	263	76	76
Chrysene	10	9	nonparametric (assumed lognorm.)	0.6242	0.5848	0.842	2.3554	0.592	169	285	55	55
Fluoranthene	10	9	nonparametric (assumed lognorm.)	0.6586	0.6064	0.842	2.2727	0.537	168	264	60	60
Pyrene	9	8	*nonparametric (assumed lognorm.)	0.7032	0.656	0.829	2.2192	0.461	167	247	76	76
Toluene	10	9	nonparametric (assumed lognorm.)	0.6643	0.6235	0.842	2.0583	0.374	5.1	6.72	3	3

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.

Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.

For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.

For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.

*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.

H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.

Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).

The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Surface/Subsurface Soil Data
Site 42 - Olson Road Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:		Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:		Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:		#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/lo					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:		P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back?	YN	Back. Freq.	Site Freq.	P Value	YN	Back. Mean@	Std.Dev Back.@	t Value	L,N Q	Back. UTL	Site Max.	YN	r	k	P Value	YN	P Value	Test	Used	YN	Back. Mean@	Site Mean@	t Value	t Table	YN	Back. Distrib.	Site Distrib.	Std.Dev Back.@	Std.Dev Site@	F Value	F Table	YN
Substance																																
Aluminum	Y	12/12	24/24		NA	7870	3820	1.7959	N	15000	18300	Y	25	20	0.0158	Y	0.0376			Y	7870	10500			NA	normal	normal					NA
Arsenic	Y	14/14	1/24	1.0000	N	2.18	0.793	1.7709	N	3.63	14	Y				NA	0.2130	Geha	Test	N	2.18	5.19			NA	normal	nonpar.					NA
Barium	Y	14/14	23/24	1.0000	N	3.54	0.548	1.7709	L	93.8	307	Y	22	20	<.0001	Y	0.0001			Y	39.1	75.8			NA	lognor.	nonpar.					NA
Beryllium	Y	12/14	2/24		NA	0.349	0.213	1.7709	N	0.739	1	Y	2	2	0.3926	N	0.9452	Geha	Test	N	0.349	0.375			NA	normal	nonpar.					NA
Cadmium	Y	6/14	3/24		NA	0.169					2	NA	3	3	0.2399	N	0.0415	Geha	Test	Y	0.169	0.448			NA	nonpar.	nonpar.					NA
Calcium	Y	2/12	7/24		NA	103					1860	NA	2	2	0.4381	N	0.0184	Geha	Test	Y	103	475			NA	nonpar.	nonpar.					NA
Chromium	Y	14/14	24/24		NA	12	4.68	1.7709	N	20.6	21	Y	15	12	0.0802	N	0.2068			N	12	13			NA	normal	normal					NA
Cobalt	Y	14/14	15/24		NA	1.25	0.932	1.7709	L	19.2	21	Y	13	11	0.0494	Y	0.0942	Geha	Test	N	5.06	7.39			NA	lognor.	normal					NA
Copper	Y	12/14	20/24		NA	1.36	0.601	1.7709	L	11.7	19	Y	17	16	0.0004	Y	0.0083	Geha	Test	Y	4.74	8.8			NA	lognor.	normal					NA
Cyanide	N	0/2	1/24	0.9231	N						0.5	NA				NA				NA		0.26			NA							NA
Iron	Y	12/12	24/24		NA	9.09	0.577	1.7959	L	26200	65200	Y	16	15	0.0022	Y	0.0006			Y	9.09	9.85	3.6901	1.6909	Y	lognor.	lognor.	0.577	0.576	0.0000	3.8439	Y
Lead	Y	12/14	24/24	0.1294	N	17.8					376	NA	17	15	0.0045	Y	0.0620	Geha	Test	N	17.8	24.4			NA	nonpar.	nonpar.					NA
Magnesium	Y	12/12	21/24	1.0000	N	576	295	1.7959	N	1130	2500	Y	15	15	0.0002	Y	0.0001			Y	576	1230			NA	normal	normal					NA
Manganese	N	12/12	24/24		NA	4.75	1.08	1.7959	L	878	261	N	25	16	0.8130	N	0.9426			N	4.75	4.15	-1.8831	1.6909	N	lognor.	lognor.	1.08	0.801	1.3953	3.8439	Y
Nickel	Y	14/14	22/24	1.0000	N	1.45	0.557	1.7709	L	11.8	27	Y	24	22	<.0001	Y	<.0001			Y	4.9	12.3			NA	lognor.	normal					NA
Potassium	Y	12/12	15/24	1.0000	N	5.99	0.564	1.7959	L	1150	1080	N	3	3	0.2835	N	0.0164	Geha	Test	Y	457	653			NA	lognor.	normal					NA
Silver	N	0/14	2/24		NA						19	NA	2	2	0.3926	N				NA		1.1			NA							NA
Sodium	Y	6/12	3/24		NA	30.4					271	NA				NA	0.0072	Geha	Test	Y	30.4	307			NA	nonpar.	nonpar.					NA
Vanadium	Y	14/14	24/24		NA	2.87	0.425	1.7709	L	38.3	40	Y	27	21	0.0055	Y	0.0335			Y	19.2	24.1			NA	lognor.	normal					NA
Zinc	Y	14/14	24/24		NA	18.1	7.66	1.7709	N	32.1	379	Y	18	18	<.0001	Y	<.0001			Y	18.1	47.6			NA	normal	nonpar.					NA
4,4'-DDD	N	0/10	1/35	0.7778	N						5	NA	1	1	0.7778	N				NA		1.83			NA							NA
4,4'-DDE	N	2/10	1/35	0.9915	N	1.72					7	NA	2	1	0.9545	N	0.8490	Geha	Test	N	1.72	1.93			NA	nonpar.	nonpar.					NA
4,4'-DDT	N	2/10	9/35	0.5350	N	2.71					22	NA	10	9	0.2789	N	0.1790	Geha	Test	N	2.71	2.95			NA	nonpar.	nonpar.					NA
Alpha-Chlordane	N	0/1	2/35	0.9444	N						3	NA	2	2	0.9444	N				NA		1			NA							NA
Beta-BHC	N	0/10	4/35	0.3514	N						3	NA	4	4	0.3514	N				NA		1.02			NA							NA
Delta-BHC	N	0/10	2/35	0.6010	N						5	NA	2	2	0.6010	N				NA		1.05			NA							NA
Dieldrin	N	0/10	1/35		NA						10	NA	1	1	0.7778	N				NA		1.9			NA							NA
Endosulfan II	N	0/10	2/35	0.6010	N						6	NA	2	2	0.6010	N				NA		1.89			NA							NA
Endosulfan Sulfate	N	0/10	11/35		NA						24	NA	9	9	0.0797	N				NA		5.06			NA							NA
Endrin	N	0/10	1/35	0.7778	N						4	NA	1	1	0.7778	N				NA		1.85			NA							NA
Gamma-BHC (Lindane)	N	0/10	2/35	0.6010	N						4	NA	2	2	0.6010	N				NA		1.04			NA							NA
Gamma-Chlordane	N	0/1	1/35	0.9722	N						3	NA	1	1	0.9722	N				NA		0.966			NA							NA
Heptachlor Epoxide	N	0/10	1/35	0.7778	N						3	NA	1	1	0.7778	N				NA		0.966			NA							NA
Benz(a)anthracene	N	0/3	1/35		NA						360	NA	1	1	0.9211	N				NA		183			NA							NA
Benzo(a)pyrene	N	0/3	1/35		NA						313	NA	1	1	0.9211	N				NA		182			NA							NA
Benzo(b)fluoranthene	N	0/3	2/35		NA						448	NA	2	2	0.8464	N				NA		192			NA							NA
Benzo(g,h,i)perylene	N	0/3	1/35		NA						290	NA	1	1	0.9211	N				NA		181			NA							NA
Benzo(k)fluoranthene	N	0/3	2/35		NA						325	NA	2	2	0.8464	N				NA		184			NA							NA

Table
Background Comparison Tests - Surface/Subsurface Soil Data
Site 42 - Olson Road Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/lo					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Bis(2-ethylhexyl)phthalate	N	1/3	7/35		NA	290					27000	NA	5	5	0.6468	N	0.6247	Geha	Test	N	290	2510			NA	lognor.	nonpar.					NA
Chrysene	N	0/3	2/35		NA						464	NA	2	2	0.8464	N				NA		192			NA							NA
Di-n-butylphthalate	N	0/3	12/35		NA						342	NA	8	8	0.4813	N				NA		184			NA							NA
Di-n-octylphthalate	N	0/3	1/35		NA						199	NA	1	1	0.9211	N				NA		173			NA							NA
Diethylphthalate	N	0/3	1/35		NA						916	NA	1	1	0.9211	N				NA		199			NA							NA
Fluoranthene	N	0/3	2/35		NA						580	NA	2	2	0.8464	N				NA		196			NA							NA
Indeno(1,2,3-cd)pyrene	N	0/3	1/35		NA						302	NA	1	1	0.9211	N				NA		182			NA							NA
Phenanthrene	N	0/3	1/35		NA						847	NA	1	1	0.9211	N				NA		197			NA							NA
Pyrene	N	0/3	2/35		NA						1390	NA	2	2	0.8464	N				NA		230			NA							NA
1,2-Dichloroethene (Total)	N	0/3	2/35		NA						12	NA	2	2	0.8464	N				NA		5.66			NA							NA
Acetone	N	2/3	4/35	0.9976	N	5070					211	NA	6	4	0.9976	N	0.9979	Geha	Test	N	5070	13.9			NA	lognor.	nonpar.					NA
Chlorobenzene	N	0/3	1/35		NA						49	NA	1	1	0.9211	N				NA		6.61			NA							NA
Ethylbenzene	N	0/3	1/35		NA						684	NA	1	1	0.9211	N				NA		24.8			NA							NA
Methylene Chloride	N	0/3	17/35		NA						40	NA	15	15	0.2099	N				NA		7.16			NA							NA
Toluene	N	0/3	1/35		NA						20	NA	1	1	0.9211	N				NA		5.79			NA							NA
Trichloroethene	N	0/3	7/35		NA						93	NA	7	7	0.5328	N				NA		9.04			NA							NA
Xylene (Total)	N	0/1	1/35		NA						15100	NA	1	1	0.9722	N				NA		437			NA							NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.
A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.
UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.
For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:
(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.
(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.
(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.
(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

Table
Representative Concentration and Statistical Distribution of COPCs - Surface/Subsurface Soil Data
Site 42 - Olson Road Landfill
Ihdiv-Nswc, Indian Head, Maryland

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.05}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Aluminum	24	23	normal	0.9479	0.862	0.916	1.7139	3030	10500	11600	18300	11600
Arsenic	24	23	nonparametric (assumed lognorm.)	0.2108	0.2108	0.916	1.7263	0.131	5.19	5.43	14	5.43
Barium	24	23	nonparametric (assumed lognorm.)	0.9048	0.5086	0.916	2.6126	1.08	75.8	194	307	194
Beryllium	24	23	nonparametric (assumed lognorm.)	0.6064	0.6584	0.916	1.9272	0.453	0.375	0.444	1	0.444
Cadmium	24	23	nonparametric (assumed lognorm.)	0.5583	0.693	0.916	2.0348	0.577	0.448	0.549	2	0.549
Calcium	24	23	nonparametric (assumed lognorm.)	0.7234	0.7804	0.916	2.3495	0.871	475	803	1860	803
Chromium	24	23	normal	0.979	0.785	0.916	1.7139	4.37	13	14.5	21	14.5
Cobalt	24	23	normal	0.9171	0.8676	0.916	1.7139	5.91	7.39	9.45	21	9.45
Copper	24	23	normal	0.9597	0.818	0.916	1.7139	5.43	8.8	10.7	19	10.7
Cyanide	24	23	nonparametric (assumed lognorm.)	0.2108	0.2108	0.916	1.7309	0.141	0.26	0.274	0.5	0.274
Iron	24	23	lognormal	0.8469	0.9671	0.916	2.0339	0.576	22300	28500	65200	28500
Lead	24	23	nonparametric (assumed lognorm.)	0.4464	0.7592	0.916	2.4092	0.92	24.4	30.9	376	30.9
Magnesium	24	23	normal	0.984	0.9163	0.916	1.7139	509	1230	1410	2500	1410
Manganese	24	23	lognormal	0.8678	0.981	0.916	2.2681	0.801	84.2	128	261	128
Nickel	24	23	normal	0.9457	0.7432	0.916	1.7139	5.43	12.3	14.2	27	14.2
Potassium	24	23	normal	0.9227	0.9063	0.916	1.7139	262	653	745	1080	745
Silver	24	23	nonparametric (assumed lognorm.)	0.2217	0.2683	0.916	2.1521	0.696	1.1	1.03	19	1.03
Sodium	24	23	nonparametric (assumed lognorm.)	0.6412	0.6898	0.916	1.8413	0.337	307	349	271	271
Vanadium	24	23	normal	0.9718	0.9021	0.916	1.7139	7.66	24.1	26.8	40	26.8
Zinc	24	23	nonparametric (assumed lognorm.)	0.5542	0.9117	0.916	2.0751	0.62	47.6	60.3	379	60.3
4,4'-DDD	45	44	nonparametric (assumed lognorm.)	0.6633	0.7321	0.945	1.6999	0.137	1.86	1.92	5	1.92
4,4'-DDE	45	44	nonparametric (assumed lognorm.)	0.3249	0.5042	0.945	1.7337	0.226	1.94	2.03	7	2.03
4,4'-DDT	45	44	nonparametric (assumed lognorm.)	0.5725	0.7287	0.945	2.032	0.689	3.63	4.18	23	4.18
Alpha-Chlordane	45	44	nonparametric (assumed lognorm.)	0.4009	0.533	0.945	1.7333	0.226	0.994	1.05	3	1.05
Beta-BHC	45	44	nonparametric (assumed lognorm.)	0.5539	0.6415	0.945	1.7296	0.217	1.01	1.06	3	1.06
Delta-BHC	45	44	nonparametric (assumed lognorm.)	0.2894	0.454	0.945	1.7604	0.286	1.04	1.09	5	1.09
Dieldrin	45	44	nonparametric (assumed lognorm.)	0.3776	0.5498	0.945	1.7239	0.203	1.91	2	10	2
Endosulfan II	45	44	nonparametric (assumed lognorm.)	0.5971	0.6911	0.945	1.7132	0.175	1.9	1.99	6	1.99
Endosulfan Sulfate	45	44	nonparametric (assumed lognorm.)	0.5976	0.6505	0.945	2.1443	0.815	4.37	5.25	24	5.25
Endrin	45	44	nonparametric (assumed lognorm.)	0.5487	0.6685	0.945	1.7067	0.157	1.87	1.94	4	1.94
Gamma-BHC (Lindane)	45	44	nonparametric (assumed lognorm.)	0.3423	0.4781	0.945	1.7544	0.273	1.03	1.08	4	1.08
Gamma-Chlordane	45	44	nonparametric (assumed lognorm.)	0.3345	0.4895	0.945	1.7216	0.197	0.969	1.01	3	1.01
Heptachlor Epoxide	45	44	nonparametric (assumed lognorm.)	0.3345	0.4895	0.945	1.7216	0.197	0.969	1.01	3	1.01
1,4-Dichlorobenzene	45	44	nonparametric (assumed lognorm.)	0.8168	0.805	0.945	1.6935	0.119	180	185	120	120
4-Methylphenol	45	44	nonparametric (assumed lognorm.)	0.803	0.8045	0.945	1.6903	0.109	180	185	140	140
Benz(a)anthracene	45	44	nonparametric (assumed lognorm.)	0.6988	0.5828	0.945	1.75	0.264	183	198	360	198
Benzo(a)pyrene	45	44	nonparametric (assumed lognorm.)	0.748	0.5698	0.945	1.7465	0.256	182	196	313	196
Benzo(b)fluoranthene	45	44	nonparametric (assumed lognorm.)	0.6532	0.6942	0.945	1.776	0.317	188	205	448	205
Benzo(g,h,i)perylene	45	44	nonparametric (assumed lognorm.)	0.7423	0.7701	0.945	1.6956	0.125	185	191	290	191
Benzo(k)fluoranthene	45	44	nonparametric (assumed lognorm.)	0.7036	0.7622	0.945	1.6999	0.137	187	193	325	193
Bis(2-ethylhexyl)phthalate	45	44	nonparametric (assumed lognorm.)	0.5123	0.7199	0.945	3.0647	1.61	2320	4010	27000	4010
Chrysene	45	44	nonparametric (assumed lognorm.)	0.6555	0.6611	0.945	1.792	0.347	187	207	464	207
Di-n-butylphthalate	45	44	nonparametric (assumed lognorm.)	0.884	0.7559	0.945	1.8194	0.395	187	212	342	212
Di-n-octylphthalate	45	44	nonparametric (assumed lognorm.)	0.6616	0.3928	0.945	1.7778	0.321	178	198	199	198
Diethylphthalate	45	44	nonparametric (assumed lognorm.)	0.2716	0.4507	0.945	1.7495	0.263	198	208	916	208
Fluoranthene	45	44	nonparametric (assumed lognorm.)	0.5709	0.6792	0.945	1.7897	0.343	190	208	580	208
Indeno(1,2,3-cd)pyrene	45	44	nonparametric (assumed lognorm.)	0.721	0.7605	0.945	1.6968	0.128	185	191	302	191

Table
Representative Concentration and Statistical Distribution of COPCs - Surface/Subsurface Soil Data
Site 42 - Olson Road Landfill
Ihdiv-Nswc, Indian Head, Maryland

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Phenanthrene	44	43	nonparametric (assumed lognorm.)	0.2839	0.4602	0.944	1.747	0.255	197	207	847	207
Pyrene	44	43	nonparametric (assumed lognorm.)	0.3396	0.5981	0.944	1.8511	0.443	217	234	1390	234
1,2-Dichloroethene (Total)	45	44	nonparametric (assumed lognorm.)	0.5157	0.6125	0.945	1.7162	0.183	5.7	5.96	12	5.96
Acetone	45	44	nonparametric (assumed lognorm.)	0.2698	0.415	0.945	2.0599	0.722	12.1	10.8	211	10.8
Chlorobenzene	45	44	nonparametric (assumed lognorm.)	0.2061	0.3581	0.945	1.789	0.341	6.44	6.65	49	6.65
Ethylbenzene	45	44	nonparametric (assumed lognorm.)	0.1549	0.2417	0.945	2.0643	0.727	20.6	9.91	684	9.91
Methylene Chloride	45	44	nonparametric (assumed lognorm.)	0.4087	0.7944	0.945	1.8258	0.405	6.71	7.25	40	7.25
Toluene	45	44	nonparametric (assumed lognorm.)	0.4152	0.6349	0.945	1.7569	0.279	5.63	6.02	20	6.02
Trichloroethene	45	44	nonparametric (assumed lognorm.)	0.2587	0.4554	0.945	1.8984	0.518	8.33	8.32	93	8.32
Xylene (Total)	45	44	nonparametric (assumed lognorm.)	0.1518	0.2051	0.945	2.5378	1.19	341	20.7	15100	20.7

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Groundwater Data
Site 42 - Olson Road Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq. Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
2,6-Dinitrotoluene	NA	0/2	1/5		NA					1	NA				NA				NA		2.4			NA							NA
Aluminum	N	3/4	2/5	0.9603	N	2710				67700	NA	1	1	0.5556	N	0.8730	Geha	Test	N	2710	13500			NA	lognor.	nonpar.					NA
Arsenic	N	0/6	3/5	0.0606	N					12.5	NA	3	3	0.0606	N				NA		6.68			NA							NA
Barium	Y	6/6	5/5		NA	3.92	0.83	2.0150	L	308	917	Y	6	4	0.1753	N	0.1234			N	3.92	4.81	1.3589	1.8331	N	lognor.	lognor.	0.83	1.33	0.8863	3.8808	Y
Beryllium	N	0/6	1/5		NA					3.8	NA	1	1	0.4545	N				NA		0.8			NA							NA
Calcium	N	4/4	5/5		NA	8.57	0.92	2.3534	L	59400	16800	N	7	5	0.1667	N	0.2778			N	7400	7290			NA	lognor.	normal					NA
Chromium	N	3/6	1/5		NA	4.35					87.9	NA	1	1	0.4545	N	0.7273	Geha	Test	N	4.35	17.8			NA	lognor.	nonpar.					NA
Cobalt	N	5/6	3/5	0.9394	N	5.46					31.6	NA	5	3	0.3918	N	0.3961			N	5.46	8.76			NA	lognor.	lognor.					NA
Copper	N	2/6	1/5	0.8788	N	5.63					114	NA	1	1	0.4545	N	0.5000	Geha	Test	N	5.63	24			NA	nonpar.	nonpar.					NA
Iron	Y	4/4	5/5		NA	9850	9200	2.3534	N	34100	76400	Y	2	2	0.2778	N	0.2778			N	8.23	9.05	0.6078	1.8946	N	lognor.	lognor.	2.22	1.83	0.1137	3.9090	Y
Lead	N	0/6	1/3		NA						50	NA	1	1	0.3333	N				NA		17			NA							NA
Magnesium	N	4/4	5/5		NA	7.56	0.542	2.3534	L	7990	10400	Y	4	3	0.3571	N	0.3651			N	7.56	7.9	0.6817	1.8946	N	lognor.	lognor.	0.542	0.857	0.5792	3.9090	Y
Manganese	N	4/4	5/5		NA	5.55	0.912	2.3534	L	2850	5720	Y	4	3	0.3571	N	0.3651			N	5.55	6.03	0.6001	1.8946	N	lognor.	lognor.	0.912	1.34	0.4105	3.9090	Y
Mercury	N	1/6	1/5	0.7273	N	0.0658					0.12	NA				NA	0.5758	Geha	Test	N	0.0658	0.064			NA	nonpar.	nonpar.					NA
Nickel	N	4/6	5/5	0.2727	N	5.28					90.4	NA	6	4	0.1753	N	0.1169			N	5.28	23.5			NA	lognor.	lognor.					NA
Potassium	N	4/4	5/5		NA	7.71	0.703	2.3534	L	14200	5960	N	4	2	0.8333	N	0.9048			N	7.71	7.09	-1.0100	1.8946	N	lognor.	lognor.	0.703	1.04	0.4228	3.9090	Y
Sodium	Y	4/4	5/5		NA	17000	12200	2.3534	N	49000	94400	Y	2	2	0.2778	N	0.4524			N	9.48	10	0.8393	1.8946	N	lognor.	lognor.	0.934	0.953	0.0011	3.9090	Y
Vanadium	N	1/6	1/5		NA	4.19					102	NA	1	1	0.4545	N	0.4545	Geha	Test	N	4.19	20.8			NA	lognor.	nonpar.					NA
Zinc	N	1/6	3/5	0.1970	N	11.8					419	NA	1	1	0.4545	N	0.3160	Geha	Test	N	11.8	88.9			NA	nonpar.	nonpar.					NA
Bis(2-ethylhexyl)phthalate	N	1/2	1/5	0.9524	N	3.25					2	NA				NA	0.4762	Geha	Test	N	3.25	2.55			NA	unknow	normal					NA
Di-n-butylphthalate	N	1/2	1/5	0.9524	N	3.25					21	NA	1	1	0.7143	N	0.7143	Geha	Test	N	3.25	7.65			NA	unknow	lognor.					NA
Phenol	N	0/2	1/5	0.7143	N						5	NA	1	1	0.7143	N				NA		3.15			NA							NA
1,1,1-Trichloroethane	N	0/2	1/5		NA						7	NA	1	1	0.7143	N				NA		1.8			NA							NA
1,1,2-Trichloroethane	N	0/2	1/5		NA						2	NA	1	1	0.7143	N				NA		0.8			NA							NA
1,1-Dichloroethane	N	0/2	1/5		NA						3	NA	1	1	0.7143	N				NA		1			NA							NA
1,1-Dichloroethene	NA	0/2	1/5		NA						2	NA				NA				NA		0.7			NA							NA
1,2-Dichloroethene (cis)	NA	0/0	2/5		NA						122	NA				NA				NA		24.4			NA							NA
1,2-Dichloroethene (trans)	N	0/2	1/5		NA						2	NA	1	1	0.7143	N				NA		0.8			NA							NA
Chlorobenzene	NA	0/2	1/5		NA						1	NA				NA				NA		0.6			NA							NA
Tetrachloroethene	N	0/2	1/5		NA						2	NA	1	1	0.7143	N				NA		0.8			NA							NA
Trichloroethene	N	0/2	2/5		NA						5210	NA	2	2	0.4762	N				NA		1000			NA							NA
Vinyl Chloride	N	0/2	1/5		NA						9	NA	1	1	0.7143	N				NA		2.2			NA							NA

Notes: Units are ug/L.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

Table
Background Comparison Tests - Groundwater Data
Site 42 - Olson Road Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	*Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test* or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

Table
Representative Concentration and Statistical Distribution of COPCs - Groundwater Data
Site 42 - Olson Road Landfill
Ihdiv-Nswc, Indian Head, Maryland

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Aluminum	5	4	*nonparametric (assumed lognorm.)	0.5523	0.585	0.762	18.1216	3.9	13500	2.86657E+20	67700	67700
Arsenic	5	4	*normal	0.8372	0.8204	0.762	2.1318	5.28	6.68	11.7	12.5	12.5
Barium	5	4	*lognormal	0.6738	0.9521	0.762	6.3587	1.33	256	20500	917	917
Beryllium	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	9.0989	1.94	0.8	5200	3.8	3.8
Calcium	5	4	*normal	0.8792	0.8615	0.762	2.1318	2900	7290	10100	16800	16800
Chromium	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	12.2293	2.62	17.8	230000000	87.9	87.9
Cobalt	5	4	*lognormal	0.7305	0.9063	0.762	8.8468	1.88	8.76	67300	31.6	31.6
Copper	5	4	*nonparametric (assumed lognorm.)	0.5607	0.6825	0.762	9.2728	1.97	24	231000	114	114
Iron	5	4	*lognormal	0.783	0.8718	0.762	8.6232	1.83	23500	120000000	76400	76400
Lead	3	2	*nonparametric (assumed lognorm.)	0.75	0.75	0.767	34.7677	2.66	17	1.94253E+30	50	50
Magnesium	5	4	*lognormal	0.7413	0.9416	0.762	4.2958	0.857	3740	24400	10400	10400
Manganese	5	4	*lognormal	0.7057	0.9738	0.762	6.3825	1.34	842	71800	5720	5720
Mercury	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	2.6281	0.392	0.064	0.108	0.12	0.12
Nickel	5	4	*lognormal	0.645	0.9187	0.762	6.6637	1.4	23.5	2750	90.4	90.4
Potassium	5	4	*lognormal	0.724	0.8486	0.762	5.0607	1.04	1950	28400	5960	5960
Sodium	5	4	*lognormal	0.7429	0.8396	0.762	4.701	0.953	33200	328000	94400	94400
Vanadium	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	10.9183	2.34	20.8	8250000	102	102
Zinc	5	4	*nonparametric (assumed lognorm.)	0.5666	0.7373	0.762	9.2807	1.98	88.9	909000	419	419
2,6-Dinitrotoluene	5	4	*normal	0.7787	0.7092	0.762	2.1318	0.822	2.4	3.18	1	1
Bis(2-ethylhexyl)phthalate	5	4	*normal	0.9557	0.9348	0.762	2.1318	0.371	2.55	2.9	2	2
Di-n-butylphthalate	5	4	*lognormal	0.7626	0.942	0.762	4.3524	0.87	7.65	53.2	21	21
Phenol	5	4	*lognormal	0.7139	0.762	0.762	2.3776	0.289	3.15	4.46	5	5
1,1,1-Trichloroethane	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	5.6918	1.18	1.8	48.9	7	7
1,1,2-Trichloroethane	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	3.3594	0.62	0.8	2.27	2	2
1,1-Dichloroethane	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	4.0673	0.801	1	5.03	3	3
1,1-Dichloroethene	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	2.9195	0.491	0.7	1.44	2	2
1,2-Dichloroethene (cis)	5	4	*nonparametric (assumed lognorm.)	0.5551	0.6342	0.762	11.1691	2.39	24.4	18800000	122	122
1,2-Dichloroethene (trans)	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	3.3594	0.62	0.8	2.27	2	2
Chlorobenzene	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	2.4248	0.31	0.6	0.878	1	1
Tetrachloroethene	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	3.3594	0.62	0.8	2.27	2	2
Trichloroethene	5	4	*nonparametric (assumed lognorm.)	0.553	0.7098	0.762	18.5274	3.99	1000	1.64463E+20	5210	5210
Vinyl Chloride	5	4	*nonparametric (assumed lognorm.)	0.5523	0.5523	0.762	6.1904	1.29	2.2	112	9	9

Notes:

Units are ug/L.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.

Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.

For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.

For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.

*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.

H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.

Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).

The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Surface Water Data
Site 42 - Olson Road Landfill
IHDIV-NSWC, Indian Head, Maryland

Name of Test:		Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:		Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:		#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:		P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back?	YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance		Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Aluminum	Y	4/4	4/4		NA	1.3	1.22	2.3534	L	89.6	1790	Y	4	4	0.0143	Y	0.0143			Y	1.3	5.9	5.3598	1.9432	Y	lognor.	lognor.	1.22	1.22	0.0000	3.9200	Y
Arsenic	N	1/4	1/4		NA	0.0229					4.2	NA	1	1	0.5000	N	0.2286	Geha	Test	N	0.0229	2.29			NA	nonpar.	nonpar.					NA
Barium	Y	4/4	4/4		NA	-0.624	0.739	2.3534	L	3.75	111	Y	4	4	0.0143	Y	0.0143			Y	-0.624	3.98	8.8100	1.9432	Y	lognor.	lognor.	0.739	0.739	0.0000	3.9200	Y
Calcium	Y	4/4	4/4		NA	105	65.9	2.3534	N	278	18000	Y	4	4	0.0143	Y	0.0143			Y	105	10500			NA	normal	normal					NA
Cobalt	N	2/4	2/4		NA	0.0257					4.7	NA	2	2	0.2143	N	0.1143	Geha	Test	N	0.0257	2.57			NA	lognor.	lognor.					NA
Copper	Y	4/4	4/4		NA	-1.67	1.19	2.3534	L	4.25	104	Y	4	4	0.0143	Y	0.0143			Y	-1.67	2.93	5.4950	1.9432	Y	lognor.	lognor.	1.19	1.19	0.0000	3.9200	Y
Iron	Y	4/4	4/4		NA	4.4	0.869	2.3534	L	797	21800	Y	4	4	0.0143	Y	0.0143			Y	4.4	9	7.4985	1.9432	Y	lognor.	lognor.	0.869	0.869	0.0000	3.9200	Y
Lead	Y	4/4	4/4		NA	-3.18	1.28	2.3534	L	1.2	15.4	Y	4	4	0.0143	Y	0.0143			Y	-3.18	1.43	5.1078	1.9432	Y	lognor.	lognor.	1.28	1.28	0.0000	3.9200	Y
Magnesium	Y	4/4	4/4		NA	21	12.3	2.3534	N	53.2	3600	Y	4	4	0.0143	Y	0.0143			Y	21	2100			NA	normal	normal					NA
Manganese	Y	4/4	4/4		NA	1.75	0.899	2.3534	L	61.3	1520	Y	4	4	0.0143	Y	0.0143			Y	1.75	6.36	7.2436	1.9432	Y	lognor.	lognor.	0.899	0.899	0.0000	3.9200	Y
Mercury	N	1/4	1/4		NA	0.0008					0.17	NA	1	1	0.5000	N	0.2286	Geha	Test	N	0.0008	0.08			NA	nonpar.	nonpar.					NA
Potassium	Y	4/4	4/4		NA	3.15	0.299	2.3534	L	51.4	3380	Y	4	4	0.0143	Y	0.0143			Y	3.15	7.76	21.7837	1.9432	Y	lognor.	lognor.	0.299	0.299	0.0000	3.9200	Y
Sodium	Y	4/4	4/4		NA	5.1	1.1	2.3534	L	2960	82600	Y	4	4	0.0143	Y	0.0143			Y	5.1	9.71	5.9279	1.9432	Y	lognor.	lognor.	1.1	1.1	0.0000	3.9200	Y
Vanadium	Y	4/4	4/4		NA	-3.84	0.848	2.3534	L	0.2	5.4	Y	4	4	0.0143	Y	0.0143			Y	-3.84	0.764	7.6759	1.9432	Y	lognor.	lognor.	0.848	0.848	0.0000	3.9200	Y
Zinc	Y	4/4	4/4		NA	-0.947	1.35	2.3534	L	13.6	221	Y	4	4	0.0143	Y	0.0143			Y	-0.947	3.66	4.8226	1.9432	Y	lognor.	lognor.	1.35	1.35	0.0000	3.9200	Y

Notes: Units are ug/L.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	*Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.*
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set *are comprised of site data if both populations are in fact equal.*

Table
Representative Concentration and Statistical Distribution of COPCs - Surface Water Data
Site 42 - Olson Road Landfill
Ihdiv-Nswc, Indian Head, Maryland

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Aluminum	4	3	*lognormal	0.7853	0.9303	0.748	8.041	1.22	643	216000	1790	1790
Arsenic	4	3	*nonparametric (assumed lognorm.)	0.6291	0.6291	0.748	3.491	0.467	2.29	5.96	4.2	4.2
Barium	4	3	*lognormal	0.9241	0.9298	0.748	5.0396	0.739	64.6	605	111	111
Calcium	4	3	*normal	0.8899	0.8887	0.748	2.3534	6590	10500	18200	18000	18000
Cobalt	4	3	*lognormal	0.7741	0.8092	0.748	8.2816	1.25	2.57	1370	4.7	4.7
Copper	4	3	*lognormal	0.6908	0.8498	0.748	7.8494	1.19	34.4	8160	104	104
Iron	4	3	*lognormal	0.9364	0.9951	0.748	5.8407	0.869	10500	221000	21800	21800
Lead	4	3	*lognormal	0.925	0.9582	0.748	8.4257	1.28	6.9	4650	15.4	15.4
Magnesium	4	3	*normal	0.8919	0.8886	0.748	2.3534	1230	2100	3540	3600	3600
Manganese	4	3	*lognormal	0.8949	0.898	0.748	6.0324	0.899	764	19700	1520	1520
Mercury	4	3	*nonparametric (assumed lognorm.)	0.6291	0.6291	0.748	4.2776	0.612	0.08	0.371	0.17	0.17
Potassium	4	3	*lognormal	0.9467	0.9674	0.748	2.7734	0.299	2420	3950	3380	3380
Sodium	4	3	*lognormal	0.6753	0.7632	0.748	7.2962	1.1	28000	3070000	82600	82600
Vanadium	4	3	*lognormal	0.9325	0.9594	0.748	5.7152	0.848	2.76	50.6	5.4	5.4
Zinc	4	3	*lognormal	0.7789	0.9761	0.748	8.9104	1.35	75.8	100000	221	221

Notes:

Units are ug/L.

Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.

Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.

For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.

For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.

*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.

H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.

Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).

The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Representative Concentration and Statistical Distribution of COPCs - Sediment Data
Site 42 - Olson Road Landfill
Ihdiv-Nswc, Indian Head, Maryland

Chemical	Detection Frequency (1)	Shapiro-Wilk W Normal (2)	Shapiro-Wilk W Lognormal (2)	Shapiro-Wilk W Test (2)	DISTRIBUTION (2)	UCL NORMAL (2)	UCL LOGNORMAL (2)	MAXIMUM DETECTION (2)	AVERAGE (1)	RME (2)	CTE (1)	Units
Aluminum	10/10	0.8284	0.9286	0.842	LOGNORMAL	11473.9547	12035.0428	18400	9046.5	12035.04		mg/kg
Arsenic	8/10	0.9161	0.9232	0.842	LOGNORMAL	5.3351	5.8568	7.6	4.3	5.86		mg/kg
Barium	10/10	0.8474	0.9464	0.842	LOGNORMAL	100.1905	118.4901	181	74.485	118.49		mg/kg
Beryllium	6/10	0.8639	0.9354	0.842	LOGNORMAL	0.4951	0.7463	0.94	0.353	0.75		mg/kg
Cadmium	5/10	0.764	0.9084	0.842	LOGNORMAL	2.0895	10.9481	4	1.2215	4.00		mg/kg
Calcium	10/10	0.857	0.8679	0.842	LOGNORMAL	2292.6988	4876.4334	3190	1602.85	3190.00		mg/kg
Chromium (total)	10/10	0.8533	0.9394	0.842	LOGNORMAL	19.2083	19.7823	29	16.025	19.78		mg/kg
Cobalt	8/10	0.8848	0.9018	0.842	LOGNORMAL	11.9627	16.619	16.7	8.875	16.62		mg/kg
Copper	10/10	0.6256	0.8957	0.842	LOGNORMAL	40.7416	52.9969	103	23.65	53.00		mg/kg
Iron	10/10	0.7726	0.9249	0.842	LOGNORMAL	31024.397	53155.0659	66900	20576	53155.07		mg/kg
Lead	10/10	0.8546	0.9318	0.842	LOGNORMAL	33.875	45.2188	59	23.715	45.22		mg/kg
Magnesium	9/10	0.8656	0.9662	0.842	LOGNORMAL	1533.9544	1703.3832	2540	1160.45	1703.38		mg/kg
Manganese	10/10	0.8794	0.9461	0.842	LOGNORMAL	541.2592	1071.1658	946	367.63	946.00		mg/kg
Mercury	6/9	0.6993	0.9624	0.829	LOGNORMAL	0.1555	0.3279	0.35	0.0903	0.35	0.090278	mg/kg
Nickel	10/10	0.9139	0.9385	0.842	LOGNORMAL	17.4403	18.3451	25	14.75	18.3451		mg/kg
Potassium	9/10	0.8068	0.9036	0.842	LOGNORMAL	1044.1809	1105.8238	1710	803.9	1105.8238		mg/kg
Selenium	1/10	0.6516	0.8694	0.842	LOGNORMAL	1.3487	1.9271	0.535	0.8333	0.535		mg/kg
Silver	10/10	0.5309	0.9294	0.842	LOGNORMAL	34.8834	72.5179	99	18.185	72.5179		mg/kg
Sodium	3/10	0.6283	0.8669	0.842	LOGNORMAL	297.3181	389.3161	742	173.385	389.3161		mg/kg
Vanadium	10/10	0.8789	0.9582	0.842	LOGNORMAL	31.0754	32.1656	46.9	25.71	32.1656		mg/kg
Zinc	10/10	0.8363	0.9475	0.842	LOGNORMAL	142.0647	222.1554	275	94.155	222.1554		mg/kg
4,4'-DDE	1/4	0.7726	0.8308	0.748	LOGNORMAL	5.0578	17.3782	5.6	2.85	8.4	2.85	ug/kg
4,4'-DDT	1/4	0.707	0.7854	0.748	LOGNORMAL	8.2175	138.0818	9.4	3.8	16	3.8	ug/kg
Endosulfan I	1/2	1	1	0	LOGNORMAL	—	6613870.787	5	2.925	5	2.925	ug/kg
2-Butanone	1/4	0.6954	0.7744	0.748	LOGNORMAL	27.8299	742.1209	32	12.375	32	12.375	ug/kg
Acetone	2/4	0.8101	0.9131	0.748	LOGNORMAL	170.3477	489344381.2	194	66	194	66	ug/kg
Bis(2-Ethylhexyl)phthalate	2/4	0.7365	0.7325	0.748	NORMAL	4775.9862	1.97712E+11	4100	2120	5700	2120	ug/kg
Di-n-butyl phthalate	1/4	0.9081	0.8713	0.748	NORMAL	305.5272	375.0168	250	240.625	250	240.625	ug/kg

Notes:

1 - Statistics calculated considering a duplicate pair as one data point

2 - Duplicate samples are considered as individual data points.

Samples used in this data set follow:

42SS-12	S42SD0020001
42SS-13	S42SD0030001
42SS-13D	S42SD0040001
42SS-5	S42SD0050001
42SS-6	S42SD0060001
S42SD0010001	S42DUP001

SITE 44 - SOAK OUT AREA

Table
Background Comparison Tests - Surface Soil Data
Site 44 - Soak Out Area
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq. Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
-Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back?	YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance		Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Nitrocellulose	N	0/1	3/4		NA						25300	NA	3	3	0.4000	N				NA		18900			NA							NA
Aluminum	N	12/12	4/4		NA	7870	3820	1.7959	N	18329	8060	N	13	4	0.3929	N	0.7769			N	8.82	8.75	-0.2368	1.7613	N	lognor.	lognor.	0.619	0.222	2.9402	3.8843	Y
Arsenic	Y	14/14	4/4		NA	2.18	0.793	1.7709	N	4.25	4.4	Y	7	4	0.0114	Y	0.0029			Y	2.18	3.75			NA	normal	lognor.					NA
Barium	N	14/14	4/4		NA	3.54	0.548	1.7709	L	144	38.6	N	12	3	0.5931	N	0.7791			N	39.1	30			NA	lognor.	normal					NA
Cadmium	N	6/14	1/4		NA	0.169					1.6	NA	1	1	0.2222	N	0.1395	Geha	Test	N	0.169	0.553			NA	nonpar.	nonpar.					NA
Calcium	Y	2/12	4/4	0.0082	Y	103					704	NA	4	3	0.0269	Y	0.0016	Geha	Test	Y	103	489			NA	nonpar.	lognor.					NA
Chromium	N	14/14	4/4		NA	12	4.68	1.7709	N	24.2	18.8	N	4	2	0.1971	N	0.1984			N	2.4	2.65	1.0506	1.7459	N	lognor.	lognor.	0.457	0.27	0.9621	3.8830	Y
Cobalt	N	14/14	3/4	1.0000	N	1.25	0.932	1.7709	L	39.7	4.7	N	10	3	0.3824	N	0.5500			N	5.06	3.31			NA	lognor.	normal					NA
Copper	Y	12/14	4/4	0.5948	N	1.36	0.601	1.7709	L	18.7	21.2	Y	5	4	0.0016	Y	0.0020			Y	4.74	11.8			NA	lognor.	nonpar.					NA
Iron	Y	12/12	4/4		NA	9.09	0.577	1.7959	L	43170	15700	N	8	4	0.0385	Y	0.0665			N	9.09	9.44	1.9203	1.7709	Y	lognor.	lognor.	0.577	0.149	4.5644	3.8843	N
Lead	Y	12/14	4/4	0.5948	N	17.8					49	NA	4	3	0.0186	Y	0.0399	Geha	Test	Y	17.8	23.2			NA	nonpar.	lognor.					NA
Magnesium	Y	12/12	4/4		NA	576	295	1.7959	N	1382	1440	Y	10	4	0.1154	N	0.1308			N	6.21	6.69	1.4334	1.7613	N	lognor.	lognor.	0.592	0.473	0.1969	3.8843	Y
Manganese	N	12/12	4/4		NA	4.75	1.08	1.7959	L	2248	200	N	14	4	0.5500	N	0.7005			N	4.75	4.5	-0.4114	1.7613	N	lognor.	lognor.	1.08	0.88	0.1701	3.8843	Y
Mercury	N	12/14	3/4		NA	0.0399	0.018	1.7709	N	0.087	0.06	N				NA	0.5804	Geha	Test	N	0.0399	0.035			NA	normal	normal					NA
Nickel	N	14/14	4/4		NA	1.45	0.557	1.7709	L	18.2	13.1	N	6	3	0.0833	N	0.0788			N	1.45	1.95	1.6389	1.7459	N	lognor.	lognor.	0.557	0.459	0.1493	3.8830	Y
Potassium	N	12/12	4/4		NA	5.99	0.564	1.7959	L	1674	681	N	6	3	0.1181	N	0.1896			N	457	569			NA	lognor.	normal					NA
Selenium	N	11/14	3/4	0.8029	N	0.458					0.95	NA	7	3	0.1373	N	0.1670			N	0.458	0.611			NA	normal	normal					NA
Vanadium	N	14/14	4/4		NA	2.87	0.425	1.7709	L	53.5	32.7	N	10	4	0.0686	N	0.0961			N	2.87	3.19	1.4601	1.7459	N	lognor.	lognor.	0.425	0.218	1.4628	3.8830	Y
Zinc	Y	14/14	4/4		NA	18.1	7.66	1.7709	N	38.1	116	Y	1	1	0.2222	N	0.3680			N	2.79	3.29	1.4060	1.7459	N	lognor.	lognor.	0.495	1.01	2.8917	3.8830	Y

Notes: Units are ug/kg for organics, mg/kg for inorganics.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.

Table
Background Comparison Tests - Surface Soil Data
Site 44 - Soak Out Area
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	

L, N, or Q — UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.

% ND — Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.

@ — Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)

r,k — The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SURFACE SOIL
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Nitrocellulose	4	3	*normal	0.8741	0.7988	0.748	2.3534	7230	18900	27400	25300	25300
Aluminum	4	3	*lognormal	0.9706	0.9723	0.748	2.5257	0.222	6420	8930	8060	8060
Arsenic	4	3	*lognormal	0.8339	0.8454	0.748	2.4913	0.21	3.75	5.1	4.4	4.4
Barium	4	3	*normal	0.8824	0.8222	0.748	2.3534	9.4	30	41	38.6	38.6
Cadmium	4	3	*nonparametric (assumed lognorm.)	0.6522	0.7057	0.748	6.9026	1.04	0.553	36.2	1.6	1.6
Calcium	4	3	*lognormal	0.8801	0.8908	0.748	3.6618	0.501	489	1460	704	704
Chromium	4	3	*lognormal	0.9351	0.9356	0.748	2.6746	0.27	14.6	22.4	18.8	18.8
Cobalt	4	3	*normal	0.9104	0.8123	0.748	2.3534	1.54	3.31	5.12	4.7	4.7
Copper	4	3	*nonparametric (assumed lognorm.)	0.6614	0.6811	0.748	3.3886	0.446	11.8	28.7	21.2	21.2
Iron	4	3	*lognormal	0.7989	0.8224	0.748	2.3307	0.149	12800	15600	15700	15700
Lead	4	3	*lognormal	0.8929	0.994	0.748	5.3801	0.795	23.2	298	49	49
Magnesium	4	3	*lognormal	0.8796	0.8953	0.748	3.5179	0.473	872	2340	1440	1440
Manganese	4	3	*lognormal	0.8837	0.8999	0.748	5.9094	0.88	116	2670	200	200
Mercury	4	3	*normal	0.9982	0.926	0.748	2.3534	0.0208	0.035	0.0595	0.06	0.06
Nickel	4	3	*lognormal	0.8767	0.9566	0.748	3.451	0.459	7.65	19.5	13.1	13.1
Potassium	4	3	*normal	0.8663	0.8422	0.748	2.3534	145	569	739	681	681
Selenium	4	3	*normal	0.95	0.9035	0.748	2.3534	0.28	0.611	0.94	0.95	0.95
Vanadium	4	3	*lognormal	0.9158	0.9473	0.748	2.514	0.218	24.8	34.3	32.7	32.7
Zinc	4	3	*lognormal	0.7051	0.8472	0.748	6.7478	1.01	41.9	2320	116	116

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Surface/Subsurface Soil Data
Site 44 - Soak Out Area
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance		Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.					Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Fluoranthene	NA	0/3	1/12		NA						61	NA				NA				NA		199			NA							NA
Phenanthrene	N	0/3	2/12		NA						340	NA	1	1	0.8000	N				NA		213			NA							NA
Pyrene	NA	0/3	1/12		NA						91	NA				NA				NA		202			NA							NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SURFACE/SUBSURFACE SOIL
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Nitrocellulose	4	3	*normal	0.8741	0.7988	0.748	2.3534	7230	18900	27400	25300	25300
Aluminum	4	3	*lognormal	0.9706	0.9723	0.748	2.5257	0.222	6420	8930	8060	8060
Arsenic	4	3	*lognormal	0.8339	0.8454	0.748	2.4913	0.21	3.75	5.1	4.4	4.4
Barium	4	3	*normal	0.8824	0.8222	0.748	2.3534	9.4	30	41	38.6	38.6
Cadmium	4	3	*nonparametric (assumed lognorm.)	0.6522	0.7057	0.748	6.9026	1.04	0.553	36.2	1.6	1.6
Calcium	4	3	*lognormal	0.8801	0.8908	0.748	3.6618	0.501	489	1460	704	704
Chromium	4	3	*lognormal	0.9351	0.9356	0.748	2.6746	0.27	14.6	22.4	18.8	18.8
Cobalt	4	3	*normal	0.9104	0.8123	0.748	2.3534	1.54	3.31	5.12	4.7	4.7
Copper	4	3	*nonparametric (assumed lognorm.)	0.6614	0.6811	0.748	3.3886	0.446	11.8	28.7	21.2	21.2
Iron	4	3	*lognormal	0.7989	0.8224	0.748	2.3307	0.149	12800	15600	15700	15700
Lead	4	3	*lognormal	0.8929	0.994	0.748	5.3801	0.795	23.2	298	49	49
Magnesium	4	3	*lognormal	0.8796	0.8953	0.748	3.5179	0.473	872	2340	1440	1440
Manganese	4	3	*lognormal	0.8837	0.8999	0.748	5.9094	0.88	116	2670	200	200
Mercury	4	3	*normal	0.9982	0.926	0.748	2.3534	0.0208	0.035	0.0595	0.06	0.06
Nickel	4	3	*lognormal	0.8767	0.9566	0.748	3.451	0.459	7.65	19.5	13.1	13.1
Potassium	4	3	*normal	0.8663	0.8422	0.748	2.3534	145	569	739	681	681
Selenium	4	3	*normal	0.95	0.9035	0.748	2.3534	0.28	0.611	0.94	0.95	0.95
Vanadium	4	3	*lognormal	0.9158	0.9473	0.748	2.514	0.218	24.8	34.3	32.7	32.7
Zinc	4	3	*lognormal	0.7051	0.8472	0.748	6.7478	1.01	41.9	2320	116	116
Fluoranthene	15	14	nonparametric (assumed lognorm.)	0.7375	0.5657	0.881	1.9084	0.332	200	240	61	61
Phenanthrene	15	14	nonparametric (assumed lognorm.)	0.8713	0.8734	0.881	1.8327	0.234	210	236	340	236
Pyrene	15	14	nonparametric (assumed lognorm.)	0.8136	0.685	0.881	1.8337	0.236	202	228	91	91

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - UNFILTERED GROUNDWATER
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Aluminum	3	2	*lognormal	0.8921	0.9946	0.767	14.5537	1.11	160	19300000	345	345
Barium	3	2	*lognormal	0.9922	0.9982	0.767	6.0077	0.463	29.4	218	43.1	43.1
Calcium	3	2	*lognormal	0.9701	0.9936	0.767	4.6099	0.348	5000	15800	6900	6900
Iron	3	2	*lognormal	0.816	0.9715	0.767	21.1682	1.62	9380	5.24923E+14	24100	24100
Magnesium	3	2	*normal	0.9716	0.9635	0.767	2.92	274	2980	3440	3220	3220
Manganese	3	2	*normal	0.9938	0.9475	0.767	2.92	165	187	465	359	359
Potassium	3	2	*lognormal	0.8286	0.8605	0.767	5.4624	0.42	1610	8340	2440	2440
Sodium	3	2	*normal	0.9782	0.9145	0.767	2.92	3000	5210	10300	7920	7920
Trichloroethene	3	2	*nonparametric (assumed lognorm.)	0.75	0.75	0.767	5.2223	0.4	0.667	2.99	1	1

Notes:

Units are ug/L.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

Table
Background Comparison Tests - Groundwater Data
Site 44 - Soak Out Area
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Aluminum N	3/4	1/3	0.9714	N	2710					345	NA	3	1	0.8857	N	0.8286	Geha	Test	N	2710	160		-	NA	lognor.	lognor.					NA
Barium N	6/6	3/3		NA	3.92	0.83	2.0150	L	254	43.1	N	8	3	0.6667	N	0.9167			N	3.92	3.31	-1.1582	1.8946	N	lognor.	lognor.	0.83	0.463	0.6779	3.9200	Y
Calcium N	4/4	3/3		NA	8.57	0.92	2.3534	L	599450	6900	N	5	3	0.2857	N	0.4286			N	8.57	8.48	-0.1684	2.0150	N	lognor.	lognor.	0.92	0.348	1.4992	3.9200	Y
Iron N	4/4	3/3		NA	9850	9200	2.3534	N	57199	24100	N	1	1	0.4286	N	0.5714			N	8.23	8.34	0.0687	2.0150	N	lognor.	lognor.	2.22	1.62	0.1875	3.9200	Y
Magnesium N	4/4	3/3		NA	7.56	0.542	2.3534	L	31254	3220	N	4	3	0.1143	N	0.2000			N	2160	2980			NA	lognor.	normal					NA
Manganese N	4/4	3/3		NA	5.55	0.912	2.3534	L	28160	359	N	4	2	0.6286	N	0.6857			N	355	187			NA	lognor.	normal					NA
Potassium N	4/4	3/3		NA	7.71	0.703	2.3534	L	83058	2440	N	2	1	0.7143	N	0.8857			N	7.71	7.32	-0.8440	2.0150	N	lognor.	lognor.	0.703	0.42	0.4740	3.9200	Y
Sodium N	4/4	2/3	1.0000	N	17000	12200	2.3534	N	79585	7920	N	5	2	0.8571	N	0.9429			N	17000	5210			NA	normal	normal					NA
Trichloroethene NA	0/2	1/3		NA						1	NA				NA				NA		0.667			NA							NA

Notes: Units are ug/L.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	Standard deviation of site results must not be different from the standard deviation of background results.
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

Table
Background Comparison Tests - Sediment Data
Site 44 - Soak Out Area
IHDIV-NSWC, Indian Head, Maryland

Name of Test:	Detection Freq: Z or Fisher				95 % Upper Tolerance Limit (UTL)							Upper Ranks				Mann-Whitney/Gehan				Student's or Satterthwaite T-test					Bartlett's Test for Equal Standard Deviations						
Question Posed:	Site Freq. > Back.Freq.?				Site Maximum > UTL for Background Data ?							Majority are site?				Ranks of Site > Back?				Site Mean > Back. Mean ?					Site Standard Deviation =Background Std.Dev.?						
Assumptions Valid:	#ND & Pos.>=5 or use Fisher				Back. lognorm. or norm. If not, #b>18 for Quantile Test							# Site (s) in Top r				<40% ND or use Gehan				#s>2,#b>2,>=85% Pos; both norm/log					#s>2,#b>2, site & back both normal or both lognorm.						
Test Criterion:	P value <= 0.05 ?				Max >95% UTL (parametric). Or, Max >95% Quantile							P<=0.05 that #s>=k				P value <=0.05 ?				t-Value > t-Table					F-Value<=F-Table (Students T). If not, Satterthwaite						
Conclusion: Site > Back? YN	Back.	Site	P	YN	Back.	Std.Dev	t	L,N	Back.	Site	YN	r	k	P	YN	P	Test	Used	YN	Back.	Site	t	t	YN	Back.	Site	Std.Dev	Std.Dev	F	F	YN
Substance	Freq.	Freq.	Value		Mean@	Back.@	Value	Q	UTL	Max.				Value		Value				Mean@	Mean@	Value	Table		Distrib.	Distrib.	Back.@	Site@	Value	Table	
Acetone N	2/3	1/2		NA	5070					460	NA	3	1	0.9000	N	0.9000	Geha	Test	N	5070	235			NA	lognor.	unknow.					NA

Notes: Units are ug/kg for organics, mg/kg for inorganics.

A statistical significance level (P value) of 0.05 is used for all tests that directly compare site to background. A two-sided significance level of 0.1 is used for Bartlett's test for equal variance.

UTL is the expected value for the upper 95 % quantile of the background population; there is an equal chance of the population's true 95 % quantile being either below or above this estimate.

For each test, a YES or NO decision is presented only if all assumptions are met. The overall decision (is site > background) for each chemical appears at the left and is based on four criteria:

(1) Overall decision is YES if any one of the UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is YES, regardless of other test results.

(2) Overall decision is NO if at least one of UTL, Mann-Whitney/Gehan, Upper Ranks Test, or T-Test is NO, and none of the aforementioned tests are YES.

(3) *Overall decision is YES/NO if Z/Fisher Test is YES/NO, respectively, and other tests are NA. Z-test is treated as lowest priority since it relies on detection frequency, not magnitude of results.*

(4) Overall decision is NA if all tests are NA. (Chemicals assigned NA are still included in human health risk-based screening and/or risk assessment.)

Abbreviations:

# NDs or # Pos.	Number of non-detected (ND) or positive (Pos.) results in data set, not including rejected data or blank-qualified data.
# s or # b	Number of site (s) or background (b) samples, not including rejected data or blank-qualified data.
s = b	*Standard deviation of site results must not be different from the standard deviation of background results.*
P value	Probability or significance level is defined as the chance of a false positive. If P <= 0.05 then test determines site > background with 95 % confidence.
L, N, or Q	UTL is based on 95 % upper limit (using t-value) when data are lognormal (L) or normal (N). Otherwise, an upper 95 % quantile (Q) is used if there are > 18 back. points.
% ND	Mann-Whitney test used if < 40% of data Non-Detected and detect. limits uniformly below the range of positive values. If not, the Gehan Test is used.
@	Mean and standard deviations are shown of log-transformed data when distributions are of this type; ie., if an (L) code appears for the UTL test or if site and background distributions both match lognormal, and both T-test and Bartlett's test are applicable. (Arithmetic mean and normal standard deviation are shown only for illustration in the event that these tests are NA.)
r,k	The upper ranks test calculates the probability that k or more samples from the top r ranks of the combined site and background data set are comprised of site data if both populations are in fact equal.

TABLE
REPRESENTATIVE CONCENTRATION AND STATISTICAL DISTRIBUTION OF COPCS - SEDIMENT
SITE 44 - SOAK OUT AREA
IHDIV-NSWC, INDIAN HEAD, MARYLAND

Substance	Number of Sample Results	Degrees of Freedom	Statistical Distribution of Site Data	Results of Shapiro-Wilk or Shapiro-Francia Distribution Tests			Table Value for $H_{0.95}$ (Lognorm.) or $T_{0.95}$ (Normal)	Standard Deviation or Log Standard Deviation	Arithmetic Mean of All Site Results	Upper 95 % Confidence Limit (UCL) on Mean	Maximum Positive Site Concentration	Representative Concentration (Lower of UCL vs Max)
				W-norm.	W-lognorm	W-Table						
Acetone	2	1	*unknown (assumed lognorm.)					2.71	235		460	460

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result. Non-detected results are treated as present at one-half the detection limit in all calculations.
Statistical distribution of data is determined using Shapiro-Wilk test for n <= 50, Shapiro-Francia test for n > 50. Statistical significance level is 0.05.
For N>=10, a normal distribution is assumed if the test statistic W-norm. is >= than the reference value (W-table), and W-norm. > W-lognorm.
For N>=10, a lognormal distribution is assumed if the test statistic W-lognorm. is >= the reference value (W-table), and W-lognorm. >= W-norm. The better fitting distribution is assumed if neither distribution is >= the reference value.
*For N<10, the maximum concentration is selected as the representative concentration, although the fitted distribution type is shown for information only.
H-values and standard deviations of log-transformed data are used to calculate the UCL if data are assumed to be lognormally distributed. Student's T-values and standard deviations are used for normally distributed data.
Arithmetic mean includes positive detections and non-detected results (detection limits are divided by two).
The representative concentration is selected as the lower of the 95 % UCL on the mean and the maximum positive site concentration.

APPENDIX K

SUPPORTING INFORMATION FOR HUMAN HEALTH RISK ASSESSMENT

K.1 HUMAN HEALTH RISK ASSESSMENT
TOXICOLOGICAL PROFILES FOR CHEMICALS OF CONCERN
K.2 HUMAN HEALTH RISK ASSESSMENT SAMPLE CALCULATIONS
K.3 HUMAN HEALTH RISK ASSESSMENT RESULTS

APPENDIX K.1

HUMAN HEALTH RISK ASSESSMENT
TOXICOLOGICAL PROFILES FOR CHEMICALS OF POTENTIAL CONCERN

K.1 TOXICOLOGICAL PROFILES

K.1.1 ALUMINUM

K.1.1.1 Noncancer Toxicity

Aluminum is not generally regarded as an industrial poison. Inhalation of finely divided powder has been reported as a cause of pulmonary fibrosis. Aluminum in aerosols has been implicated in Alzheimer's disease. As with other metals, the powder and dust are the most dangerous forms (Sax and Lewis, 1989). Most hazardous exposures to aluminum occur in refining and smelting processes. Aluminum dust is a respiratory and eye irritant. USEPA presented an oral RfD of 1.00 mg/kg/day and an inhalation reference dose of 0.001 mg/kg/day (1998).

K.1.1.2 Carcinogenicity

Data were not located regarding the carcinogenicity of aluminum to humans. No oral or inhalation cancer slope factor is available for aluminum.

K.1.2 ANTIMONY

K.1.2.1 Pharmacokinetics

Ingested antimony is absorbed slowly and incompletely from the gastrointestinal (GI) tract (Iffland 1988). Within a few days of acute exposure, highest tissue concentrations are found in the liver, kidney, and thyroid. Organs of storage include skin, bone, and teeth. Highest concentrations in deceased smelter workers (inhalation exposure) occurred in the lungs and skeleton. Excretion is largely via the urine or feces, although some is incorporated into the hair.

K.1.2.2 Noncancer Toxicity

Acute intoxication from ingestion of large doses of antimony induces GI disturbances, dehydration, and cardiac effects in humans (Iffland 1988). Chronic effects from occupational exposure include irritation of the respiratory tract, pneumoconiosis, pustular eruptions of the skin called "antimony spots," allergic contact dermatitis, and cardiac effects, including abnormalities of the electrocardiograph (ECG) and myocardial changes. Cardiac effects were also observed in rats and rabbits exposed by inhalation for six weeks and in animals (dogs, and possibly other species) treated by intravenous injection (Elinder and Friberg 1986a).

Chronic oral exposure studies in laboratory animals include two briefly reported lifetime drinking water studies in rats and mice (Kanisawa and Schroeder 1969; Schroeder et al. 1970). The only dose tested, 5 ppm potassium antimony tartrate, resulted in reduced longevity in both species and in reduced mean heart weight in the rats. The EPA (1993a) verified an RfD of 0.0004 mg/kg/day for chronic oral exposure to antimony from the LOAEL of 5 ppm potassium antimony tartrate (0.35 mg antimony/kg body weight-day) in the lifetime study in rats (Schroeder et al. 1970). An uncertainty factor of 1000 was applied; factors of 10 each for inter- and intraspecies variation and to estimate an NOAEL from an LOAEL. The heart is considered a likely target organ for chronic oral exposure of humans.

K.1.2.3 Carcinogenicity

Data were not located regarding the carcinogenicity of antimony to humans. Antimony fed to rats did not produce an excess of tumors (Goyer 1991), but a high frequency of lung tumors was observed in rats exposed by inhalation to antimony trioxide for one year (Elinder and Friberg 1986). Antimony is classified in EPA cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans) (1997).

K.1.3 ARSENIC

K.1.3.1 Pharmacokinetics

Several studies confirm that soluble inorganic arsenic compounds and organic arsenic compounds are almost completely (>90 percent) absorbed from the GI tract in both animals and humans (Ishinishi et al. 1986). The absorption efficiency of insoluble inorganic arsenic compounds depends on particle size and stomach pH. Initial distribution of absorbed arsenic is to the liver, kidneys, and lungs, followed by redistribution to hair, nails, teeth, bone, and skin, which are considered tissues of accumulation. Arsenic has a longer half-life in the blood of rats, compared with other animals and humans, because of firm binding to the hemoglobin in erythrocytes.

Metabolism of inorganic arsenic includes reversible oxidation-reduction so that both arsenite (valence of 3) and arsenate (valence of 5) are present in the urine of animals treated with arsenic of either valence (Ishinishi et al. 1986). Arsenite is subsequently oxidized and methylated by a saturable mechanism to form mono- or dimethylarsenate; the latter is the predominant metabolite in the urine of animals or humans. Organic arsenic compounds (arsenilic acid, cacodylic acid) are not readily converted to inorganic arsenic. Excretion of organic or inorganic arsenic is largely via the urine, but considerable species variation exists. Continuously exposed humans appear to excrete 60 to 70 percent of their daily intake of arsenate or arsenite via the urine.

K.1.3.2 Noncancer Toxicity

A lethal dose of arsenic trioxide in humans is 70 to 180 mg (approximately 50 to 140 mg arsenic; Ishinishi et al. 1986). Acute oral exposure of humans to high doses of arsenic produce liver swelling, skin lesions, disturbed heart function, and neurological effects. The only noncancer effects in humans clearly attributable to chronic oral exposure to arsenic are dermal hyperpigmentation and keratosis, as revealed by studies of several hundred Chinese exposed to naturally occurring arsenic in well water (Tseng 1977; Tseng et al. 1968; EPA 1994). Similar effects were observed in persons exposed to high levels of arsenic in water in Utah and the northern part of Mexico (Cebrian et al. 1983; Southwick et al. 1983). Occupational (predominantly inhalation) exposure is also associated with neurological deficits, anemia, and cardiovascular effects (Ishinishi et al. 1986), but concomitant exposure to other chemicals cannot be ruled out. The EPA (1997) derived an RfD of 0.3 μg/kg/day for chronic oral exposure, based on an NOAEL of 0.8 μg/kg/day for skin lesions from the Chinese data. The principal target organ for arsenic appears to be the skin. The nervous system and cardiovascular systems appear to be less significant target organs. Inorganic arsenic may be an essential nutrient, exerting beneficial effects on growth, health, and feed conversion efficiency (Underwood 1977).

K.1.3.3 CARCINOGENICITY

Inorganic arsenic is clearly a carcinogen in humans. Inhalation exposure is associated with increased risk of lung cancer in persons employed as smelter workers, in arsenical pesticide applicators, and in a population residing near a pesticide manufacturing plant (1998). Oral exposure to high levels in well water is associated with increased risk of skin cancer (Tseng 1977; EPA 1998). Extensive animal testing with various forms of arsenic given by many routes of exposure to several species, however, has not demonstrated the carcinogenicity of arsenic (International Agency for Research on Cancer [IARC] 1980). The EPA (1997) classifies inorganic arsenic in cancer weight-of-evidence Group A (human carcinogen), and recommends an oral unit risk of 0.00005 mg/L in drinking water, based on the incidence of skin cancer in the Tseng (1977) study. EPA presents an oral slope factor of 1.5 per mg/kg/day based on the unit risk. The EPA (1998) notes that the uncertainties associated with the oral unit risk are considerably less than those for most carcinogens, so that the unit risk might be reduced an order of magnitude. An inhalation unit risk of 0.0043 per mg/m^3 was derived for inorganic arsenic from the incidence of lung cancer in occupationally exposed men (EPA 1998). Assuming an inhalation rate of $20m^3$/day and a body weight of 70 kg, the inhalation slope factor is 15.1 per mg/kg/day.

K.1.4 BARIUM

K.1.4.1 Noncancer Toxicity

Barium is a naturally occurring alkaline earth metal that comprises approximately 0.04 percent of the earth's crust (Reeves 1986a). Acute oral toxicity was manifested by GI upset, altered cardiac performance, and transient hypertension, convulsions, and muscular paralysis. Repeated oral exposures were associated with hypertension. Occupational exposure to insoluble barium sulfate induced benign pneumoconiosis (ACGIH 1991). The EPA (1997) presented a verified chronic oral RfD of 0.07 mg/kg/day, based on an NOAEL of 0.21 mg/kg/day in a ten-week study in humans exposed to barium in drinking water and an uncertainty factor of 3. The EPA (1997) presented the same value as a provisional RfD for subchronic oral exposure. A provisional chronic inhalation RfC of 0.0005 mg/m3 and a provisional subchronic inhalation RfC of 0.005 were based on an NOEL for fetotoxicity in a four-month intermittent-exposure inhalation study in rats (EPA 1997). Uncertainty factors of 1000 and 100 were used for the chronic and subchronic RfC values, respectively. The chronic and subchronic inhalation RfC values are equivalent to 0.0001 and 0.001 mg/kg/day, assuming a human inhalation rate of 20 m3/day and body weight of 70 kg. Barium is principally a muscle toxin. Its targets are the GI system, skeletal muscle, the cardiovascular system, and the fetus.

K.1.4.2 Carcinogenicity

The EPA (1997) classifies barium as a cancer weight-of-evidence Group D substance (not classifiable as to carcinogenicity in humans). Cancer risk is not estimated for Group D substances.

K.1.5 BENZO(B)FLUORANTNENE

K.1.5.1 Noncancer Toxicity

Little information is available on benzo(b)fluoranthene. However based on the similarities of chemical structures, most properties should be similar to benzo(a)pyrene.

K.1.5.2 Carcinogenicity

A Clement's relative potency factor (RFP) has been developed (Clement International, 1990) for benzo(b)fluoranthene which allows the estimation of an oral CSF of 7.3E-01 per mg/kg/day. The EPA (1997) has classified benzo(b)fluoranthene in cancer weight-of-evidence Group B2 (Probable Human Carcinogen, sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans) based on lung tumors in mice.

K.1.6 BERYLLIUM

K.1.6.1 Noncancer Toxicity

Beryllium has a low order of toxicity when ingested because it is poorly absorbed from the GI tract (Reeves 1986b). Occupational exposure was associated with dermatitis, acute pneumonitis, and chronic pulmonary granulomatosis (berylliosis). Berylliosis was also observed in humans living in the vicinity of a beryllium plant. Similar pulmonary effects were observed in laboratory animals subjected to inhalation exposure. A verified chronic oral RfD value of 0.002 mg/kg/day was based on an NOAEL in a lifetime drinking water study in rats and an uncertainty factor of 100 (EPA 1994). The EPA (1997) presented the same value as a provisional subchronic oral RfD. EPA (1998) presented an inhalation RfD of 5.7E-06 mg/kg/day. The target organ for inhalation exposure appears to be the lung; a target organ is not identified for oral exposure.

K.1.6.2 Carcinogenicity

The EPA (1997) classifies beryllium in cancer weight-of-evidence Group B2 (probable human carcinogen) based on inadequate human (occupational) cancer data and sufficient animal data. A significant increase in lung tumors occurred in rats and in rhesus monkeys subjected to inhalation exposure or intratracheal instillation of a variety of beryllium compounds. Osteogenic sarcomas were induced in rabbits and mice, but not in rats or guinea pigs, injected intravenously with various beryllium compounds. Oral studies in animals yielded inconclusive results. The EPA (1997) derived an oral slope factor of 4.3 per mg/kg/day from a statistically nonsignificant increase in total tumors in a lifetime drinking water study in rats. An inhalation unit risk of 0.0024 per $\mu g/m^3$, equivalent to 8.4 per mg/kg/day (assuming an inhalation rate of 20 m^3/day and body weight of 70 kg for humans), was derived from an occupational study.

K.1.7 BIS(2-ETHYLHEXYL)PHTHALATE (DI[2-ETHYLHEXYL]PHTHALATE)

K.1.7.1 Noncancer Toxicity

The acute oral toxicity of bis(2-ethylhexyl)phthalate is very low; oral $LD_{50/30}$ (lethal dose to 50 percent of population within 30 days without medical treatment) values in rats and mice were 33,800 and 26,300 mg/kg, respectively (ACGIH 1991). Repeated high-dose oral exposures were associated with decreased growth, altered organ weights, testicular degeneration, and developmental effects. The EPA (1997) presented a verified chronic oral RfD of 0.02 mg/kg/day based on an LOAEL for increased relative liver weight in guinea pigs and an uncertainty factor of 1000. The EPA (1992b) adopted the chronic oral RfD as the provisional subchronic oral RfD. The principal target organs for the toxicity of bis(2-ethylhexyl)phthalate are the liver and testis.

K.1.7.2 Carcinogenicity

The EPA (1993a) classifies bis(2-ethylhexyl)phthalate in cancer weight-of-evidence Group B2 (probable human carcinogen), based on inadequate human cancer data (one limited occupational study) and sufficient cancer data in laboratory animals. An oral slope factor of 0.014 per mg/kg/day was based on the increased incidence of liver tumors in a dietary study in male mice. Assuming an inhalation rate of $20m^3$/day and a body weight of 70 kg, the inhalation slope factor is 0.014 per mg/kg/day (EPA, April 1998).

K.1.8 CADMIUM

K.1.8.1 Pharmacokinetics

Estimates of cadmium uptake by the respiratory tract range from 10 to 50 percent; uptake is greatest for fumes and small particles and least for large dust particles (Friberg et al. 1986; Goyer 1991). GI absorption of ingested cadmium is ordinarily 5 to 8 percent, but may reach 20 percent in cases of serious dietary iron deficiency. Highest tissue levels are normally found in the kidneys followed by the liver, although levels in the liver may exceed those in the kidneys of persons suffering from cadmium-induced renal dysfunction. The half-life of cadmium in the kidneys and liver may be as long as 10-30 years. Fecal and urinary excretion of cadmium are approximately equivalent in normal humans exposed to small amounts. Urinary excretion increases markedly in humans with cadmium-induced renal disease.

K.1.8.2 Noncancer Toxicity

Acute inhalation exposure to fumes or particles of cadmium induces respiratory symptoms, general weakness, and, in severe cases, respiratory insufficiency, shock, and death (Friberg et al. 1986). Acute oral exposure induces GI disturbances. Chronic inhalation exposure induces pulmonary emphysema, and chronic exposure by either route consistently produces renal tubular disease in humans and laboratory animals. Proteinuria is a reliable early indicator of cadmium-induced kidney disease. The combination of pulmonary emphysema and renal tubular disease, if severe, may result in early mortality. Painful osteomalacia and osteoporosis may arise from altered metabolism of bone minerals secondary to renal damage. The combination of renal and skeletal damage is called itai-itai disease in Japan. Cadmium exposure has been associated with liver damage, but the liver appears to be less sensitive than the kidney. The kidney is the primary target organ of cadmium toxicity. The EPA (1997) derived chronic oral RfD values of 0.5 μg/kg/day for cadmium ingested in water and 1 μg/kg/day for cadmium ingested in food, based on a toxicokinetic model that predicted NOAELs from renal cortical concentrations of cadmium. The different RfD values reflect assumed differences in GI absorption of cadmium from water (5 percent) and food (2.5 percent).

K.1.8.3 Carcinogenicity

Carcinogenicity data in humans consist of several occupational studies that associate cadmium exposure with lung cancer, but concomitant exposure to other carcinogenic chemicals and smoking were not adequately controlled. Other occupational studies reported significantly increased risk of prostatic cancer, but this effect was not observed in the largest occupational study of workers exposed to high levels (Thun et al. 1985). The animal data consist of an inhalation study in rats that showed a significant increase in lung tumors, and several parenteral injection studies that produced injection site tumors. No evidence of carcinogenicity, however, was observed in seven oral studies in rats and mice. The EPA (1997) classifies cadmium a cancer weight-of-evidence Group B1 substance for inhalation exposure on the basis of limited evidence of carcinogenicity in humans and sufficient evidence in animals. The data were insufficient to classify cadmium as carcinogenic to humans exposed by the oral route. The EPA (1997) derived an

inhalation unit risk of 0.0018 $\mu g/m^3$ from the occupational exposure study by Thun et al. (1985). Assuming an inhalation rate of $20m^3$/day and a body weight of 70 kg, the inhalation slope factor is 6.3 per mg/kg/day.

K.1.9 CHROMIUM

K.1.9.1 Noncancer Toxicity

In nature, chromium (III) predominates over chromium (VI) (Langård and Norseth 1986). Little chromium (VI) exists in biological materials, except shortly after exposure, because reduction to chromium (III) occurs rapidly. Chromium (III) is considered a nutritionally essential trace element and is considerably less toxic than chromium (VI). No effects were observed in rats consuming 1800 mg chromium (III)/kg/day in the diet for over two years (EPA 1994). The NOEL of 1800 mg/kg/day and an uncertainty factor of 1000 was the basis for a verified chronic oral RfD of 1 mg/kg/day (EPA 1997). The same NOEL and an uncertainty factor of 100 was the basis for a provisional subchronic oral RfD of 10 mg/kg/day (EPA 1997).

Acute oral exposure of humans to high doses of chromium (VI) induced neurological effects, GI hemorrhage and fluid loss, and kidney and liver effects. Parenteral dosing of animals with chromium (VI) is selectively toxic to the kidney tubules. An NOAEL of 2.4 mg chromium (VI)/kg/day in a one-year drinking water study in rats and an uncertainty factor of 500 was the basis of a verified RfD of 0.005 mg/kg/day for chronic oral exposure (EPA 1997). The same NOAEL and an uncertainty factor of 100 was the basis of a provisional subchronic oral RfD of 0.02 mg/kg/day (EPA 1997).

Occupational (inhalation and dermal) exposure to chromium (III) compounds induced dermatitis (ACGIH 1991). Similar exposure to chromium (VI) induced ulcerative and allergic contact dermatitis, irritation of the upper respiratory tract including ulceration of the mucosa and perforation of the nasal septum, and possibly kidney effects. The inhalation RfD presented by EPA (April, 1998) is 0.0001 ug/kg/day.

A target organ was not identified for chromium (III). The kidney appears to be the principal target organ for repeated oral dosing with chromium (VI). Additional target organs for dermal and inhalation exposure include the skin and respiratory tract.

K.1.9.2 Carcinogenicity

Data were not located regarding the carcinogenicity of chromium (III). The EPA (1997) classifies chromium (VI) in cancer weight-of-evidence Group A (human carcinogen), based on the consistent observation of increased risk of lung cancer in occupational studies of workers in chromate production or the chrome pigment industry. Parenteral dosing of animals with chromium (VI) compounds consistently induced injection-site tumors. There is no evidence that oral exposure to chromium (VI) induces cancer. An inhalation unit risk of 0.012 per $\mu g/m^3$, equivalent to 41 per mg/kg/day, assuming humans inhale 20 m^3/day and weigh 70 kg, was based on increased risk of lung cancer deaths in chromate production workers.

K.1.10 COBALT

K.1.10.1 Noncancer Toxicity

Acute high oral or parenteral doses of cobalt in humans or animals induced myocardial degeneration often leading to mortality, erythropoiesis, enlarged thyroid, and, in animals, renal tubular degeneration (Elinder and Friberg 1986b). Chronic ingestion from the consumption of beer containing high concentrations of cobalt was associated with "beer-drinkers cardiomyopathy," which includes polycythemia and goiter, as well as marked myocardial degeneration and mortality. The therapeutic use of 0.16 to 0.32 mg cobalt/kg/day in anemic, anephric dialysis patients for 12 to 32 weeks induced a significant, but reversible, rise in blood hemoglobin concentration (EPA 1998).

Occupational (inhalation and dermal) exposure was associated with allergic dermatitis, chronic interstitial pneumonitis, reversibly impaired lung function, occupational asthma, and myocardial effects (ACGIH 1991). Cobalt was determined to be the etiologic factor in hard metal disease, the syndrome of respiratory symptoms, and pneumoconiosis associated with inhalation exposure to dusts containing tungsten carbide with cobalt powder as a binder (Elinder and Friberg 1986b). The lowest occupational air concentration of cobalt associated with hard metal disease was 0.003 mg cobalt/m^3 (Sprince et al. 1988). It should be noted that the workers were also exposed to tungsten and sometimes to titanium, tantalum, and niobium (Elinder and Friberg 1986b). Similar lung effects were seen in animals exposed to cobalt by inhalation.

The developmental toxicity of cobalt was tested in rodents treated orally with cobalt chloride (EPA 1998). Maternal effects (unspecified) were reported in rats treated with 5.4 to 21.8 mg cobalt/kg/day from gestation day 14 through lactation day 21. Effects on the offspring included stunted growth at 5.4 mg cobalt/kg/day and reduced survival at 21.8 mg cobalt/kg/day. In rats treated with 6.2, 12.4, or 24.8 mg cobalt/kg/day on gestation days 6 through 15, maternal effects included reduced food consumption and body weight gain and altered hematologic parameters, although it is unclear at what dose level(s) these effects occurred. There were no effects on fetal survival, although a nonsignificant increase in fetal stunting was observed in rats treated with ≥12.4 mg cobalt/kg/day. Mice treated with 81.7 mg cobalt/kg/day had reduced maternal weight gain, but no fetal effects.

Several studies reported testicular degeneration and atrophy in rats treated with cobalt chloride in the diet or drinking water at concentrations equivalent to doses of 5.7 to 30.2 mg cobalt/kg/day (EPA 1997).

Cobalt is nutritionally essential as a cofactor in cyanocobalamin (vitamin B12) (EPA 1997). Cobalt is universally present in the diet. Average daily adult dietary intakes of cobalt range from 0.16 to 0.58 mg/day (0.002 to 0.008 mg/kg/day, assuming adults weigh 70 kg) (Tipton et al. 1966; Schroeder et al. 1967). In 9- to 12-year-old children, dietary intakes of cobalt range from 0.3 to 1.77 mg/day (Murthy et al. 1971; National Research Council 1989). Assuming an average weight for children in this age range of 28 kg (National Research Council, 1989), the dietary intakes are equivalent to 0.01 to 0.06 mg/kg/day.

The EPA (1992g) concluded that the oral toxicity data were insufficient for derivation of an oral RfD for cobalt. The relatively well characterized dietary intake data, however, can provide useful guidance. The EPA (1997) noted that the upper range of dietary intake for children, 0.06 mg/kg/day, was below the level associated with enhanced erythropoiesis in anephric patients. Therefore, the upper range of dietary intake, 0.06 mg cobalt/kg/day, can be considered a guidance level for the oral intake of cobalt and can be used in place of an oral RfD in CERCLA and RCRA baseline risk assessments.

An inhalation RfD was not presented for cobalt.

Important target organs in orally exposed humans are the heart, erythrocyte, and thyroid. Target organs for occupational exposure are the skin, lungs, and heart.

K.1.10.2 Carcinogenicity

Data regarding the carcinogenicity of cobalt were not located.

K.1.11 COPPER

K.1.11.1 Noncancer Toxicity

Copper is a nutritionally essential element that functions as a cofactor in several enzyme systems (Aaseth and Norseth 1986). Acute exposure to large oral doses of copper salts was associated with GI disturbances, hemolysis, and liver and kidney lesions. Chronic oral toxicity in humans has not been reported. Chronic oral exposure of animals was associated with an iron-deficiency type of anemia, hemolysis, and lesions in the liver and kidneys. Occupational exposure may induce metal fume fever, and, in cases of chronic exposure to high levels, hemolysis and anemia (ACGIH 1991). Neither oral nor inhalation RfD or RfC values were located for copper. The target organs for copper are the erythrocyte, liver, and kidney, and, for inhalation exposure, the lung. An oral RfD of 0.04 mg/kg/day was presented for copper (EPA, 1997). A RfC value was not located for copper.

K.1.11.2 Carcinogenicity

Copper is classified in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans) (EPA 1997). Quantitative risk estimates are not derived for Group D chemicals.

K.1.12 CYANIDE

K.1.12.1 Noncancer Toxicity

Acute exposure to cyanide induced histotoxic hypoxia (inability of the tissues to use oxygen); death was due to central respiratory arrest (Smith 1991). Chronic dietary exposure to cyanide was associated with reduced body weight gain, decreased thyroid activity, myelin degeneration, and reduced fertility in rats (EPA 1997). The EPA (1997) presented a verified RfD of 0.02 mg/kg/day for oral exposure to cyanide, based on an NOAEL in a two-year study in rats that consumed food fumigated with hydrogen cyanide, and an uncertainty factor of 500. The same value was adopted as the provisional RfD for subchronic oral exposure (EPA 1997). The target organs for acute exposure are the CNS, respiratory system, and cardiovascular system (ACGIH 1991). Target organs for chronic oral exposure to cyanide appear to be the thyroid and nervous system.

K.1.12.2 Carcinogenicity

The EPA (1997) classifies cyanide as a cancer weight-of-evidence Group D substance (not classifiable as to carcinogenicity to humans). Quantitative risk estimates are not derived for Group D chemicals.

K.1.13 DI-N-BUTYLPHTHALATE (DIBUTYLPHTHALATE)

K.1.13.1 Noncancer Toxicity

The oral and inhalation toxicities of di-n-butylphthalate appear to be quite low (ACGIH 1991). Oral doses of 2000 mg/kg/day for 10 days induced testicular degeneration in mice and guinea pigs, but not in rats or hamsters. A one-year dietary study with di-n-butylphthalate resulted in mortality of half the rats within the first week; no adverse effects were observed in the survivors (EPA 1998). A verified chronic oral RfD of 0.1 mg/kg/day was derived from the NOAEL in the one-year rat study and an uncertainty factor of 1000. The same NOAEL and an uncertainty factor of 100 were the basis of a provisional subchronic oral RfD of 1 mg/kg/day (EPA 1997). The testis appears to be a target organ for oral exposure in some species.

K.1.13.2 Carcinogenicity

The EPA (1997) classifies di-n-butylphthalate in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans), based on an absence of human or animal cancer data. Quantitative risk estimates are not derived for Group D chemicals.

K.1.14 1,4-DICHLOROBENZENE (PARA-DICHLOROBENZENE)

K.1.14.1 Pharmacokinetics

No data are available to quantitatively evaluate the absorption of 1,4-dichlorobenzene. Absorption via oral administration is assumed to be 100 percent since this chemical is similar in structure to benzene and smaller chlorinated aliphatic hydrocarbons. Approximately 20 percent of the compound is absorbed following inhalational exposure. The dermal absorption of 1,4-dichlorobenzene has not been studied (ATSDR, 1991k).

Once absorbed, whether through inhalation or oral exposure, 1,4-dichlorobenzene is mainly deposited in fatty tissue and the liver and kidneys to a lower extent. The major urinary metabolite of 1,4-dichlorobenzene is 2,5-dichlorophenol. This metabolite is eliminated as conjugates of glucuronic and sulfuric acids.

K.1.14.2 Noncancer Toxicity

Studies indicate that the liver is the primary target organ associated with toxic effects for 1,4-dichlorobenzene. Malaise, nausea, anemia, proteinuria, hematuria, as well as liver effects, were observed in humans exposed to this chemical (ATSDR, 1991k).

The U.S. EPA (1997) derived an inhalation RfC for 1,4-dichlorobenzene of 2.5 mg/m^3 from a NOAEL of 75 mg/m^3 for increased liver weights and an uncertainty factor of 30, which is equivalent to a RfD of 0.229 mg/kg/day (1998). The NOAEL was estimated from a subchronic two-generation reproductive study where male and female rats were exposed to varying concentrations of 1,4-dichlorobenzene vapors. Although this study lacked chronic data, chronic lifetime exposure studies support the conclusions drawn in the study.

Oral LD_{50} values for male and female rats were identified as 3,900 and 3,800 mg/kg respectively (ATSDR, 1991k). A NOAEL of 300 mg/kg/day for hepatic effects was derived. No human studies are available regarding toxic effects of 1,4-dichlorobenzene from oral and dermal exposure.

K.1.14.3 Carcinogenicity

The U.S. EPA (1997) has classified this compound in the cancer weight-of-evidence Group C (possible human carcinogen). This classification is based on an oral gavage study over a period of 103 weeks resulting in liver tumors which indicate that this chemical is carcinogenic in mice. EPA has assigned this compound an oral and inhalation CSF of 0.024 per mg/kg/day (1997) and 0.022 per mg/kg/day (April 1998), respectively.

K.1.15 1,1-DICHLOROETHENE

K.1.15.1 Noncancer Toxicity

Chronic oral exposure of laboratory animals to 1,1-dichloroethene induced liver effects (EPA 1997). In animals, inhalation exposure induced degenerative changes in the liver and kidneys (ATSDR 1989f). No

health effects were observed in a limited study of 138 exposed workers (ACGIH 1986). The EPA (1997) presented a verified RfD for chronic oral exposure of 0.009 mg/kg/day, based on an NOAEL for liver effects in a chronic drinking water study in rats and an uncertainty factor of 1000. The EPA (1997) presented the same value as a provisional subchronic oral RfD. The liver and kidneys are the target organs for exposure to 1,1-dichloroethene.

K.1.15.2 Carcinogenicity

EPA classifies 1,1-dichloroethene as a cancer weight-of-evidence Group C compound (possible human carcinogen), based on an inadequate occupational exposure cancer study, limited data in several animal studies, its mutagenicity and ability to alkylate deoxyribonucleic acid (DNA), and its structural similarity to vinyl chloride, a known human carcinogen (EPA 1994). The eighteen available animal studies (11 by inhalation exposure, 5 by oral exposure, and 1 each by dermal application and subcutaneous injection) were limited in sensitivity by various deficiencies in design. Credible evidence that 1,1-dichloroethene was a complete carcinogen was provided only by one 12-month inhalation study in mice, in which the incidence of kidney adenocarcinomas was significantly greater in the high-dose males than in the control males. A slope factor of 0.6 per mg/kg/day for oral exposure was based on the increased incidence of adrenal pheochromocytomas in male rats treated by gavage for two years, even though the increase was not statistically significant (EPA, 1998). A unit risk for inhalation exposure of 5.0E-05 per $\mu g/m^3$ was based on the incidence of kidney adenocarcinomas in male mice in the inhalation study mentioned above (EPA, 1998). The unit risk is equivalent to 0.175 per mg/kg/day, assuming humans inhale 20 m^3 of air/day and weigh 70 kg.

K.1.16 CIS-1,2-DICHLOROETHENE (CIS-1,2-DICHLOROETHYLENE)

K.1.16.1 Noncancer Toxicity

Repeated oral exposure of rats to cis-1,2-dichloroethene was associated with signs of anemia (decreased hematocrit and hemoglobin) (EPA 1997). Inhalation exposure to isomeric mixtures of 1,2-dichloroethene induced narcosis, and mixed isomers of 1,2-dichloroethene were used as an anesthetic gas (ACGIH 1991). The EPA (1997) presented a provisional chronic oral RfD of 0.01 mg/kg/day based on an NOAEL for signs of anemia in rats and an uncertainty factor of 3000. A provisional subchronic oral RfD of 0.1 mg/kg/day was derived from the same NOAEL and an uncertainty factor of 300. Target organs appear to be the erythrocyte for oral exposure and the CNS for inhalation exposure.

K.1.16.2 Carcinogenicity

The EPA (1997) classifies cis-1,2-dichloroethene as a cancer weight-of-evidence Group D compound (not classifiable as to carcinogenicity to humans), based on an absence of human or animal cancer data. Quantitative estimates of cancer risk are not derived for Group D chemicals.

K.1.17 DIELDRIN

K.1.17.1 Noncancer Toxicity

Dieldrin does not appear to be mutagenic when tested in a number of systems. Dieldrin is toxic to the reproductive system and teratogenic. Reproductive effects include decreased fertility, increased fetal death, and effects on gestation; while teratogenic effects include cleft palate, webbed foot, and skeletal anomalies. Chronic effects attributed to dieldrin include liver toxicity and central nervous system abnormalities. Dieldrin is acutely toxic; the oral LD_{50} is around 50 mg/kg, and the dermal LD_{50} is about 100 mg/kg (Clement, 1985). An oral RfD of 5E-5 mg/kg/day was derived from a two year diet study with rats and an uncertainty factor of 100. The NOAEL is 0.005 mg/kg/day based on a high incidence of liver lesions. The inhalation RfC was not located.

K.1.17.2 Carcinogenicity

Dieldrin is a carcinogen, causing increases in a variety of tumors in rats at low but not at high doses and producing a higher incidence of liver tumors in mice. The reason for this reversed dose-response relationship is unclear. A diet study with mice resulted in liver carcinomas. Based on this study, EPA (1998) presented an oral slope factor of 16 per mg/kg/day. Based on route-to-route extrapolation, the inhalation slope factor is 16 per mg/kg/day (EPA, 1998).

K.1.18 1,1-DIMETHYLHYDRAZINE

Inhalation, oral, and dermal studies in animals indicate that hydrazines are rapidly absorbed into the blood. Animal studies also indicate that hydrazines rapidly distribute to tissues without preferential accumulation at any specific site. Hydrazines with a free amino group are able to react with endogenous alpha-keto acids, and in so doing produce a variety of adverse health effects. In vivo and in vitro studies indicate that hydrazines are metabolized by several pathways, both enzymatic and nonenzymatic. Free radical and copper ion intermediates are produced during the metabolism of hydrazines, and may also be involved in adverse health effects produced by exposure to hydrazines. Data from 1,1-dimethylhydrazine studies indicate that 1,1-dimethylhydrazine undergoes demethylation and can reat with cellular molecules in vivo. Limited data from animal studies indicate that metabolites of hydrazines are excreted principally in the urine and expired air.

K.1.18.1 Noncancer Toxicity

No studies were located regarding systemic effects in humans after oral exposure to hydrazines. Studies are available regarding systemic effects in animals after oral exposure to hydrazines. These studies demonstrate that the central nervous system is the primary target organ of 1,1-dimethylhydrazine.

K.1.18.2 Carcinogenicity

Data indicate that hydrazines are carcinogenic by the oral route following acute, intermediate, or chronic exposure, and are capable of producing tumors in multiple tissue sites in several different animal species. 1,1-Dimethyl hydrazine produces tumors primarily in the lungs. The EPA has derived an oral slope factor for 1,1-dimethylhydrazine of 2.6 per mg/kg/day based on tumors of the cardiovascular system (ATSDR June 1994). This value has recently been withdrawn.

The EPA has derived an inhalation unit risk of 0.001 $(ug/m^3)^{-1}$ for 1,1-dimethylhydrazine based on tumors of the respiratory system (ATSDR, June 1994). Assuming an inhalation rate of $20m^3$/day and a weight of 70 kg, the inhalation RfD for 1,1-dimethylhydrazine is 3.5 per mg/kg/day. This value has been recently withdrawn.

K.1.19 HEPTACHLOR/HEPTACHLOR EPOXIDE (CLEMENT, 1985)

K.1.19.1 Noncancer Toxicity

Tests with laboratory animals, primarily rodents, demonstrate acute and chronic toxic effects due to heptachlor exposure. Although heptachlor and heptachlor epoxide are absorbed most readily through the gastrointestinal tract, inhalation and skin contact are also potential routes of exposure. Acute exposure by various routes can cause development of hepatic vein thrombi and can effect the central nervous system and cause death. Chronic exposure induces liver changes, affects hepatic microsomal enzyme activity, and causes increased mortality in offspring. The oral LD_{50} in the rat is 40 mg/kg for heptachlor and 47 mg/kg for heptachlor epoxide. Results from mutagenicity bioassays suggest that these compounds also may have genotoxic activity. Reproductive and teratogenic effects in rats include decreased litter size, shortened life span of suckling rats, and development of cataracts in offspring. Although there are reports of acute and chronic toxicity in humans, with symptoms including tremors, convulsions, kidney damage, respiratory collapse, and death, details of such episodes are not well documented. Heptachlor epoxide has been found in a high percentage of human adipose tissue samples, and also in human milk samples and biomagnification of heptachlor/heptachlor epoxide occurs. This compound also has been found in the tissues of stillborn infants, suggesting an ability to cross the placenta and bioaccumulate in the fetus. A diet study with dogs for 60 (LOAEL of 0.0125 mg/kg/day) with an uncertainty factor of 1000 resulted in increased liver weights. The LOAEL was converted to an oral RfD of 0.013 ug/kg/day (1997).

K.1.19.2 Carcinogenicity

Heptachlor and heptachlor epoxide are liver carcinogens when administered orally to mice. An 18 to 24 month oral diet study with mice produced liver carcinomas. Based on this study, an oral slope factor of 9.1 per mg/kg/day was presented by EPA (1998). Through route-to-route extrapolation, an inhalation slope factor of 9.1 per mg/kg/day was presented by EPA (1998).

K.1.20 INDENO(1,2,3-CD)PYRENE

K.1.20.1 Noncancer Toxicity

Little information was found on the toxicity of indeno(1,2,3-cd)pyrene. Because of its structural similarity its properties should resemble benzo(a)pyrene.

K.1.20.2 Carcinogenicity

A Clement's relative potency factor (RFP) has been developed for indeno(1,2,3-cd)pyrene. This allows the estimation of a CSF of 0.73 mg/kg/day for the oral route. The EPA (1997) has classified indeno(1,2,3-cd)pyrene in cancer weight-of-evidence Group B2 (Probable Human Carcinogen, sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans) based on tumors in mice following lung implants.

K.1.21 IRON

K.1.21.1 Noncancer Toxicity

Iron is potentially toxic in all forms and by all routes of exposures. Inorganic iron is a poison by the intraperitoneal route. The inhalation of large amounts of iron dust may result in iron pneumoconiosis or arc welders lung. Chronic exposure to excess levels of iron (>50-100 mg Iron/day) can result in pathological deposition of iron in tissues. The target organs are the pancreas and liver (Sax and Lewis 1989).

Iron compounds are of varying toxicity. Iron oxides are a potential risk in all industrial settings. In general, ferrous compounds are more toxic than ferric compounds. Acute exposure to excessive levels of ferrous compounds can cause liver and kidney damage, altered respiratory rates and convulsions (Sax and Lewis 1989). An oral RfD of 0.3 mg/kg/day has recently been published for iron by EPA (1998). No inhalation RfD has been found for iron.

K.1.21.2 Carcinogenicity

Some iron compounds are suspected human carcinogens. Iron dust is an experimental neoplastigen and an increased incidence of lung cancer has been associated with exposure to iron dust. Iron oxide is an experimental tumorigen and a suspected human carcinogen. (Sax and Lewis 1989). EPA has not published oral or inhalation slope factors for iron.

K.1.22 LEAD

K.1.22.1 Pharmacokinetics

Studies in humans indicate that an average of 10 percent of ingested lead is absorbed, but estimates as high as 40 percent were obtained in some individuals (Tsuchiya, 1986). Nutritional factors have a profound effect on GI absorption efficiency. Children absorb ingested lead more efficiently than adults; absorption efficiencies up to 53 percent were recorded for children three months to eight years of age. Similar results were obtained for laboratory animals; absorption efficiencies of 5 to 10 percent were obtained for adults and > 50 percent were obtained for young animals. The deposition rate of inhaled lead averages approximately 30 to 50 percent, depending on particle size, with as much as 60 percent deposition of very small particles (0.03 mm) near highways. All lead deposited in the lungs is eventually absorbed.

Approximately 95 percent of the lead in the blood is located in the erythrocytes (EPA, 1998). Lead in the plasma exchanges with several body compartments, including the internal organs, bone, and several excretory pathways. In humans, lead concentrations in bone increase with age (Tsuchiya, 1986). About 90 percent of the body burden of lead is located in the skeleton. Neonatal blood concentrations are about 85 percent of maternal concentrations (EPA, 1998). Excretion of absorbed lead is principally through the urine, although GI secretion, biliary excretion, and loss through hair, nails, and sweat are also significant.

K.1.22.2 Noncancer Toxicity

The noncancer toxicity of lead to humans has been well characterized through decades of medical observation and scientific research (EPA, 1990). The principal effects of acute oral exposure are colic with diffuse paroxysmal abdominal pain (probably due to vagal irritation), anemia, and, in severe cases, acute encephalopathy, particularly in children (Tsuchiya, 1986). The primary effects of long-term exposure are neurological and hematological. Limited occupational data indicate that long-term exposure to lead may induce kidney damage. The principal target organs of lead toxicity are the erythrocyte and the nervous system. Some of the effects on the blood, particularly changes in levels of certain blood enzymes, and subtle neurobehavioral changes in children, appear to occur at levels so low as to be considered nonthreshold effects.

The USEPA (1990; July 1995) determined that it is inappropriate to derive an RfD for oral exposure to lead for several reasons. First, the use of an RfD assumes that a threshold for toxicity exists, below which adverse effects are not expected to occur; however, the most sensitive effects of lead exposure, impaired neurobehavioral development in children and altered blood enzyme levels associated with anemia, may occur at blood lead concentrations so low as to be considered practically nonthreshold in nature. Second, RfD values are specific for the route of exposure for which they are derived. Lead, however, is ubiquitous, so that exposure occurs from virtually all media and by all pathways simultaneously, making it practically impossible to quantify the contribution to blood lead from any one route of exposure. Finally, the dose-response relationships common to many toxicants, and upon which derivation of an RfD is based, do not hold true for lead. This is because the fate of lead within the body depends, in part, on the amount and rate

of previous exposures, the age of the recipient, and the rate of exposure. There is, however, a reasonably good correlation between blood lead concentration and effect. Therefore, blood lead concentration is the appropriate parameter on which to base the regulation of lead.

USEPA (1997) presented no inhalation RfC for lead, but referred to the National Ambient Air Quality Standard (NAAQS) for lead, which could be used in lieu of an inhalation RfC. The NAAQSs are based solely on human health considerations and are designed to protect the most sensitive subgroup of the human population. The NAAQS for lead is 1.5 mg/m^3, averaged quarterly.

K.1.22.3 Carcinogenicity

USEPA (February 1998) classifies lead in cancer weight-of-evidence Group B2 (probable human carcinogen), based on inadequate evidence of cancer in humans and sufficient animal evidence. The human data consist of several epidemiologic occupational studies that yielded confusing results. All of the studies lacked quantitative exposure data and failed to control for smoking and concomitant exposure to other possibly carcinogenic metals. Rat and mouse bioassays showed statistically significant increases in renal tumors following dietary and subcutaneous exposure to several soluble lead salts. Various lead compounds were observed to induce chromosomal alterations in vivo and in vitro, sister chromatic exchange in exposed workers, and cell transformation in Syrian hamster embryo cells; to enhance simian adenovirus induction; and to alter molecular processes that regulate gene expression. USEPA (July 1997) declined to estimate risk for oral exposure to lead because many factors (e.g., age, general health, nutritional status, existing body burden and duration of exposure) influence the bioavailability of ingested lead, introducing a great deal of uncertainty into any estimate of risk.

The USEPA IEUBK lead model is an iterated set of equations that estimate blood lead concentration in children aged 0 to 7 years (USEPA, February 1994). The biokinetic part of the model describes the movement of lead between the plasma and several body compartments and estimates the resultant blood lead concentration. The rate of the movement of lead between the plasma and each compartment is a function of the transition or residence time (i.e., the mean time for lead to leave the plasma and enter a given compartment, or the mean residence time for lead in that compartment). Compartments modeled include the erythrocytes, liver, kidneys, all the other soft tissue of the body, cortical bone, and trabecular bone. Excretory pathways and their rates are also modeled. These include the mean time for excretion from the plasma to the urine, from the liver to the bile, and from the other soft tissues to the hair, skin, sweat, etc. The model permits the user to adjust the transition and residence times.

USEPA guidance (USEPA, July 1994) recommends using 400 mg/kg as a screening level for lead in soil for residential scenarios at CERCLA sties and at RCRA Corrective Action sites. Residential areas with soil lead below 400 mg/kg generally require no further action. However, in some special situations, further study is warranted below the screening level (e.g., wetlands, agricultural areas).

K.1.23 MANGANESE

K.1.23.1 Noncancer Toxicity

Manganese is nutritionally required in humans for normal growth and health (EPA 1994) Humans exposed to approximately 0.8 mg manganese/kg/day in drinking water exhibited lethargy, mental disturbances (1/16 committed suicide), and other neurologic effects. The elderly appeared to be more sensitive than children. Oral treatment of laboratory rodents induced biochemical changes in the brain, but rodents did not exhibit the neurological signs exhibited by humans. Occupational exposure to high concentrations in air induced a generally typical spectrum of neurological effects, and increased incidence of pneumonia (ACGIH 1986).

Very recently, a chronic oral RfD of 0.02 mg/kg/day for nonfood and 0.14 mg/kg/day for food based on a human diet study with an uncertainty factor of 1 resullting in CNS effects has been made available for manganese (April, 1998). The EPA (1993a) presented a verified chronic inhalation RfC of 0.00005 mg/m^3 based on an LOAEL for respiratory symptoms and psychomotor disturbances in occupationally exposed humans and an uncertainty factor of 1000. The EPA (1997) presented the same value as a subchronic inhalation RfC. The inhalation RfC is equivalent to 0.000014 mg/kg/day, assuming humans inhale 20 m^3 of air/day and weigh 70 kg. The CNS and respiratory tract are target organs of inhalation exposure to manganese.

K.1.23.2 Carcinogenicity

The EPA (1997) classifies manganese in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans). Quantitative cancer risk estimates are not derived for Group D chemicals.

K.1.24 MERCURY

Mercury occurs in three forms: elemental, organic, and inorganic. Although the toxicity of all forms is mediated by the mercury cation, the extent of absorption and pattern of distribution within the body, which determines the effects observed, depends on the form to which the organism is exposed (Goyer 1991). Bacterial activity in the environment converts inorganic mercury to methyl mercury (Berlin 1986a). It is likely that either inorganic mercury or methyl mercury may be taken up by plants and enter the food chain, and this discussion will focus on inorganic and methyl mercury. Exposure to elemental mercury, which is more likely to occur in an occupational setting, is not discussed herein.

K.1.24.1 Pharmacokinetics

The GI absorption of inorganic mercury salts is about 2 to 10 percent in humans, and slightly higher in experimental animals (Berlin 1986a; Goyer 1991). Inorganic mercury in the blood is roughly equally divided between the plasma and erythrocytes. Distribution is preferentially to the kidney, with somewhat lower concentrations found in the liver, and even lower levels found in the skin, spleen, testes, and brain (Berlin 1986a). Inorganic mercury is excreted principally through the feces and urine, with minor pathways including the secretions of exocrine glands and exhalation of elemental mercury vapor.

Methyl mercury is nearly completely (90 to 95 percent) absorbed from the GI tract (Berlin 1986a). The concentration of methyl mercury in the erythrocytes is about 10 times that in the plasma. Methyl mercury leaves the blood slowly, showing particular affinity for the brain, particularly in primates. In rats, 1 percent of the body burden of methyl mercury is found in the brain, but in humans, 10 percent of the body burden is found in the brain. Somewhat lower levels are found in the liver and kidney. During pregnancy, methyl mercury accumulates in the fetal brain, often at levels higher than in the maternal brain. Most tissues except the brain transform methyl mercury to inorganic mercury. Excretion of methyl mercury is principally via the bile, with a half-life of 70 days in humans not suffering from toxicity. Following exposure to methyl mercury, some of the mercury in the bile exists as methyl mercury and some as the inorganic form. The inorganic form is largely passed in the feces, but the methyl mercury is subject to enterohepatic recirculation. Another important excretory pathway for methyl mercury is lactation.

K.1.24.2 Noncancer Toxicity

Target organs for inorganic or methyl mercury include the kidney, nervous system, fetus, and neonate. Acute oral exposure to high doses of inorganic mercury causes severe damage to the GI mucosa because of the corrosive nature of mercury salts, which may lead to bloody diarrhea, shock, circulatory collapse, and death (Berlin 1986a; Goyer 1991). Acute sublethal poisoning induces severe kidney damage. Chronic exposure induces an autoimmune glomerular disease and renal tubular injury. The EPA (1997) presented a verified RfD of 0.3 μg/mg-day for chronic oral exposure to inorganic mercury, based on kidney effects in rats.

Acute or chronic exposure to methyl mercury leads to neurologic dysfunction (Berlin 1986a; Goyer 1991). The region of the nervous system affected is species-dependent. Methyl mercury poisoning in rats induces peripheral nerve damage and kidney effects. In humans, the sensory cortex appears to be the most

sensitive. The brain of the fetus and the neonate may be unusually sensitive to methyl mercury; retarded neurologic development was observed in prenatally exposed children whose mothers showed no clinical signs of poisoning. The EPA (1993a) derived an RfD of 0.1μg/kg/day for chronic oral exposure to methyl mercury based on neurological effects in environmentally exposed humans. In this derivation, an intake of 1 μg/kg/day was a critical oral dose associated with CNS effects. An inhalation RfC of 0.0003 mg/kg/day (uncertainty factor of 30) has been established for inorganic mercury based on neurotoxic effects in humans and a NOAEL of 0.009 mg/m^3(1997). This translates into a chronic RfD of 0.000086 mg/kg/day (EPA, 1997).

K.1.24.2 Carcinogenicity

The EPA (1997) classifies inorganic mercury in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans), based on no data regarding cancer in humans, and inadequate animal and supporting data. In an intraperitoneal injection study with metallic mercury in rats, sarcomas developed only in those tissues in direct contact with the test material (Druckrey et al. 1957). A two-year dietary study in rats with mercuric acetate (inorganic mercury) yielded no evidence of carcinogenicity (Fitzhugh et al. 1950). In mice, however, dietary exposure to high doses of mercury chloride for up to 78 weeks induced renal adenomas and adenocarcinomas (Mitsumori et al. 1981). The EPA has not yet evaluated the carcinogenicity of organic mercury. No carcinogenic effect, however, was observed in a two-year feeding study with phenylmercuric acetate in rats (Fitzhugh et al. 1950).

K.1.25 NICKEL

K.1.25.1 Noncancer Toxicity

In a subchronic gavage study with nickel chloride in water, clinical signs of toxicity in rats included lethargy, ataxia, irregular breathing, reduced body temperature, salivation, and discolored extremities (EPA 1998). Inhalation exposure was associated with asthma and pulmonary fibrosis in welders using nickel alloys (ACGIH 1986). Lung effects were observed in laboratory animals exposed by inhalation. The EPA (1997) presented a verified RfD of 0.02 for chronic oral exposure to nickel, based on an NOAEL for decreased organ and body weights in a two-year dietary study with nickel sulfate in rats and an uncertainty factor of 300. The EPA (1998) presented the same value as a provisional subchronic oral RfD. The CNS appears to be the target organ for the oral toxicity of nickel. The lung is clearly the target organ for inhalation exposure.

K.1.25.2 Carcinogenicity

Occupational exposure to nickel was associated with increased risk of nasal, laryngeal and lung cancer (ATSDR 1988a). Inhalation exposure of rats to nickel subsulfide increased the incidence of lung tumors. The EPA (1997) presents a cancer weight-of-evidence Group A classification (human carcinogen) for nickel, and presents an inhalation unit risk of 0.00024 per $\mu g/m^3$ for nickel refinery dust. The unit risk is equivalent to 0.84 per mg/kg/day, assuming humans inhale 20 m^3 of air/day and weigh 70 kg. The quantitative estimate was derived from the human occupational studies.

K.1.26 N-NITROSODIPHENYLAMINE (DIPHENYLNITROSAMINE)

K.1.26.1 Noncancer Toxicity

The acute oral toxicity of N-nitrosodiphenylamine is low; oral $LD_{50/30}$ values in rats and mice are 1650 and 3850 mg/kg, respectively (Sax 1984). Data regarding the noncancer effects of repeated oral or inhalation exposure were not located.

K.1.25.2 Carcinogenicity

The EPA (1993a) classifies N-nitrosodiphenylamine in cancer weight-of-evidence Group B2 (probable human carcinogen), based on inadequate human data and sufficient evidence for carcinogenicity in animals. A verified oral slope factor of 0.0049 per mg/kg/day was based on increased incidence of bladder tumors in a chronic drinking water study in rats.

K.1.27 POLYAROMATIC HYDROCARBONS

PAHs are a large class of ubiquitous natural and anthropogenic chemicals, all with similar chemical structures (ATSDR 1990). There are 5 individual PAHs listed among the CPCs for this site.

K.1.27.1 Pharmacokinetics

Although quantitative absorption data for the PAHs were not located, benzo(a)pyrene was readily absorbed across the GI (Rees et al. 1971) and respiratory epithelia (Kotin et al. 1969; Vainich et al. 1976). The high lipophilicity of other compounds in this class suggests that other PAHs also would be readily absorbed across GI and respiratory epithelia.

Benzo(a)pyrene was distributed widely in the tissues of treated rats and mice, but primarily to tissues high in fat, such as adipose tissue and mammary gland (Kotin et al. 1969; Schlede et al. 1970a). Patterns of tissue distribution of other PAHs would be expected to be similar because of the high lipophilicity of the members of this class.

Studies of the metabolism of benzo(a)pyrene provide information relevant to other PAHs because of the structural similarities of all members of the class. Metabolism involves microsomal mixed function oxidase hydroxylation of one or more of the phenyl rings with the formation of phenols and dihydrodiols, probably via formation of arene oxide intermediates (EPA 1979a). The dihydrodiols may be further oxidized to diol epoxides, which, for certain members of the class, are known to be the ultimate carcinogens (LaVoie et al. 1982). Conjugation with glutathione or glucuronic acid, and reduction to tetrahydrotetrols are important detoxification pathways. Metabolism of naphthalene resulted in the formation of 1,2-naphthoquinone, which induced cataract formation and retinal damage in rats and rabbits.

Excretion of benzo(a)pyrene or dibenzo(a,h)anthracene residues was reported to be rapid, although quantitative data were not located (EPA 1979b). Excretion occurred mainly via the feces, probably largely due to biliary secretion (Schlede et al. 1970a, 1970b). The EPA (1980a) concluded that accumulation in the body tissues of PAHs from chronic low level exposure would be unlikely.

K.1.27.2 Noncancer Toxicity

Oral noncancer toxicity data are available for acenaphthene, anthracene, fluoranthene, fluorene, and naphthalene. Newborn infants, children, and adults exposed to naphthalene by ingestion, inhalation, or possibly by skin contact developed hemolytic anemia with associated jaundice and occasionally renal disease (EPA 1979c). In a 13-week gavage study in rats, treatment with 50 mg naphthalene/kg, 5 days/week for 13 weeks (35.7 mg/kg/day) induced no effects; higher doses presumably reduced the growth rate (National Toxicology Program (NTP) 1980). Application of an uncertainty factor of 1000 yielded a provisional RfD for chronic oral exposure of 0.04 mg/kg/day (EPA 1997). The very mild effect (decreased growth rate) apparently observed at higher doses suggests that the RfD is very conservatively protective.

K.1.27.3 Carcinogenicity

The PAHs are ubiquitous, being released to the environment from anthropogenic as well as from natural sources (ATSDR 1987). Benzo(a)pyrene is the most extensively studied member of the class, inducing tumors in multiple tissues of virtually all laboratory species tested by all routes of exposure. Although epidemiology studies suggested that complex mixtures that contain PAHs (coal tar, soots, coke oven emissions, cigarette smoke) are carcinogenic to humans (EPA 1994), the carcinogenicity cannot be attributed to PAHs alone because of the presence of other potentially carcinogenic substances in these mixtures (ATSDR 1987). In addition, recent investigations showed that the PAH fraction of roofing tar, cigarette smoke, and coke oven emissions accounted for only 0.1 to 8 percent of the total mutagenic activity of the unfractionated complex mixture in Salmonella (Lewtas 1988). Aromatic amines, nitrogen heterocyclic compounds, highly oxygenated quinones, diones, and nitrooxygenated compounds, none of which would be expected to arise from in vivo metabolism of PAHs, probably accounted for the majority of the mutagenicity of coke oven emissions and cigarette smoke. Furthermore, coal tar, which contains a mixture of many PAHs, has a long history of use in the clinical treatment of a variety of skin disorders in humans (ATSDR 1987).

Because of the lack of human cancer data, assignment of individual PAHs to EPA cancer weight-of-evidence groups was based largely on the results of animal studies with large doses of purified compound (EPA 1994). Frequently, unnatural routes of exposure, including implants of the test chemical in beeswax and trioctanoin in the lungs of female Osborne-Mendel rats, intratracheal instillation, and subcutaneous or intraperitoneal injection, were used. Benzo(a)anthracene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were classified in Group B2 (probable human carcinogens).

The EPA (1993a) verified a slope factor for oral exposure to benzo(a)pyrene of 7.3 per mg/kg/day, based on several dietary studies in mice and rats. Neither verified nor provisional quantitative risk estimates were available for the other PAHs in Group B2. The EPA (1980a) promulgated an ambient water quality criterion for "total carcinogenic PAHs," based on an oral slope factor derived from a study with benzo(a)pyrene, as being sufficiently protective for the class. Largely because of this precedent, the quantitative risk estimates for benzo(a)pyrene were adopted for the other carcinogenic PAHs when quantitative estimates were needed.

Recent reevaluations of the carcinogenity and mutagenicity of the Group B2 PAHs suggest that there are large differences between individual PAHs in cancer potency (Krewski et al., 1989). Based on the available cancer and mutagenicity data, and assuming that there is a constant relative potency between different carcinogens across different bioassay systems and that the PAHs under consideration have similar dose-response curves, Thorslund and Charnley (1988) derived relative potency values for several PAHs. A more recent Relative Potency Factor (RPF) scheme for the Group B2 PAHs was based only on the induction of lung epidermoid carcinomas in female Osborne-Mendel rats in the lung-implantation experiments (Clement International 1990).

K.1.28 POLYCHLORINATED BIPHENYLS

K.1.28.1 Noncancer Toxicity

Epidemiologic studies of women in the United States associated oral PCB exposure with low birth weight or retarded musculoskeletal or neurobehavioral development of their infants (ATSDR 1991). Oral studies in animals established the liver as the target organ in all species, and the thyroid as an additional target organ in the rat. Effects observed in monkeys included gastritis, anemia, chloracne-like dermatitis, and immunosuppression. Oral treatment of animals induced developmental effects, including retarded neurobehavioral and learning development in monkeys. Oral RfD values of 0.02 ug/kg/day for Aroclor-1254 and 0.07 ug/kg/day for Aroclor-1016 were located.

Occupational exposure to PCBs was associated with upper respiratory tract and ocular irritation, loss of appetite, liver enlargement, increased serum concentrations of liver enzymes, skin irritation, rashes and chloracne, and, in heavily exposed female workers, decreased birth weight of their infants (ATSDR 1991). Concurrent exposure to other chemicals confounded the interpretation of the occupational exposure studies. Laboratory animals exposed by inhalation to Aroclor-1254 vapors exhibited moderate liver degeneration, decreased body weight gain and slight renal tubular degeneration. Neither subchronic nor chronic inhalation RfC values were available.

Target organs for PCBs include the skin, liver, fetus, and neonate.

K.1.28.2 Carcinogenicity

The EPA (1997) classifies the PCBs as EPA cancer weight-of-evidence Group B2 substances (probable human carcinogens), based on inadequate data in humans and sufficient data in animals. The human data consist of several epidemiologic occupational and accidental oral exposure studies with serious limitations, including poorly quantified concentrations of PCBs and durations of exposure, and probable exposures to other potential carcinogens.

The animal data consist of several oral studies in rats and mice with various aroclors, kanechlors, or clophens (commercial PCB mixtures manufactured in the United States, Japan and Germany, respectively) that reported increased incidence of liver tumors in both species (EPA 1994).

The EPA (1998) presents a verified oral slope factor and an inhalation slope factor of 2.0 per mg/kg/day for PCBs based on liver tumors in rats treated with Aroclor-1260.

K.1.29 SILVER

K.1.28.1 Pharmacokinetics

The GI absorption of ingested silver in animals was estimated at ≤10 percent; however, absorption of 18 percent was estimated for one human subject given silver acetate (Fowler and Nordberg 1986). Highest tissue levels are located in the liver; lower levels are located in the lungs, brain, spleen, bone marrow, muscle, and skin (Fowler and Nordberg 1986; Goyer 1991). Excretion is virtually entirely through the bile. The excretion kinetics appear to be species- and organ-dependent. In humans, the apparent half-life for silver in the liver is approximately 50 days. Silver in skin also appeared to have a long half-life (not quantified).

K.1.29.2 Noncancer Toxicity

Silver compounds have been used in dentistry, medicinally in the treatment of burns, as a local disinfectant, and as a drinking water disinfectant (Fowler and Nordberg 1986). The classical syndrome of toxicity, called argyria, is a blue-gray to nearly black discoloration of areas of the skin or the viscera resulting from deposition of microscopic granules of silver compounds in the affected tissues. Argyria results from occupational (inhalation), parenteral, or oral exposure. The EPA (1993a) derived an RfD of 0.005 mg/kg/day for chronic oral exposure based on a 2 to 9 year human i.v. study, where a total i.v. dose of 1g metallic silver (in the form of 4g silver arsphenamine) resulted in minimal observed effects (argyria) in patients. This total i.v. dose for metallic silver was converted into an oral dose (LOAEL) of 0.014 mg/kg/day. The chronic oral RfD was derived by dividing the LOAEL by an uncertainty factor of 3, which was applied to account for minimal effects in a subpopulation that has exhibited an increased propensity for the development of argyria.

K.1.29.3 Carcinogenicity

The EPA (1997) classifies silver in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans). The human data consist of no evidence in the literature of cancer despite frequent medical use of silver compounds. The animal data are limited to studies of implanted silver foil or injected metallic silver that provided unconvincing indications of a carcinogenic response relevant to humans.

K.1.30 TETRACHLOROETHENE

K.1.30.1 Noncancer Toxicity

Occupational (inhalation and dermal) exposure to tetrachloroethene was associated with neurologic effects, beginning with incoordination and progressing to dizziness, headache, vertigo, and unconsciousness (ACGIH 1986). The EPA (1997) presented a verified chronic oral RfD for tetrachloroethene of 0.01 mg/kg/day based on an NOAEL for liver toxicity in mice in a subchronic gavage study, and on an NOEL for depressed body weight gain in rats in a subchronic drinking water study. An uncertainty factor of 1000 was used. The EPA (1992b) presented a provisional subchronic oral RfD of 0.1 mg/kg/day based on the same NOEL and an uncertainty factor of 100. The CNS is the principal target organ for inhalation exposure. The inhalation RfD presented by EPA (April, 1998) is 0.14 mg/kg/day. The liver is the principal target organ for oral exposure to tetrachloroethene.

K.1.30.2 Carcinogenicity

Inhalation exposure to tetrachloroethene induced mononuclear cell leukemia in rats, and inhalation or oral exposure induced hepatocellular carcinomas in mice (ATSDR 1988b). Occupational exposure data do not suggest a carcinogenic role for tetrachloroethene in humans (ACGIH 1986). Interpretation of the data regarding the carcinogenicity of tetrachloroethene is controversial, and the EPA (1997) has not adopted a final position on the cancer weight-of-evidence classification or quantitative risk estimates for tetrachloroethene. The oral slope factor presented by EPA is 0.052 per mg/kg/day and the inhalation slope factor is 0.002 per mg/kg/day (April, 1998).

K.1.31 1,1,2-TRICHLOROETHANE

K.1.31.1 Noncancer Toxicity

1,1,2-Trichloroethane was not mutagenic when tested using the Ames assay. No information was found concerning the reproductive toxicity or teratogenicity of 1,1,2-trichloroethane. No chronic studies were found on the toxicity of 1,1,2-trichloroethane but single doses as low as 400 mg/kg caused liver and kidney damage in dogs. The oral LD_{50} value for 1,1,2-trichloroethane in rats is 835 mg/kg (Clement, 1985). A drinking water 90-day study in mice had a NOAEL of 3.9 mg/kg/day with clinical chemistry alterations. A subchronic RfD of 4E-02 mg/kg/day with an uncertainty factory of 100 was interpolated to a chronic oral RfD 4E-03 mg/kg/day. No inhalation RfD was reported for 1,1,2-trichloroethane.

K.1.31.2 Carcinogenicity

1,1,2-Trichloroethane induced heptacellular carcinomas and pheochromocytoma of the adrenal gland in male and female mice but did not produce a significant increase in tumor incidence in male or female rats (NCI 1976). A 78 week oral gavage study in mice produced liver carcinomas and EPA presented and oral slope factor of 5.7E-02 per mg/kg/day (1997). The route-to-route extrapolation presents an inhalation slope factor of 5.6E-2 per mg/kg/day (1997).

K.1.32 TRICHLOROETHENE

K.1.32.1 Noncancer Toxicity

Little is known about the toxicity of prolonged oral exposure to trichloroethene, but the EPA presented ans oral RfD of 0.006 mg/kg/day (April, 1998). Acute inhalation exposure to high levels induced anesthesia, tachypnea, and ventricular arrhythmias (ACGIH 1986). Occupational exposure was associated with headache, dizziness, lassitude, and other CNS effects. Prolonged inhalation exposure of animals affected the liver and kidneys. An inhalation RfC value was not located for trichloroethene in IRIS or HEAST. The principal target organs for trichloroethene are the CNS and heart, and, to a lesser extent, the liver and kidney.

K.1.32.2 Carcinogenicity

Carcinogenicity studies in laboratory animals showed increased incidence of hepatocellular carcinomas (gavage exposure) and malignant lymphomas (inhalation exposure) in mice and increased incidence of renal adenocarcinomas in male rats (gavage) (EPA 1988d). Cancer studies in humans were inadequate. Interpretation of the data regarding the carcinogenicity of trichloroethene is controversial, and the EPA (1992h) has not adopted a final position on a cancer weight-of-evidence classification or quantitative risk estimates for trichloroethene. For this reason, trichloroethene was removed from the IRIS and the 1992 HEAST (EPA 1992). Currently, EPA believes the weight-of-evidence to be on the C-B2 continuum (possible-probable human carcinogen), and offers slope factors of 0.011 per mg/kg/day (April, 1998) for oral exposure and 0.006 per mg/kg/day (April, 1998) for inhalation exposure as being useful.

K.1.33 VANADIUM

K.1.33.1 Noncancer Toxicity

The oral toxicity of vanadium compounds to humans is very low (Lagerkvist et al. 1986), probably because little vanadium is absorbed from the GI tract. Effects in humans exposed by inhalation include upper and lower respiratory tract irritation. A provisional subchronic and chronic oral RfD of 0.007 mg/kg/day was derived from an NOEL in rats in a lifetime drinking water study with vanadyl sulfate and an uncertainty factor of 100 (EPA, 1997). A target organ could not be identified for oral exposure. The respiratory tract is the target organ for inhalation exposure.

K.1.33.2 Carcinogenicity

No information was located regarding the carcinogenicity of vanadium.

K.1.34 VINYL CHLORIDE

K.1.34.1 Noncancer Toxicity

Data were not located regarding oral exposure of humans to vinyl chloride (ATSDR 1989i). In rats, lifetime dietary ingestion of vinyl chloride slightly but significantly increased mortality and induced mild histopathologic effects in the liver. Several early occupational studies associated vinyl chloride exposure with a syndrome known as vinyl chloride disease, which includes acroosteolysis (dissolution of the ends of the distal phalanges of the hands), circulatory disturbances in the extremities, Raynaud syndrome (sudden, recurrent bilateral cyanosis of the digits), scleroderma, hematologic effects, effects on the lungs, and impaired liver function and liver damage. Mild neurologic effects were also associated with occupational exposure. Long-term inhalation studies in rats and mice identified elevated relative liver weight as a sensitive indicator of liver effects. Neither inhalation RfC values nor oral RfD values for vinyl chloride were located. The principal target organs for vinyl chloride appear to be the CNS and the liver.

K.1.34.2 Carcinogenicity

The EPA (1997) lists vinyl chloride as an EPA cancer weight-of-evidence Group A compound (human carcinogen) and presents a verified oral slope factor of 1.9 per mg/kg/day, based on the increased incidence of liver and lung tumors in a lifetime dietary study in rats. An inhalation unit risk of 8.4E-05 per $\mu g/m^3$, equivalent to 0.3 per mg/kg/day, assuming humans inhale 20 m^3 of air/day and weigh 70 kg, is based on liver tumors in rats intermittently exposed by inhalation for 12 months.

K.1.35 ZINC

K.1.35.1 Pharmacokinetics

Zinc is a nutritionally required trace element. Estimates of the efficiency of GI absorption of zinc in animals range from <10 to 90 percent (Elinder 1986c). Estimates in normal humans range from approximately 20 to 77 percent (Elinder 1986c; Goyer 1991). The net absorption of zinc appears to be homeostatically controlled, but it is unclear whether GI absorption, intestinal secretion, or both are regulated. Distribution of absorbed zinc is primarily to the liver (Goyer 1991), with subsequent redistribution to bone, muscle, and kidney (Elinder 1986c). Highest tissue concentrations are found in the prostate. Excretion appears to be principally through the feces, in part from biliary secretion, but the relative importance of fecal and urinary excretion is species-dependent. The half-life of zinc absorbed from the GI tracts of humans in normal zinc homeostasis is approximately 162 to 500 days.

K.1.35.2 Noncancer Toxicity

Humans exposed to high concentrations of aerosols of zinc compounds may experience severe pulmonary damage and death (Elinder 1986c). The usual occupational exposure is to freshly formed fumes of zinc, which can induce a reversible syndrome known as metal fume fever. Orally, zinc exhibits a low order of acute toxicity. Animals dosed with 100 times dietary requirement showed no evidence of toxicity (Goyer 1991). In humans, acute poisoning from foods or beverages prepared in galvanized containers is characterized by GI upset (Elinder 1986c). Chronic oral toxicity in animals is associated with poor growth, GI inflammation, arthritis, lameness, and a microcytic, hypochromic anemia (Elinder 1986c), possibly secondary to copper deficiency (Underwood 1977). The EPA (1998) presented a verified RfD of 0.3 mg/kg/day for chronic oral exposure to zinc, based on anemia in humans.

K.1.35.3 Carcinogenicity

The EPA (1997) classifies zinc in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans) based on inadequate evidence for carcinogenicity in humans and animals. The human data consist largely of occupational exposure studies not designed to detect a carcinogenic response, and of reports that prostatic zinc concentrations were lower in cancerous than in noncancerous tissue. The animal data consist of several dietary, drinking water, and zinc injection studies, none of which provided convincing data for a evaluation.

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APPENDIX K.2

HUMAN HEALTH RISK ASSESSMENT SAMPLE CALCULATIONS

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil / Sediment - Construction Worker	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of surface soil for the Construction Worker.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical Specific mg/Kg
IR = Ingestion Rate	480 mg/day	240 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	0.88 unitless	0.88 unitless
EF = Exposure Frequency	250 day/year	219 day/year
ED = Exposure Duration	1 years	1 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time carcinogens	25550 days	25550 days
AT_N = Averaging Time noncarcinogens	365 days	365 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 14.4 RME and 8.34 CTE for Site 12 follows:

$$\text{Noncarcinogenic Intake (mg/Kg-day)}^{RME} = \frac{14.4\ \text{mg/Kg} \times 480\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 0.88 \times 250\ \text{day/year} \times 1\ \text{years}}{70\ \text{Kg} \times 365\ \text{days}}$$

$$= \boxed{5.95E\text{-}5\ \text{mg/Kg-day}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Construction Worker	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) = $\frac{14.4\ mg/kg \times 480\ mg/day \times 1.0E-6\ kg/mg \times 0.88 \times 250\ day/year \times 1\ years}{70\ kg \times 25{,}550\ days}$

= **8.5E-7 mg/kg-day** ✓

CTE Noncarcinogenic Intake (mg/kg-day) = $\frac{8.34\ mg/kg \times 240\ mg/day \times 1.0E-6\ kg/mg \times 0.88 \times 219\ day/year \times 1\ years}{70\ kg \times 365\ days}$

= **1.51E-5 mg/kg-day** ✓

CTE Carcinogenic Intake (mg/kg-day) = $\frac{8.34\ mg/kg \times 240\ mg/day \times 1.0E-6\ kg/mg \times 0.88 \times 219\ day/year \times 1\ year}{70\ kg \times 25550\ days}$

= **2.16E-7 mg/kg-day** ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Construction Worker	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD$_o$) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 8.5E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **1.27E-6** ✓

RME
Hazard Index = 5.95E-5 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **1.98E-1** ✓

CTE
Incremental Cancer Risk = 2.16E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **3.24E-7** ✓

CTE
Hazard Index = 1.51E-5 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **5.03E-2** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil / Sediment Construction Worker	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

References:

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CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil / Sediment - On-Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of sediment for the Adult On site Resident.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical Specific mg/Kg
IR = Ingestion Rate	✓100 mg/day	✓50 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	✓1 unitless	✓1 unitless
EF = Exposure Frequency	✓16 day/year	✓8 day/year
ED = Exposure Duration	✓24 years	✓7 years
BW = Body Weight	✓70 Kg	✓70 Kg
AT_C = Averaging Time carcinogens	✓25550 days	✓25550 days
AT_N = Averaging Time noncarcinogens	✓8760 days	✓2555 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 19.7 RME and 9.13 CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/Kg-day)} = \frac{19.7\ \text{mg/Kg} \times 100\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 16\ \text{day/year} \times 24\ \text{years}}{70\ \text{Kg} \times 8760\ \text{days}}$$

$$= \boxed{1.23E\text{-}6\ \text{mg/Kg-day}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - One Site Resident	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME

Carcinogenic Intake (mg/kg-day) = $\frac{19.7 \text{ mg/kg} \times 100 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 16 \text{ day/year} \times 24 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$

= **4.23E-7 mg/kg-day**

CTE

Noncarcinogenic Intake (mg/kg-day) = $\frac{9.13 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 8 \text{ day/year} \times 7 \text{ years}}{70 \text{ kg} \times 2555 \text{ days}}$

= **1.43E-7 mg/kg-day**

CTE

Carcinogenic Intake (mg/kg-day) = $\frac{9.13 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 8 \text{ day/year} \times 7 \text{ year}}{70 \text{ kg} \times 25550 \text{ days}}$

= **1.43E-8 mg/kg-day**

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245		JOB NUMBER 7129	
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident			
BASED ON RAGS		DRAWING NUMBER	
BY KAC	CHECKED BY PAK	APPROVED BY	DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 4.23E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)

= **6.34E-7** ✓

RME
Hazard Index = 1.23E-6 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)

= **4.1E-3** ✓

CTE
Incremental Cancer Risk = 1.43E-8 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)

= **2.14E-8** ✓

CTE
Hazard Index = 1.43E-7 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)

= **4.77E-4** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil / Sediment - On Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of Soil for the Child Resident.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical specific mg/Kg
IR = Ingestion Rate	200 mg/day	100 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	350 day/year	234 day/year
ED = Exposure Duration	6 years	2 years
BW = Body Weight	15 Kg	15 Kg
AT_C = Averaging Time carcinogens	25550 days	25550 days
AT_N = Averaging Time noncarcinogens	2190 days	730 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 14.4 RME and 8.34 CTE for Site 12 follows:

$$\text{Noncarcinogenic Intake (mg/Kg-day)}^{RME} = \frac{14.4\ \text{mg/Kg} \times 200\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 350\ \text{day/year} \times 6\ \text{years}}{15\ \text{Kg} \times 2190\ \text{days}}$$

$$= \boxed{1.84E\text{-}4\ \text{mg/Kg-day}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) =

$$\frac{14.4\ mg/kg \times 200\ mg/day \times 1.0E-6\ kg/mg \times 1 \times 350\ day/year \times 6\ years}{15\ kg \times 25550\ days}$$

= **1.58E-5 mg/kg-day** ✓

CTE Noncarcinogenic Intake (mg/kg-day) =

$$\frac{8.34\ mg/kg \times 100\ mg/day \times 1.0E-6\ kg/mg \times 1 \times 234\ day/year \times 2\ years}{15\ kg \times 730\ days}$$

= **3.56E-5 mg/kg-day** ✓

CTE Carcinogenic Intake (mg/kg-day) =

$$\frac{8.34\ mg/kg \times 100\ mg/day \times 1.0E-6\ kg/mg \times 1 \times 234\ day/year \times 2\ years}{15\ kg \times 25550\ days}$$

= **1.02E-6 mg/kg-day** ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = Noncarcinogenic Intake (mg/kg-day) / Reference Dose oral (mg/kg-day)

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On-Site Resident	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 1.58E-5 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **2.37E-5** ✓

RME
Hazard Index = 1.84E-4 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **6.13E-1** ✓

CTE
Incremental Cancer Risk = 1.02E-6 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **1.53E-6** ✓

CTE
Hazard Index = 3.56E-5 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **1.19E-1** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington DC. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of sediment for the Child Resident.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical Specific mg/Kg
IR = Ingestion Rate	200 mg/day	100 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	✓ 1 unitless	✓ 1 unitless
EF = Exposure Frequency	✓ 16 day/year	✓ 8 day/year
ED = Exposure Duration	✓ 6 years	✓ 2 years
BW = Body Weight	✓ 15 Kg	✓ 15 Kg
AT_C = Averaging Time Carcinogens	✓ 25550 days	✓ 25550 days
AT_N = Averaging Time noncarcinogens	✓ 2190 days	✓ 730 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 19.7 RME and 9.13 CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/Kg-day)} = \frac{19.7\ \text{mg/Kg} \times 200\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 16\ \text{day/year} \times 6\ \text{years}}{15\ \text{Kg} \times 2190\ \text{days}}$$

$$= \boxed{1.15E\text{-}5\ \text{mg/Kg-day}}\ ✓$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head Site 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME

Carcinogenic Intake (mg/Kg-day) = $\frac{19.7 \text{ mg/Kg} \times 100 \text{ mg/day} \times 1.0E\text{-}6 \text{ Kg/mg} \times 1 \times 16 \text{ day/year} \times 6 \text{ years}}{15 \text{ Kg} \times 25550 \text{ days}}$

= **9.87E-7 mg/Kg-day**

CTE

Noncarcinogenic Intake (mg/Kg-day) = $\frac{9.13 \text{ mg/Kg} \times 100 \text{ mg/day} \times 1.0E\text{-}6 \text{ Kg/mg} \times 1 \times 8 \text{ day/year} \times 2 \text{ years}}{15 \text{ Kg} \times 730 \text{ days}}$

= **1.33E-6 mg/Kg-day**

CTE

Carcinogenic Intake (mg/Kg-day) = $\frac{9.13 \text{ mg/Kg} \times 100 \text{ mg/day} \times 1.0E\text{-}6 \text{ Kg/mg} \times 1 \times 8 \text{ day/year} \times 2 \text{ year}}{15 \text{ Kg} \times 25550 \text{ days}}$

= **3.81E-8 mg/Kg-day**

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/Kg-day) × Cancer Slope Factor oral (Kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{Reference Dose oral (mg/Kg-day)}}$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head OU45	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident	
BASED ON BAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfDo) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 9.87E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **1.48E-6**

RME
Hazard Index = 1.15E-5 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **3.83E-2**

CTE
Incremental Cancer Risk = 3.81E-8 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **5.71E-8**

CTE
Hazard Index = 1.33E-6 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **4.43E-3**

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil / Sediment - On-Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY CAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of Soil for the Adult One Site Resident.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical specific mg/Kg
IR = Ingestion Rate	100 mg/day	50 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	350 day/year	234 day/year
ED = Exposure Duration	24 years	7 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25550 days	25550 days
AT_N = Averaging Time noncarcinogens	8760 days	2555 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 14.4 RME and 8.34 CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{14.4\ \text{mg/kg} \times 100\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 350\ \text{day/year} \times 24\ \text{years}}{70\ \text{Kg} \times 8760\ \text{days}}$$

$$= \boxed{1.97E\text{-}5\ \text{mg/Kg-day}}$$

CLIENT NSWC Indian Head Cro 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME
Carcinogenic Intake (mg/kg-day) = $\frac{14.4 \text{ mg/kg} \times 100 \text{ mg/day} \times 1.0E6 \text{ kg/mg} \times 1 \times 350 \text{ day/year} \times 24 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$

= **6.76E-6 mg/kg-day** ✓

CTE
Noncarcinogenic Intake (mg/kg-day) = $\frac{8.34 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 234 \text{ day/year} \times 7 \text{ years}}{70 \text{ kg} \times 2555 \text{ days}}$

= **3.82E-6 mg/kg-day** ✓

CTE
Carcinogenic Intake (mg/kg-day) = $\frac{8.34 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 234 \text{ day/year} \times 7 \text{ year}}{70 \text{ kg} \times 25550 \text{ days}}$

= **3.82E-7 mg/kg-day** ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - On-Site Resident	
BASED ON BAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 6.76E-5 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **1.01E-5** ✓

RME
Hazard Index = 1.97E-5 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **6.57E-2** ✓

CTE
Incremental Cancer Risk = 3.82E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **5.73E-7** ✓

CTE
Hazard Index = 3.82E-6 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **1.27E-2** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment On-Site Resident	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Construction Worker	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of exposed sediments for the Construction Worker.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical specific mg/Kg
IR = Ingestion Rate	240 mg/day	120 mg/day
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	60 day/year	30 day/year
ED = Exposure Duration	1 year	1 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25550 days	25550 days
AT_N = Averaging Time noncarcinogens	365 days	365 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 19.7 RME and 9.13 CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/Kg-day)} = \frac{19.7\ \text{mg/Kg} \times 240\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 60\ \text{day/year} \times 1\ \text{years}}{70\ \text{Kg} \times 365\ \text{days}}$$

$$= \boxed{1.11E\text{-}5\ \text{mg/Kg-day}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment-Construction Worker	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME

Carcinogenic Intake (mg/kg-day) = $\frac{19.7 \text{ mg/kg} \times 240 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 60 \text{ day/year} \times 1 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$

= **1.59E-7 mg/kg-day** ✓

CTE

Noncarcinogenic Intake (mg/kg-day) = $\frac{9.13 \text{ mg/kg} \times 120 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 30 \text{ day/year} \times 1 \text{ years}}{70 \text{ kg} \times 365 \text{ days}}$

= **1.28E-6 mg/kg-day** ✓

CTE

Carcinogenic Intake (mg/kg-day) = $\frac{9.13 \text{ mg/kg} \times 120 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 30 \text{ day/year} \times 1 \text{ year}}{70 \text{ kg} \times 25550 \text{ days}}$

= **1.84E-8 mg/kg-day** ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Construction Worker	
BASED ON RAGS	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PJK		5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 1.59E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **2.38E-7** ✓

RME
Hazard Index = 1.11E-5 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **3.7E-2** ✓

CTE
Incremental Cancer Risk = 1.84E-8 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **2.76E-8** ✓

CTE
Hazard Index = 1.28E-6 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **4.27E-3** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Construction Worker	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAR		5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of sediment for the Adolescent trespasser.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical Specific mg/Kg
IR = Ingestion Rate	100 mg/day	50 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	16 day/year	8 day/year
ED = Exposure Duration	10 years	10 years
BW = Body Weight	43 Kg	43 Kg
AT_C = Averaging Time Carcinogens	25550 days	25550 days
AT_N = Averaging Time noncarcinogens	3650 days	3650 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 19.7 RME and 9.13 CTE at site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{19.7\ \text{mg/kg} \times 100\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 16\ \text{day/year} \times 10\ \text{years}}{43\ \text{Kg} \times 3650\ \text{days}}$$

$$= \boxed{2.01E\text{-}6\ \text{mg/Kg-day}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME

Carcinogenic Intake (mg/kg-day) = $\frac{19.7 \text{ mg/kg} \times 100 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 16 \text{ day/year} \times 10 \text{ years}}{43 \text{ kg} \times 25550 \text{ days}}$

= **2.87E-7 mg/kg-day** ✓

CTE

Noncarcinogenic Intake (mg/kg-day) = $\frac{9.13 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 8 \text{ day/year} \times 10 \text{ years}}{43 \text{ kg} \times 3650 \text{ days}}$

= **2.33E-7 mg/kg-day** ✓

CTE

Carcinogenic Intake (mg/kg-day) = $\frac{9.13 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 8 \text{ day/year} \times 10 \text{ year}}{43 \text{ kg} \times 25550 \text{ days}}$

= **3.32E-8 mg/kg-day** ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$

CALCULATION WORKSHEET Order No. 19116 (01-01)

CLIENT NSWC Indian Head PTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Adolescent Trespasser	
BASED ON BAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 2.87E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **4.3E-7** ✓

RME
Hazard Index = 2.01E-6 mg/Kg-day
Arsenic (unitless) 3.0E-4 mg/Kg-day
= **6.7E-3** ✓

CTE
Incremental Cancer Risk = 3.32E-8 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **4.98E-8** ✓

CTE
Hazard Index = 2.33E-7 mg/Kg-day
Arsenic (unitless) 3.0E-4 mg/Kg-day
= **7.77E-4** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment-Adolescent Trespasser	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of surface soil for the Adolescent Trespasser.

Relevant Equations:

$$\text{Intake} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$
(mg/kg-day)

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical specific mg/Kg	Chemical specific mg/Kg
IR = Ingestion Rate	100 mg/day	50 mg/day
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	16 day/year	8 day/year
ED = Exposure Duration	10 years	10 years
BW = Body Weight	43 Kg	43 Kg
AT_C = Averaging Time carcinogens	25550 days	25550 days
AT_N = Averaging Time noncarcinogens	3650 days	3650 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 14.4 mg/Kg RME and 8.34 mg/Kg CTE for Site 12 follows:

$$\text{Noncarcinogenic Intake}^{RME} = \frac{14.4\ mg/Kg \times 100\ mg/day \times 1.0E\text{-}6\ Kg/mg \times 1 \times 16\ day/year \times 10\ years}{43\ Kg \times 3650\ days}$$
(mg/Kg-day)

$$= \boxed{1.47E\text{-}6\ mg/Kg\text{-}day}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Adolescent trespasser	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME

$$\text{Carcinogenic Intake (mg/kg-day)} = \frac{14.4\ \text{mg/kg} \times 100\ \text{mg/day} \times 1.0E\text{-}6\ \text{kg/mg} \times 1 \times 16\ \text{day/year} \times 10\ \text{years}}{43\ \text{kg} \times 25550\ \text{days}}$$

$$= \boxed{2.1E\text{-}7\ \text{mg/kg-day}}$$ ✓

CTE

$$\text{Noncarcinogenic Intake (mg/kg-day)} = \frac{8.34\ \text{mg/kg} \times 50\ \text{mg/day} \times 1.0E\text{-}6\ \text{kg/mg} \times 1 \times 8\ \text{day/year} \times 10\ \text{years}}{43\ \text{kg} \times 3650\ \text{days}}$$

$$= \boxed{2.12E\text{-}7\ \text{mg/kg-day}}$$ ✓

CTE

$$\text{Carcinogenic Intake (mg/kg-day)} = \frac{8.34\ \text{mg/kg} \times 50\ \text{mg/day} \times 1.0E\text{-}6\ \text{kg/mg} \times 1 \times 8\ \text{day/year} \times 10\ \text{year}}{43\ \text{kg} \times 25550\ \text{days}}$$

$$= \boxed{3.04E\text{-}8\ \text{mg/kg-day}}$$ ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

$$\text{Incremental Cancer Risk (unitless)} = \text{Carcinogenic Intake (mg/kg-day)} \times \text{Cancer Slope Factor oral (kg-day/mg)}$$

$$\text{Hazard Index (unitless)} = \frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head PTD245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Adolescent Trespasser	
BASED ON BAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 2.1E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **3.15E-7** ✓

RME
Hazard Index = 1.47E-6 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **4.9E-3** ✓

CTE
Incremental Cancer Risk = 3.04E-8 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **4.56E-8** ✓

CTE
Hazard Index = 2.12E-7 mg/Kg-day / 3.0E-4 mg/Kg-day
Arsenic (unitless)
= **7.07E-4** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245		JOB NUMBER 7129	
SUBJECT Incidental Ingestion of Soil/Sediment - Adolescent Trespasser			
BASED ON RAGs		DRAWING NUMBER	
BY KAC	CHECKED BY PAK	APPROVED BY	DATE 5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245		JOB NUMBER 7129	
SUBJECT Incidental Ingestion of Soil / Sediment - Full Time Worker			
BASED ON RAGs		DRAWING NUMBER	
BY KAC	CHECKED BY	APPROVED BY	DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of exposed sediment for the Full Time worker.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical specific mg/Kg
IR = Ingestion Rate	50 mg/day	25 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	60 day/year	30 day/year
ED = Exposure Duration	25 years	5 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time noncarcinogens	9125 days	7825 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 19.7 mg/kg RME and 9.13 mg/kg CTE at Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/Kg-day)} = \frac{19.7\ \text{mg/Kg} \times 50\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 60\ \text{day/year} \times 25\ \text{years}}{70\ \text{Kg} \times 9125\ \text{days}}$$

$$= \boxed{2.31E\text{-}6\ \text{mg/Kg-day}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment – Full Time Worker	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY JAK	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) =

$$\frac{19.7\ mg/kg \times 50\ mg/day \times 1.0E\text{-}6\ kg/mg \times 1 \times 60\ day/year \times 25\ years}{70\ kg \times 25{,}550\ days}$$

= **8.26E-5 mg/kg-day** ✓

CTE Noncarcinogenic Intake (mg/kg-day) =

$$\frac{9.13\ mg/kg \times 25\ mg/day \times 1.0E\text{-}6\ kg/mg \times 1 \times 30\ day/year \times 5\ years}{70\ kg \times 1825\ days}$$

= **2.68E-7 mg/kg-day** ✓

CTE Carcinogenic Intake (mg/kg-day) =

$$\frac{9.13\ mg/kg \times 25\ mg/day \times 1.0E\text{-}6\ kg/mg \times 1 \times 30\ day/year \times 5\ years}{70\ kg \times 25{,}550\ days}$$

= **1.91E-8 mg/kg-day** ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = Noncarcinogenic Intake (mg/kg-day) / Reference Dose oral (mg/kg-day)

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head PTD245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Full Time Worker	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 8.26E-5 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **1.24E-4** ✓

RME
Hazard Index = 2.31E-6 mg/Kg-day
Arsenic (unitless) 3.0E-4 mg/Kg-day
= **7.7 E-3** ✓

CTE
Incremental Cancer Risk = 1.91E-8 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **2.87E-8** ✓

CTE
Hazard Index = 2.68E-1 mg/Kg-day
Arsenic (unitless) 3.0E-4 mg/Kg-day
= **8.93 E-4** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Full time Worker	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil / Sediment - Maintenance Worker	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of exposed Sediments for the Maintenance Worker.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:

	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical Specific mg/Kg
IR = Ingestion Rate	100 mg/day	50 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	30 day/year	15 day/year
ED = Exposure Duration	25 years	5 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time noncarcinogens	9125 days	1825 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 19.7 mg/kg RME and 9.13 mg/kg CTE at site 12 follows:

$$\text{Noncarcinogenic Intake}^{RME} \text{ (mg/Kg-day)} = \frac{19.7\ \text{mg/Kg} \times 100\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 30\ \text{day/year} \times 25\ \text{years}}{70\ \text{Kg} \times 9125\ \text{days}}$$

$$= \boxed{2.31E\text{-}6\ \text{mg/Kg-day}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245		JOB NUMBER 7129	
SUBJECT Incidental Ingestion of Soil/Sediment - Maintenance Worker			
BASED ON RAGS		DRAWING NUMBER	
BY KAC	CHECKED BY PAK	APPROVED BY	DATE 5/20/98

RME

Carcinogenic Intake (mg/kg-day) = $\frac{19.7 \text{ mg/kg} \times 100 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 30 \text{ day/year} \times 25 \text{ years}}{70 \text{ kg} \times 25{,}550 \text{ days}}$

= **8.26E-7 mg/kg-day** ✓

CTE

Noncarcinogenic Intake (mg/kg-day) = $\frac{9.13 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 15 \text{ day/year} \times 5 \text{ years}}{70 \text{ kg} \times 1825 \text{ days}}$

= **2.68E-7 mg/kg-day** ✓

CTE

Carcinogenic Intake (mg/kg-day) = $\frac{9.13 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 15 \text{ day/year} \times 5 \text{ years}}{70 \text{ kg} \times 25{,}550 \text{ days}}$

= **1.91E-8 mg/kg-day** ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Maintenance Worker	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 8.26E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **1.24E-6** ✓

RME
Hazard Index = $\frac{2.31E-6 \text{ mg/Kg-day}}{3.0E-4 \text{ mg/Kg-day}}$
Arsenic (unitless)
= **7.7E-3** ✓

CTE
Incremental Cancer Risk = 1.91E-8 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **2.86E-8** ✓

CTE
Hazard Index = $\frac{2.68E-7 \text{ mg/Kg-day}}{3.0E-4 \text{ mg/Kg-day}}$
Arsenic (unitless)
= **8.9E-4** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Maintenance Worker	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19118 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil / Sediment - Full Time Employee	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of surface soil for the Full time Employee.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical specific mg/Kg
IR = Ingestion Rate	100 mg/day	50 mg/day
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	250 day/year	219 day/year
ED = Exposure Duration	25 years	5 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time noncarcinogens	9125 days	1825 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 14.4 mg/kg RME and 8.34 mg/kg CTE at site 12 follows:

$$\text{Noncarcinogenic Intake (mg/kg-day)}^{RME} = \frac{14.4\ mg/kg \times 100\ mg/day \times 1.0E\text{-}6\ kg/mg \times 1 \times 250\ day/year \times 25\ years}{70\ Kg \times 9125\ days}$$

$$= \boxed{1.4E\text{-}5\ mg/kg\text{-}day}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Full Time Employee	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAR	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) = $\frac{14.4 \text{ mg/kg} \times 100 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 250 \text{ day/year} \times 25 \text{ years}}{70 \text{ kg} \times 25{,}550 \text{ days}}$

= **5.03E-6 mg/kg-day** ✓

CTE Noncarcinogenic Intake (mg/kg-day) = $\frac{8.34 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 219 \text{ day/year} \times 5 \text{ years}}{70 \text{ kg} \times 1825 \text{ days}}$

= **3.57E-6 mg/kg-day** ✓

CTE Carcinogenic Intake (mg/kg-day) = $\frac{8.34 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E-6 \text{ kg/mg} \times 1 \times 219 \text{ day/year} \times 5 \text{ year}}{70 \text{ kg} \times 25{,}550 \text{ days}}$

= **2.55E-7 mg/kg-day** ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$

CALCULATION WORKSHEET Order No. 19116 (01-01)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Full Time Employee	
BASED ON BAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 5.03E-6 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **7.54E-6** ✓

RME
Hazard Index = 1.4E-5 mg/Kg-day
Arsenic (unitless) 3.0E-4 mg/Kg-day
= **4.67E-2** ✓

CTE
Incremental Cancer Risk = 2.55E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **3.82E-7** ✓

CTE
Hazard Index = 3.57E-6 mg/Kg-day
Arsenic (unitless) 3.0E-4 mg/Kg-day
= **1.19E-2** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Full Time Employee	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil / Sediment - Maintenance Worker	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY Pax	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of surface soil for the maintenance worker.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical specific mg/Kg
IR = Ingestion Rate	100 mg/day	50 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	30 day/year	15 day/year
ED = Exposure Duration	25 years	5 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time carcinogens	25,550 days	25,550 days
AT_N = Averaging Time noncarcinogens	9,125 days	1,825 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 14.4 mg/kg RME + 8.34 mg/kg CTE at site 12 follows:

$$\text{Noncarcinogenic Intake Arsenic (mg/Kg-day)}^{RME} = \frac{14.4\ mg/kg \times 100\ mg/day \times 1.0E\text{-}6\ Kg/mg \times 1 \times 30\ day/year \times 25\ years}{70\ Kg \times 9125\ days}$$

$$= \boxed{1.69E\text{-}6\ mg/Kg\text{-}day}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Maintenance Worker	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

RME

$$\text{Carcinogenic Intake Arsenic (mg/kg-day)} = \frac{14.4\ \text{mg/kg} \times 100\ \text{mg/day} \times 1.0E\text{-}6\ \text{kg/mg} \times 1 \times 30\ \text{day/year} \times 25\ \text{years}}{70\ \text{kg} \times 25{,}550\ \text{days}}$$

$$= \boxed{6.04E\text{-}7\ \text{mg/kg-day}}$$ ✓

CTE

$$\text{Noncarcinogenic Intake Arsenic (mg/kg-day)} = \frac{8.34\ \text{mg/kg} \times 50\ \text{mg/day} \times 1.0E\text{-}6\ \text{kg/mg} \times 1 \times 15\ \text{day/year} \times 5\ \text{years}}{70\ \text{kg} \times 1825\ \text{days}}$$

$$= \boxed{2.45E\text{-}7\ \text{mg/kg-day}}$$ ✓

CTE

$$\text{Carcinogenic Intake Arsenic (mg/kg-day)} = \frac{8.34\ \text{mg/kg} \times 50\ \text{mg/day} \times 1.0E\text{-}6\ \text{kg/mg} \times 1 \times 15\ \text{day/year} \times 5\ \text{year}}{70\ \text{kg} \times 25{,}550\ \text{days}}$$

$$= \boxed{1.75E\text{-}8\ \text{mg/kg-day}}$$ ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

$$\underset{\text{(unitless)}}{\text{Incremental Cancer Risk}} = \underset{\text{(mg/kg-day)}}{\text{Carcinogenic Intake}} \times \underset{\text{(kg-day/mg)}}{\text{Cancer Slope Factor oral}}$$

$$\underset{\text{(unitless)}}{\text{Hazard Index}} = \frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference Dose oral (mg/kg-day)}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Maintenance Worker	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

where the Cancer Slope Factor (CSF_o) for Arsenic = 1.5E+0 Kg-day/mg
Reference Dose (RfD_o) for Arsenic = 3.0E-4 mg/Kg-day

RME
Incremental Cancer Risk = 6.04E-7 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **9.06E-7** ✓

RME
Hazard Index = 1.69E-6 mg/Kg-day
Arsenic (unitless) 3.0E-4 mg/Kg-day
= **5.6E-3** ✓

CTE
Incremental Cancer Risk = 1.75E-8 mg/Kg-day x 1.5E+0 Kg-day/mg
Arsenic (unitless)
= **2.63E-8** ✓

CTE
Hazard Index = 2.45E-7 mg/Kg-day
Arsenic (unitless) 3.0E-4 mg/Kg-day
= **8.17E-4** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Maintenance Worker	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CLIENT NSWC Indian Head CTO 245		JOB NUMBER 7129	
SUBJECT Ingestion of Fish - Recreational User.			
BASED ON RAGS		DRAWING NUMBER	
BY KAC	CHECKED BY	APPROVED BY	DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of Fish for the adult recreational user

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_F \times IR \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_F = Concentration of Chemical	Chemical-specific (mg/kg)	Chemical-specific (mg/kg)
IR = Ingestion Rate	0.145 kg/meal	0.145 kg/meal
EF = Exposure Frequency	48 meal/year	24 meal/year
ED = Exposure Duration	30 year	9 year
BW = Body Weight	70 kg	70 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Noncarcinogens	10950 days	3285 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for BEHP at an exposure point concentration of 6.29 mg/kg RME and 6.29 mg/kg CTE for Site 39 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{6.29\ \text{mg/kg} \times 0.145\ \text{kg/meal} \times 48\ \frac{\text{meal}}{\text{year}} \times 30\ \text{years}}{70\ \text{kg} \times 10950\ \text{days}}$$

$$= \boxed{1.71E\text{-}3\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Fish - Recreational User	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/Kg-day) = $\frac{6.29 \text{ mg/Kg} \times 0.145 \text{ Kg/meal} \times 48 \text{ meal/year} \times 30 \text{ years}}{70 \text{ Kg} \times 25550 \text{ days}}$

= **7.34E-4 mg/Kg-day** ✓

CTE Noncarcinogenic Intake (mg/Kg-day) = $\frac{6.29 \text{ mg/Kg} \times 0.145 \text{ Kg/meal} \times 24 \text{ meal/year} \times 9 \text{ years}}{70 \text{ Kg} \times 3285 \text{ days}}$

= **8.57E-4 mg/Kg-day** ✓

CTE Carcinogenic Intake (mg/Kg-day) = $\frac{6.29 \text{ mg/Kg} \times 0.145 \text{ Kg/} \times 24 \text{ meal/year} \times 9 \text{ years}}{70 \text{ Kg} \times 25550 \text{ days}}$

= **1.10E-4 mg/Kg-day** ✓

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/Kg-day) X Cancer Slope Factor and (Kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{oral Reference Dose (mg/Kg-day)}}$

Where the oral Cancer Slope factor for Arsenic = 1.5 Kg-day/mg
and the oral Reference dose for Arsenic = 3.0E-4 mg/Kg-day

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Ingestion of Fish – Recreational User	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY MK	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk Arsenic (unitless) = 7.34E-4 mg/kg-day × 1.5 kg-day/mg

= **1.10E-3** ✓

RME Hazard Index Arsenic (unitless) = $\frac{1.71E-3 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$

= **5.7E+0** ✓

CTE Incremental Cancer Risk Arsenic (unitless) = 1.10E-4 mg/kg-day × 1.5 kg-day/mg

= **1.65E-4** ✓

CTE Hazard Index Arsenic (unitless) = $\frac{8.57E-4 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$

= **2.86E+0** ✓

REFERENCES:

Risk Assessment Guidance for Superfund – Volume I – Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Recreational User	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate noncarcinogenic and carcinogenic risk via ingestion of sediment for the Adult Recreational User.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_s \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Concentration of Chemical in	Chemical Specific mg/Kg	Chemical Specific mg/Kg
IR = Ingestion Rate	100 mg/day	50 mg/day
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
FI = Fraction Ingestion	1 unitless	1 unitless
EF = Exposure Frequency	16 day/year	8 day/year
ED = Exposure Duration	30 year	9 year
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25550 days	25550 days
AT_N = Averaging Time noncarcinogens	10950 days	3285 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 6.46 mg/kg RME + 5.35 mg/kg CTE from Site 41 follows:

$$\text{RME Noncarcinogenic Intake (mg/Kg-day)} = \frac{6.46\ \text{mg/Kg} \times 100\ \text{mg/day} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1 \times 16\ \text{day/year} \times 30\ \text{years}}{70\ \text{Kg} \times 10950\ \text{days}}$$

$$= \boxed{4.04E\text{-}7\ \text{mg/Kg-day}}$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head Site 245		JOB NUMBER 7129	
SUBJECT Incidental Ingestion of Soil/Sediment - Recreational User			
BASED ON RAGs		DRAWING NUMBER	
BY KAC	CHECKED BY Pan	APPROVED BY	DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) $= \frac{6.46 \text{ mg/kg} \times 100 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 16 \text{ day/year} \times 30 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$

$= \boxed{1.73E\text{-}7 \text{ mg/kg-day}}$ ✓

CTE Noncarcinogenic Intake (mg/kg-day) $= \frac{5.35 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 8 \text{ day/year} \times 9 \text{ years}}{70 \text{ kg} \times 3285 \text{ days}}$

$= \boxed{8.38E\text{-}8 \text{ mg/kg-day}}$ ✓

CTE Carcinogenic Intake (mg/kg-day) $= \frac{5.35 \text{ mg/kg} \times 50 \text{ mg/day} \times 1.0E\text{-}6 \text{ kg/mg} \times 1 \times 8 \text{ day/year} \times 9 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$

$= \boxed{1.08E\text{-}8 \text{ mg/kg-day}}$ ✓

Calculation of the Incremental Cancer Risk and the Hazard Index are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = Noncarcinogenic Intake (mg/kg-day) / Reference Dose oral (mg/kg-day)

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head OTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Recreational User	
BASED ON RAGS	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

where the Cancer Slope Factor (CSF$_o$) for Arsenic = 1.5E+0 kg-day/mg
Reference Dose (RfD$_o$) for Arsenic = 3.0E-4 mg/kg-day

RME Incremental Cancer Risk Arsenic (unitless) = 1.73E-7 mg/kg-day x 1.5E+0 kg-day/mg

= **2.59E-7** ✓

RME Hazard Index Arsenic (unitless) = $\frac{4.04E-7 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$

= **1.35E-3** ✓

CTE Incremental Cancer Risk Arsenic (unitless) = 1.08E-8 mg/kg-day x 1.5E+0 kg-day/mg

= **1.62E-8** ✓

CTE Hazard Index Arsenic (unitless) = $\frac{8.38E-8 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$

= **2.79E-4** ✓

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Soil/Sediment - Recreational User	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	PAK		5/20/98

References:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater / Surface Water - Recreational User	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of surface water for the adult Recreational User.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_W \times CR \times EF \times ED \times ET}{BW \times AT}$$

Where:	RME	CTE
C_W = Concentration of Chemical	Chemical-specific (mg/L)	Chemical-specific (mg/L)
CR = Contact Rate	0.05 L/hr	0.05 L/hr
EF = Exposure Frequency	16 day/year	8 day/year
ED = Exposure Duration	30 year	9 year
BW = Body Weight	70 kg	70 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Noncarcinogens	10950 days	3285 days
ET = Exposure Time	4 hrs/event	2 hrs/event

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for manganese at an exposure point concentration of 0.202 mg/L RME and 0.104 mg/L CTE for Site 39 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{0.202\ \text{mg/L} \times 0.05\ \text{L/hr} \times 16\ \text{days/year} \times 30\ \text{years} \times 4\ \text{hrs/event}}{70\text{kg} \times 10950\ \text{days}}$$

$$= \boxed{2.53\text{E-}5\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO 245		JOB NUMBER 7129	
SUBJECT Ingestion of Groundwater/Surface Water - Recreational Use			
BASED ON RAGS		DRAWING NUMBER	
BY KAC	CHECKED BY PAK	APPROVED BY	DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) = $\frac{0.202\ mg/L \times 0.05\ L/hr \times 16\ hr/day \times 30\ yrs \times 4\ hrs/event}{70\ Kg \times 25550\ days}$

= **1.08 E-5 mg/kg-day** ✓

CTE Noncarcinogenic Intake (mg/kg-day) = $\frac{0.104\ mg/L \times 0.05\ L/hr \times 8\ hr/day \times 9\ yrs \times 2\ hrs/event}{70\ Kg \times 3285\ days}$

= **3.26E-6 mg/kg-day** ✓

CTE Carcinogenic Intake (mg/kg-day) = $\frac{0.104\ mg/L \times 0.05\ L/hr \times 8\ hr/day \times 9\ yrs \times 2\ hrs/event}{70\ Kg \times 25550\ days}$

= **4.19 E-7 mg/kg-day** ✓

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) X Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{oral Reference Dose (mg/kg-day)}}$

Where the oral cancer slope factor for Manganese = ✓NA kg-day/mg
and the oral Reference dose for Manganese = ✓2.0E-2 mg/kg-day

NA = None Available → Not a carcinogen

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater / Surface Water - Recreational User	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = NA x NA kg-day/mg
Manganese (unitless)

= Not a carcinogen

RME Hazard Index = $\frac{2.53E-5 \text{ mg/kg-day}}{2.0E-2 \text{ mg/kg-day}}$
Manganese (unitless)

= **1.26E-3** ✓

CTE Incremental Cancer Risk = NA x NA kg-day/mg
Manganese (unitless)

= Not a carcinogen

CTE Hazard Index = $\frac{3.26E-6 \text{ mg/kg-day}}{2.0E-2 \text{ mg/kg-day}}$
Manganese (unitless)

= **1.63E-4** ✓

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adult Recreational User	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with sediment for the Adult recreational user

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	✓6000 cm²/event	✓6000 cm²/event
AF = Adherence Factor	✓1 mg/cm²	✓0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	✓16 events/year	✓8 events/year
ED = Exposure Duration	✓30 years	✓9 years
BW = Body Weight	✓70 kg	✓70 kg
ATc = Averaging Time Carcinogens	✓25,550 days	✓25,550 days
ATN = Averaging Time Non-Carcinogen	✓10950 days	✓3285 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 8.7 mg/kg RME and 5.08 mg/kg CTE for Site 39 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/kg-day)} = \frac{8.7\ \text{mg/kg} \times 1.0E\text{-}6\ \text{Kg/mg} \times 6000\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 16\ \frac{\text{event}}{\text{year}} \times 30\ \text{yr}}{70\ \text{Kg} \times 10950\ \text{days}}$$

$$= \boxed{1.05E\text{-}6\ \text{mg/kg-day}}$$ ✓

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adult Recreational User	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJK	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{8.7\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 6000\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 16\ events/yrs \times 30\ yrs}{70\ kg \times 25550\ days}$

$= \boxed{4.48E\text{-}7\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{5.08\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 6000\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 8\ events/yrs \times 9\ yrs}{70\ kg \times 3285\ days}$

$= \boxed{6.18E\text{-}8\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{5.08\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 6000\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 8\ events/yr \times 9\ yr}{70\ kg \times 25550\ days}$

$= \boxed{7.85E\text{-}9\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head CO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adult Recreational User	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY PAK	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 4.48E-7 mg/kg-day x 1.6 kg-day/mg
Arsenic (unitless)

= **7.17E-7**

RME Hazard Index = $\frac{1.05E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **3.62E-3** ✓

CTE Incremental Cancer Risk = 7.85E-9 mg/kg-day x 1.6 kg-day/mg
Arsenic (unitless)

= **1.26E-8**

CTE Hazard Index = $\frac{6.11E-8 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **2.11E-4**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater / Surface Water - On-Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY RJY	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of groundwater for the adult on-site resident.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_W \times IR \times EF \times ED}{BW \times AT}$$

Where:	RME		CTE	
C_W = Concentration of Chemical	Chemical-specific	(mg/L)	Chemical-specific	(mg/L)
IR = Ingestion Rate	2	L/day	1.4	L/day
EF = Exposure Frequency	350	day/year	234	day/year
ED = Exposure Duration	24	year	7	year
BW = Body Weight	70	kg	70	kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time Noncarcinogens	8760	days	2555	days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 0.0328 mg/L RME and 0.0172 mg/L CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{0.0328\ \text{mg/L} \times 2\ \text{L/day} \times 350\ \frac{\text{days}}{\text{year}} \times 24\ \text{years}}{70\ \text{kg} \times 8760\ \text{days}}$$

$$= \boxed{8.99E\text{-}4\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO 245		JOB NUMBER 7129	
SUBJECT Ingestion of Groundwater/Surface Water - On-Site Resident			
BASED ON RAGS		DRAWING NUMBER	
BY KAC	CHECKED BY RJY	APPROVED BY	DATE 5/20/98

BME Carcinogenic Intake (mg/kg-day) = $\frac{0.0328 \text{ mg/L} \times 2 \text{ L/day} \times 350 \text{ days/year} \times 24 \text{ years}}{70 \text{ Kg} \times 25550 \text{ days}}$

= **3.08 E-4 mg/kg-day**

CTE Noncarcinogenic Intake (mg/kg-day) = $\frac{0.0172 \text{ mg/L} \times 1.4 \text{ L/day} \times 234 \text{ day/year} \times 7 \text{ years}}{70 \text{ Kg} \times 2555 \text{ days}}$

= **2.20 E-4 mg/kg-day**

CTE Carcinogenic Intake (mg/kg-day) = $\frac{0.0172 \text{ mg/L} \times 1.4 \text{ L/day} \times 234 \text{ day/year} \times 7 \text{ years}}{70 \text{ Kg} \times 25550 \text{ days}}$

= **2.20E-5 mg/kg-day**

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) X Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{oral Reference Dose (mg/kg-day)}}$

Where the oral cancer slope factor for Arsenic = 1.5 kg-day/mg
and the oral Reference dose for Arsenic = 3.0E-4 mg/kg-day

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater / Surface Water - On-Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY RDN	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 3.08E-4 mg/kg-day x 1.5 kg-day/mg
Arsenic (unitless)

= **4.62E-4**

RME Hazard Index = $\frac{8.99E-4 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **3.0E+0**

CTE Incremental Cancer Risk = 2.20E-5 mg/kg-day x 1.5 kg-day/mg
Arsenic (unitless)

= **3.3E+5**

CTE Hazard Index = $\frac{2.20E-4 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **7.33E-1**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater/Surface Water - On-Site Resident	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY RJP	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of groundwater for the child on-site Resident.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_W \times IR \times EF \times ED}{BW \times AT}$$

Where:	RME		CTE	
C_W = Concentration of Chemical	Chemical-specific (mg/L)		Chemical-specific (mg/L)	
IR = Ingestion Rate	1	L/day	1	L/day
EF = Exposure Frequency	350	day/year	234	day/year
ED = Exposure Duration	6	year	2	year
BW = Body Weight	15	kg	15	kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time Noncarcinogens	2190	days	730	days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 0.0328 mg/L RME and 0.0172 mg/L CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{0.0328\ \text{mg/L} \times 1\ \text{L/day} \times 350\ \frac{\text{days}}{\text{years}} \times 6\ \text{years}}{15\ \text{kg} \times 2190\ \text{days}}$$

$$= \boxed{2.10E\text{-}3\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater / Surface Water - On-Site Resident	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY MY	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) = $\frac{0.0328 \text{ mg/L} \times 1 \text{ L/day} \times 350 \text{ days/year} \times 6 \text{ years}}{15 \text{ Kg} \times 25550 \text{ days}}$

= **1.80E-4 mg/kg-day**

CTE Noncarcinogenic Intake (mg/kg-day) = $\frac{0.0172 \text{ mg/L} \times 1 \text{ L/day} \times 234 \text{ day/year} \times 2 \text{ years}}{15 \text{ Kg} \times 730 \text{ days}}$

= **7.35E-4 mg/kg-day**

CTE Carcinogenic Intake (mg/kg-day) = $\frac{0.0172 \text{ mg/L} \times 1 \text{ L/day} \times 234 \text{ day/year} \times 2 \text{ years}}{15 \text{ Kg} \times 25550 \text{ days}}$

= **2.1E-5 mg/kg-day**

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) X Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{oral Reference Dose (mg/kg-day)}}$

Where the oral cancer slope factor for Arsenic = 1.5 kg-day/mg
and the oral Reference dose for Arsenic = 3.0E-4 mg/kg-day

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater / Surface Water - On Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY RJP	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 1.8E-4 mg/kg-day x 1.5 kg-day/mg
Arsenic (unitless)

= **2.7E-4**

RME Hazard Index = $\frac{2.1E-3 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **7.0E+0**

CTE Incremental Cancer Risk = 2.1E-5 mg/kg-day x 1.5 kg-day/mg
Arsenic (unitless)

= **3.15E-5**

CTE Hazard Index = $\frac{7.35E-4 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **2.45E+0**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Groundwater / Surface Water - On Site Resident	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY RJN	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of surface water for the adult on-site resident.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_W \times CR \times EF \times ED \times ET}{BW \times AT}$$

Where:	RME	CTE
C_W = Concentration of Chemical	Chemical-specific (mg/L)	Chemical-specific (mg/L)
CR = Contact Rate	0.05 L/hr	0.05 L/hr
EF = Exposure Frequency	16 day/year	8 day/year
ED = Exposure Duration	24 year	7 year
BW = Body Weight	70 kg	70 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Noncarcinogens	8760 days	2555 days
ET = Exposure Time	4 hrs/day	2 hours/day

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 0.006 mg/L RME and 0.0043 mg/L CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{0.006\ \text{mg/L} \times 0.05\ \text{L/hr} \times 16\ \frac{\text{days}}{\text{years}} \times 24\ \text{year} \times 4\ \text{hrs/day}}{70\ \text{kg} \times 8760\ \text{days}}$$

$$= \boxed{7.51E\text{-}7\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater/Surface Water - On-Site Resident	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY RJN	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) = $\frac{0.006\ mg/L \times 0.05\ L/hr \times 16\ hrs/day \times 365\ days/year \times 24\ years}{70\ Kg \times 25550\ days}$

= **2.58 E-7 mg/kg-day**

CTE Noncarcinogenic Intake (mg/kg-day) = $\frac{0.0043\ mg/L \times 0.05\ L \times 8\ hrs/day \times 365\ days/year \times 7\ years}{70\ Kg \times 2555\ days}$

= **1.35 E-7 mg/kg-day**

CTE Carcinogenic Intake (mg/kg-day) = $\frac{0.0043\ mg/L \times 0.05\ L/day \times 8\ hours/day \times 365\ days/year \times 7\ years}{70\ Kg \times 25550\ days}$

= **1.35 E-8 mg/kg-day**

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) X Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{oral Reference Dose (mg/kg-day)}}$

Where the oral cancer slope factor for Arsenic = 1.5 kg-day/mg
and the oral Reference dose for Arsenic = 3.0 E-4 mg/kg-day

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater / Surface Water	One-Site Receptor
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY RJV	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 2.58E-7 × 1.5 Kg-day/mg
Arsenic (unitless)

= **3.87E-8**

RME Hazard Index = $\frac{7.51E^{-7}\ mg/Kg\text{-}day}{3.0E-4\ mg/Kg\text{-}day}$
Arsenic (unitless)

= **2.50E-3**

CTE Incremental Cancer Risk = 1.35E-8 mg/kg-day × 1.5 kg-day/mg
Arsenic (unitless)

= **2.02E-8**

CTE Hazard Index = $\frac{1.35E^{-7}\ mg/Kg\text{-}day}{3.0E-4\ mg/Kg\text{-}day}$
Arsenic (unitless)

= **4.5E-4**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Groundwater/Surface Water - OnSite Resident	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of surface water for the child on-site resident.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_W \times CR \times EF \times ED \times ET}{BW \times AT}$$

Where:	RME	CTE
C_W = Concentration of Chemical	Chemical-specific (mg/L)	Chemical-specific (mg/L)
CR = Contact Rate	0.05 L/hr	0.05 L/hr
EF = Exposure Frequency	16 day/year	8 day/year
ED = Exposure Duration	6 year	2 year
BW = Body Weight	15 kg	15 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Noncarcinogens	2190 days	730 days
ET = Exposure Time	4 hrs/day	2 hours/day

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 0.006 mg/L RME and 0.0043 mg/L CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{0.006\ \text{mg/L} \times 0.05\ \text{L/hr} \times 16\ \frac{\text{days}}{\text{year}} \times 6\ \text{year} \times 4\ \text{hrs/day}}{15\ \text{kg} \times 2190\ \text{days}}$$

$$= \boxed{3.51E\text{-}6\ \text{mg/kg day}}$$

CLIENT NSWC Indian Head CTO 245		JOB NUMBER 7129	
SUBJECT Ingestion of Groundwater/Surface Water - On-Site Resident			
BASED ON RAGS		DRAWING NUMBER	
BY KAC	CHECKED BY	APPROVED BY	DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) = $\frac{0.006\ mg/L \times 0.05\ L/hr \times 16\ hrs/day \times 6\ years \times 4\ days/year}{15\ Kg \times 25550\ days}$

= **3.01E-7 mg/kg-day**

CTE Noncarcinogenic Intake (mg/kg-day) = $\frac{0.0043\ mg/L \times 0.05\ L \times 8\ hrs/day \times 2\ days/year \times 2\ years}{15\ Kg \times 730\ days}$

= **6.28E-7 mg/kg-day**

CTE Carcinogenic Intake (mg/kg-day) = $\frac{0.0043\ mg/L \times 0.05\ L/day \times 8\ hrs/day \times 2\ days/year \times 2\ years}{15\ Kg \times 25550\ days}$

= **1.79 E-8 mg/kg-day**

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) X Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{oral Reference Dose (mg/kg-day)}}$

Where the oral cancer slope factor for Arsenic = 1.5 kg-day/mg
and the oral Reference dose for Arsenic = 3.0E-4 mg/kg-day

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Ingestion of Groundwater / Surface Water	On-Site Resident
BASED ON RAGs	DRAWING NUMBER
BY KAC	CHECKED BY	APPROVED BY	DATE 5/20/98

RME Incremental Cancer Risk = 3.01E-7 mg/kg-day x 1.5 kg-day/mg
Arsenic (unitless)

= **4.51E-7**

RME Hazard Index = $\frac{3.51E-6 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **1.17E-2**

CTE Incremental Cancer Risk = 1.79E-8 mg/kg-day x 1.5 kg-day/mg
Arsenic (unitless)

= **2.68E-8**

CTE Hazard Index = $\frac{6.28E-7 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **2.09E-3**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Surface Water - Adolescent Trespasser	
BASED ON RAGs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KAC	RJO		5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of surface water for the Adolescent Tresspasser.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_W \times R \times EF \times ED \times ET}{BW \times AT}$$

Where:

	RME		CTE	
C_W = Concentration of Chemical	Chemical-specific (mg/L)		Chemical-specific (mg/L)	
CR = Contact Rate	0.05	L/hr	0.05	L/hr
EF = Exposure Frequency	16	day/year	8	day/year
ED = Exposure Duration	10	year	10	year
BW = Body Weight	43	kg	43	kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time Noncarcinogens	3650	days	3650	days
ET = Exposure Time	4	hrs/day	2	hrs/day

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 0.006 mg/L RME and 0.0043 mg/L CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{0.006\ \text{mg/L} \times 0.05\ \text{L/hr} \times 16\ \frac{\text{days}}{\text{years}} \times 10\ \text{years} \times 4\ \frac{\text{hrs}}{\text{day}}}{43\ \text{kg} \times 3650\ \text{days}}$$

$$= \boxed{1.22\text{E-}6\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Surface Water - Adolescent Trespasser	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY RDI	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/Kg-day) = $\frac{0.008 \text{ mg/L} \times 0.05 \text{ L/hr} \times 16 \text{ days/year} \times 10 \text{ years} \times 4 \text{ hrs/day}}{43 \text{ Kg} \times 25{,}550 \text{ days}}$

= **1.75 E-7 mg/Kg-day**

CTE Noncarcinogenic Intake (mg/Kg-day) = $\frac{0.0043 \text{ mg/L} \times 0.05 \text{ L/hr} \times 8 \text{ day/year} \times 10 \text{ yrs} \times 2 \text{ hrs/day}}{43 \text{ Kg} \times 3650 \text{ days}}$

= **2.19 E-7 mg/Kg-day**

CTE Carcinogenic Intake (mg/Kg-day) = $\frac{0.0043 \text{ mg/L} \times 0.05 \text{ L/hr} \times 8 \text{ day/year} \times 10 \text{ yrs} \times 2 \text{ hrs/day}}{43 \text{ Kg} \times 25550 \text{ days}}$

= **3.13 E-8 mg/Kg-day**

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/Kg-day) X Cancer Slope Factor oral (Kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{oral Reference Dose (mg/Kg-day)}}$

Where the oral cancer slope factor for Arsenic = 1.5 Kg-day/mg
and the oral Reference dose for Arsenic = 3.0E-4 mg/Kg-day

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Incidental Ingestion of Surface Water - Adolescent Trespasser	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY RPT	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 1.75E-7 × 1.5 Kg-day/mg
Arsenic (unitless)

= **2.62E-7**

RME Hazard Index = $\frac{1.22E-6 \text{ mg/Kg-day}}{3.0E-4 \text{ mg/Kg-day}}$
Arsenic (unitless)

= **4.07E-3**

CTE Incremental Cancer Risk = 3.13E-8 × 1.5 Kg-day/mg
Arsenic (unitless)

= **4.69E-8**

CTE Hazard Index = $\frac{2.19E-7 \text{ mg/Kg-day}}{3.0E-4 \text{ mg/Kg-day}}$
Arsenic (unitless)

= **7.3E-4**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJN	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface soil for the Adolescent Trespasser

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.0E-6 kg/mg	1.0E-6 kg/mg
SA = Skin Surface Area	3720 cm²/event	3720 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	16 events/year	8 events/year
ED = Exposure Duration	10 years	10 years
BW = Body Weight	43 kg	43 kg
ATc = Averaging Time Carcinogens	25,550 days	25,550 days
ATN = Averaging Time Non-Carcinogen	3650 days	3650 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 14.4 mg/kg RME and 8.34 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/kg-day)} = \frac{14.4\ \text{mg/kg} \times 1.0E\text{-}6\ \text{kg/mg} \times 3720\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 16\ \frac{\text{event}}{\text{year}} \times 10\ \text{yr}}{43\ \text{kg} \times 3650\ \text{days}}$$

$$= \boxed{1.75E\text{-}7\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RDY	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{14.4\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 3720\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 16\ events/yrs \times 10\ yrs}{43\ Kg \times 25550\ days}$

$= \boxed{2.50E\text{-}8\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 3720\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 8\ events/yrs \times 10\ yrs}{43\ Kg \times 3650\ days}$

$= \boxed{1.01E\text{-}7\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 3720\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 8\ events/yr \times 10\ yr}{43\ Kg \times 25550\ days}$

$= \boxed{1.44E\text{-}8\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{Reference dose dermal (mg/Kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/Kg-day (dermal)

CLIENT NSWC Indian Head CO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RDY	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 2.5E-8 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **4.0E-8**

RME Hazard Index = $\frac{1.75E-7 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **6.03E-4**

CTE Incremental Cancer Risk = 1.44E-8 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **2.3E-8**

CTE Hazard Index = $\frac{1.01E-7 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **3.48E-4**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY AJR	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate Carcinogenic and noncarcinogenic risk via direct dermal contact with sediment for the Adolescent Trespasser

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	3720 cm²/event	3720 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	16 events/year	16 events/year
ED = Exposure Duration	10 years	10 years
BW = Body Weight	43 kg	43 kg
AT_c = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Non-Carcinogen	3650 days	3650 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 19.7 mg/kg RME and 9.13 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/Kg-day)} = \frac{19.7\ \text{mg/Kg} \times 1.0E\text{-}6\ \text{Kg/mg} \times 3720\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 16\ \frac{\text{event}}{\text{year}} \times 10\ \text{a}}{43\ \text{Kg} \times 3650\ \text{days}}$$

$$= \boxed{2.39E\text{-}6\ \text{mg/Kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJP	APPROVED BY / DATE 5/20/98

$$\text{RME Intake Carcinogenic (mg/kg-day)} = \frac{19.7\ \text{mg/kg} \times 1.0E\text{-}6\ \text{kg/mg} \times 3720\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 16\ \text{event/yrs} \times 10\ \text{yrs}}{43\ \text{Kg} \times 25550\ \text{days}}$$

$$= \boxed{3.41E\text{-}5\ \text{mg/kg-day}}$$

$$\text{CTE Intake Noncarcinogenic (mg/kg-day)} = \frac{9.13\ \text{mg/kg} \times 1.0E\text{-}6\ \text{kg/mg} \times 3720\ \text{cm}^2/\text{event} \times 0.2\ \text{mg/cm}^2 \times 0.032 \times 8\ \text{event/yrs} \times 10\ \text{yrs}}{43\ \text{Kg} \times 3650\ \text{days}}$$

$$= \boxed{1.11\ E\text{-}7\ \text{mg/kg-day}}$$

$$\text{CTE Intake Carcinogenic (mg/kg-day)} = \frac{9.13\ \text{mg/kg} \times 1.0E\text{-}6\ \text{kg/mg} \times 3720\ \text{cm}^2/\text{event} \times 0.2\ \text{mg/cm}^2 \times 0.032 \times 8\ \text{event/yr} \times 10\ \text{yr}}{43\ \text{Kg} \times 25550\ \text{days}}$$

$$= \boxed{1.58E\text{-}8\ \text{mg/kg-day}}$$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

$$\underset{\text{(unitless)}}{\text{Icremental Cancer Risk}} = \underset{\text{(mg/kg-day)}}{\text{Carcinogenic Intake}} \times \underset{\text{(kg-day/mg)}}{\text{Cancer Slope Factor dermal}}$$

$$\underset{\text{(unitless)}}{\text{Hazard Index}} = \frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$$

where the Cancer Slope Factor for Arsenic = 1.6 kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Adolescent Trespasser	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJR	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 3.41E-5 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **5.46E-6**

RME Hazard Index = $\frac{2.39E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **8.24E-3**

CTE Incremental Cancer Risk = 1.58E-8 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **2.53E-8**

CTE Hazard Index = $\frac{1.11E-7 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **3.83E-4**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Full Time Employee	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RDR	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface soil for the full time employee.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	4300 cm²/event	4300 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	250 events/year	219 events/year
ED = Exposure Duration	25 years	5 years
BW = Body Weight	70 kg	70 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Non-Carcinogen	9125 days	1825 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 14.4 mg/kg RME and 8.34 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/kg-day)} = \frac{14.4\ \text{mg/kg} \times 1.0E\text{-}6\ \text{kg/mg} \times 4300\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 250\ \frac{\text{event}}{\text{year}} \times 25\ \text{yrs}}{70\ \text{kg} \times 9125\ \text{days}}$$

$$= \boxed{1.94E\text{-}5\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Full time Employee	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJY	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{14.4\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 250\ events/yrs \times 25\ yrs}{70\ Kg \times 25550\ days}$

$= \boxed{6.92E\text{-}6\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 219\ events/yrs \times 5\ yrs}{70\ Kg \times 1825\ days}$

$= \boxed{1.97E\text{-}6\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 219\ events/yr \times 5\ yr}{70\ Kg \times 25550\ days}$

$= \boxed{1.40E\text{-}7\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head CT0245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment-Full Time Employee	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RPR	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 6.92E6 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **1.11E-5**

RME Hazard Index = $\frac{1.94E-5 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **6.69E-2**

CTE Incremental Cancer Risk = 1.40E-7 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **2.24E-7**

CTE Hazard Index = $\frac{1.97E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **6.79E-3**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Full Time Employee	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY MJV	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate Carcinogenic and noncarcinogenic risk via direct dermal contact with sediment for the Full time Employee.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	4300 cm²/event	4300 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	60 events/year	30 events/year
ED = Exposure Duration	25 years	5 years
BW = Body Weight	70 kg	70 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Non-Carcinogen	9125 days	1825 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical Specific intake for Arsenic at an exposure point concentration of 19.7 mg/kg RME and 9.13 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake} = \frac{19.7\ \text{mg/kg} \times 1.0E\text{-}6\ \text{Kg/mg} \times 4300\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 60\ \frac{\text{event}}{\text{year}} \times 2}{70\ \text{Kg} \times 9125\ \text{days}}$$

Noncarcinogenic (mg/Kg-day) = **6.36E-6 mg/Kg-day**

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Full Time Employee	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJY	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{19.7\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 60\ events/yrs \times 25\ yrs}{70\ Kg \times 25550\ days}$

$= \boxed{2.27E\text{-}6\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 30\ events/yrs \times 5\ yrs}{70\ Kg \times 1825\ days}$

$= \boxed{2.95E\text{-}7\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 30\ events/yr \times 5\ yr}{70\ Kg \times 25{,}550\ days}$

$= \boxed{2.11E\text{-}8\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head CO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Full time Employee	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY LJY	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 2.27E-6 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **3.6E-6**

RME Hazard Index = $\frac{6.36E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **2.19E-2**

CTE Incremental Cancer Risk = 2.11E-8 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **3.38E-8**

CTE Hazard Index = $\frac{2.95E-7 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **1.02E-3**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Maintenance Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RAP	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface soil for the Maintenance Worker.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	4300 cm²/event	4300 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	30 events/year	15 events/year
ED = Exposure Duration	25 years	5 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Non-Carcinogen	9125 days	1825 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 14.4 mg/kg RME and 8.34 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/Kg-day)} = \frac{14.4\ \text{mg/Kg} \times 1.0E\text{-}6\ \text{Kg/mg} \times 4300\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 30\ \frac{\text{event}}{\text{year}} \times 25\ \text{yr}}{70\ \text{Kg} \times 9125\ \text{days}}$$

$$= \boxed{2.33E\text{-}6\ \text{mg/Kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Maintenance Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJR	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{14.4\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 30\ events/yrs \times 25\ yrs}{70\ Kg \times 25550\ days}$

$= \boxed{8.31E\text{-}7\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 15\ events/yrs \times 5\ yrs}{70\ Kg \times 9125\ days}$

$= \boxed{2.69E\text{-}8\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 15\ events/yr \times 5\ yr}{70\ Kg \times 25550\ days}$

$= \boxed{9.62E\text{-}9\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/Kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/Kg-day (dermal)

CLIENT NSWC Indian Head CO245		JOB NUMBER 7612	
SUBJECT Direct Dermal Contact with Soil/Sediment - Maintenance Worker			
BASED ON RAGs and Dermal Guidance		DRAWING NUMBER	
BY KAC	CHECKED BY RJR	APPROVED BY	DATE 5/20/98

RME Incremental Cancer Risk = 8.31E-7 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **1.33E-6**

RME Hazard Index = $\frac{2.33E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **8.03E-3**

CTE Incremental Cancer Risk = 9.62E-9 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **1.54E-8**

CTE Hazard Index = $\frac{2.69E-8 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **9.27E-5**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Maintenance Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY AJP	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with sediment for the maintenance worker.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.0E-6 kg/mg	1.0E-6 kg/mg
SA = Skin Surface Area	4300 cm²/event	4300 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	30 events/year	15 events/year
ED = Exposure Duration	25 years	5 years
BW = Body Weight	70 kg	70 kg
ATc = Averaging Time Carcinogens	25,550 days	25,550 days
ATN = Averaging Time Non-Carcinogen	9125 days	1825 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 19.7 mg/kg RME and 9.13 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake} = \frac{19.7\ \text{mg/kg} \times 1.0E\text{-}6\ \text{kg/mg} \times 4300\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 30\ \text{events/year} \times 25}{70\ \text{kg} \times 9125\ \text{days}}$$

Noncarcinogenic (mg/kg-day) = **3.18E-6 mg/kg-day**

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Maintenance Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJD	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{19.7\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 30\ events/yrs \times 25\ yrs}{70\ kg \times 25550\ days}$

$= \boxed{1.14E\text{-}6\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 15\ events/yrs \times 5\ yrs}{70\ kg \times 1825\ days}$

$= \boxed{1.47E\text{-}8\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 4300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 15\ events/yr \times 5\ yr}{70\ kg \times 25550\ days}$

$= \boxed{1.05E\text{-}9\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head CO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Maintenance Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY NJ	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 1.14E-6 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **1.82E-6**

RME Hazard Index = $\frac{3.18E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **1.10E-2**

CTE Incremental Cancer Risk = 1.05E-9 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **1.68E-9**

CTE Hazard Index = $\frac{1.47E-8 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **5.07E-5**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - On-Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJP	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with soil for the adult on-site resident.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	5000 cm²/event	5000 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	350 events/year	234 events/year
ED = Exposure Duration	24 years	7 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Non-Carcinogen	8760 days	2555 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 14.4 mg/kg RME and 8.34 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/Kg-day)} = \frac{14.4\ \text{mg/Kg} \times 1.0E\text{-}6\ \text{Kg/mg} \times 5000\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 350\ \text{event/year} \times 24\ \text{yr}}{70\ \text{Kg} \times 8760\ \text{days}}$$

$$= \boxed{3.16E\text{-}5\ \text{mg/Kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - On-Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJR	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{14.4\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 5000\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 350\ events/yrs \times 24\ yrs}{70\ Kg \times 25550\ days}$

$= \boxed{1.08E\text{-}5\ mg/Kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 5000\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 234\ events/yrs \times 7\ yrs}{70\ Kg \times 2555\ days}$

$= \boxed{2.44E\text{-}6\ mg/Kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 5000\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 234\ events/yr \times 7\ yr}{70\ Kg \times 25550\ days}$

$= \boxed{2.44E\text{-}7\ mg/Kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{Reference dose dermal (mg/Kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/Kg-day (dermal)

CLIENT NSWC Indian Head CO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - On-Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RAJ	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 1.08E-5 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **1.73E-5**

RME Hazard Index = $\frac{3.16E-5 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **1.09E-1**

CTE Incremental Cancer Risk = 2.44E-7 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **3.90E-7**

CTE Hazard Index = $\frac{2.44E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **8.41E-3**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - On-Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJP	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface soil for the child on-site resident.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.DE-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	1743 cm²/event	1743 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	350 events/year	234 events/year
ED = Exposure Duration	6 years	2 years
BW = Body Weight	15 kg	15 kg
ATc = Averaging Time Carcinogens	25,550 days	25,550 days
ATN = Averaging Time Non-Carcinogen	2190 days	730 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 14.4 mg/kg RME and 8.34 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake (Noncarcinogenic (mg/Kg-day))} = \frac{14.4\ \text{mg/kg} \times 1.0E\text{-}6\ \text{Kg/mg} \times 1743\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 350\ \text{event/year} \times}{15\ \text{Kg} \times 2190\ \text{days}}$$

$$= \boxed{5.13E\text{-}5\ \text{mg/Kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - On-Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJD	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{14.4\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 1743\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 350\ events/yrs \times 6\ yrs}{15\ Kg \times 25550\ days}$

$= \boxed{4.40E\text{-}6\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 1743\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 234\ events/yrs \times 2\ yrs}{15\ Kg \times 730\ days}$

$= \boxed{3.98E\text{-}6\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 1743\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 234\ events/yrs \times 2\ yrs}{15\ Kg \times 25550\ days}$

$= \boxed{1.14E\text{-}7\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head G0245		JOB NUMBER 7612	
SUBJECT Direct Dermal Contact with Soil/Sediment - On-Site Resident			
BASED ON RAGs and Dermal Guidance		DRAWING NUMBER	
BY KAC	CHECKED BY RJR	APPROVED BY	DATE 5/20/98

RME Incremental Cancer Risk = 4.40E-6 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **7.04E-6**

RME Hazard Index = $\frac{5.13E-5 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **1.77E-1**

CTE Incremental Cancer Risk = 1.14E-7 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **1.82E-7**

CTE Hazard Index = $\frac{3.98E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **1.37E-2**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - On-Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RDR	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with sediment for the Adult on-site resident

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.DE-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	5000 cm²/event	5000 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	16 events/year	8 events/year
ED = Exposure Duration	24 years	7 years
BW = Body Weight	70 Kg	70 Kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Non-Carcinogen	8760 days	2555 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 19.7 mg/kg RME and 9.13 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake (Noncarcinogenic) (mg/Kg-day)} = \frac{19.7\ \text{mg/Kg} \times 1.0E\text{-}6\ \text{Kg/mg} \times 5000\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 16\ \frac{\text{event}}{\text{year}} \times 24\ \text{yr}}{70\ \text{Kg} \times 8760\ \text{days}}$$

$$= \boxed{1.97E\text{-}6\ \text{mg/Kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJA	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/Kg-day) $= \dfrac{19.7\ mg/kg \times 1.0E\text{-}6\ Kg/mg \times 5000\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 16\ events/yrs \times 24\ yrs}{70\ Kg \times 25550\ days}$

$= \boxed{6.77E\text{-}7\ mg/Kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/Kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ Kg/mg \times 5000\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 8\ events/yrs \times 7\ yrs}{70\ Kg \times 2555\ days}$

$= \boxed{9.15E\text{-}8\ mg/Kg\text{-}day}$

CTE Intake Carcinogenic (mg/Kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ Kg/mg \times 5000\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 8\ events/yrs \times 7\ yrs}{70\ Kg \times 25550\ days}$

$= \boxed{9.15E\text{-}9\ mg/Kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/Kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{Reference dose dermal (mg/Kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/Kg-day (dermal)

CLIENT NSWC Indian Head CO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RDD	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 6.77E-7 mg/kg-day x 1.6 kg-day/mg
Arsenic (unitless)

= **1.08E-6**

RME Hazard Index = $\frac{1.97E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **6.79E-3**

CTE Incremental Cancer Risk = 9.15E-9 mg/kg-day x 1.6 kg-day/mg
Arsenic (unitless)

= **1.46E-8**

CTE Hazard Index = $\frac{9.15E-8 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **3.16 E-4**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - On-Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJJ	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with sediment for the Child on-site resident.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	1743 cm²/event	1743 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	16 events/year	8 events/year
ED = Exposure Duration	6 years	2 years
BW = Body Weight	15 kg	15 kg
ATc = Averaging Time Carcinogens	25,550 days	25,550 days
ATN = Averaging Time Non-Carcinogen	2190 days	730 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 19.7 mg/kg RME and 9.13 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/kg-day)} = \frac{19.7\ \text{mg/kg} \times 1.0E\text{-}6\ \text{kg/mg} \times 1743\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 16\ \frac{\text{event}}{\text{year}} \times 6}{15\ \text{kg} \times 2190\ \text{days}}$$

$$= \boxed{3.21E\text{-}6\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - On Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RAF	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{19.7\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 1743\ \frac{cm^2}{event} \times 1\ mg/cm^2 \times 0.032 \times 16\ \frac{event}{yrs} \times 6\ yrs}{15\ Kg \times 25550\ days}$

$= \boxed{2.75E\text{-}7\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 1743\ \frac{cm^2}{event} \times 0.2\ mg/cm^2 \times 0.032 \times 8\ \frac{event}{yrs} \times 2\ yrs}{15\ Kg \times 730\ days}$

$= \boxed{1.49E\text{-}7\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 1743\ \frac{cm^2}{event} \times 0.2\ mg/cm^2 \times 0.032 \times 8\ \frac{event}{yr} \times 2\ yr}{15\ Kg \times 25550\ days}$

$= \boxed{4.25E\text{-}9\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{Reference dose dermal (mg/Kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/Kg-day (dermal)

CLIENT NSWC Indian Head G0245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment On-Site Resident	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJF	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 2.15E-7 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **4.4E-7**

RME Hazard Index = $\frac{3.21E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **1.11E-2**

CTE Incremental Cancer Risk = 4.25E-9 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **6.8E-9**

CTE Hazard Index = $\frac{1.49E-7 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **5.14E-4**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Construction Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJJ	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface soil for the Construction Worker.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion factor	1.DE-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	5300 cm²/event	5300 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	250 events/year	219 events/year
ED = Exposure Duration	1 years	1 years
BW = Body Weight	70 kg	70 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Non-Carcinogen	365 days	365 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 14.4 mg/kg RME and 8.34 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/kg-day)} = \frac{14.4\ mg/kg \times 1DE\text{-}6\ kg/mg \times 5300\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 250\ \frac{event}{year} \times 1\ y}{70\ kg \times 365\ days}$$

$$= \boxed{2.39E\text{-}5\ mg/kg\text{-}day}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Construction Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJP	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/kg-day) $= \dfrac{14.4\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 5300\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 250\ event/yrs \times 1\ yrs}{70\ Kg \times 25550\ days}$

$= \boxed{3.41E\text{-}7\ mg/kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 5300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 219\ event/yrs \times 1\ yrs}{70\ Kg \times 365\ days}$

$= \boxed{2.42E\text{-}6\ mg/kg\text{-}day}$

CTE Intake Carcinogenic (mg/kg-day) $= \dfrac{8.34\ mg/kg \times 1.0E\text{-}6\ kg/mg \times 5300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 219\ event/yr \times 1\ yr}{70\ Kg \times 25550\ days}$

$= \boxed{3.46E\text{-}8\ mg/kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{Reference dose dermal (mg/Kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/Kg-day (dermal)

CLIENT NSWC Indian Head CT0245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Construction Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJK	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 3.41E-7 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **5.46E-7**

RME Hazard Index = $\frac{2.39E-5 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **8.24E-2**

CTE Incremental Cancer Risk = 3.46E-8 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **5.53E-8**

CTE Hazard Index = $\frac{2.42E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **8.34E-3**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Construction Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJF	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with sediment for the Construction Worker.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{C_s \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_s = Chemical concentration	Chemical-specific mg/kg	Chemical Specific mg/kg
CF = Conversion Factor	1.0E-6 Kg/mg	1.0E-6 Kg/mg
SA = Skin Surface Area	5300 cm²/event	5300 cm²/event
AF = Adherence Factor	1 mg/cm²	0.2 mg/cm²
ABS = Absorption Factor	Chemical Specific unitless	Chemical specific unitless
EF = Exposure Frequency	60 events/year	30 events/year
ED = Exposure Duration	1 years	1 years
BW = Body Weight	70 kg	70 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Non-Carcinogen	365 days	365 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for Arsenic at an exposure point concentration of 19.7 mg/kg RME and 9.13 mg/kg CTE for Site 12 and the ABS for Arsenic = 0.032 Follows:

$$\text{RME Intake Noncarcinogenic (mg/kg-day)} = \frac{19.7\ \text{mg/kg} \times 1.0E\text{-}6\ \text{Kg/mg} \times 5300\ \text{cm}^2/\text{event} \times 1\ \text{mg/cm}^2 \times 0.032 \times 60\ \frac{\text{event}}{\text{year}} \times 1}{70\ \text{Kg} \times 365\ \text{days}}$$

$$= \boxed{7.85E\text{-}6\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment Construction Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJJ	APPROVED BY / DATE 5/20/98

RME Intake Carcinogenic (mg/Kg-day) $= \dfrac{19.7\ mg/kg \times 1.0E\text{-}6\ Kg/mg \times 5300\ cm^2/event \times 1\ mg/cm^2 \times 0.032 \times 60\ events/yrs \times 1\ yrs}{70\ Kg \times 25550\ days}$

$= \boxed{1.12E\text{-}7\ mg/Kg\text{-}day}$

CTE Intake Noncarcinogenic (mg/Kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ Kg/mg \times 5300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 30\ events/yrs \times 1\ yrs}{70\ Kg \times 365\ days}$

$= \boxed{3.64E\text{-}7\ mg/Kg\text{-}day}$

CTE Intake Carcinogenic (mg/Kg-day) $= \dfrac{9.13\ mg/kg \times 1.0E\text{-}6\ Kg/mg \times 5300\ cm^2/event \times 0.2\ mg/cm^2 \times 0.032 \times 30\ events/yr \times 1\ yr}{70\ Kg \times 25550\ days}$

$= \boxed{5.19E\text{-}9\ mg/Kg\text{-}day}$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/Kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

Hazard Index (unitless) = $\dfrac{\text{Noncarcinogenic Intake (mg/Kg-day)}}{\text{Reference dose dermal (mg/Kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/Kg-day (dermal)

CLIENT NSWC Indian Head G0245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with Soil/Sediment - Construction Worker	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY KAC / CHECKED BY RJF	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 1.12E-7 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **1.79E-7**

RME Hazard Index = $\frac{7.85E-6 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **2.71E-2**

CTE Incremental Cancer Risk = 5.19E-9 mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

= **8.30E-9**

CTE Hazard Index = $\frac{3.64E-7 \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

= **1.25E-3**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Fish - On-Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY RJP	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of Fish for the adult on-site resident

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_F \times IR \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_F = Concentration of Chemical	Chemical-specific (mg/kg)	Chemical-specific (mg/kg)
IR = Ingestion Rate	0.145 kg/meal	0.145 kg/meal
EF = Exposure Frequency	48 meal/year	24 meal/year
ED = Exposure Duration	24 year	7 year
BW = Body Weight	70 kg	70 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Noncarcinogens	8760 days	2555 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 0.264 mg/kg RME and 0.189 mg/kg CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{0.264\ \text{mg/kg} \times 0.145\ \text{kg/meal} \times 48\ \frac{\text{meal}}{\text{year}} \times 24\ \text{years}}{70\ \text{kg} \times 8760\ \text{days}} = \boxed{7.19E\text{-}5\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Fish On-Site Resident	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY RJK	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) $= \frac{0.264\ mg/kg \times 0.145\ kg/meal \times 48\ meals/year \times 24\ years}{70\ kg \times 25{,}550\ days}$

$= \boxed{2.46E\text{-}5\ mg/kg\text{-}day}$

CTE Noncarcinogenic Intake (mg/kg-day) $= \frac{0.189\ mg/kg \times 0.145\ kg/meal \times 24\ meal/year \times 7\ year}{70\ kg \times 2555\ days}$

$= \boxed{2.57E\text{-}5\ mg/kg\text{-}day}$

CTE Carcinogenic Intake (mg/kg-day) $= \frac{0.189\ mg/kg \times 0.145\ kg/meal \times 24\ meal/year \times 7\ years}{70\ kg \times 25550\ days}$

$= \boxed{2.57E\text{-}6\ mg/kg\text{-}day}$

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) X Cancer Slope Factor and (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{oral Reference Dose (mg/kg-day)}}$

Where the oral Cancer Slope factor for Arsenic = 1.5 kg-day/mg
and the oral Reference dose for Arsenic = 3.0E-4 mg/kg-day

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Ingestion of Fish - On-Site Resident	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY RJL	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk = 2.46E-5 mg/kg-day × 1.5 kg-day/mg
Arsenic (unitless)

= **3.69E-5**

RME Hazard Index = 7.19E-5 mg/kg-day / 3.0E-4 mg/kg-day
Arsenic (unitless)

= **2.40E-1**

CTE Incremental Cancer Risk = 2.57E-6 mg/kg-day × 1.5 kg-day/mg
Arsenic (unitless)

= **3.85E-6**

CTE Hazard Index = 2.57E-5 mg/kg-day / 3.0E-4 mg/kg-day
Arsenic (unitless)

= **8.57E-2**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Fish - Adolescent Trespasser	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY MJY	APPROVED BY / DATE 5/20/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via ingestion of Fish for the Adolescent Trespasser.

Relevant Equations:

$$\text{Intake (mg/kg-day)} = \frac{C_F \times IR \times EF \times ED}{BW \times AT}$$

Where:	RME	CTE
C_F = Concentration of Chemical	Chemical-specific (mg/kg	Chemical-specific (mg/kg
IR = Ingestion Rate	0.145 kg/meal	0.145 kg/meal
EF = Exposure Frequency	48 meals/year	24 meals/year
ED = Exposure Duration	10 year	10 year
BW = Body Weight	43 kg	43 kg
AT_C = Averaging Time Carcinogens	25,550 days	25,550 days
AT_N = Averaging Time Noncarcinogens	3650 days	3650 days

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The chemical specific intake for arsenic at an exposure point concentration of 0.264 mg/kg RME and 0.189 mg/kg CTE for Site 12 follows:

$$\text{RME Noncarcinogenic Intake (mg/kg-day)} = \frac{0.264\ \text{mg/kg} \times 0.145\ \text{kg/meal} \times 48\ \frac{\text{meal}}{\text{year}} \times 10\ \text{years}}{43\ \text{kg} \times 3650\ \text{days}}$$

$$= \boxed{1.1E\text{-}4\ \text{mg/kg-day}}$$

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Ingestion of Fish - Adolescent Trespasser	
BASED ON RAGS	DRAWING NUMBER
BY KAC / CHECKED BY	APPROVED BY / DATE 5/20/98

RME Carcinogenic Intake (mg/kg-day) $= \frac{0.264\ mg/kg \times 0.145\ kg/meal \times 48\ meal/year \times 10\ years}{43\ kg \times 25550\ days}$

$= \boxed{1.67E\text{-}5\ mg/kg\text{-}day}$

CTE Noncarcinogenic Intake (mg/kg-day) $= \frac{0.189\ mg/kg \times 0.145\ kg/meal \times 24\ meal/year \times 10\ years}{43\ kg \times 3650\ days}$

$= \boxed{4.19E\text{-}5\ mg/kg\text{-}day}$

CTE Carcinogenic Intake (mg/kg-day) $= \frac{0.189\ mg/kg \times 0.145\ kg/meal \times 24\ meal/year \times 10\ years}{43\ kg \times 25550\ days}$

$= \boxed{5.99E\text{-}6\ mg/kg\text{-}day}$

Calculation of Incremental Cancer Risk and the Hazard Index are as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) X Cancer Slope Factor oral (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{oral Reference Dose (mg/kg-day)}}$

Where the oral Cancer Slope factor for Arsenic = 1.5 kg-day/mg
and the oral Reference dose for Arsenic = 3.0E-4 mg/kg-day

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Ingestion of Fish - Adolescent Trespasser	
BASED ON RAGs	DRAWING NUMBER
BY KAC / CHECKED BY MM	APPROVED BY / DATE 5/20/98

RME Incremental Cancer Risk Arsenic (unitless) = 1.67E-5 mg/kg-day × 1.5 kg-day/mg

= **2.50E-5**

RME Hazard Index Arsenic (unitless) = $\frac{1.17E-4 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$

= **3.9E-1**

CTE Incremental Cancer Risk Arsenic (unitless) = 5.99E-6 mg/kg-day × 1.5 kg-day/mg

= **8.98E-6**

CTE Hazard Index Arsenic (unitless) = $\frac{4.19E-5 \text{ mg/kg-day}}{3.0E-4 \text{ mg/kg-day}}$

= **1.40E-1**

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA, Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surfacewater	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
RJJ	Rpk		5/22/98

Purpose: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with groundwater for the construction worker.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{DA_{event} \times EV \times EF \times ED \times SA}{BW \times AT}$$

For Inorganic contaminants:

$$DA_{event} = K_p \times C_W \times t_{event} \times CF$$

For Organic Contaminants:

If $t_{event} < t^*$, then $DA_{event} = 2 \times K_p \times C_W \times CF \times \sqrt{\frac{6 \times tau \times t_{event}}{\pi}}$

If $t_{event} > t^*$, then $DA_{event} = K_p \times C_W \times CF \times \left[\frac{t_{event}}{1+B} + 2 \times tau \times \left(\frac{1+3+B}{1+B}\right)\right]$

Where:	RME		CTE	
SA = Skin Surface Area	4050	cm^2	4050	cm^2
DA_{event} = Dose Absorbed per event		mg/cm²/event		mg/cm²/event
EV = Event Frequency	1	events/day	1	events/day
EF = Exposure Frequency	20	days/year	20	days/year
ED = Exposure Duration	1	years	1	years
BW = Body Weight	70	Kg	70	Kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time noncarcinogens	365	days	365	days

CLIENT NSWC Indian head CTo 245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

Where:	RME		CTE	
Kp = Permeability Coefficient	Chemical Specific	cm/hour	Chemical Specific	cm/hour
Cw = Concentration of Chemical	Chemical Specific	mg/L	Chemical-Specific	mg/L
tevent = duration of event	8	hr/event	8	hr/event
tau = Lag time	Chemical specific	hr	Chemical Specific	hr
t* = time to reach steady state	chemical specific	hr	chemical Specific	hr
B = dimensionless Constant	Chemical specific	unitless	Chemical Specific	unitless
CF = Volumetric Conversion Factor	1.0E-3	L/cm³	1.0E-3	L/cm³

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The Chemical Specific intake for Arsenic at an exposure point concentration of 0.0328 mg/L RME and 0.072 mg/L CTE for Site 12 follows. The Kp for Arsenic = 1.0E-3 cm/hour.

$$DA_{event\ RME} = 1.0E\text{-}3\ cm/hr \times 0.0328\ mg/L \times 8\ hr/event \times 1.0E\text{-}3\ L/cm^3$$
$$= 2.62 \times 10^{-7}$$

$$RME\ Noncarc\ Intake\ mg/Kg\text{-}day = \frac{2.62\times10^{-7}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 20\ \frac{day}{yr} \times 1\ yrs \times 4050\ cm^2}{70\ Kg \times 365\ days}$$

$$= 8.31 \times 10^{-7}\ mg/Kg\text{-}day$$

$$RME\ Carcinogenic\ Intake\ (mg/Kg\text{-}day) = \frac{2.62\times10^{-7}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 20\ \frac{day}{yr} \times 1\ yrs \times 4050\ cm^2}{70\ Kg \times 25550\ days}$$

$$= 1.19 \times 10^{-8}\ mg/Kg\text{-}day$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY	CHECKED BY	APPROVED BY	DATE 5/22/98

$DAevent = 1.0E-3 \frac{cm}{hr} \times 0.0172 \frac{mg}{L} \times 8 \frac{hr}{event} \times 1.0E-3 L/cm^3$

$CTE = 1.38 \times 10^{-7}$

$$\text{CTE Noncarc Intake (mg/kg-day)} = \frac{1.38\times10^{-7} \frac{mg}{cm^2\text{-event}} \times 1 \frac{event}{day} \times 20 \frac{day}{yr} \times 1\ yrs \times 4050\ cm^2}{70\ kg \times 365\ days}$$

$= 4.37 \times 10^{-7}$ mg/kg-day

$$\text{CTE Carcinogenic Intake (mg/kg-day)} = \frac{1.38\times10^{-7} \frac{mg}{cm^2\text{-event}} \times 1 \frac{event}{day} \times 20 \frac{day}{yr} \times 1\ yrs \times 4050\ cm^2}{70\ kg \times 25550\ days}$$

$= 6.25 \times 10^{-9}$ mg/kg-day

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Incremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (kg-day/mg)

$$\text{Hazard Index (unitless)} = \frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$$

where the Cancer Slope Factor for Arsenic = 1.6 kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT	JOB NUMBER		
NSWC Indian Head CO245	7612		
SUBJECT Direct Dermal Contact with			
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER		
BY RJJ	CHECKED BY	APPROVED BY	DATE 5/22/98

RME Incremental Cancer Risk = 1.19×10^{-8} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 1.9 \times 10^{-8}$

RME Hazard Index = $\frac{8.31 \times 10^{-7} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 2.9 \times 10^{-3}$

CTE Incremental Cancer Risk = 6.25×10^{-9} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 1 \times 10^{-8}$

CTE Hazard Index = $\frac{4.37 \times 10^{-7} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 1.5 \times 10^{-3}$

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surfacewater	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY RJL	APPROVED BY / DATE 5/22/98

Purpose: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface water for a child resident

Relevant Equations:

$$\text{Absorbed Dose} = \frac{DA_{event} \times EV \times EF \times ED \times SA}{BW \times AT}$$

For Inorganic contaminants:

$$DA_{event} = K_p \times C_W \times t_{event} \times CF$$

For Organic Contaminants:

$$\text{If } t_{event} < t^*, \text{ then } DA_{event} = 2 \times K_p \times C_W \times CF \times \sqrt{\frac{6 \times tau \times t_{event}}{\pi}}$$

$$\text{If } t_{event} > t^*, \text{ then } DA_{event} = K_p \times C_W \times CF \times \left[\frac{t_{event}}{1+B} + 2 \times tau \times \left(\frac{1+3+B}{1+B}\right)\right]$$

Where:	RME		CTE	
SA = Skin Surface Area	1743	cm^2	1743	cm^2
DA_{event} = Dose Absorbed per event		mg/cm²/event		mg/cm²/event
EV = Event Frequency	1	events/day	1	events/day
EF = Exposure Frequency	16	days/year	8	days/year
ED = Exposure Duration	6	years	2	years
BW = Body Weight	15	Kg	15	Kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time noncarcinogens	2190	days	730	days

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

Where:	RME		CTE	
Kp = Permeability Coefficient	Chemical Specific	cm/hour	Chemical Specific	cm/hour
Cw = Concentration of Chemical	Chemical Specific	mg/L	Chemical-specific	mg/L
tevent = duration of event	4	hr/event	2	hr/event
tau = Lag time	Chemical specific	hr	Chemical Specific	hr
t* = time to reach steady state	chemical specific	hr	chemical Specific	hr
B = dimensionless Constant	Chemical specific	unitless	Chemical Specific	unitless
CF = Volumetric Conversion Factor	1.0E-3	L/cm³	1.0E-3	L/cm³

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The Chemical Specific intake for Arsenic at an exposure point concentration of 0.006 mg/L RME and 0.0043 mg/L CTE for Site 12 follows. The Kp for Arsenic = 1.0E-3 cm/hour.

$$DA_{event} = 1.0E\text{-}3\ cm/hr \times 0.006\ mg/L \times 4\ hr/event \times 1.0E\text{-}3\ L/cm^3$$

RME $= 2.4 \times 10^{-8}$

$$\text{RME Noncarc Intake (mg/Kg-day)} = \frac{2.4\times10^{-8}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 16\ \frac{day}{yr} \times 6\ yrs \times 1743\ cm^2}{15\ Kg \times 2190\ days}$$

$= 1.22 \times 10^{-7}$ mg/Kg-day

$$\text{RME Carcinogenic Intake (mg/Kg-day)} = \frac{2.4\times10^{-8}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 16\ \frac{day}{yr} \times 6\ yrs \times 1743\ cm^2}{15\ Kg \times 25550\ days}$$

$= 1.05 \times 10^{-8}$ mg/Kg-day

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY	CHECKED BY / APPROVED BY / DATE

$DAevent = 1.0E-3 \frac{cm}{hr} \times 0.0043 \frac{mg}{L} \times 2 \frac{hr}{event} \times 1.0E-3 L/cm^3$
CTE 8.6×10^{-9}

$$CTE\ Noncarc\ Intake\ (mg/kg\text{-}day) = \frac{8.6\times10^{-9} \frac{mg}{cm^2\text{-}event} \times 1 \frac{event}{day} \times 8 \frac{day}{yr} \times 2\ yrs \times 1743\ cm^2}{15\ kg \times 730\ days}$$

$= 2.19 \times 10^{-8}$ mg/kg-day

$$CTE\ Carcinogenic\ Intake\ (mg/kg\text{-}day) = \frac{8.6\times10^{-9} \frac{mg}{cm^2\text{-}event} \times 1 \frac{event}{day} \times 8 \frac{day}{yr} \times 2\ yrs \times 1743\ cm^2}{15\ kg \times 25550\ days}$$

$= 6.26 \times 10^{-10}$ mg/kg-day

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (kg-day/mg)

Hazard Index (unitless) = Noncarcinogenic Intake (mg/kg-day) / Reference dose dermal (mg/kg-day)

where the Cancer Slope Factor for Arsenic = 1.6 kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head CO245		JOB NUMBER 7612	
SUBJECT Direct Dermal Contact with Surface Water			
BASED ON RAGs and Dermal Guidance		DRAWING NUMBER	
BY RJJ	CHECKED BY	APPROVED BY	DATE 5/22/98

RME Incremental Cancer Risk = 1.03×10^{-8} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 1.68 \times 10^{-8}$

RME Hazard Index = $\frac{1.22 \times 10^{-7} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 4.21 \times 10^{-4}$

CTE Incremental Cancer Risk = 6.26×10^{-10} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 1.0 \times 10^{-9}$

CTE Hazard Index = $\frac{2.19 \times 10^{-8} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 7.55 \times 10^{-5}$

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surfacewater	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY [illegible]	APPROVED BY / DATE 5/22/98

Purpose: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface water for an adult resident

Relevant Equations:

$$\text{Absorbed Dose} = \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$$

For Inorganic contaminants:

$$DAevent = Kp \times CW \times tevent \times CF$$

For Organic Contaminants:

$$\text{If } tevent < t^*, \text{ then } DAevent = 2 \times Kp \times Cw \times CF \times \sqrt{\frac{6 \times tau \times tevent}{\pi}}$$

$$\text{If } tevent > t^*, \text{ then } DAevent = Kp \times Cw \times CF \times \left[\frac{tevent}{1+B} + 2 \times tau \times \left(\frac{1+3+B}{1+B}\right)\right]$$

Where:	RME	CTE
SA = Skin Surface Area	5000 cm^2	5000 cm^2
DAevent = Dose Absorbed per event	mg/cm^2/event	mg/cm^2/event
EV = Event Frequency	1 events/day	1 events/day
EF = Exposure Frequency	16 days/year	8 days/year
ED = Exposure Duration	24 years	7 years
BW = Body Weight	70 Kg	70 Kg
ATc = Averaging Time Carcinogens	25,550 days	25,550 days
ATN = Averaging Time noncarcinogens	8760 days	2555 days

CLIENT NSWC Indian head CTO 245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

Where:	RME		CTE	
Kp = Permeability Coefficient	Chemical Specific	cm/hour	Chemical Specific	cm/hour
Cw = Concentration of Chemical	Chemical Specific	mg/L	Chemical-Specific	mg/L
tevent = duration of event	4	hr/event	2	hr/event
tau = Lag time	Chemical specific	hr	Chemical Specific	hr
t* = time to reach steady state	chemical specific	hr	chemical Specific	hr
B = dimensionless Constant	Chemical specific	unitless	Chemical Specific	unitless
CF = Volumetric Conversion Factor	1.0E-3	L/cm³	1.0E-3	L/cm³

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The Chemical Specific intake for Arsenic at an exposure point concentration of 0.006 mg/L RME and 0.0043 mg/L CTE for Site 12 follows. The Kp for Arsenic = 1.0E-3 cm/hour.

$$DA_{event\ RME} = 1.0E\text{-}3\ cm/hr \times 0.006\ mg/L \times 4\ hr/event \times 1.0E\text{-}3\ L/cm^3$$
$$= 2.4 \times 10^{-8}$$

$$\text{RME Noncarc Intake (mg/Kg-day)} = \frac{2.4\times10^{-8}\ \frac{mg}{cm^2\text{-event}} \times 1\ \frac{event}{day} \times 16\ \frac{day}{yr} \times 24\ yrs \times 5000\ cm^2}{70\ Kg \times 8766\ days}$$

$$= 7.51 \times 10^{-8}\ mg/Kg\text{-}day$$

$$\text{RME Carcinogenic Intake (mg/Kg-day)} = \frac{2.4\times10^{-8}\ \frac{mg}{cm^2\text{-event}} \times 1\ \frac{event}{day} \times 16\ \frac{day}{yr} \times 24\ yrs \times 5000\ cm^2}{70\ Kg \times 25550\ days}$$

$$= 2.58 \times 10^{-8}\ mg/Kg\text{-}day$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

$DAevent = 1.0E-3 \frac{cm}{hr} \times 0.0043 \frac{mg}{L} \times 2 \frac{hr}{event} \times 1.0E-3 L/cm^3$

$CTE = 8.6 \times 10^{-7}$

$$\text{CTE Noncarc Intake (mg/kg-day)} = \frac{8.6\times10^{-7} \frac{mg}{cm^2\text{-event}} \times 1 \frac{event}{day} \times 8 \frac{day}{yr} \times 7 \text{ yrs} \times 5000 cm^2}{70 \text{ Kg} \times 2555 \text{ days}}$$

$= 1.35\times10^{-8}$ mg/kg-day

$$\text{CTE Carcinogenic Intake (mg/kg-day)} = \frac{8.6\times10^{-7} \frac{mg}{cm^2\text{-event}} \times 1 \frac{event}{day} \times 8 \frac{day}{yr} \times 7 \text{ yrs} \times 5000 cm^2}{70 \text{ Kg} \times 25550 \text{ days}}$$

$= 1.35\times10^{-7}$ mg/kg-day

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (Kg-day/mg)

$$\text{Hazard Index (unitless)} = \frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$$

where the Cancer Slope Factor for Arsenic = 1.6 Kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head G0245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

RME Incremental Cancer Risk = 2.58×10^{-8} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 4.13 \times 10^{-8}$

RME Hazard Index = $\frac{7.51 \times 10^{-8} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 2.59 \times 10^{-4}$

CTE Incremental Cancer Risk = 1.35×10^{-9} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 2.16 \times 10^{-9}$

CTE Hazard Index = $\frac{1.35 \times 10^{-8} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 4.66 \times 10^{-5}$

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO 245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surfacewater	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY [illegible]	APPROVED BY / DATE 5/22/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface water for the adolescent trespasser.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{DA_{event} \times EV \times EF \times ED \times SA}{BW \times AT}$$

For Inorganic contaminants:

$$DA_{event} = K_p \times CW \times t_{event} \times CF$$

For Organic Contaminants:

$$\text{If } t_{event} < t^*, \text{ then } DA_{event} = 2 \times K_p \times C_w \times CF \times \sqrt{\frac{6 \times \tau_{au} \times t_{event}}{\pi}}$$

$$\text{If } t_{event} > t^*, \text{ then } DA_{event} = K_p \times C_w \times CF \times \left[\frac{t_{event}}{1+B} + 2 \times \tau_{au} \times \left(\frac{1+3+B}{1+B}\right)\right]$$

Where:	RME		CTE	
SA = Skin Surface Area	12,400	cm^2	12,400	cm^2
DA_{event} = Dose Absorbed per event		mg/cm²/event		mg/cm²-event
EV = Event Frequency	1	events/day	1	events/day
EF = Exposure Frequency	16	days/year	8	days/year
ED = Exposure Duration	10	years	10	years
BW = Body Weight	43	Kg	43	Kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time noncarcinogens	3650	days	3650	days

CLIENT NSWC Indian head CTO 245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY / CHECKED BY	APPROVED BY / DATE 5/21/98

Where:	RME		CTE	
Kp = Permeability Coefficient	Chemical Specific	cm/hour	Chemical Specific	cm/hour
Cw = Concentration of Chemical	Chemical Specific	mg/L	Chemical-Specific	mg/L
tevent = duration of event	4	hr/event	2	hr/event
tau = Lag time	Chemical specific	hr	Chemical Specific	hr
t* = time to reach steady state	chemical specific	hr	chemical Specific	hr
B = dimensionless Constant	Chemical specific	unitless	Chemical Specific	unitless
CF = Volumetric Conversion Factor	1.0E-3	L/cm³	1.0E-3	L/cm³

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The Chemical Specific intake for Arsenic at an exposure point concentration of 0.006 mg/L RME and 0.0043 mg/L CTE for Site 12 follows. The Kp for Arsenic = 1.0E-3 cm/hour.

$$DA_{event\ RME} = 1.0E\text{-}3\ cm/hr \times 0.006\ mg/L \times 4\ hr/event \times 1.0E\text{-}3\ L/cm^3$$
$$= 2.4\times10^{-8}$$

$$RME\ Noncanc\ Intake\ mg/Kg\text{-}day = \frac{2.4\times10^{-8}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 16\ \frac{day}{yr} \times 10\ yrs \times 12{,}400\ cm^2}{43\ Kg \times 3650\ days}$$

$$= 3.03\times10^{-7}\ mg/Kg\text{-}day$$

$$RME\ Carcinogenic\ Intake\ (mg/Kg\text{-}day) = \frac{2.4\times10^{-8}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 16\ \frac{day}{yr} \times 10\ yrs \times 12{,}400\ cm^2}{43\ Kg \times 25550\ days}$$

$$= 4.33\times10^{-8}\ mg/Kg\text{-}day$$

CLIENT	JOB NUMBER
NSWC Indian Head CTO245	7129
SUBJECT: Direct Dermal Contact with groundwater/Surface Water	
BASED ON: RAGs and Dermal Guidance	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE

$$DA_{event} = 1.0E\text{-}3 \frac{cm}{hr} \times 0.0043 \frac{mg}{L} \times 2 \frac{hr}{event} \times 1.0E\text{-}3\, L/cm^3$$

$$CTE = 8.6 \times 10^{-9}$$

$$\text{CTE Noncarc Intake (mg/kg-day)} = \frac{8.6\times10^{-9} \frac{mg}{cm^2\text{-}event} \times 1 \frac{event}{day} \times 8 \frac{day}{yr} \times 10\ yrs \times 12400\ cm^2}{70\ kg \times 3650\ days}$$

$$= 3.39 \times 10^{-8}\ mg/kg\text{-}day$$

$$\text{CTE Carcinogenic Intake (mg/kg-day)} = \frac{8.6\times10^{-9} \frac{mg}{cm^2\text{-}event} \times 1 \frac{event}{day} \times 8 \frac{day}{yr} \times 10\ yrs \times 12400\ cm^2}{70\ kg \times 25550\ days}$$

$$= 4.77 \times 10^{-9}\ mg/kg\text{-}day$$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:-

$$\text{Incremental Cancer Risk (unitless)} = \text{Carcinogenic Intake (mg/kg-day)} \times \text{Cancer Slope Factor dermal (kg-day/mg)}$$

$$\text{Hazard Index (unitless)} = \frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$$

where the Cancer Slope Factor for Arsenic = 1.6 kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head CO245		JOB NUMBER 7612	
SUBJECT Direct Dermal Contact with			
BASED ON RAGs and Dermal Guidance		DRAWING NUMBER	
BY RJJ	CHECKED BY	APPROVED BY	DATE 5/22/98

RME Incremental Cancer Risk = 4.33×10^{-8} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 6.93 \times 10^{-8}$

RME Hazard Index = $\frac{3.03 \times 10^{-7} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 1.04 \times 10^{-3}$

CTE Incremental Cancer Risk = 4.77×10^{-9} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 7.63 \times 10^{-9}$

CTE Hazard Index = $\frac{3.34 \times 10^{-8} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 1.15 \times 10^{-4}$

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NSWC Indian Head CTO 245	JOB NUMBER: 7129
SUBJECT: Direct Dermal Contact with Groundwater/Surfacewater	
BASED ON: RAGs and Dermal Guidance	DRAWING NUMBER:
BY: RJJ / CHECKED BY: [illegible]	APPROVED BY: / DATE: 5/22/98

Purpose: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with the child resident exposed to groundwater

Relevant Equations:

$$\text{Absorbed Dose} = \frac{DA_{event} \times EV \times EF \times ED \times SA}{BW \times AT}$$

For Inorganic contaminants:

$$DA_{event} = K_p \times C_W \times t_{event} \times CF$$

For Organic Contaminants:

If $t_{event} < t^*$, then $DA_{event} = 2 \times K_p \times C_W \times CF \times \sqrt{\frac{6 \times \tau_{au} \times t_{event}}{\pi}}$

If $t_{event} > t^*$, then $DA_{event} = K_p \times C_W \times CF \times \left[\frac{t_{event}}{1+B} + 2 \times \tau_{au} \times \left(\frac{1+3+B}{1+B}\right)\right]$

Where:	RME		CTE	
SA = Skin Surface Area	6970	cm^2	6970	cm^2
DA_{event} = Dose Absorbed per event		mg/cm²/event		mg/cm²/event
EV = Event Frequency	1	events/day	1	events/day
EF = Exposure Frequency	350	days/year	234	days/year
ED = Exposure Duration	6	years	2	years
BW = Body Weight	15	Kg	15	Kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time noncarcinogens	2190	days	730	days

CLIENT NSWC Indian head CTO 245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

Where:	RME		CTE	
Kp = Permeability Coefficient	Chemical Specific	cm/hour	Chemical Specific	cm/hour
Cw = Concentration of Chemical	Chemical Specific	mg/L	Chemical-Specific	mg/L
tevent = duration of event	0.25	hr/event	0.167	hr/event
tau = Lag time	Chemical specific	hr	Chemical Specific	hr
t* = time to reach steady state	Chemical specific	hr	Chemical Specific	hr
B = dimensionless Constant	Chemical specific	unitless	Chemical Specific	unitless
CF = Volumetric Conversion Factor	1.0E-3	L/cm³	1.0E-3	L/cm³

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The Chemical Specific intake for Arsenic at an exposure point concentration of 0.0328 mg/L RME and 0.0172 mg/L CTE for Site 12 follows. The Kp for Arsenic = 1.0E-3 cm/hour.

$$DA_{event\ RME} = 1.0E\text{-}3\ cm/hr \times 0.0328\ mg/L \times 0.25\ hr/event \times 1.0E\text{-}3\ L/cm^3 = 8.2\times10^{-9}$$

$$\text{RME Noncarc Intake mg/Kg-day} = \frac{8.2\times10^{-9}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 350\ \frac{day}{yr} \times 6\ yrs \times 6970\ cm^2}{15\ Kg \times 2190\ days}$$

$$= 3.65\times10^{-6}\ mg/Kg\text{-}day$$

$$\text{RME Carcinogenic Intake (mg/Kg-day)} = \frac{8.2\times10^{-9}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 350\ \frac{day}{yr} \times 6\ yrs \times 6970\ cm^2}{15\ Kg \times 25550\ days}$$

$$= 3.13\times10^{-7}\ mg/Kg\text{-}day$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

$DAevent = 1.0E-3 \frac{cm}{hr} \times 0.0172 \frac{mg}{L} \times 0.167 \frac{hr}{event} \times 1.0E-3 L/cm^3$

$CTE = 2.87 \times 10^{-9}$

CTE Noncarc Intake (mg/kg-day) $= \frac{2.87 \times 10^{-9} \frac{mg}{cm^2\text{-}event} \times 1 \frac{event}{day} \times 234 \frac{day}{yr} \times 2\ yrs \times 6970\ cm^2}{15\ kg \times 730\ days}$

$= 8.55 \times 10^{-7}$ mg/kg-day

CTE Carcinogenic Intake (mg/kg-day) $= \frac{2.87 \times 10^{-9} \frac{mg}{cm^2\text{-}event} \times 1 \frac{event}{day} \times 234 \frac{day}{yr} \times 2\ yrs \times 6970\ cm^2}{15\ kg \times 25550\ days}$

$= 2.44 \times 10^{-8}$ mg/kg-day

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (kg-day/mg)

Hazard Index (unitless) = $\frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$

where the Cancer Slope Factor for Arsenic = 1.6 kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head CO245	JOB NUMBER 7612
SUBJECT Direct Dermal Contact with	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

RME Incremental Cancer Risk = 3.13×10^{-7} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 5.01 \times 10^{-7}$

RME Hazard Index = $\frac{3.65 \times 10^{-6} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 1.26 \times 10^{-2}$

CTE Incremental Cancer Risk = 2.44×10^{-8} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 3.91 \times 10^{-8}$

CTE Hazard Index = $\frac{8.55 \times 10^{-7} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 2.95 \times 10^{-3}$

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NSWC Indian Head CTO 245	JOB NUMBER: 7129
SUBJECT: Direct Dermal Contact with Groundwater/Surfacewater	
BASED ON: RAGs and Dermal Guidance	DRAWING NUMBER:
BY: RJJ / CHECKED BY: RJM	APPROVED BY: / DATE: 5/22/98

Purpose: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with groundwater for the adult resident

Relevant Equations:

$$\text{Absorbed Dose} = \frac{DA_{event} \times EV \times EF \times ED \times SA}{BW \times AT}$$

For Inorganic contaminants:

$$DA_{event} = K_p \times CW \times t_{event} \times CF$$

For Organic Contaminants:

$$\text{If } t_{event} < t^*, \text{ then } DA_{event} = 2 \times K_p \times C_w \times CF \times \sqrt{\frac{6 \times tau \times t_{event}}{\pi}}$$

$$\text{If } t_{event} > t^*, \text{ then } DA_{event} = K_p \times C_w \times CF \times \left[\frac{t_{event}}{1+B} + 2 \times tau \times \left(\frac{1+3+B}{1+B}\right)\right]$$

Where:	RME		CTE	
SA = Skin Surface Area	20,000	cm^2	20,000	cm^2
DA_{event} = Dose Absorbed per event		mg/cm²/event		mg/cm²/event
EV = Event Frequency	1	events/day	1	events/day
EF = Exposure Frequency	350	days/year	234	days/year
ED = Exposure Duration	24	years	7	years
BW = Body Weight	70	Kg	70	Kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time noncarcinogens	8760	days	2555	days

CLIENT NSWC Indian head CTO 245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

Where:	RME		CTE	
Kp = Permeability Coefficient	Chemical Specific	cm/hour	Chemical Specific	cm/hour
Cw = Concentration of Chemical	Chemical Specific	mg/L	Chemical-Specific	mg/L
tevent = duration of event	0.25	hr/event	0.167	hr/event
tau = Lag time	Chemical specific	hr	Chemical Specific	hr
t* = time to reach steady state	chemical specific	hr	chemical Specific	hr
B = dimensionless Constant	Chemical specific	unitless	Chemical Specific	unitless
CF = Volumetric Conversion Factor	1.0E-3	L/cm³	1.0E-3	L/cm³

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The Chemical Specific intake for Arsenic at an exposure point concentration of 0.0328 mg/L RME and 0.0172 mg/L CTE for Site 12 follows. The Kp for Arsenic = 1.0E-3 cm/hour.

$$DA_{event\ RME} = 1.0E\text{-}3\ cm/hr \times 0.0328\ mg/L \times 0.25\ hr/event \times 1.0E\text{-}3\ L/cm^3$$
$$= 8.2\times10^{-9}$$

$$\text{RME Noncarc Intake (mg/Kg-day)} = \frac{8.2\times10^{-9}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 350\ \frac{day}{yr} \times 24\ yrs \times 20{,}000\ cm^2}{70\ Kg \times 8760\ days}$$

$$= 2.25\times10^{-6}\ mg/Kg\text{-}day$$

$$\text{RME Carcinogenic Intake (mg/Kg-day)} = \frac{8.2\times10^{-9}\ \frac{mg}{cm^2\text{-}event} \times 1\ \frac{event}{day} \times 350\ \frac{day}{yr} \times 24\ yrs \times 20{,}000\ cm^2}{70\ Kg \times 25550\ days}$$

$$= 7.70\times10^{-7}\ mg/Kg\text{-}day$$

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

$$DA_{event} = 1.0E\text{-}3 \frac{cm}{hr} \times 0.0172 \frac{mg}{L} \times 0.167 \frac{hr}{event} \times 1.0E\text{-}3\, L/cm^3$$

$$CTE = 2.87 \times 10^{-9}$$

$$\text{CTE Noncarc Intake (mg/kg-day)} = \frac{2.87\times10^{-9} \frac{mg}{cm^2\text{-event}} \times 1 \frac{event}{day} \times 234 \frac{day}{yr} \times 7\ yrs \times 20000\ cm^2}{78\ kg \times 2555\ days}$$

$$= 5.26\times10^{-7}\ mg/kg\text{-day}$$

$$\text{CTE Carcinogenic Intake (mg/kg-day)} = \frac{2.87\times10^{-9} \frac{mg}{cm^2\text{-event}} \times 1 \frac{event}{day} \times 234 \frac{day}{yr} \times 7\ yrs \times 20000\ cm^2}{70\ kg \times 25550\ days}$$

$$= 5.26\times10^{-5}\ mg/kg\text{-day}$$

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:

$$\underset{\text{(unitless)}}{\text{Icremental Cancer Risk}} = \underset{\text{(mg/kg-day)}}{\text{Carcinogenic Intake}} \times \underset{\text{(kg-day/mg)}}{\text{Cancer Slope Factor dermal}}$$

$$\underset{\text{(unitless)}}{\text{Hazard Index}} = \frac{\text{Noncarcinogenic Intake (mg/kg-day)}}{\text{Reference dose dermal (mg/kg-day)}}$$

where the Cancer Slope Factor for Arsenic = 1.6 kg-day/mg (dermal)
Reference Dose for Arsenic = 2.9E-4 mg/kg-day (dermal)

CLIENT NSWC Indian Head G0245		JOB NUMBER 7612	
SUBJECT Direct Dermal Contact with			
BASED ON RAGs and Dermal Guidance		DRAWING NUMBER	
BY RJJ	CHECKED BY	APPROVED BY	DATE 5/22/98

RME Incremental Cancer Risk = 7.70×10^{-7} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 1.23 \times 10^{-6}$

RME Hazard Index = $\frac{2.23 \times 10^{-6} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 7.76 \times 10^{-3}$

CTE Incremental Cancer Risk = 5.26×10^{-8} mg/kg-day × 1.6 kg-day/mg
Arsenic (unitless)

$= 8.41 \times 10^{-8}$

CTE Hazard Index = $\frac{5.26 \times 10^{-7} \text{ mg/kg-day}}{2.9E-4 \text{ mg/kg-day}}$
Arsenic (unitless)

$= 1.81 \times 10^{-3}$

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A). Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surfacewater	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY RAK	APPROVED BY / DATE 5/22/98

PURPOSE: To calculate carcinogenic and noncarcinogenic risk via direct dermal contact with surface water for the adult recreational user.

Relevant Equations:

$$\text{Absorbed Dose} = \frac{DA_{event} \times EV \times EF \times ED \times SA}{BW \times AT}$$

For Inorganic contaminants:

$$DA_{event} = K_p \times CW \times t_{event} \times CF$$

For Organic Contaminants:

$$\text{If } t_{event} < t^*, \text{ then } DA_{event} = 2 \times K_p \times C_w \times CF \times \sqrt{\frac{6 \times \tau_{au} \times t_{event}}{\pi}}$$

$$\text{If } t_{event} > t^*, \text{ then } DA_{event} = K_p \times C_w \times CF \times \left[\frac{t_{event}}{1+B} + 2 \times \tau_{au} \times \left(\frac{1+3+B}{1+B}\right)\right]$$

Where:	RME		CTE	
SA = Skin Surface Area	20 000	cm^2	20000	cm^2
DA_{event} = Dose Absorbed per event		mg/cm²/event		mg/cm²/event
EV = Event Frequency	1	events/day	1	events/day
EF = Exposure Frequency	16	days/year	8	days/year
ED = Exposure Duration	30	years	9	years
BW = Body Weight	70	Kg	70	Kg
AT_C = Averaging Time Carcinogens	25,550	days	25,550	days
AT_N = Averaging Time noncarcinogens	10950	days	3285	days

CLIENT NSWC Indian head CTO 245	JOB NUMBER 7129
SUBJECT Direct Dermal Contact with Groundwater/Surface Water	
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER
BY RJJ / CHECKED BY	APPROVED BY / DATE 5/22/98

Where:	RME		CTE	
Kp = Permeability Coefficient	Chemical Specific	cm/hour	Chemical Specific	cm/hour
Cw = Concentration of Chemical	Chemical Specific	mg/L	Chemical-Specific	mg/L
tevent = duration of event	4	hr/event	2	hr/event
tau = Lag time	Chemical specific	hr	Chemical Specific	hr
t* = time to reach steady state	chemical specific	hr	chemical Specific	hr
B = dimensionless Constant	Chemical specific	unitless	Chemical Specific	unitless
CF = Volumetric Conversion Factor	1.0E-3	L/cm³	1.0E-3	L/cm³

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

The Chemical Specific intake for Arsenic at an exposure point concentration of 0.202 mg/L RME and 0.104 mg/L CTE for Site 12 follows. The Kp for Arsenic = 1.0E-3 cm/hour.

DAevent RME = 1.0E-3 cm/hr X 0.202 mg/L X 4 hr/event X 1.0E-3 L/cm³
= 8.08×10^{-7}

RME Noncarc Intake mg/Kg-day = $\frac{8.08\times10^{-7}\ \frac{mg}{cm^2\text{-event}} \times 1\ \frac{event}{day} \times 16\ \frac{day}{yr} \times 30\ yrs \times 20{,}000\ cm^2}{70\ Kg \times 10950\ days}$

= 1.01×10^{-5} mg/Kg-day

RME Carcinogenic Intake (mg/Kg-day) = $\frac{8.08\times10^{-7}\ \frac{mg}{cm^2\text{-event}} \times 1\ \frac{event}{day} \times 16\ \frac{day}{yr} \times 30\ yrs \times 20{,}000\ cm^2}{70\ Kg \times 25{,}550\ days}$

= 4.34×10^{-6} mg/Kg-day

CLIENT NSWC Indian Head CTO245	JOB NUMBER 7129		
SUBJECT Direct Dermal Contact with Groundwater/Surface Water			
BASED ON RAGs and Dermal Guidance	DRAWING NUMBER		
BY	CHECKED BY	APPROVED BY	DATE

$DAevent = 1.0E-3 \frac{cm}{hr} \times 0.104 \frac{mg}{L} \times 2 \frac{hr}{event} \times 1.0E-3 L/cm^3$

$CTE = 2.08 \times 10^{-7}$

$$\text{CTE Noncarc Intake (mg/kg-day)} = \frac{2.08\times10^{-7} \frac{mg}{cm^2\text{-event}} \times 1 \frac{event}{day} \times 8 \frac{day}{yr} \times 9\ yrs \times 20000\ cm^2}{70\ kg \times 3285\ days}$$

$= 1.3 \times 10^{-6}$ mg/kg-day

$$\text{CTE Carcinogenic Intake (mg/kg-day)} = \frac{2.08\times10^{-7} \frac{mg}{cm^2\text{-event}} \times 1 \frac{event}{day} \times 8 \frac{day}{yr} \times 9\ yrs \times 20000\ cm^2}{70\ kg \times 25550\ days}$$

$= 1.67 \times 10^{-7}$ mg/kg-day

Calculation of the Hazard Index and Incremental Cancer Risk are calculated as follows:-

Icremental Cancer Risk (unitless) = Carcinogenic Intake (mg/kg-day) × Cancer Slope Factor dermal (kg-day/mg)

Hazard Index (unitless) = Noncarcinogenic Intake (mg/kg-day) / Reference dose dermal (mg/kg-day)

where the Cancer Slope Factor for Manganese = NA kg-day/mg (dermal)
Reference Dose for Manganese = 2.0E-2 mg/kg-day (dermal)

CLIENT NSWC Indian Head CO245		JOB NUMBER 7612	
SUBJECT Direct Dermal Contact with			
BASED ON RAGs and Dermal Guidance		DRAWING NUMBER	
BY RJJ	CHECKED BY	APPROVED BY	DATE 5/22/98

RME Incremental Cancer Risk = 4.94×10^{-6} mg/kg-day X NA kg-day/mg
Manganese (unitless)

= Not a carcinogen

RME Hazard Index = $\frac{1.01 \times 10^{-5} \text{ mg/kg-day}}{2 \times 10^{-2} \text{ mg/kg-day}}$
Manganese (unitless)

= 5×10^{-4}

CTE Incremental Cancer Risk = 1.67×10^{-7} mg/kg-day X NA kg-day/mg
Manganese (unitless)

= Not a carcinogen

CTE Hazard Index = $\frac{1.3 \times 10^{-6} \text{ mg/kg-day}}{2 \times 10^{-2} \text{ mg/kg-day}}$
Manganese (unitless)

= 6.5×10^{-5}

REFERENCES:

Risk Assessment Guidance for Superfund - Volume I - Human Health Evaluation Manual (Part A), Interim Final. USEPA Washington D.C. EPA/540/1-89/002. December 1989.

USEPA Region III Risk-Based Concentration Table April 1, 1998

Dermal Exposure Assessment: Principals and Applications. Interim Report. USEPA Washington D.C. EPA/600/8-91/011B January 1992.

Inhalation of Particulates in Soil

The Estimated Cancer Risk for Particulate Emissions for a Construction Worker at Site 42 from exposure to arsenic in soil is as follows:
This exposure scenario uses the general equation:

$$Intake_{air} = \frac{Ca_{Particulate} * IR * ET * EF * ED}{BW * AT}$$

where:

$Intake_{air}$	=	Intake of arsenic for construction worker at Site 42; 1.52E-09 mg/kg-day
$Ca_{Particulate}$	=	Chemical concentration in air of arsenic particulate; 4.11E-07 mg/m^3
IR	=	Inhalation rate; 3.3 m^3/hour
ET	=	Exposure Time; 8 hours/day
EF	=	Exposure Frequency; 250 days/year
ED	=	Exposure Duration; 1 year
BW	=	Body Weight; 70 kg
AT	=	Averaging Time for Carcinogens; 25,550 days (70 years*365 days/year)

>>$Ca_{Particulate}$ is derived from:

$$Ca_{Particulate} = Cs/PEF$$

where:

Cs	=	Chemical concentration of arsenic in soil at Site 42; 5.43 mg/kg
PEF	=	Particulate Emission Factor; 1.32E+07 m^3/kg

Therefore the estimated cancer risk for occupational worker exposed to arsenic in soil at Site 42 is equal to:
Intake = 1.52E-09 mg/kg-day
Inhalation Slope Factor for Arsenic = 1.51E+01 (mg/kg-day)$^{-1}$
Estimated Cancer Risk for The Occupational Worker at Site 42 (Intake*Slope Factor) = 2.29E-08

Inhalation of Volatiles from Groundwater for Outdoor Activities

The Estimated Cancer Risk for Volatile Emissions for a Construction Worker at Site 42 from exposure to TCE in groundwater is as follows:
This exposure scenario uses the general equation:

$$Intake_{air} = \frac{Cw * VF * IR * ET * EF * ED}{BW * AT}$$

where:

$Intake_{air}$	=	Intake for volatilization of TCE during outdoor activities; 2.58E-07 mg/kg-day
Cw	=	Chemical concentration in water; 5.21 mg/L
VF	=	Volatilzation Factor for TCE in groundwater; 1.34E-03 L/m^3
IR	=	Inhalation rate; 3.3 m^3/hour
ET	=	Exposure Time; 8 hours/day
EF	=	Exposure Frequency; 20 days/year
ED	=	Exposure Duration; 1 year
BW	=	Body Weight; 70 kg
AT	=	Averaging Time for Carcinogens; 25,550 days (70 years*365 days/year)

>>VF is derived from:

$$VF = \frac{H'}{1 + \left[\frac{U_{air} * S_{air} * L_{GW}}{W * D_{EFF-WS}} \right]} * 10^3 \, L/m^3$$

where:

VF	=	Volatilzation Factor for TCE in groundwater; 1.34E-3 L/m^3
H'	=	dimensionless Henry's Law constant for TCE; 0.422
U_{air}	=	wind speed above ground surface in the mixing zone; 340 cm/sec (avg. wind speed for Washington, D.C.)
S_{air}	=	ambient mixing zone; 200 cm
L_{GW}	=	depth to groundwater, h_v+h_{cap}; 0.1 cm
h_v	=	thickness of the vadose zone; 0 cm
h_{cap}	=	thickness of the capillary fringe; 0.1 cm
W	=	width of the source parallel to groundwater flow direction; 1500 cm
D_{EFF-WS}	=	effective diffusion coefficient between groundwater and surface soil for TCE; 1.44E-05 cm^2/sec

>>D_{EFF-WS} is derived from:

$$D_{EFF-WS} = \left(h_{cap} + h_v\right) * \left[\frac{h_{cap}}{D_{EFF-cap}} + \frac{h_v}{D_{EFF-s}}\right]^{-1}$$

where:

D_{EFF-WS}	=	effective diffusion coefficient between groundwater and surface soil for TCE; 1.44E-05 cm^2/sec
h_v	=	thickness of the vadose zone; 0 cm
h_{cap}	=	thickness of the capillary fringe; 0.1 cm
$D_{EFF-cap}$	=	effective diffusion through capillary fringe for TCE; 1.44E-05 cm^2/sec
D_{EFF-s}	=	effective diffusion in soil based on vapor-phase concentration, chemical specific; cm^2/sec

Because h_v is equal to zero, this equation reduces to show that the effective diffusion between groundwater and surface soil (D_{EFF-WS}) is equal to the effective diffusion through the capillary fringe ($D_{EFF-cap}$).

>>$D_{EFF-cap}$ is derived from:

$$D_{EFF-cap} = \left[D^{air} * \frac{Oa_{cap}^{3.33}}{Ot^2}\right] + \left[D^{wat} * \frac{1}{H'} * \left(\frac{Ow_{cap}^{3.33}}{Ot^2}\right)\right]$$

where:

$D_{EFF-cap}$	=	effective diffusion through capillary fringe for TCE; 1.44E-05 cm^2/sec
D^{air}	=	diffusion coefficient in air for TCE; 7.9E-02 cm^2/sec
D^{wat}	=	diffusion coefficient in water for TCE; 9.1E-06 cm^2/sec
H'	=	dimensionless Henry's Law constant for TCE; 0.422
Oa_{cap}	=	volumetric air content in capillary fringe soils; 0.038 cm^3-air/cm^3-soil
Ow_{cap}	=	volumetric water content in capillary fringe soils; 0.342 cm^3-H_2O/cm^3-soil
Ot	=	total soil porosity; 0.38 cm^3/cm^3-soil

Therefore the intake for an occupational worker exposed to TCE in surface soil at Site 42 is equal to:
Intake = 2.58E-07 mg/kg-day
Inhalation Slope Factor for TCE = 6.00E-03 (mg/kg-day)$^{-1}$
Estimated Cancer Risk for The Occupational Worker at Site 42 (Intake*Slope Factor) = 1.6E-9

Inhalation of Volatiles During Showering

The Estimated Cancer Risk for Volatile Emissions for a Residential Adult at Site 42 from exposure to TCE in groundwater is as follows:
This exposure scenario uses the general equation:

$$Intake_{air} = \frac{D * EF * ED}{AT}$$

where:

$Intake_{air}$	=	Inhalation dose; 5.32E-02 mg/kg-day
D	=	Inhalation dose; 1.62E-01 mg/kg/shower
EF	=	Exposure Frequency; 350 showers/year
ED	=	Exposure duration; 24 years
AT	=	Averaging Time for Carcinogens; 25,550 days (70 years*365 days/year)

>>D is derived from:

$$D = \left(\frac{IR * S * CF_1}{BW * Ra * CF_2 * CF_3} \right) * Q$$

where:

D	=	Inhalation dose; 1.62E-01 mg/kg/shower
Q	=	Function of air exchange rate and time in shower and shower room; 2.79 min
IR	=	Inhalation rate; 0.6 m^3/hour
CF_1	=	1000 L/m^3
CF_3	=	60 min/hour
S	=	Indoor voc generation rate; 6773 ug/m^3/min
BW	=	Body weight; 70 kg
Ra	=	Rate of air exchange; 1.667E-2 min^{-1}
CF_2	=	Conversion factor; 10^6 ug*L/(mg*m^3)

>>Q is derived from:

$$Q = Ds + \left[e^{-Ra*Dt} / Ra \right] - \left[e^{Ra*(Ds-Dt)} / Ra \right]$$

where:

Q	=	Function of air exchange rate and time in shower and shower room; 2.79 min
Ds	=	Duration of shower; 15 min
Dt	=	Total time in shower room; 20 min
Ra	=	Rate of air exchange; 1.667E-2 min^{-1}

>>S is derived from:

$$S = Cwd * FR / SV$$

where:

S	=	Indoor voc generation rate; 6773 ug/m^3/min
Cwd	=	Concentration leaving water droplet after time ts; 2,031.9 ug/L
FR	=	Shower flow rate; 20 L/min
SV	=	Shower room air volume; 6 m^3

>>Cwd is derived from:

$$Cwd = C * CF * \left(1 - e^{\left[\frac{-KaL*ts}{60d} \right]} \right)$$

where:

Cwd	=	Concentration leaving water droplet after time ts; 2,031.9 ug/L
C	=	Concentration in water; 5.21 mg/L
CF	=	Conversion factor; 1000 ug/mg
KaL	=	Adjusted overall mass transfer coefficient; 14.6 cm/hr
ts	=	Shower droplet time; 2 sec
d	=	Shower droplet diameter; 1 mm

>>KaL is derived from:

$$KaL = \frac{KL}{\sqrt{\frac{T_1 * m_s}{T_s * m_1}}}$$

where:

KaL	=	Adjusted overall mass transfer coefficient; 14.6 cm/hr
KL	=	Mass transfer coefficient; 11.26 cm/hr
T_1	=	Calibration water temperature of KL; 293 ^{m}K
T_s	=	Shower water temperature; 318 ^{m}K
m_1	=	Water viscosity at T_1; 1.002 centipoise
m_S	=	Water viscosity at T_s; 0.596 centipoise

>>KL is derived from:

$$KL = \frac{1}{\left[\left(\frac{1}{kl}\right) + \left(\frac{R * T}{H * kg}\right)\right]}$$

where:

KL	=	Mass transfer coefficient; 11.26 cm/hr
R	=	Ideal gas law constant; 8.21E-5 atm m^3/mol/^{m}K
T	=	Absolute temperature; 293 ^{m}K
H	=	Henry's Law constant; 0.0091 atm m^3/mole
kg	=	Gas-film mass transfer coefficient; 1,110.39 cm/hr
kl	=	Liquid-film mass transfer coefficient; 11.57 cm/hr

>>kg and kl are derived from:

$$kg = kH * \sqrt{\frac{MWH}{MW}}$$

$$kl = kC * \sqrt{\frac{MWC}{MW}}$$

where:

kg	=	Gas-film mass transfer coefficient; 1440 cm/hr
kl	=	Liquid-film mass transfer coefficient; 15.0 cm/hr
kH	=	kg for water; 3000 cm/hr
kC	=	kl for carbon dioxide; 20 cm/hr
MWH	=	Molecular weight of water; 18 g/mole
MWC	=	Molecular weight of carbon dioxide; 44 g/mole
MW	=	Molecular weight of PCE; 131.39 g/mole

The volatile chemical generation rate was estimated using the Foster and Chrostowski mass transfer model, which is based on two-phase film theory. The model employs contaminant-specific mass transfer coefficients, Henry's Law constants, droplet drop time, viscosity, temperature, etc. Specific details regarding the application of the mass transfer model can be found in the source documents (Foster and Chrostowski, 1987).

Therefore the intake for a residential adult exposed to TCE in groundwater during showering at Site 42 is equal to:
$Intake_{air}$ = 5.32E-02 mg/kg-day
Inhalation Slope Factor for TCE = 6.00E-03 $(mg/kg\text{-}day)^{-1}$
Estimated Cancer Risk for a Residential Adult at Site 42 (Intake*Slope Factor) = 3.26E-04

It was assumed that small children would take baths rather than showers; therefore, only adult residents were selected as potential receptors for this pathway.

Three potential exposure routes are associated with theoretical groundwater direct contact at Keystone Sanitation Landfill Site areas of interest. These exposure routes include ingestion, dermal contact, and inhalation of vapors during showering. The methods used to assess these routes of exposure are discussed in the following text.

For Area 1, inhalation exposure to PCE in groundwater (during showering) was calculated for adult residents only using the following equations (EPA, 1989a; Foster and Chrostowski, 1987):

APPENDIX K.3

HUMAN HEALTH RISK ASSESSMENT RESULTS

SITE 12 - TOWN GUT LANDFILL

Table K-3.1.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Full-Time Employee					Estimated Hazard Index** Maintenance Worker					Estimated Hazard Index** Adolescent Trespasser				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
46200	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
16300	Aluminum	1.59E-02	2.54E-02	NA	NT	4.13E-02	1.91E-03	3.05E-03	NA	NT	4.96E-03	1.66E-03	2.29E-03	NA	NT	3.95E-03
14.4	Arsenic	4.70E-02	6.80E-02	NA	NT	1.15E-01	5.64E-03	8.16E-03	NA	NT	1.38E-02	4.89E-03	6.13E-03	NA	NT	1.10E-02
23000	Iron	7.50E-02	3.23E-02	NA	NT	1.07E-01	9.00E-03	3.87E-03	NA	NT	1.29E-02	7.82E-03	2.91E-03	NA	NT	1.07E-02
577	Manganese	2.82E-02	1.21E-02	NA	5.98E-03	4.63E-02	3.39E-03	1.46E-03	NA	7.18E-04	5.56E-03	2.94E-03	1.09E-03	NA	3.99E-04	4.43E-03
4	Mercury	NT	NT	NA	6.90E-06	6.90E-06	NT	NT	NA	8.27E-07	8.27E-07	NT	NT	NA	4.60E-07	4.60E-07
125	Silver	2.45E-02	1.05E-02	NA	NT	3.50E-02	2.94E-03	1.26E-03	NA	NT	4.20E-03	2.55E-03	9.48E-04	NA	NT	3.50E-03
1200	Benz(a)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
1100	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
1500	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
210	Dibenz(a,h)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
	Total Risk:	**1.91E-01**	**1.48E-01**	**NT**	**5.99E-03**	**3.45E-01**	**2.29E-02**	**1.78E-02**	**NT**	**7.19E-04**	**4.14E-02**	**1.99E-02**	**1.34E-02**	**NT**	**3.99E-04**	**3.36E-02**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Incremental Cancer Risk Full-Time Employee					Estimated Incremental Cancer Risk Maintenance Worker					Estimated Incremental Cancer Risk Adolescent Trespasser				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
46200	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
16300	Aluminum	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
14.4	Arsenic	7.55E-06	1.09E-05	NA	1.15E-08	1.85E-05	9.06E-07	1.31E-06	NA	1.38E-09	2.22E-06	3.15E-07	3.94E-07	NA	3.07E-10	7.09E-07
23000	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
577	Manganese	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
4	Mercury	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
125	Silver	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
1200	Benz(a)anthracene	3.06E-07	NT	NA	NT	3.06E-07	3.67E-08	NT	NA	NT	3.67E-08	1.28E-08	NT	NA	NT	1.28E-08
1100	Benzo(a)pyrene	2.81E-06	NT	NA	1.81E-10	2.81E-06	3.37E-07	NT	NA	2.17E-11	3.37E-07	1.17E-07	NT	NA	4.82E-12	1.17E-07
1500	Benzo(b)fluoranthene	3.83E-07	NT	NT	NT	3.83E-07	4.59E-08	NT	NT	NT	4.59E-08	1.59E-08	NT	NT	NT	1.59E-08
210	Dibenz(a,h)anthracene	5.36E-07	NT	NA	NT	5.36E-07	6.43E-08	NT	NA	NT	6.43E-08	2.23E-08	NT	NA	NT	2.23E-08
	Total Risk:	**1.16E-05**	**1.09E-05**	**NT**	**1.17E-08**	**2.25E-05**	**1.39E-06**	**1.31E-06**	**NT**	**1.40E-09**	**2.70E-06**	**4.83E-07**	**3.94E-07**	**NT**	**3.12E-10**	**8.77E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT – No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA – Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Full-Time Employee					Estimated Hazard Index** Maintenance Worker					Estimated Hazard Index** Adolescent Trespasser				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
15600	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
13000	Aluminum	5.57E-03	3.55E-03	NA	NT	9.12E-03	3.82E-04	2.43E-04	NA	NT	6.25E-04	3.31E-04	1.83E-04	NA	NT	5.14E-04
8.34	Arsenic	1.19E-02	6.90E-03	NA	NT	1.88E-02	8.16E-04	4.73E-04	NA	NT	1.29E-03	7.09E-04	3.55E-04	NA	NT	1.06E-03
22200	Iron	3.17E-02	5.45E-03	NA	NT	3.72E-02	2.17E-03	3.74E-04	NA	NT	2.55E-03	1.89E-03	2.81E-04	NA	NT	2.17E-03
315	Manganese	6.75E-03	1.16E-03	NA	1.43E-03	9.34E-03	4.62E-04	7.95E-05	NA	9.80E-05	6.40E-04	4.01E-04	5.97E-05	NA	5.44E-05	5.16E-04
0.916	Mercury	NT	NT	NA	6.92E-07	6.92E-07	NT	NT	NA	4.74E-08	4.74E-08	NT	NT	NA	2.63E-08	2.63E-08
25.4	Silver	2.18E-03	3.74E-04	NA	NT	2.55E-03	1.49E-04	2.56E-05	NA	NT	1.75E-04	1.29E-04	1.93E-05	NA	NT	1.49E-04
434	Benz(a)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
380	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
493	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
222	Dibenz(a,h)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
	Total Risk:	**5.81E-02**	**1.74E-02**	**NT**	**1.43E-03**	**7.70E-02**	**3.98E-03**	**1.19E-03**	**NT**	**9.80E-05**	**5.27E-03**	**3.46E-03**	**8.97E-04**	**NT**	**5.45E-05**	**4.41E-03**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT – No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA – Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Incremental Cancer Risk Full-Time Employee					Estimated Incremental Cancer Risk Maintenance Worker					Estimated Incremental Cancer Risk Adolescent Trespasser				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
15600	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
13000	Aluminum	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
8.34	Arsenic	3.83E-07	2.22E-07	NA	5.84E-10	6.05E-07	2.62E-08	1.52E-08	NA	4.00E-11	4.15E-08	4.55E-08	2.28E-08	NA	4.45E-11	6.84E-08
22200	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
315	Manganese	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
0.916	Mercury	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
25.4	Silver	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
434	Benz(a)anthracene	9.70E-09	NT	NA	NT	9.70E-09	6.64E-10	NT	NA	NT	6.64E-10	1.15E-09	NT	NA	NT	1.15E-09
380	Benzo(a)pyrene	8.49E-08	NT	NA	5.46E-12	8.49E-08	5.82E-09	NT	NA	3.74E-13	5.82E-09	1.01E-08	NT	NA	4.16E-13	1.01E-08
493	Benzo(b)fluoranthene	1.10E-08	NT	NT	NT	1.10E-08	7.55E-10	NT	NT	NT	7.55E-10	1.31E-09	NT	NT	NT	1.31E-09
222	Dibenz(a,h)anthracene	4.96E-08	NT	NA	NT	4.96E-08	3.40E-09	NT	NA	NT	3.40E-09	5.90E-09	NT	NA	NT	5.90E-09
	Total Risk:	**5.38E-07**	**2.22E-07**	**NT**	**5.90E-10**	**7.61E-07**	**3.69E-08**	**1.52E-08**	**NT**	**4.04E-11**	**5.21E-08**	**6.40E-08**	**2.28E-08**	**NT**	**4.49E-11**	**8.69E-08**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index** Construction Worker					Estimated Hazard Index** Residential Child					Estimated Hazard Index** Residential Adult					Estimated Incremental Cancer Risk Construction Worker				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
46200	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
16300	Aluminum	6.74E-02	3.13E-02	NA	NT	9.87E-02	2.08E-01	6.73E-02	NA	NT	2.76E-01	2.23E-02	4.13E-02	NA	NT	6.37E-02	NT	NT	NA	NT	NT
14.4	Arsenic	1.98E-01	8.38E-02	NA	NT	2.82E-01	6.14E-01	1.80E-01	NA	NT	7.94E-01	6.58E-02	1.11E-01	NA	NT	1.76E-01	1.28E-06	5.39E-07	NA	6.08E-08	1.88E-06
23000	Iron	3.17E-01	3.98E-02	NA	NT	3.57E-01	9.80E-01	8.54E-02	NA	NT	1.07E+00	1.05E-01	5.25E-02	NA	NT	1.58E-01	NT	NT	NA	NT	NT
577	Manganese	1.19E-01	1.50E-02	NA	7.90E-01	9.24E-01	3.69E-01	3.21E-02	NA	2.34E-02	4.24E-01	3.95E-02	1.98E-02	NA	8.37E-03	6.77E-02	NT	NT	NA	NT	NT
4	Mercury	NT	NT	NA	9.10E-04	9.10E-04	NT	NT	NA	2.70E-05	2.70E-05	NT	NT	NA	9.65E-06	9.65E-06	NT	NT	NA	NT	NT
125	Silver	1.03E-01	1.30E-02	NA	NT	1.16E-01	3.20E-01	2.79E-02	NA	NT	3.47E-01	3.42E-02	1.71E-02	NA	NT	5.14E-02	NT	NT	NA	NT	NT
1200	Benz(a)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	5.17E-08	NT	NA	NT	5.17E-08
1100	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	4.74E-07	NT	NA	9.53E-10	4.75E-07
1500	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	6.47E-08	NT	NT	NT	6.47E-08
210	Dibenz(a,h)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	9.05E-08	NT	NA	NT	9.05E-08
	Total Risk:	**8.05E-01**	**1.83E-01**	**NT**	**7.91E-01**	**1.78E+00**	**2.49E+00**	**3.93E-01**	**NT**	**2.35E-02**	**2.91E+00**	**2.67E-01**	**2.41E-01**	**NT**	**8.38E-03**	**5.17E-01**	**1.96E-06**	**5.39E-07**	**NT**	**6.17E-08**	**2.56E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child					Estimated Incremental Cancer Risk Residential Adult					Estimated Incremental Cancer Risk Lifetime Resident				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
46200	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
16300	Aluminum	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
14.4	Arsenic	2.37E-05	6.95E-06	NA	1.08E-08	3.06E-05	1.01E-05	1.71E-05	NA	1.55E-08	2.72E-05	3.38E-05	2.40E-05	NA	2.63E-08	5.79E-05
23000	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
577	Manganese	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
4	Mercury	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
125	Silver	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
1200	Benz(a)anthracene	9.60E-07	NT	NA	NT	9.60E-07	4.11E-07	NT	NA	NT	4.11E-07	1.37E-06	NT	NA	NT	1.37E-06
1100	Benzo(a)pyrene	8.80E-06	NT	NA	1.70E-10	8.80E-06	3.77E-06	NT	NA	2.43E-10	3.77E-06	1.26E-05	NT	NA	4.12E-10	1.26E-05
1500	Benzo(b)fluoranthene	1.20E-06	NT	NT	NT	1.20E-06	5.14E-07	NT	NT	NT	5.14E-07	1.71E-06	NT	NT	NT	1.71E-06
210	Dibenz(a,h)anthracene	1.68E-06	NT	NA	NT	1.68E-06	7.20E-07	NT	NA	NT	7.20E-07	2.40E-06	NT	NA	NT	2.40E-06
	Total Risk:	**3.63E-05**	**6.95E-06**	**NT**	**1.10E-08**	**4.33E-05**	**1.56E-05**	**1.71E-05**	**NT**	**1.57E-08**	**3.27E-05**	**5.19E-05**	**2.40E-05**	**NT**	**2.67E-08**	**7.59E-05**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index Construction Worker					Estimated Hazard Index Residential Child					Estimated Hazard Index Residential Adult					Estimated Incremental Cancer Risk Construction Worker				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
15600	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
13000	Aluminum	2.67E-02	4.37E-03	NA	NT	3.11E-02	5.56E-02	7.17E-03	NA	NT	6.27E-02	5.95E-03	4.41E-03	NA	NT	1.04E-02	NT	NT	NA	NT	NT
8.34	Arsenic	5.72E-02	8.51E-03	NA	NT	6.57E-02	1.19E-01	1.40E-02	NA	NT	1.33E-01	1.27E-02	8.58E-03	NA	NT	2.13E-02	3.68E-07	5.47E-08	NA	3.08E-08	4.53E-07
22200	Iron	1.52E-01	6.72E-03	NA	NT	1.59E-01	3.16E-01	1.10E-02	NA	NT	3.27E-01	3.39E-02	6.78E-03	NA	NT	4.07E-02	NT	NT	NA	NT	NT
315	Manganese	3.24E-02	1.43E-03	NA	3.78E-01	4.11E-01	6.73E-02	2.35E-03	NA	8.56E-03	7.82E-02	7.21E-03	1.44E-03	NA	3.06E-03	1.17E-02	NT	NT	NA	NT	NT
0.916	Mercury	NT	NT	NA	1.83E-04	1.83E-04	NT	NT	NA	4.14E-06	4.14E-06	NT	NT	NA	1.48E-06	1.48E-06	NT	NT	NA	NT	NT
25.4	Silver	1.05E-02	4.62E-04	NA	NT	1.09E-02	2.17E-02	7.57E-04	NA	NT	2.25E-02	2.33E-03	4.65E-04	NA	NT	2.79E-03	NT	NT	NA	NT	NT
434	Benz(a)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	9.31E-09	NT	NA	NT	9.31E-09
380	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	8.15E-08	NT	NA	2.88E-10	8.18E-08
493	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1.06E-08	NT	NT	NT	1.06E-08
222	Dibenz(a,h)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	4.76E-08	NT	NA	NT	4.76E-08
	Total Risk:	**2.79E-01**	**2.15E-02**	**NT**	**3.78E-01**	**6.78E-01**	**5.80E-01**	**3.53E-02**	**NT**	**8.56E-03**	**6.23E-01**	**6.21E-02**	**2.17E-02**	**NT**	**3.06E-03**	**8.68E-02**	**5.17E-07**	**5.47E-08**	**NT**	**3.11E-08**	**6.02E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child					Estimated Incremental Cancer Risk Residential Adult					Estimated Incremental Cancer Risk Lifetime Resident				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
15600	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
13000	Aluminum	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
8.34	Arsenic	1.53E-06	1.79E-07	NA	1.40E-09	1.71E-06	5.73E-07	3.86E-07	NA	1.75E-09	9.61E-07	2.10E-06	5.65E-07	NA	3.14E-09	2.67E-06
22200	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
315	Manganese	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
0.916	Mercury	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
25.4	Silver	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
434	Benz(a)anthracene	3.87E-08	NT	NA	NT	3.87E-08	1.45E-08	NT	NA	NT	1.45E-08	5.32E-08	NT	NA	NT	5.32E-08
380	Benzo(a)pyrene	3.39E-07	NT	NA	1.31E-11	3.39E-07	1.27E-07	NT	NA	1.63E-11	1.27E-07	4.66E-07	NT	NA	2.94E-11	4.66E-07
493	Benzo(b)fluoranthene	4.39E-08	NT	NT	NT	4.39E-08	1.65E-08	NT	NT	NT	1.65E-08	6.04E-08	NT	NT	NT	6.04E-08
222	Dibenz(a,h)anthracene	1.98E-07	NT	NA	NT	1.98E-07	7.42E-08	NT	NA	NT	7.42E-08	2.72E-07	NT	NA	NT	2.72E-07
	Total Risk:	**2.15E-06**	**1.79E-07**	**NT**	**1.41E-09**	**2.33E-06**	**8.05E-07**	**3.86E-07**	**NT**	**1.76E-09**	**1.19E-06**	**2.95E-06**	**5.65E-07**	**NT**	**3.17E-09**	**3.52E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.5

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult				Estimated Incremental Cancer Risk Construction Worker		
		Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Dermal Contact	Inhalation of Volatiles	Total
32.8	Arsenic	2.92E-03	NA	2.92E-03	6.99E+00	1.28E-02	7.00E+00	3.00E+00	7.88E-03	NA	3.00E+00	1.88E-08	NA	1.88E-08
356	Barium	1.29E-04	NA	1.29E-04	3.25E-01	5.67E-04	3.26E-01	1.39E-01	3.48E-04	NA	1.40E-01	NT	NA	NT
83700	Iron	7.08E-03	NA	7.08E-03	1.78E+01	3.11E-02	1.79E+01	7.64E+00	1.91E-02	NA	7.66E+00	NT	NA	NT
4470	Manganese	4.93E-03	NA	4.93E-03	1.24E+01	2.16E-02	1.24E+01	5.32E+00	1.33E-02	NA	5.34E+00	NT	NA	NT
1140	Zinc	3.86E-04	NA	3.86E-04	2.43E-01	1.69E-03	2.45E-01	1.04E-01	1.04E-03	NA	1.05E-01	NT	NA	NT
0.005	Dieldrin	3.36E-04	NA	3.36E-04	6.39E-03	8.36E-03	1.48E-02	2.74E-03	5.14E-03	NA	7.88E-03	3.85E-09	NA	3.85E-09
0.003	Heptachlor Epoxide	2.59E-04	NA	2.59E-04	1.48E-02	6.44E-03	2.12E-02	6.32E-03	3.96E-03	NA	1.03E-02	4.38E-10	NA	4.38E-10
17	N-Nitrosodiphenylamine (1)	NT	NA	NT	NT	NT	NT	NT	NT	NA	NT	1.39E-09	NA	1.39E-09
306	1,2-Dichloroethene (cis)	8.37E-03	NT	8.37E-03	1.96E+00	1.10E-01	2.07E+00	6.38E-01	3.80E-02	NT	8.76E-01	NT	NT	NT
12	Trichloroethene	9.08E-04	NT	9.08E-04	1.28E-01	1.46E-02	1.42E-01	5.48E-02	5.41E-03	NT	6.02E-02	8.56E-10	2.80E-11	8.84E-10
317	Vinyl Chloride	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1.67E-06	9.60E-08	1.77E-06
	Total Risk:	**2.53E-02**	**NT**	**2.53E-02**	**3.99E+01**	**2.07E-01**	**4.01E+01**	**1.71E+01**	**9.42E-02**	**NT**	**1.72E+01**	**1.70E-06**	**9.60E-08**	**1.786E-06**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.5

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child			Estimated Incremental Cancer Risk Residential Adult				Estimated Incremental Cancer Risk Lifetime Resident			
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total
32.8	Arsenic	2.70E-04	4.94E-07	2.70E-04	4.62E-04	1.22E-06	NA	4.63E-04	7.32E-04	1.71E-06	NA	7.33E-04
356	Barium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
83700	Iron	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
4470	Manganese	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
1140	Zinc	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
0.005	Dieldrin	4.38E-07	5.73E-07	1.01E-06	7.51E-07	1.41E-06	NA	2.16E-06	1.19E-06	1.98E-06	NA	3.17E-06
0.003	Heptachlor Epoxide	1.50E-07	6.54E-08	2.15E-07	2.56E-07	1.61E-07	NA	4.17E-07	4.06E-07	2.26E-07	NA	6.32E-07
17	N-Nitrosodiphenylamine (1)	4.56E-07	1.87E-07	6.44E-07	7.82E-07	4.61E-07	NA	1.24E-06	1.24E-06	6.48E-07	NA	1.89E-06
306	1,2-Dichloroethene (cis)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
12	Trichloroethene	7.23E-07	8.27E-08	8.06E-07	1.24E-06	1.22E-07	7.50E-07	2.11E-06	1.96E-06	2.05E-07	7.50E-07	2.92E-06
317	Vinyl Chloride	3.30E-03	1.06E-04	3.41E-03	5.66E-03	1.23E-04	1.32E-03	7.10E-03	8.96E-03	2.29E-04	1.32E-03	1.05E-02
	Total Risk:	**3.57E-03**	**1.08E-04**	**3.68E-03**	**6.12E-03**	**1.27E-04**	**1.32E-03**	**7.57E-03**	**9.69E-03**	**2.34E-04**	**1.32E-03**	**1.12E-02**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.6

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult				Estimated Incremental Cancer Risk Construction Worker		
		Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Dermal Contact	Inhalation of Volatiles	Total
17.2	Arsenic	1.53E-03	NA	1.53E-03	2.45E+00	3.00E-03	2.45E+00	7.35E-01	1.85E-03	NA	7.37E-01	9.84E-09	NA	9.84E-09
225	Barium	8.15E-05	NA	8.15E-05	1.37E-01	1.60E-04	1.38E-01	4.12E-02	9.83E-05	NA	4.13E-02	NT	NA	NT
62800	Iron	5.31E-03	NA	5.31E-03	8.95E+00	1.04E-02	8.96E+00	2.68E+00	6.40E-03	NA	2.69E+00	NT	NA	NT
1660	Manganese	1.83E-03	NA	1.83E-03	3.08E+00	3.59E-03	3.09E+00	9.25E-01	2.21E-03	NA	9.28E-01	NT	NA	NT
259	Zinc	8.76E-05	NA	8.76E-05	3.69E-02	1.72E-04	3.71E-02	1.11E-02	1.06E-04	NA	1.12E-02	NT	NA	NT
0.00983	Dieldrin	6.62E-04	NA	6.62E-04	8.40E-03	8.98E-03	1.74E-02	2.52E-03	5.52E-03	NA	8.04E-03	7.56E-09	NA	7.56E-09
0.00488	Heptachlor Epoxide	4.22E-04	NA	4.22E-04	1.60E-02	5.73E-03	2.18E-02	4.81E-03	3.52E-03	NA	8.34E-03	7.13E-10	NA	7.13E-10
5.08	N-Nitrosodiphenylamine (1)	NT	NA	NT	NT	NT	NT	NT	NT	NA	NT	4.15E-10	NA	4.15E-10
51.4	1,2-Dichloroethene (cis)	1.41E-03	NT	1.41E-03	2.20E-01	1.01E-02	2.30E-01	6.59E-02	3.49E-03	NT	6.94E-02	NT	NT	NT
2.42	Trichloroethene	1.83E-04	NT	1.83E-04	1.72E-02	1.61E-03	1.88E-02	5.17E-03	5.96E-04	NT	5.77E-03	1.73E-10	5.70E-12	1.79E-10
53.3	Vinyl Chloride	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	2.81E-07	1.60E-08	2.97E-07
	Total Risk:	**1.15E-02**	**NT**	**1.15E-02**	**1.49E+01**	**4.37E-02**	**1.50E+01**	**4.48E+00**	**2.38E-02**	**NT**	**4.50E+00**	**3.00E-07**	**1.60E-08**	**3.157E-07**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.6

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child			Estimated Incremental Cancer Risk Residential Adult				Estimated Incremental Cancer Risk Lifetime Resident			
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total
17.2	Arsenic	3.15E-05	3.86E-08	3.15E-05	3.31E-05	8.31E-08	NA	3.32E-05	6.46E-05	1.22E-07	NA	6.47E-05
225	Barium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
62800	Iron	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
1660	Manganese	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
259	Zinc	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
0.00983	Dieldrin	1.92E-07	2.05E-07	3.97E-07	2.02E-07	4.42E-07	NA	6.43E-07	3.94E-07	6.47E-07	NA	1.04E-06
0.00488	Heptachlor Epoxide	5.42E-08	1.94E-08	7.36E-08	5.69E-08	4.17E-08	NA	9.86E-08	1.11E-07	6.10E-08	NA	1.72E-07
5.08	N-Nitrosodiphenylamine (1)	3.04E-08	1.02E-08	4.06E-08	3.19E-08	2.19E-08	NA	5.39E-08	6.23E-08	3.21E-08	NA	9.44E-08
51.4	1,2-Dichloroethene (cis)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2.42	Trichloroethene	3.25E-08	3.04E-09	3.55E-08	3.41E-08	3.94E-09	1.61E-08	5.42E-08	6.66E-08	6.97E-09	1.61E-08	8.97E-08
53.3	Vinyl Chloride	1.24E-04	3.26E-06	1.27E-04	1.30E-04	3.30E-06	2.36E-05	1.57E-04	2.54E-04	6.56E-06	2.36E-05	2.84E-04
	Total Risk:	**1.55E-04**	**3.53E-06**	**1.59E-04**	**1.63E-04**	**3.89E-06**	**2.37E-05**	**1.91E-04**	**3.19E-04**	**7.43E-06**	**2.37E-05**	**3.50E-04**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.7

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult			Estimated Hazard Index** Adolescent Trespasser			Estimated Incremental Cancer Risk Residential Child		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
2.8	Antimony	4.09E-03	1.43E-03	5.52E-03	8.77E-04	8.77E-04	1.75E-03	1.43E-03	3.54E-03	4.97E-03	NT	NT	NT
6	Arsenic	1.17E-02	4.29E-04	1.21E-02	2.50E-03	2.64E-04	2.77E-03	4.08E-03	1.06E-03	5.14E-03	4.51E-07	1.65E-08	4.67E-07
854	Iron	1.66E-03	5.80E-05	1.72E-03	3.57E-04	3.57E-05	3.92E-04	5.80E-04	1.44E-04	7.24E-04	NT	NT	NT
140	Manganese	3.56E-03	1.24E-04	3.68E-03	7.62E-04	7.62E-05	8.39E-04	1.24E-03	3.08E-04	1.55E-03	NT	NT	NT
0.22	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.006	Heptachlor Epoxide	2.70E-04	5.89E-04	8.59E-04	5.78E-05	3.62E-04	4.20E-04	9.41E-05	1.46E-03	1.56E-03	2.74E-09	5.98E-09	8.71E-09
	Total Risk:	**2.13E-02**	**2.63E-03**	**2.39E-02**	**4.56E-03**	**1.61E-03**	**6.17E-03**	**7.42E-03**	**6.52E-03**	**1.39E-02**	**4.54E-07**	**2.25E-08**	**4.76E-07**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.7

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Adult			Estimated Incremental Cancer Risk Lifetime Resident			Estimated Incremental Cancer Risk Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
2.8	Antimony	NT	NT	NT	NT	NT	NT	NT	NT	NT
6	Arsenic	3.86E-07	4.07E-08	4.27E-07	8.37E-07	5.72E-08	8.95E-07	2.62E-07	6.84E-08	3.31E-07
854	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT
140	Manganese	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.22	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.006	Heptachlor Epoxide	2.34E-09	1.47E-08	1.70E-08	5.08E-09	2.07E-08	2.58E-08	1.59E-09	2.47E-08	2.63E-08
	Total Risk:	**3.89E-07**	**5.54E-08**	**4.44E-07**	**8.42E-07**	**7.79E-08**	**9.20E-07**	**2.64E-07**	**9.32E-08**	**3.57E-07**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.8

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult			Estimated Hazard Index** Adolescent Trespasser			Estimated Incremental Cancer Risk Residential Child		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
2.8	Antimony	1.02E-03	3.57E-04	1.38E-03	2.19E-04	2.19E-04	4.38E-04	3.57E-04	8.85E-04	1.24E-03	NT	NT	NT
4.3	Arsenic	2.09E-03	7.69E-05	2.17E-03	4.49E-04	4.72E-05	4.96E-04	7.31E-04	1.91E-04	9.21E-04	2.69E-08	9.88E-10	2.79E-08
425	Iron	2.07E-04	7.22E-06	2.14E-04	4.44E-05	4.44E-06	4.88E-05	7.22E-05	1.79E-05	9.01E-05	NT	NT	NT
101	Manganese	6.42E-04	2.24E-05	6.64E-04	1.37E-04	1.37E-05	1.51E-04	2.24E-04	5.55E-05	2.79E-04	NT	NT	NT
0.07	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.00292	Heptachlor Epoxide	3.28E-05	1.01E-04	1.34E-04	7.03E-06	6.23E-05	6.94E-05	1.14E-05	2.52E-04	2.63E-04	1.11E-10	3.43E-10	4.54E-10
	Total Risk:	**4.00E-03**	**5.64E-04**	**4.56E-03**	**8.57E-04**	**3.47E-04**	**1.20E-03**	**1.39E-03**	**1.40E-03**	**2.80E-03**	**2.70E-08**	**1.33E-09**	**2.84E-08**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.8

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Adult			Estimated Incremental Cancer Risk Lifetime Resident			Estimated Incremental Cancer Risk Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
2.8	Antimony	NT	NT	NT	NT	NT	NT	NT	NT	NT
4.3	Arsenic	2.02E-08	2.13E-09	2.23E-08	4.71E-08	3.11E-09	5.02E-08	4.70E-08	1.23E-08	5.92E-08
425	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT
101	Manganese	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.07	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.00292	Heptachlor Epoxide	8.32E-11	7.37E-10	8.21E-10	1.94E-10	1.08E-09	1.27E-09	1.93E-10	4.25E-09	4.45E-09
	Total Risk:	**2.03E-08**	**2.86E-09**	**2.31E-08**	**4.73E-08**	**4.19E-09**	**5.15E-08**	**4.72E-08**	**1.65E-08**	**6.37E-08**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.9

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Full-Time Employee			Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Maintenance Worker			Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
471000	Nitrocellulose	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19.7	Arsenic	6.43E-02	9.31E-02	1.57E-01	3.70E-02	2.75E-02	6.45E-02	7.71E-03	1.12E-02	1.89E-02	3.84E-02	1.13E-02	4.96E-02	4.11E-03	6.93E-03	1.10E-02
33800	Iron	1.10E-01	4.74E-02	1.58E-01	6.35E-02	1.40E-02	7.75E-02	1.32E-02	5.69E-03	1.89E-02	6.59E-02	5.74E-03	7.16E-02	7.06E-03	3.53E-03	1.06E-02
148	Vanadium	2.07E-02	4.45E-01	4.65E-01	1.19E-02	1.32E-01	1.43E-01	2.48E-03	5.34E-02	5.59E-02	1.24E-02	5.38E-02	6.62E-02	1.32E-03	3.31E-02	3.44E-02
14000	Benz(a)anthracene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
12000	Benzo(a)pyrene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19000	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2300	Dibenz(a,h)anthracene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
6900	Indeno(1,2,3-cd)pyrene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**1.95E-01**	**5.85E-01**	**7.80E-01**	**1.12E-01**	**1.73E-01**	**2.86E-01**	**2.34E-02**	**7.02E-02**	**9.37E-02**	**1.17E-01**	**7.09E-02**	**1.87E-01**	**1.25E-02**	**4.36E-02**	**5.60E-02**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.9

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Adolescent Trespasser			Estimated Cancer Risk Full-Time Employee			Estimated Cancer Risk Construction Worker			Estimated Cancer Risk Maintenance Worker		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
471000	Nitrocellulose	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19.7	Arsenic	6.69E-03	8.39E-03	1.51E-02	1.03E-05	1.50E-05	2.53E-05	2.38E-07	1.77E-07	4.15E-07	1.24E-06	1.79E-06	3.03E-06
33800	Iron	1.15E-02	4.27E-03	1.58E-02	NT	NT	NT	NT	NT	NT	NT	NT	NT
148	Vanadium	2.16E-03	4.01E-02	4.22E-02	NT	NT	NT	NT	NT	NT	NT	NT	NT
14000	Benz(a)anthracene	NT	NT	NT	3.57E-06	NT	3.57E-06	8.23E-08	NT	8.23E-08	4.29E-07	NT	4.29E-07
12000	Benzo(a)pyrene	NT	NT	NT	3.06E-05	NT	3.06E-05	7.05E-07	NT	7.05E-07	3.67E-06	NT	3.67E-06
19000	Benzo(b)fluoranthene	NT	NT	NT	4.85E-06	NT	4.85E-06	1.12E-07	NT	1.12E-07	5.82E-07	NT	5.82E-07
2300	Dibenz(a,h)anthracene	NT	NT	NT	5.87E-06	NT	5.87E-06	1.35E-07	NT	1.35E-07	7.04E-07	NT	7.04E-07
6900	Indeno(1,2,3-cd)pyrene	NT	NT	NT	1.76E-06	NT	1.76E-06	4.06E-08	NT	4.06E-08	2.11E-07	NT	2.11E-07
	Total Risk:	**2.03E-02**	**5.28E-02**	**7.31E-02**	**5.70E-05**	**1.50E-05**	**7.19E-05**	**1.31E-06**	**1.77E-07**	**1.49E-06**	**6.84E-06**	**1.79E-06**	**8.63E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.9

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Cancer Risk Residential Child			Estimated Cancer Risk Residential Adult			Estimated Cancer Risk Lifetime Resident			Estimated Cancer Risk Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
471000	Nitrocellulose	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19.7	Arsenic	1.48E-06	4.35E-07	1.91E-06	6.34E-07	1.07E-06	1.70E-06	2.11E-06	1.50E-06	3.62E-06	4.30E-07	5.39E-07	9.70E-07
33800	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
148	Vanadium	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
14000	Benz(a)anthracene	5.12E-07	NT	5.12E-07	2.19E-07	NT	2.19E-07	7.31E-07	NT	7.31E-07	1.49E-07	NT	1.49E-07
12000	Benzo(a)pyrene	4.39E-06	NT	4.39E-06	1.88E-06	NT	1.88E-06	6.27E-06	NT	6.27E-06	1.28E-06	NT	1.28E-06
19000	Benzo(b)fluoranthene	6.95E-07	NT	6.95E-07	2.98E-07	NT	2.98E-07	9.93E-07	NT	9.93E-07	2.02E-07	NT	2.02E-07
2300	Dibenz(a,h)anthracene	8.41E-07	NT	8.41E-07	3.60E-07	NT	3.60E-07	1.20E-06	NT	1.20E-06	2.45E-07	NT	2.45E-07
6900	Indeno(1,2,3-cd)pyrene	2.52E-07	NT	2.52E-07	1.08E-07	NT	1.08E-07	3.60E-07	NT	3.60E-07	7.34E-08	NT	7.34E-08
	Total Risk:	**8.17E-06**	**4.35E-07**	**8.60E-06**	**3.50E-06**	**1.07E-06**	**4.57E-06**	**1.17E-05**	**1.50E-06**	**1.32E-05**	**2.37E-06**	**5.39E-07**	**2.91E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.10

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Full-Time Employee			Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Maintenance Worker			Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult			Estimated Hazard Index** Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
94700	Nitrocellulose	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
9.13	Arsenic	1.30E-02	7.56E-03	2.06E-02	4.29E-03	1.28E-03	5.56E-03	8.93E-04	5.18E-04	1.41E-03	4.45E-03	5.22E-04	4.97E-03	4.76E-04	3.21E-04	7.97E-04	7.76E-04	3.89E-04	1.16E-03
21700	Iron	3.10E-02	5.33E-03	3.63E-02	1.02E-02	9.00E-04	1.11E-02	2.12E-03	3.65E-04	2.49E-03	1.06E-02	3.68E-04	1.09E-02	1.13E-03	2.26E-04	1.36E-03	1.84E-03	2.74E-04	2.12E-03
47.3	Vanadium	2.90E-03	2.49E-02	2.78E-02	9.52E-04	4.21E-03	5.16E-03	1.98E-04	1.71E-03	1.90E-03	9.87E-04	1.72E-03	2.71E-03	1.06E-04	1.06E-03	1.16E-03	1.72E-04	1.28E-03	1.45E-03
2610	Benz(a)anthracene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2250	Benzo(a)pyrene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
3550	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
574	Dibenz(a,h)anthracene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1340	Indeno(1,2,3-cd)pyrene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**4.69E-02**	**3.78E-02**	**8.47E-02**	**1.54E-02**	**6.38E-03**	**2.18E-02**	**3.21E-03**	**2.59E-03**	**5.80E-03**	**1.60E-02**	**2.61E-03**	**1.86E-02**	**1.71E-03**	**1.61E-03**	**3.32E-03**	**2.79E-03**	**1.94E-03**	**4.74E-03**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.1.10

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 12 - Town Gut Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Cancer Risk Full-Time Employee			Estimated Cancer Risk Construction Worker			Estimated Cancer Risk Maintenance Worker			Estimated Cancer Risk Residential Child			Estimated Cancer Risk Residential Adult			Estimated Cancer Risk Lifetime Resident			Estimated Cancer Risk Adolescent Trespasser		
Representative Concentration	Substance	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
94700	Nitrocellulose	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
9.13	Arsenic	4.19E-07	2.43E-07	6.62E-07	2.76E-08	8.20E-09	3.58E-08	2.87E-08	1.66E-08	4.54E-08	5.72E-08	6.71E-09	6.39E-08	2.14E-08	1.44E-08	3.59E-08	7.86E-08	2.12E-08	9.98E-08	4.99E-08	2.50E-08	7.49E-08
21700	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
47.3	Vanadium	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2610	Benz(a)anthracene	5.83E-08	NT	5.83E-08	3.84E-09	NT	3.84E-09	3.99E-09	NT	3.99E-09	7.95E-09	NT	7.95E-09	2.98E-09	NT	2.98E-09	1.09E-08	NT	1.09E-08	6.94E-09	NT	6.94E-09
2250	Benzo(a)pyrene	5.03E-07	NT	5.03E-07	3.31E-08	NT	3.31E-08	3.44E-08	NT	3.44E-08	6.86E-08	NT	6.86E-08	2.57E-08	NT	2.57E-08	9.43E-08	NT	9.43E-08	5.98E-08	NT	5.98E-08
3550	Benzo(b)fluoranthene	7.93E-08	NT	7.93E-08	5.22E-09	NT	5.22E-09	5.43E-09	NT	5.43E-09	1.08E-08	NT	1.08E-08	4.06E-09	NT	4.06E-09	1.49E-08	NT	1.49E-08	9.44E-09	NT	9.44E-09
574	Dibenz(a,h)anthracene	1.28E-07	NT	1.28E-07	8.43E-09	NT	8.43E-09	8.79E-09	NT	8.79E-09	1.75E-08	NT	1.75E-08	6.56E-09	NT	6.56E-09	2.41E-08	NT	2.41E-08	1.53E-08	NT	1.53E-08
1340	Indeno(1,2,3-cd)pyrene	2.99E-08	NT	2.99E-08	1.97E-09	NT	1.97E-09	2.05E-09	NT	2.05E-09	4.08E-09	NT	4.08E-09	1.53E-09	NT	1.53E-09	5.62E-09	NT	5.62E-09	3.56E-09	NT	3.56E-09
	Total Risk:	**1.22E-06**	**2.43E-07**	**1.46E-06**	**8.01E-08**	**8.20E-09**	**8.83E-08**	**8.34E-08**	**1.66E-08**	**1.00E-07**	**1.66E-07**	**6.71E-09**	**1.73E-07**	**6.23E-08**	**1.44E-08**	**7.67E-08**	**2.28E-07**	**2.12E-08**	**2.50E-07**	**1.45E-07**	**2.50E-08**	**1.70E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT – No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA – Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

IEUBK MODEL - Exposure to Lead (Page 1 of 2)

SITE NAME: Site 12 Town Gut Landfill

Exposure Scenario: RME

Location: IHDIV_NSWC, Indian Head, Maryland

Date: May 15, 1998

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 ug Pb/m3 DEFAULT
Indoor AIR Pb Conc: 30.0 percent of outdoor.
Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 34.50 ug Pb/L
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: constant conc.
Dust: constant conc.

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	67.6	67.6
1-2	67.6	67.6
2-3	67.6	67.6
3-4	67.6	67.6
4-5	67.6	67.6
5-6	67.6	67.6
6-7	67.6	67.6

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	4.0	7.32	1.59
1-2:	5.1	12.77	2.45
2-3:	5.0	13.57	2.47
3-4:	4.8	13.80	2.51
4-5:	4.5	13.55	1.88
5-6:	4.3	14.10	1.70
6-7:	4.1	14.53	1.62

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.54	3.17	0.00	0.02
1-2:	2.58	7.71	0.00	0.03
2-3:	2.93	8.10	0.00	0.06
3-4:	2.86	8.37	0.00	0.07
4-5:	2.79	8.81	0.00	0.07
5-6:	2.96	9.34	0.00	0.09
6-7:	3.28	9.54	0.00	0.09

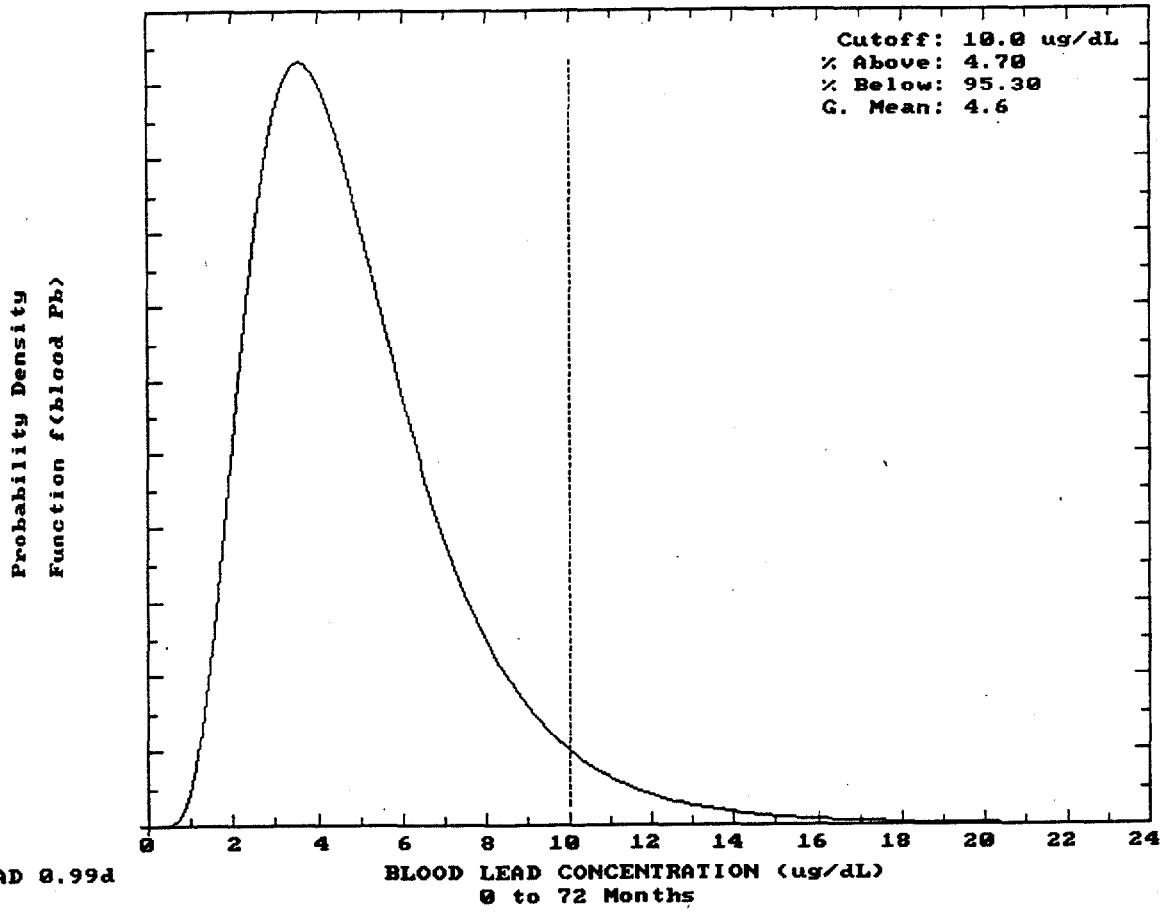
IEUBK MODEL - Exposure to Lead (Page 2 of 2)

SITE NAME: Site 12 Town Gut Landfill

Exposure Scenario: RME

Location: IHDIV_NSWC, Indian Head, Maryland

Date: May 15, 1998



IEUBK MODEL - Exposure to Lead (Page 1 of 2)

SITE NAME: Site 12 Town Gut Landfill

Exposure Scenario: CTE

Location: IHDIV_NSWC, Indian Head, Maryland

Date: May 15, 1998

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 ug Pb/m3 DEFAULT
Indoor AIR Pb Conc: 30.0 percent of outdoor.
Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 13.30 ug Pb/L
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: constant conc.
Dust: constant conc.

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	39.8	39.8
1-2	39.8	39.8
2-3	39.8	39.8
3-4	39.8	39.8
4-5	39.8	39.8
5-6	39.8	39.8
6-7	39.8	39.8

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	2.7	4.86	0.96
1-2:	3.0	7.37	1.51
2-3:	2.9	7.91	1.52
3-4:	2.8	7.92	1.53
4-5:	2.6	7.61	1.15
5-6:	2.4	7.89	1.03
6-7:	2.3	8.23	0.98

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.62	1.26	0.00	0.02
1-2:	2.71	3.12	0.00	0.03
2-3:	3.06	3.26	0.00	0.06
3-4:	2.97	3.35	0.00	0.07
4-5:	2.88	3.51	0.00	0.07
5-6:	3.05	3.71	0.00	0.09
6-7:	3.38	3.78	0.00	0.09

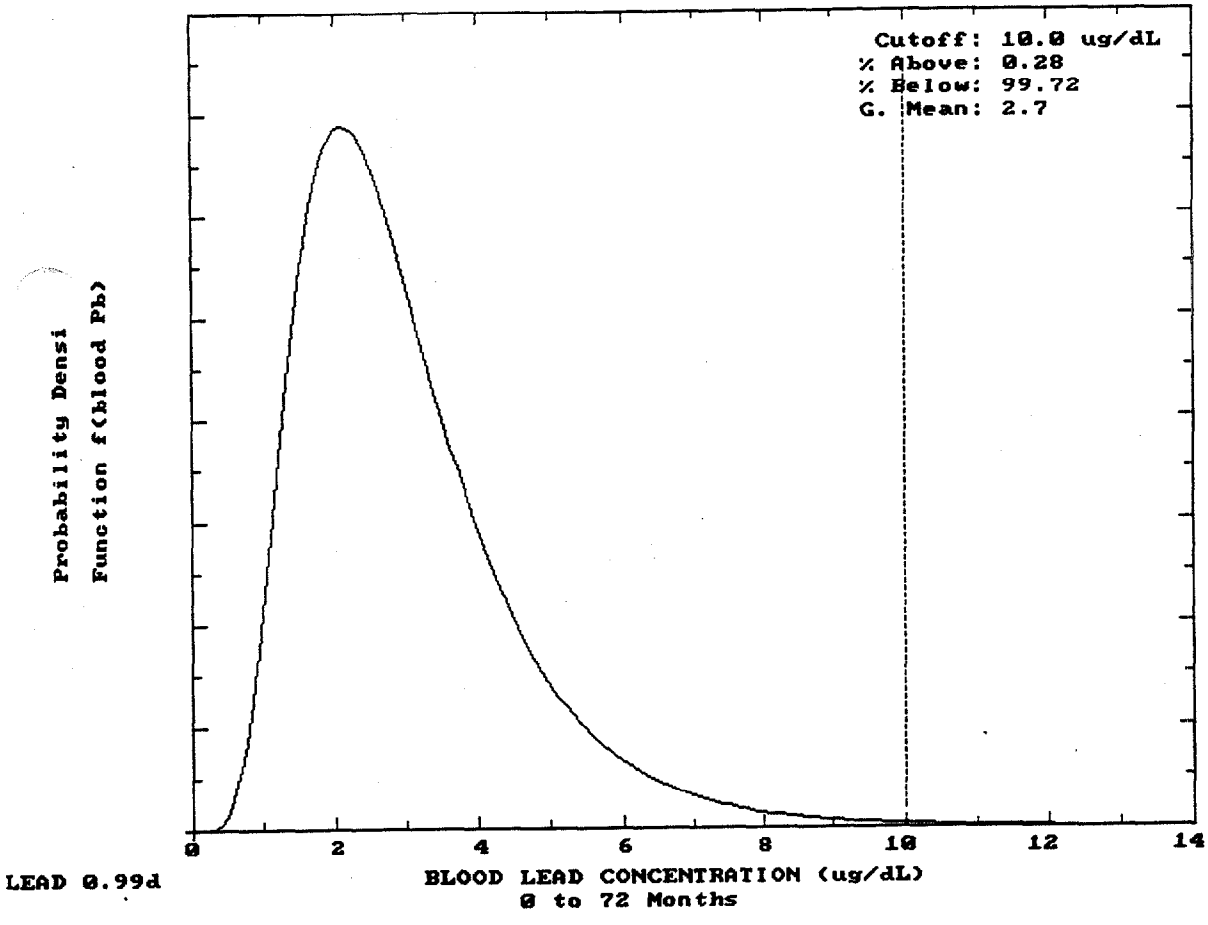
IEUBK MODEL - Exposure to Lead (Page 2 of 2)

SITE NAME: Site 12 Town Gut Landfill

Exposure Scenario: CTE

Location: IHDIV_NSWC, Indian Head, Maryland

Date: May 15, 1998



RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH

SITE NAME: SITE 12 - TOWN GUT LANDFILL
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADOLESCENT TRESPASSER (7-16 YEARS) - REASONABLE MAXIMUM EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH INGESTION OF FISH ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

RELEVANT EQUATION: $$\text{Intake} = \frac{Cf \times IR \times FI \times EF \times ED}{BW \times AT}$$

WHERE:			
	Cf = :		Chemical concentration in fish (mg/kg)
	IR = :	0.145	Ingestion Rate (Kg/meal)
	FI = :	1	Fraction from contaminated source (unitless)
	EF = :	48	Exposure Frequency (meals/year)
	ED = :	10	Exposure Duration (years)
	BW = :	43	Body Weight (kg)
	ATc = :	25,550	Averaging time for carcinogenic exposures (days)
	ATn = :	3,650	Averaging time for noncarcinogenic exposures (days)

Unit Dose
Lifetime Chronic Daily Intake = 6.3E-05 kg-fish/kg-wt/day
Chronic Daily Intake = : 4.4E-04 kg-fish/kg-wt/day

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH (PAGE TWO)

SITE NAME: SITE 12 - TOWN GUT LANDFILL
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADOLESCENT TRESPASSER (7-16 YEARS) - REASONABLE MAXIMUM EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

CHEMICAL	Cf (mg/kg)	Lifetime Chronic Daily Intake (mg/kg/day)	Chronic Daily Intake (mg/kg/day)	Cancer Slope Factor $(mg/kg/day)^{-1}$	Reference Dose (mg/kg/day)	Lifetime Cancer Risk	Percent Cancer Risk	Hazard Quotient	Percent Hazard Quotient
Di-n-butyl phthalate	1034	6.6E-02	4.6E-01	NA	1.00E+00	NA	NA	4.6E-01	52.6%
Heptachlor Epoxide	0.00066	4.2E-08	2.9E-07	9.10E+00	1.30E-05	3.8E-07	1.5%	2.3E-02	2.6%
Arsenic	0.264	1.7E-05	1.2E-04	1.50E+00	3.00E-04	2.5E-05	98.5%	3.9E-01	44.8%
					Total	**2.5E-05**	**100.0%**	**8.7E-01**	**100.0%**

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH

SITE NAME: SITE 12 - TOWN GUT LANDFILL
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADOLESCENT TRESPASSER (7-16 YEARS) - CENTRAL TENDENCY EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH INGESTION OF FISH ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

RELEVANT EQUATION: $$\text{Intake} = \frac{Cf \times IR \times FI \times EF \times ED}{BW \times AT}$$

WHERE:			
	Cf = :		Chemical concentration in fish (mg/kg)
	IR = :	0.145	Ingestion Rate (Kg/meal)
	FI = :	1	Fraction from contaminated source (unitless)
	EF = :	24	Exposure Frequency (meals/year)
	ED = :	10	Exposure Duration (years)
	BW = :	43	Body Weight (kg)
	ATc = :	25,550	Averaging time for carcinogenic exposures (days)
	ATn = :	3,650	Averaging time for noncarcinogenic exposures (days)

Unit Dose
Lifetime Chronic Daily Intake = 3.2E-05 kg-fish/kg-wt/day
Chronic Daily Intake = : 2.2E-04 kg-fish/kg-wt/day

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH (PAGE TWO)

SITE NAME: SITE 12 - TOWN GUT LANDFILL
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADOLESCENT TRESPASSER (7-16 YEARS) - CENTRAL TENDENCY EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

CHEMICAL	Cf (mg/kg)	Lifetime Chronic Daily Intake (mg/kg/day)	Chronic Daily Intake (mg/kg/day)	Cancer Slope Factor $(mg/kg/day)^{-1}$	Reference Dose (mg/kg/day)	Lifetime Cancer Risk	Percent Cancer Risk	Hazard Quotient	Percent Hazard Quotient
Di-n-butyl phthalate	302	9.6E-03	6.7E-02	NA	1.00E+00	NA	NA	6.7E-02	31.5%
Heptachlor Epoxide	0.00033	1.0E-08	7.3E-08	9.10E+00	1.30E-05	9.5E-08	1.0%	5.6E-03	2.7%
Arsenic	0.189	6.0E-06	4.2E-05	1.50E+00	3.00E-04	9.0E-06	99.0%	1.4E-01	65.8%
					Total	**9.1E-06**	**100.0%**	**2.1E-01**	**100.0%**

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH

SITE NAME: SITE 12 - TOWN GUT LANDFILL
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADULT RESIDENT - REASONABLE MAXIMUM EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH INGESTION OF FISH ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

RELEVANT EQUATION: $$\text{Intake} = \frac{Cf \times IR \times FI \times EF \times ED}{BW \times AT}$$

WHERE:			
	Cf = :		Chemical concentration in fish (mg/kg)
	IR = :	0.145	Ingestion Rate (Kg/meal)
	FI = :	1	Fraction from contaminated source (unitless)
	EF = :	48	Exposure Frequency (meals/year)
	ED = :	24	Exposure Duration (years)
	BW = :	70	Body Weight (kg)
	ATc = :	25,550	Averaging time for carcinogenic exposures (days)
	ATn = :	8,760	Averaging time for noncarcinogenic exposures (days)

Unit Dose
Lifetime Chronic Daily Intake = 9.34E-05 kg-fish/kg-wt/day
Chronic Daily Intake = : 2.72E-04 kg-fish/kg-wt/day

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH (PAGE TWO)

SITE NAME: SITE 12 - TOWN GUT LANDFILL
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADULT RESIDENT - REASONABLE MAXIMUM EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

CHEMICAL	Cf (mg/kg)	Lifetime Chronic Daily Intake (mg/kg/day)	Chronic Daily Intake (mg/kg/day)	Cancer Slope Factor $(mg/kg/day)^{-1}$	Reference Dose (mg/kg/day)	Lifetime Cancer Risk	Percent Cancer Risk	Hazard Quotient	Percent Hazard Quotient
Di-n-butyl phthalate	1034	9.7E-02	2.8E-01	NA	1.00E+00	NA	NA	2.8E-01	52.6%
Heptachlor Epoxide	0.00066	6.2E-08	1.8E-07	9.10E+00	1.30E-05	5.6E-07	1.5%	1.4E-02	2.6%
Arsenic	0.264	2.5E-05	7.2E-05	1.50E+00	3.00E-04	3.7E-05	98.5%	2.4E-01	44.8%
					Total	**3.8E-05**	**100.0%**	**5.4E-01**	**100.0%**

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH

SITE NAME: SITE 12 - TOWN GUT LANDFILL
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADULT RESIDENT - CENTRAL TENDENCY EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH INGESTION OF FISH ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

RELEVANT EQUATION: $$\text{Intake} = \frac{Cf \times IR \times FI \times EF \times ED}{BW \times AT}$$

WHERE:			
	Cf = :		Chemical concentration in fish (mg/kg)
	IR = :	0.145	Ingestion Rate (Kg/meal)
	FI = :	1	Fraction from contaminated source (unitless)
	EF = :	24	Exposure Frequency (meals/year)
	ED = :	7	Exposure Duration (years)
	BW = :	70	Body Weight (kg)
	ATc = :	25,550	Averaging time for carcinogenic exposures (days)
	ATn = :	2,555	Averaging time for noncarcinogenic exposures (days)

Unit Dose
Lifetime Chronic Daily Intake = 1.36E-05 kg-fish/kg-wt/day
Chronic Daily Intake = : 1.36E-04 kg-fish/kg-wt/day

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH (PAGE TWO)

SITE NAME: SITE 12 - TOWN GUT LANDFILL
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADULT RESIDENT - CENTRAL TENDENCY EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

CHEMICAL	Cf (mg/kg)	Lifetime Chronic Daily Intake (mg/kg/day)	Chronic Daily Intake (mg/kg/day)	Cancer Slope Factor $(mg/kg/day)^{-1}$	Reference Dose (mg/kg/day)	Lifetime Cancer Risk	Percent Cancer Risk	Hazard Quotient	Percent Hazard Quotient
Di-n-butyl phthalate	302	4.1E-03	4.1E-02	NA	1.00E+00	NA	NA	4.1E-02	31.5%
Heptachlor Epoxide	0.00033	4.5E-09	4.5E-08	9.10E+00	1.30E-05	4.1E-08	1.0%	3.5E-03	2.7%
Arsenic	0.189	2.6E-06	2.6E-05	1.50E+00	3.00E-04	3.9E-06	99.0%	8.6E-02	65.8%
					Total	**3.9E-06**	**100.0%**	**1.3E-01**	**100.0%**

SITE 39 - ORGANICS PLANT

Table K-3.2.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 39 - Organics Plant
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Adult Recreational User			Estimated Incremental Cancer Risk Adult Recreational User		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
1620	Iron	6.76E-04	2.71E-04	9.47E-04	NT	NT	NT
202	Manganese	1.10E-03	4.40E-04	1.54E-03	NT	NT	NT
	Total Risk:	**1.78E-03**	**7.11E-04**	**2.49E-03**	**NT**	**NT**	**NT**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.2.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 39 - Organics Plant
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index Adult Recreational User			Estimated Incremental Cancer Risk Adult Recreational User		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
622	Iron	6.49E-05	2.60E-05	9.09E-05	NT	NT	NT
104	Manganese	1.42E-04	5.66E-05	1.98E-04	NT	NT	NT
	Total Risk:	**2.06E-04**	**8.26E-05**	**2.89E-04**	**NT**	**NT**	**NT**

Notes:

Units are ug/L.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.2.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 39 - Organics Plant
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index* Construction Worker			Estimated Hazard Index* Adult Recreational User			Estimated Cancer Risk Construction Worker			Estimated Cancer Risk Adult Recreational User		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
1000000	Nitrocellulose	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
19600	Aluminum	1.10E-02	9.04E-03	2.01E-02	1.23E-03	2.73E-03	3.95E-03	NT	NT	NT	NT	NT	NT
8.7	Arsenic	1.63E-02	1.22E-02	2.85E-02	1.82E-03	3.67E-03	5.49E-03	1.05E-07	7.82E-08	1.83E-07	3.50E-07	7.08E-07	1.06E-06
0.762	Beryllium	2.15E-04	4.74E-03	4.96E-03	2.39E-05	1.43E-03	1.46E-03	NT	NT	NT	NT	NT	NT
26.1	Chromium	2.94E-03	6.50E-02	6.79E-02	3.27E-04	1.96E-02	1.99E-02	NT	NT	NT	NT	NT	NT
31500	Iron	5.92E-02	1.31E-02	7.22E-02	6.58E-03	3.95E-03	1.05E-02	NT	NT	NT	NT	NT	NT
956	Manganese	2.69E-02	5.95E-03	3.29E-02	2.99E-03	1.80E-03	4.79E-03	NT	NT	NT	NT	NT	NT
9.5	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
308	Silver	3.47E-02	7.67E-03	4.24E-02	3.86E-03	2.31E-03	6.17E-03	NT	NT	NT	NT	NT	NT
85500	1,1-Dimethylhydrazine	NT	NT	NT	NT	NT	NT	1.79E-06	3.95E-06	5.74E-06	5.97E-06	3.58E-05	4.18E-05
95	Benzo(a)pyrene	NT	NT	NT	NT	NT	NT	5.58E-09	NT	5.58E-09	1.86E-08	NT	1.86E-08
	Total Risk:	**1.51E-01**	**1.18E-01**	**2.69E-01**	**1.68E-02**	**3.55E-02**	**5.23E-02**	**1.90E-06**	**4.03E-06**	**5.93E-06**	**6.33E-06**	**3.65E-05**	**4.28E-05**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.2.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 39 - Organics Plant
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index* Construction Worker			Estimated Hazard Index* Adult Recreational User			Estimated Cancer Risk Construction Worker			Estimated Cancer Risk Adult Recreational User		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
305000	Nitrocellulose	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5460	Aluminum	7.69E-04	2.52E-04	1.02E-03	8.55E-05	7.60E-05	1.61E-04	NT	NT	NT	NT	NT	NT
5.08	Arsenic	2.39E-03	7.10E-04	3.10E-03	2.65E-04	2.14E-04	4.79E-04	1.53E-08	4.56E-09	1.99E-08	1.53E-08	1.24E-08	2.77E-08
0.465	Beryllium	3.28E-05	2.89E-04	3.22E-04	3.64E-06	8.74E-05	9.10E-05	NT	NT	NT	NT	NT	NT
15.1	Chromium	4.26E-04	3.76E-03	4.18E-03	4.73E-05	1.13E-03	1.18E-03	NT	NT	NT	NT	NT	NT
15800	Iron	7.42E-03	6.55E-04	8.08E-03	8.25E-04	1.98E-04	1.02E-03	NT	NT	NT	NT	NT	NT
346	Manganese	2.44E-03	2.15E-04	2.65E-03	2.71E-04	6.50E-05	3.36E-04	NT	NT	NT	NT	NT	NT
1.66	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
33.8	Silver	9.52E-04	8.41E-05	1.04E-03	1.06E-04	2.54E-05	1.31E-04	NT	NT	NT	NT	NT	NT
35500	1,1-Dimethylhydrazine	NT	NT	NT	NT	NT	NT	1.86E-07	1.64E-07	3.50E-07	1.86E-07	4.46E-07	6.32E-07
324	Benzo(a)pyrene	NT	NT	NT	NT	NT	NT	4.76E-09	NT	4.76E-09	4.76E-09	NT	4.76E-09
	Total Risk:	**1.44E-02**	**5.96E-03**	**2.04E-02**	**1.60E-03**	**1.80E-03**	**3.40E-03**	**2.06E-07**	**1.69E-07**	**3.75E-07**	**2.06E-07**	**4.58E-07**	**6.64E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH

SITE NAME: SITE 39/41 - ORGANICS PLANT/SCRAP YARD
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADULT RECREATIONAL USER - REASONABLE MAXIMUM EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH INGESTION OF FISH ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

RELEVANT EQUATION: $$\text{Intake} = \frac{Cf \times IR \times FI \times EF \times ED}{BW \times AT}$$

WHERE:			
	Cf = :		Chemical concentration in fish (mg/kg)
	IR = :	0.145	Ingestion Rate (Kg/meal)
	FI = :	1	Fraction from contaminated source (unitless)
	EF = :	48	Exposure Frequency (meals/year)
	ED = :	30	Exposure Duration (years)
	BW = :	70	Body Weight (kg)
	ATc = :	25,550	Averaging time for carcinogenic exposures (days)
	ATn = :	10,950	Averaging time for noncarcinogenic exposures (days)

Unit Dose
Lifetime Chronic Daily Intake = 1.17E-04 kg-fish/kg-wt/day
Chronic Daily Intake = : 2.72E-04 kg-fish/kg-wt/day

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH (PAGE TWO)

SITE NAME: SITE 39/41 - ORGANICS PLANT/SCRAP YARD
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADULT RECREATIONAL USER - REASONABLE MAXIMUM EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

CHEMICAL	Cf (mg/kg)	Lifetime Chronic Daily Intake (mg/kg/day)	Chronic Daily Intake (mg/kg/day)	Cancer Slope Factor $(mg/kg/day)^{-1}$	Reference Dose (mg/kg/day)	Lifetime Cancer Risk	Percent Cancer Risk	Hazard Quotient	Percent Hazard Quotient
Bis(2-ethylhexyl)phthalate	6.29	7.3E-04	1.7E-03	1.40E-02	2.00E-02	1.0E-05	100.0%	8.6E-02	100.0%
					Total	**1.0E-05**	**100.0%**	**8.6E-02**	**100.0%**

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH

SITE NAME: SITE 39/41 - ORGANICS PLANT/SCRAP YARD
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADULT RECREATIONAL USER - CENTRAL TENDENCY EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

HAZARD INDICES AND INCREMENTAL CANCER RISKS ARE CALCULATED BY THIS SPREADSHEET.
EXPOSURES THROUGH INGESTION OF FISH ARE CONSIDERED.
ASSUMPTIONS ARE OUTLINED BELOW.

RELEVANT EQUATION:

$$\text{Intake} = \frac{Cf \times IR \times FI \times EF \times ED}{BW \times AT}$$

WHERE:			
	Cf = :		Chemical concentration in fish (mg/kg)
	IR = :	0.145	Ingestion Rate (Kg/meal)
	FI = :	1	Fraction from contaminated source (unitless)
	EF = :	24	Exposure Frequency (meals/year)
	ED = :	30	Exposure Duration (years)
	BW = :	70	Body Weight (kg)
	ATc = :	25,550	Averaging time for carcinogenic exposures (days)
	ATn = :	10,950	Averaging time for noncarcinogenic exposures (days)

Unit Dose
Lifetime Chronic Daily Intake = 5.84E-05 kg-fish/kg-wt/day
Chronic Daily Intake = : 1.36E-04 kg-fish/kg-wt/day

RISK ASSESSMENT SPREADSHEET - INGESTION OF FISH (PAGE TWO)

SITE NAME: SITE 39/41 - ORGANICS PLANT/SCRAP YARD
LOCATION: IHDIV-NSWS, INDIAN HEAD, MARYLAND
EXPOSURE SCENARIO: ADULT RECREATIONAL USER - CENTRAL TENDENCY EXPOSURES
MEDIA: SURFACE WATER
DATE: MAY 13, 1998

CHEMICAL	Cf (mg/kg)	Lifetime Chronic Daily Intake (mg/kg/day)	Chronic Daily Intake (mg/kg/day)	Cancer Slope Factor $(mg/kg/day)^{-1}$	Reference Dose (mg/kg/day)	Lifetime Cancer Risk	Percent Cancer Risk	Hazard Quotient	Percent Hazard Quotient
Bis(2-ethylhexyl)phthalate	6.29	3.7E-04	8.6E-04	1.40E-02	2.00E-02	5.1E-06	100.0%	4.3E-02	100.0%
					Total	**5.1E-06**	**100.0%**	**4.3E-02**	**100.0%**

SITE 41 - SCRAP YARD

Table K-3.3.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index** Full-Time Employee					Estimated Hazard Index** Maintenance Worker					Estimated Hazard Index** Adolescent Trespasser				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
7.87	Antimony	1.93E-02	8.28E-02	NA	NT	1.02E-01	2.31E-03	9.93E-03	NA	NT	1.22E-02	2.01E-03	7.46E-03	NA	NT	9.47E-03
144	Arsenic	4.70E-01	6.80E-01	NA	NT	1.15E+00	5.64E-02	8.16E-02	NA	NT	1.38E-01	4.89E-02	6.13E-02	NA	NT	1.10E-01
45.6	Cadmium	4.46E-02	3.84E-01	NA	NT	4.28E-01	5.35E-03	4.60E-02	NA	NT	5.14E-02	4.65E-03	3.46E-02	NA	NT	3.92E-02
54.8	Chromium	1.07E-02	4.61E-01	NA	8.12E-02	5.53E-01	1.29E-03	5.53E-02	NA	9.75E-03	6.64E-02	1.12E-03	4.16E-02	NA	5.42E-03	4.81E-02
170	Copper	4.16E-03	2.98E-03	NA	NT	7.14E-03	4.99E-04	3.58E-04	NA	NT	8.57E-04	4.33E-04	2.69E-04	NA	NT	7.02E-04
36700	Iron	1.20E-01	5.15E-02	NA	NT	1.71E-01	1.44E-02	6.18E-03	NA	NT	2.05E-02	1.25E-02	4.64E-03	NA	NT	1.71E-02
3540	Lead	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
1.64	Mercury	NT	NT	NA	2.83E-06	2.83E-06	NT	NT	NA	3.39E-07	3.39E-07	NT	NT	NA	1.89E-07	1.89E-07
180000	Aroclor-1260	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
2800	Benz(a)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
2000	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
3400	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
571	Dibenz(a,h)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
1600	Indeno(1,2,3-cd)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
	Total Risk:	**6.68E-01**	**1.66E+00**	**NT**	**8.12E-02**	**2.41E+00**	**8.02E-02**	**1.99E-01**	**NT**	**9.75E-03**	**2.89E-01**	**6.96E-02**	**1.50E-01**	**NT**	**5.42E-03**	**2.25E-01**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Full-Time Employee					Estimated Incremental Cancer Risk Maintenance Worker					Estimated Incremental Cancer Risk Adolescent Trespasser				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
7.87	Antimony	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
144	Arsenic	7.55E-05	1.09E-04	NA	1.15E-07	1.85E-04	9.06E-06	1.31E-05	NA	1.38E-08	2.22E-05	3.15E-06	3.94E-06	NA	3.07E-09	7.09E-06
45.6	Cadmium	NT	NT	NA	1.52E-08	1.52E-08	NT	NT	NA	1.83E-09	1.83E-09	NT	NT	NA	4.06E-10	4.06E-10
54.8	Chromium	NT	NT	NA	1.19E-07	1.19E-07	NT	NT	NA	1.43E-08	1.43E-08	NT	NT	NA	3.17E-09	3.17E-09
170	Copper	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
36700	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
3540	Lead	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
1.64	Mercury	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
180000	Aroclor-1260	1.26E-04	3.25E-04	NA	1.91E-08	4.50E-04	1.51E-05	3.89E-05	NA	2.29E-09	5.40E-05	5.24E-06	1.17E-05	NA	5.08E-10	1.69E-05
2800	Benz(a)anthracene	7.14E-07	NT	NA	NT	7.14E-07	8.57E-08	NT	NA	NT	8.57E-08	2.98E-08	NT	NA	NT	2.98E-08
2000	Benzo(a)pyrene	5.10E-06	NT	NA	3.28E-10	5.10E-06	6.12E-07	NT	NA	3.94E-11	6.12E-07	2.13E-07	NT	NA	8.76E-12	2.13E-07
3400	Benzo(b)fluoranthene	8.67E-07	NT	NT	NT	8.67E-07	1.04E-07	NT	NT	NT	1.04E-07	3.61E-08	NT	NT	NT	3.61E-08
571	Dibenz(a,h)anthracene	1.46E-06	NT	NA	NT	1.46E-06	1.75E-07	NT	NA	NT	1.75E-07	6.07E-08	NT	NA	NT	6.07E-08
1600	Indeno(1,2,3-cd)pyrene	4.08E-07	NT	NA	NT	4.08E-07	4.90E-08	NT	NA	NT	4.90E-08	1.70E-08	NT	NA	NT	1.70E-08
	Total Risk:	**2.10E-04**	**4.34E-04**	**NT**	**2.69E-07**	**6.44E-04**	**2.52E-05**	**5.21E-05**	**NT**	**3.22E-08**	**7.73E-05**	**8.74E-06**	**1.56E-05**	**NT**	**7.17E-09**	**2.44E-05**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index** Full-Time Employee					Estimated Hazard Index** Maintenance Worker					Estimated Hazard Index** Adolescent Trespasser				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
2.38	Antimony	2.55E-03	4.39E-03	NA	NT	6.94E-03	1.75E-04	3.00E-04	NA	NT	4.75E-04	1.52E-04	2.26E-04	NA	NT	3.77E-04
108	Arsenic	1.54E-01	8.94E-02	NA	NT	2.44E-01	1.06E-02	6.12E-03	NA	NT	1.67E-02	9.17E-03	4.60E-03	NA	NT	1.38E-02
9.69	Cadmium	4.15E-03	1.43E-02	NA	NT	1.84E-02	2.84E-04	9.78E-04	NA	NT	1.26E-03	2.47E-04	7.35E-04	NA	NT	9.82E-04
26.2	Chromium	2.25E-03	3.86E-02	NA	1.70E-02	5.79E-02	1.54E-04	2.65E-03	NA	1.17E-03	3.96E-03	1.34E-04	1.99E-03	NA	6.47E-04	2.77E-03
59.1	Copper	6.33E-04	1.82E-04	NA	NT	8.15E-04	4.34E-05	1.24E-05	NA	NT	5.58E-05	3.77E-05	9.34E-06	NA	NT	4.70E-05
28300	Iron	4.04E-02	6.95E-03	NA	NT	4.74E-02	2.77E-03	4.76E-04	NA	NT	3.25E-03	2.40E-03	3.58E-04	NA	NT	2.76E-03
476	Lead	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
0.773	Mercury	NT	NT	NA	5.84E-07	5.84E-07	NT	NT	NA	4.00E-08	4.00E-08	NT	NT	NA	2.22E-08	2.22E-08
23000	Aroclor-1260	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
791	Benz(a)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
604	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
1250	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
316	Dibenz(a,h)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
557	Indeno(1,2,3-cd)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
	Total Risk:	**2.04E-01**	**1.54E-01**	**NT**	**1.70E-02**	**3.75E-01**	**1.40E-02**	**1.05E-02**	**NT**	**1.17E-03**	**2.57E-02**	**1.21E-02**	**7.91E-03**	**NT**	**6.48E-04**	**2.07E-02**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

		Estimated Incremental Cancer Risk Full-Time Employee					Estimated Incremental Cancer Risk Maintenance Worker					Estimated Incremental Cancer Risk Adolescent Trespasser				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
2.38	Antimony	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
108	Arsenic	4.96E-06	2.87E-06	NA	7.56E-09	7.84E-06	3.40E-07	1.97E-07	NA	5.18E-10	5.37E-07	5.90E-07	2.96E-07	NA	5.76E-10	8.86E-07
9.69	Cadmium	NT	NT	NA	2.83E-10	2.83E-10	NT	NT	NA	1.94E-11	1.94E-11	NT	NT	NA	2.16E-11	2.16E-11
26.2	Chromium	NT	NT	NA	4.98E-09	4.98E-09	NT	NT	NA	3.41E-10	3.41E-10	NT	NT	NA	3.79E-10	3.79E-10
59.1	Copper	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
28300	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
476	Lead	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
0.773	Mercury	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
23000	Aroclor-1260	1.41E-06	1.45E-06	NA	2.13E-10	2.86E-06	9.64E-08	9.95E-08	NA	1.46E-11	1.96E-07	1.67E-07	1.50E-07	NA	1.62E-11	3.17E-07
791	Benz(a)anthracene	1.77E-08	NT	NA	NT	1.77E-08	1.21E-09	NT	NA	NT	1.21E-09	2.10E-09	NT	NA	NT	2.10E-09
604	Benzo(a)pyrene	1.35E-07	NT	NA	8.68E-12	1.35E-07	9.24E-09	NT	NA	5.95E-13	9.25E-09	1.61E-08	NT	NA	6.61E-13	1.61E-08
1250	Benzo(b)fluoranthene	2.79E-08	NT	NT	NT	2.79E-08	1.91E-09	NT	NT	NT	1.91E-09	3.32E-09	NT	NT	NT	3.32E-09
316	Dibenz(a,h)anthracene	7.06E-08	NT	NA	NT	7.06E-08	4.84E-09	NT	NA	NT	4.84E-09	8.40E-09	NT	NA	NT	8.40E-09
557	Indeno(1,2,3-cd)pyrene	1.24E-08	NT	NA	NT	1.24E-08	8.53E-10	NT	NA	NT	8.53E-10	1.48E-09	NT	NA	NT	1.48E-09
	Total Risk:	**6.63E-06**	**4.33E-06**	**NT**	**1.31E-08**	**1.10E-05**	**4.54E-07**	**2.96E-07**	**NT**	**8.94E-10**	**7.51E-07**	**7.89E-07**	**4.45E-07**	**NT**	**9.93E-10**	**1.23E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index* Construction Worker					Estimated Hazard Index* Residential Child					Estimated Hazard Index* Residential Adult					Estimated Incremental Cancer Risk Construction Worker				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
33200	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
4.35	Antimony	4.49E-02	5.64E-02	NA	NT	1.01E-01	1.39E-01	1.21E-01	NA	NT	2.60E-01	1.49E-02	7.45E-02	NA	NT	8.94E-02	NT	NT	NA	NT	NT
328	Arsenic	4.52E+00	1.91E+00	NA	NT	6.43E+00	1.40E+01	4.10E+00	NA	NT	1.81E+01	1.50E+00	2.52E+00	NA	NT	4.02E+00	2.90E-05	1.23E-05	NA	1.38E-06	4.27E-05
8.59	Cadmium	3.55E-02	8.91E-02	NA	NT	1.25E-01	1.10E-01	1.91E-01	NA	NT	3.01E-01	1.18E-02	1.18E-01	NA	NT	1.29E-01	NT	NT	NA	1.51E-08	1.51E-08
31.8	Chromium	2.63E-02	3.30E-01	NA	6.22E+00	6.58E+00	8.13E-02	7.09E-01	NA	1.85E-01	9.75E-01	8.71E-03	4.36E-01	NA	6.60E-02	5.10E-01	NT	NT	NA	3.64E-07	3.64E-07
66.3	Copper	6.85E-03	1.43E-03	NA	NT	8.28E-03	2.12E-02	3.08E-03	NA	NT	2.43E-02	2.27E-03	1.89E-03	NA	NT	4.16E-03	NT	NT	NA	NT	NT
51100	Iron	7.04E-01	8.83E-02	NA	NT	7.92E-01	2.18E+00	1.90E-01	NA	NT	2.37E+00	2.33E-01	1.17E-01	NA	NT	3.50E-01	NT	NT	NA	NT	NT
942	Lead	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
0.622	Mercury	NT	NT	NA	1.42E-04	1.42E-04	NT	NT	NA	4.20E-06	4.20E-06	NT	NT	NA	1.50E-06	1.50E-06	NT	NT	NA	NT	NT
180000	Aroclor-1260	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	2.13E-05	1.60E-05	NA	1.01E-07	3.74E-05
643	Benz(a)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	2.77E-08	NT	NA	NT	2.77E-08
509	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	2.19E-07	NT	NA	4.41E-10	2.20E-07
1060	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	4.57E-08	NT	NT	NT	4.57E-08
299	Dibenz(a,h)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	1.29E-07	NT	NA	NT	1.29E-07
483	Indeno(1,2,3-cd)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	2.08E-08	NT	NA	NT	2.08E-08
	Total Risk:	**5.34E+00**	**2.47E+00**	**NT**	**6.22E+00**	**1.40E+01**	**1.65E+01**	**5.32E+00**	**NT**	**1.85E-01**	**2.20E+01**	**1.77E+00**	**3.27E+00**	**NT**	**6.60E-02**	**5.10E+00**	**5.07E-05**	**2.83E-05**	**NT**	**1.87E-06**	**8.09E-05**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

		Estimated Incremental Cancer Risk Residential Child					Estimated Incremental Cancer Risk Residential Adult					Estimated Incremental Cancer Risk Lifetime Resident				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
33200	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
4.35	Antimony	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
328	Arsenic	5.39E-04	1.58E-04	NA	2.47E-07	6.98E-04	2.31E-04	3.89E-04	NA	3.52E-07	6.21E-04	7.70E-04	5.47E-04	NA	5.99E-07	1.32E-03
8.59	Cadmium	NT	NT	NA	2.70E-09	2.70E-09	NT	NT	NA	3.85E-09	3.85E-09	NT	NT	NA	6.55E-09	6.55E-09
31.8	Chromium	NT	NT	NA	6.49E-08	6.49E-08	NT	NT	NA	9.27E-08	9.27E-08	NT	NT	NA	1.58E-07	1.58E-07
66.3	Copper	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
51100	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
942	Lead	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
0.622	Mercury	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
180000	Aroclor-1260	3.95E-04	2.06E-04	NA	1.79E-08	6.01E-04	1.69E-04	5.07E-04	NA	2.56E-08	6.76E-04	5.84E-04	7.14E-04	NA	4.35E-08	1.28E-03
643	Benz(a)anthracene	5.14E-07	NT	NA	NT	5.14E-07	2.20E-07	NT	NA	NT	2.20E-07	7.35E-07	NT	NA	NT	7.35E-07
509	Benzo(a)pyrene	4.07E-06	NT	NA	7.86E-11	4.07E-06	1.75E-06	NT	NA	1.12E-10	1.75E-06	5.82E-06	NT	NA	1.91E-10	5.82E-06
1060	Benzo(b)fluoranthene	8.48E-07	NT	NT	NT	8.48E-07	3.63E-07	NT	NT	NT	3.63E-07	1.21E-06	NT	NT	NT	1.21E-06
299	Dibenz(a,h)anthracene	2.39E-06	NT	NA	NT	2.39E-06	1.03E-06	NT	NA	NT	1.03E-06	3.42E-06	NT	NA	NT	3.42E-06
483	Indeno(1,2,3-cd)pyrene	3.86E-07	NT	NA	NT	3.86E-07	1.66E-07	NT	NA	NT	1.66E-07	5.52E-07	NT	NA	NT	5.52E-07
	Total Risk:	**9.42E-04**	**3.65E-04**	**NT**	**3.32E-07**	**1.31E-03**	**4.04E-04**	**8.96E-04**	**NT**	**4.75E-07**	**1.30E-03**	**1.35E-03**	**1.26E-03**	**NT**	**8.07E-07**	**2.61E-03**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index** Construction Worker					Estimated Hazard Index** Residential Child					Estimated Hazard Index** Residential Adult					Estimated Incremental Cancer Risk Construction Worker				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
19100	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
2.77	Antimony	1.42E-02	6.29E-03	NA	NT	2.05E-02	2.96E-02	1.03E-02	NA	NT	3.99E-02	3.17E-03	6.34E-03	NA	NT	9.51E-03	NT	NT	NA	NT	NT
63.1	Arsenic	4.33E-01	6.44E-02	NA	NT	4.97E-01	8.99E-01	1.06E-01	NA	NT	1.00E+00	9.63E-02	6.49E-02	NA	NT	1.61E-01	2.78E-06	4.14E-07	NA	2.33E-07	3.43E-06
4.65	Cadmium	9.57E-03	8.45E-03	NA	NT	1.80E-02	1.99E-02	1.39E-02	NA	NT	3.37E-02	2.13E-03	8.52E-03	NA	NT	1.06E-02	NT	NT	NA	7.17E-09	7.17E-09
13.9	Chromium	5.72E-03	2.53E-02	NA	2.38E+00	2.41E+00	1.19E-02	4.14E-02	NA	5.40E-02	1.07E-01	1.27E-03	2.55E-02	NA	1.93E-02	4.60E-02	NT	NT	NA	1.40E-07	1.40E-07
29.9	Copper	1.54E-03	1.13E-04	NA	NT	1.65E-03	3.19E-03	1.86E-04	NA	NT	3.38E-03	3.42E-04	1.14E-04	NA	NT	4.56E-04	NT	NT	NA	NT	NT
17200	Iron	1.18E-01	5.21E-03	NA	NT	1.23E-01	2.45E-01	8.54E-03	NA	NT	2.54E-01	2.63E-02	5.25E-03	NA	NT	3.15E-02	NT	NT	NA	NT	NT
212	Lead	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
0.385	Mercury	NT	NT	NA	7.67E-05	7.67E-05	NT	NT	NA	1.74E-06	1.74E-06	NT	NT	NA	6.21E-07	6.21E-07	NT	NT	NA	NT	NT
10000	Aroclor-1260	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	5.88E-07	1.56E-07	NA	4.90E-09	7.48E-07
465	Benz(a)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	9.98E-09	NT	NA	NT	9.98E-09
374	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	8.02E-08	NT	NA	2.84E-10	8.05E-08
674	Benzo(b)fluoranthene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1.45E-08	NT	NT	NT	1.45E-08
252	Dibenz(a,h)anthracene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	5.41E-08	NT	NA	NT	5.41E-08
354	Indeno(1,2,3-cd)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	7.59E-09	NT	NA	NT	7.59E-09
	Total Risk:	**5.82E-01**	**1.10E-01**	**NT**	**2.38E+00**	**3.07E+00**	**1.21E+00**	**1.80E-01**	**NT**	**5.40E-02**	**1.44E+00**	**1.29E-01**	**1.11E-01**	**NT**	**1.93E-02**	**2.59E-01**	**3.54E-06**	**5.70E-07**	**NT**	**3.85E-07**	**4.49E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child					Estimated Incremental Cancer Risk Residential Adult					Estimated Incremental Cancer Risk Lifetime Resident				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
19100	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
2.77	Antimony	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
63.1	Arsenic	1.16E-05	1.36E-06	NA	1.06E-08	1.29E-05	4.33E-06	2.92E-06	NA	1.32E-08	7.27E-06	1.59E-05	4.28E-06	NA	2.38E-08	2.02E-05
4.65	Cadmium	NT	NT	NA	3.25E-10	3.25E-10	NT	NT	NA	4.06E-10	4.06E-10	NT	NT	NA	7.32E-10	7.32E-10
13.9	Chromium	NT	NT	NA	6.33E-09	6.33E-09	NT	NT	NA	7.91E-09	7.91E-09	NT	NT	NA	1.42E-08	1.42E-08
29.9	Copper	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
17200	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
212	Lead	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
0.385	Mercury	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
10000	Aroclor-1260	2.44E-06	5.11E-07	NA	2.22E-10	2.95E-06	9.16E-07	1.10E-06	NA	2.77E-10	2.02E-06	3.36E-06	1.61E-06	NA	4.99E-10	4.97E-06
465	Benz(a)anthracene	4.15E-08	NT	NA	NT	4.15E-08	1.55E-08	NT	NA	NT	1.55E-08	5.70E-08	NT	NA	NT	5.70E-08
374	Benzo(a)pyrene	3.33E-07	NT	NA	1.29E-11	3.33E-07	1.25E-07	NT	NA	1.61E-11	1.25E-07	4.58E-07	NT	NA	2.90E-11	4.58E-07
674	Benzo(b)fluoranthene	6.01E-08	NT	NT	NT	6.01E-08	2.25E-08	NT	NT	NT	2.25E-08	8.26E-08	NT	NT	NT	8.26E-08
252	Dibenz(a,h)anthracene	2.25E-07	NT	NA	NT	2.25E-07	8.42E-08	NT	NA	NT	8.42E-08	3.09E-07	NT	NA	NT	3.09E-07
354	Indeno(1,2,3-cd)pyrene	3.16E-08	NT	NA	NT	3.16E-08	1.18E-08	NT	NA	NT	1.18E-08	4.34E-08	NT	NA	NT	4.34E-08
	Total Risk:	**1.47E-05**	**1.87E-06**	**NT**	**1.75E-08**	**1.66E-05**	**5.51E-06**	**4.02E-06**	**NT**	**2.18E-08**	**9.55E-06**	**2.02E-05**	**5.89E-06**	**NT**	**3.93E-08**	**2.61E-05**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT – No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA – Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.5

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Residential Child				Estimated Hazard Index** Residential Adult			
		Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total
32	Trichloroethene	2.4E-03	NT	2.4E-03	3.4E-01	3.9E-02	NT	3.8E-01	1.5E-01	2.4E-02	NT	1.7E-01
37.6	Arsenic	3.3E-03	NT	3.3E-03	8.0E+00	1.5E-02	NT	8.0E+00	3.4E+00	9.0E-03	NT	3.4E+00
142	Barium	5.1E-05	NT	5.1E-05	1.3E-01	2.3E-04	NT	1.3E-01	5.6E-02	1.4E-04	NT	5.6E-02
248	Cobalt	3.5E-04	NT	3.5E-04	2.6E-01	1.5E-03	NT	2.7E-01	1.1E-01	9.4E-04	NT	1.1E-01
	Total Risk:	**6.2E-03**	**NT**	**6.2E-03**	**8.7E+00**	**5.5E-02**	**NT**	**8.8E+00**	**3.7E+00**	**3.4E-02**	**NT**	**3.8E+00**

Notes:

Units are ug/L.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.5

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Construction Worker			Estimated Incremental Cancer Risk Residential Child				Estimated Incremental Cancer Risk Residential Adult				Estimated Incremental Cancer Risk Lifetime Resident			
		Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total
32	Trichloroethene	2.3E-09	7.6E-11	2.4E-09	1.9E-06	2.2E-07	NT	2.1E-06	3.3E-06	5.4E-07	2.0E-06	5.8E-06	5.2E-06	7.6E-07	NT	8.0E-06
37.6	Arsenic	2.2E-08	NT	2.2E-08	3.1E-04	5.7E-07	NT	3.1E-04	5.3E-04	1.4E-06	NT	5.3E-04	8.4E-04	2.0E-06	NT	8.4E-04
142	Barium	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
248	Cobalt	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**2.4E-08**	**7.6E-11**	**2.4E-08**	**3.1E-04**	**7.9E-07**	**NT**	**3.1E-04**	**5.3E-04**	**1.9E-06**	**2.0E-06**	**5.4E-04**	**8.4E-04**	**2.7E-06**	**NT**	**8.5E-04**

Notes:

Units are ug/L.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.6

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Residential Child				Estimated Hazard Index** Residential Adult			
		Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total
10.3	Trichloroethene	7.8E-04	NT	7.8E-04	7.3E-02	6.9E-03	NT	8.0E-02	2.2E-02	4.2E-03	NT	2.6E-02
10.6	Arsenic	9.4E-04	NT	9.4E-04	1.5E+00	1.9E-03	NT	1.5E+00	4.5E-01	1.1E-03	NT	4.5E-01
48.6	Barium	1.8E-05	NT	1.8E-05	3.0E-02	3.5E-05	NT	3.0E-02	8.9E-03	2.1E-05	NT	8.9E-03
106	Cobalt	1.5E-04	NT	1.5E-04	7.6E-02	2.9E-04	NT	7.6E-02	2.3E-02	1.8E-04	NT	2.3E-02
	Total Risk:	**1.9E-03**	**NT**	**1.9E-03**	**1.7E+00**	**9.0E-03**	**NT**	**1.7E+00**	**5.1E-01**	**5.6E-03**	**NT**	**5.1E-01**

Notes:

Units are ug/L.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.6

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Construction Worker			Estimated Incremental Cancer Risk Residential Child				Estimated Incremental Cancer Risk Residential Adult				Estimated Incremental Cancer Risk Lifetime Resident			
		Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total
10.3	Trichloroethene	7.4E-10	2.4E-11	7.6E-10	1.4E-07	1.3E-08	NT	1.5E-07	1.5E-07	2.8E-08	6.9E-08	2.4E-07	2.8E-07	4.1E-08	#VALUE!	3.9E-07
10.6	Arsenic	6.1E-09	NT	6.1E-09	1.9E-05	2.4E-08	NT	1.9E-05	2.0E-05	5.1E-08	NT	2.0E-05	4.0E-05	7.5E-08	NT	4.0E-05
48.6	Barium	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
106	Cobalt	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**6.8E-09**	**2.4E-11**	**6.8E-09**	**2.0E-05**	**3.7E-08**	**NT**	**2.0E-05**	**2.1E-05**	**7.9E-08**	**6.9E-08**	**2.1E-05**	**4.0E-05**	**1.2E-07**	**#VALUE!**	**4.0E-05**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.7

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Adult Recreational User			Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult			Estimated Cancer Risk Construction Worker		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
16100	Aluminum	9.07E-03	7.42E-03	1.65E-02	1.01E-03	2.24E-03	3.25E-03	9.41E-03	3.04E-03	1.24E-02	1.01E-03	1.87E-03	2.88E-03	NT	NT	NT
6.46	Arsenic	1.21E-02	9.03E-03	2.12E-02	1.35E-03	2.73E-03	4.07E-03	1.26E-02	3.69E-03	1.63E-02	1.35E-03	2.27E-03	3.62E-03	7.80E-08	5.80E-08	1.36E-07
1.28	Beryllium	3.61E-04	7.97E-03	8.33E-03	4.01E-05	2.40E-03	2.44E-03	3.74E-04	3.26E-03	3.63E-03	4.01E-05	2.00E-03	2.04E-03	NT	NT	NT
35.2	Chromium	3.97E-03	8.76E-02	9.16E-02	4.41E-04	2.65E-02	2.69E-02	4.11E-03	3.59E-02	4.00E-02	4.41E-04	2.20E-02	2.25E-02	NT	NT	NT
32400	Iron	6.09E-02	1.34E-02	7.43E-02	6.76E-03	4.06E-03	1.08E-02	6.31E-02	5.50E-03	6.86E-02	6.76E-03	3.38E-03	1.01E-02	NT	NT	NT
1140	Manganese	3.21E-02	7.09E-03	3.92E-02	3.57E-03	2.14E-03	5.71E-03	3.33E-02	2.90E-03	3.62E-02	3.57E-03	1.78E-03	5.35E-03	NT	NT	NT
0.602	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
6.79	Silver	7.65E-04	1.69E-04	9.34E-04	8.50E-05	5.10E-05	1.36E-04	7.94E-04	6.92E-05	8.63E-04	8.50E-05	4.25E-05	1.28E-04	NT	NT	NT
170	Benzo(a)pyrene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	9.99E-09	NT	9.99E-09
	Total Risk:	**1.19E-01**	**1.33E-01**	**2.52E-01**	**1.33E-02**	**4.01E-02**	**5.33E-02**	**1.24E-01**	**5.43E-02**	**1.78E-01**	**1.33E-02**	**3.34E-02**	**4.66E-02**	**8.80E-08**	**5.80E-08**	**1.46E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.7

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Cancer Risk Adult Recreational User			Estimated Cancer Risk Residential Child			Estimated Cancer Risk Residential Adult			Estimated Cancer Risk Lifetime Resident		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
16100	Aluminum	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
6.46	Arsenic	2.60E-07	5.26E-07	7.86E-07	4.85E-07	1.43E-07	6.28E-07	2.08E-07	3.50E-07	5.58E-07	6.93E-07	4.93E-07	1.19E-06
1.28	Beryllium	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
35.2	Chromium	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
32400	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1140	Manganese	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.602	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
6.79	Silver	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
170	Benzo(a)pyrene	3.33E-08	NT	3.33E-08	6.22E-08	NT	6.22E-08	2.66E-08	NT	2.66E-08	8.88E-08	NT	8.88E-08
	Total Risk:	**2.93E-07**	**5.26E-07**	**8.19E-07**	**5.48E-07**	**1.43E-07**	**6.90E-07**	**2.35E-07**	**3.50E-07**	**5.85E-07**	**7.82E-07**	**4.93E-07**	**1.28E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.8

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index* Construction Worker			Estimated Hazard Index* Adult Recreational User			Estimated Hazard Index* Residential Child			Estimated Hazard Index* Residential Adult			Estimated Cancer Risk Construction Worker		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
13900	Aluminum	1.96E-03	6.41E-04	2.60E-03	2.18E-04	1.93E-04	4.11E-04	2.03E-03	2.62E-04	2.29E-03	2.18E-04	1.61E-04	3.79E-04	NT	NT	NT
5.35	Arsenic	2.51E-03	7.48E-04	3.26E-03	2.79E-04	2.26E-04	5.05E-04	2.61E-03	3.06E-04	2.91E-03	2.79E-04	1.88E-04	4.67E-04	1.62E-08	4.81E-09	2.10E-08
1.15	Beryllium	8.10E-05	7.16E-04	7.97E-04	9.00E-06	2.16E-04	2.25E-04	8.40E-05	2.93E-04	3.77E-04	9.00E-06	1.80E-04	1.89E-04	NT	NT	NT
31.1	Chromium	8.76E-04	7.74E-03	8.62E-03	9.74E-05	2.34E-03	2.43E-03	9.09E-04	3.17E-03	4.08E-03	9.74E-05	1.95E-03	2.04E-03	NT	NT	NT
29200	Iron	1.37E-02	1.21E-03	1.49E-02	1.52E-03	3.66E-04	1.89E-03	1.42E-02	4.96E-04	1.47E-02	1.52E-03	3.05E-04	1.83E-03	NT	NT	NT
977	Manganese	6.88E-03	6.08E-04	7.49E-03	7.65E-04	1.84E-04	9.48E-04	7.14E-03	2.49E-04	7.39E-03	7.65E-04	1.53E-04	9.18E-04	NT	NT	NT
0.359	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5.73	Silver	1.61E-04	1.43E-05	1.76E-04	1.79E-05	4.31E-06	2.22E-05	1.67E-04	5.84E-06	1.73E-04	1.79E-05	3.59E-06	2.15E-05	NT	NT	NT
490	Benzo(a)pyrene	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	7.20E-09	NT	7.20E-09
	Total Risk:	**2.62E-02**	**1.17E-02**	**3.79E-02**	**2.91E-03**	**3.53E-03**	**6.44E-03**	**2.72E-02**	**4.78E-03**	**3.19E-02**	**2.91E-03**	**2.94E-03**	**5.85E-03**	**2.34E-08**	**4.81E-09**	**2.82E-08**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.3.8

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 41 - Scrap Yard
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Cancer Risk Adult Recreational User			Estimated Cancer Risk Residential Child			Estimated Cancer Risk Residential Adult			Estimated Cancer Risk Lifetime Resident		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
13900	Aluminum	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5.35	Arsenic	1.62E-08	1.31E-08	2.92E-08	3.35E-08	3.93E-09	3.74E-08	1.26E-08	8.46E-09	2.10E-08	4.61E-08	1.24E-08	5.85E-08
1.15	Beryllium	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
31.1	Chromium	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
29200	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
977	Manganese	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.359	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5.73	Silver	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
490	Benzo(a)pyrene	7.20E-09	NT	7.20E-09	1.49E-08	NT	1.49E-08	5.60E-09	NT	5.60E-09	2.05E-08	NT	2.05E-08
	Total Risk:	**2.34E-08**	**1.31E-08**	**3.64E-08**	**4.84E-08**	**3.93E-09**	**5.24E-08**	**1.82E-08**	**8.46E-09**	**2.66E-08**	**6.66E-08**	**1.24E-08**	**7.90E-08**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

IEUBK MODEL - Exposure to Lead (Page 1 of 2)

SITE NAME: Site 39/41 Organics Plant/Scrap Yard

EXPOSURE SCENARIO: RME/CTE

LOCATION: IHDIV-NSWC, Indian Head, Maryland

DATE: May 15, 1998

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 ug Pb/m3 DEFAULT
Indoor AIR Pb Conc: 30.0 percent of outdoor.
Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 11.30 ug Pb/L
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: constant conc.
Dust: constant conc.

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	942.0	942.0
1-2	942.0	942.0
2-3	942.0	942.0
3-4	942.0	942.0
4-5	942.0	942.0
5-6	942.0	942.0
6-7	942.0	942.0

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	11.3	21.66	18.62
1-2:	13.2	32.63	28.35
2-3:	12.4	34.14	29.33
3-4:	12.0	35.21	30.29
4-5:	10.2	29.25	23.99
5-6:	8.7	27.87	22.16
6-7:	7.8	27.36	21.23

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.14	0.88	0.00	0.02
1-2:	2.15	2.10	0.00	0.03
2-3:	2.49	2.26	0.00	0.06
3-4:	2.48	2.38	0.00	0.07
4-5:	2.55	2.64	0.00	0.07
5-6:	2.76	2.86	0.00	0.09
6-7:	3.09	2.95	0.00	0.09

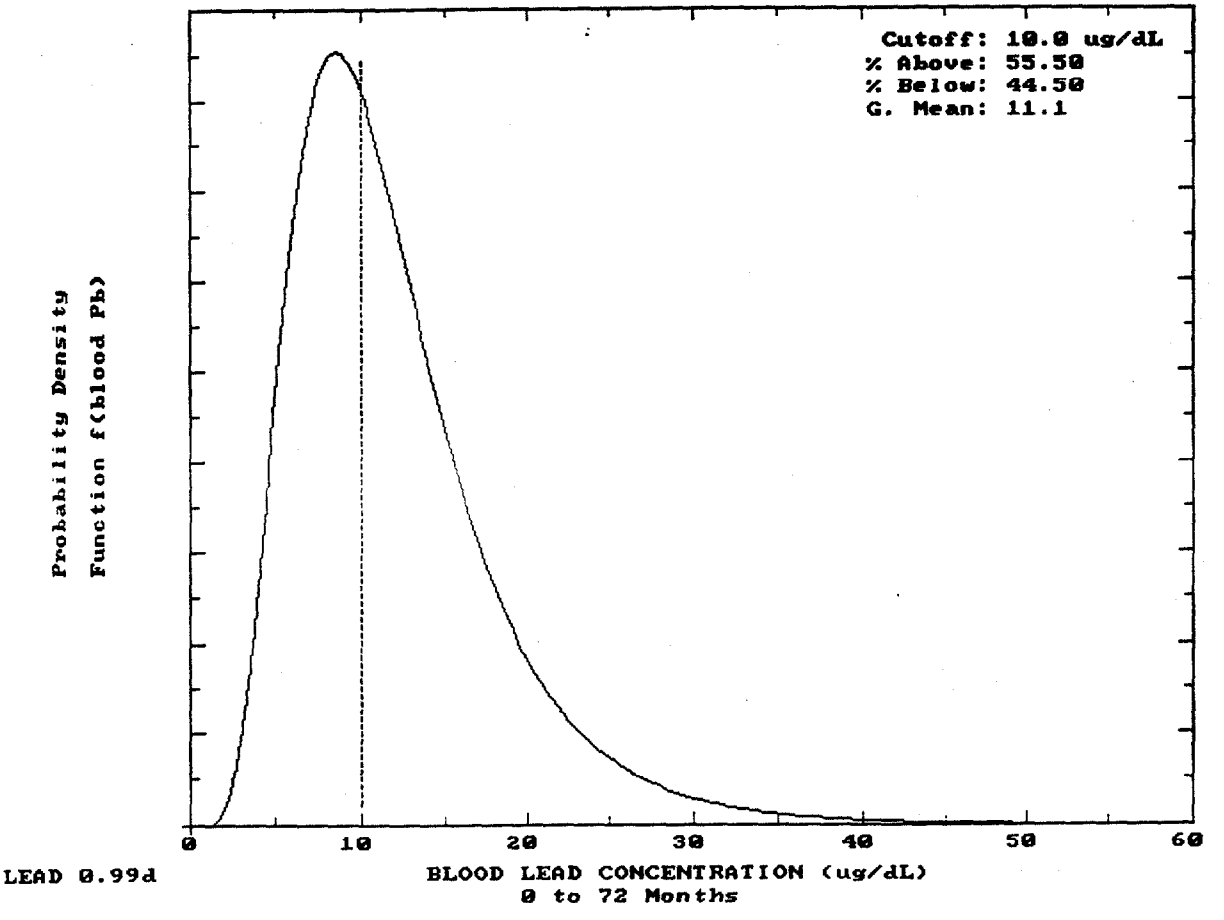
IEUBK MODEL - Exposure to Lead (Page 2 of 2)

SITE NAME: Site 39/41 Organics Plant/Scrap Yard

EXPOSURE SCENARIO: RME/CTE

LOCATION: IHDIV-NSWC, Indian Head, Maryland

DATE: May 15, 1998



Calculations of 95th Percentile Fetal Blood Lead Concentrations for Adult Exposure to Soil

SITE NAME: SITE 39/41 ORGANICS PLANT/SCRAP YARD
LOCATION: DIV-NSWC, INDIAN HEAD, MARYLAND
RECEPTOR: FULL-TIME EMPLOYEE - REASONABLE MAXIMUM EXPOSURES
DATE: MAY 15, 1998

OBJECTIVE: Adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood lead concentration in the developing fetuses of adult women. This spreadsheet calculates a range of 95th percentile fetal blood lead concentrations from central estimates of blood lead concentrations in pregnant adult women using the exposure parameters identified below (U.S. EPA, 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).

RELEVANT EQUATIONS: $PbB_{adult,\ central} = PbB_{adult,\ 0} + (PbS \times BKSF \times IR_s \times AF_s \times EF_s)/AT$

and

$PbB_{fetal,\ 0.95} = PbB_{adult,\ central} \times GSD_{i,\ adult}^{1.645} \times R_{fetal/maternal}$

Exposure Parameter	Description (units)	GSD_i = 1.8 - 2.1; $PbB_{adult,\ 0}$ = 1.7 - 2.2			
		Adult 1	Adult 2	Adult 3	Adult 4
$PbB_{adult,\ 0}$	Typical blood lead concentration in adult women of child-bearing age in absence of site exposures (ug/dL)	1.7	1.7	2.2	2.2
PbS	Site-specific soil lead concentration (mg/kg)	942	942	942	942
BKSF	Biokinetic slope factor (unitless)	0.4	0.4	0.4	0.4
IR_s	Intake rate of soil, includes outdoor soil and indoor soil-derived dust (g/day)	0.100	0.100	0.100	0.100
AF_s	Absolute gastrointestinal absorption fraction (unitless)	0.12	0.12	0.12	0.12
EF_s	Exposure frequency (days/year)	250	250	250	250
AT	Averaging time (days/year)	365	365	365	365
$GSD_{i,\ adult}$	Estimate of individual geometric standard deviation among adults (unitless)	1.8	2.1	1.8	2.1
$R_{fetal/maternal}$	Constant of proportionality between fetal blood lead concentraiton at birth and maternal blood lead concentration (unitless)	0.9	0.9	0.9	0.9
$PbB_{adult,\ central}$	Calculated central estimate of blood lead concentrations in adult women of child-bearing age from site exposures (ug/dL)	4.80	4.80	5.30	5.30
$PbB_{fetal,\ 0.95}$	Calculated 95th percentile blood lead concentrations among fetuses born to women having site exposures (ug/dL)	11.35	14.63	12.54	16.16
RBRG	Lead soil concentration corresponding to a 95th percentile 10 ug/dL lead blood level in a fetus (mg/kg).	768	480	616	328

Note: According to the cited guidance document, this adult exposure model is not applicable for infrequent site exposures, where the EF_s is less than 1 day/week.

Calculations of 95th Percentile Fetal Blood Lead Concentrations for Adult Exposure to Soil

SITE NAME: SITE 39/41 ORGANICS PLANT/SCRAP YARD
LOCATION: DIV-NSWC, INDIAN HEAD, MARYLAND
RECEPTOR: FULL-TIME EMPLOYEE - CENTRAL TENDENCY EXPOSURES
DATE: MAY 15, 1998

OBJECTIVE: Adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood lead concentration in the developing fetuses of adult women. This spreadsheet calculates a range of 95th percentile fetal blood lead concentrations from central estimates of blood lead concentrations in pregnant adult women using the exposure parameters identified below (U.S. EPA, 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).

RELEVANT EQUATIONS: $PbB_{adult,\ central} = PbB_{adult,\ 0} + (PbS \times BKSF \times IR_s \times AF_s \times EF_s)/AT$

and

$$PbB_{fetal,\ 0.95} = PbB_{adult,\ central} \times GSD_{i,\ adult}^{1.645} \times R_{fetal/maternal}$$

Exposure Parameter	Description (units)	GSD_i = 1.8 - 2.1; $PbB_{adult,\ 0}$ = 1.7 - 2.2			
		Adult 1	Adult 2	Adult 3	Adult 4
$PbB_{adult,\ 0}$	Typical blood lead concentration in adult women of child-bearing age in absence of site exposures (ug/dL)	1.7	1.7	2.2	2.2
PbS	Site-specific soil lead concentration (mg/kg)	942	942	942	942
BKSF	Biokinetic slope factor (unitless)	0.4	0.4	0.4	0.4
IR_s	Intake rate of soil, includes outdoor soil and indoor soil-derived dust (g/day)	0.050	0.050	0.050	0.050
AF_s	Absolute gastrointestinal absorption fraction (unitless)	0.12	0.12	0.12	0.12
EF_s	Exposure frequency (days/year)	219	219	219	219
AT	Averaging time (days/year)	365	365	365	365
$GSD_{i,\ adult}$	Estimate of individual geometric standard deviation among adults (unitless)	1.8	2.1	1.8	2.1
$R_{fetal/maternal}$	Constant of proportionality between fetal blood lead concentraiton at birth and maternal blood lead concentration (unitless)	0.9	0.9	0.9	0.9
$PbB_{adult,\ central}$	Calculated central estimate of blood lead concentrations in adult women of child-bearing age from site exposures (ug/dL)	3.06	3.06	3.56	3.56
$PbB_{fetal,\ 0.95}$	Calculated 95th percentile blood lead concentrations among fetuses born to women having site exposures (ug/dL)	7.23	9.32	8.42	10.85
RBRG	Lead soil concentration corresponding to a 95th percentile 10 ug/dL lead blood level in a fetus (mg/kg).	1754	1096	1406	749

Note: According to the cited guidance document, this adult exposure model is not applicable for infrequent site exposures, where the EF_s is less than 1 day/week.

Calculations of 95th Percentile Fetal Blood Lead Concentrations for Adult Exposure to Soil

SITE NAME: SITE 39/41 ORGANICS PLANT/SCRAP YARD
LOCATION: DIV-NSWC, INDIAN HEAD, MARYLAND
RECEPTOR: CONSTRUCTION WORKER - REASONABLE MAXIMUM EXPOSURES
DATE: MAY 15, 1998

OBJECTIVE: Adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood lead concentration in the developing fetuses of adult women. This spreadsheet calculates a range of 95th percentile fetal blood lead concentrations from central estimates of blood lead concentrations in pregnant adult women using the exposure parameters identified below (U.S. EPA, 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).

RELEVANT EQUATIONS: $PbB_{adult,\ central} = PbB_{adult,\ 0} + (PbS \times BKSF \times IR_s \times AF_s \times EF_s)/AT$

and

$PbB_{fetal,\ 0.95} = PbB_{adult,\ central} \times GSD_{i,\ adult}^{1.645} \times R_{fetal/maternal}$

Exposure Parameter	Description (units)	GSD_i = 1.8 - 2.1; $PbB_{adult,\ 0}$ = 1.7 - 2.2			
		Adult 1	Adult 2	Adult 3	Adult 4
$PbB_{adult,\ 0}$	Typical blood lead concentration in adult women of child-bearing age in absence of site exposures (ug/dL)	1.7	1.7	2.2	2.2
PbS	Site-specific soil lead concentration (mg/kg)	942	942	942	942
BKSF	Biokinetic slope factor (unitless)	0.4	0.4	0.4	0.4
IR_s	Intake rate of soil, includes outdoor soil and indoor soil-derived dust (g/day)	0.480	0.480	0.480	0.480
AF_s	Absolute gastrointestinal absorption fraction (unitless)	0.12	0.12	0.12	0.12
EF_s	Exposure frequency (days/year)	250	250	250	250
AT	Averaging time (days/year)	365	365	365	365
$GSD_{i,\ adult}$	Estimate of individual geometric standard deviation among adults (unitless)	1.8	2.1	1.8	2.1
$R_{fetal/maternal}$	Constant of proportionality between fetal blood lead concentraiton at birth and maternal blood lead concentration (unitless)	0.9	0.9	0.9	0.9
$PbB_{adult,\ central}$	Calculated central estimate of blood lead concentrations in adult women of child-bearing age from site exposures (ug/dL)	16.57	16.57	17.07	17.07
$PbB_{fetal,\ 0.95}$	Calculated 95th percentile blood lead concentrations among fetuses born to women having site exposures (ug/dL)	39.21	50.52	40.39	52.05
RBRG	Lead soil concentration corresponding to a 95th percentile 10 ug/dL lead blood level in a fetus (mg/kg).	160	100	128	68

Note: According to the cited guidance document, this adult exposure model is not applicable for infrequent site exposures, where the EF_s is less than 1 day/week.

Calculations of 95th Percentile Fetal Blood Lead Concentrations for Adult Exposure to Soil

SITE NAME: SITE 39/41 ORGANICS PLANT/SCRAP YARD
LOCATION: DIV-NSWC, INDIAN HEAD, MARYLAND
RECEPTOR: CONSTRUCTION WORKER - CENTRAL TENDENCY EXPOSURES
DATE: MAY 15, 1998

OBJECTIVE: Adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood lead concentration in the developing fetuses of adult women. This spreadsheet calculates a range of 95th percentile fetal blood lead concentrations from central estimates of blood lead concentrations in pregnant adult women using the exposure parameters identified below (U.S. EPA, 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).

RELEVANT EQUATIONS: $PbB_{adult,\ central} = PbB_{adult,\ 0} + (PbS \times BKSF \times IR_s \times AF_s \times EF_s)/AT$

and

$PbB_{fetal,\ 0.95} = PbB_{adult,\ central} \times GSD_{i,\ adult}^{1.645} \times R_{fetal/maternal}$

Exposure Parameter	Description (units)	GSD_i = 1.8 - 2.1; $PbB_{adult,\ 0}$ = 1.7 - 2.2			
		Adult 1	Adult 2	Adult 3	Adult 4
$PbB_{adult,\ 0}$	Typical blood lead concentration in adult women of child-bearing age in absence of site exposures (ug/dL)	1.7	1.7	2.2	2.2
PbS	Site-specific soil lead concentration (mg/kg)	942	942	942	942
BKSF	Biokinetic slope factor (unitless)	0.4	0.4	0.4	0.4
IR_s	Intake rate of soil, includes outdoor soil and indoor soil-derived dust (g/day)	0.240	0.240	0.240	0.240
AF_s	Absolute gastrointestinal absorption fraction (unitless)	0.12	0.12	0.12	0.12
EF_s	Exposure frequency (days/year)	219	219	219	219
AT	Averaging time (days/year)	365	365	365	365
$GSD_{i,\ adult}$	Estimate of individual geometric standard deviation among adults (unitless)	1.8	2.1	1.8	2.1
$R_{fetal/maternal}$	Constant of proportionality between fetal blood lead concentraiton at birth and maternal blood lead concentration (unitless)	0.9	0.9	0.9	0.9
$PbB_{adult,\ central}$	Calculated central estimate of blood lead concentrations in adult women of child-bearing age from site exposures (ug/dL)	8.21	8.21	8.71	8.71
$PbB_{fetal,\ 0.95}$	Calculated 95th percentile blood lead concentrations among fetuses born to women having site exposures (ug/dL)	19.43	25.04	20.62	26.57
RBRG	Lead soil concentration corresponding to a 95th percentile 10 ug/dL lead blood level in a fetus (mg/kg).	365	228	293	156

Note: According to the cited guidance document, this adult exposure model is not applicable for infrequent site exposures, where the EF_s is less than 1 day/week.

SITE 42 - OLSON ROAD LANDFILL

Table K-3.4.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Construction Worker					Estimated Hazard Index** Residential Child					Estimated Hazard Index** Residential Adult					Estimated Incremental Cancer Risk Construction Worker				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
11600	Aluminum	4.79E-02	2.23E-02	NA	NT	7.02E-02	1.48E-01	4.79E-02	NA	NT	1.96E-01	1.59E-02	2.94E-02	NA	NT	4.53E-02	NT	NT	NA	NT	NT
5.43	Arsenic	7.48E-02	3.16E-02	NA	NT	1.06E-01	2.31E-01	6.79E-02	NA	NT	2.99E-01	2.48E-02	4.18E-02	NA	NT	6.66E-02	4.81E-07	2.03E-07	NA	2.29E-06	7.07E-07
28500	Iron	3.93E-01	4.93E-02	NA	NT	4.42E-01	1.21E+00	1.06E-01	NA	NT	1.32E+00	1.30E-01	6.51E-02	NA	NT	1.95E-01	NT	NT	NA	NT	NT
196	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	8.45E-08	NT	NA	1.70E-10	8.46E-08
	Total Risk:	**5.15E-01**	**1.03E-01**	**NA**	**NT**	**6.19E-01**	**1.59E+00**	**2.22E-01**	**NA**	**NT**	**1.82E+00**	**1.71E-01**	**1.36E-01**	**NA**	**NT**	**3.07E-01**	**5.65E-07**	**2.03E-07**	**NA**	**2.31E-08**	**7.92E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Incremental Cancer Risk Residential Child					Estimated Incremental Cancer Risk Residential Adult					Estimated Incremental Cancer Risk Lifetime Resident				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
11600	Aluminum	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
5.43	Arsenic	8.93E-06	2.62E-06	NA	4.08E-09	1.16E-05	3.83E-06	6.44E-06	NA	5.83E-09	1.03E-05	1.28E-05	9.06E-06	NA	9.92E-09	2.18E-05
28500	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
196	Benzo(a)pyrene	1.57E-06	NT	NA	3.03E-11	1.57E-06	6.72E-07	NT	NA	4.32E-11	6.72E-07	2.24E-06	NT	NA	7.35E-11	2.24E-06
	Total Risk:	**1.05E-05**	**2.62E-06**	**NA**	**4.11E-09**	**1.31E-05**	**4.50E-06**	**6.44E-06**	**NA**	**5.88E-09**	**1.09E-05**	**1.50E-05**	**9.06E-06**	**NA**	**9.99E-09**	**2.41E-05**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index* Construction Worker					Estimated Hazard Index* Residential Child					Estimated Hazard Index* Residential Adult					Estimated Incremental Cancer Risk Construction Worker				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
10500	Aluminum	2.16E-02	3.53E-03	NA	NT	2.51E-02	4.49E-02	5.79E-03	NA	NT	5.07E-02	4.81E-03	3.56E-03	NA	NT	8.37E-03	NT	NT	NA	NT	NT
5.19	Arsenic	3.56E-02	5.29E-03	NA	NT	4.09E-02	7.39E-02	8.68E-03	NA	NT	8.26E-02	7.92E-03	5.34E-03	NA	NT	1.33E-02	2.29E-07	3.40E-08	NA	1.92E-08	2.82E-07
22300	Iron	1.53E-01	6.75E-03	NA	NT	1.60E-01	3.18E-01	1.11E-02	NA	NT	3.29E-01	3.40E-02	6.81E-03	NA	NT	4.08E-02	NT	NT	NA	NT	NT
182	Benzo(a)pyrene	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	3.90E-08	NT	NA	1.38E-10	3.92E-08
	Total Risk:	**2.10E-01**	**1.56E-02**	**NA**	**NT**	**2.26E-01**	**4.37E-01**	**2.56E-02**	**NA**	**NT**	**4.62E-01**	**4.68E-02**	**1.57E-02**	**NA**	**NT**	**6.25E-02**	**2.68E-07**	**3.40E-08**	**NA**	**1.93E-08**	**3.21E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Incremental Cancer Risk					Estimated Incremental Cancer Risk					Estimated Incremental Cancer Risk				
		Residential Child					Residential Adult					Lifetime Resident				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
10500	Aluminum	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
5.19	Arsenic	9.51E-07	1.12E-07	NA	8.70E-10	1.06E-06	3.56E-07	2.40E-07	NA	1.09E-09	5.98E-07	1.31E-06	3.52E-07	NA	1.96E-09	1.66E-06
22300	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
182	Benzo(a)pyrene	1.62E-07	NT	NA	6.26E-12	1.62E-07	6.08E-08	NT	NA	7.83E-12	6.08E-08	2.23E-07	NT	NA	1.41E-11	2.23E-07
	Total Risk:	**1.11E-06**	**1.12E-07**	**NA**	**8.76E-10**	**1.23E-06**	**4.17E-07**	**2.40E-07**	**NA**	**1.09E-09**	**6.59E-07**	**1.53E-06**	**3.52E-07**	**NA**	**1.97E-09**	**1.88E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult				Estimated Incremental Cancer Risk Construction Worker		
Representative Concentration	Substance	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Dermal Contact	Inhalation of Volatiles	Total
12.5	Arsenic	1.11E-03	NA	1.11E-03	2.66E+00	4.89E-03	2.67E+00	1.14E+00	3.00E-03	NA	1.14E+00	7.15E-09	NA	7.15E-09
917	Barium	3.32E-04	NA	3.32E-04	8.37E-01	1.46E-03	8.39E-01	3.59E-01	8.97E-04	NA	3.60E-01	NT	NA	NT
3.8	Beryllium	4.82E-03	NA	4.82E-03	1.21E-01	2.12E-02	1.43E-01	5.21E-02	1.30E-02	NA	6.51E-02	NT	NA	NT
87.9	Chromium	4.46E-02	NA	4.46E-02	1.12E+00	1.96E-01	1.32E+00	4.82E-01	1.20E-01	NA	6.02E-01	NT	NA	NT
76400	Iron	6.46E-03	NA	6.46E-03	1.63E+01	2.84E-02	1.63E+01	6.98E+00	1.74E-02	NA	6.99E+00	NT	NA	NT
50	Lead	NT	NA	NT	NT	NT	NT	NT	NT	NA	NT	NT	NA	NT
90.4	Nickel	1.15E-03	NA	1.15E-03	2.89E-01	5.03E-03	2.94E-01	1.24E-01	3.10E-03	NA	1.27E-01	NT	NA	NT
102	Vanadium	1.85E-02	NA	1.85E-02	9.32E-01	8.12E-02	1.01E+00	3.99E-01	4.99E-02	NA	4.49E-01	NT	NA	NT
2	1,1,2-Trichloroethane	1.21E-04	NT	1.21E-04	3.20E-02	1.95E-03	3.39E-02	1.37E-02	7.94E-04	NT	1.45E-02	3.94E-10	3.30E-08	3.34E-08
2	1,1-Dichloroethene	9.69E-05	NT	9.69E-05	1.42E-02	1.28E-03	1.55E-02	6.09E-03	4.31E-04	NT	6.52E-03	7.47E-09	1.00E-07	1.07E-07
122	1,2-Dichloroethene (cis)	3.34E-03	NT	3.34E-03	7.80E-01	4.38E-02	8.24E-01	3.34E-01	1.52E-02	NT	3.49E-01	NT	NT	NT
2	Tetrachloroethene	2.71E-04	3.00E-04	5.71E-04	1.28E-02	5.61E-03	1.84E-02	5.48E-03	2.18E-03	4.00E-04	8.06E-03	2.02E-09	1.20E-09	3.22E-09
5210	Trichloroethene	3.94E-01	NT	3.94E-01	5.55E+01	6.34E+00	6.19E+01	2.38E+01	2.35E+00	NT	2.61E+01	3.72E-07	2.40E-11	3.72E-07
9	Vinyl Chloride	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	4.75E-08	1.60E-08	6.35E-08
	Total Risk:	**4.75E-01**	**3.00E-04**	**4.75E-01**	**7.86E+01**	**6.74E+00**	**8.53E+01**	**3.37E+01**	**2.58E+00**	**4.00E-04**	**3.63E+01**	**4.36E-07**	**1.50E-07**	**5.868E-07**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child			Estimated Incremental Cancer Risk Residential Adult				Estimated Incremental Cancer Risk Lifetime Resident			
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total
12.5	Arsenic	1.03E-04	1.88E-07	1.03E-04	1.76E-04	4.63E-07	NA	1.77E-04	2.79E-04	6.52E-07	NA	2.80E-04
917	Barium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
3.8	Beryllium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
87.9	Chromium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
76400	Iron	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
50	Lead	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
90.4	Nickel	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
102	Vanadium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
2	1,1,2-Trichloroethane	6.25E-07	3.82E-08	6.63E-07	1.07E-06	6.21E-08	9.94E-07	2.13E-06	1.70E-06	1.00E-07	9.94E-07	2.79E-06
2	1,1-Dichloroethene	6.58E-06	5.91E-07	7.17E-06	1.13E-05	7.97E-07	4.14E-06	1.62E-05	1.78E-05	1.39E-06	4.14E-06	2.34E-05
122	1,2-Dichloroethene (cis)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2	Tetrachloroethene	5.70E-07	2.50E-07	8.20E-07	9.77E-07	3.90E-07	3.90E-08	1.41E-06	1.55E-06	6.39E-07	3.90E-08	2.23E-06
5210	Trichloroethene	3.14E-04	3.59E-05	3.50E-04	5.38E-04	5.32E-05	3.26E-04	9.17E-04	8.52E-04	8.91E-05	3.26E-04	1.27E-03
9	Vinyl Chloride	9.37E-05	3.02E-06	9.67E-05	1.61E-04	3.50E-06	3.74E-05	2.02E-04	2.54E-04	6.52E-06	3.74E-05	2.98E-04
	Total Risk:	**5.18E-04**	**4.00E-05**	**5.58E-04**	**8.88E-04**	**5.84E-05**	**3.68E-04**	**1.32E-03**	**1.41E-03**	**9.83E-05**	**3.68E-04**	**1.87E-03**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult				Estimated Incremental Cancer Risk Construction Worker		
		Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Dermal Contact	Inhalation of Volatiles	Total
6.68	Arsenic	5.94E-04	NA	5.94E-04	9.52E-01	1.17E-03	9.53E-01	2.86E-01	7.17E-04	NA	2.86E-01	3.82E-09	NA	3.82E-09
256	Barium	9.28E-05	NA	9.28E-05	1.56E-01	1.82E-04	1.56E-01	4.69E-02	1.12E-04	NA	4.70E-02	NT	NA	NT
0.8	Beryllium	1.01E-03	NA	1.01E-03	1.71E-02	1.99E-03	1.91E-02	5.13E-03	1.22E-03	NA	6.35E-03	NT	NA	NT
17.8	Chromium	9.03E-03	NA	9.03E-03	1.52E-01	1.77E-02	1.70E-01	4.56E-02	1.09E-02	NA	5.65E-02	NT	NA	NT
23500	Iron	1.99E-03	NA	1.99E-03	3.35E+00	3.90E-03	3.35E+00	1.00E+00	2.40E-03	NA	1.01E+00	NT	NA	NT
17	Lead	NT	NA	NT	NT	NT	NT	NT	NT	NA	NT	NT	NA	NT
23.5	Nickel	2.98E-04	NA	2.98E-04	5.02E-02	5.85E-04	5.08E-02	1.51E-02	3.59E-04	NA	1.54E-02	NT	NA	NT
20.8	Vanadium	3.77E-03	NA	3.77E-03	1.27E-01	7.39E-03	1.34E-01	3.81E-02	4.54E-03	NA	4.26E-02	NT	NA	NT
0.8	1,1,2-Trichloroethane	4.83E-05	NT	4.83E-05	8.55E-03	4.27E-04	8.97E-03	2.56E-03	1.74E-04	NT	2.74E-03	1.57E-10	6.10E-12	1.63E-10
0.7	1,1-Dichloroethene	3.39E-05	NT	3.39E-05	3.32E-03	2.44E-04	3.57E-03	9.97E-04	8.23E-05	NT	1.08E-03	2.62E-09	1.20E-10	2.74E-09
24.4	1,2-Dichloroethene (cis)	6.68E-04	NT	6.68E-04	1.04E-01	4.79E-03	1.09E-01	3.13E-02	1.66E-03	NT	3.29E-02	NT	NT	NT
0.8	Tetrachloroethene	1.09E-04	2.20E-07	1.09E-04	3.42E-03	1.23E-03	4.64E-03	1.03E-03	4.78E-04	5.85E-05	1.56E-03	8.07E-10	9.00E-13	8.08E-10
1000	Trichloroethene	7.57E-02	NT	7.57E-02	7.12E+00	6.65E-01	7.79E+00	2.14E+00	2.46E-01	NT	2.38E+00	7.14E-08	2.40E-09	7.38E-08
2.2	Vinyl Chloride	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	1.16E-08	6.60E-10	1.23E-08
	Total Risk:	**9.33E-02**	**2.20E-07**	**9.33E-02**	**1.20E+01**	**7.05E-01**	**1.28E+01**	**3.61E+00**	**2.69E-01**	**5.85E-05**	**3.88E+00**	**9.04E-08**	**3.19E-09**	**9.359E-08**

Notes:

Units are ug/L.

NT – No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA – Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Groundwater
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child			Estimated Incremental Cancer Risk Residential Adult				Estimated Incremental Cancer Risk Lifetime Resident			
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Total
6.68	Arsenic	1.22E-05	1.50E-08	1.23E-05	1.28E-05	3.23E-08	NA	1.29E-05	2.51E-05	4.73E-08	NA	2.51E-05
256	Barium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
0.8	Beryllium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
17.8	Chromium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
23500	Iron	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
17	Lead	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
23.5	Nickel	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
20.8	Vanadium	NT	NT	NT	NT	NT	NA	NT	NT	NT	NA	NT
0.8	1,1,2-Trichloroethane	5.57E-08	2.78E-09	5.85E-08	5.85E-08	3.96E-09	4.24E-08	1.05E-07	1.14E-07	6.74E-09	4.24E-08	1.63E-07
0.7	1,1-Dichloroethene	5.13E-07	3.77E-08	5.51E-07	5.39E-07	4.45E-08	1.55E-07	7.38E-07	1.05E-06	8.21E-08	1.55E-07	1.29E-06
24.4	1,2-Dichloroethene (cis)	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.8	Tetrachloroethene	5.08E-08	1.82E-08	6.90E-08	5.33E-08	2.48E-08	1.66E-09	7.98E-08	1.04E-07	4.30E-08	1.66E-09	1.49E-07
1000	Trichloroethene	1.34E-05	1.25E-06	1.47E-05	1.41E-05	1.63E-06	6.67E-06	2.24E-05	2.75E-05	2.88E-06	6.67E-06	3.71E-05
2.2	Vinyl Chloride	5.10E-06	1.34E-07	5.24E-06	5.36E-06	1.36E-07	9.76E-07	6.47E-06	1.05E-05	2.71E-07	9.76E-07	1.17E-05
	Total Risk:	**3.14E-05**	**1.46E-06**	**3.29E-05**	**3.30E-05**	**1.87E-06**	**7.84E-06**	**4.27E-05**	**6.44E-05**	**3.33E-06**	**7.84E-06**	**7.55E-05**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.5

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult			Estimated Hazard Index** Adolescent Trespasser			Estimated Incremental Cancer Risk Residential Child		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
4.2	Arsenic	8.18E-03	3.00E-04	8.48E-03	1.75E-03	1.85E-04	1.94E-03	2.85E-03	2.24E-04	3.08E-03	3.16E-07	1.16E-08	3.27E-07
21800	Iron	4.25E-02	1.48E-03	4.40E-02	9.10E-03	9.10E-04	1.00E-02	1.48E-02	1.10E-03	1.59E-02	NT	NT	NT
15.4	Lead	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1520	Manganese	3.86E-02	1.35E-03	4.00E-02	8.28E-03	8.28E-04	9.10E-03	1.35E-02	1.00E-03	1.45E-02	NT	NT	NT
0.17	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**8.93E-02**	**3.13E-03**	**9.24E-02**	**1.91E-02**	**1.92E-03**	**2.11E-02**	**3.11E-02**	**2.33E-03**	**3.35E-02**	**3.16E-07**	**1.16E-08**	**3.27E-07**

Notes:

Units are ug/L.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.5

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Adult			Estimated Incremental Cancer Risk Lifetime Resident			Estimated Incremental Cancer Risk Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
4.2	Arsenic	2.71E-07	2.85E-08	2.99E-07	5.86E-07	4.01E-08	6.26E-07	1.83E-07	1.44E-08	1.98E-07
21800	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT
15.4	Lead	NT	NT	NT	NT	NT	NT	NT	NT	NT
1520	Manganese	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.17	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**2.71E-07**	**2.85E-08**	**2.99E-07**	**5.86E-07**	**4.01E-08**	**6.26E-07**	**1.83E-07**	**1.44E-08**	**1.98E-07**

Notes:

Units are ug/L.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.6

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index* Residential Child			Estimated Hazard Index* Residential Adult			Estimated Hazard Index* Adolescent Trespasser			Estimated Incremental Cancer Risk Residential Child		
Representative Concentration	Substance	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
2.29	Arsenic	1.12E-03	4.09E-05	1.16E-03	2.39E-04	2.52E-05	2.64E-04	3.89E-04	3.05E-05	4.20E-04	1.43E-08	5.26E-10	1.49E-08
10500	Iron	5.11E-03	1.78E-04	5.29E-03	1.10E-03	1.10E-04	1.21E-03	1.78E-03	1.33E-04	1.92E-03	NT	NT	NT
6.8	Lead	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
764	Manganese	4.85E-03	1.69E-04	5.02E-03	1.04E-03	1.04E-04	1.14E-03	1.69E-03	1.26E-04	1.82E-03	NT	NT	NT
0.08	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**1.11E-02**	**3.88E-04**	**1.15E-02**	**2.37E-03**	**2.39E-04**	**2.61E-03**	**3.87E-03**	**2.89E-04**	**4.16E-03**	**1.43E-08**	**5.26E-10**	**1.49E-08**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.6

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Water
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Adult			Estimated Incremental Cancer Risk Lifetime Resident			Estimated Incremental Cancer Risk Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
2.29	Arsenic	1.08E-08	1.13E-09	1.19E-08	2.51E-08	1.66E-09	2.68E-08	2.50E-08	1.96E-09	2.70E-08
10500	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT
6.9	Lead	NT	NT	NT	NT	NT	NT	NT	NT	NT
764	Manganese	NT	NT	NT	NT	NT	NT	NT	NT	NT
0.08	Mercury	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**1.08E-08**	**1.13E-09**	**1.19E-08**	**2.51E-08**	**1.66E-09**	**2.68E-08**	**2.50E-08**	**1.96E-09**	**2.70E-08**

Notes:

Units are ug/L.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.7

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index Full-Time Employee			Estimated Hazard Index Construction Worker			Estimated Hazard Index Maintenance Worker			Estimated Hazard Index Residential Child			Estimated Hazard Index Residential Adult			Estimated Hazard Index Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
12035	Aluminum	1.4E-03	4.5E-03	5.9E-03	6.8E-03	5.5E-03	1.2E-02	1.4E-03	2.3E-03	3.7E-03	7.0E-03	2.3E-03	9.3E-03	7.5E-04	1.4E-03	2.1E-03	1.2E-03	1.7E-03	2.9E-03
5.86	Arsenic	2.3E-03	6.6E-03	8.9E-03	1.1E-02	8.2E-03	1.9E-02	2.3E-03	3.3E-03	5.6E-03	1.1E-02	3.3E-03	1.5E-02	1.2E-03	2.1E-03	3.3E-03	2.0E-03	2.5E-03	4.5E-03
53155	Iron	2.1E-02	1.8E-02	3.9E-02	1.0E-01	2.2E-02	1.2E-01	2.1E-02	8.9E-03	3.0E-02	1.0E-01	9.0E-03	1.1E-01	1.1E-02	5.5E-03	1.7E-02	1.8E-02	6.7E-03	2.5E-02
72.5	Silver	1.7E-03	1.5E-03	3.2E-03	8.2E-03	1.8E-03	1.0E-02	1.7E-03	7.3E-04	2.4E-03	8.5E-03	7.4E-04	9.2E-03	9.1E-04	4.5E-04	1.4E-03	1.5E-03	5.5E-04	2.0E-03
	Total Risk:	**2.6E-02**	**3.0E-02**	**5.7E-02**	**1.3E-01**	**3.8E-02**	**1.6E-01**	**2.6E-02**	**1.5E-02**	**4.1E-02**	**1.3E-01**	**1.5E-02**	**1.5E-01**	**1.4E-02**	**9.5E-03**	**2.3E-02**	**2.3E-02**	**1.1E-02**	**3.4E-02**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.7

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Cancer Risk Full-Time Employee			Estimated Cancer Risk Construction Worker			Estimated Cancer Risk Maintenance Worker			Estimated Cancer Risk Residential Child			Estimated Cancer Risk Residential Adult			Estimated Cancer Risk Lifetime Resident			Estimated Cancer Risk Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
12035	Aluminum	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5.86	Arsenic	3.7E-07	1.1E-06	1.4E-06	7.1E-08	5.3E-08	1.2E-07	3.7E-07	5.3E-07	9.0E-07	4.4E-07	1.3E-07	5.7E-07	1.9E-07	3.2E-07	5.1E-07	6.3E-07	4.5E-07	1.1E-06	1.3E-07	1.6E-07	2.9E-07
53155	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
72.5	Silver	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**3.7E-07**	**1.1E-06**	**1.4E-06**	**7.1E-08**	**5.3E-08**	**1.2E-07**	**3.7E-07**	**5.3E-07**	**9.0E-07**	**4.4E-07**	**1.3E-07**	**5.7E-07**	**1.9E-07**	**3.2E-07**	**5.1E-07**	**6.3E-07**	**4.5E-07**	**1.1E-06**	**1.3E-07**	**1.6E-07**	**2.9E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.8

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index** Full-Time Employee			Estimated Hazard Index** Construction Worker			Estimated Hazard Index** Maintenance Worker			Estimated Hazard Index** Residential Child			Estimated Hazard Index** Residential Adult			Estimated Hazard Index** Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
12035	Aluminum	3.5E-04	4.5E-04	8.0E-04	1.7E-03	5.5E-04	2.3E-03	3.5E-04	2.3E-04	5.8E-04	1.8E-03	2.3E-04	2.0E-03	1.9E-04	1.4E-04	3.3E-04	3.1E-04	1.7E-04	4.8E-04
5.86	Arsenic	5.7E-04	6.6E-04	1.2E-03	2.8E-03	8.2E-04	3.6E-03	5.7E-04	3.3E-04	9.1E-04	2.9E-03	3.3E-04	3.2E-03	3.1E-04	2.1E-04	5.1E-04	5.0E-04	2.5E-04	7.5E-04
53155	Iron	5.2E-03	1.8E-03	7.0E-03	2.5E-02	2.2E-03	2.7E-02	5.2E-03	8.9E-04	6.1E-03	2.6E-02	9.0E-04	2.7E-02	2.8E-03	5.5E-04	3.3E-03	4.5E-03	6.7E-04	5.2E-03
72.5	Silver	4.3E-04	1.5E-04	5.7E-04	2.0E-03	1.8E-04	2.2E-03	4.3E-04	7.3E-05	5.0E-04	2.1E-03	7.4E-05	2.2E-03	2.3E-04	4.5E-05	2.7E-04	3.7E-04	5.5E-05	4.2E-04
	Total Risk:	**6.6E-03**	**3.0E-03**	**9.6E-03**	**3.1E-02**	**3.8E-03**	**3.5E-02**	**6.6E-03**	**1.5E-03**	**8.1E-03**	**3.3E-02**	**1.5E-03**	**3.4E-02**	**3.5E-03**	**9.5E-04**	**4.4E-03**	**5.7E-03**	**1.1E-03**	**6.8E-03**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.4.8

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Sediment
Site 42 - Olson Road Landfill
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Cancer Risk Full-Time Employee			Estimated Cancer Risk Construction Worker			Estimated Cancer Risk Maintenance Worker			Estimated Cancer Risk Residential Child			Estimated Cancer Risk Residential Adult			Estimated Cancer Risk Lifetime Resident			Estimated Cancer Risk Adolescent Trespasser		
		Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total	Ingestion	Dermal Contact	Total
12035	Aluminum	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
5.86	Arsenic	1.8E-08	2.1E-08	4.0E-08	1.8E-08	5.26E-09	2.29E-08	1.8E-08	1.1E-08	2.9E-08	3.7E-08	4.3E-09	4.1E-08	1.4E-08	9.3E-09	2.3E-08	5.04E-08	1.36E-08	6.40E-08	3.2E-08	1.6E-08	4.8E-08
53155	Iron	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
72.5	Silver	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
	Total Risk:	**1.842E-08**	**2.134E-08**	**3.976E-08**	**1.8E-08**	**5.3E-09**	**2.3E-08**	**1.8E-08**	**1.1E-08**	**2.9E-08**	**3.7E-08**	**4.3E-09**	**4.1E-08**	**1.4E-08**	**9.3E-09**	**2.3E-08**	**5.043E-08**	**1.357E-08**	**6.4E-08**	**3.199E-08**	**1.603E-08**	**4.802E-08**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

IEUBK MODEL - Exposure to Lead (Page 1 of 2)

SITE NAME: Site 42 - Olson Road Landfill

EXPOSURE SCENARIO: RME

LOCATION: IHDIV-NSWC, Indian Head, Maryland

DATE: May 15, 1998

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 ug Pb/m3 DEFAULT
Indoor AIR Pb Conc: 30.0 percent of outdoor.
Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 575.00 ug Pb/L
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: constant conc.
Dust: constant conc.

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	376.0	376.0
1-2	376.0	376.0
2-3	376.0	376.0
3-4	376.0	376.0
4-5	376.0	376.0
5-6	376.0	376.0
6-7	376.0	376.0

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	21.3	42.28	5.80
1-2:	29.8	79.60	7.49
2-3:	29.9	86.57	7.84
3-4:	30.0	92.64	8.26
4-5:	30.1	98.21	6.42
5-6:	29.9	105.31	5.93
6-7:	28.9	109.45	5.74

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	1.67	34.79	0.00	0.02
1-2:	1.42	70.66	0.00	0.03
2-3:	1.67	76.99	0.00	0.06
3-4:	1.69	82.63	0.00	0.07
4-5:	1.71	90.01	0.00	0.07
5-6:	1.85	97.43	0.00	0.09
6-7:	2.09	101.52	0.00	0.09

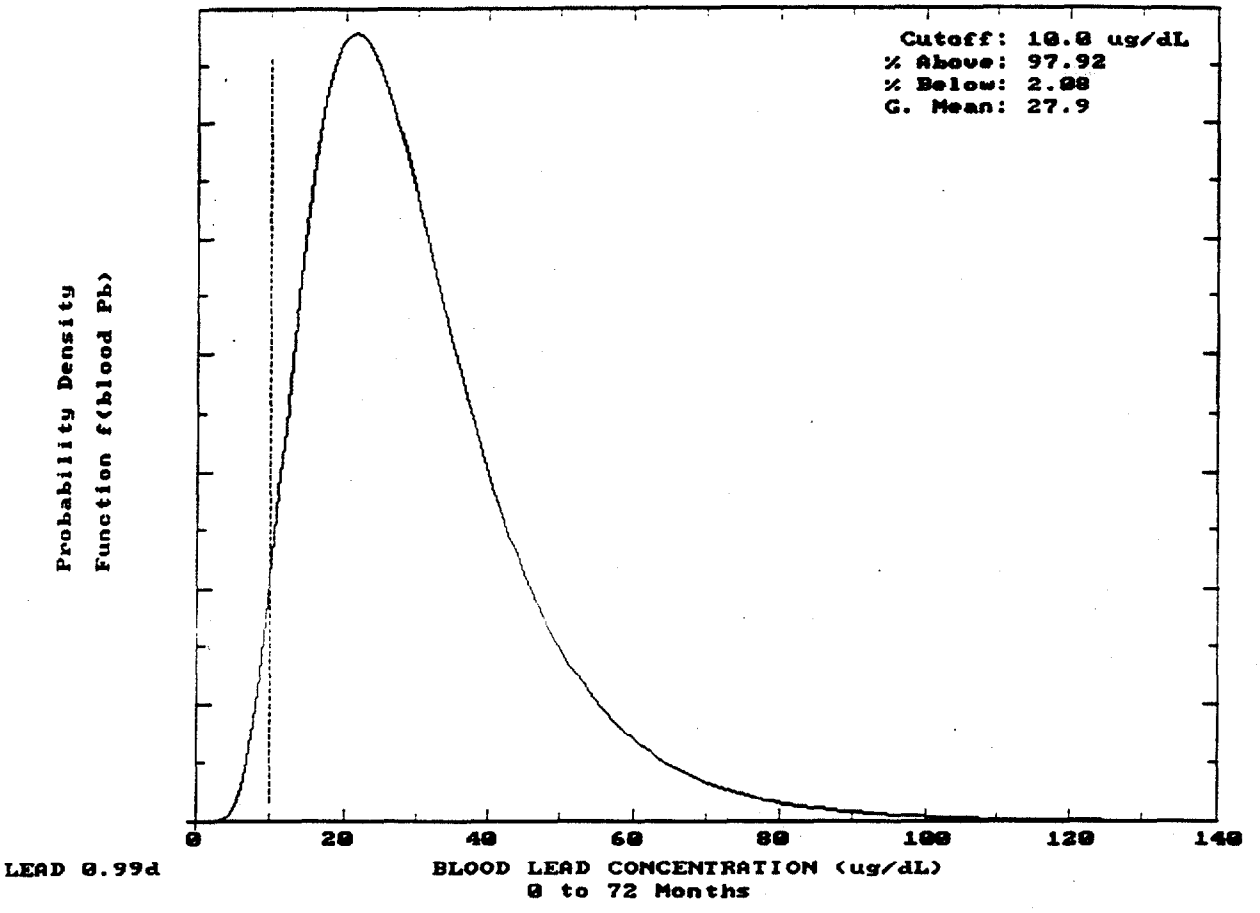
IEUBK MODEL - Exposure to Lead (Page 2 of 2)

SITE NAME: Site 42 - Olson Road Landfill

EXPOSURE SCENARIO: RME

LOCATION: IHDIV-NSWC, Indian Head, Maryland

DATE: May 15, 1998



IEUBK MODEL - Exposure to Lead (Page 1 of 2)

SITE NAME: Site 42 - Olson Road Landfill

EXPOSURE SCENARIO: CTE

LOCATION: IHDIV-NSWC, Indian Head, Maryland

DATE: May 15, 1998

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 ug Pb/m3 DEFAULT
Indoor AIR Pb Conc: 30.0 percent of outdoor.
Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 192.00 ug Pb/L
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: constant conc.
Dust: constant conc.

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	24.0	24.0
1-2	24.0	24.0
2-3	24.0	24.0
3-4	24.0	24.0
4-5	24.0	24.0
5-6	24.0	24.0
6-7	24.0	24.0

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 ug Pb/day DEFAULT

MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	9.6	18.26	0.49
1-2:	14.3	37.02	0.69
2-3:	14.3	39.83	0.71
3-4:	14.1	41.80	0.74
4-5:	14.0	44.08	0.56
5-6:	13.9	47.06	0.51
6-7:	13.4	48.65	0.49

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.23	15.51	0.00	0.02
1-2:	2.06	34.23	0.00	0.03
2-3:	2.38	36.67	0.00	0.06
3-4:	2.37	38.62	0.00	0.07
4-5:	2.34	41.11	0.00	0.07
5-6:	2.50	43.95	0.00	0.09
6-7:	2.80	45.27	0.00	0.09

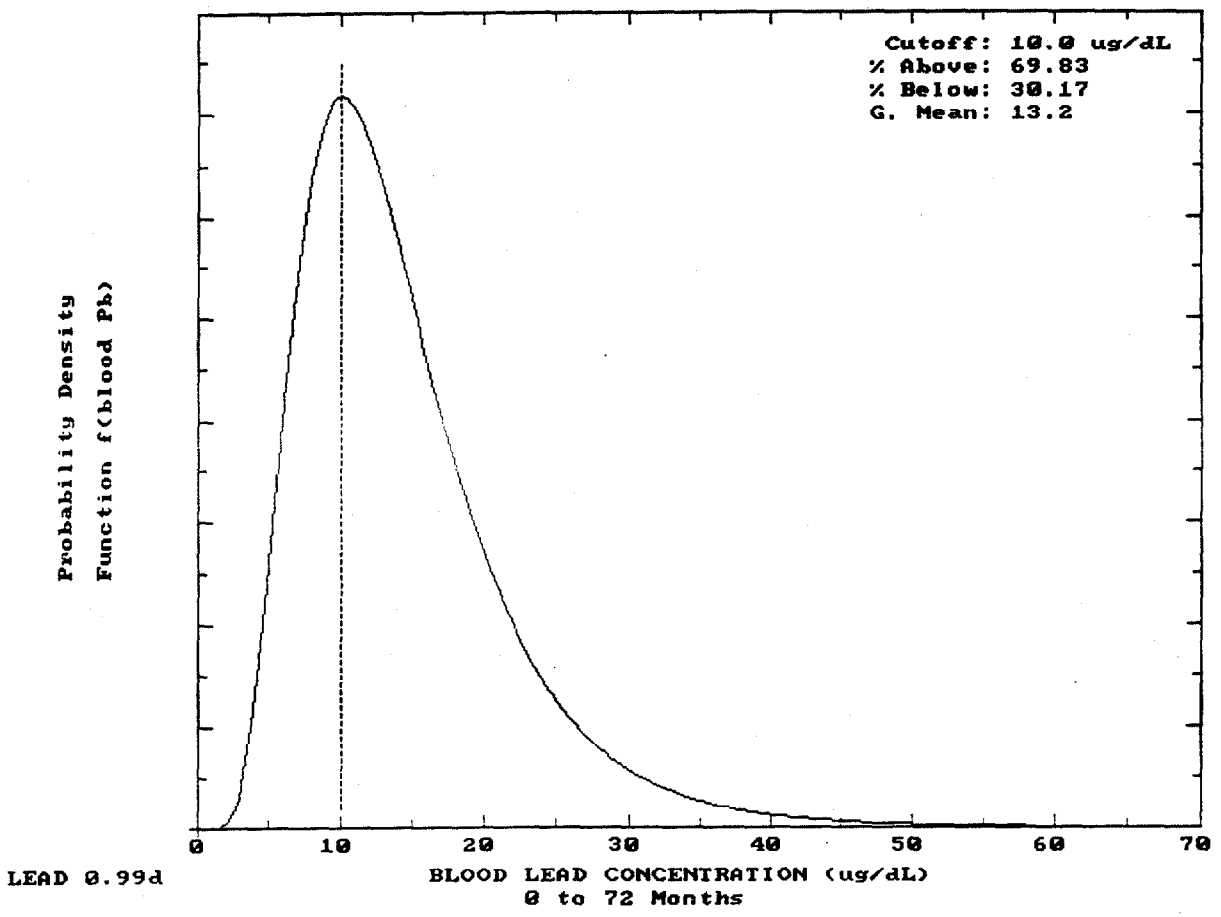
IEUBK MODEL - Exposure to Lead (Page 2 of 2)

SITE NAME: Site 42 - Olson Road Landfill

EXPOSURE SCENARIO: CTE

LOCATION: IHDIV-NSWC, Indian Head, Maryland

DATE: May 15, 1998



SITE 44 - SOAK OUT AREA

Table K-3.5.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 44 - Soak Out Area
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index* Full-Time Employee					Estimated Hazard Index* Maintenance Worker					Estimated Hazard Index* Adolescent Trespasser				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
25300	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
4.4	Arsenic	1.44E-02	2.08E-02	NA	NT	3.51E-02	1.72E-03	2.49E-03	NA	NT	4.22E-03	1.50E-03	1.87E-03	NA	NT	3.37E-03
15700	Iron	5.12E-02	2.20E-02	NA	NT	7.32E-02	6.14E-03	2.64E-03	NA	NT	8.79E-03	5.34E-03	1.98E-03	NA	NT	7.32E-03
	Total Risk:	**6.56E-02**	**4.28E-02**	**NA**	**NT**	**1.08E-01**	**7.87E-03**	**5.14E-03**	**NA**	**NT**	**1.30E-02**	**6.83E-03**	**3.86E-03**	**NA**	**NT**	**1.07E-02**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.5.1

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 44 - Soak Out Area
IHDIV - NSWC, Indian Head, Maryland

		Estimated Incremental Cancer Risk Full-Time Employee					Estimated Incremental Cancer Risk Maintenance Worker					Estimated Incremental Cancer Risk Adolescent Trespasser				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
25300	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
4.4	Arsenic	2.31E-06	3.34E-06	NA	3.52E-09	5.65E-06	2.77E-07	4.01E-07	NA	4.22E-10	6.78E-07	9.61E-08	1.20E-07	NA	9.38E-11	2.17E-07
15700	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
	Total Risk:	**2.31E-06**	**3.34E-06**	**NA**	**3.52E-09**	**5.65E-06**	**2.77E-07**	**4.01E-07**	**NA**	**4.22E-10**	**6.78E-07**	**9.61E-08**	**1.20E-07**	**NA**	**9.38E-11**	**2.17E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.5.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 44 - Soak Out Area
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Hazard Index* Full-Time Employee					Estimated Hazard Index* Maintenance Worker					Estimated Hazard Index* Adolescent Trespasser				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
18900	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
3.75	Arsenic	5.36E-03	3.10E-03	NA	NT	8.46E-03	3.67E-04	2.13E-04	NA	NT	5.80E-04	3.19E-04	1.60E-04	NA	NT	4.78E-04
12600	Iron	1.83E-02	3.15E-03	NA	NT	2.14E-02	1.25E-03	2.15E-04	NA	NT	1.47E-03	1.09E-03	1.62E-04	NA	NT	1.25E-03
	Total Risk:	**2.36E-02**	**6.25E-03**	**NA**	**NT**	**2.99E-02**	**1.62E-03**	**4.28E-04**	**NA**	**NT**	**2.05E-03**	**1.41E-03**	**3.21E-04**	**NA**	**NT**	**1.73E-03**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT – No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA – Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.5.2

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - Surface Soil
Site 44 - Soak Out Area
IHDIV - NSWC, Indian Head, Maryland

		Estimated Incremental Cancer Risk Full-Time Employee					Estimated Incremental Cancer Risk Maintenance Worker					Estimated Incremental Cancer Risk Adolescent Trespasser				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
18900	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
3.75	Arsenic	1.72E-07	9.98E-08	NA	2.63E-10	2.72E-07	1.18E-08	6.83E-09	NA	1.80E-11	1.86E-08	2.05E-08	1.03E-08	NA	2.00E-11	3.08E-08
12600	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
	Total Risk:	**1.72E-07**	**9.98E-08**	**NA**	**2.63E-10**	**2.72E-07**	**1.18E-08**	**6.83E-09**	**NA**	**1.80E-11**	**1.86E-08**	**2.05E-08**	**1.03E-08**	**NA**	**2.00E-11**	**3.08E-08**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.
NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.
NA -- Exposure route not applicable for that substance in that medium for that receptor.
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.
Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).
The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.5.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 44 - Soak Out Area
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index* Construction Worker					Estimated Hazard Index* Residential Child					Estimated Hazard Index* Residential Adult					Estimated Incremental Cancer Risk Construction Worker				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
25300	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
4.4	Arsenic	6.06E-02	2.56E-02	NA	NT	8.62E-02	1.88E-01	5.50E-02	NA	NT	2.43E-01	2.01E-02	3.38E-02	NA	NT	5.39E-02	3.90E-07	1.65E-07	NA	1.86E-08	5.73E-07
15700	Iron	2.16E-01	2.71E-02	NA	NT	2.43E-01	6.69E-01	5.63E-02	NA	NT	7.27E-01	7.17E-02	3.58E-02	NA	NT	1.06E-01	NT	NT	NA	NT	NT
	Total Risk:	**2.77E-01**	**5.28E-02**	**NA**	**NT**	**3.30E-01**	**8.57E-01**	**1.13E-01**	**NA**	**NT**	**9.70E-01**	**9.18E-02**	**6.97E-02**	**NA**	**NT**	**1.61E-01**	**3.90E-07**	**1.65E-07**	**NA**	**1.86E-08**	**5.73E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.5.3

Estimated RME Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 44 - Soak Out Area
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child					Estimated Incremental Cancer Risk Residential Adult					Estimated Incremental Cancer Risk Lifetime Resident				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
25300	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
4.4	Arsenic	7.23E-06	2.12E-06	NA	3.31E-09	9.36E-06	3.10E-06	5.22E-06	NA	4.73E-09	8.33E-06	1.03E-05	7.34E-06	NA	8.04E-09	1.77E-05
15700	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
	Total Risk:	**7.23E-06**	**2.12E-06**	**NA**	**3.31E-09**	**9.36E-06**	**3.10E-06**	**5.22E-06**	**NA**	**4.73E-09**	**8.33E-06**	**1.03E-05**	**7.34E-06**	**NA**	**8.04E-09**	**1.77E-05**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Reasonable Maximum Exposure (RME).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.5.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 44 - Soak Out Area
IHDIV - NSWC, Indian Head, Maryland

		Estimated Hazard Index** Construction Worker					Estimated Hazard Index** Residential Child					Estimated Hazard Index** Residential Adult					Estimated Incremental Cancer Risk Construction Worker				
Representative Concentration	Substance	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
18900	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
3.75	Arsenic	2.57E-02	3.83E-03	NA	NT	2.95E-02	5.34E-02	6.27E-03	NA	NT	5.97E-02	5.72E-03	3.86E-03	NA	NT	9.58E-03	1.65E-07	2.46E-08	NA	1.39E-08	2.04E-07
12800	Iron	8.78E-02	3.88E-03	NA	NT	9.16E-02	1.82E-01	6.36E-03	NA	NT	1.89E-01	1.95E-02	3.91E-03	NA	NT	2.34E-02	NT	NT	NA	NT	NT
	Total Risk:	**1.13E-01**	**7.70E-03**	**NA**	**NT**	**1.21E-01**	**2.36E-01**	**1.26E-02**	**NA**	**NT**	**2.48E-01**	**2.53E-02**	**7.76E-03**	**NA**	**NT**	**3.30E-02**	**1.65E-07**	**2.46E-08**	**NA**	**1.39E-08**	**2.04E-07**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route.
Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes
and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

Table K-3.5.4

Estimated CTE Cancer Risks and Noncarcinogenic Hazard Indices - All Soils
Site 44 - Soak Out Area
IHDIV - NSWC, Indian Head, Maryland

Representative Concentration	Substance	Estimated Incremental Cancer Risk Residential Child					Estimated Incremental Cancer Risk Residential Adult					Estimated Incremental Cancer Risk Lifetime Resident				
		Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Inhalation of Dusts	Total
18900	Nitrocellulose	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
3.75	Arsenic	6.87E-07	8.07E-08	NA	6.29E-10	7.68E-07	2.58E-07	1.74E-07	NA	7.85E-10	4.32E-07	9.44E-07	2.54E-07	NA	1.41E-09	1.20E-06
12800	Iron	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT	NT	NT	NA	NT	NT
	Total Risk:	**6.87E-07**	**8.07E-08**	**NA**	**6.29E-10**	**7.68E-07**	**2.58E-07**	**1.74E-07**	**NA**	**7.85E-10**	**4.32E-07**	**9.44E-07**	**2.54E-07**	**NA**	**1.41E-09**	**1.20E-06**

Notes:

Units are ug/kg for organics, mg/kg for inorganics.

NT -- No toxicity factor (slope factor or RfD) is applicable for the selected COPCs for this exposure route. Risks due to lead are evaluated separately using the IEUBK or adult toxicity model.

NA -- Exposure route not applicable for that substance in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

Estimated cancer and noncancer risks assume a Central Tendency Exposure (CTE).

The representative concentration is selected as presented in a preceding data evaluation table.

APPENDIX L

ECOLOGICAL RISK ASSESSMENT CALCULATIONS

FOODCHAIN MODELING EXAMPLE CALCULATION
AQUATIC RECEPTOR
NSWC INDIAN HEAD, MARYLAND

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg
Food Ingestion Rate	0.6000000 kg/day
Water Ingestion Rate	0.1200000 L/day
Sediment Ingestion Rate	0.0540000 kg/day

Analyte	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Volatile Organic Compounds								
1,1-Dimethylhydrazine	85.5	0	85.5	25.086137	NA	NA	NA	NA
1,2,4-Trichlorobenzene	0	0.001	0	5.384E-05	NA	NA	NA	NA
2-Butanone	0.39	0	0.39	0.114428	NA	NA	NA	NA
Acetone	5.8	0	5.8	1.7017497	NA	NA	NA	NA
Carbon Disulfide	0.023	0	0.023	0.0067483	NA	NA	NA	NA
Chloromethane	0.017	0	0.017	0.0049879	NA	NA	NA	NA
Trichloroethene	0	0.001	0	5.384E-05	NA	NA	NA	NA
Semivolatile Organic Compounds								
Acenaphthylene	0.033	0	0.033	0.0096824	10	100	9.68E-04	9.68E-05
Anthracene	0.064	0	0.064	0.0187779	10	100	1.88E-03	1.88E-04
Benzo(a)anthracene	0.24	0	0.24	0.0704172	10	100	7.04E-03	7.04E-04
Benzo(a)pyrene	0.17	0	0.17	0.0498789	10	100	4.99E-03	4.99E-04
Benzo(b)fluoranthene	0.32	0	0.32	0.0938896	10	100	9.39E-03	9.39E-04
Benzo(g,h,i)perylene	0.062	0	0.062	0.0181911	10	100	1.82E-03	1.82E-04
Benzo(k)fluoranthene	0.17	0	0.17	0.0498789	10	100	4.99E-03	4.99E-04
Bis(2-Ethylhexyl)phthalate	0.41	0.001	0.41	0.1203499	1.1	11	1.09E-01	1.09E-02
Chrysene	0.25	0	0.25	0.0733513	10	100	7.34E-03	7.34E-04
Di-n-butyl phthalate	0.64	0	0.64	0.1877793	0.11	1.1	1.71E+00	1.71E-01
Fluoranthene	0.59	0.001	0.59	0.1731629	10	100	1.73E-02	1.73E-03
Indeno(1,2,3-cd)pyrene	0.049	0	0.049	0.0143769	10	100	1.44E-03	1.44E-04
N-Nitrosodiphenylamine	3.1	0	3.1	0.9095559	0	0	NA	NA
Phenanthrene	0.16	0	0.16	0.0469448	10	100	4.69E-03	4.69E-04
Pyrene	0.53	0.001	0.53	0.1555585	10	100	1.56E-02	1.56E-03
Pesticides/PCBs								
4,4'-DDD	0.0078	0.000035	0.0078	0.0022904	0.0028	0.028	8.18E-01	8.18E-02
4,4'-DDE	0.006	0.00023	0.006	0.0017728	0.0028	0.028	6.33E-01	6.33E-02
4,4'-DDT	0.011	0	0.011	0.0032275	0.0028	0.028	1.15E+00	1.15E-01
Aroclor-1260	0	0.047	0	0.0025303	0.18	1.8	1.41E-02	1.41E-03
Endosulfan I	0	0.000031	0	1.669E-06	10	100	1.67E-07	1.67E-08
Endrin	0.0027	0	0.0027	0.0007922	0.01	0.1	7.92E-02	7.92E-03
Gamma-Chlordane	0.0015	0	0.0015	0.0004401	2.14	10.7	2.06E-04	4.11E-05
BHC,alpha	0.0007	0	0.0007	0.0002054	0.56	2.25	3.67E-04	9.13E-05
Energetics								
Nitrocellulose	1580	0	1580	463.58008	0	0	NA	NA
Nitroguanidine	1.88	0	1.88	0.5516016	NA	NA	NA	NA
Metals and Inorganics								
Aluminum	20500	3.74	20500	6015.0062	109.7	1097	5.48E+01	5.48E+00
Antimony	0.69	0	0.69	0.2024495	0	0	NA	NA
Arsenic	16.6	0.0072	16.6	4.8709125	2.46	7.38	1.98E+00	6.60E-01
Barium	182	0.372	182	53.419758	20.8	41.7	2.57E+00	1.28E+00
Beryllium	1.6	0	1.6	0.4694482	0	0	NA	NA
Cadmium	3.8	0.104	3.8	1.1205384	1.45	20	7.73E-01	5.60E-02
Calcium	4730	49.1	4730	1390.4495	0	0	NA	NA
Chromium	43.3	0.0376	43.3	12.706466	1	5	1.27E+01	2.54E+00
Cobalt	34.7	0.0063	34.7	10.181497	1	10	1.02E+01	1.02E+00
Copper	49.1	0.154	49.1	14.414482	47	61.7	3.07E-01	2.34E-01
Iron	43800	16.7	43800	12852.043	0	0	NA	NA
Lead	105	0.716	105	30.846083	1.13	11.3	2.73E+01	2.73E+00
Manganese	1300	0.225	1300	381.43876	977	9770	3.90E-01	3.90E-02
Mercury	9.5	0.0028	9.5	2.7874993	0.0064	0.064	4.36E+02	4.36E+01
Nickel	59.8	0.0402	59.8	17.54779	77.4	107	2.27E-01	1.64E-01
Selenium	1.7	0	1.7	0.4987887	0.5	1	9.98E-01	4.99E-01
Silver	308	0.0081	308	90.369211	0	0	NA	NA
Vanadium	55	0.0149	55	16.138083	11.4	114	1.42E+00	1.42E-01
Zinc	273	1.15	273	80.161507	14.5	131	5.53E+00	6.12E-01

FOODCHAIN MODELING EXAMPLE CALCULATION
TERRESTRIAL RECEPTOR
NSWC INDIAN HEAD, MARYLAND

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0150000	kg
Food Ingestion Rate	0.0105000	kg/day
Water Ingestion Rate	0.0037500	L/day
Soil Ingestion Rate	0.0010900	kg/day

Analyte	Soil Concentration (mg/kg)	Water Concentration (mg/L)	Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Volatile Organic Compounds								
Acetone	0.12	0	0.12	0.09272	10	50	9.27E-03	1.85E-03
Carbon Disulfide	0.003	0	0.003	0.002318	11	70	2.11E-04	3.31E-05
Toluene	0.009	0	0.009	0.006954	26	260	2.67E-04	2.67E-05
1,2,4-Trichlorobenzene	4.8	0.001	4.8	3.70905	NA	NA	NA	NA
Trichloroethene	0	0.001	0	0.00025	0.7	7	3.57E-04	3.57E-05
Semivolatile Organic Compounds								
2-Methylnaphthalene	0.69	0	0.69	0.53314	1	10	5.33E-01	5.33E-02
4-Methylphenol	0.2	0	0.2	0.1545333	0	0	NA	NA
Acenaphthene	0.56	0	0.56	0.4326933	1	10	4.33E-01	4.33E-02
Acenaphthylene	0.1	0	0.1	0.0772667	1	10	7.73E-02	7.73E-03
Anthracene	0.94	0	0.94	0.7263067	1	10	7.26E-01	7.26E-02
Benzo(a)anthracene	2.8	0	2.8	2.1634667	1	10	2.16E+00	2.16E-01
Benzo(a)pyrene	2	0	2	1.5453333	1	10	1.55E+00	1.55E-01
Benzo(b)fluoranthene	3.4	0	3.4	2.6270667	1	10	2.63E+00	2.63E-01
Benzo(g,h,i)perylene	1.5	0	1.5	1.159	1	10	1.16E+00	1.16E-01
Benzo(k)fluoranthene	2.1	0	2.1	1.6226	1	10	1.62E+00	1.62E-01
Bis(2-Ethylhexyl)phthalate	2.1	0.001	2.1	1.62285	18.3	183	8.87E-02	8.87E-03
Carbazole	0.24	0	0.24	0.18544	1	10	1.85E-01	1.85E-02
Chrysene	2.9	0	2.9	2.2407333	1	10	2.24E+00	2.24E-01
Di-n-butyl phthalate	0.44	0	0.44	0.3399733	550	1833	6.18E-04	1.85E-04
Dibenzo(a,h)anthracene	0.85	0	0.85	0.6567667	1	10	6.57E-01	6.57E-02
Dibenzofuran	0.59	0	0.59	0.4558733	0	0	NA	NA
Diethyl Phthalate	0.14	0	0.14	0.1081733	4583	45830	2.36E-05	2.36E-06
Fluoranthene	2.9	0.001	2.9	2.2409833	1	10	2.24E+00	2.24E-01
Fluorene	0.34	0	0.34	0.2627067	1	10	2.63E-01	2.63E-02
Indeno(1,2,3-cd)pyrene	1.6	0	1.6	1.2362667	1	10	1.24E+00	1.24E-01
Naphthalene	0.98	0	0.98	0.7572133	1	10	7.57E-01	7.57E-02
Phenanthrene	1.9	0	1.9	1.4680667	1	10	1.47E+00	1.47E-01
Pyrene	6.1	0.001	6.1	4.7135167	1	10	4.71E+00	4.71E-01
Pesticides/PCBs	0							
4,4'-DDD	0	0.000035	0	8.75E-06	0.8	4	1.09E-05	2.19E-06
4,4'-DDE	0	0.00023	0	0.0000575	0.8	4	7.19E-05	1.44E-05
Aroclor-1260	180	0.047	180	139.09175	0.068	0.68	2.05E+03	2.05E+02
Endosulfan I	0	0.000031	0	7.75E-06	0.15	1.5	5.17E-05	5.17E-06
Endrin	0.091	0	0.091	0.0703127	0.092	0.92	7.64E-01	7.64E-02
Heptachlor Epoxide	0.0055	0	0.0055	0.0042497	0.1	1	4.25E-02	4.25E-03
Energetics								
Nitrocellulose	33.2	0	33.2	25.652533	1280	12800	2.00E-02	2.00E-03
Nitroguanidine	0.2884	0	0.2884	0.2228371	NA	NA	NA	NA
Metals and Inorganics								
Aluminum	13800	3.74	13800	10663.735	1.93	19.3	5.53E+03	5.53E+02
Antimony	10.6	0	10.6	8.1902667	0.125	1.25	6.55E+01	6.55E+00
Arsenic	216	0.0072	216	166.8978	0.126	1.26	1.32E+03	1.32E+02
Barium	192	0.372	192	148.445	5.1	51	2.91E+01	2.91E+00
Beryllium	0.52	0	0.52	0.4017867	0.66	6.6	6.09E-01	6.09E-02
Cadmium	45.6	0.104	45.6	35.2596	1	10	3.53E+01	3.53E+00
Calcium	137000	49.1	137000	105867.61	0	0	NA	NA
Chromium	88.2	0.0376	88.2	68.1586	3.28	32.8	2.08E+01	2.08E+00
Cobalt	12.1	0.0063	12.1	9.3508417	1	10	9.35E+00	9.35E-01
Copper	189	0.154	189	146.0725	11.7	15.14	1.25E+01	9.65E+00
Cyanide	0.52	0	0.52	0.4017867	68.7	687	5.85E-03	5.85E-04
Iron	53000	16.7	53000	40955.508	0	0	NA	NA
Lead	3540	0.716	3540	2735.419	8	80	3.42E+02	3.42E+01
Magnesium	9460	0	9460	7309.4267	0	0	NA	NA
Manganese	754	0.225	754	582.64692	88	284	6.62E+00	2.05E+00
Mercury	3.9	0.0028	3.9	3.0141	0.015	0.025	2.01E+02	1.21E+02
Nickel	44.3	0.0402	44.3	34.239183	40	80	8.56E-01	4.28E-01
Potassium	702	14.4	702	546.012	0	0	NA	NA
Selenium	3.3	0	3.3	2.5498	0.2	0.33	1.27E+01	7.73E+00
Silver	4	0.0081	4	3.0926917	1.8	18	1.72E+00	1.72E-01
Vanadium	30.1	0.0149	30.1	23.260992	0.21	2.1	1.11E+02	1.11E+01
Zinc	536	1.15	536	414.43683	160	320	2.59E+00	1.30E+00

APPENDIX M

GEOPHYSICAL INVESTIGATION
SITE 12 - TOWN GUT LANDFILL
IHDIV-NSWC, INDIAN HEAD, MARYLAND

1.0 INTRODUCTION

Magnetic surveys are used to map the presence of perturbations in the earth's magnetic field caused by anomalous geologic structure, stratigraphy or anthropogenic features. The earth's magnetic field is composed of both spatial and temporal variations. Spatially, the earth's magnetic field is not perfectly symmetrical. It's axis is offset approximately 1,000 miles from the earth's geographic north pole. Numerous other high order poles and large anomalous regions also exist. These are primarily thought to be due to the characteristics of the earth's iron-nickel core. In addition, the solar wind distorts the earth's magnetic field to a tear-drop shape with the blunt end pointing towards the sun. Temporally, sun spots and solar storms also cause further short term distortion of the earth's magnetic field. Drift of the magnetic field due to solar storm activity is commonly referred to as diurnal drift and is generally only present during the daylight hours. On a local scale, the earth's magnetic field is further distorted by the presence of magnetic minerals or buried metallic objects.

Localized magnetic anomalies in the earth's magnetic field are caused by two different kinds of magnetism: induced or remanent magnetization. Induced magnetization occurs when the ferrous material acts as a magnet as a result of being in the presence of the magnetic field. Objects that exhibit induced magnetization enhance the local magnetic field. The ability of an object to exhibit induced magnetization depends upon the amount of ferrous material present. Remanent magnetism occurs when material is heated to a high temperature and the magnetic domains re-orient themselves in the direction of the ambient magnetic field. Objects that exhibit remanent magnetism can enhance or decrease the ambient field.

The presence of a buried metallic object can affect the local magnetic field differently depending on the direction of its induced and remanent magnetization relative to the ambient field and the orientation of the object. The direction of data collection can also affect how the anomaly is recorded. For instance, a buried steel drum can produce a positive, negative or combination of both depending upon its remanent magnetization, the direction of the ambient field and the direction of data collection. The magnetometers response is generally maximized when data are collected along north-south oriented survey lines.

Depth to the target features can also be estimated. Depths or distance from the sensor to the target features are approximately equal to one half the width of the anomaly. A table is attached that demonstrates the mass of various ferrous materials verses depth of burial verses instrument response.

Methodology

High resolution total field and vertical magnetic gradient data were collected on August 16, 1997 at Site 12, the Town Gut Landfill. Approximately 2,100 data points were collected along east-west trending survey lines spaced 10 feet apart. Data were collected using a Geometrix Model #858 cesium vapor magnetometer/gradiometer. The device utilized for this survey was equipped with two magnetic field sensors attached to an aluminum pole. The first sensor is located about one foot from the ground surface and the second sensor is located approximately three feet above the first. Both sensors record the earth's total magnetic field at intervals of one second or less. Total field data are commonly used to identify large or deeply buried features such as geologic structure or stratigraphic changes or to identify the presence of buried ferrous materials. Vertical gradient data are obtained by subtracting the top sensors reading from the bottom sensors reading and dividing by the separation distance. Vertical gradient data are not affected by diurnal drift or by the presence of large geologic structures. For this reason, the vertical gradient data are used to identify buried anthropogenic features such as drums, metallic debris, etc.

Total field data are collected in units of nanoTeslas (nT) in SI units where:

$$1 \text{ nanoTesla} = 1 \text{ gamma} = 10^{-5} \text{ Oersted}$$

Vertical gradient magnetic data are collected in units of nanoTeslas per meter (nT/m)

The frequency and amplitude of the anomaly is used to determine the mass and depth of the ferrous material present. The polarity of the anomaly is not considered as it will change depending upon the direction of data collection and the direction of the objects magnetism relative to the ambient magnetic field. For this reason, the absolute value of the vertical gradient data were taken and used for contouring and data interpretation.

2.0 RESULTS

The vertical magnetic gradient data are presented as Figure M-1. These data were color contoured such that shades of deep blue represent background conditions in respect to an absence of ferrous materials. Background conditions were observed only in the eastern areas of the site. These areas are anticipated

to have minimal amounts of metallic debris present on the surface or in the subsurface. The presence of non-metallic wastes at these background locations is possible.

Areas that represent the presence of buried metallic debris and metallic objects are shown in color contour shades of light blue, green, yellow, red and purple. This area includes the southern, western and central areas of the site. The anomalous response observed in the extreme northern areas of the site are believed to be due to the presence of metallic utilities that parallel Atkins Road. The boundary and extent of the landfill as defined by the presence or absence of metallic wastes, can be approximated by tracing the light blue and green color contour line. The landfill extent was not defined in the west due to the presence of a pond. The landfill appears to extend to the edges of the pond and metallic wastes are possibly present within the near shore areas of the pond.

The presence of large metallic objects, clusters of metallic objects or clusters of metallic debris can be identified within the landfilled area. These features are presented as anomalous responses shown in shades of orange, red and purple. Examples of objects that commonly result in similar magnitudes of vertical magnetic gradient are clusters of steel drums, sheet metal, metallic household appliances such as washers or dryers, car or truck engines, etc.

The remaining landfilled area is color contoured in shades light blue, green, yellow and orange. These anomalous responses probably represent the presence of small metallic objects and metallic debris. Examples of objects and clusters of objects that commonly result in similar magnitudes of vertical magnetic gradient are paint cans, car or truck parts, metallic food or drink containers, scrap wire or cable, metals from construction and demolition activities, etc.

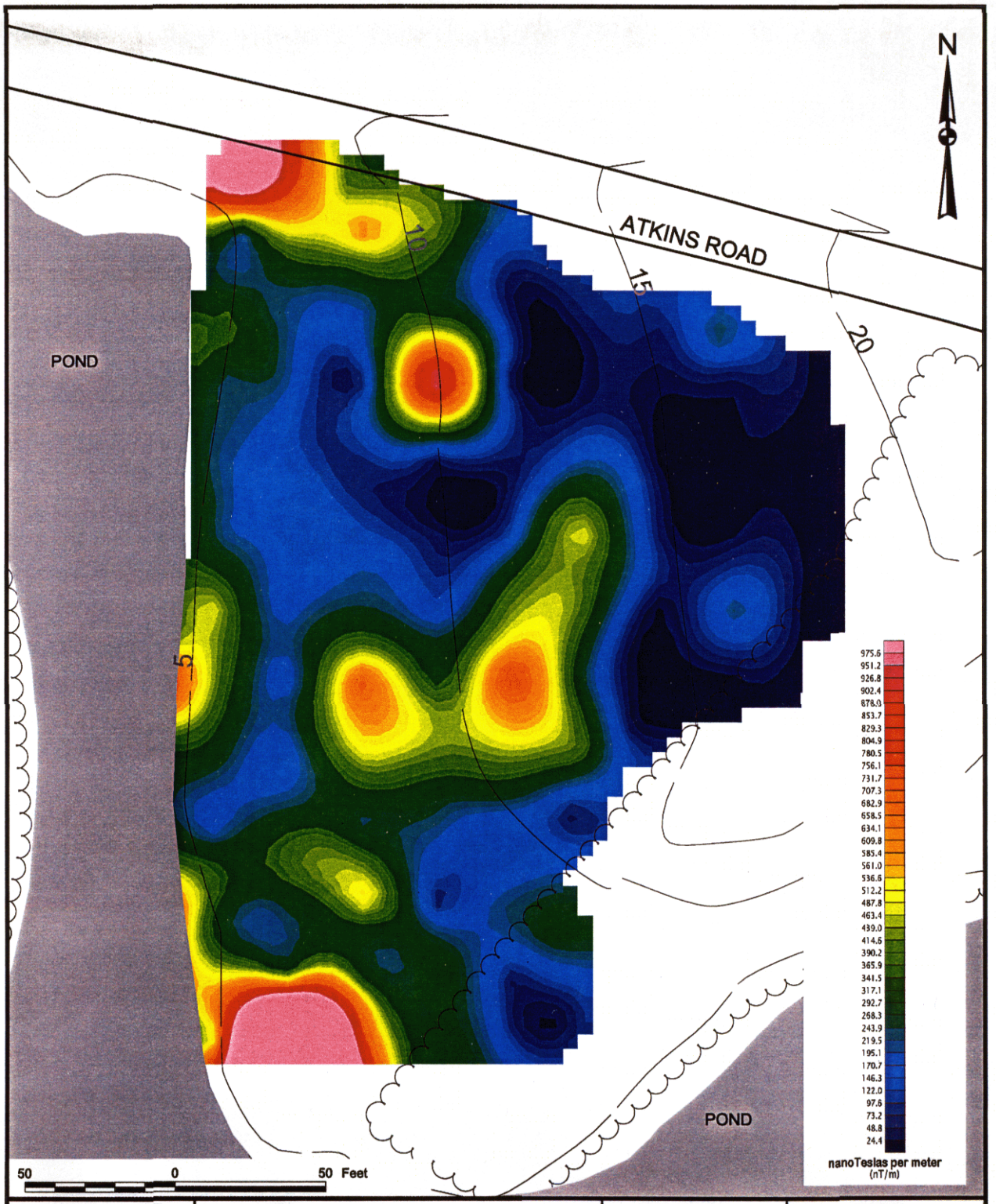
3.0 CONCLUSIONS

The eastern and northeastern extents of the landfill have been defined by the magnetometer survey. The presence of Atkins Road and related buried utilities has prevented the definition of the landfill extent in the northwestern area of the site. Additional magnetometer data collected from north of Atkins Road may confirm that the road represents the northern boundary of landfilling.

The western extent of the landfill was not defined by the land-based field investigation due to the presence of the pond. The southern extent of the landfill was also not completely defined because the apparent landfilling activity extended further south than the pre-defined limits of the geophysical survey. The western extent of landfilling could be better defined by collecting magnetic data in the pond using a non-ferrous boat equipped with a magnetometer and sub-meter accuracy global positioning system (GPS) to

provide data point location data. Additional data collected toward the south may define how far the landfill extends toward the south.

DRAFT



DRAWN BY D. PERRY — DATE 15-MAY-98	Brown & Root Environmental	CONTRACT NUMBER	OWNER NO.
CHECKED BY — DATE 5/18/98 — COST/SCHEDULE-AREA	VERTICAL MAGNETIC GRADIENT RESULTS SITE 12 - TOWN GUT LANDFILL IHDIV-NSWC, INDIANHEAD, MARYLAND	APPROVED BY — DATE 5/18/98 APPROVED BY — DATE	
SCALE AS NOTED		DRAWING NO. FIGURE M-1	REV 0

P:\GIS\INDIANHD\7129.APR 15-MAY-98 DNP SITE 12 - VERTICAL MAGNETIC GRADIENT RESULTS LAYOUT

APPENDIX N

GEOLOGY AND HYDROGEOLOGY
SITE 42 - OLSON ROAD LANDFILL

APPENDIX N

GEOLOGY AND HYDROGEOLOGY
SITE 42 - OLSON ROAD LANDFILL

This appendix includes geology and hydrogeology information copied from the Final Site Inspection Report: Phase I Olsen Road Landfill (E/A&H, 1992). The information includes data, tables, figures and discussions prepared by ENSAFE/Allen & Hoshall, and published in the 1992 report.

References:

E/A&H (ENSAFE/Allen & Hoshall), 1992. Final Report Site Inspection: Phase I Olson Road Landfill.

3.0 GEOLOGY AND HYDROGEOLOGY

3.1 Regional Geology and Physiography

The Indian Head Peninsula is located in the Atlantic Coastal Plains physiographic province. The peninsula is on the western edge of an eastwardly thickening wedge of interbedded fluvial and marine deposits. This wedge was deposited during the Cretaceous and Quaternary periods and ranges from 650 to 900 feet thick (Vroblesky, 1991). Sedimentary units in the wedge conform to the underlying crystalline basement rock of the Piedmont Plateau. The wedge is composed of the upper Lowland Deposits and the subordinate Potomac Group (Harsh, 1990).

The Lowland Deposits are a Quaternary sequence of fluvial sediments ranging from 0 to 150 feet in thickness. This sequence comprises medium to coarse-grained sands and gravels grading upward to silts and clays. Isolated cobbles and boulders may be found at the base (Vroblesky, 1991).

The Cretaceous Potomac Group consists of the Patapsco, Arundel, and Patuxent Formations and ranges from 650 to 750 feet in thickness (Vroblesky, 1991; Harsh, 1990). The Potomac Group is characterized by crossbedding, channel fills, and lateral pinching and thickening of beds (Hiortdahl, 1990). These formations are composed of interbedded gravels, argillaceous sands, and multicolored silts and clays (U.S. Department of the Navy, P-059, 1990; Vroblesky, 1991).

3.2 Regional Hydrology

The main aquifer system used in the Indian Head region is the Potomac Group. The Potomac Group comprises a series of water-bearing units and confining units topped by the Patapsco confining unit. The Potomac Group aquifer system produces water of good quality and is used as a regional potable water source. There are numerous localized aquifer systems in the Lowland Deposits; however, it is believed that none of these systems are used for potable water sources due to poor water quality (Hiortdahl, 1990).

3.3 Site Geology

The following section is a brief discussion of the shallow site geology determined from soil boring data. Complete logs for each boring are provided in Appendix B along with a copy of the boring log for the production well adjacent to Site 42 (Building 1728). It should be noted that data collected from borings depict conditions at each particular boring location. Strata divisions indicated by this data are estimated based on visual evaluation of each soil sample. The data represent approximate transitions between soil types. In the field, strata variations may occur gradually and/or at slightly different levels than those indicated by soil boring data.

In general, the shallow stratigraphy (0 to 25 feet) of the Olson Road Landfill comprises two soil units. Each unit was found to be reasonably consistent across the site. These units are designated as Unit 1 and Unit 2:

Unit 1 Unit 1 is a reddish to brown silty clay with some sand, organics and iron staining. This unit was found to be approximately 10 to 20 feet thick. Many of the soil samples collected from the silty clay were moist or slightly moist. Sand stringers (1 to 3 inches thick) were commonly encountered and were usually very moist.

Unit 2 Unit 2 is a brown and gray poor to moderately sorted, medium- to fine-grained sand with minor amounts of silt and clay. This sand unit was not penetrated at every boring location; however, thickness was indicated to range from 5 to 10 feet. This unit was saturated and identified as the uppermost water-bearing unit.

Surface soil types ranged from topsoil to gravel and fill materials (wood, metal, etc.). A dark gray, stiff clay was identified below Unit 2. Unit 2 was not fully penetrated at every boring location; therefore, no comment can be made regarding the continuity of the clay. The southwestern portion of the site (left of the dirt road in Figure 2-1) has been filled from 5 feet

deep near the road to more than 15 feet deep near the ponds. This fill material includes wood, metal, asphalt and minor amounts of plastic. Due to the presence of wood, metal and voids, sample recovery was low or none in samples collected between the surface and 15 feet deep for borings 42B14, 42B15 and 42B16.

3.4 Site Cross Sections

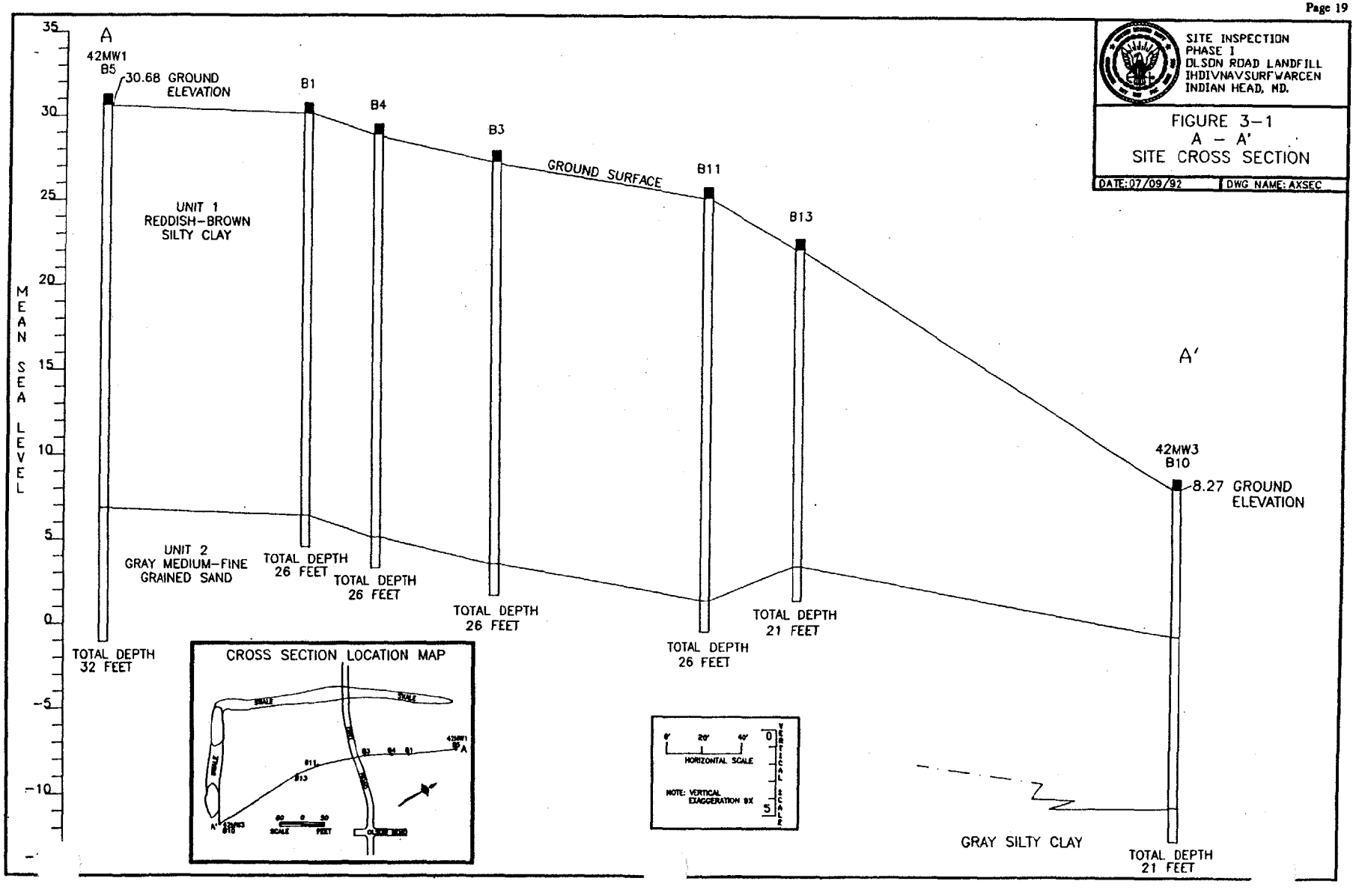
Cross sections were completed along two traverses of the site. Section A to A' (Figure 3-1) extends from monitoring well 42MW-1 to 42MW-3. Section B to B' (Figure 3-2) extends from monitoring well 42MW-2 to boring 42B6. Upon examination of cross section A-A', Unit 1 appears to decrease in thickness from the northeast to the southwest. Alternatively, Unit 2 is relatively consistent in depth, but exhibits a slight, gently increasing dip to southwest.

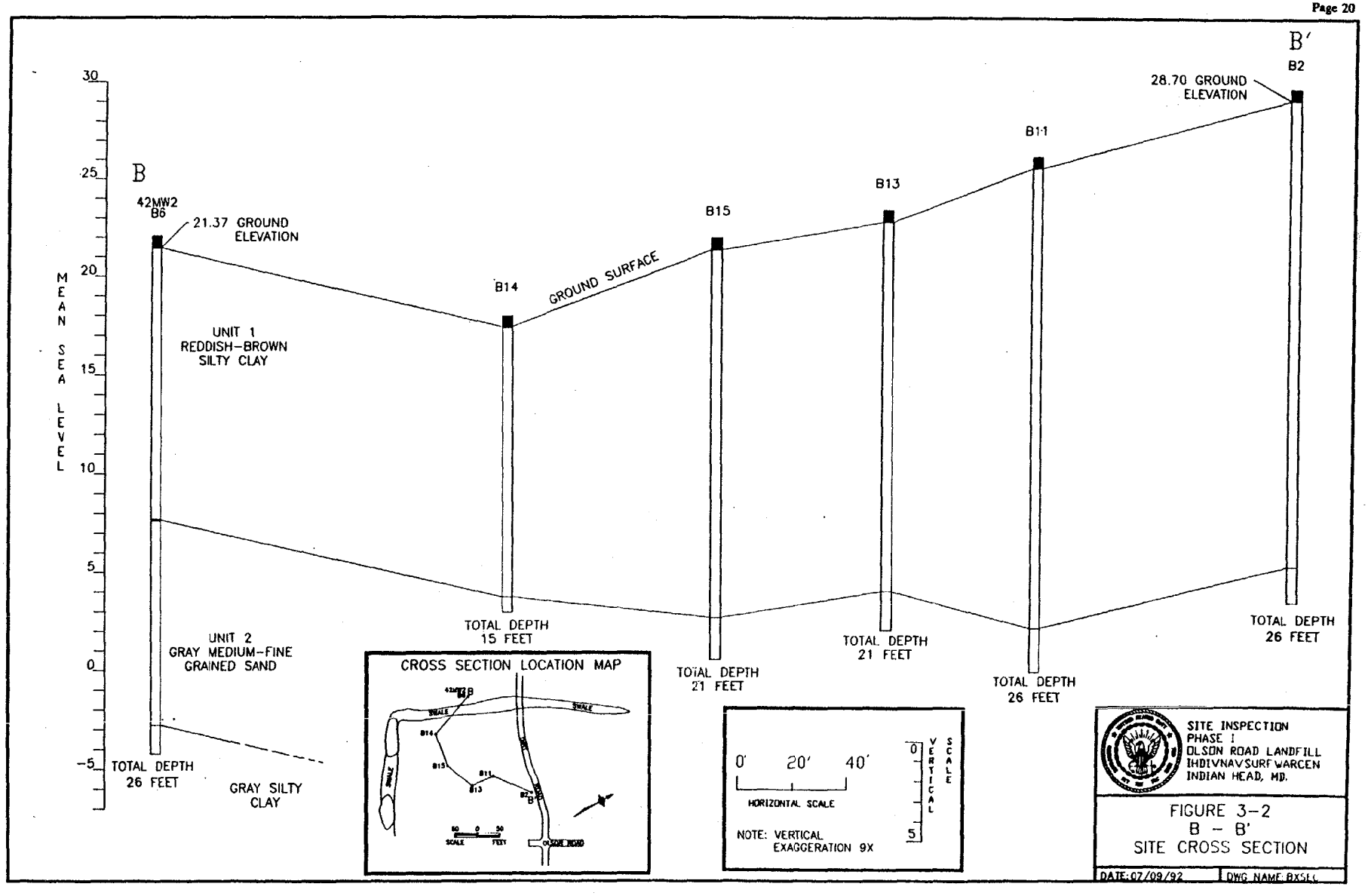
3.5 Site Hydrology

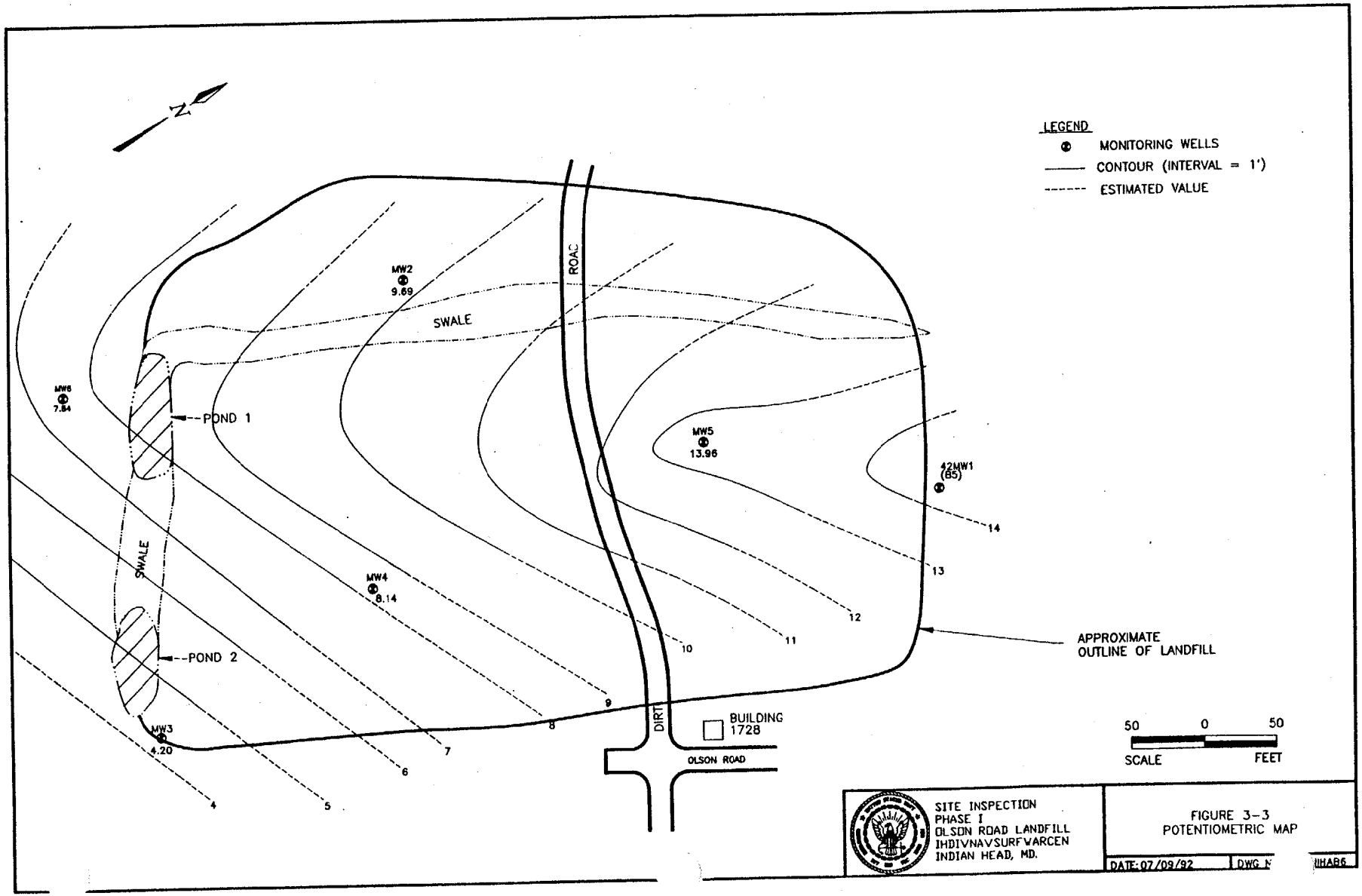
The scope of work for the SI did not require the collection of the appropriate data to evaluate the site hydrology. Field observations and boring data indicate:

- Isolated perched zones, usually associated with sand stringers are present in Unit 1. These sand stringers are relatively more permeable than the surrounding silt and clay and may tend hold water.
- The shallow aquifer is composed of a layer of fine- to medium-grained, poor to moderately sorted sand.
- This aquifer may be under some confining pressure from the relatively less permeable unit above (Unit 1). This is evident since the apparent head measured in the monitoring wells was above the level of the water table indicated during drilling. The top of the water table was indicated to coincide with the top of Unit 2.

The apparent water-table potentiometric surface is indicated on Figure 3-3. The mean water levels were calculated from one data set collected during Stage 1 (wells 42MW1, 42MW2 and


SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
IHDIVNAVSURFWARCEN
INDIAN HEAD, MD.
FIGURE 3-1
A – A'
SITE CROSS SECTION
DATE:07/09/92
DWG NAME: AXSEC
A
42MW1
B5
30.68 GROUND ELEVATION
B1
B4
B3
B11
B13
A'
42MW3
B10
8.27 GROUND ELEVATION
GROUND SURFACE
UNIT 1
REDDISH-BROWN
SILTY CLAY
UNIT 2
GRAY MEDIUM-FINE
GRAINED SAND
TOTAL DEPTH
32 FEET
TOTAL DEPTH
26 FEET
TOTAL DEPTH
26 FEET
TOTAL DEPTH
26 FEET
TOTAL DEPTH
26 FEET
TOTAL DEPTH
21 FEET
TOTAL DEPTH
21 FEET
GRAY SILTY CLAY
MEAN SEA LEVEL
35
30
25
20
15
10
5
0
-5
-10
CROSS SECTION LOCATION MAP
SCALE
FEET
HORIZONTAL SCALE
NOTE: VERTICAL EXAGGERATION 8X
VERTICAL SCALE


B
B'
42MW2
B6
21.37 GROUND ELEVATION
B14
GROUND SURFACE
B15
B13
B11
B2
28.70 GROUND ELEVATION
MEAN SEA LEVEL
30
25
20
15
10
5
0
-5
UNIT 1
REDDISH-BROWN
SILTY CLAY
UNIT 2
GRAY MEDIUM-FINE
GRAINED SAND
GRAY SILTY
CLAY
TOTAL DEPTH
26 FEET
TOTAL DEPTH
15 FEET
TOTAL DEPTH
21 FEET
TOTAL DEPTH
21 FEET
TOTAL DEPTH
26 FEET
TOTAL DEPTH
26 FEET
CROSS SECTION LOCATION MAP
SWALE
SWALE
SWALE
OLSON ROAD
0' 20' 40'
HORIZONTAL SCALE
NOTE: VERTICAL
EXAGGERATION 9X
VERTICAL SCALE
0
5
SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
IHDIVNAVSURFWARCEN
INDIAN HEAD, MD.
FIGURE 3-2
B - B'
SITE CROSS SECTION
DATE: 07/09/92
DWG NAME: BXSEC


N
LEGEND
MONITORING WELLS
CONTOUR (INTERVAL = 1')
ESTIMATED VALUE
MW2
9.69
SWALE
ROAD
MW6
7.54
POND 1
MW5
13.96
42MW1
(65)
SWALE
MW4
8.14
POND 2
MW3
4.20
4
5
6
7
8
9
10
11
12
13
14
DIRT
BUILDING
1728
OLSON ROAD
APPROXIMATE
OUTLINE OF LANDFILL
50
0
50
SCALE
FEET
SITE INSPECTION
PHASE I
OLSON ROAD LANDFILL
IHDIVNAVSURFWARCEN
INDIAN HEAD, MD.
FIGURE 3-3
POTENTIOMETRIC MAP
DATE: 07/09/92
DWG N
IIHAB6

42MW3) and two data sets collected during Stage 2 (all wells). Table 3-1 includes all water elevation data. Based on this data, the flow of groundwater appears to be predominately to the south-southeast. There is some indication that flow in the northwest section of the site may be toward the northwest; however, this can not be verified based on the current data set. Additional routine monitoring of groundwater level will aid in defining the shallow aquifer flow characteristics.

Table 3-1
Water Elevation Data
Mean Sea Level

Well No.	42MW1	42MW2	42MW3	42MW4	42MW5	42MW6
Top of Casing Elevation	30.68	21.37	8.27	18.37	27.06	18.28
Depth to Water Stage 1	19.32	13.68	5.55	—	—	—
Groundwater Elevation	11.36	7.69	2.72	—	—	—
Depth to Water Stage 2(1st set)	15.74	11.15	4.52	10.41	13.44	10.78
Groundwater Elevation	14.94	10.22	3.75	7.96	13.62	7.50
Depth to Water Stage(2nd set)	15.14	10.93	4.52	10.03	12.76	10.10
Groundwater Elevation	15.54	10.44	3.75	8.34	14.30	8.18
Average Elevation	13.95	9.45	3.41	8.15	13.96	7.84

Note: Calculated water elevations are shaded