M00263.AR.000226
MCRD PARRIS ISLAND
5090.3a

REMEDIAL INVESTIGATION/RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION FOR SITE 1 INCINERATOR LANDFILL AND SITE 41 FORMER INCINERATOR VOLUME 2 OF 2 APPENDICES A THROUGH I MCRD PARRIS ISLAND SC
6/1/2001
TETRA TECH NUS

REVISION 2
JUNE 2001

Remedial Investigation (RI)/ RCRA Facilities Investigation (RFI) for Site/SWMU 1 - Incinerator Landfill and SWMU 41 - Former Incinerator

Marine Corps Recruit Depot

Parris Island, South Carolina

Volume II - Appendices A - I

Southern Division Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0020

June 2001

APPENDIX A

FIELD FORMS

A-1	WELL PERMIT
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A-1

WELL PERMIT

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

MONITORING WELL APPROVAL

Approval is hereby granted to:

Commanding Officer
Department of the Navy
SOUTHNAVFACENGCOM
ATTN: Art Sanford (Code 1862)
2155 Eagle Drive
N. Charleston, SC 29406

Date of Issue: 6 May 1998

Approval Number: HW-98-029

Facility: Marine Corps Recruit Depot
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

For the installation of ten (10) permanent monitoring wells at SWMU-1 as follows:

1) Five (5) shallow and five (5) deep permanent monitoring wells to be installed at the locations specified on Figure 7-4 (attached).

2) The five shallow wells will be screened in the uppermost portion of the surficial aquifer.

3) The five deep wells will be screened at the base of the surficial aquifer, just above the Hawthorn Formation.

Conditions:

1) That the monitoring wells be installed by a well driller certified by the state of South Carolina. And that the certified well driller must be present during all phases of drilling, construction, and completion of these monitoring wells.

2) That investigation derived waste including, but not necessarily limited to, drill cuttings, drilling fluids, development and purge water, be managed properly and in compliance with all applicable requirements. If containerized, each vessel shall be clearly labeled with regard to contents, source, and date of activity.

DD980316.DCH

3) That the latitude, longitude and actual construction details be submitted to the Department within 30 days after installation of the last monitoring well.

4) That the monitoring wells be labeled with an identification plate constructed of a durable material affixed to the casing or surface pad where it is readily visible. The plate shall provide the well identification number, date of construction, static water level and driller name and certification number.

5) A minimum of (48) hours prior to initiation of drilling activities, provide notice to James White, District Hydrogeologist, at Low Country District EQC Office (843)522-9097.

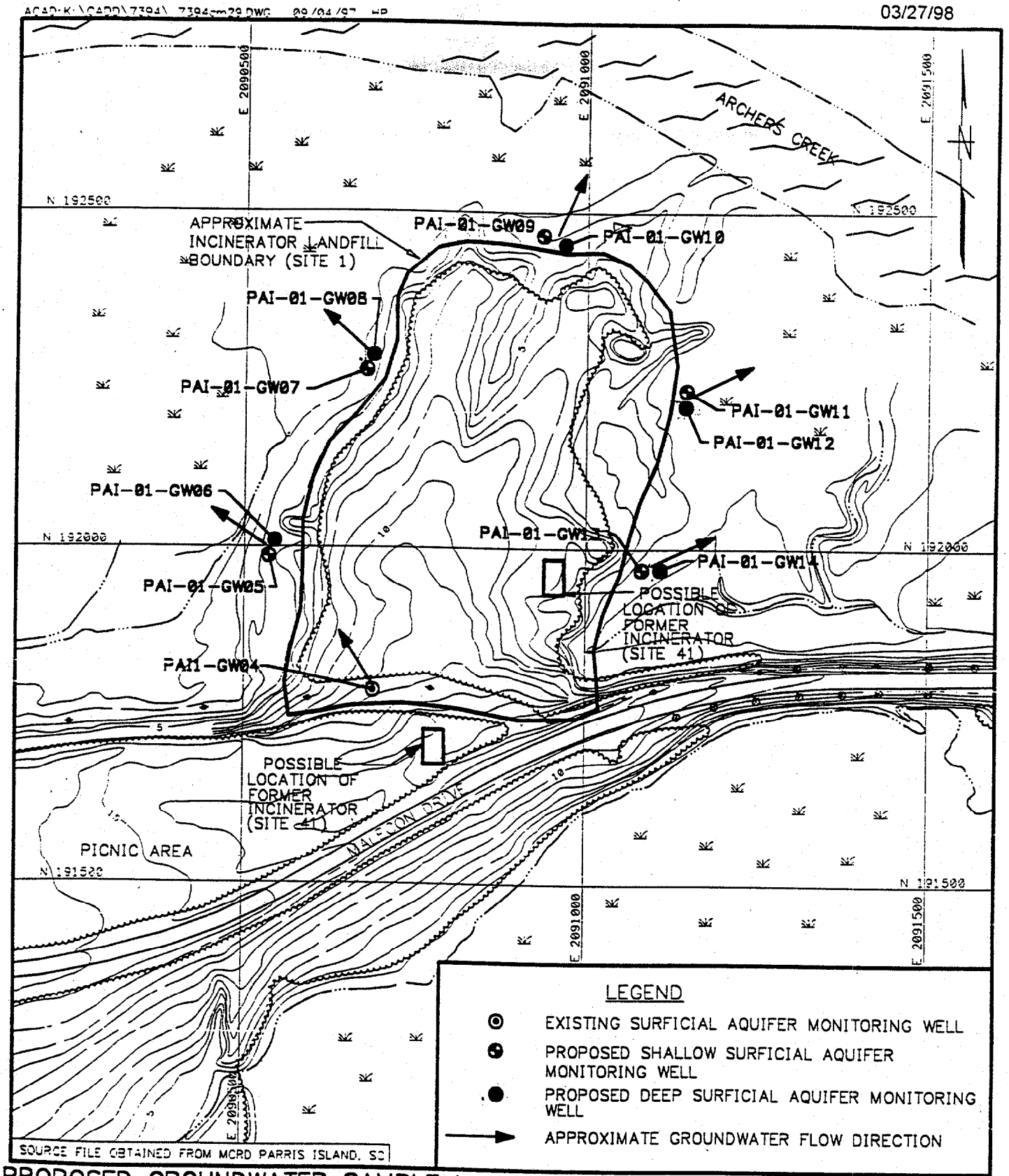
This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Environmental Control's Regulation R.61-71.

Approval granted by:

Donald C. Hargrove, Hydrogeologist
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control

Attachment: Figure 7-4, Proposed Groundwater Sampling Locations

cc: Susan Peterson, Corrective Action Permitting
James White, Low Country District EQC
Kenneth Lapierre, Federal Facilities Section, USEPA Region IV



PROPOSED GROUNDWATER SAMPLE LOCATIONS
SITE 1 – INCINERATOR LANDFILL
SITE 41–FORMER INCINERATOR
MCRD, PARRIS ISLAND, SOUTH CAROLINA

FIGURE 7–4

0 200 400
SCALE IN FEET

Brown & Root Environmental

069703/P

CTO 0020

A-2

SOIL BORING LOGS

LOG OF BORING NO. PAI 1-4

Site 1 - Incinerator Landfill
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 12.4'

Depth, Ft	Samples	Penetration Resistance, Blows/Ft	MATERIAL DESCRIPTION	Shear Strength, ksf: Penetrometer (P) Torvane (T)	Shear Strength, ksf: Unconfined Compression	Shear Strength, ksf: Triaxial Compression	Confining Pressure, ksf	Unit Dry Weight pcf	Water Content, %	Liquid Limit	Plastic Limit	Percent Passing No. 200 Sieve
	■		FILL: SILTY SAND, dark brown - with gravel and rubble (3.5')									
5	■		SILTY SAND, light brown									
			- wet at 8.0'									
10	■											
15	■		(15.0')									
20												
25												
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 15.0'
Water First Noticed: --
Date: February 23, 1987
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 15'
Wet Rotary:
Boring Sealed: Well Installed

McCLELLAND ENGINEERS

A-4

PLATE >

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-01-SB01
DATE: 5/21/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

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**
1	0-2	WOH / WOH			V.Soft	Brn Blk	F/co Sa Silt	SM	wood Fragments	5.5	0	0	0
		1 / 2	10"										
2	2-4	1 / 13			V.Stiff	Blk	Silt	OL	wood & Glass	58	0	0	0
		10 / 1	4"	4					Fragments				
3	4-6	WOH / WOH			V.Loose	Blk Gray	Silty F/med Sand	SM		0	0	0	0
		WOH / 1	8"	6									
4	6-8	WOH / WOH			V.Soft	Black &	CLAY	OL	wood fragments	0	0	0	0
		WOH / WOH	4"			Gray Grn							
5	8-10	WOH / WOH			V.Soft	Gray Grn	CLAY	OL	Shell Fragments	0	0	0	0
		WOH / WOH	18"										
6	10-12	WOH / WOH			V.Soft	Gray Grn	Same	OL		0	0	0	
		WOH / WOH	16"	12									
7	12-14	WOH / WOH			—	—	No Recovery	—		—	—	0	0
		WOH / WOH	0	14									
8	14-16	WOH / WOH			V.Soft	Gray Grn	CLAY	OL		0	0	0	0
		WOH / WOH	10"										
9	16-18	WOH / WOH			V.Soft	Gray Grn	Same	OL		0	0	0	0
		WOH / WOH	18"										
10	18-20	WOH / WOH			V.Soft	Blk	F Sandy CLAY	OL		0	0	0	0
		WOH / WOH	16"										
11	20-22	WOH / WOH			V.Soft	Dk Gray	Same	OL		0	0	0	0
		WOH / WOH	12"	22		Grn							
12	22-24	2 / 3			Loose	Gray	F/co SAND	SW	2" clay seam	0	0	0	0
		2 / 3	20"						@ 23 FT				
13	24-26	5 / 4			Loose	Gray	Same	SW		0	0	0	0

* When rock coring, enter rock brokeness.

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

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-01-MW06

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-01-SB01
DATE: 5/21/98
GEOLOGIST: G Gunter
DRILLER: L. LeFever

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**
		6/6	10"										
14	26-28	3/4			Firm	Gray	Same	SW		0	0	0	0
		7/6	10"	28									
15	28-30	1/6		29	Firm	Dk Gray	Clayey F/Co Sand	SC		0	0	0	0
		12/13	18"			Wh	F/Co Sand	SW					
16	30-32	3/3			Loose	Dk Gray	F/Co Sand	SW		0	0	0	0
		4/10	14"										
17	32-34	3/7			Firm	Dk Gray	Same	SW		0	0	0	0
		4/3	12"	35									
18	34-36	1/1			V. Loose	Gray Grn	Clayey F Sand	SC		0	0	0	0
		1/2	18"	36									

* When rock coring, enter rock brokeness.

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

Remarks: 2" well set to 36FT (5FT 0.020 Screen)
Sand to 29 FT, Bentonite to 27FT, Grout to Surface.

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-01-MW06

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG

BORING NUMBER: PAI-01-SB02
DATE: 5/20/98
GEOLOGIST: G. Gunter
DRILLER: L. LeFever

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**
1	0-2	WOH / WOH			V. Loose	Brn Blk	Silty F SAND w/ Rock	SM	wet	0	0	0	0
		4 / 3	18"				Fragments						
2	2-4	4 / 3			—		No Recovery	—		—	—	0	0
		1 / 1	0										
3	4-6	WOH / WOH			V. Loose	Blk Brn	Silty F SAND	SM	Wood Fragments	0	0	0	0
		2 / 1	8"										
4	6-8	1 / 1		6	—		No Recovery	—		—	—	0	0
		1 / 2	0										
5	8-10	WOH / WOH		8	V. Soft	Gray Blk	CLAY w/gravel &	OL		0	0	0	0
		WOH / WOH	10"				Trace F Sand						
6	10-12	WOH / WOH			V. Soft	Gray Blk	CLAY	OL		0	0	0	
		WOH / WOH	4"	12									
7	12-14	WOH / WOH			—		No Recovery	—		—	—	0	0
		WOH / WOH	0	14									
8	14-16	WOH / WOH			V. Soft	Gray Grn	CLAY	OL		0	0	0	0
		WOH / WOH	18"										
9	16-18	WOH / WOH			V. Soft	Gray Grn	Same	OL		0	0	0	0
		WOH / WOH	24"										
10	18-20	WOH / WOH			V. Soft	Gray Grn	Same	OL		0	0	0	0
		WOH / WOH	20"										
11	20-22	WOH / WOH			V. Soft	Gray Grn	CLAY w/Tr. F Sand	OL		0	0	0	0
		WOH / WOH	20"										
12	22-24	WOH / WOH			V. Soft	Gray Grn	CLAY	OL		0	0	0	0
		WOH / WOH	20"	24									
13	24-26	WOH / WOH			V. Soft	Gray Grn	F Sa CLAY	CL	Shell Fragments	0	0	0	0

*When rock coring, enter rock brokeness.

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

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-01-MW08

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-01-SB02
DATE: 5/20/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

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**
		WOH / WOH	20"										
14	26-28	WOH / WOH		26	V. Loose	Gray Grn	Clayey F/mod SAND	SC		0	0	0	0
		WOH / 2	20"										
15	28-30	WOH / WOH		28	V. Loose	Gray	F/CO SAND	SW		0	0	0	0
		10 / 6	20"										
16	30-32	WOH / 4			Firm	Gray	SAME	SW		0	0	0	0
		10 / 10	18"										
17	32-34	5 / 6			Firm	Gray	SAME	SW		0	0	0	0
		7 / 10	20"										
18	34-36	WOH / WOH		34.5						0	0	0	0
		WOH / WOH	10"		V. Loose	GRN	Clayey F SAND	SC					
				36.5									

* When rock coring, enter rock brokeness.

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

Remarks: 2" well set to 36.5FT (5FT 0.020 Screen). Sand to 29.5 Bentonite to 27.5FT. Grout to Surface.

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-01-MW08

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-01-SB03
DATE: 5/19/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

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**	Driller BZ**
1	0-2	6/38				Brn to Blk	Clayey F/med SAND	SC	wood debris @ 2FT	5.4	0	0	0
		18/5	24"						WET				
2	2-4	4/6					No Recovery	—	Strong Creosote	—	0	210	0
		6/7	0						ODOR				
3	4-6	3/WOH				BLK	Silty FSAND	SM	wood Fragments	9.2	0	192	0
		WOH/WOH	8"										
4	6-8	WOH/WOH		6.5		BLK	CLAY	OL		1.2	0	0	0
		WOH/WOH	24"										
5	8-10	WOH/WOH				BLK	CLAY	OL	F/co SA & Gravel	0	0	0	0
		WOH/WOH	20"						8-8.5 FT				
6	10-12	WOH/WOH				BLK	Same	OL		0	0	0	
		WOH/WOH	8"										
7	12-14	WOH/WOH				BLK	Same	OL	w/ROOTS	0	0	0	0
		WOH/WOH	24"	14									
8	14-16	WOH/WOH		14.5		BLK	F/co Sandy CLAY	OL	Shells	0	0	0	0
		WOH/WOH	24"			BLK	CLAY						
9	16-18	WOH/WOH				BLK	Same	OL	Shells	0	0	0	0
		WOH/WOH	24"										
10	18-20	WOH/WOH				BLK	Same	OL		0	0	0	0
		WOH/WOH	24"										
11	20-22	WOH/WOH				BLK	Same	OL		0	0	0	0
		WOH/WOH	24"										
12	22-24	WOH/WOH				BLK	Clay w/Trace FSA	OL		0	0	0	0
		WOH/WOH	20"										
13	24-26	WOH/WOH		24.5		BLK	Same	OL		0	0	0	0

* When rock coring, enter rock brokeness.

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

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-01-MW10

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRACTRG
BORING NUMBER: PAI-01-SB03
DATE: 5/19/98
GEOLOGIST: G Gunter
DRILLER: L. LeFever

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**	Driller BZ**
		WOH / WOH	18"			BK	Clayey FSAND	SC					
14	26-28	WOH / WOH				BK	Same	SC		0	0	0	0
		WOH / WOH	18"										
15	28-30	WOH / WOH				BK	Same	SC		0	0	0	0
		WOH / WOH	18"										
16	30-32	WOH / WOH				BK	Same	SC		0	0	0	0
		WOH / 5	18"	31		LT Gray	F/Co SAND	SW					
17	32-34	3 / 4				LT Gray	F/Co SAND w/Trace	SW		0	0	0	0
		4 / 4	24"				Clay & Gravel	CL					
18	34-36	WOH / WOH				Gray	F/Co SAND	SW		0	0	0	0
		WOH / WOH	18	35.5		Gray Grn	Clayey F SAND	SP					
				36									

* When rock coring, enter rock brokeness.

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

Remarks: 2" well set to 35 FT (5 FT 0.020 Screen) Sand to 28 FT, Bentonite to 26 FT Grout to Surface

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI-01-MW10

BORING LOG

PROJECT NAME: MCRD - Parris Island
BORING NUMBER: PAI-01-SB04
PROJECT NUMBER: 7394
DATE: 5/18/98
DRILLING COMPANY: Parratt Wolff
GEOLOGIST: G. Gunter
DRILLING RIG: CME 850 Trac Rig
DRILLER: L. Lefever

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**
1	0-2	WOR / WOR			V. loose	Brn	Silty Fine Sand	SM	wet	9.5	0	1.6	0
		WOR / WOR	6"	2									
2	2-4	12 / 1			V. loose	Gray	Fine Sand w/Trace	SP	4" FSa. Clay	8	0	0	0
		1 / 1	18"	4			Silt & Rock Fragments		Zone				
3	4-6	WOH / WOH			V. Soft	Blk	Fine Sandy Silt	SP	Plastic Debris	0	0	0	0
		WOH / WOH	8"	6									
4	6-8	WOH / WOH			V Soft	Blk	Fine Sandy Clay	OL	Reeds	12	0	0	0
		WOH / WOH	24"										
5	8-10	WOH / WOH			V. Soft	Blk	CLAY	OL		6	0	0	0
		WOH / WOH	24"										
6	10-12	WOH / WOH			V Soft	Blk	Same	OL		15.3	0		
		WOH / WOH	24"										
7	12-14	WOH / WOH			V. Soft	Blk	Same	OL		3.5	0	0	0
		WOH / WOH	18"										
8	14-16	WOH / WOH			V. Soft	Blk	Same	OL	w/Shells @ 14 Ft	12.2	0	0	0
		WOH / WOH	24"										
9	16-18	WOR / WOH					NO Recovery						
		WOH / WOH	0										
10	18-20	WOH / WOH			V. Soft	Blk	Clay	OL		0	0	0	0
		WOH / WOH	24"										
11	20-22	WOH / WOH			V. Soft	Blk	Same	OL		0	0	0	0
		WOH / WOH	8"										
12	22-24	WOH / WOH			V. Soft	Blk	Same	OL		0	0	0	0
		WOH / WOH	24"										
13	24-26	WOH / WOH			V. Soft	Blk	Same	OL	2" Sa Seam @ 22 Ft	0	0	0	0

* When rock coring, enter rock brokeness.

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

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI-01-MW12

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-01-SB04
DATE: 5/18/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

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**
		WOH / WOH											
14	26-28	WOH / WOH			V. SOFT	BLK	Clay	OL	8" F. Sa. Clay	0	0	0	0
		WOH / WOH		28					w/shell Fragmt				
15	28-30	WOH / WOH			Loose	DK. Gray	Clayey F/Co SAND	SC		0	0	0	0
		6 / 12		30			w/Gravel						
16	30-32	WOH / WOH			V Loose	DK Gray	F/Co SAND	SW		0	0	0	0
		3 / 3											
17	32-34	7 / 8			Firm	DK Gray	Same	SW		0	0	0	0
		11 / 7											
18	34-36	1 / 1			V. Loose	DK Gray	Same	SW	Shell Fragments	0	0	0	0
		1 / 2											
19	36-38	1 / 2			Loose		Same	SW		0	0	0	0
		4 / 5		37		Gray Grn	Silty F SAND w/Trace	SM					
							Clay						

* When rock coring, enter rock brokeness.

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

Remarks: 2" well set to 38 FT (5 FT Screen 0.020" Slot) Sand to 31 FT Bent to 29 FT Grout to Surface

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-01-MW12

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-01-SB05
DATE: 5/18/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

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**
1	0-2	WOH / 2			Soft	Blk	F. Sandy Silt	OH	w/Reeds	17	0	5	0
		1 / 1	6"	2									
2	2-4	WOH / 1			V. Loose	Blk	Silty F/med Sand	SM		42	0	5	0
		WOH / 1	12"	3.5		Blk	CLAY	CL					
3	4-6	WOH / WOH			V Soft	Blk	Same	CL	2" layer F Sand	6	0	14	0
		WOH / WOH	24"						@ 4 Ft				
4	6-8	WOH / WOH			V. Soft	Blk	Same	CL		5	0	0	0
		WOH / WOH	24"										
5	8-10	WOH / WOH			V. Soft	Blk	Same	CL		42	0	0	0
		WOH / 2	24										
6	10-12	WOH / 2 Ft			V. Soft	Blk	Same	CL		16	0	0	0
			14"										
7	12-14	WOH / 1 Ft				Blk	Same	CL		7	0	0	0
		1 / 1	18"	13 / 14	V. Loose	Gray Blk	Clayey F/med Sand	SC					
8	14-16	1 / 1		15	V Soft	D Gray Grn	Clay	CL		7	0	0	0
		1 / 2	20"	16		Blk-Grn	F/med Sand w/Trace Clay	SP					
9	16-18	3 / 7			Firm	D. Gray Grn	F/med Sand w/Trace Silt	SP		3	0	0	0
		8 / 9	20"										
10	18-20	2 / 1			V. Loose	D Gray Grn	F/med Sand	SP	4" Clayey Seam @ 19 Feet	10	0	0	0
		2 / 5	24"	20									
11	20-22	WOH / WOH			V Soft	D. Gray Grn	Clay	CL		0	0	0	0
		WOH / 1	16"	21.5		D Gray Grn	F/Co Sand	SW					
12	22-24	2 / 6			Firm	D. Gray Grn	F/Co Sand w/Trace Clay	SW	4" Clay Seam @ 22.5'	0	0	0	0
		7 / 5	20"										
13	24-26	3 / 2			Loose	D. Gray Grn	F/Co Sand w/Trace Silt & Gravel	SW		0	0	0	0

* When rock coring, enter rock brokeness.

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

Drilling Area Background (ppm): 0

Remarks:

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

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-01-SB05
DATE: 5/18/98
GEOLOGIST: G. GUNTER
DRILLER: L. Lefever

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**
		4/5	18"										
14	26-28	4/5			Firm	Gray Grn	Same	SW		0	0	0	0
		10/15	20"										
15	28-30	4/4			Loose	Gray Grn	Same	SW		-	-	-	-
		6/7	20"										
16	30-32	6/8			Firm	Gray Grn	F/co Sand w/trace silt	SW		0	0	0	0
		8/10	18"										
17	32-34	9/12			Dense	Gray wH	F/co Sand	SW		0	0	0	0
		24/27	22"										
18	34-36	6/3			Loose	D.Gray	F/co Sand	SW	2" Grn CL FSA stn	0	0	0	0
		3/3	18"	36					Bottom of Spoon				
19	36-38	2/2			Loose	Grn	Silty F Sand	SM		-	-	-	—
		3/4	18"										
20	38-40	6/5			Loose	Grn	Same	SM		-	-	-	—
		4/3	20"										
21	40-42	2/1			V.Loose	Grn	Same	SM	w/Fossils	0	0	0	0
		1/5	20"	42					wet				
22	42-44	2/2			Loose	Gray Grn	F/co Sand w/increasing	SW	getting Denser	0	0	0	0
		3/4	18"				Clay content w/depth						
23	44-46	31/37			Dense	Gray Grn	F/med Sand w/Trace	SP					
		13/13	24"				Clay		Dry				
24	46-48	6/26			V.Dense	Gray Grn	Same	SP	Dry				
		50/4	16"										
25	48-50	21/26			V.Dense	Gray Grn	Same	SP	Dry				
		40/40	20"										

* When rock coring, enter rock brokeness.

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

Drilling Area Background (ppm): 0

Remarks: Boring Abandoned by Grouting to Surface
Soil Log used for wells PAI-01-MW13 & PAI-01-MW14

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

A-3

WELL INSTALLATION RECORDS

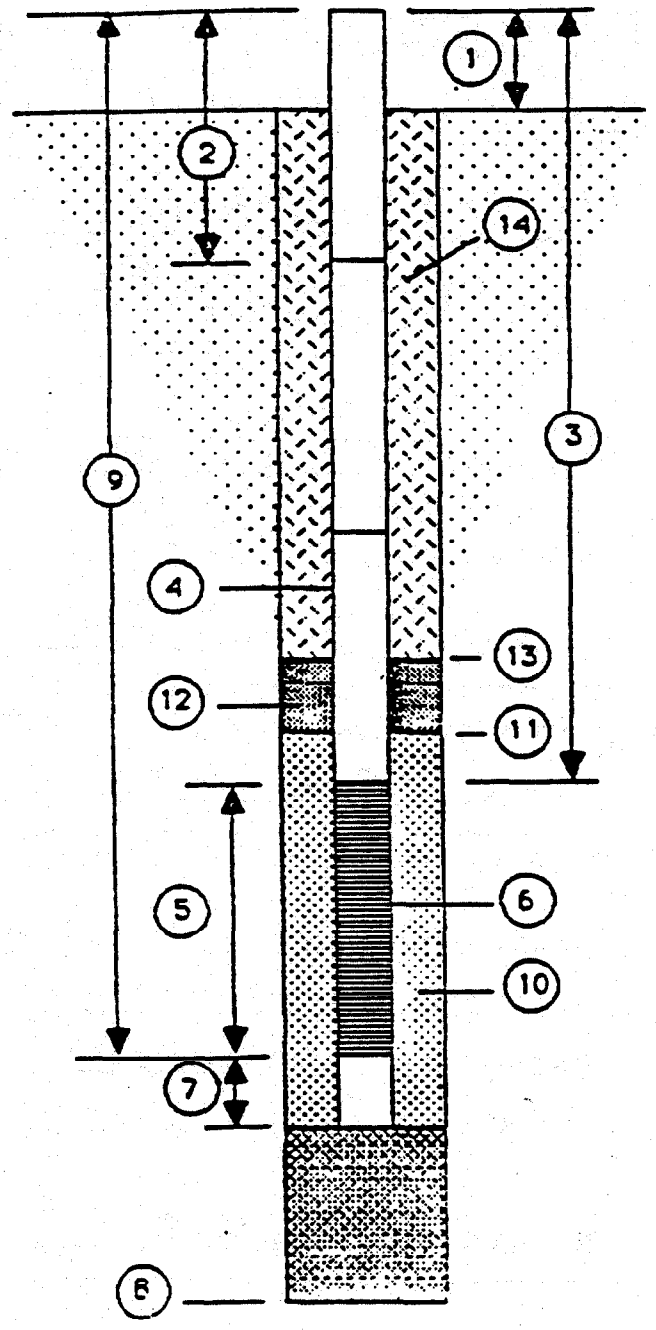
PAI1-MW4(S)

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DR., P.O BOX 10068
CHARLESTON S C 29411-0068

WELL CONSTRUCTION DETAILS

WELL NUMBER PAI-1-4

DATE OF INSTALLATION 2-23-88



1. Height of Casing above ground 3.5'
2. Depth to first Coupling 8.5'

   Coupling Interval Depths —
3. Total Length of Blank Pipe 8.5'
4. Type of Blank Pipe 2" SCH 40 THREADED PVC
5. Length of Screen 10.0'
6. Type of Screen 2" SCH 40 PVC THREADED 0.010"S
7. Length of Sump —
8. Total Depth of Boring 15.0' Hole Diameter 6.0"
9. Depth To Bottom of Screen 15.0'
10. Type of Screen Filter FRAC SAND

    Quantity Used 200 LBS Size 16/30 U/C —
11. Depth To Top of Filter 3.5'
12. Type of Seal BENTONITE PELLETS

    Quantity Used 25 LBS.
13. Depth To Top of Seal 2.0'
14. Type of Grout CEMENT/BENTONITE

    Grout Mixture 94/5

    Method of Placement POUR IN DRY HOLE

COMMENTS ON INSTALLATION.

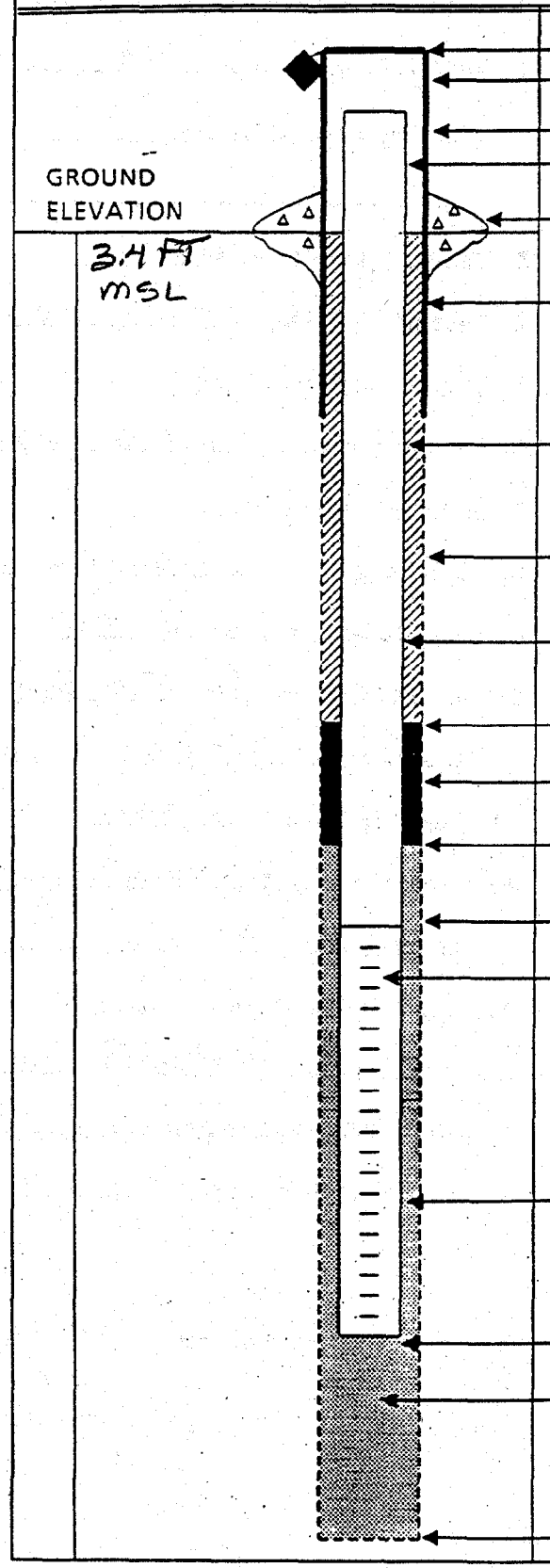
BORING NO.: PAF-01-MW-05(S)

OVERBURDEN MONITORING WELL SHEET

Constructed Adjacent to

PROJECT: MCRD-Parris Island
LOCATION: SWMU 01
PROJECT NO.: 7394
BORING: PAI-01-SB01
ELEVATION: 3.4 Ft MSL
DATE: 5/21/99
FIELD GEOLOGIST: G. GUNTER

DRILLER: L. LeFever #12
DRILLING METHOD: HSA
DEVELOPMENT METHOD: SURGE & Pump



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.33 FT

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 2.93 FT

TYPE OF SURFACE SEAL: 4'x4'x8" Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: Aluminum

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 1.9 FT / 1.5 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 2.5 FT

ELEVATION / DEPTH TOP OF SCREEN: -0.1 FT / 3.5 FT

TYPE OF SCREEN: SCH40 PVC

SLOT SIZE x LENGTH: 0.010 INCH X 10 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #1 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -10.1 FT / 13.5 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -10.1 FT / 13.5 FT

TYPE OF BACKFILL BELOW OBSERVATION WELL: #1 Sand
Backfill Consist of 6-8" of Sand

ELEVATION / DEPTH OF HOLE: -10.1 FT / 13.5 FT

BORING NO.: _____

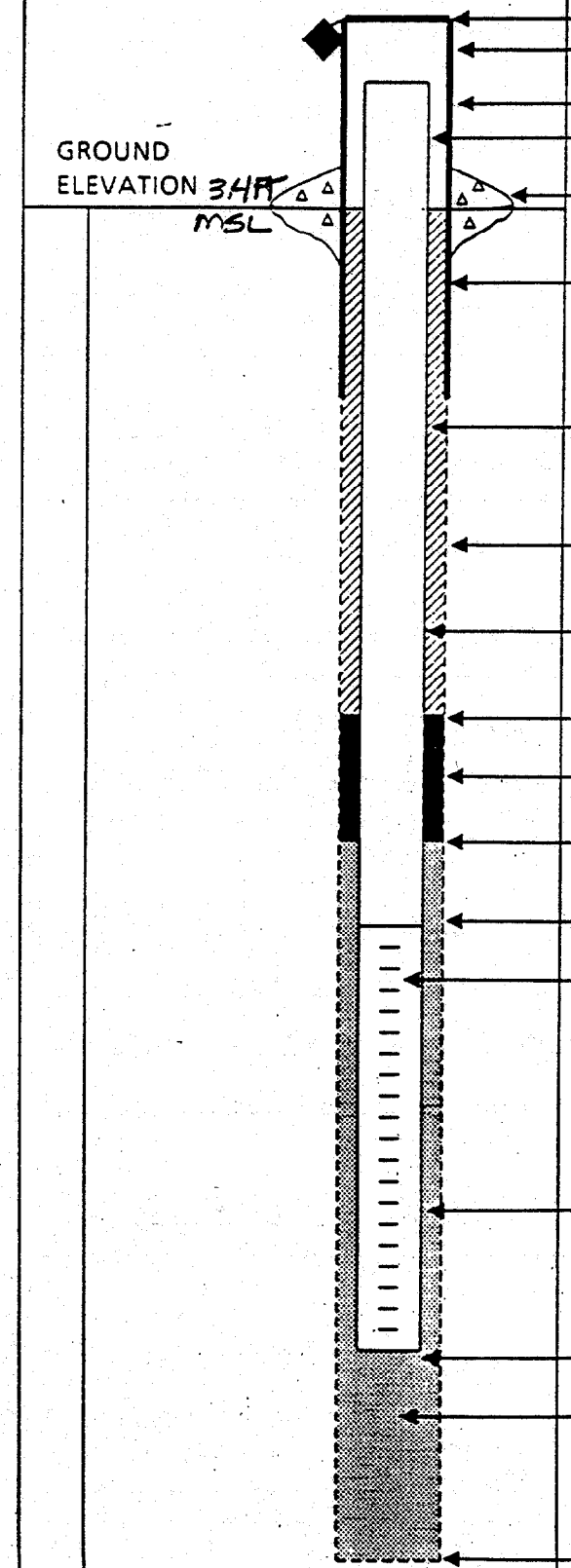
OVERBURDEN MONITORING WELL SHEET

PAI-01-MW-06

PROJECT: MCRD Parris Island
PROJECT NO.: 7394
ELEVATION: 3.4 MSL
FIELD GEOLOGIST: G. GUNTER

LOCATION: Swmu 01
BORING: PAI-01-SB01
DATE: 5/21/98

DRILLER: L. LeFever #1361
DRILLING METHOD: HSA
DEVELOPMENT METHOD: Surge & Pump



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.04 FT

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 2.64 FT

TYPE OF SURFACE SEAL: 4'x4'x8" Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: Aluminum

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -23.6FT/27FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 29 FT

ELEVATION / DEPTH TOP OF SCREEN: -27.6FT/31FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH x 5 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -32.6FT/36FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -32.6FT/36FT

TYPE OF BACKFILL BELOW OBSERVATION WELL: #2 Sand
Backfill consist of 6-8" of sand

ELEVATION / DEPTH OF HOLE: -32.6FT/36FT

BORING NO.: PAI-01-MW-07(S)

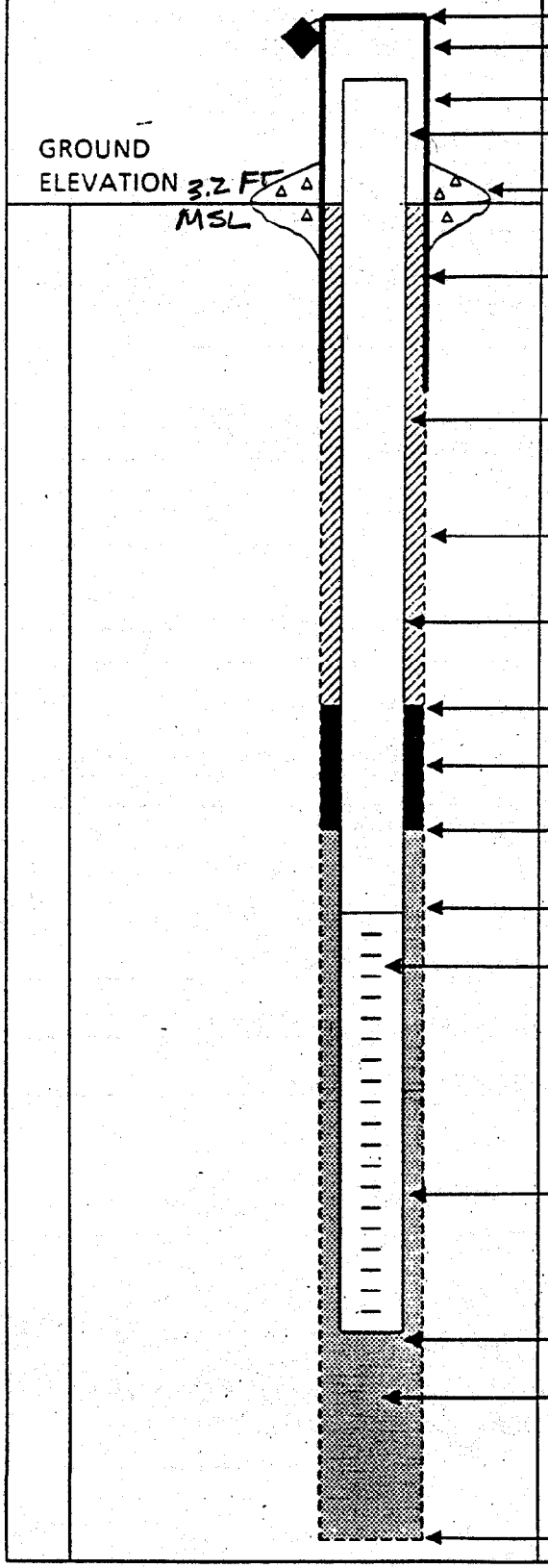
OVERBURDEN MONITORING WELL SHEET

Constructed adjacent to

PROJECT: MCRD Parris Island
PROJECT NO.: 7394
ELEVATION: 3.2 MSL
FIELD GEOLOGIST: G. Gunter

LOCATION: SWMU 01
BORING: PAI-01-SB02
DATE: 5/21/98

DRILLER: L. LeFever #13
DRILLING METHOD: HSA
DEVELOPMENT METHOD: Surge & Pump



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.26 FT

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 3.06 FT

TYPE OF SURFACE SEAL: 4'X4'X8" Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: Aluminum

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 1.7 FT / 1.5 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 2.5 FT

ELEVATION / DEPTH TOP OF SCREEN: -0.06 FT / 3 FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.010 INCH X 10 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #1 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -9.9 FT / 13.0 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -10.3 FT / 13

TYPE OF BACKFILL BELOW OBSERVATION WELL: Backfill consists of 6-8" of #1 Sand

ELEVATION / DEPTH OF HOLE: -10.3 FT / 13.5 FT

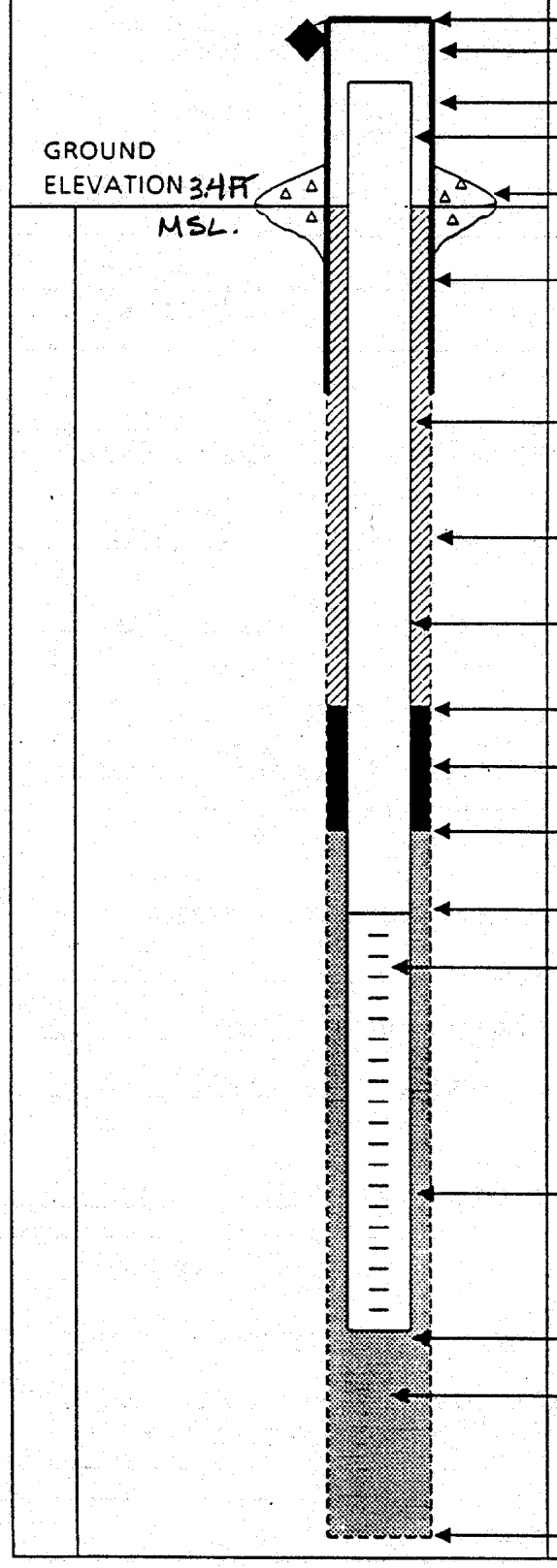
BORING NO.: PAI-01-SB
PAI-01-mw
PAI-01-mw-08(

OVERBURDEN MONITORING WELL SHEET

PROJECT MCRD Parris Island
PROJECT NO. 7394
ELEVATION 3.4 MSL
FIELD GEOLOGIST GGUNTER

LOCATION Swmu 01
BORING PAI-01-SB02
DATE 5/20/98

DRILLER L. LeFever #1361
DRILLING METHOD HSA
DEVELOPMENT METHOD Surge & Pump



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.78

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 3.38

TYPE OF SURFACE SEAL: 4' X 4' X 8" Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: ALUMINUM

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: BENTONITE GROUT

ELEVATION / DEPTH TOP OF SEAL: -24.1 FT / 27.5 F

TYPE OF SEAL: BENTONITE PELLETS

DEPTH TOP OF SAND PACK: 29.5 FT

ELEVATION / DEPTH TOP OF SCREEN: -27.9 FT / 31.3

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH X 5 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -32.9 FT / 36.3 F

ELEVATION / DEPTH BOTTOM OF SAND PACK: -33.1 FT / 36.5

TYPE OF BACKFILL BELOW OBSERVATION WELL: Backfill consists of 6-8' of #2 sand

ELEVATION / DEPTH OF HOLE: -33.1 FT / 36.5 F

BORING NO.: PAI-01-MW
PAI-01-SB0

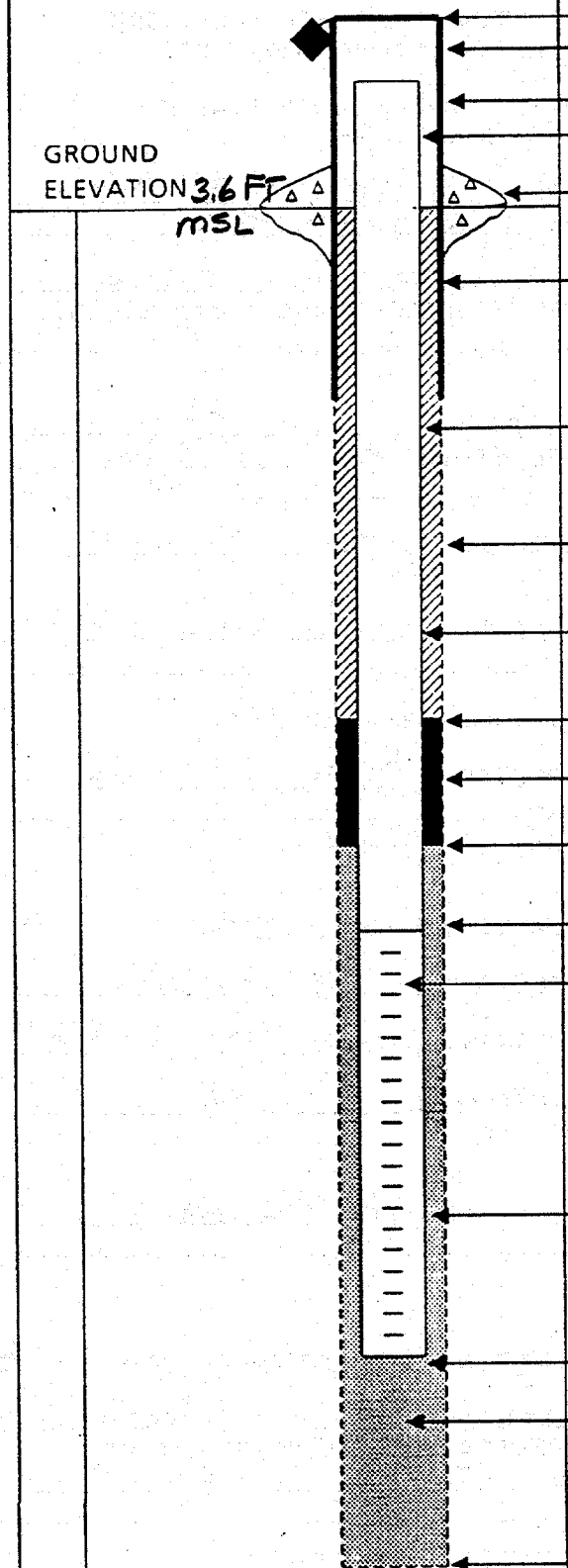
OVERBURDEN
MONITORING WELL SHEET

Constructed adjacent to PAI-01-MW-09(S)

PROJECT McRD Parris Island
PROJECT NO. 7394
ELEVATION 3.6 MSL
FIELD GEOLOGIST G. GUNTER

LOCATION Swamp 01
BORING PAI-01-SB03
DATE 5/20/98

DRILLER L. LeFever #10
DRILLING METHOD HSA
DEVELOPMENT METHOD Surge & Pump



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.76 FT

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 3.16 FT

TYPE OF SURFACE SEAL: 4'X4'X8" Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: Aluminum

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 2.1 FT / 1.5F

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 2.5 FT

ELEVATION / DEPTH TOP OF SCREEN: 0.6FT / 3 F

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.010 inch x 10 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #1 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -9.4 FT / 13F

ELEVATION / DEPTH BOTTOM OF SAND PACK: -9.9 FT /

TYPE OF BACKFILL BELOW OBSERVATION WELL: Backfill consists of 6-8" of #1 sand

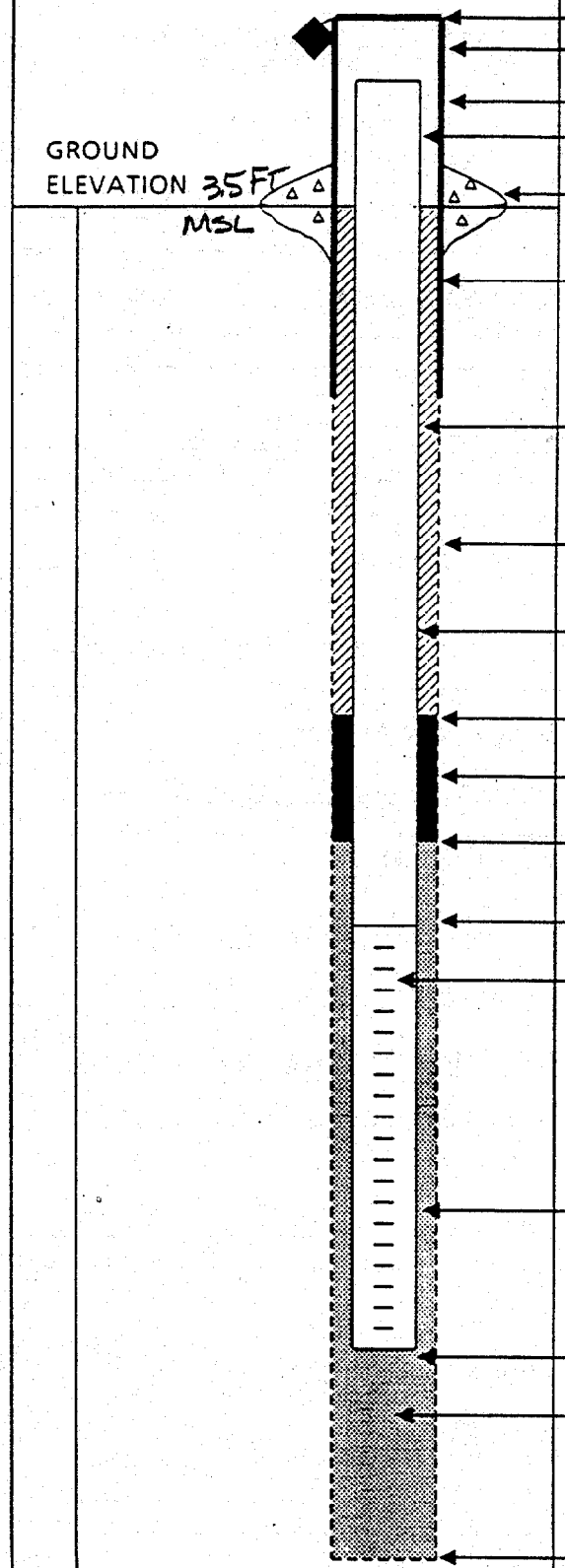
ELEVATION / DEPTH OF HOLE: -9.9 FT / 13.5

BORING NO.: PAI-01-SB0
PAI-01-MW0
PAI-01-MW-10

OVERBURDEN MONITORING WELL SHEET

PROJECT MCRD Parris Island
PROJECT NO. 7394
ELEVATION 3.5 MSL
FIELD GEOLOGIST GGUNTER
LOCATION SWMU 01
BORING PAI-01-SB03
DATE 5/19/98

DRILLER L. LeFever #1361
DRILLING METHOD HSA
DEVELOPMENT METHOD Surge & Pump



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.47 FT

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 3.5 FT

TYPE OF SURFACE SEAL: 4'x4'x8" Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: Aluminum

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -22.5 FT / 26 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 28 FT

ELEVATION / DEPTH TOP OF SCREEN: -26.5 FT / 30 FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH X 5 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -31.5 FT / 35 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -32.5 / 36 FT

TYPE OF BACKFILL BELOW OBSERVATION WELL: #2 SAND
Backfill consists of 6-8" of sand

ELEVATION / DEPTH OF HOLE: -32.5 / 36 FT

BORING NO.: PAI-01-mw

PAI-01-mw-11(S)

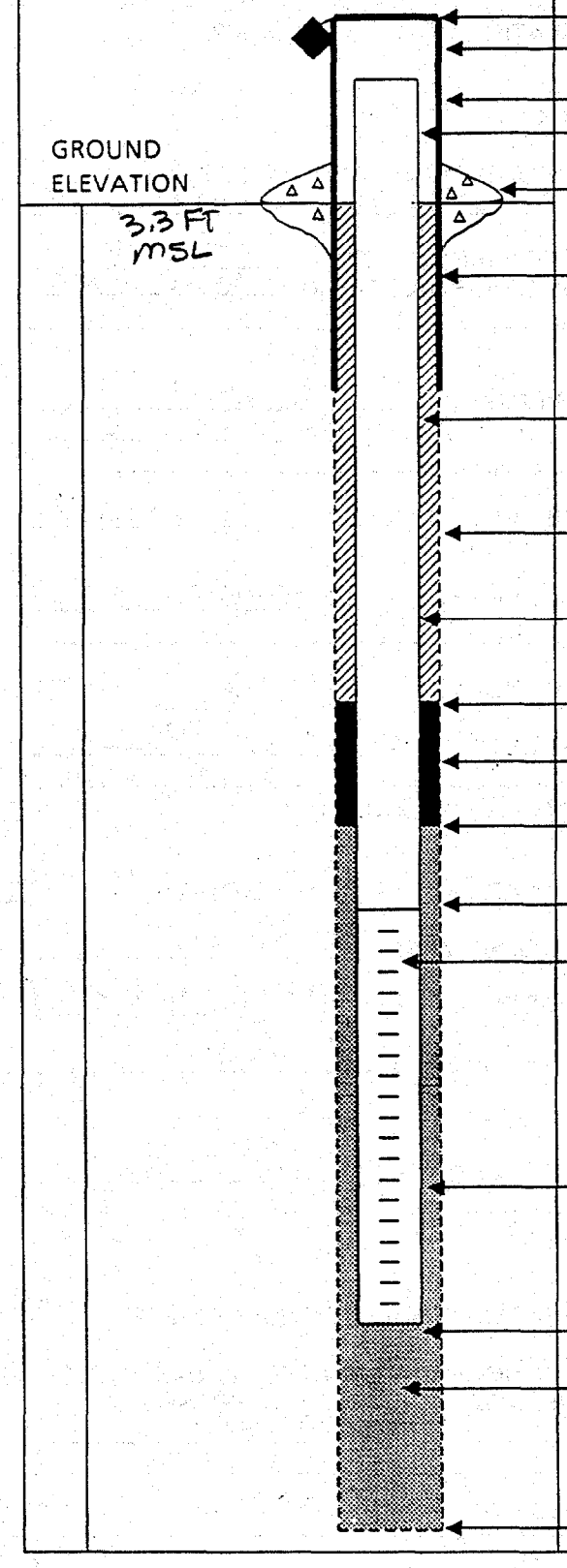
OVERBURDEN MONITORING WELL SHEET

Constructed adjacent to

PROJECT MCRD Parris Island
PROJECT NO. 7394
ELEVATION 3.3 MSL
FIELD GEOLOGIST G. GUNTER

LOCATION SWMU D1
BORING PAI-01-SB04
DATE 5/19/98

DRILLER L. LeFever #1304
DRILLING METHOD HSA
DEVELOPMENT METHOD Surge & Pump



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.08 FT

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 2.78 FT

TYPE OF SURFACE SEAL: 4' x 4' x 8" Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: Aluminum

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 1.8 FT / 1.5 F

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 2.5 FT

ELEVATION / DEPTH TOP OF SCREEN: -0.2 FT / 3.5 F

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.010 INCH X 10 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #1 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -10.2 FT / 13.5 F

ELEVATION / DEPTH BOTTOM OF SAND PACK: -10.2 F / 13

TYPE OF BACKFILL BELOW OBSERVATION WELL: Backfill consists of 6-8" of #1 sand

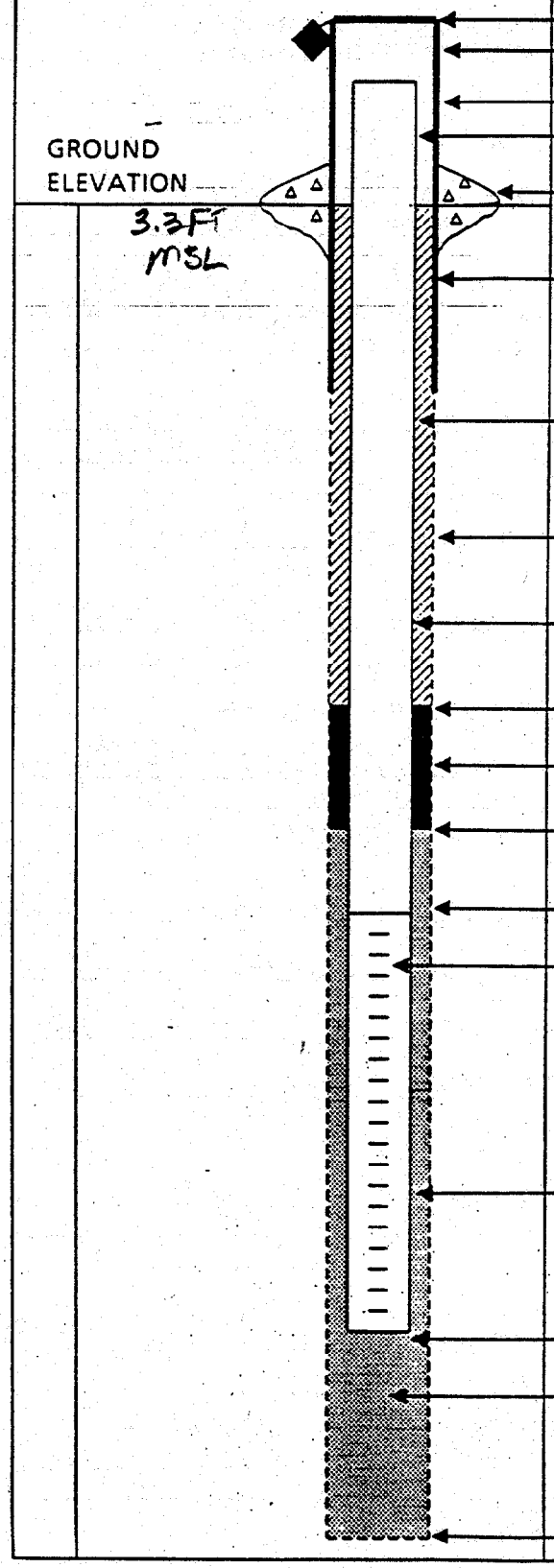
ELEVATION / DEPTH OF HOLE: -10.2 FT / 13.5

BORING NO.: PAF-01-mw
PAF-01-mw-R

OVERBURDEN MONITORING WELL SHEET

PROJECT: MCRD Parris Island
PROJECT NO.: 7394
ELEVATION: 3.3 MSL
FIELD GEOLOGIST: G. GUNTER
LOCATION: Swmu 01
BORING: PAF-01-SB04
DATE: 5/19/98

DRILLER: L. LeFever #1361
DRILLING METHOD: HSA
DEVELOPMENT METHOD: Surge & Pump



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.33 FT

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 3.03 FT

TYPE OF SURFACE SEAL: 4'x4'x8" Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: Aluminum

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -25.7 FT / 29 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 31 FT

ELEVATION / DEPTH TOP OF SCREEN: -29.7 FT / 33 FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH X 5 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -34.7 FT / 38 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -34.7 FT / 38 FT

TYPE OF BACKFILL BELOW OBSERVATION WELL: Backfill consists of 6-8" of #2 Sand

ELEVATION / DEPTH OF HOLE: -34.7 FT / 38 FT

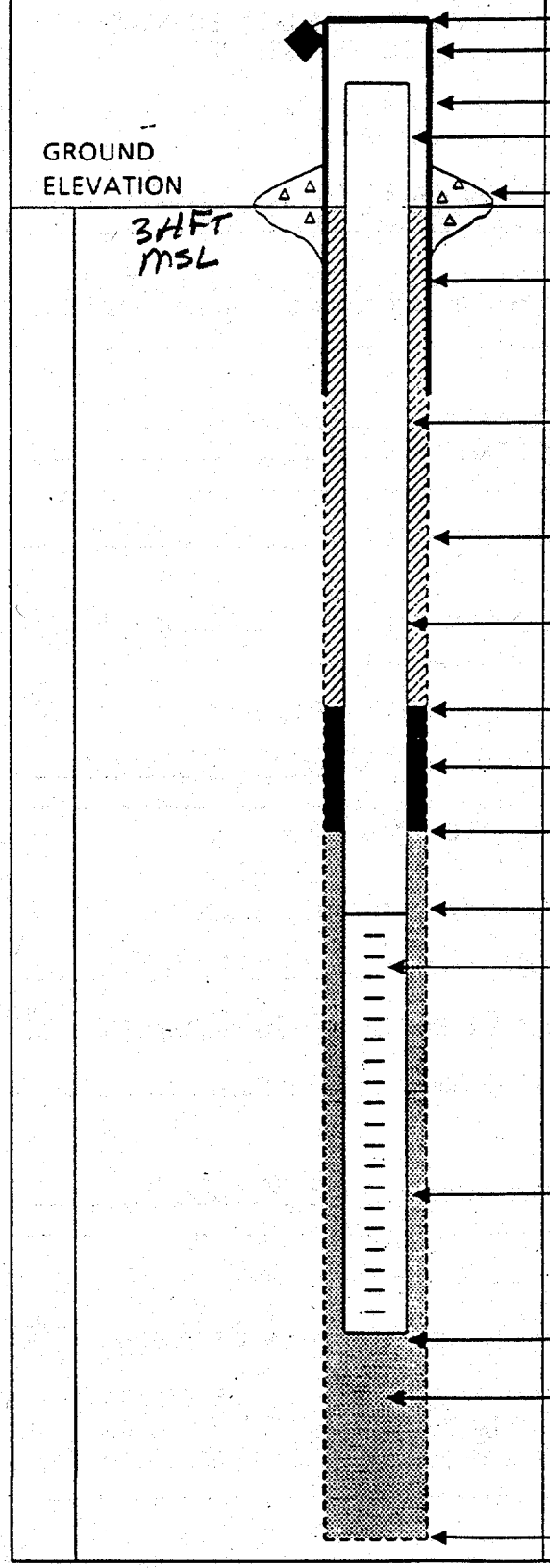
BORING NO.: PAI-01-SB-
PAI-01-MW-13(

OVERBURDEN MONITORING WELL SHEET

Constructed adjacent to

PROJECT: MCRD-Parris Island
PROJECT NO.: 7394
ELEVATION: 3.4 MSL
FIELD GEOLOGIST: G. GUNTER
LOCATION: Sumu 01
BORING: PAI-01-SB05
DATE: 5/19/98

DRILLER: L. Lefever #1
DRILLING METHOD: HSA
DEVELOPMENT METHOD: Pump & Surge



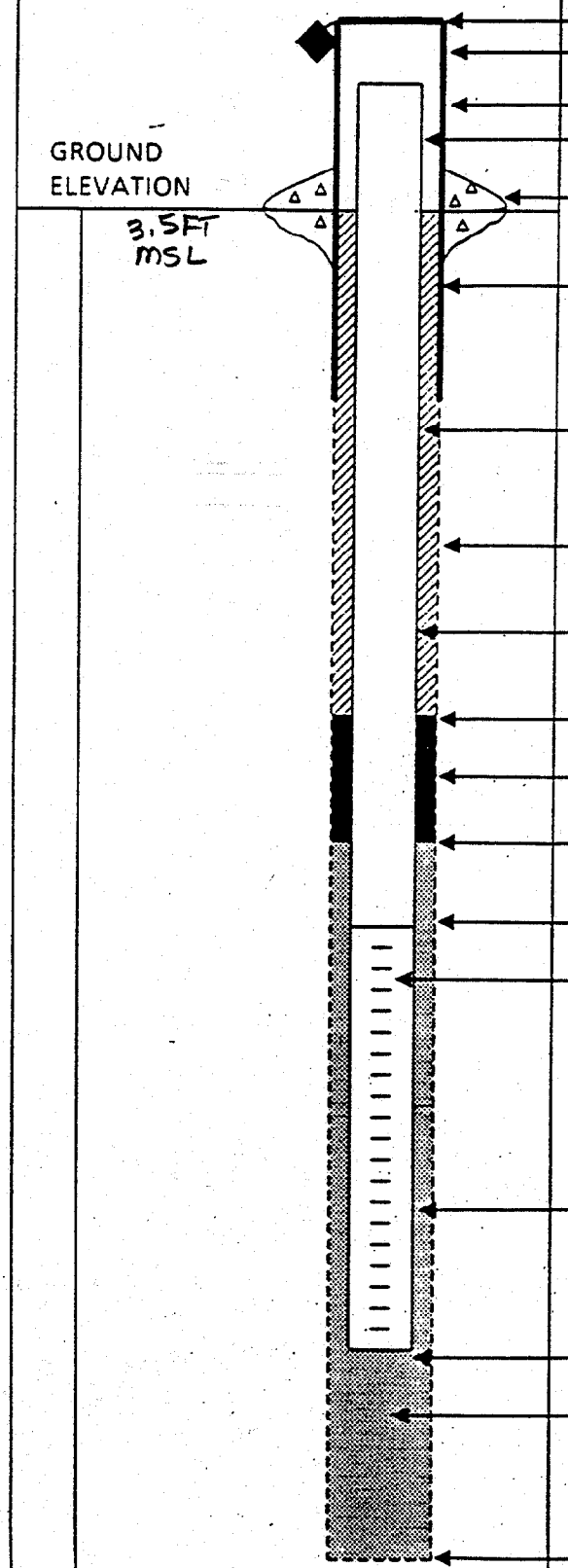
ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.45 FT
STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 3.05 FT
TYPE OF SURFACE SEAL: 4'x4'x8" CONCRETE PAD
I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: ALUMINUM
RISER PIPE I.D.: 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC
BOREHOLE DIAMETER: 8 INCH
TYPE OF BACKFILL: Bentonite Grout
ELEVATION / DEPTH TOP OF SEAL: 1.9 FT / 1.5 F
TYPE OF SEAL: Bentonite Pellets
DEPTH TOP OF SAND PACK: 2.5 FT
ELEVATION / DEPTH TOP OF SCREEN: 0.2 FT / 3.2 F
TYPE OF SCREEN: SCH 40 PVC
SLOT SIZE x LENGTH: 0.010 INCH X 10 FT
I.D. OF SCREEN: 2 INCH
TYPE OF SAND PACK: #1 SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: -9.8 FT / 13.2
ELEVATION / DEPTH BOTTOM OF SAND PACK: -10.1 FT / 1
TYPE OF BACKFILL BELOW OBSERVATION WELL: Backfill consists of 6-8" of #1 sand
ELEVATION / DEPTH OF HOLE: -10.1 FT / 13.5 F

BORING NO.: PAF-01-MW14(D)

OVERBURDEN MONITORING WELL SHEET

PROJECT: MCRD-Parris Island
PROJECT NO.: 7394
ELEVATION: 3.5 MSL
FIELD GEOLOGIST: G. GUNTER
LOCATION: Swmu 01
BORING: PAF-01-SB05
DATE: 5/19/98

DRILLER: L. Lefever #1341
DRILLING METHOD: HSA
DEVELOPMENT METHOD: Pump & Surge



ELEVATION OF TOP OF SURFACE CASING: NA
ELEVATION OF TOP OF RISER PIPE: 6.35 FT

STICK - UP TOP OF SURFACE CASING: NA
STICK - UP RISER PIPE: 2.85 FT

TYPE OF SURFACE SEAL: 4'x4'x 8IN Concrete PAD

I.D. OF SURFACE CASING: 4 INCH
TYPE OF SURFACE CASING: ALUMINUM

RISER PIPE I.D. 2 INCH
TYPE OF RISER PIPE: SCH 40 PVC

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -23.5FT / 27FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 29 FT

ELEVATION / DEPTH TOP OF SCREEN: -27.5FT / 31FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020IN x 5FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: # 2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -32.5FT 36FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -32.5F / 36FT

TYPE OF BACKFILL BELOW OBSERVATION WELL: Backfill consists of 6-8" of #2 sand

ELEVATION / DEPTH OF HOLE: -32.5FT 36FT

A-4

WELL DEVELOPMENT RECORDS

MONITORING WELL DEVELOPMENT RECORD

17.30
11.73
5.57

Page 1 of 1

Well: PAI-MW4(S)66 ~~PAI-01-MW04(S)~~
Site: SWMU01
Date Installed: NA
Date Developed: 6/1/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 17.30
Static Water Level Before (ft.): 11.73
Static Water Level After (ft.): —
Screen Length (ft.): NA
Specific Capacity: NA
Casing ID (in.): 2 inch

Responsible Personnel: GG
Drilling Co.: NA
Project Name: MCRD - Parris Island
Project Number: 7594

Vol = 0.924 gal. = 1 gal.

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	Sal.	DO
1433		initial		24.4	6.99	0.496	>999	initial	0.02	2.35
1435		3 gal		20.0	6.78	0.459	>999	3 gal	0.01	0.79
1436		6		19.5	6.66	0.483	198	6 gal	0.02	0.49
1438		9		19.4	6.53	0.508	203	9 gal	0.02	0.47
1440		12		19.4	6.49	0.529	84	12 gal	0.02	0.75
1441	stop	-		~~19.7~~				—		
1447	start	-		~~19~~						
1448				~~19.9~~	~~6.73~~	~~0.510~~	~~257~~	~~14~~	~~0.02~~	~~1.14~~
1451		16		19.2	6.78	0.589	18	16	0.02	1.25
1452		18		19.1	6.78	0.566	65	18	0.02	0.78
1453		20		19.0	6.80	0.573	53	20	0.02	1.07
1455		22		19.1	6.80	0.580	39	22 gal.	0.02	0.99

Lots of Sand. Fines in well.

A-26

MONITORING WELL DEVELOPMENT RECORD

Pumping into Poly Tank same Time as PAT-01-MW06

Well: PAT-01-MW05(S)
Site: Swmu 01
Date Installed: 5/21/98
Date Developed: 5/29/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 16.26
Static Water Level Before (ft.): 3.48 TOC
Static Water Level After (ft.): —
Screen Length (ft.): 10.
Specific Capacity: —
Casing ID (in.): 2 INCH

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MCRD - Parris Island
Project Number: 7394

Pumped approximately 60 gals

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	Sal.	DO.
0948				21.0	7.68	21.7	>999	initial	1.31	0.07
0953	STOP	Dry	to Surge							
0955	Start									
0957	Dry									
1002	Start									
1024	Stop	to Surge								
1029	Start									
1035				22.9	7.98	29.7	338		1.85	2.10
1057				22.4	7.94	30.0	18		1.86	3.00
1104				22.5	8.04	30.2	12		1.87	2.35
1107		60 gallons		22.5	8.06	30.2	17		1.86	2.83
								60 gallon		

A-27

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-01(MW06CD)
Site: SWMU01
Date Installed: 5/21/98
Date Developed: 5/29/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 38.64
Static Water Level Before (ft.): 4.71
Static Water Level After (ft.): –
Screen Length (ft.): 5
Specific Capacity: –
Casing ID (in.): 2 INCH

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MCRD - Parris Island
Project Number: 7394

Pumping into Poli Tank @ Same Time as PAI-01-MW05

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	Sal.	DO
0946		initial		22.1	6.92	15.5	>999	initial	0.90	0.05
0959				21.2	5.95	21.2	691		1.28	0.86
1040				21.4	5.85	21.7	29		1.31	0.67
1045				21.2	5.82	21.6	19		1.30	0.70
1053	Stop	90 gal		21.2	5.84	21.7	17		1.31	0.70
								½ 90 gal pumped		

A-28

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-01-mw-07(S) ~~01mw07~~ GC
Site: Sumu 01
Date Installed: 5/21/98
Date Developed: 5/28/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 15.60
Static Water Level Before (ft.): 2.99
Static Water Level After (ft.): –
Screen Length (ft.): 10
Specific Capacity: –
Casing ID (in.): 2 in

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MCRD-Parris Island
Project Number: 7394

Pumping into Poly Tank @ Same Time as PAI-01-mw08

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	Sal	DO
1218		initial		20.2	7.81	28.7	>999	initial	1.78	0.87
1308		100		20.6	8.15	31.1	19	100	1.94	0.78
1321		110		20.4	8.16	31.1	12	110	1.92	1.15
1326		120		20.4	8.15	31.0	7	120 gal	1.91	1.15

A-29

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-01-MW08(D)
Site: Swmu 01
Date Installed: 5/21/98
Date Developed: 5/28/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 38.80
Static Water Level Before (ft.): 3.94
Static Water Level After (ft.): -
Screen Length (ft.): 5
Specific Capacity: -
Casing ID (in.): 2 INCH

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MCRD - Parris Island
Project Number: 7394
Pumping into Poly Tank @ same time as PAI-01-MW07

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	Sal	DO
1214		initial		22.2	7.61	10.7	>999	initial	0.60	0.68
1244		45		21.1	6.79	19.0	>999		1.13	0.72
1306		90		21.0	6.80	19.1	78		1.14	0.90
1313		100		20.8	6.82	19.6	12		1.17	0.94
1317		110		20.6	6.81	19.4	9		1.15	1.04
1323		120		20.6	6.84	19.6	7		1.17	0.95

A-30

MONITORING WELL DEVELOPMENT RECORD

Well: PAL-01-MW09(S)
Site: SWMU01
Date Installed: 5/20/98-29
Date Developed: 5/28/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 15.89
Static Water Level Before (ft.): 4.91-307
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2 IN

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MCRD - Parris Island
Project Number: 7394

Pump approximately 30 gallon

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	
									SO2 DO
1732				21.0	7.48	17.4	>999	initial	1.03 0.01
1735	Dry								
1740	Start								
1747	Dry								
1758	Start								
1800	Dry								
1812	Start								
1813	Dry								
1814	Start								
1815	Dry								
1823	Start								
1825	Dry								
1845	Start								
1848	Dry								
1905	Start								
1906	dry								
5/29 0703				20.6	7.12	41.8	>999		2.69 2.68
0704	dry								
0710	Start								
0715	Start	0720	Start	0725	20.6	7.19	36.6	>999	3 1.94
		0721	dry	0726	dry				

A-31

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-01MW10(D)
Site: Swmu 01
Date Installed: 5/19/98
Date Developed: 5/28/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 35.8 TOC
Static Water Level Before (ft.): 4.97 TOC*
Static Water Level After (ft.): —
Screen Length (ft.): 5
Specific Capacity: —
Casing ID (in.): 2 in

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MCRD - Parris Island
Project Number: 7394
* sediment in well.

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	Sel.	DO
1730		initial		22.0	7.50	10.3	>999	INITIAL	0.57	0.69
1819				21.5	7.00	29.0	>999		1.80	0.40
1832		32 gal		21.4	7.02	29.5	153	32 gal	1.82	0.74
1845		38		21.3	7.02	29.6	116	38	1.84	0.59
1901		42		21.6	7.02	29.8	48	42	1.85	0.74
1908		44		21.6	7.03	29.8	14	44	1.85	0.99

A-32

MONITORING WELL DEVELOPMENT RECORD

Well: PI-01-MW-11 (S)
Site: SWMU01
Date Installed: 5/19/98
Date Developed: 5/28/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): * 15.8 TOC
Static Water Level Before (ft.): * 2.86 TOC
Static Water Level After (ft.): -
Screen Length (ft.): 10
Specific Capacity: -
Casing ID (in.): 2 in

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MCRD - Parris Island
Project Number: 7394

* Sediment in well ≈ 2.4 gal per vol.

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.) Sal	DO	
0718				20.4	7.21	37.7	>999	initial 2.4	0.04	Black
0727	stop	- dry								
0732	Start									
0736	stop	dry								
0747	Start									
0750	Stop	dry								
0800	Start									
0800	Stop	dry								
0811	Start									
0816	Stop	dry								
0828	Start									
0830	Stop	dry								
0843	Start									
0849	Stop	dry								
0858	Start									
0908				22.8	7.69	42.9	963	2.76	0.57	
0912	dry									
0916	Start									

A-33

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-01MW-11(S)
Site: Suma 01
Date Installed: 5/19/98
Date Developed: 5/28
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 15.8 TOC
Static Water Level Before (ft.): 2.86 TOC
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2 in

Responsible Personnel: GG
Drilling Co.: Parratt Wolf
Project Name: NCRD - Parris Island
Project Number: 7394

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.) Sal.	Do	
0921	dry									
0924	Start									
0925				23.6	7.66	43.0	75	2.78	1.04	Tea color
0927	Dry									
0933	Start									
0938	Dry									
0945	Start									
0950	Dry									
0954	Start									
0955				23.7	7.65	43.0	33	2.78	1.46	Tea color
0958	Dry									
1002	Start									
1006	Dry									
1017	Start									
1019				24.6	7.36	43.6	142	2.82	0.46	
1022	Dry			~~24.4~~						
1031	Start									
1033				24.4	7.50	43.3	53	2.81	0.57	
1035	Dry									
1040	Start			24.1	7.63	43.4	70	2.80	0.68	

A-34

MONITORING WELL DEVELOPMENT RECORD

≈1.5 gpm flow

Well: PAF-01-MW-12(D)
Site: SWMU 01
Date Installed: 5/19/98
Date Developed: 5/28/98
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 36.5 TOC *
Static Water Level Before (ft.): 3.69 TOC
Static Water Level After (ft.): —
Screen Length (ft.): 5
Specific Capacity: —
Casing ID (in.): 2 in

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MCRD - Parris Island
Project Number: 7394

* Sediment in well.

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.) Sal.	DO.	
0707		INITIAL		21.4	7.41	26.8	>999	initial 1.65	0.04	Blk
0743		~59		20.5	6.99	34.5	236	2.18	0.68	
0813		~94		21.3	6.94	34.4	189	2.17	0.37	
0818		~99		20.8	6.97	34.4	121	2.18	1.80	
0825		~107		20.8	6.96	34.5	156	2.18	2.14	
0831		~124		20.8	6.96	34.1	113	2.18	1.33	
0850		~133		20.8	6.96	34.6	85	2.19	0.67	Tea color
0855		~138		20.9	6.95	34.3	86	2.16	0.44	
0858		≈140						← Stopped		

A-35

1.0 - 1.5 gal/min
maintain @ 1.1 gpm
1.5 gpm initial

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-DMW13(S)
Site: Sumu 01
Date Installed: 5/19/98
Date Developed: 5/27/98
Dev. Method: Surge & pump
Pump Type: Submersible

Depth to Bottom (ft.): 15.81 TOC
Static Water Level Before (ft.): 3.62 TOC
Static Water Level After (ft.): –
Screen Length (ft.): 10
Specific Capacity: –
Casing ID (in.): 2 in

Responsible Personnel: GG
Drilling Co.: Barnett Well
Project Name: MCRD – Parris Island
Project Number: 7394

1 vol = 2.01

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	Salinity	DO
1509				24.0	6.84	23.8	>999	initial	1.45	0.05
1522				21.5	6.87	~~24.5~~ 29.5	>999	70g	1.84	0.1
1527	Dry @	20 gal		~~20.5~~						
1530	start									
1542				20.5	6.73	28.2	>999	40g	1.74	0.38
1551	stop									
1556	start									
1611	stop – dry									
1615	start									
1638				21.6	6.76	~~27.8~~	709		1.71	0.6
1651				22.0	6.75	28.1	63		1.74	0.7
1707				21.7	6.75	28.0	36		1.74	0.4
1715	stop			21.7	6.74	28.0	15	120 gal	1.73	0.5

A-30

1.5-2gpm

MONITORING WELL DEVELOPMENT RECORD

Well: AAF-DI-MW-14(D)
Site: Summer 01
Date Installed: 5/19/98
Date Developed: 5/27/97
Dev. Method: Pump & Surge
Pump Type: Submersible

Depth to Bottom (ft.): 40.22 Toc
Static Water Level Before (ft.): 3.57 Toc
Static Water Level After (ft.): --
Screen Length (ft.): 5
Specific Capacity: -
Casing ID (in.): 2 in

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: MERD - Fairbanks Island
Project Number: 7394

1 WV = 6 gal

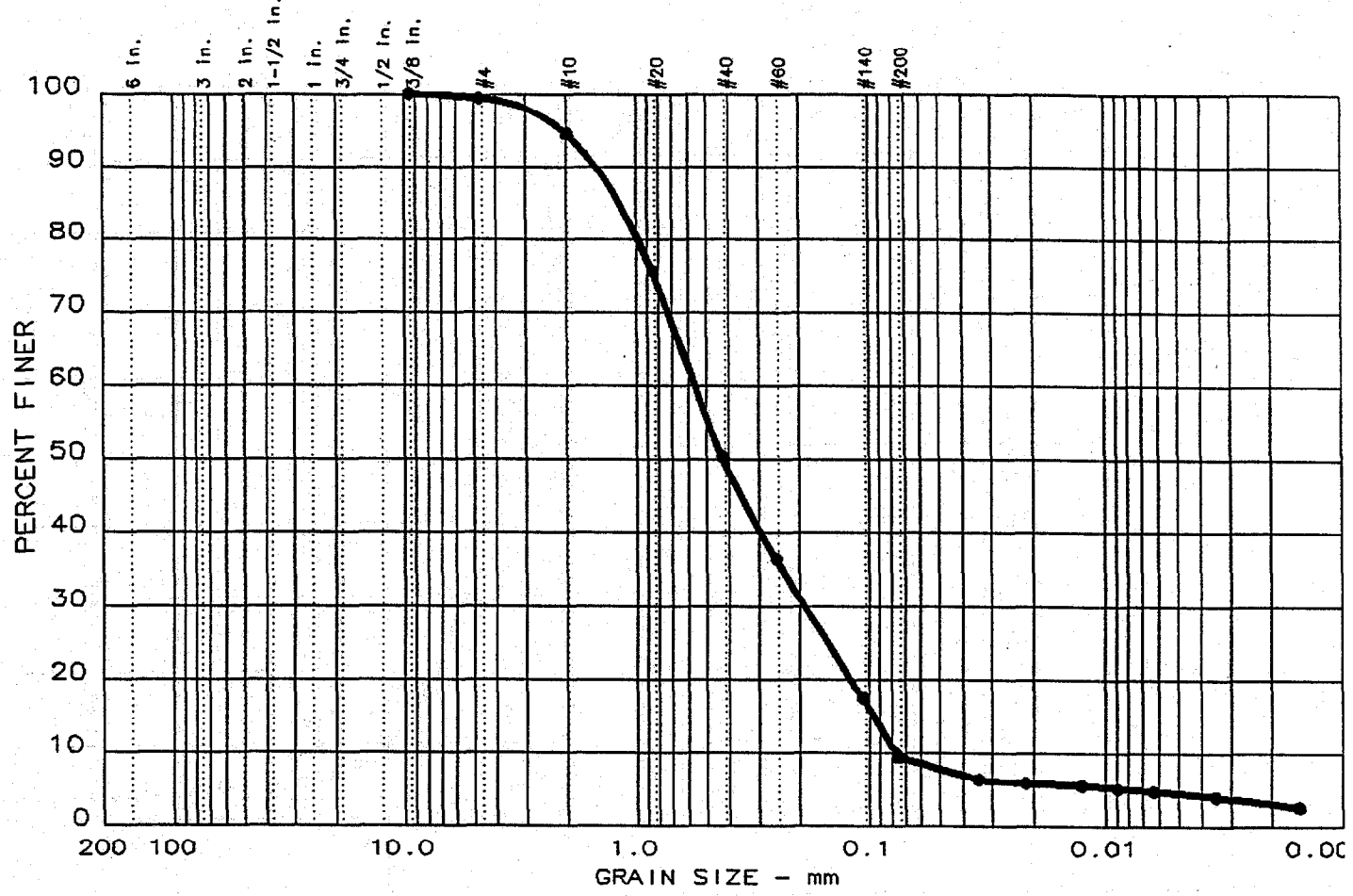
Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.) gal	sal.	DO
1524				21.6	7.51	9.5	895	initial	0.53	0.11
1527	~~Pump @ 20 gal~~			20.6	6.24	9.8	240	40 g	0.55	0.44
1539	—	—	—	—	—	—	—		0.62	0.48
1558				20.6	6.37	11.0	>999		0.62	0.47
1607				20.4	6.21	10.1	79		0.56	0.79
1619				20.5	6.19	10.2	16		0.57	0.79
1630				20.4	6.18	10.2	9		0.57	0.49
1636				20.3	6.18	10.2	12		0.57	0.58
1637	Stop	—						120 gal		

A-37

A-5

GEOTECHNICAL/ECOLOGICAL DATA

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	7	0.0	0.6	90.0	4.9	4.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	1.17	0.556	0.421	0.188	0.0952	0.0765	0.83	7.3

MATERIAL DESCRIPTION	USCS	AASHTO
● Poorly Graded Light Brown Sand with Silt	SP-SM	A-1-B

Project No.: 2857
Project: Parris Island
● Location: PAI 01-SB-001-36

Date: 10 JUNE 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

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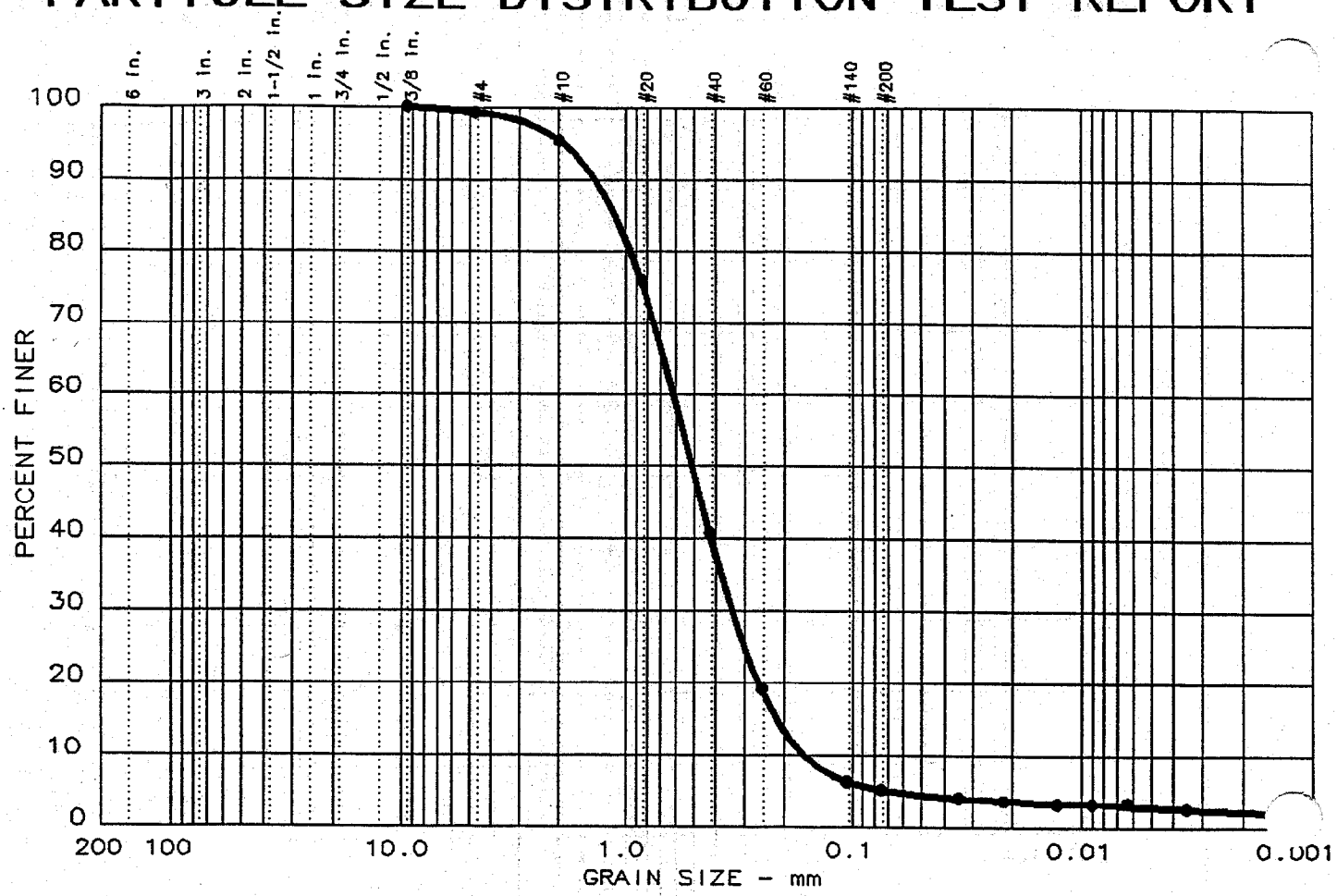
PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	9	0.0	0.7	94.0	2.4	2.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	1.11	0.612	0.508	0.337	0.213	0.161	1.15	3.8

MATERIAL DESCRIPTION	USCS	AASHTO
● Light Brown Poorly Graded Sand with Silt	SP-SM	A-1-B

Project No.: 2857
Project: Parris Island
● Location: PAI 01-SB-002-36

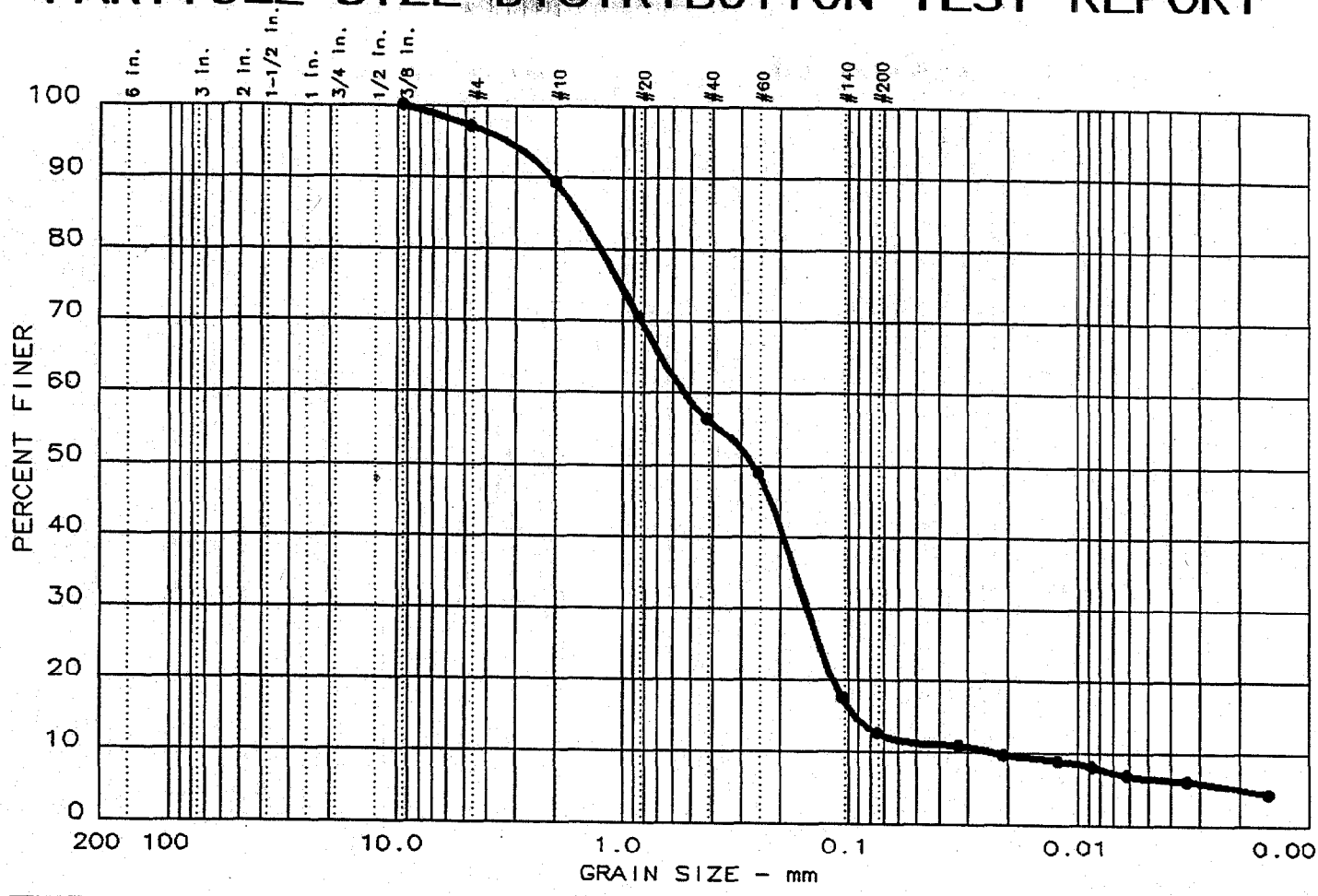
Date: 10 JUNE 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	8	0.0	2.8	84.6	6.0	6.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	1.57	0.531	0.260	0.150	0.0928	0.0233	1.83	22.8

MATERIAL DESCRIPTION	USCS	AASHTO
● Light Brown Silty Sand	SM	A-2-4(0.2)

Project No.: 2857
Project: Parris Island
● Location: PAI 01-SB-003-36

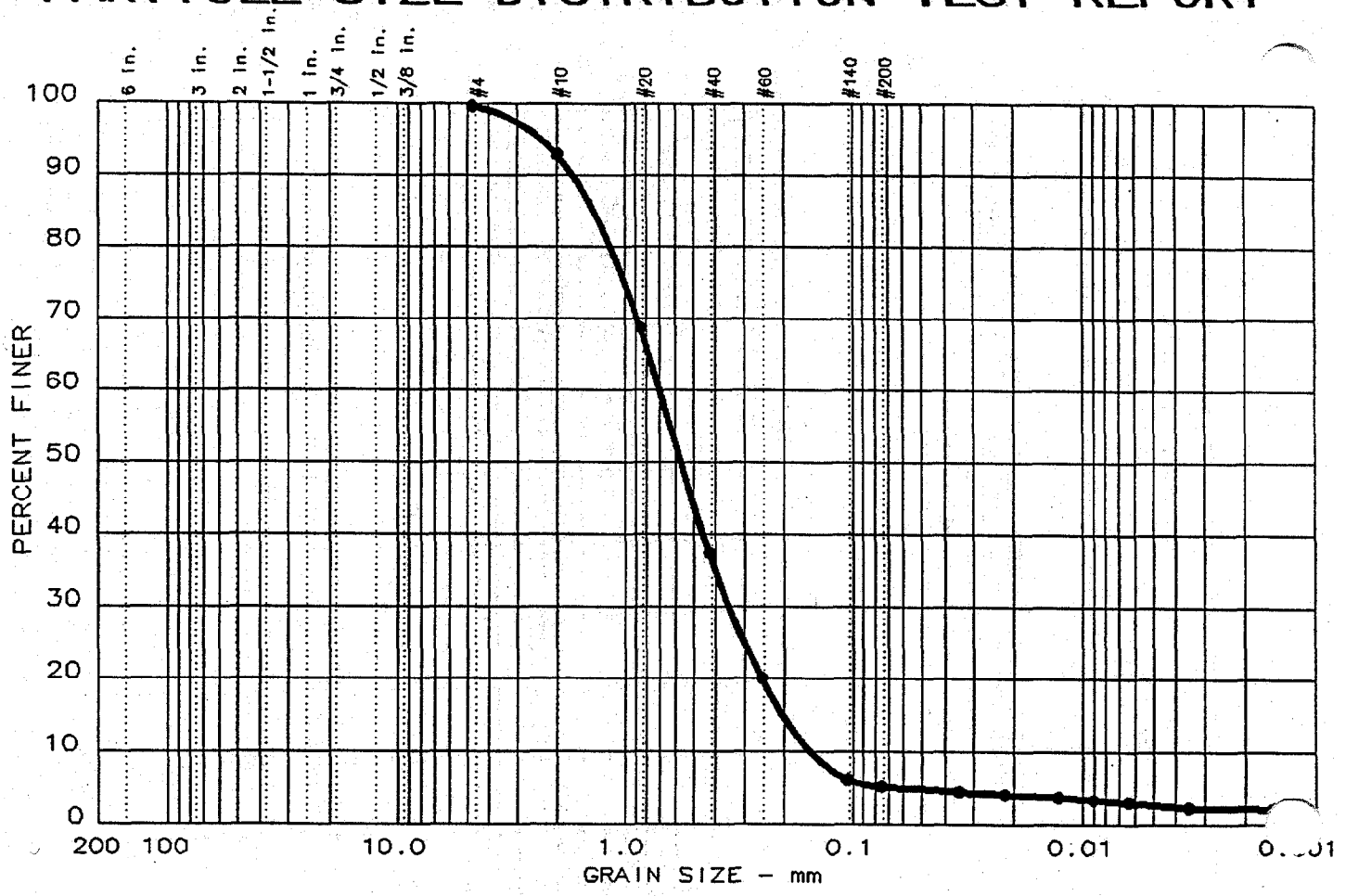
Date: 10 JUNE 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	11	0.0	0.4	94.3	2.5	2.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	1.38	0.697	0.564	0.348	0.200	0.152	1.14	4.6

MATERIAL DESCRIPTION	USCS	AASHTO
● Light Brown Poorly Graded Sand with Silt	SP-SM	A-1-B

Project No.: 2857
Project: Parris Island
● Location: PAI 01-SB-004-38

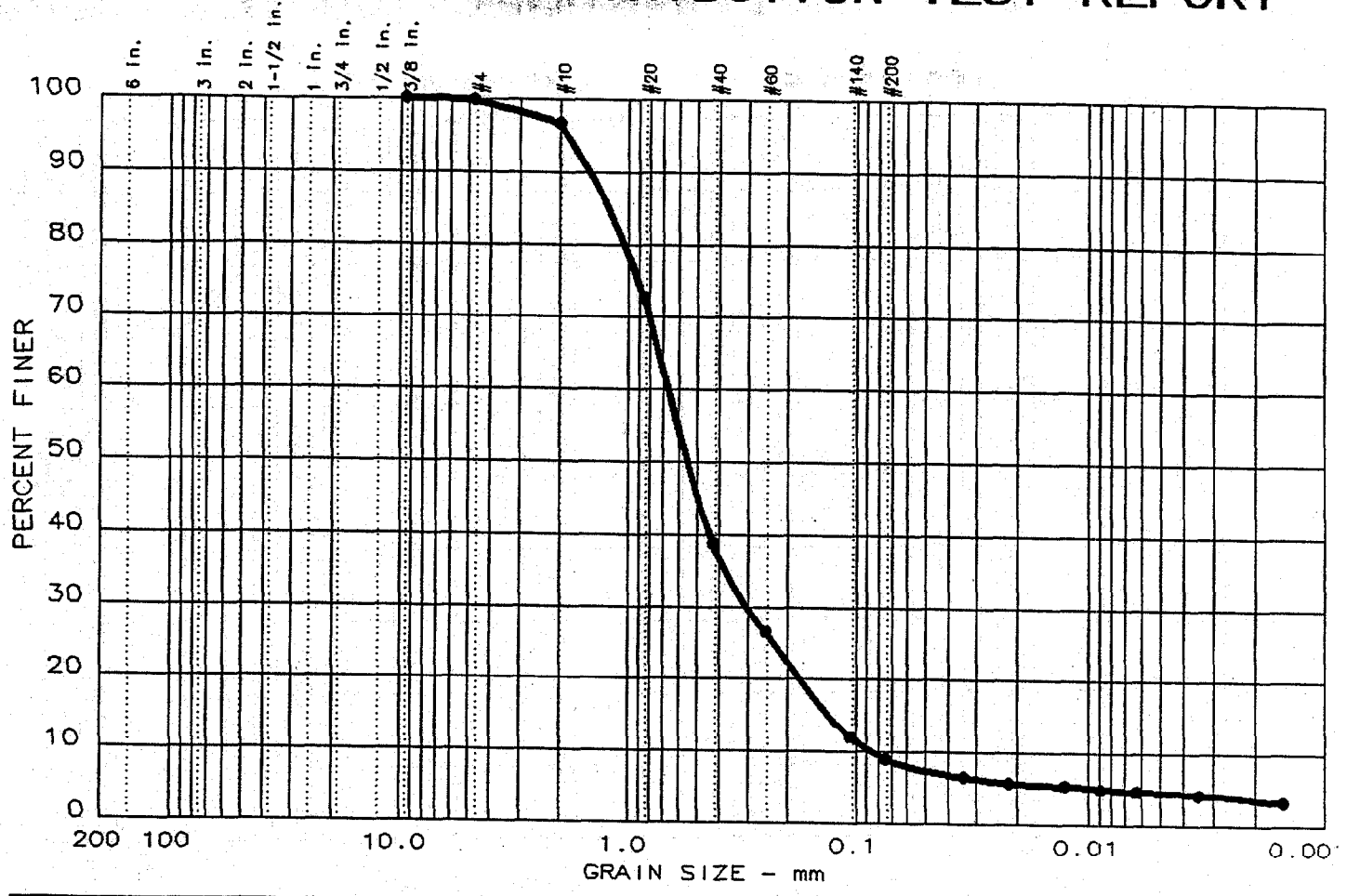
Date: 10 JUNE 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	6	0.0	0.2	90.8	4.5	4.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	1.22	0.661	0.547	0.301	0.130	0.0857	1.60	7.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Light Brown Well Graded Sand with Silt	SW-SM	A-1-b

Project No.: 2857
Project: Parris Island
● Location: PAI 01-SB-005-36

Date: 10 JUNE 1998

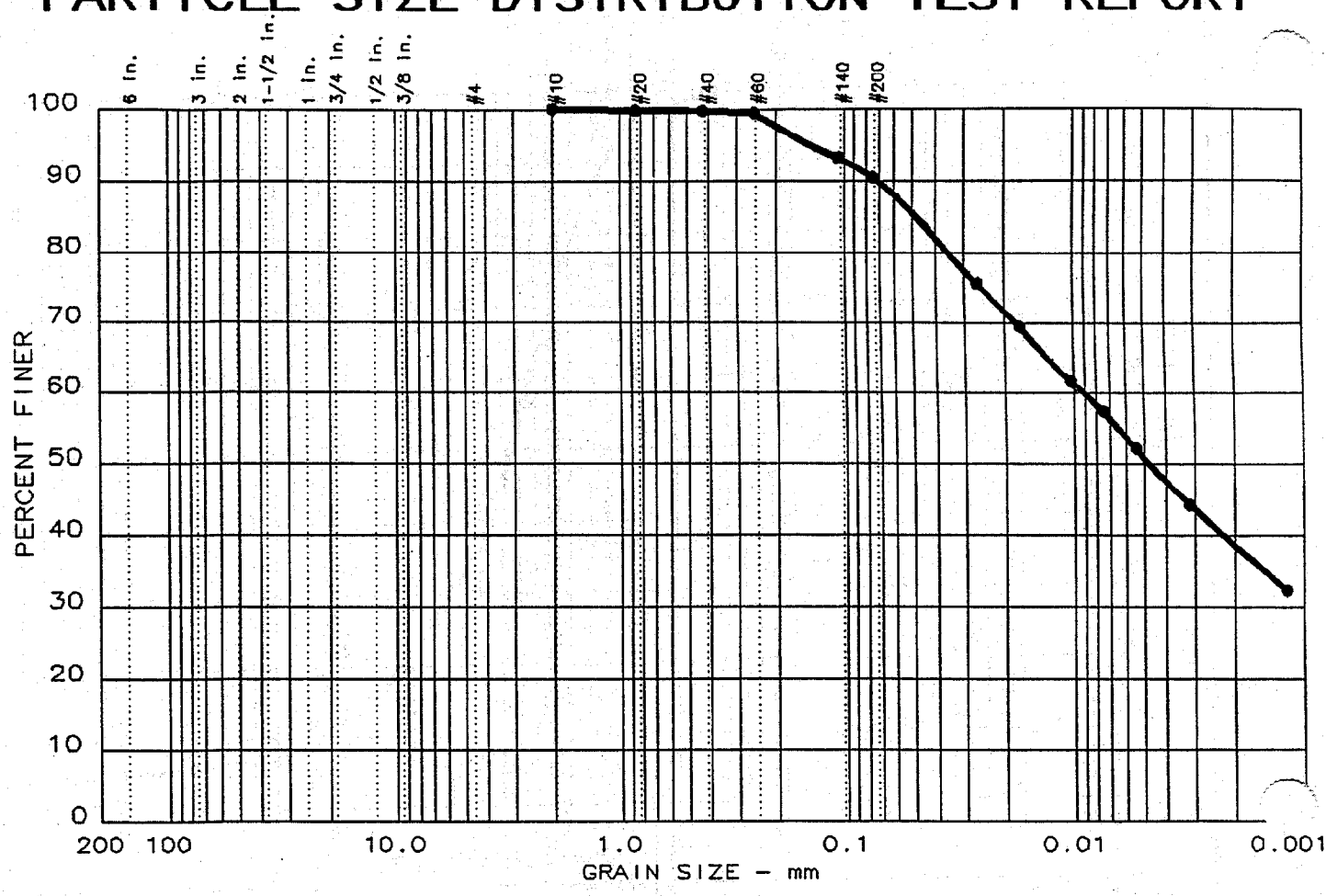
KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

A-42

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	4	0.0	0.0	9.6	39.6	50.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●					0.0047					

MATERIAL DESCRIPTION	USCS	AASHTO
● Green Brown Silty Clay		

Project No.: 2857
Project: Parris Island
● Location: PAI-01-SB-002 ⊕ (4-6 FT.)

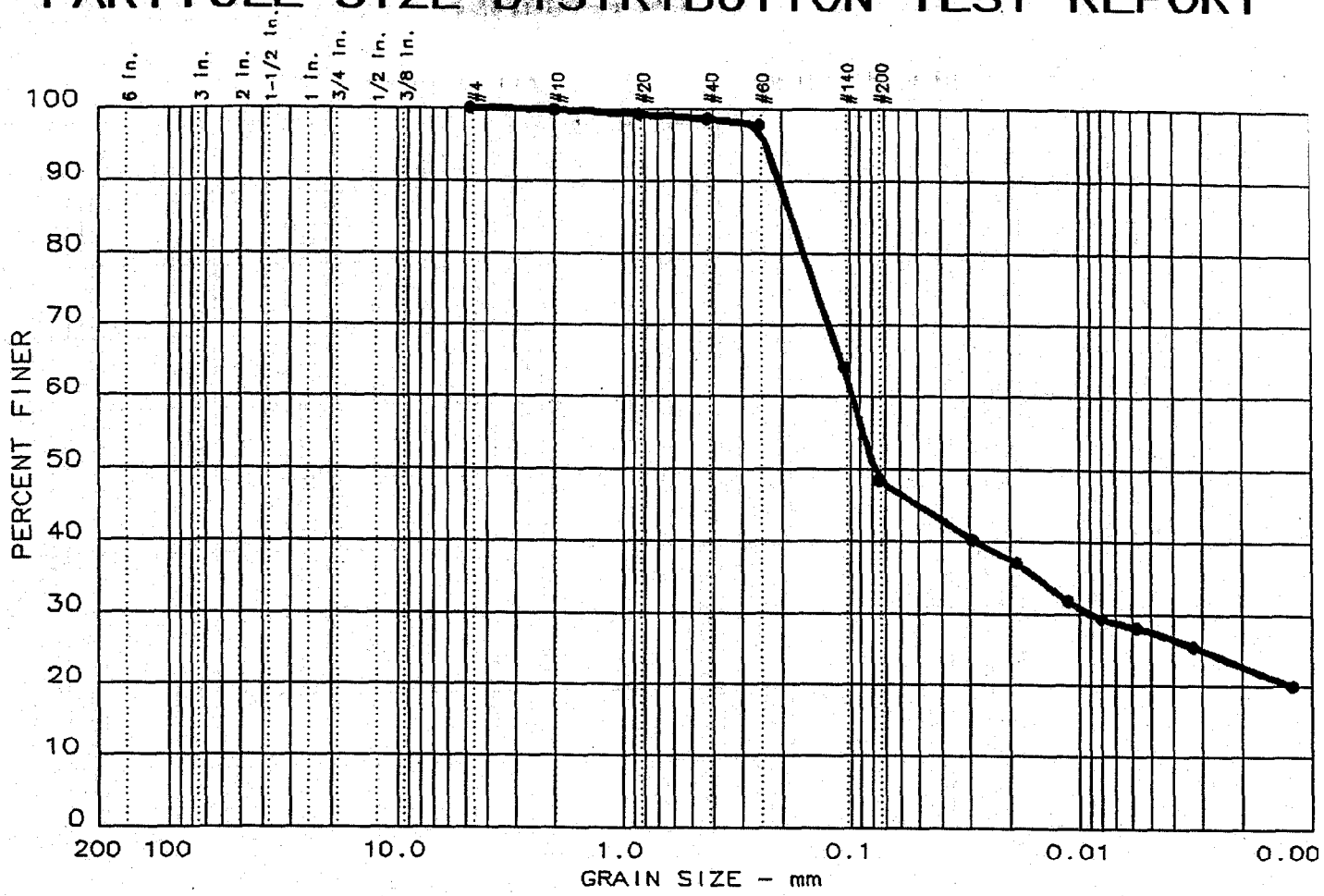
Date: 22 September 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	2	0.0	0.0	51.5	21.0	27.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.180	0.0966	0.0775	0.0089				

MATERIAL DESCRIPTION	USCS	AASHTO
● Green Brown Silty Clayey Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI-01-SB-003 @ (4-6 FT.)

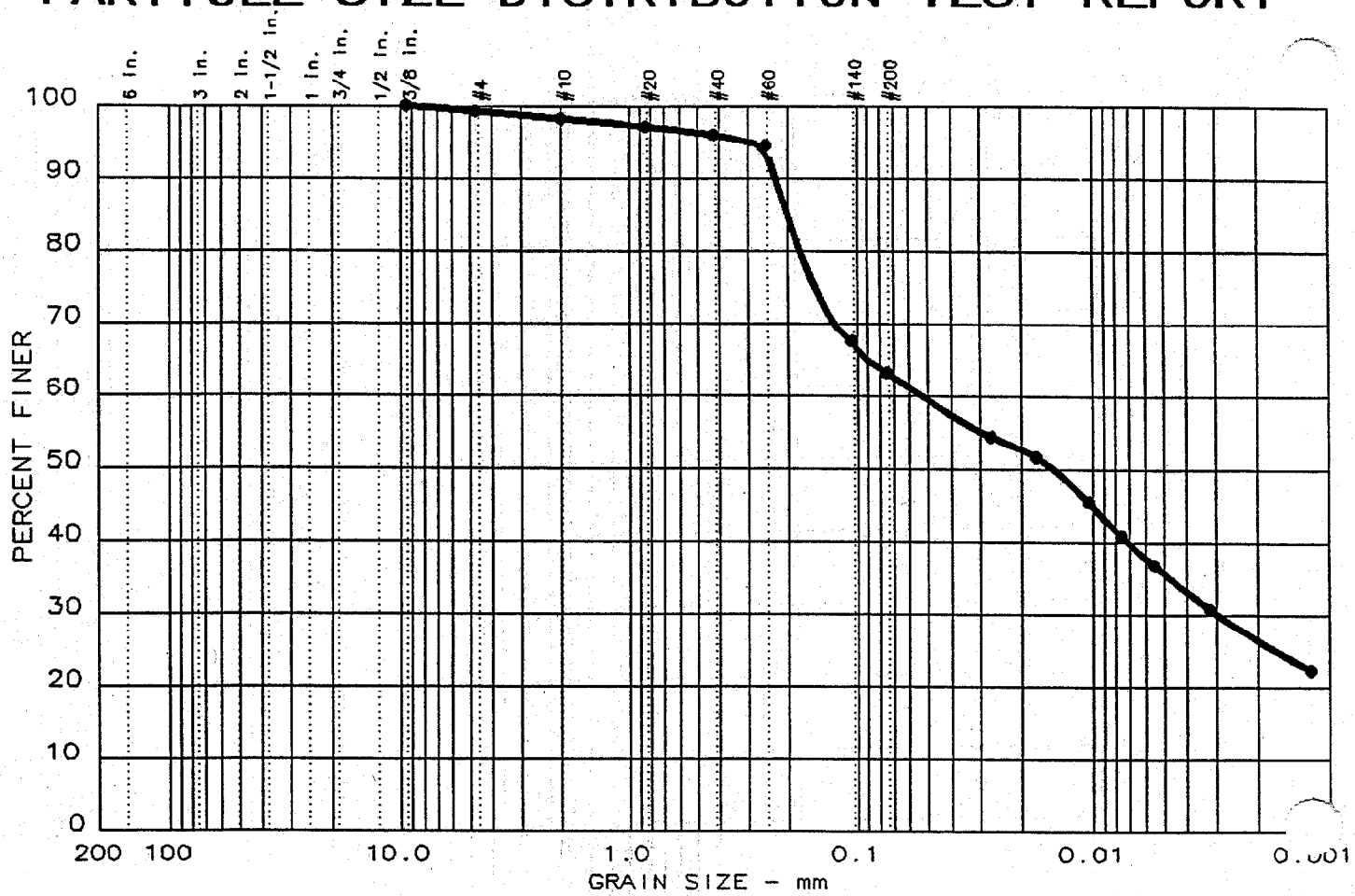
Date: 22 September 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	0.7	36.1	27.5	35.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.199		0.0146	0.0029				

MATERIAL DESCRIPTION	USCS	AASHTO
● Green Brown Sandy Silty Clay		

Project No.: 2857
Project: Parris Island
● Location: PAI-01-SB-005 @ (4-6 FT.)

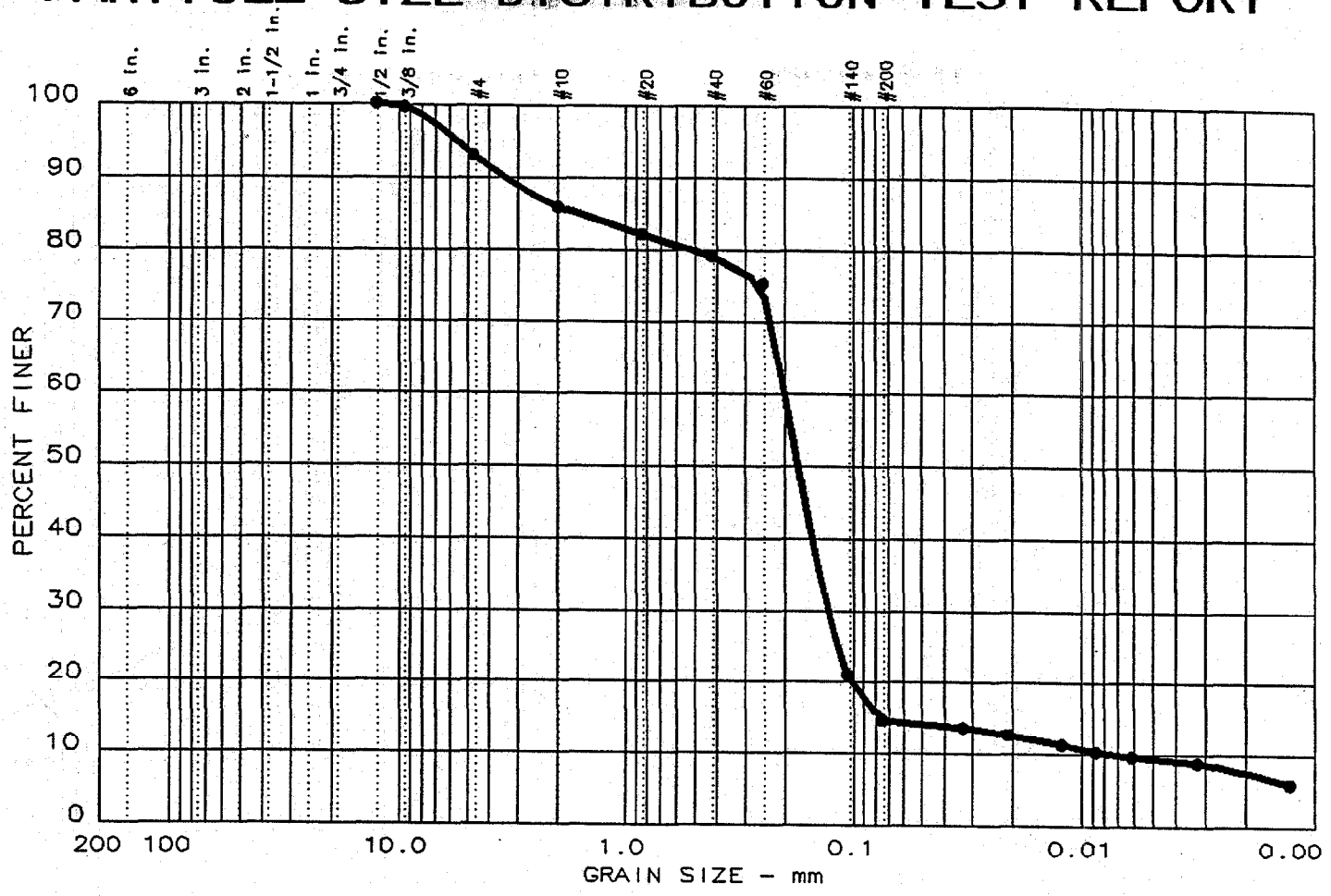
Date: 22 September 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	20	0.0	6.9	78.5	5.3	9.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			1.66	0.200	0.174	0.128	0.0761	0.0069	11.79	28.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Dark Brown Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI 01SD00101

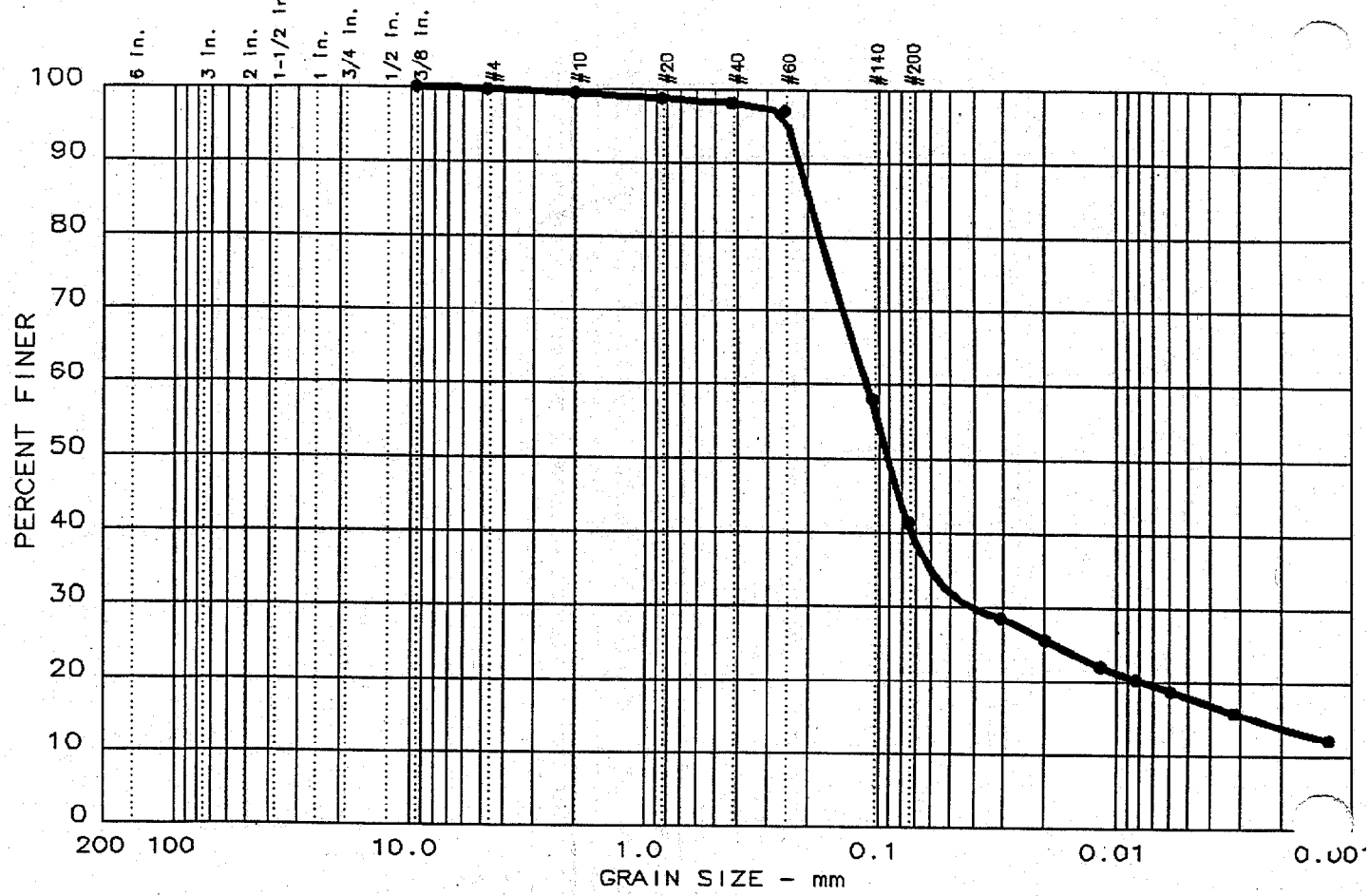
Date: 21 JUNE 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	0.2	58.5	23.4	17.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.194	0.111	0.0911	0.0407	0.0025			

MATERIAL DESCRIPTION	USCS	AASHTO
● Dark Brown Clayey Silty Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI 01SD 00201

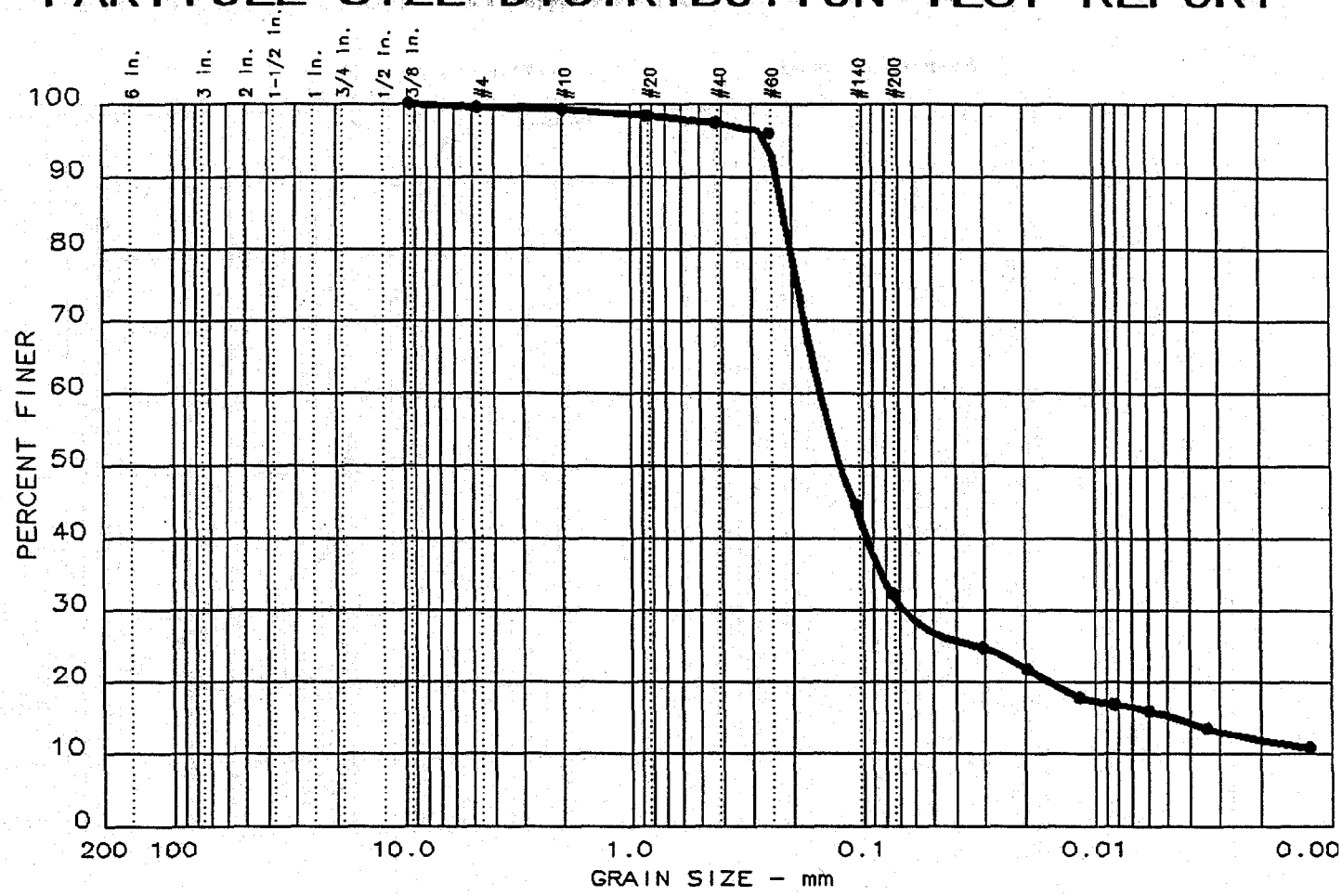
Date: 21 June 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	0.5	67.3	17.0	15.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.216	0.150	0.123	0.0668	0.0047			

MATERIAL DESCRIPTION	USCS	AASHTO
● Green Brown Clayey Silty Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI-01-SD-002-02

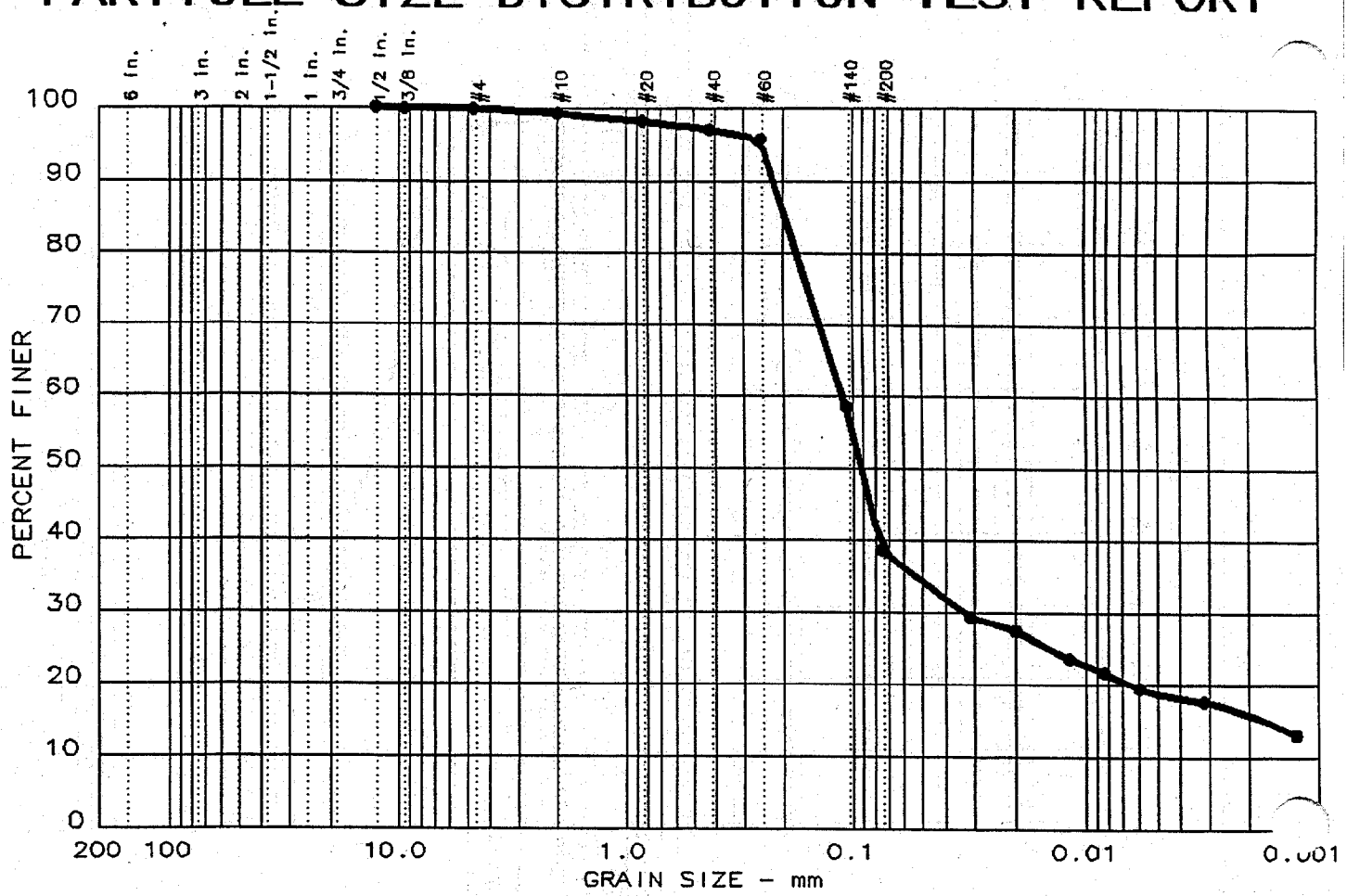
Date: 22 September 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	19	0.0	0.1	61.2	19.9	18.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.195	0.109	0.0914	0.0332	0.0017			

MATERIAL DESCRIPTION	USCS	AASHTO
● Dark Brown Clayey Silty Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI 01SD00301

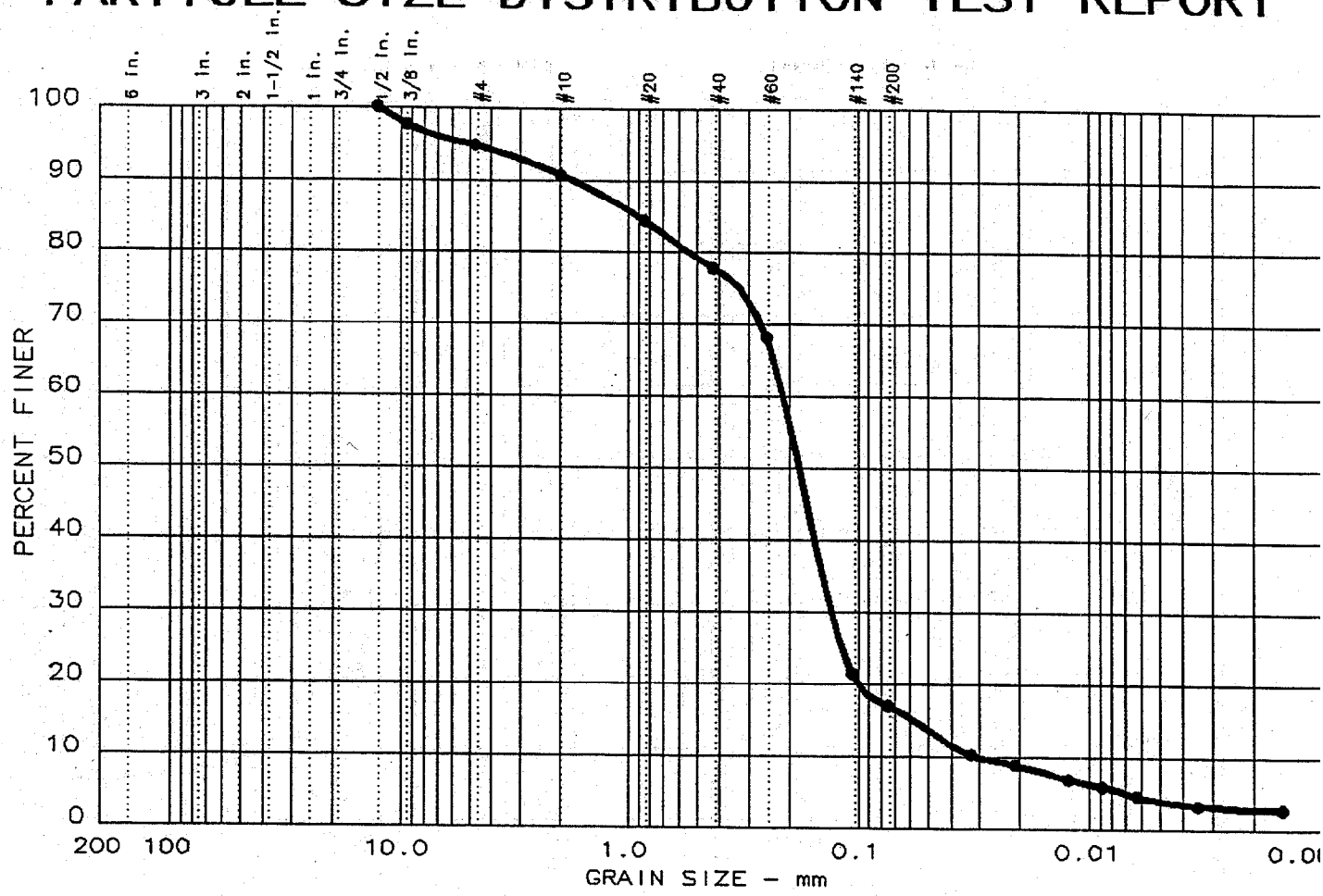
Date: 21 JUNE 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	12	0.0	5.2	77.8	13.0	4.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.891	0.211	0.179	0.130	0.0572	0.0307	2.59	6.9

MATERIAL DESCRIPTION	USCS	AASHTO
● Dark Brown Silty Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI 01SS00701

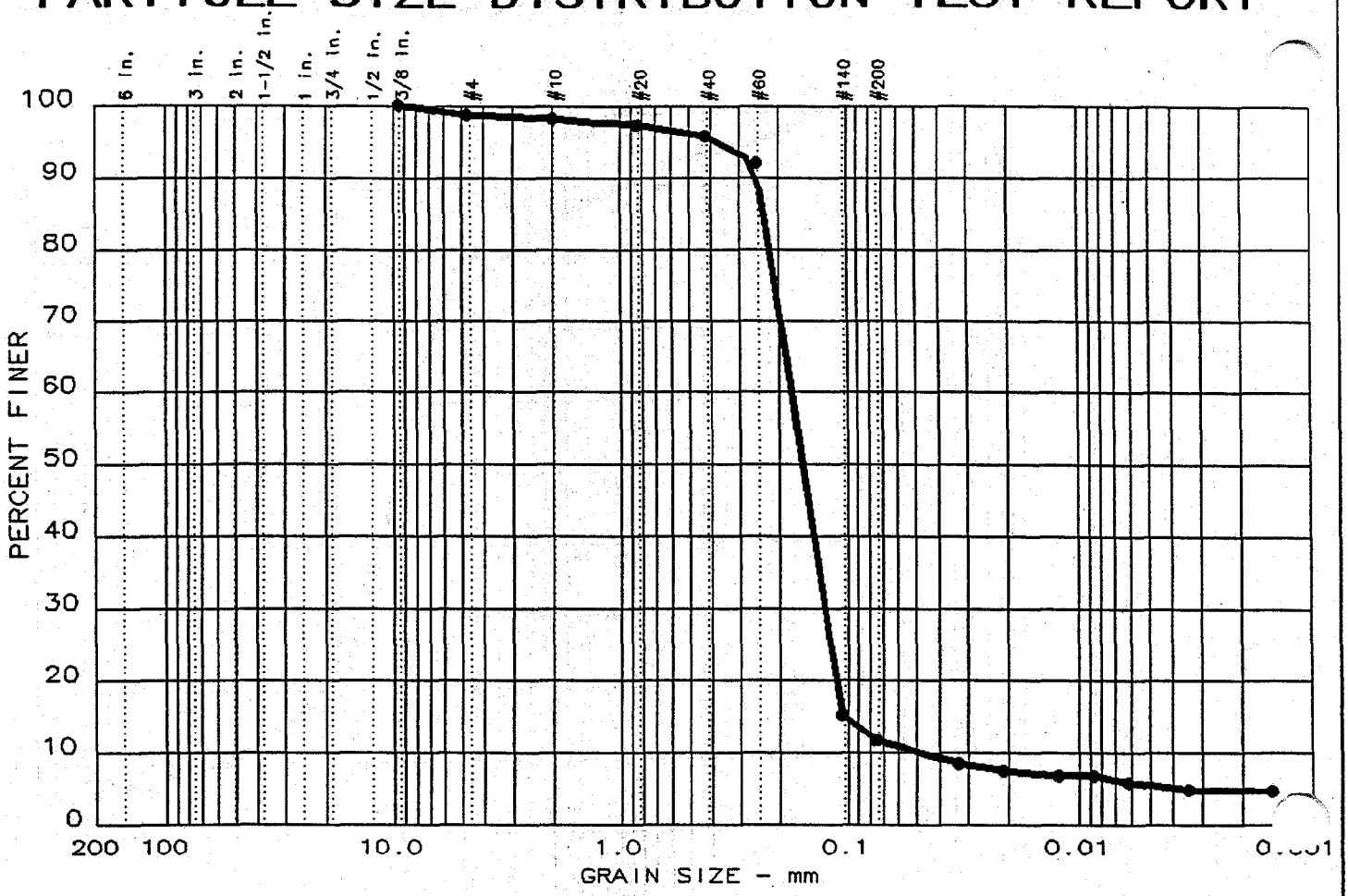
Date: 10 JUNE 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	1.3	87.0	6.1	5.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.231	0.175	0.156	0.125	0.103	0.0469	1.90	3.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Light Brown Poorly Graded Sand with Silt	SP-SM	A-2-4(0.3)

Project No.: 2857
Project: Parris Island
● Location: PAI 01-SS-010-01

Date: 10 JUNE 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

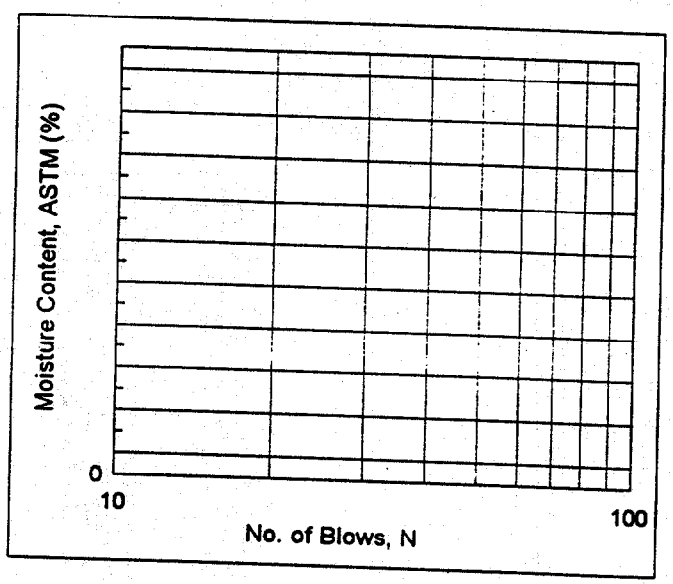
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: PARRIS ISLAND
Project No.: 2857
Sample No. PAI-01-SB-001-36
Description:

Testing Date: 29 JUNE 1998
Tested By: DG
Tracking Code: 7776_AT

Liquid Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
No. of Blows, N		
Correction Factor, K		
Liquid Limit	***NL***	



Liquid Limit:
Plastic Limit:
Plasticity Index: ***NA***

N	k
20	0.974
21	0.979
22	0.985
23	0.990
24	0.995
25	1.000
26	1.005
27	1.009
28	1.014
29	1.018
30	1.022

Plastic Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
Plastic Limit	***NP***	

NL = Nonliquid
NP = Nonplastic

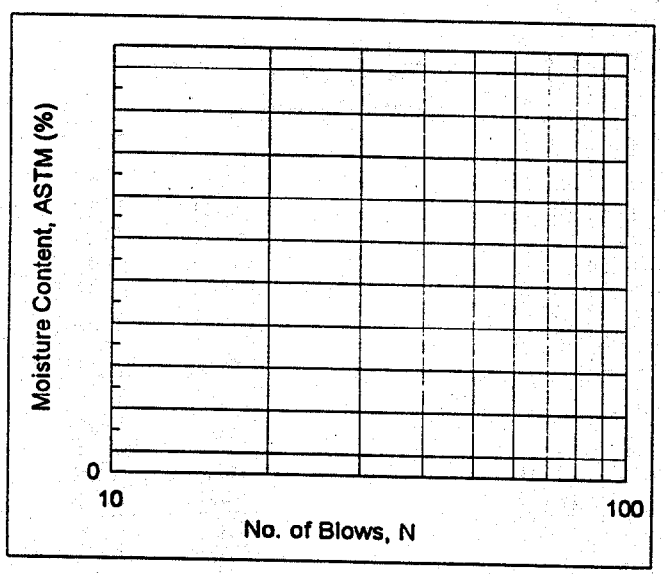
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: PARRIS ISLAND
Project No.: 2857
Sample No. PAI-01-SB-002-36
Description:

Testing Date: 29 JUNE 1998
Tested By: DG
Tracking Code: 7773_AT

Liquid Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
No. of Blows, N		
Correction Factor, K		
Liquid Limit	*NL*	



Liquid Limit:
Plastic Limit:
Plasticity Index: *NA*

N	k
20	0.974
21	0.979
22	0.985
23	0.990
24	0.995
25	1.000
26	1.005
27	1.009
28	1.014
29	1.018
30	1.022

Plastic Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
Plastic Limit	*NP*	

NL = Nonliquid
NP = Nonplastic

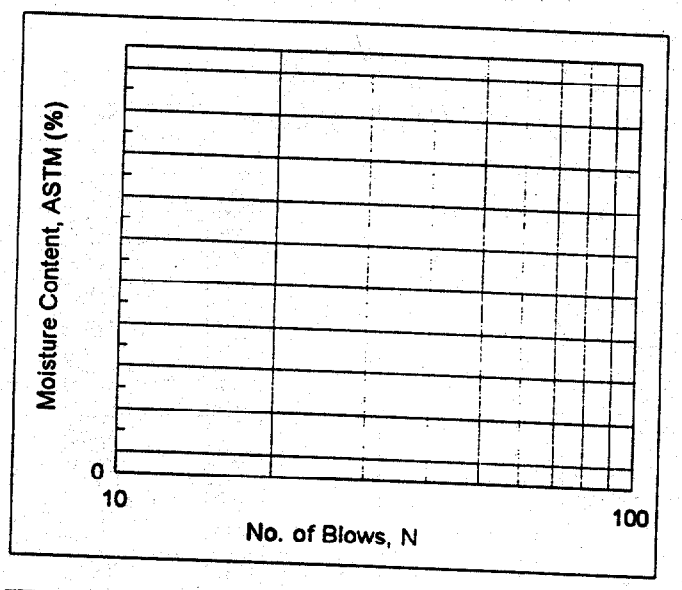
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: PARRIS ISLAND
Project No.: 2857
Sample No. PAI-01-SB-003-36
Description:

Testing Date: 29 JUNE 1998
Tested By: DG
Tracking Code: 7775_AT

Liquid Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
No. of Blows, N		
Correction Factor, K		
Liquid Limit	***NL***	



Liquid Limit:
Plastic Limit:
Plasticity Index: ***NA***

N	k
20	0.974
21	0.979
22	0.985
23	0.990
24	0.995
25	1.000
26	1.005
27	1.009
28	1.014
29	1.018
30	1.022

Plastic Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
Plastic Limit	***NP***	

NL = Nonliquid
NP = Nonplastic

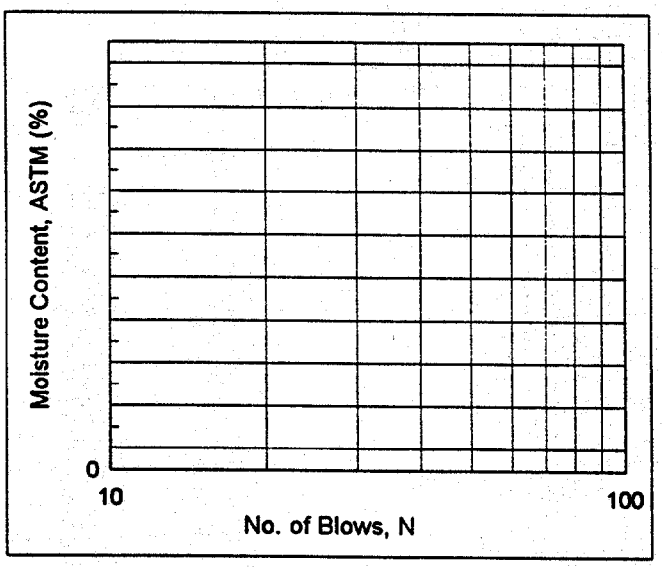
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: PARRIS ISLAND
Project No.: 2857
Sample No. PAI-01-SB-004-38
Description:

Testing Date: 29 JUNE 1998
Tested By: DG
Tracking Code: 7774_AT

Liquid Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
No. of Blows, N		
Correction Factor, K		
Liquid Limit	***NL***	



Liquid Limit:
Plastic Limit:
Plasticity Index: ***NA***

N	k
20	0.974
21	0.979
22	0.985
23	0.990
24	0.995
25	1.000
26	1.005
27	1.009
28	1.014
29	1.018
30	1.022

Plastic Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
Plastic Limit	***NP***	

NL = Nonliquid
NP = Nonplastic

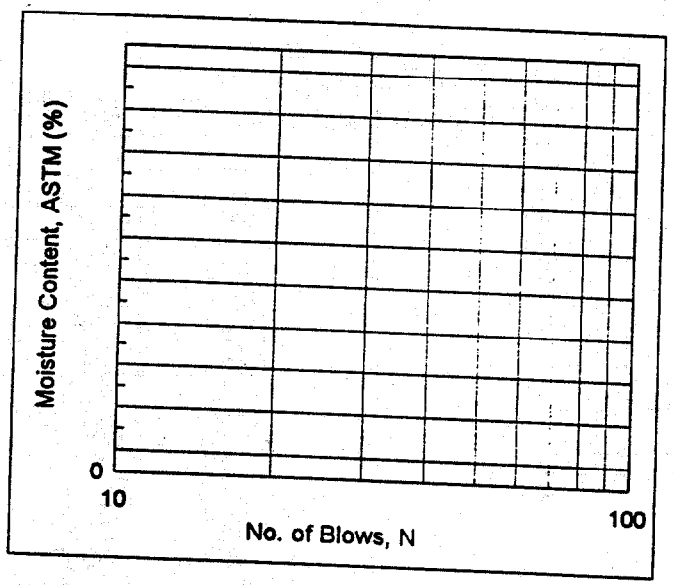
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: PARRIS ISLAND
Project No.: 2857
Sample No. PAI-01-SB-005-36
Description:

Testing Date: 29 JUNE 1998
Tested By: DG
Tracking Code: 7842_AT

Liquid Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
No. of Blows, N		
Correction Factor, K		
Liquid Limit	*NL*	



Liquid Limit:
Plastic Limit:
Plasticity Index: *NA*

N	k
20	0.974
21	0.979
22	0.985
23	0.990
24	0.995
25	1.000
26	1.005
27	1.009
28	1.014
29	1.018
30	1.022

Plastic Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
Plastic Limit	*NP*	

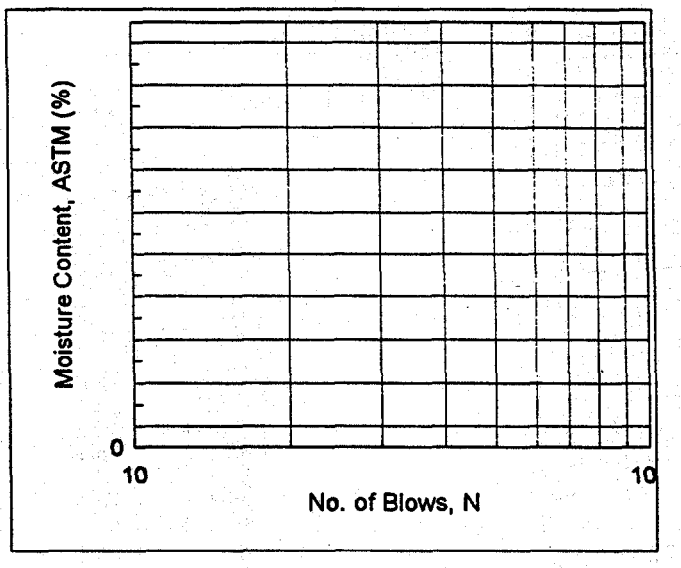
NL = Nonliquid
NP = Nonplastic

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	PARRIS ISLAND	Testing Date:	29 JUNE 1998
Project No.:	2857	Tested By:	DG
Sample No.	PAI-01-SS-010-01	Tracking Code:	7771_AT
Description:			

Liquid Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
No. of Blows, N		
Correction Factor, K		
Liquid Limit	***NL***	



Liquid Limit:
Plastic Limit:
Plasticity Index: ***NA***

N	k
20	0.974
21	0.979
22	0.985
23	0.990
24	0.995
25	1.000
26	1.005
27	1.009
28	1.014
29	1.018
30	1.022

Plastic Limit Determination		
Pan No.		
Pan Weight	g	g
Wet Soil + Pan	g	g
Dry Soil + Pan	g	g
Wt of Dry Soil, Ws	g	g
Wt of Water, Ww	g	g
Moisture Content, ASTM	%	%
Plastic Limit	***NP***	

NL = Nonliquid
NP = Nonplastic

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
TESTING DATE:	15 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7783-GS2

SOLID SPECIFIC GRAVITY			
1. SAMPLE NUMBER	01-SB-002-36	01-SB-001-36	01-SB-003-36
2. FLASK NUMBER	1	1	3
3. TEMPERATURE	22.0 C	22.3 °C	22.5 °C
4. WT. FLASK & WATER	0.00 g	0.00 g	0.00 g
5. WT. WATER, FLASK & SOIL	27.84 g	27.73 g	28.14 g
6. WT OF SOIL	27.84 g	27.73 g	28.14 g
7. CALIBRATION WATER & FLASK	353.6956 g	353.6801 g	352.77 g
8. DEAIRED SAMPLE	371.35 g	371.27 g	370.51 g
9. SPECIFIC GRAVITY	2.73	2.73	2.71
10. CORRECTION FACTOR K	0.9996	0.9995	0.9995
11. Gs @ 20 °C	2.73	2.73	2.70

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
TESTING DATE:	15 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7782-GS2

SOLID SPECIFIC GRAVITY			
1. SAMPLE NUMBER	01-SS-007-01	01-SB-005-36	01-SB-004-38
2. FLASK NUMBER	3	1	3
3. TEMPERATURE	21.5 C	21.9 °C	21.7 °C
4. WT. FLASK & WATER	0.00 g	0.00 g	0.00 g
5. WT. WATER, FLASK & SOIL	30.07 g	27.13 g	24.48 g
6. WT OF SOIL	30.07 g	27.13 g	24.48 g
7. CALIBRATION WATER & FLASK	352.82 g	353.70 g	352.81 g
8. DEAIRED SAMPLE	371.68 g	370.77 g	368.34 g
9. SPECIFIC GRAVITY	2.68	2.70	2.73
10. CORRECTION FACTOR K	0.9997	0.9996	0.9997
11. Gs @ 20 °C	2.68	2.70	2.73

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
TESTING DATE:	15 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7783-GS2

SOLID SPECIFIC GRAVITY			
1. SAMPLE NUMBER	01-SS-010-01		
2. FLASK NUMBER	1		
3. TEMPERATURE	22.0 C	°C	°C
4. WT. FLASK & WATER	0.00 g	g	g
5. WT. WATER, FLASK & SOIL	31.15 g	g	g
6. WT OF SOIL	31.15 g	g	g
7. CALIBRATION WATER & FLASK	353.70 g	g	g
8. DEAIRED SAMPLE	373.42 g	g	g
9. SPECIFIC GRAVITY	2.73		
10. CORRECTION FACTOR K	0.9996		
11. Gs @ 20 °C	2.73		

PERMEABILITY
SUMMARY OF RESULTS

PROJECT:	PARIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7777 PM
SAMPLE No.:	PAI- 01-SB-003-41	EQUIPMENT No.:	4
TEST DATE:	10 JUNE 1998		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	119.1 pcf	120.4 pcf
DRY UNIT WEIGHT	87.2 pcf	91.0 pcf
MOISTURE CONTENT	36.6 %	32.3 %
PERMEABILITY	8.4E-07 cm/sec	

PERMEABILITY

SPECIMEN CONDITIONS

PROJECT:	PARIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7777 PM
SAMPLE No.:	PAI- 01-SB-003-41	EQUIPMENT No.:	4
TEST DATE:	10 JUNE 1998		

MOISTURE CONTENT (Dry Basis)	INITIAL	FINAL
1. MOISTURE TIN NO.	0341	0341
2. WT MOISTURE TIN (tare weight)	0.00 g	208.32 g
3. WT WET SOIL + TARE	745.20 g	930.20 g
4. WT DRY SOIL + TARE	545.50 g	753.82 g
5. WT WATER, Ww	199.70 g	176.38 g
6. WT DRY SOIL, Ws	545.50 g	545.50 g
7. MOISTURE CONTENT, W	36.61 %	32.33 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	DIAMETER		HEIGHT	
ANALYSES	INITIAL	FINAL	INITIAL	FINAL
No. 1	2.81 in.	2.78 in.	3.80 in.	3.83 in.
No. 2	2.83 in.	2.79 in.	3.81 in.	3.65 in.
No. 3	2.83 in.	2.78 in.	3.81 in.	3.78 in.
Average	2.82 in.	2.78 in.	3.81 in.	3.75 in.

SPECIMEN CONDITIONS	INITIAL	FINAL
Specimen WT, Wo	745.20 g	722.00 g
Area, Ao	6.26 in^2	6.08 in^2
Volume, Vo	23.83 in^3	22.84 in^3
Bulk Unit Weight	119.1 pcf	120.4 pcf
Dry Unit Weight	87.2 pcf	91.0 pcf

PERMEABILITY

BACK-PRESSURE SATURATION

PROJECT:	PARIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7777 PM
SAMPLE No.:	PAI- 01-SB-003-41	EQUIPMENT No.:	4
TEST DATE:	10 JUNE 1998		

TEST DATE	TIME (military)	TESTED BY	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
			CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
6/10/98	9 : 31	MC	7.0	5.0	*				
6/10/98	10 : 13	MC	17.0	15.0	16.1	*	10.0	0.0	0.00
6/10/98	10 : 49	MC	27.0	25.0	26.3	24.3	10.0	8.2	0.82
6/10/98	11 : 34	MC	37.0	35.0	36.2	35.4	10.0	9.1	0.91
6/10/98	12 : 10	MC	47.0	45.0	46.3	45.6	10.0	9.4	0.94
6/10/98	12 : 40	MC	57.0	55.0	*	55.9	10.0	9.6	0.96
6/10/98	12 : 42	MC	47.0	45.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY

SPECIMEN CONSOLIDATION

PROJECT:	PARIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7777 PM
SAMPLE No.:	PAI- 01-SB-003-41	EQUIPMENT No.:	4
TEST DATE:	10 JUNE 1998		

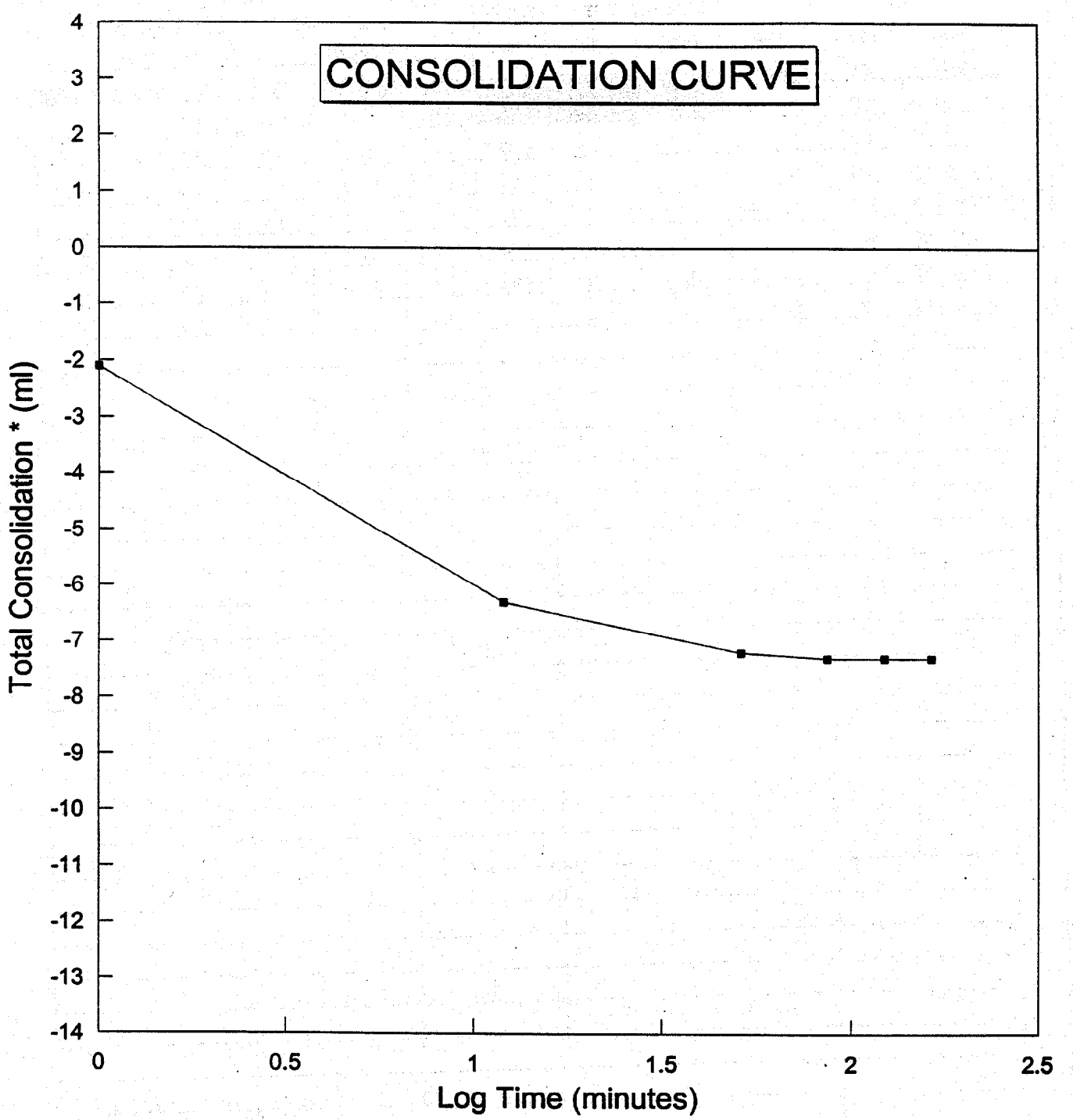
CELL PRESSURE: 55 psi BACK PRESSURE: 45 psi EFFECTIVE STRESS: 10 psi

TEST DATE	TESTED BY	TIME (Military)	ELAPSED TIME (minutes)	TOTAL TIME (minutes)	TOTAL TIME (Log)	SPECIMEN CONSOLIDATION (ml) READING CELL	BOTTOM	TOP	ACTUAL CELL (Cc)	TOTAL (Ct)
6 /10 /98	MC	12 : 51				0.0	25.0	25.0	0.0	0.0
6 /10 /98	MC	12 : 52	1	1	0.00	1.8	24.0	23.9	1.8	2.1
6 /10 /98	MC	13 : 3	11	12	1.08	6.0	21.9	21.8	6.0	6.3
6 /10 /98	MC	13 : 42	39	51	1.71	7.0	21.4	21.4	7.0	7.2
6 /10 /98	MC	14 : 17	35	86	1.93	7.2	21.4	21.3	7.2	7.3
6 /10 /98	MC	14 : 53	36	122	2.09	7.3	21.4	21.3	7.3	7.3
6 /10 /98	MC	15 : 34	41	163	2.21	7.5	21.4	21.3	7.5	7.3

PERMEABILITY

CONSOLIDATION CURVE

PROJECT:	PARIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7777_PM
SAMPLE No.:	PAI- 01-SB-003-41	EQUIPMENT No.:	4
TEST DATE:	10 JUNE 1998		



* Negative values denote consolidation

PERMEABILITY

TEST DATA

PROJECT:	PARIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7777 PM
SAMPLE No.:	PAI- 01-SB-003-41	EQUIPMENT No.:	4
TEST DATE:	10 JUNE 1998		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT	CELL	INFLUENT	EFFLUENT
6 /10 /98	MC	15 : 47		0.0	25.0	55.0	45.0	45.0
6 /10 /98	MC	17 : 23	96	0.6	24.4	55.0	45.0	45.0
6 /10 /98	MC	18 : 35	72	1.0	24.0	55.0	45.0	45.0
6 /11 /98	MC	8 : 8	813	4.4	20.7	55.0	45.0	45.0
6 /11 /98	MC	8 : 35	RESET	0.0	25.0	55.0	46.0	44.0
6 /11 /98	MC	8 : 51	16	0.5	24.5	55.0	46.0	44.0
6 /11 /98	MC	9 : 11	20	1.0	24.0	55.0	46.0	44.0

PERMEABILITY

TEST DATA (continued)

PROJECT:	PARIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7777 PM
SAMPLE No.:	PAI- 01-SB-003-41	EQUIPMENT No.:	4
TEST DATE:	10 JUNE 1998		

ELAPSED TIME (minutes)	HYDRAULIC HEAD DIFFERENCE (cm)		EFFLUENT - INFLUENT RATIO	HYDRAULIC GRADIENT (cm/cm)	HYDRAULIC CONDUCTIVITY (cm/sec)
	INFLUENT	EFFLUENT			
RESET				2.586	
96	0.6	0.6	1.00	2.461	1.02E-06
72	0.4	0.4	1.00	2.379	9.47E-07
813	3.4	3.3	0.97	1.686	8.45E-07
RESET				17.135	
16	0.5	0.5	1.00	17.032	7.55E-07
20	0.5	0.5	1.00	16.928	6.08E-07

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 01-SB-001-36
TESTING DATE:	5 JUNE 1998
TESTED BY:	JCV
TRACKING CODE:	7776_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.01 g	21.01 g	21.01 g
3. WT OF MOLD + SOIL	438.85 g	439.38 g	438.59 g
4. WT OF WET SOIL, W	417.84 g	418.37 g	417.58 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	126.7 pcf	126.8 pcf	126.6 pcf
9. BULK SPECIFIC GRAVITY	2.0	2.0	2.0

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI- 01SB-002-36
TESTING DATE:	5 JUNE 1998
TESTED BY:	JCV
TRACKING CODE:	7773 UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	20.96 g	20.96 g	20.96 g
3. WT OF MOLD + SOIL	418.25 g	424.20 g	423.43 g
4. WT OF WET SOIL, W	397.29 g	403.24 g	402.47 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	120.4 pcf	122.2 pcf	122.0 pcf
9. BULK SPECIFIC GRAVITY	1.9	2.0	2.0

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 01-SB-003-36
TESTING DATE:	5 JUNE 1998
TESTED BY:	JCV
TRACKING CODE:	7775 UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.00 g	21.00 g	21.00 g
3. WT OF MOLD + SOIL	425.79 g	427.78 g	428.21 g
4. WT OF WET SOIL, W	404.79 g	406.78 g	407.21 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	122.7 pcf	123.3 pcf	123.4 pcf
9. BULK SPECIFIC GRAVITY	2.0	2.0	2.0

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 01-SB-004-38
TESTING DATE:	5 JUNE 1998
TESTED BY:	JCV
TRACKING CODE:	7774_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.00 g	21.00 g	21.00 g
3. WT OF MOLD + SOIL	428.35 g	427.57 g	425.59 g
4. WT OF WET SOIL, W	407.35 g	406.57 g	404.59 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	123.5 pcf	123.3 pcf	122.7 pcf
9. BULK SPECIFIC GRAVITY	2.0	2.0	2.0

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 01-SB-005-36
TESTING DATE:	5 JUNE 1998
TESTED BY:	JCV
TRACKING CODE:	7768_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.01 g	21.01 g	21.01 g
3. WT OF MOLD + SOIL	444.10 g	444.55 g	446.50 g
4. WT OF WET SOIL, W	423.09 g	423.54 g	425.49 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	128.3 pcf	128.4 pcf	129.0 pcf
9. BULK SPECIFIC GRAVITY	2.1	2.1	2.1

UNIT WEIGHT DETERMINATION
DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-002 @ 4-6 Ft.
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8022 UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.04 g	21.04 g	21.04 g
3. WT OF MOLD + SOIL	288.83 g	288.21 g	286.51 g
4. WT OF WET SOIL, W	267.79 g	267.17 g	265.47 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	81.2 pcf	81.0 pcf	80.5 pcf
9. BULK SPECIFIC GRAVITY	1.3	1.3	1.3

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-003 @ 4-6 Ft.
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8018_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	20.98 g	20.98 g	20.98 g
3. WT OF MOLD + SOIL	327.25 g	326.67 g	329.61 g
4. WT OF WET SOIL, W	306.27 g	305.69 g	308.63 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	92.8 pcf	92.7 pcf	93.6 pcf
9. BULK SPECIFIC GRAVITY	1.5	1.5	1.5

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-005 @ 4-6 Ft.
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8020 UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.05 g	21.05 g	21.05 g
3. WT OF MOLD + SOIL	320.93 g	319.90 g	319.21 g
4. WT OF WET SOIL, W	299.88 g	298.85 g	298.16 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	90.9 pcf	90.6 pcf	90.4 pcf
9. BULK SPECIFIC GRAVITY	1.5	1.5	1.4

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 01SD 00101
TESTING DATE:	22 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7783_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.02 g	21.02 g	21.02 g
3. WT OF MOLD + SOIL	410.95 g	412.27 g	407.58 g
4. WT OF WET SOIL, W	389.93 g	391.25 g	386.56 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	118.2 pcf	118.6 pcf	117.2 pcf
9. BULK SPECIFIC GRAVITY	1.9	1.9	1.9

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 01SD 00201
TESTING DATE:	22 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7784_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.02 g	21.02 g	21.02 g
3. WT OF MOLD + SOIL	353.46 g	351.15 g	351.44 g
4. WT OF WET SOIL, W	332.44 g	330.13 g	330.42 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	100.8 pcf	100.1 pcf	100.2 pcf
9. BULK SPECIFIC GRAVITY	1.6	1.6	1.6

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SD-002-02
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8021_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.05 g	21.05 g	21.05 g
3. WT OF MOLD + SOIL	353.31 g	352.18 g	353.59 g
4. WT OF WET SOIL, W	332.26 g	331.13 g	332.54 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	100.7 pcf	100.4 pcf	100.8 pcf
9. BULK SPECIFIC GRAVITY	1.6	1.6	1.6

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 01SD 00301
TESTING DATE:	22 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7786_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	20.98 g	20.98 g	20.98 g
3. WT OF MOLD + SOIL	330.05 g	329.44 g	330.13 g
4. WT OF WET SOIL, W	309.07 g	308.46 g	309.15 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	93.7 pcf	93.5 pcf	93.7 pcf
9. BULK SPECIFIC GRAVITY	1.5	1.5	1.5

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 01-SS-007-01
TESTING DATE:	5 JUNE 1998
TESTED BY:	JCV
TRACKING CODE:	7772_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.00 g	21.00 g	21.00 g
3. WT OF MOLD + SOIL	265.87 g	268.10 g	266.62 g
4. WT OF WET SOIL, W	244.87 g	247.10 g	245.62 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	74.2 pcf	74.9 pcf	74.5 pcf
9. BULK SPECIFIC GRAVITY	1.2	1.2	1.2

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI -01SS-010-01
TESTING DATE:	5 JUNE 1998
TESTED BY:	JCV
TRACKING CODE:	7771_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.00 g	21.00 g	21.00 g
3. WT OF MOLD + SOIL	318.01 g	316.59 g	316.47 g
4. WT OF WET SOIL, W	297.01 g	295.59 g	295.47 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	90.0 pcf	89.6 pcf	89.6 pcf
9. BULK SPECIFIC GRAVITY	1.4	1.4	1.4

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-001-36
TESTING DATE:	5 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7776_MC

MOISTURE CONTENT (Dry & Wet Basis)			
1. MOISTURE TIN NO.	A	B	C
2. WT MOISTURE TIN (tare weight)	1.28 g	1.28 g	1.28 g
3. WT WET SOIL + TARE	24.68 g	22.44 g	22.28 g
4. WT DRY SOIL + TARE	20.59 g	18.64 g	17.74 g
5. WT WATER, Ww	4.09 g	3.80 g	4.54 g
6. WT DRY SOIL, Ws	19.31 g	17.36 g	16.46 g
7. ASTM MOISTURE CONTENT, W	21.18 %	21.89 %	27.58 %
8. EPA MOISTURE CONTENT, W	17.48 %	17.96 %	21.62 %

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-002-36
TESTING DATE:	5 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7773_MC

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.27	g	1.28	g	1.27	g
3. WT WET SOIL + TARE	24.36	g	23.29	g	26.55	g
4. WT DRY SOIL + TARE	20.96	g	19.74	g	23.07	g
5. WT WATER, Ww	3.40	g	3.55	g	3.48	g
6. WT DRY SOIL, Ws	19.69	g	18.46	g	21.80	g
7. ASTM MOISTURE CONTENT, W	17.27	%	19.23	%	15.96	%
8. EPA MOISTURE CONTENT, W	14.72	%	16.13	%	13.77	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-003-36
TESTING DATE:	5 JUNE 1998
TESTED BY:	MC
TRACKING CODE:	7775_MC

MOISTURE CONTENT (Dry & Wet Basis)			
1. MOISTURE TIN NO.	A	B	C
2. WT MOISTURE TIN (tare weight)	1.27 g	1.25 g	1.26 g
3. WT WET SOIL + TARE	30.15 g	25.86 g	22.20 g
4. WT DRY SOIL + TARE	24.37 g	20.80 g	18.33 g
5. WT WATER, Ww	5.78 g	5.06 g	3.87 g
6. WT DRY SOIL, Ws	23.10 g	19.55 g	17.07 g
7. ASTM MOISTURE CONTENT, W	25.02 %	25.88 %	22.67 %
8. EPA MOISTURE CONTENT, W	20.01 %	20.56 %	18.48 %

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-004-38
TESTING DATE:	5 JUNE 1998
TESTED BY:	MC
TRACKING CODE:	7774_MC

MOISTURE CONTENT (Dry & Wet Basis)			
1. MOISTURE TIN NO.	A	B	C
2. WT MOISTURE TIN (tare weight)	1.27 g	1.29 g	1.28 g
3. WT WET SOIL + TARE	27.82 g	25.62 g	24.94 g
4. WT DRY SOIL + TARE	23.92 g	21.90 g	21.30 g
5. WT WATER, Ww	3.90 g	3.72 g	3.64 g
6. WT DRY SOIL, Ws	22.65 g	20.61 g	20.02 g
7. ASTM MOISTURE CONTENT, W	17.22 %	18.05 %	18.18 %
8. EPA MOISTURE CONTENT, W	14.69 %	15.29 %	15.38 %

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-005-36
TESTING DATE:	5 JUNE 1998
TESTED BY:	MC
TRACKING CODE:	7768_MC

MOISTURE CONTENT (Dry & Wet Basis)			
1. MOISTURE TIN NO.	A	B	C
2. WT MOISTURE TIN (tare weight)	1.25 g	1.25 g	1.27 g
3. WT WET SOIL + TARE	28.37 g	24.39 g	29.42 g
4. WT DRY SOIL + TARE	23.94 g	20.59 g	24.55 g
5. WT WATER, Ww	4.43 g	3.80 g	4.87 g
6. WT DRY SOIL, Ws	22.69 g	19.34 g	23.28 g
7. ASTM MOISTURE CONTENT, W	19.52 %	19.65 %	20.92 %
8. EPA MOISTURE CONTENT, W	16.33 %	16.42 %	17.30 %

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-002
TESTING DATE:	22 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8022 MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	240.33	g
3. WT WET SOIL + TARE	395.71	g
4. WT DRY SOIL + TARE	297.06	g
5. WT WATER, Ww	98.65	g
6. WT DRY SOIL, Ws	56.73	g
7. ASTM MOISTURE CONTENT, W	173.89	%
8. EPA MOISTURE CONTENT, W	63.49	%

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-003
TESTING DATE:	22 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8018_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	206.67	g
3. WT WET SOIL + TARE	353.85	g
4. WT DRY SOIL + TARE	283.81	g
5. WT WATER, Ww	70.04	g
6. WT DRY SOIL, Ws	77.14	g
7. ASTM MOISTURE CONTENT, W	90.80	%
8. EPA MOISTURE CONTENT, W	47.59	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SB-005
TESTING DATE:	22 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8020_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	209.96	g
3. WT WET SOIL + TARE	354.55	g
4. WT DRY SOIL + TARE	283.52	g
5. WT WATER, Ww	71.03	g
6. WT DRY SOIL, Ws	73.56	g
7. ASTM MOISTURE CONTENT, W	96.56	%
8. EPA MOISTURE CONTENT, W	49.13	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SD-002-02
TESTING DATE:	22 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8021_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.		A
2. WT MOISTURE TIN (tare weight)	194.12	g
3. WT WET SOIL + TARE	357.70	g
4. WT DRY SOIL + TARE	295.51	g
5. WT WATER, Ww	62.19	g
6. WT DRY SOIL, Ws	101.39	g
7. ASTM MOISTURE CONTENT, W	61.34	%
8. EPA MOISTURE CONTENT, W	38.02	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-01-SS-010-01
TESTING DATE:	5 JUNE 1998
TESTED BY:	DG
TRACKING CODE:	7771_MC

MOISTURE CONTENT (Dry & Wet Basis)			
1. MOISTURE TIN NO.	A	B	C
2. WT MOISTURE TIN (tare weight)	1.27 g	1.26 g	1.26 g
3. WT WET SOIL + TARE	22.28 g	23.62 g	26.40 g
4. WT DRY SOIL + TARE	21.29 g	22.67 g	25.29 g
5. WT WATER, Ww	0.99 g	0.95 g	1.11 g
6. WT DRY SOIL, Ws	20.02 g	21.41 g	24.03 g
7. ASTM MOISTURE CONTENT, W	4.95 %	4.44 %	4.62 %
8. EPA MOISTURE CONTENT, W	4.71 %	4.25 %	4.42 %

A-6

SUBSURFACE SOIL SAMPLE LOG SHEETS

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SB-02-04
Sample Location: PAI-01-SB02
Sampled By: GG
C.O.C. No.: 2269

[ ] Surface Soil
[X] 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: 7/24/98 Time: 1430 Method: SPT Spoon Monitor Reading (ppm): 0	4-6	Blk-Gray	Silty F/med Sand w/wood Frag. wet

COMPOSITE SAMPLE DATA:

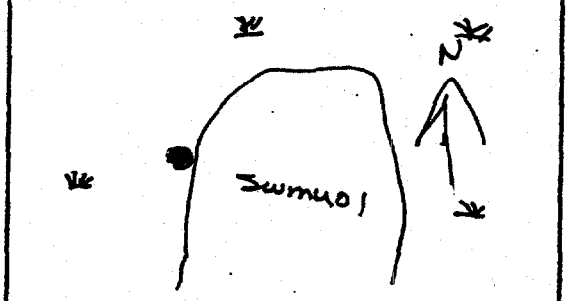
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL VOCs~~	~~5 ENCORE SAMPLES~~		
~~TCL SVOCs~~	~~16 oz~~		
~~TAL METALS (TOTAL)~~	~~16 oz~~		
~~TCL PESTICIDES / PCBs~~	~~16 oz~~		
TOC	16 oz	✓	
pH	~~16 oz~~		
~~GEOTECH~~			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7394

Sample ID No.: PAI-01-SB-02
Sample Location: PAI-01-SB02
Sampled By: MD JSP
C.O.C. No.: 2293

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

Type of Sample:
[redacted]
[ ] High Concentration
Geotechnical

GRAB SAMPLE DATA:

Date: 09/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1253	4'-6'	dark gray	silty clay, saturated
Method: Grab (Hand Auger)			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

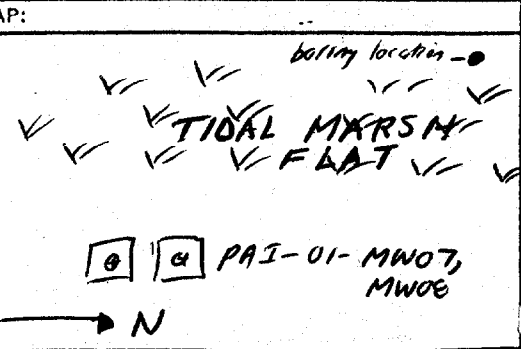
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
Natural Moisture Content, Grain Size, Bulk Density	(1) Quart Size baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Scott Pelayton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SB-03-04
Sample Location: PAI-01-SB03
Sampled By: GG
C.O.C. No.: 2269

[ ] Surface Soil
[X] 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: 7/24/98 Time: 1350 Method: SPT. Spoon Monitor Reading (ppm): 0	4-6	BLK	Silt F Sand w/wood wet Frag.

COMPOSITE SAMPLE DATA:

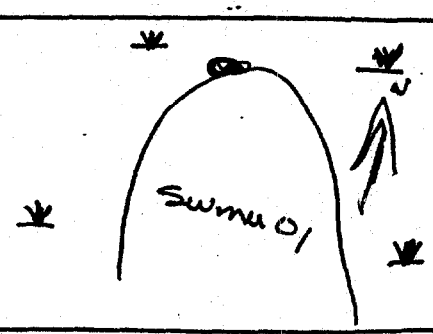
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL VOCs~~	~~5 EnCore Samples~~		
~~TCL SVOCs~~	~~16 oz~~		
~~TAL Metals (Total)~~	~~16 oz~~		
~~TCL Pesticides/PCBs~~	~~16 oz~~		
TOC	16 oz		
PH	~~16 oz~~ > 1		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7394

Sample ID No.: PAI-01-SB 03
Sample Location: PAI-01-SB03
Sampled By: MD
C.O.C. No.: 2293

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

Type of Sample:
[redacted]
[ ] High Concentration
Geotechnical

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 09/14/98 Time: 1259 Method: Grab (Hand Auger) Monitor Reading (ppm): —	4'-6'	dark gray	silty clay, saturated

COMPOSITE SAMPLE DATA:

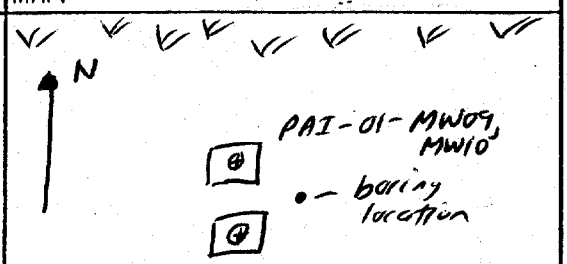
	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
Natural Moisture Content, Grain Size, Bulk Density	(1) Quart size baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7394

Sample ID No.: PAI-01-SB-05-04
Sample Location: PAI-01-SB05
Sampled By: SP / MD
C.O.C. No.: 2293

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

Type of Sample:
[redacted]
[ ] High Concentration
Geotechnical

GRAB SAMPLE DATA:

Date: 091498	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1230	4' - 6'	dark gray	silty clay, saturated
Method: Grab (Hand Auger)			
Monitor Reading (ppm): –			

COMPOSITE SAMPLE DATA:

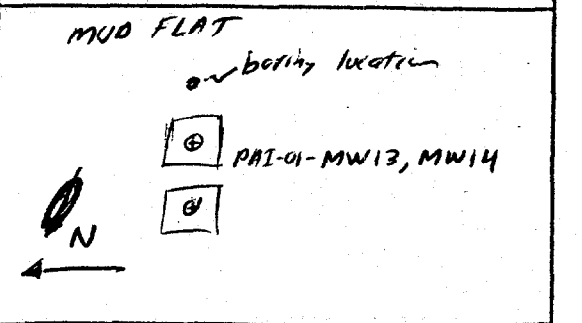
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
Natural Moisture Content, Grain Size, Bulk Density	(1) Quart-size baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Seth Palmer, MD

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SB-0504
Sample Location: PAI-01-SB05
Sampled By: GG
C.O.C. No.: 2269

[] Surface Soil
[X] 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: 7/24/98 Time: 1330 Method: SPT Spoon Monitor Reading (ppm): 0	4-6	BLK	Clay & Clayey F Sand

COMPOSITE SAMPLE DATA:

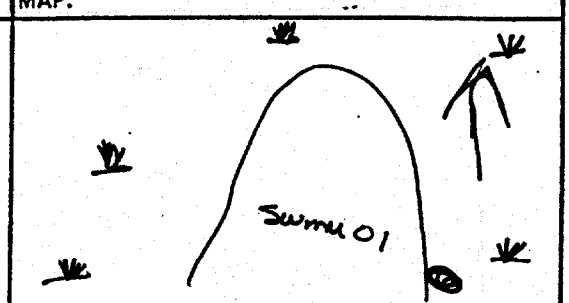
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL VOCs~~	~~5 EnCore Samples~~		
~~TCL SVOCs~~	~~16 oz~~		
~~TAL Metals (Total)~~	~~16 oz~~		
~~TCL Pesticides / PCBs~~	~~16 oz~~		
TOC	~~16 oz~~	✓	
pH	16 oz		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

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SURFACE WATER SAMPLE LOG SHEETS

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: ~~PAI01SW001~~ PAI-01-SW-01-00
Sample Location: Parris Is.
Sampled By: RLM/JFL
C.O.C. No.: 01309

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

SAMPLING DATA:

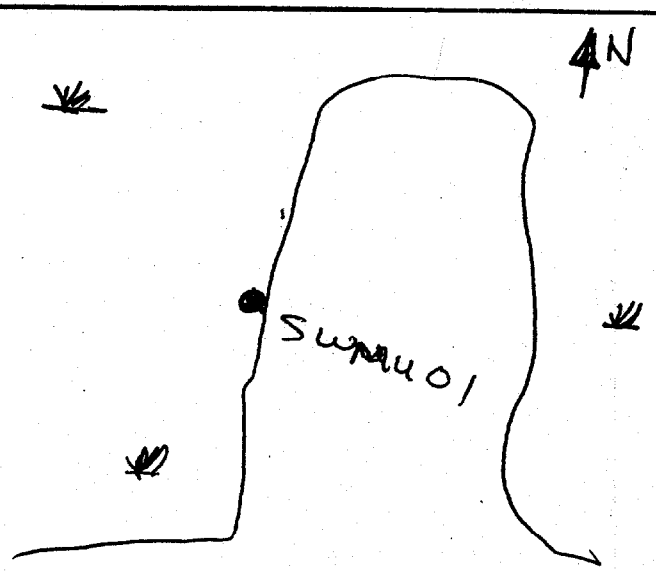
Date: 06/16/98	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Time:								
Depth: —		7.47	39.5	33.4	>999	4.71	2.54	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
Hex Chromium		1000 plastic	1
TOC	H_2SO_4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD PAI01SWA01

Duplicate ID No.: PAI01SW001D PAI-01-SW-01-00D

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: ~~PAI01SW002~~ PAI-01-SW-02-00
Sample Location: Parris Is. GC
Sampled By: EJH / RLM
C.O.C. No.: 02253

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

SAMPLING DATA:

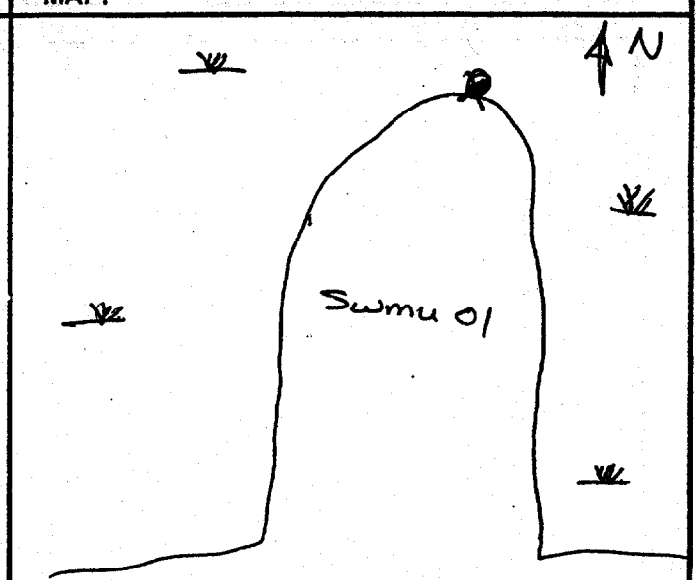
Date: 062698 / Time: 1200 / Depth: — / Method: Grab	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	Clr.	7.55	41.2	30.7	0	4.80	2.66	—

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H_2SO_4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.: PAI01SW00201D

Signature(s): BM Eldy J Harrison

PAI-01-SW-02-00D GW

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI-01-SW-03-00
Sample Location: SWMU-01
Sampled By: RLM / FW
C.O.C. No.: 00249

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

SAMPLING DATA:

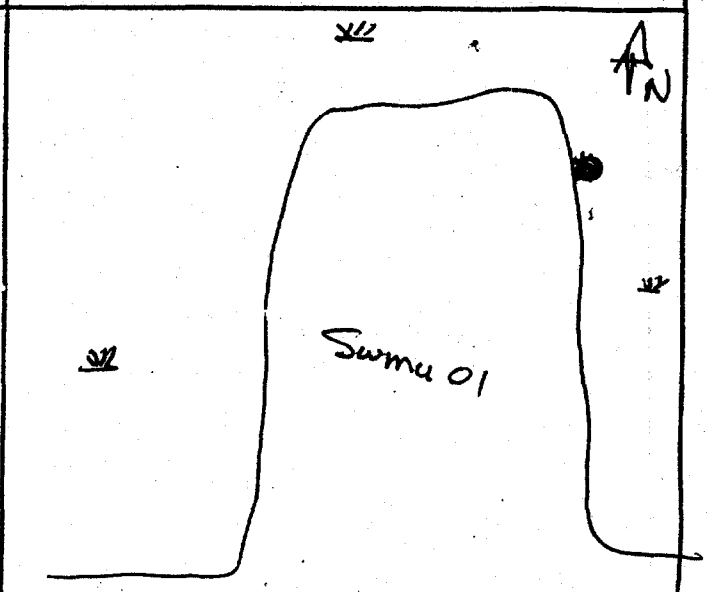
	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 5-17-98								
Time: 1425								
Depth: SW	clear	6.84	39.2	30.7	2	6.27	2.57	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (mL)	Collected
VOCs	HCL	40	3
SVOCs		1000	2
Pest./PCBs		1000	2
Total Metals, Hardness	HNO_3	1000	1
Dissolved (Filtered) Metals	HNO_3	1000	1
Cyanide	NAOH	250	1
Hex Chromium		~~1000~~	
TOC	H_2SO_4	1000	1
pH		1000	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI-01-SW-04-00
Sample Location: SWMU-01
Sampled By: RLM / FW
C.O.C. No.: 00249

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

SAMPLING DATA:

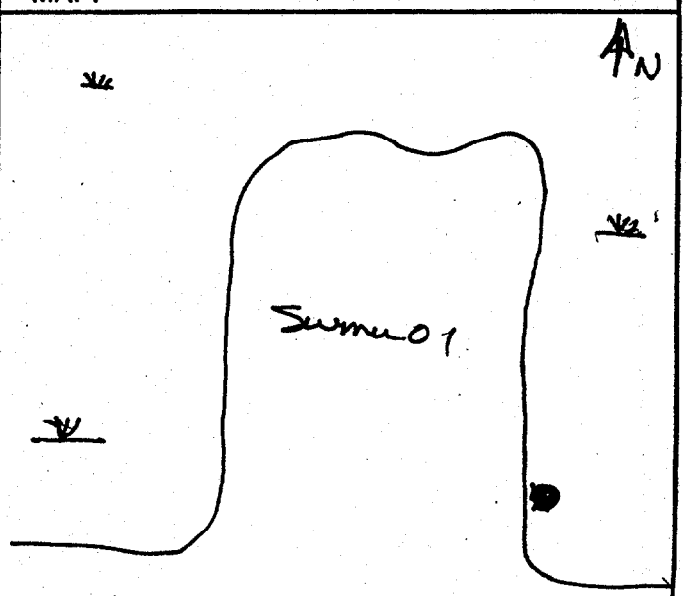
	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Date: 5-17-98								
Time: 14-15								
Depth: SW	Clear	5.92	39.2	31.1	15	6.28	2.48	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
VOCs	HCL	3x 40ml	
SVOCs		2x 1L amber	
Pest./PCBs		2x 1L amber	
Total Metals + Hardness	HNO_3	1L plastic	
Dissolved (Filtered) Metals	HNO_3	1L plastic	
Cyanide	NAOH	250ml plastic	
Hex Chromium			
TOC	H_2SO_4	1L plastic	
PH		1L plastic	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI-01-SW-05-00
Sample Location: PINCKNEY IS.
Sampled By: RLM / JFL
C.O.C. No.: 01306

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

SAMPLING DATA:

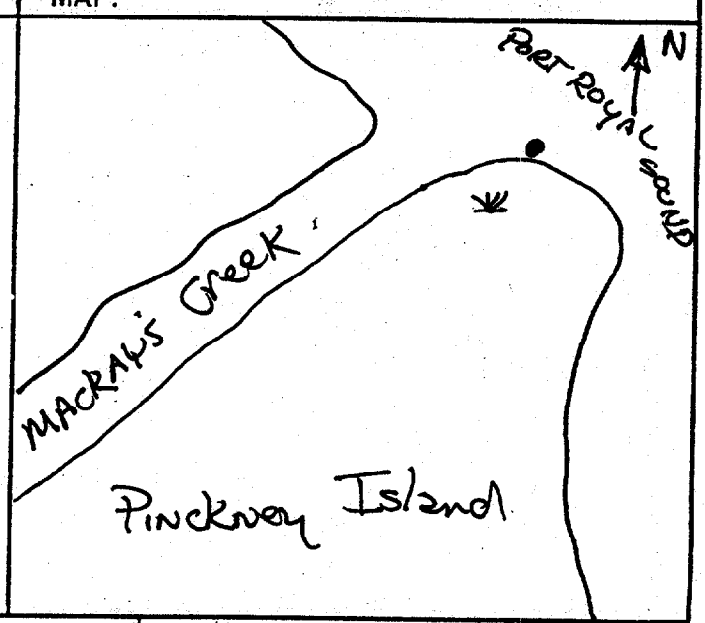
	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 052798								
Time: 1240								
Depth:								
Method: Grab		7.7	39	28	8	10.3	2.5	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H_2SO_4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI-01 – SW06
Sample Location: Pinckney Is.
Sampled By: RCM/JFL
C.O.C. No.: 01306

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

SAMPLING DATA:

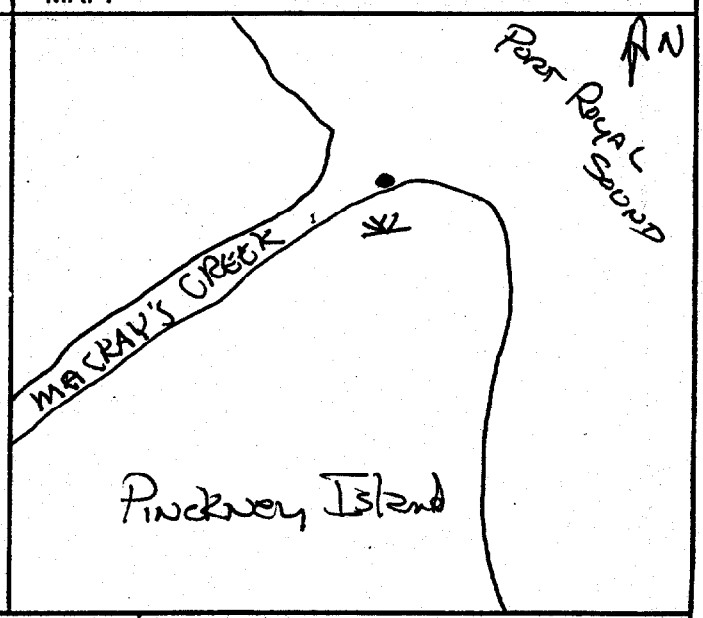
Date: 052798	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1330	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth:								
Method: Grab		7.7	38	29	36	9.1	2.5	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NaOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H2SO4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SW07-00
Sample Location: Pinckney Is. 66
Sampled By: RLM/JFL
C.O.C. No.: 01364

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

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

SAMPLING DATA:

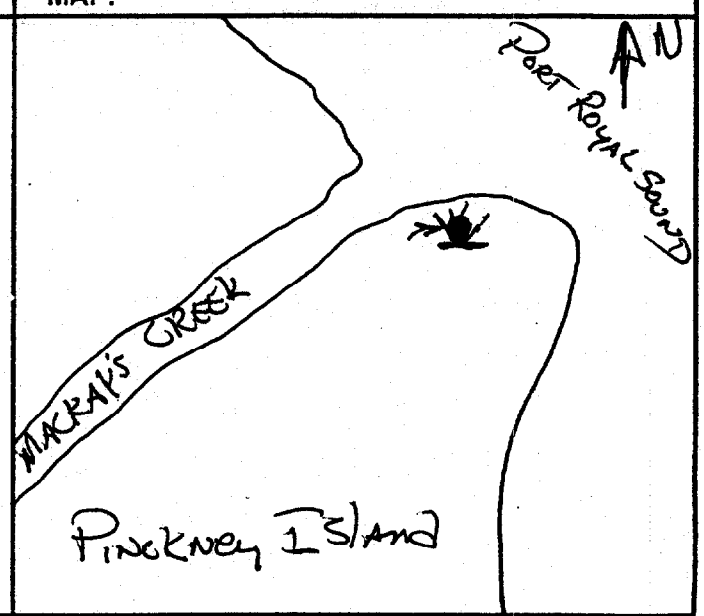
Date: / Time:	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: / Method: Grab		6.8	38.0	31	18	11.4	24	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H2SO4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SW-09-[illegible]
Sample Location: SWMU-01 [illegible]
Sampled By: RLM / FW
C.O.C. No.: 60249

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

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

SAMPLING DATA:

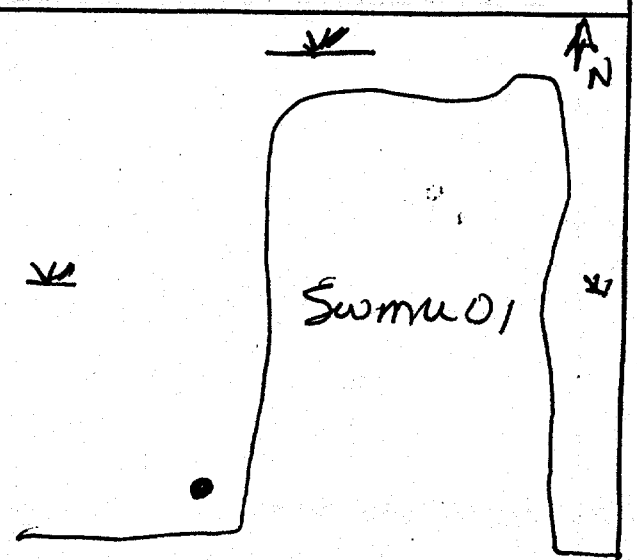
	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 3-17-98								
Time: 1500								
Depth:								
Method: Grab		7.43	37.8	29.8	0	7.10	2.37	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 Amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
Hex Chromium			
TOC	H2SO4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI-01-SW-10-02 ~~PAI01SW010~~
Sample Location: Parris Is.
Sampled By: RLM / EJH
C.O.C. No.: 01304

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

SAMPLING DATA:

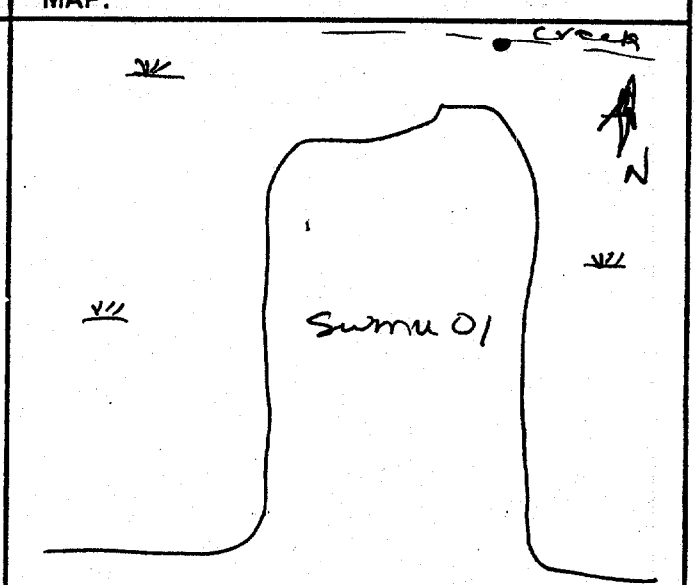
	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 062498								
Time: 1130								
Depth: —		7.09	36.7	31.8	886	4.90	2.29	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H2SO4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

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SURFACE WATER SAMPLE LOG SHEET

PAI-01-SW-01-00

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: ~~PAI01SW01~~
Sample Location: Parris Is.
Sampled By: RLM / EJH
C.O.C. No.: 2253

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: – TIDAL STREAM
[] 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: 06298								
Time: 1430								
Depth: —		7.40	43.1	33.8	81	8.49	2.83	—
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
PEST./PCBs		1000 Amber	2
Total Metals	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
Hex Chromium		1000 plastic	1
TOC	H2SO4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Emily J. Harrison

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: ~~PAI01SW012~~ PAI-01-SW-012-00
Sample Location: Parris Is.
Sampled By: RLM / EJH
C.O.C. No.: 01364

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

SAMPLING DATA:

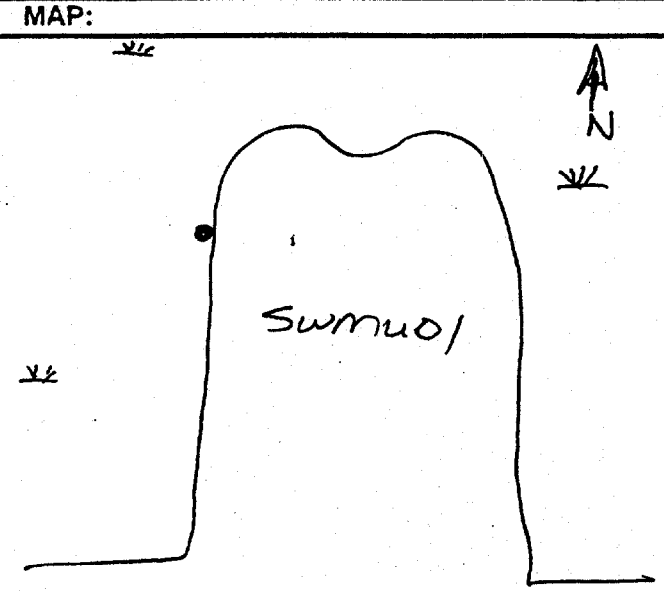
	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 062498								
Time: 1115								
Depth: —		6.27	36.5	29.7	10	4.32	2.32	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (mL)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NaOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H_2SO_4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): RLM, EJH

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SEDIMENT SAMPLE LOG SHEETS

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: NCRD PARRIS Island
Project No.: 7394

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

Sample ID No.: PAI-01-SD-001
Sample Location: PAI-01-SD-01
Sampled By: GG
C.O.C. No.: 00241

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

GRAB SAMPLE DATA:

Date: 4/21/99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 11:45	0-0.5	Blk	Silty Clay w/organics (Reeds) -WET
Method: Grab			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

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

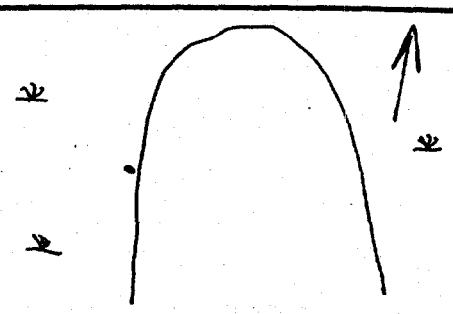
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	3 ENCORE	✓	
TCL SVOCs & PAH, TAL Metals (TOTAL) + Cyanide, TCL Pest/PCB	1-16 oz	✓	
TOC PH			

OBSERVATIONS / NOTES:

Collected Sample in Marsh Sed.
≈ 6 Feet From Ash/Refuse pile
Refuse - bottles, metal, wood, brick
- No Ash/Refuse in sample

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Gary L Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-01-SD-02-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI01SD00201
Sample Location: Parris Is.
Sampled By: RGG/JFL
C.O.C. No.: 00270

[] 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: 061898 Time: 1040 Method: Grab Monitor Reading (ppm):	0-0.5'	Dk. br.	fn.-med sd. moist

COMPOSITE SAMPLE DATA:

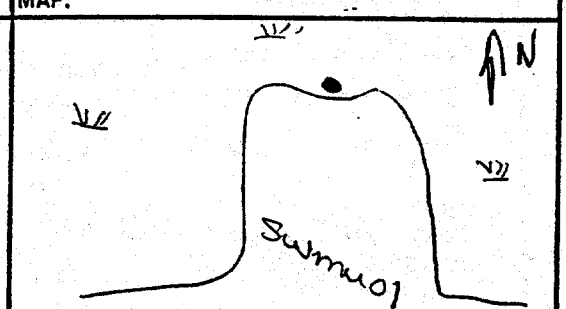
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1/6 oz	✓	
TAL METALS (TOTAL)	1/6 oz	✓	
CYANIDE	1/6 oz	✓	
TCL PESTICIDES / PCBs	1/6 oz	✓	
TOC	1/6 oz	✓	
pH	1/6 oz	✓	
~~HEXAVALENT CHROMIUM~~	~~1/6 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

[redacted] SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7394

Sample ID No.: PAL-01-SD-002-02
Sample Location: PAI-01-SD02
Sampled By: SP
C.O.C. No.: 2294 / 2293

[redacted]
[] 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: 09/1/98 Time: 1315 Method: grab Monitor Reading (ppm): —	0.5' - 1.0'	dark gray	~~dark~~ silty clay, saturated, root mat SP 9/1/98

COMPOSITE SAMPLE DATA:

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

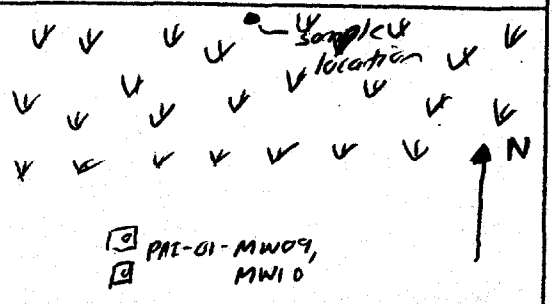
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	(5) ENCORE SAMPLES	✓	
TCL SVOC.A / PEST. / PCBs	[redacted] (1) 8 oz	✓	
TAL METALS (TOTAL) / CN	[redacted] (1) 8 oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
TOC / pH	[redacted] (1) 4oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
Grain Size, Bulk Density	(1) Quart Size baggie	✓	

OBSERVATIONS / NOTES:

Could not find originally-staked location. Chose sample location based on map and vicinity to monitoring wells MW09 and MW10.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Seth Pelosso

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: ~~PAI01SD00301~~ PAI-01-SD-03-01
Sample Location: Parris Is.
Sampled By: GG/JFL
C.O.C. No.: 06270

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 061098 Time: Method: Grab Monitor Reading (ppm):	0-0.5'	Blk	fn.-med silty sand, moist to wet

COMPOSITE SAMPLE DATA:

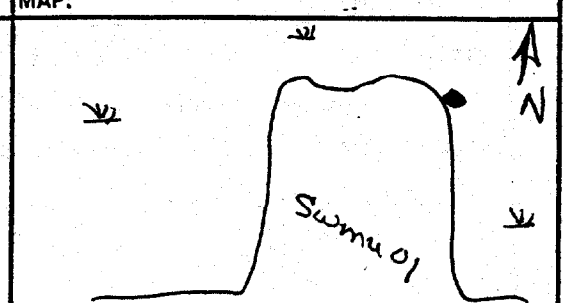
Date: ~~06/09~~	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1 oz	✓	
TAL METALS (TOTAL)	1 oz	✓	
CYANIDE	1 oz	✓	
TCL PESTICIDES / PCBs	1 oz	✓	
TOC	1 oz	✓	
pH	1 oz	✓	
~~HEXAVALENT CHROMIUM~~	~~1 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
PAI01SDA01	PAI01SD00301D

Signature(s):

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SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: ~~PAI015000401~~ PAI-01-SD-04-01
Sample Location: Parris Is.
Sampled By: GG/JFL
C.O.C. No.: 00270

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 06/10/98 Time: 1107 Method: Grab Monitor Reading (ppm):	0-0.5'	Dk. Br.	fn.-med. sd. moist

COMPOSITE SAMPLE DATA:

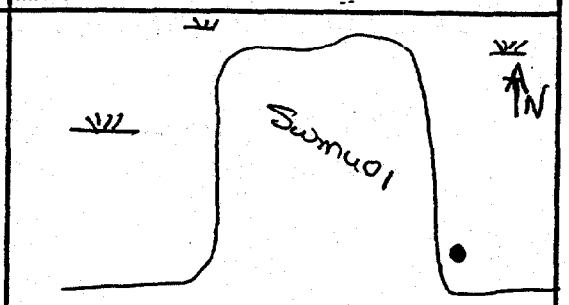
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1/6 oz	✓	
TAL METALS (TOTAL)	1/6 oz	✓	
CYANIDE	1/6 oz	✓	
TCL PESTICIDES / PCBs	1/6 oz	✓	
TOC	1/6 oz	✓	
pH	1/6 oz	✓	
~~HEXAVALENT CHROMIUM~~	~~1/6 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: ~~PAI 01 SD 05~~ PAI-01-SD-05-0
Sample Location: Pinckney Is.
Sampled By: RLM / JH
C.O.C. No.: 01307

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 052798 Time: 1240 Method: Grab Monitor Reading (ppm):	0-6"	lt. br. - blk.	fw. - med. gr. sd.

COMPOSITE SAMPLE DATA:

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

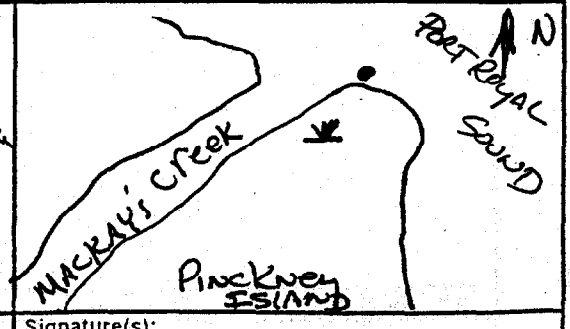
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16oz	✓	
TAL METALS (TOTAL)	16oz	✓	
CYANIDE	16oz	✓	
TCL PESTICIDES / PCBs	16oz	✓	
TOC	16oz	✓	
pH	16oz	✓	
~~HEXAVALENT CHROMIUM~~	~~16oz~~		

OBSERVATIONS / NOTES:

Sample Area Chosen by Diane Duncan of SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAE-01-SD-06-01 ~~PAE 01 SD06~~
Sample Location: Pinckney Is. C.C.
Sampled By: RLM/JFL
C.O.C. No.: 01307

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

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1330	0-6"	Hbr.-blk.	fn.-med. gr. sd.
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

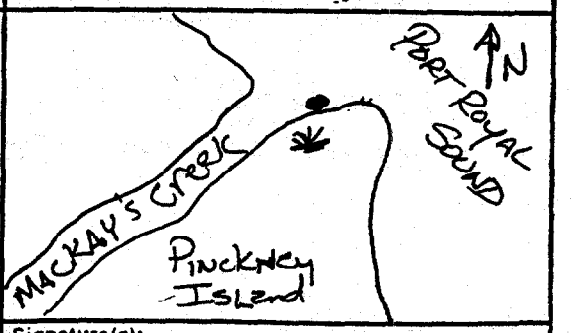
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE Samples	✓	
TCL SVOCs	1 oz	✓	
TAL METALS (TOTAL)	1 oz	✓	
CYANIDE	1 oz	✓	
TCL PESTICIDES / PCBs	1 oz	✓	
TOC	1 oz	✓	
pH	1 oz	✓	
~~HEXAVALENT CHROMIUM~~	~~1 oz~~		

OBSERVATIONS / NOTES:

Sample Area Chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-01-SD-07-0

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI01SD07
Sample Location: PINCKNEY ISLA. X6
Sampled By: RLM/JCL
C.O.C. No.: 01307

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 052798 Time: 1400 Method: Grab Monitor Reading (ppm):	0-6"	br.-blk.	fn.-med. gr. sd.

COMPOSITE SAMPLE DATA:

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

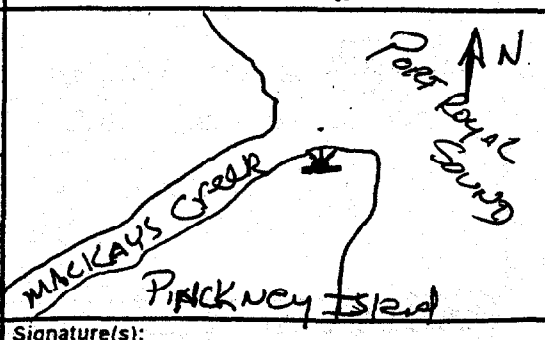
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1/602	✓	
TAL METALS (TOTAL)	1/602	✓	
CYANIDE	1/602	✓	
TCL PESTICIDES / PCBs	1/602	✓	
TOC	1/602	✓	
pH	1/602	✓	
~~HEXAVALENT CHROMIUM~~	~~1/602~~		

OBSERVATIONS / NOTES:

Sample Area Chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-116

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAI-01-SD-09-01
Sample Location: PAI-01-SD-09
Sampled By: GG/JL
C.O.C. No.: 00270

- [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: 6/10/98 Time: 1547 Method: GRAB Monitor Reading (ppm): —	0-0.5	dk. brn	Fine - med Sand wet.

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 VOCs	5-Encores	✓	
TCL SVOCs	1-16 oz	✓	
TAL Metals (TOT)			
Cyanide			
TCL Pest/PCBs			
TOC			
pH			

OBSERVATIONS / NOTES:

Original log lost. Redone 10/20/99

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Dunlee Gaffey

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SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAIE01-SD010-01
Sample Location: Parris Is.
Sampled By: 66/JFL
C.O.C. No.: 00270

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 061098 Time: 0948 Method: Grab Monitor Reading (ppm):	0-0.5'	dk. blk	Clay w/Tr. F Sand ~~fn-med. sd~~, moist. to wet at 8 inches

COMPOSITE SAMPLE DATA:

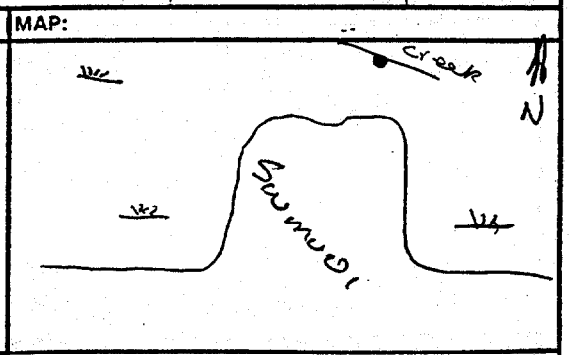
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1 16oz	✓	
TAL METALS (TOTAL)	1 16oz	✓	
CYANIDE	1 16oz	✓	
TCL PESTICIDES / PCBs	1 16oz	✓	
TOC	1 16oz	✓	
pH	1 16oz	✓	
~~HEXAVALENT CHROMIUM~~	~~1 16oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

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SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI-01-SD-11-01 ~~PAI01SD0110~~
Sample Location: Parris Is.
Sampled By: GG/JFL
C.O.C. No.: 00270

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 061098 Time: Method: Grab Monitor Reading (ppm):	0-0.5'	Blk	Sl F Sand wet @ 8"

COMPOSITE SAMPLE DATA:

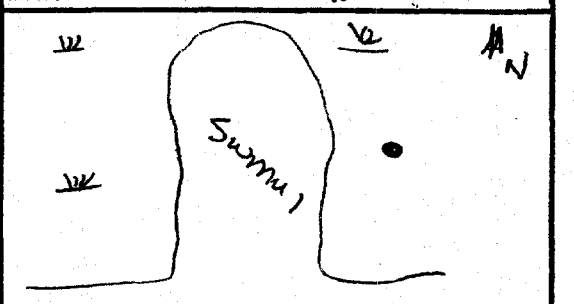
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16oz	✓	
TAL METALS (TOTAL)	16oz	✓	
CYANIDE	16oz	✓	
TCL PESTICIDES / PCBs	16oz	✓	
TOC	16oz	✓	
pH	16oz	✓	
~~HEXAVALENT CHROMIUM~~	~~16oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI-01-SD-12-01 ~~PAI01SD0126~~
Sample Location: Parris Is. GC
Sampled By: 66 / JFL
C.O.C. No.: 00270

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 061098 Time: 1015 Method: Grab Monitor Reading (ppm):	0-0.5'	dk. br.	fn.-med. sd. moist

COMPOSITE SAMPLE DATA:

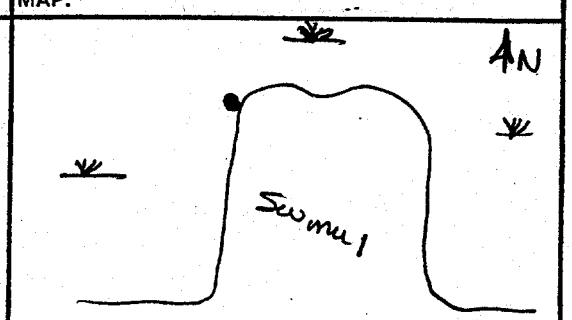
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1 16oz	✓	
TAL METALS (TOTAL)	1 16oz	✓	
CYANIDE	1 16oz	✓	
TCL PESTICIDES / PCBs	1 16oz	✓	
TOC	1 16oz	✓	
pH	1 16oz	✓	
~~HEXAVALENT CHROMIUM~~	~~1 16oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-120

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAI-01-SD-013
Sample Location: PAI-01-SD13
Sampled By: GG, BH
C.O.C. No.: 00241

- [ ] 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: 4/21/99 Time: 07:58 Method: Grab Monitor Reading (ppm):	0-0.5	Blk	Silty Clay - wet reed mat

COMPOSITE SAMPLE DATA:

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

SAMPLE COLLECTION INFORMATION:

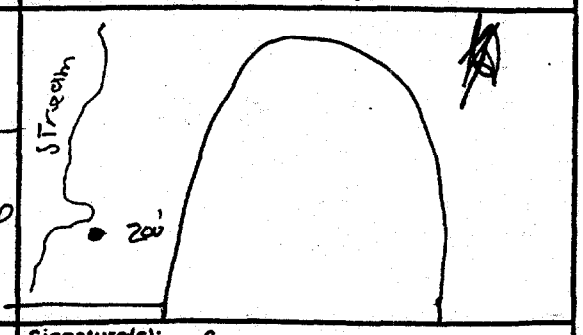
Analysis	Container Requirements	Collected	Other
PAHs, Pest (TCL), TAL Metals	1 - 16 oz	✓	

OBSERVATIONS / NOTES:

NO ASH/Refuse encountered
checked @:
50' Blk silty Clay
100' Same
150' Same
200' Same

Small Tidal Streams ≈ 1.5 ft deep at 70' & 120'

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
	PAI-01-SD-013D

Signature(s): BH

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAI-01-SD-014
Sample Location: PAI-01-SD14
Sampled By: GG
C.O.C. No.: 00241

[ ] 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: 4/21/99 Time: 0815 Method: Grab Monitor Reading (ppm): —	0-0.5FT	Blk	Silty Clay w/ Root mat Wet

COMPOSITE SAMPLE DATA:

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

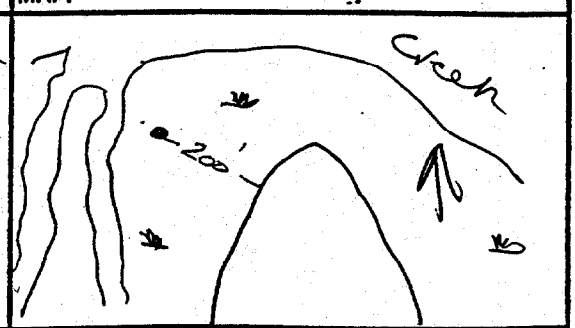
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs, TCL Pest, TAL metals	1 - 16 oz	✓	

OBSERVATIONS / NOTES:

No Garbage/ash observed to 1.5FT
@
50' Blk Si CL w/ Reed & Roots
100' Same
150' Same
200' Same

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Gary Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAI-01-SD-015
Sample Location: PAI-01-SD-015
Sampled By: GG
C.O.C. No.: 00241

[ ] 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: 4/21/99 Time: 0838 Method: Grab Monitor Reading (ppm): —	0-0.5	BLK	Silty Clay - Root mat (Reed)

COMPOSITE SAMPLE DATA:

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

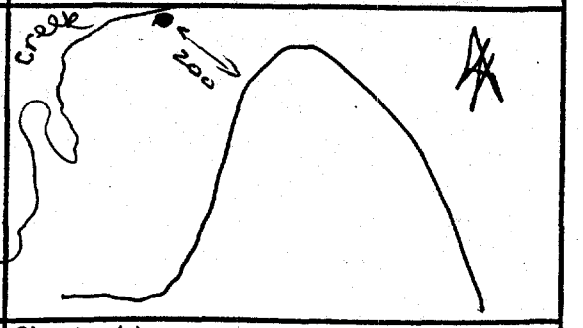
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs, Pest (TCL) TAL Metals	1-16oz	✓	

OBSERVATIONS / NOTES:

No Refuse/ash, sed check to 1.5 FT
at
50' BK Si CL Roots
100' same
150' same
200' same.

MAP:



Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s):

A-123

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAF-01-SD-016
Sample Location: PAF-01-SD16
Sampled By: GG
C.O.C. No.: 00241

- [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: 4/21/99 Time: 0855 Method: Grab Monitor Reading (ppm): —	0-0.5 FT	Blk	Slightly Sandy Silty Clay wet

COMPOSITE SAMPLE DATA:

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

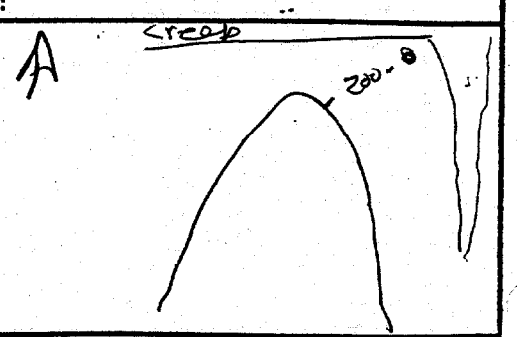
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH, TCL Pest, TAL Metals	1-16 oz	✓	

OBSERVATIONS / NOTES:

No Refuse ash at 50 FT, was ash/debris <50. No ash/Garbage to 1.5 FT depth.
50' Blk Sl. Sandy Si Cl
100' same
150' same
200' same

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): G Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAF-01-SD-017
Sample Location: PAF-01-SD17
Sampled By: GG
C.O.C. No.: 00241

- [ ] 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: 4/21/99	0-0.5 FT	Blk	Silty Clay, Root mat Wet
Time: 10:35			
Method: Grab			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

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

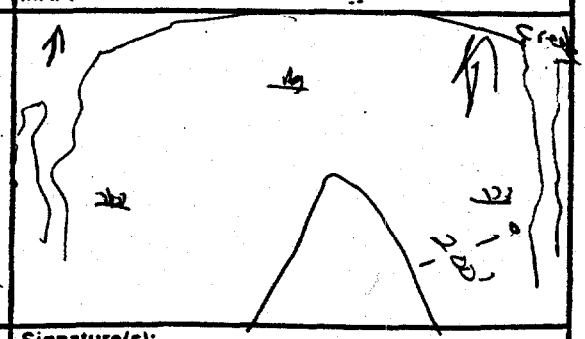
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH, TCL Pest, TAL Metals	1 - 16 oz	✓	

OBSERVATIONS / NOTES:

No Debris @ 1.5 FT depth
50' - Blk Silty F Sand (wood debris - treated poles, construction debris on surface)
100' Same w/ construction debris, Glass on surface
150: Same w/ construction debris, Glass on surface
200' Blk Silty clay - no debris on surface

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): D Hunter

A-125

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SOIL SAMPLE LOG SHEETS

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SS-21-01 ~~PAI01SS00101~~
Sample Location: Pinckney Is.
Sampled By: RLM/JFL
C.O.C. No.: 00263

- [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: 060198 Time: 1015 Method: Grab Monitor Reading (ppm): —	0-1'	H.br.	fn.-med. sd., dry

COMPOSITE SAMPLE DATA:

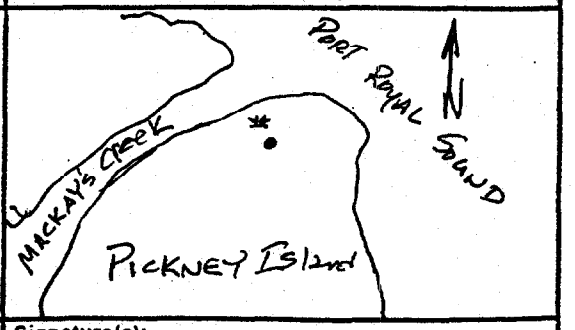
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SS-02-01 ~~PAI01SS00201~~
Sample Location: ~~Pe~~ Pinckney Isr
Sampled By: RLM/JFL
C.O.C. No.: 00263

[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: 060198 Time: 1030 Method: Gmb Monitor Reading (ppm): —	0-1'	H.br.	fn.-med. sd. dry

COMPOSITE SAMPLE DATA:

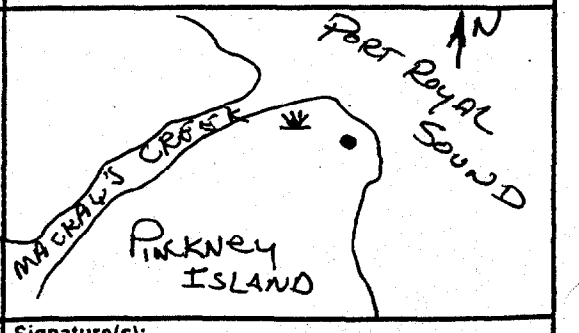
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBs	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-127

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SS-23-01 PAI-01SS00301
Sample Location: Pinckney Is.
Sampled By: RLM/LHL
C.O.C. No.: 00263

- [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: 060198 Time: 1055 Method: Grab Monitor Reading (ppm): —	0-1'	H. br.	fv.-med. sd. dry

COMPOSITE SAMPLE DATA:

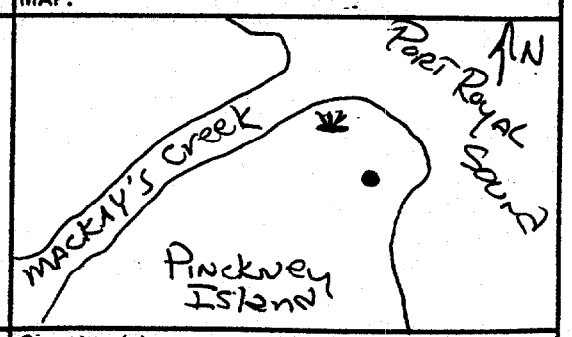
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-41-SS-04-D1
Sample Location: Parris Is.
Sampled By: RLM/JFL
C.O.C. No.: 00263

[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: 060198 Time: 1538 Method: Grab Monitor Reading (ppm):	0-1'	lt. br.	fa.-med. Sd.-dry.

COMPOSITE SAMPLE DATA:

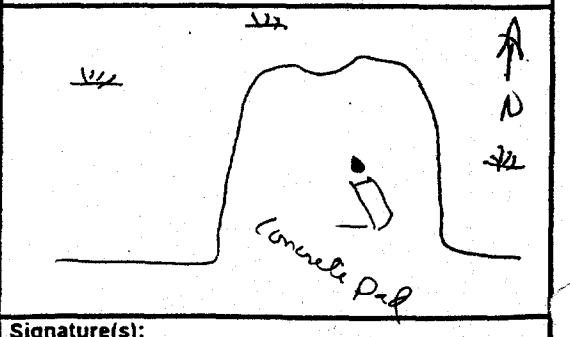
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SS-05-01 ~~PAI01SS00501~~
Sample Location: Parris Is.
Sampled By: RLM / JFL
C.O.C. No.: 00267

[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: 060398 Time: 1022 Method: Grab Monitor Reading (ppm): —	0-1'	dkbr.-br.	fn.-med. sd; dry

COMPOSITE SAMPLE DATA:

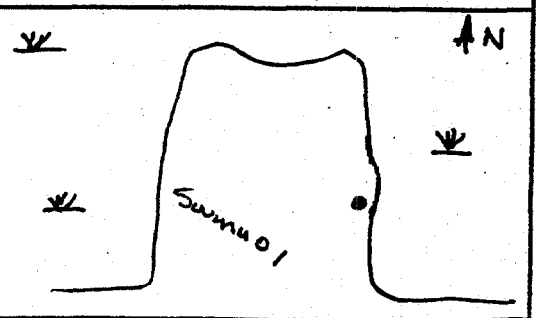
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBs	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-130

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-01-SS-06-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI01SS0060T
Sample Location: PACOS Is.
Sampled By: RLM/JFL
C.O.C. No.: 00267

[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: 060398 Time: 1045 Method: Grab Monitor Reading (ppm):	0-1'	dk. br.	fn.-med gr. sd, moist.

COMPOSITE SAMPLE DATA:

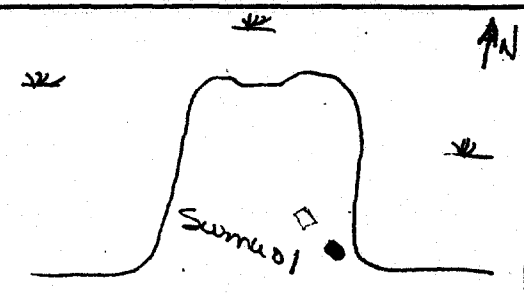
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAE-01-SS-01-01 ~~PAE01SS00701~~
Sample Location: Parris Is.
Sampled By: GG/JFL
C.O.C. No.: 00265

[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: 060298 Time: 1238 Method: Grab Monitor Reading (ppm):	0-1'	H.br.-br.	fn.-med. sd., dry

COMPOSITE SAMPLE DATA:

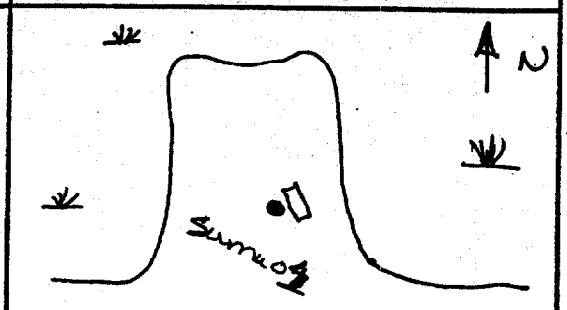
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
TOC	16 oz	✓	
pH	16 oz	✓	
~~HEXAVALENT CHROMIUM~~	16 oz		
GEOTECH	1 - QUART BAG	✓	
- POROSITY, GRAIN SIZE, BULK DENSITY, SP. GR.			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-132

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-01-SS-00-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: ~~PAI01SS00801~~
Sample Location: Parris Is.
Sampled By: GG/JFL
C.O.C. No.: 0265

[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: 060298 Time: 1113 Method: Grab Monitor Reading (ppm): —	0-1'	lt-br-br.	fn.-med. sd, dry

COMPOSITE SAMPLE DATA:

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

SAMPLE COLLECTION INFORMATION:

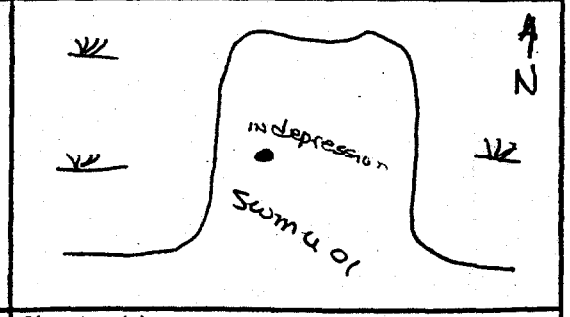
Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
HEXAVALENT CHROMIUM	16 oz	✓	

OBSERVATIONS / NOTES:

Trash debris encountered ~ 1'

Glass & Tin Cans.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-01-SS-01-01 PAI01SS00901
Sample Location: Parris Is.
Sampled By: GG/JFL
C.O.C. No.: 0265

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

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

GRAB SAMPLE DATA:

Date: 060298	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1138	0-1'	lt.br. - br	fn.-med. sd. dry
Method: Grab			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

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

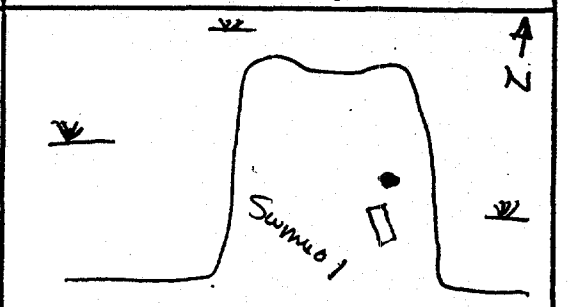
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
HEXAVALENT CHROMIUM	16 oz	✓	

OBSERVATIONS / NOTES:

Trash Debris encountered ~ 1'

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: ~~PAEOISS0001~~ PA-01-SS-0001
Sample Location: Parris Is.
Sampled By: GG WFL
C.O.C. No.: 0265

[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: 060298	0 – 1'	lt. br. - br.	fn. - med. sd. dry
Time: 1120			
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

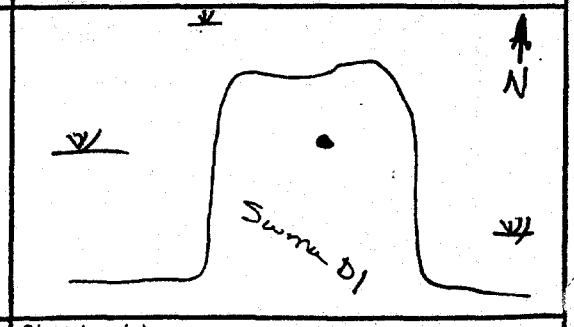
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE Samples	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
TOC	16 oz	✓	
pH	16 oz	✓	
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		
– GEOTECH			
– Nat. Moist., Grain Size, ATTERBERG,	1 Quart	✓	
Porosity, Bulk Dens., Sp. Gr.	Bag		

OBSERVATIONS / NOTES:

Trash debris encountered ~ 1'

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-135

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI-DI-SS-11-01 PAI01SS0101
Sample Location: Parris Is.
Sampled By: GG / JFL
C.O.C. No.: 00265

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 060298 Time: 1657 Method: Grab Monitor Reading (ppm): —	0-1'	lt. br.-br.	fn.-med sd., dry-moist

COMPOSITE SAMPLE DATA:

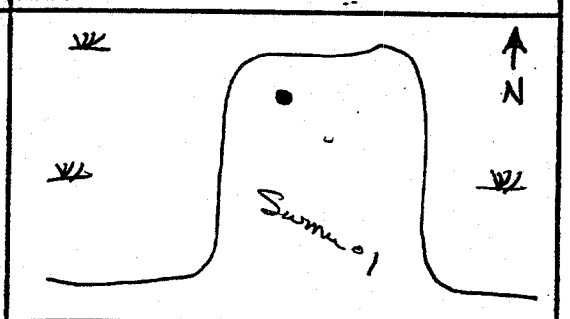
	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBs	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
HEXAVALENT CHROMIUM	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): JFL GG

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SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAF-01-SS-12-01 ~~PAF01SS01201~~
Sample Location: Parris Is.
Sampled By: ~~RG~~ GG/JFL
C.O.C. No.: 00265

[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: 060298	0-1'	lt. br.-br.	fn.-med. sd. moist.
Time: 1112			
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

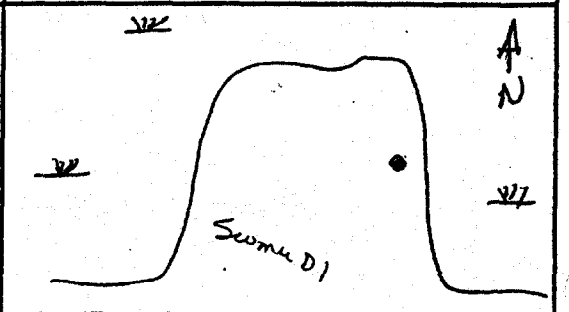
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBs	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-01-SS-13-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: ~~PAI01SS01301~~ 66
Sample Location: Parris Is.
Sampled By: 66/JFL
C.O.C. No.: 00265

[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: 66 02 98 Time: 1700 Method: 6mb Monitor Reading (ppm): —	0-1'	lt.br.-br.	fn.-med. sd. moist

COMPOSITE SAMPLE DATA:

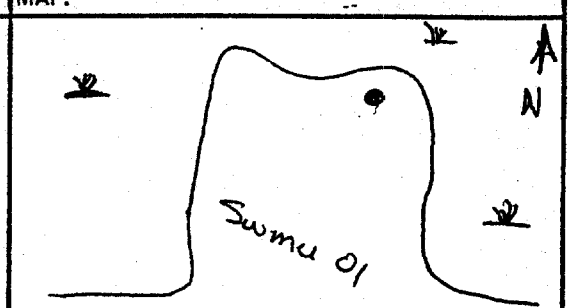
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-138

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: ~~PAI01SS01401~~ PAI-01-SS-14-01
Sample Location: Parris Is.
Sampled By: GG/JFL
C.O.C. No.: 00265

[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: 060298 Time: 1240 Method: Grab Monitor Reading (ppm):	0-1'	lt.br.-br.	fn.-med. sd., moist

COMPOSITE SAMPLE DATA:

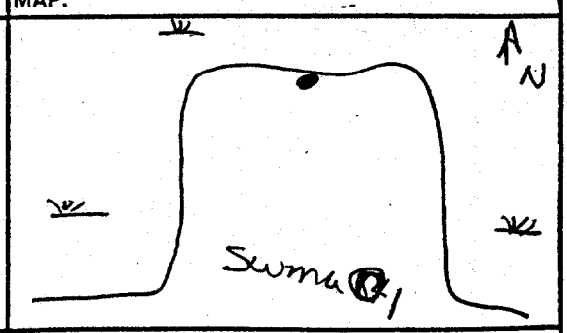
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBs	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
HEXAVALENT CHROMIUM	16 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
PAI01SSA01	~~PAI01SS01401D~~ PAI-01-SS-14-01D

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAI-01-SS-015
Sample Location: PAI-01-SS15
Sampled By: GG
C.O.C. No.: 00241

[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: 4/21/99 Time: 1301 Method: Grab Monitor Reading (ppm): —	0-1.0 FT	Tan-Brn	F Sand Dry

COMPOSITE SAMPLE DATA:

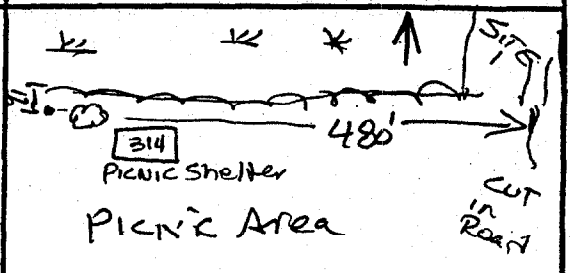
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs, TCL Pest	1-16 OZ	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): G Gunter

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SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAI-01-SS-016
Sample Location: PAI-01-SS16
Sampled By: GG
C.O.C. No.: 00241

[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: 4/21/99 Time: 13:18 Method: Grab Monitor Reading (ppm): —	0 - 1.0 Ft	Tan Brn	F Sand Dry

COMPOSITE SAMPLE DATA:

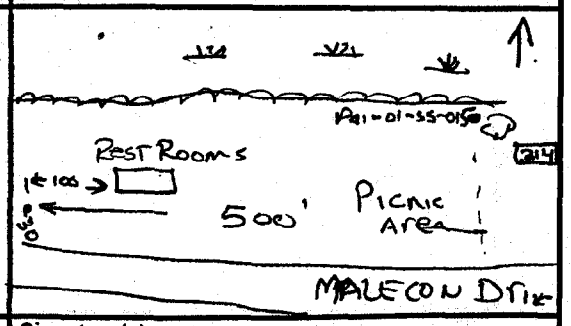
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH, TCL Pest	1-16 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI-41-SS-01-01 ~~PAI41SS00161~~
Sample Location: Parris Is.
Sampled By: RLM/HFL/GG
C.O.C. No.: 00263

- [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: 060198 Time: 1625 Method: Grab Monitor Reading (ppm):	0-1'	lt. br.	fn-med sd, dry

COMPOSITE SAMPLE DATA:

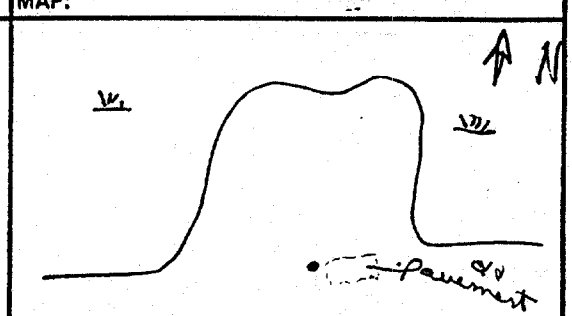
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: ~~PAI41SS00201~~ PAF-41-SS-02-01
Sample Location: Parris Is.
Sampled By: RLM / JFL
C.O.C. No.: 00267

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 060398 Time: 1011 Method: Grab Monitor Reading (ppm):	0-1'	lt.br.-br.	fn.-med. sd. dry

COMPOSITE SAMPLE DATA:

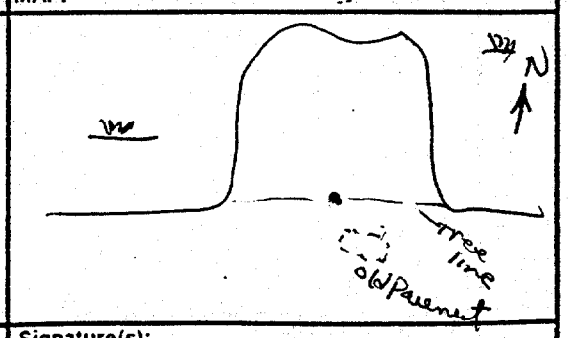
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): RLM / JFL

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: ~~PAI41550030~~ PAI-41-SS-03-01
Sample Location: Parris Is.
Sampled By: RLM/JFL/GG
C.O.C. No.: 00263

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 060198 Time: 1618 Method: Grab Monitor Reading (ppm):	0-1'	lt. br.	fn.-med sd. dry

COMPOSITE SAMPLE DATA:

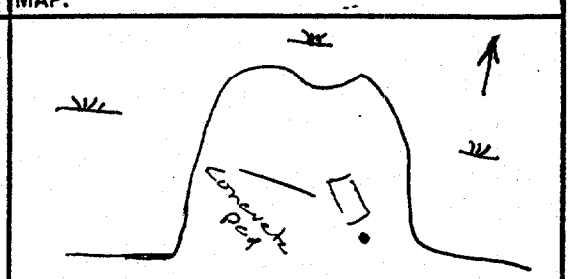
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-144

A-10

GROUNDWATER SAMPLE LOG SHEETS

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD - Paris Is.
Project No.: 7394

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

Sample ID No.: PAI-01-GW-04-01 ~~PAI01GW04~~
Sample Location: PAI01GW04
Sampled By: RLM / FJH
C.O.C. No.: 02251
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 062596	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Time: 1720								
Method: Low Flow	Clr.	7.26	0.465	21.3	0	2.93	0.01	—

PURGE DATA:

Date: 062596	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic Pump	Initial	7.57	0.738	23.0	2	—	0.03	—
Monitor Reading (ppm): 0	1	6.94	0.45	20.7	0	2.03	0.01	—
Well Casing Diameter & Material	2	7.26	0.465	21.3	0	2.93	0.01	—
Type: 2" Sch 40 PVC	3							
Total Well Depth (TD): 17.76'								
Static Water Level (WL): 12.22								
One Casing Volume(gal/L): ~~0.815gal~~	0.90							
Start Purge (hrs): 1620	JJG 12/8/99							
End Purge (hrs): 1720								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 12.0 l								

SAMPLE COLLECTION INFORMATION:

Analysis ~~Appendix IX~~	Preservative	Container Requirements (ml)		Collected
TAL Metals	HNO_3	1000 plastic	(1)	✓
Hardness	HNO_3			✓
[redacted]	[redacted]	[redacted]	(1)	[redacted]
Cyanide	NaOH	1000 plastic	(1)	✓
TCL Pest / PCB		1000 Amber Glass	(2)	✓
[redacted]		[redacted]	(2)	[redacted]
SVOC [redacted] TCL		1000 Amber Glass	(2)	✓
[redacted]	[redacted]	[redacted]	(3)	[redacted]
[redacted]		[redacted]	(2)	[redacted]
TCL VOC [redacted]	HCl	40 glass	(3)	✓
TAL Metals (Filtered)	HNO_3	1000 plastic	(1)	✓
TOC	H_2SO_4	1000 plastic	(1)	✓

OBSERVATIONS / NOTES:

TDS, TSS, Cl, F, Sulfate	[redacted]	125 Amber	(1)	✓
[redacted]		[redacted]	(1)	[redacted]
NO_3/NO_2	H_2SO_4	1000 plastic	(1)	✓

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

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2.5 gal ≅ 10,000 ml, ≅ 50 min.

TD = ~~12.20'~~ 17.76'
WL = 12.20 Scr. = 17.10 - 7.10
PAE-01-GW-04-01

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: 7394

WELL ID.: ~~PAE01GW04~~
DATE: 062598

Time (Hrs.)	Water Level (Feet below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments (ml)
1600	12.22'	200							
1623	12.22'	200	7.59	.738	2	—	23.0	0.03	
1627	12.23'	200	6.81	0.510	0	1.77	21.5	0.02	
1630	12.24'	200	6.71		0	2.02	21.0	0.01	
1634	12.24'	200	6.84	0.465	0	1.43	20.7	0.01	
1638	12.24'	200	7.02	0.463	0	2.39	20.7	0.01	
1642	12.25'	200	6.86	0.457	0	—	20.7	0.01	≈4400 mL
1646	12.24'	200	6.94	0.45	0	2.03	21.0	0.01	~5200 mL
1651	12.24	200	6.93	0.456	0	1.60	20.8	0.01	~6200 mL
1656	12.23	200	7.00	0.458	0	1.80	21.1	0.01	~7200 mL
1701	12.23	200	7.15	0.463	0	2.11	21.3	0.01	~8200 mL
1706	12.23	200	7.15	0.455	0	2.04	21.1	0.01	~9200 mL
1711	12.22	200	7.12	0.468	0	2.35	21.2	0.01	~10,200
1716	12.22	200	7.04	0.463	0	1.68	21.4	0.01	~11,200
1720	12.25	200	7.26	0.465	0	2.93	21.3	0.01	12,000

SIGNATURE(S): RM, Eric Haim

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GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD - Paris Is.
Project No.: 7394

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

Sample ID No.: ~~PAI01GW05 01~~ PAI-01-GW-05-01
Sample Location: PAI01GW05
Sampled By: RLM / KJH
C.O.C. No.: 2251
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: 062798								
Time: 1733								
Method: Low Flow	Clr.	7.81	31.0	26.0	0	0.75	1.94	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 062798								
Method: Peristaltic Pump	Initial	7.70	31.5	23.9	0	0.80	1.98	—
Monitor Reading (ppm): 0	1	7.73	31.9	25.2	0	0.55	2.01	—
Well Casing Diameter & Material	2	7.78	31.4	26.2	0	0.72	1.96	—
Type: 2" Sch 40 PVC	3	7.79	31.1	26.2	0	0.69	1.95	—
Total Well Depth (TD): 16.26	4	7.81	31.0	26.0	0	0.75	1.94	—
Static Water Level (WL): 3.65								
One Casing Volume(gal/L): ~~2 gal~~	1.63 2.8 12/18/99							
Start Purge (hrs): 1615								
End Purge (hrs): 1733								
Total Purge Time (min): 78								
Total Vol. Purged (gal/L): 16 l								

SAMPLE COLLECTION INFORMATION:

Analysis Appendix IX	Preservative	Container Requirements (ml)		Collected
TAL Metals	HNO_3	1000 plastic	(1)	✓
Hardness	HNO_3			✓
[redacted]	[redacted]	500 plastic	(1)	
Cyanide	NaOH	1000 plastic	(1)	✓
TCL Pest / PCB		1000 Amber Glass	(2)	✓
[redacted]		1000 Amber Glass	(2)	
SVOC [redacted] TCL		1000 Amber Glass	(2)	✓
[redacted]	[redacted]	40 glass	(3)	
[redacted]		1000 Amber Glass	(2)	
TCL VOC [redacted]	HCl	40 glass	(3)	✓
TAL Metals (Filtered)	HNO_3	1000 plastic	(1)	✓
TOC	H_2SO_4	1000 plastic	(1)	✓
OBSERVATIONS / NOTES:				
TDS, TSS, Cl, F, Sulfate	[redacted]	125 Amber	(1)	✓
[redacted]		1000 plastic	(1)	
NO_3/NO_2	H_2SO_4	1000 plastic	(1)	✓

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Emily J. Harrison

TD = 16.26
WL = 3.65'
CASING VOL = 12 × 0.163 = 2 gal

Purge = 4 gal [redacted] 000 mL

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: 7394

WELL ID.: PAIE01-GW0501
DATE: 062798

Time (Hrs)	Water Level (Ft. Below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments
1615	3.78	200	7.70	31.6	0	0.80	23.9	1.98	
1619	3.78	200	7.68	31.7	0	0.70	23.9	1.99	~800 mL
1621	3.78	200	7.67	31.7	0	0.62	24.0	1.99	1600
1623	3.78	200	7.68	31.7	0	0.53	24.4	1.99	2000
1626	3.79	200	7.69	31.8	0	0.61	24.5	1.99	2600
1628	3.80	200	7.70	31.9	0	0.65	24.8	2.00	3000
1630	3.80	200	7.71	31.9	0	0.55	24.9	2.01	3400
1633	3.80	200	7.73	31.9	0	0.55	25.0	2.01	4000
1635	3.80	200	7.75	31.9	0	0.55	25.2	2.01	4400
1637	3.80	200	7.76	31.9	0	0.45	25.3	2.00	4800
1640	3.80	200	7.77	31.8	0	0.53	25.2	2.00	5400
1643	3.80	200	7.78	31.6	0	0.44	25.3	1.99	6000
1645	3.80	200	7.80	31.5	0	0.60	25.2	1.98	6400
1649	3.77	200	7.80	31.3	0	0.76	25.4	1.97	7000
1651	3.76	200	7.77	31.4	0	0.68	26.0	1.97	7600
1655	3.75	200	7.78	31.4	0	0.72	26.2	1.96	8400
1700	3.75	200	7.78	31.2	0	1.45	26.3	1.96	9400
1706	3.76	200	7.77	31.2	0	1.40	26.9	1.95	10600
1711	3.74	200	7.78	31.1	0	0.90	26.5	1.95	11600
1717	3.74	200	7.79	31.1	0	0.69	26.7	1.95	12800
1724	3.79	200	7.80	31.1	0	1.62	26.7	1.95	14200
1729	3.79	200	7.81	31.1	0	0.87	26.1	1.95	15200
1733	3.77	200	7.81	31.0	0	0.75	26.0	1.94	16000

SIGNATURE(S): Emily J Harrison

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GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD - Paris Is.
Project No.: 7394

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

Sample ID No.: ~~PAI01GW0601~~ PAI-01-GW-06-01
Sample Location: PAI01GW06
Sampled By: RLM
C.O.C. No.: 2251
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: 062798								
Time: 1713								
Method: Low Flow	Clr.	5.89	19.7	25.6	0	1.87	1.18	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 062798								
Method: Peristaltic Pump	Initial	6.28	16.4	27.1	0	1.27	0.96	
Monitor Reading (ppm): 0	1	5.91	19.5	25.9	0	1.63	1.18	
Well Casing Diameter & Material	2	5.89	19.7	25.6	0	1.87	1.18	
Type: 2" Sch 40 PVC	3							
Total Well Depth (TD): 38.64'								
Static Water Level (WL): 4.00'								
One Casing Volume(gal/L): ~~1.141~~	1.63							
Start Purge (hrs): 1618	JJB 12/8/99							
End Purge (hrs): 1713								
Total Purge Time (min): 55								
Total Vol. Purged (gal/L): 2.75								

SAMPLE COLLECTION INFORMATION:

Analysis Appendix IX	Preservative	Container Requirements (ml)	Collected
TAL Metals	HNO_3	1000 plastic (1)	✓
Hardness	HNO_3		✓
[redacted]	[redacted]	500 plastic (1)	
Cyanide	NaOH	1000 plastic (1)	✓
TCL Pest/PCB		1000 Amber Glass (2)	✓
[redacted]		1000 Amber Glass (2)	
SVOC [redacted] TCL		1000 Amber Glass (2)	✓
[redacted]	[redacted]	40 glass (3)	
[redacted]		1000 Amber Glass (2)	
TCL VOC [redacted]	HCl	40 glass (3)	✓
TAL Metals (Filtered)	HNO_3	1000 plastic (1)	✓
TOC	H_2SO_4	1000 plastic (1)	✓
OBSERVATIONS / NOTES:			
TDS, TSS, Cl, F, Sulfate	[redacted]	125 Amber (1)	✓
[redacted]		1000 plastic (1)	
NO_3/NO_2	H_2SO_4	1000 plastic (1)	✓

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): RLM

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9128 ml

TD = 38.64' Sr. = 5'
WL = 4.00

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: 7394

WELL ID.: PAI01-GW-0601
DATE: 062798

Time (Hrs.)	Water Level (Ft. Below TOC)	Flow (ml/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments
1618	4.00	200	—	—	—	—	—	—	
1620	4.30	200	6.28	16.4	0	1.27	27.1	0.96	
1625	4.32	200	6.17	17.5	0	1.46	26.0	1.04	
1629	4.32	200	6.25	16.6	0	1.12	25.7	0.99	2200 ml
1633	4.34	200	6.03	18.8	0	0.96	25.9	1.11	
1637	4.34	200	5.96	19.3	0	1.05	25.4	1.15	
1643	4.34	200	5.91	19.5	0	1.41	25.4	1.17	5000 ml
1650	4.34	200	5.89	19.7	0	1.63	25.9	1.18	
1654	4.34	200	5.87	19.7	0	1.64	26.1	1.18	7200 ml
1659	4.36	200	5.85	19.7	0	1.23	25.7	1.18	
1703	4.34	200	5.90	19.7	0	1.53	25.5	1.18	9000 ml
1707	4.34	200	5.88	19.7	0	1.15	25.6	1.18	9800 ml
1713	4.34	200	5.89	19.7	0	1.17	25.6	1.18	11000 ml

SIGNATURE(S):

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: Parris Island (MCRD)
Project No.: 7394

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

Sample ID No.: ~~PAI-01-GW-007~~ PAI-01-GW-07-01 ~~01~~
Sample Location: PAI-01-GW-07
Sampled By: JKL
C.O.C. No.: 01310
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: 061698								
Time: 0908								
Method: Peristaltic	Tea	7.88	30.1	23.0	0	0.98	1.89	—

PURGE DATA:

Date: 061698	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method:	Initial	6.79	27.6	23.0	4	2.03	1.71	—
Monitor Reading (ppm): 0	1	7.59	25.8	23.3	<10	0.81	1.59	—
Well Casing Diameter & Material	2	7.84	29.5	22.8	0	1.53	1.83	—
Type: Schedule 40 PVC 2"	3	7.88	30.1	23.0	0	0.98	1.88	—
Total Well Depth (TD): 15.85								
Static Water Level (WL): 3.57								
One Casing Volume(gal/L): ~~1.8gal~~ 1.63								
Start Purge (hrs): 0745 JJB 12/8/99								
End Purge (hrs): 0851								
Total Purge Time (min): 66								
Total Vol. Purged (gal/L): 5gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	3-40 ml	✓
TCL SVOCs	—	2-1L Ag	✓
TAL Metals (TOTAL)	HNO3	1-1LP	✓
Hardness			✓
Cyanide	NAOH	1-1LP	✓
TAL Metals (Filtered)	HNO3	1-1LP	✓
TCL Pest/PCBs	—	2-1LAg	✓
TOC	H_2SO_4	1-125 ml Ag	✓
Hex Chromium	—	1 LITER plastic	✓
TDS, TSS, Cl, F, Sulfate	—	1 LITER plastic	✓
Nitrate / Nitrite	H_2SO_4	1 LITER plastic	✓

OBSERVATIONS / NOTES:

See Low-Flow Purge Data Sheet for Details

Do not need to analyze Field Parameters @ Laboratory per JBrown / GLG.

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

Stickup 2.88

LOW FLOW PURGE DATA SHEET

PAI-01-MW07

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: 7394

WELL I.D.: PAI-01-GW-07-01
DATE: 061698

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
0745	3.64	200	23.0	6.79	27.6	2.03	1.71	4	
0801	3.64	200	23.3	7.43	25.8	0.91	1.59	<10	Hydrogen gas
0806	3.64	200	23.4	7.56	25.7	2.45	1.58	<10	
0811	3.64	200	23.3	7.59	25.8	0.81	1.59	<10	1 volume
0816	3.64	200	23.2	7.62	26.2	1.23	1.61	<10	
0821	3.64	200	23.0	7.80	29.2	1.37	1.81	0	
0826	3.67	200	22.8	7.84	29.5	1.53	1.83	0	2nd volume
0831	3.67	200	22.7	7.85	29.6	1.48	1.84	0	
0836	3.68	200	22.9	7.88	29.8	1.03	1.86	0	
0841	3.68	200	22.8	7.88	29.9	0.72	1.87	0	
0846	3.68	200	22.9	7.88	30.0	1.41	1.87	0	
0851	3.68	200	23.0	7.88	30.1	0.98	1.88	0	
					Sampled 0908				

SIGNATURE(S) [illegible]

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GROUNDWATER SAMPLE LOG SHEET

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Project Site Name: MCRD Parris Island
Project No.: 7394

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

Sample ID No.: PAI-01-GW-08-01
Sample Location: PAI-01-GW08
Sampled By: GG
C.O.C. No.: 01310
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: 6/16/98								
Time: 10:15								
Method: Low Flow	Tea	6.82	19.8	23.8	5	2.42	1.19	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 6/16/98								
Method: Peristaltic	Initial	6.94	20.5	22.8	124	3.40	1.18	—
Monitor Reading (ppm): 0	1	6.81	20.1	22.2	24	1.95	1.20	—
Well Casing Diameter & Material Type: 2" SCH 40 PVC	2	6.72	19.9	23.3	7	1.53	1.19	—
	3	6.82	19.8	23.8	5	2.42	1.19	—
Total Well Depth (TD): 39.59								
Static Water Level (WL): 4.82								
One Casing Volume(gal/L): 1.1	1.63							
Start Purge (hrs): 0810	JJB 12/8/99							
End Purge (hrs): 1010								
Total Purge Time (min): 120								
Total Vol. Purged (gal/L): 5 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	3 - 40ml VOA	✓
TCL SVOCs	—	2 - 1LAG	✓
TAL metals (Total)	HNO_3	1 - 1LP	✓
Hardness	—		✓
Cyanide	NaOH	1 - LP	✓
TAL metals (Filtered)	HNO_3	1 - 1LP	✓
TCL Pest/PCBs	—	2 - 1LAG	✓
TOC	H_2SO_4	1 - 125ml AG	✓
TDS, TSS, Cl, F, Sulfate	—	1 - 1LP	✓
Nitrate/Nitrite	H_2SO_4	1 - 1LP	✓

OBSERVATIONS / NOTES:

See Low Flow data Sheet
DO NOT need To analyze FIELD PARAMETERS @ Laboratory
Per JBrown/GLG

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): G. Hunter GLG

3.17 ft stickup

LOW FLOW PURGE DATA SHEET

(PAI-01MW08)

PROJECT SITE NAME: MCRD-Parris Island
PROJECT NUMBER: 7394

WELL I.D.: PAI-01-GW-08-01
DATE: 6/16/98

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
0810		300	22.0	6.94	20.5	3.40	1.18	124	
0815	4.94	200	22.4	6.81	19.7	2.48	1.18	27	Setting Flow
0820	4.94	200	21.8	6.66	19.3	1.12	1.15	12	
0825	4.94	200	21.7	6.65	19.7	1.13	1.19	15	
0830	4.94	200	22.0	6.66	19.8	1.48	1.18	16	
0835	4.94	200	22.2	6.81	20.1	1.95	1.20	24	
~~0840~~									1 Vol (Screen Vol.)
0845	4.94	200	22.4	6.85	19.9	2.25	1.19	22	
0850	4.94	100	22.6	6.73	19.9	1.58	1.19	23	reduced rate to
~~0855~~	~~4.94~~		~~23.3~~	~~6.94~~	~~20.1~~	—	~~1.21~~	19	lower turb
0900	4.94	100	23.3	6.91	20.1	2.44	1.21	21	interval now 10'
0910	4.94	100	22.8	6.74	19.8	2.42	1.19	15	
0920	4.94	100	23.7	6.87	19.9	2.32	1.19	4	
0930	4.94	100	23.9	6.95	19.8	2.41	1.19	6	
0940	4.94	100	23.3	6.72	19.9	2.53	1.19	7	2nd Vol
0950	4.94	100	24.0	6.86	19.9	2.54	1.19	5	
1000	4.94	100	23.8	6.90	19.8	2.62	1.19	3	
1010	4.94	100	23.8	6.82	19.8	2.42	1.19	5	

1015 Sample

SIGNATURE(S) Gary Hunter

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GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD - Parris Is.
Project No.: 7394

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

Sample ID No.: ~~PAI016W0901~~ PAI-01-GW-01-01
Sample Location: PAI016W09 GC
Sampled By: RLM / EJH
C.O.C. No.: 2281
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 06 2998	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 0842	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: Low Flow	—	~~6.87~~	~~386~~	~~23.7~~	0	~~0.78~~	~~2.26~~	—
PURGE DATA:		7.02	57.8	24.8		1.19	3.41	

Date: 062898	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic Pump	Initial	6.95	51.0	27.0	0	1.33	3.36	-
Monitor Reading (ppm): 0	1	6.98	51.6	24.8	0	2.26	3.34	-
Well Casing Diameter & Material	2	7.02	57.8	24.8	0	1.19	3.41	-
Type: 2" Sch 40 PVC	3							
Total Well Depth (TD): 15.89								
Static Water Level (WL): 8.65								
One Casing Volume(gal/L): ~~1.95~~	1.63							
Start Purge (hrs): ~~0752~~ 1600	JJB 12/8/99							
End Purge (hrs): ~~0842~~ 1724								
Total Purge Time (min): ~~50~~ 84								
Total Vol. Purged (gal/L): ~~10000~~ ~~16~~ 4.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
TAL Metals	HNO_3	1000 plastic (1)	✓
Hardness	HNO_3		✓
[redacted]	[redacted]	500 plastic (1)	
Cyanide	NaOH	1000 plastic (1)	✓
TCL Pest / PCB		1000 Amber Glass (2)	✓
[redacted]		1000 Amber Glass (2)	
SVOC [redacted] TCL		1000 Amber Glass (2)	✓
[redacted]	[redacted]	40 glass (3)	
		1000 Amber Glass (2)	
TCL VOC [redacted]	HCl	40 glass (3)	✓
TAL Metals (Filtered)	HNO_3	1000 plastic (1)	✓
TOC	H_2SO_4	1000 plastic (1)	✓
OBSERVATIONS / NOTES:			
TDS, TSS, Cl, F, Sulfate	[redacted]	125 Amber (1)	✓
[redacted]		1000 plastic (1)	
NO_3/NO_2	H_2SO_4	1000 plastic (1)	✓

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

TD = 15.89' WL = 3.65' Scr. Int. = 10.0'
mid. Scr. = 10.0'

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: 7394
WELL ID.: PAI01-GW0901
DATE: 062898

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments
1600	3.65'	200							
1603	4.75'	200	6.95	51.0	0	1.33	27.0	3.36	
1607	5.30	200	6.98	51.0	0	1.08	26.6	3.36	~800 mL
1612	6.10	200	6.96	51.2	0	0.82	26.7	3.37	~1800 mL
1617	6.73	200	7.03	50.8	0	0.97	26.8	3.34	~2800 mL
1621	7.05	200	7.07	50.7	0	1.20	27.0	3.33	~3600 mL
1625	7.26	200	7.10	50.5	0	1.53	27.0	3.32	~4400 mL
1629	7.55	200	7.05	50.6	0	1.40	26.8	3.33	~5200 mL
1633	7.83	200	7.03	51.0	0	1.49	27.0	3.37	~6000 mL
1637	8.08	200	7.01	51.1	0	1.30	27.0	3.36	~6800 mL
1642	8.33	200	7.02	50.8	0	1.12	26.7	3.34	~7800 mL
1647	8.77	200	6.98	51.6	0	1.19	26.3	3.40	~8800 mL
1651	9.08	200	7.05	50.8	0	2.26	24.8	3.34	~9600 mL
1655	9.14	200	7.01	51.8	0	1.26	25.4	3.42	~10,400 mL
1660	9.30	200	7.01	52.0	0	1.75	25.6	3.43	~13,000 mL
1703	9.50	200	7.02	51.6	0	1.54	25.3	3.40	~14,000 mL
1707	9.70	200	7.01	51.6	0	1.83	25.2	3.40	~14,800 mL
1712	9.94	200	7.04	51.4	0	1.37	25.0	3.39	~15,800 mL
1716	10.11	200	7.01	51.7	0	1.45	24.9	3.41	~16,600 mL
1719	10.27	200	7.03	51.8	0	1.74	24.9	3.42	~17,000 mL
1724	10.58	200	7.02	51.8	0	1.19	24.8	3.41	~18,000 — DRY —

SIGNATURE(S): [signature] Cindy J. Hanson

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GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD - Parris Island
Project No.: 7394

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

Sample ID No.: PAI-01-GW-10-01
Sample Location: PAI-01-GW10
Sampled By: [illegible]
C.O.C. No.: 1301
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: 6/17/98								
Time: 0932								
Method: Low Flow	Clear	6.70	26.7	26.3	3	1.24	1.65	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 6/17/98								
Method: Peristaltic Pump	Initial	6.71	25.2	26.2	25	1.71	1.57	—
Monitor Reading (ppm):	1	6.74	26.0	25.6	9	2.20	1.60	—
Well Casing Diameter & Material	2	6.70	26.7	26.3	3	1.24	1.65	—
Type: 2" Ø SCH 40 PVC	3							
Total Well Depth (TD): 37.90'								
Static Water Level (WL): 5.61								
One ~~Casing~~ Screen Volume(gal/L): 1.14 gal	1.63							
Start Purge (hrs): 0900	JJB 12/18/99							
End Purge (hrs): 1110								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 3.6 gal								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IV			✓
TAL metals (TOTAL)	HNO_3	1-LP	✓
Hardness	HNO_3		✓
Sulfide	$ZnOAc$	1-500mLP	✓
Cyanide	NaOH	1-LP	✓
TCL Pest/PCBs	-	2-1LAG	✓
Chlorinated Herbicides	-	2-1LAG	✓
SVOCs (8270C)	-	2-1LAG	✓
VOCs (8015B)	HCL	3-40ml g	✓
8270 (8270)	-	2-1LAG	✓
TCL VOCs (8260C)	HCL	3-40ml g	✓
TAL metals (FILTERED)	HNO_3	1-LP	✓

OBSERVATIONS / NOTES:

TOC	H_2SO_4	1-125mLAG
TDS, TSS, Cl, F, Sulfate		1-1LP
Chromium +6		1-1LP
NO_3/NO_2	H_2SO_4	1-1LP

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [illegible]

TD = 37.90'

LOW FLOW PURGE DATA SHEET

WL = 5.61'

Scr. Inter. = 37.40 – 32.40 (34.90)

PAT-01-GW-10-01

PROJECT SITE NAME: MCRD Parris Is.

PROJECT NUMBER: 7394

WELL I.D.: 6W010

DATE: 061798

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1005	6.07	100	~~25.4~~	~~6.63~~	~~246~~	—	~~1.50~~	—	2 gal purged prior 100ml/min.
1009	6.22	100	26.2	6.71	25.2	0.94	1.55	25	
1019	6.20	100	26.3	6.75	25.6	1.71	1.57	18	~~1400 ml.~~
1028	6.41	100	25.8	6.78	25.8	1.59	1.60	12	2300 ml
1037	6.43	100	25.6	6.74	26.0	2.20	1.60	9	3200 ml.
1045	6.41	100	25.7	6.73	26.4	1.36	1.62	6	4000 ml.
1052	6.32	100	25.8	6.74	26.5	1.00	1.65	5	4700 ml
1101	6.49	100	25.4	6.76	26.7	1.35	1.65	5	5600 ml.
1110	6.49	100	26.3	6.70	26.7	1.24	1.65	3	6500 ml. 1.6 gal.
									+ 8000 ml (2 gal. prior)
									14500 ml = 3.6 gal.

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SIGNATURE(S) [signature]

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD - Paris Is.
Project No.: 7394

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

Sample ID No.: ~~PAI01GW0101~~ PAI-01-GW-11-01
Sample Location: PAI01GW011
Sampled By: RLM / EJH
C.O.C. No.: 2251
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: 062998								
Time: 0907								
Method: Low Flow	Clr-Brown Tint	6.94	48.7	26.9	0	0.71	3.20	Odor

PURGE DATA:

Date: 062998	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic Pump	Initial	6.87	47.5	24.0	0	0.49	3.10	-
Monitor Reading (ppm): 0	1	6.94	48.5	26.4	0	0.48	3.18	
Well Casing Diameter & Material	2	6.94	48.7	26.6	0	0.57	3.19	-
Type: 2" Sch 40 PVC	3	6.94	48.7	26.9	0	0.71	3.20	—
Total Well Depth (TD): 15.8'								
Static Water Level (WL): 2.85								
One Casing Volume(gal/L): 2 gal	1.63							
Start Purge (hrs): 0758	JJB 12/3/99							
End Purge (hrs): 0907								
Total Purge Time (min): 69 min								
Total Vol. Purged (gal/L): 17 l								

SAMPLE COLLECTION INFORMATION:

Analysis Appendix IX	Preservative	Container Requirements (ml)	Collected
TAL Metals	HNO_3	1000 plastic (1)	✓
Hardness	HNO_3		✓
[redacted]	[redacted]	500 plastic (1)	
Cyanide	NaOH	1000 plastic (1)	✓
TCL Pest / PCB		1000 Amber Glass (2)	✓
[redacted]		1000 Amber Glass (2)	
SVOC [redacted] TCL		1000 Amber Glass (2)	✓
[redacted]	HCl	40 glass (3)	
[redacted]		1000 Amber Glass (2)	
TCL VOC [redacted]	HCl	40 glass (3)	✓
TAL Metals (Filtered)	HNO_3	1000 plastic (1)	✓
TOC	H_2SO_4	1000 plastic (1)	✓
OBSERVATIONS / NOTES:			
TDS, TSS, Cl, F, SULFATE	[redacted]	125 Amber (1)	✓
Chromium Hex		1000 plastic (1)	✓
NO_3/NO_2	H_2SO_4	1000 plastic (1)	✓

Circle if Applicable:

MS/MSD	Duplicate ID No.: PAI-01-GW-11-01D

Signature(s): Emily J. Harrison

Casing Vol = 12 × 0.163 Purge Vol = 4 gal ≈ 6000 mL
TD = 15.8'
WL = 2.85'

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: 7394

WELL ID.: PAI-01-GW 1401
DATE: 062998

Time (Hrs)	Water Level (Ft. below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments
0758	2.85	200	6.87	47.5	0	0.49	24.0	3.10	
0756	3.22	200	6.88	47.6	0	0.45	24.2	3.12	~800 mL
0800	3.25	200	6.89	47.8	0	0.40	24.6	3.13	~1600 mL
0804	3.25	200	6.91	48.0	0	0.45	25.4	3.15	~2400 mL
0809	3.19	200	6.93	48.3	0	0.50	26.0	3.16	~3400 mL
0815	3.15	200	6.93	48.4	0	0.39	26.3	3.17	~5600 mL
0820	3.15	200	6.94	48.5	0	0.48	26.4	3.18	~6600 mL
0826	3.15	200	6.93	48.5	0	0.65	26.4	3.18	~8800 mL
0832	3.15	200	6.94	48.5	0	0.52	26.5	3.19	~10,000
0838	3.15	200	6.94	48.5	0	0.54	26.5	3.18	~11,200
0844	3.15	200	6.94	48.7	0	0.61	26.6	3.19	~12,400
0849	3.15	200	6.93	48.8	0	0.52	26.6	3.20	~13,400
0855	3.15	200	6.94	48.8	0	0.78	26.7	3.20	~14,600
0900	3.15	200	6.94	48.7	0	0.90	26.8	3.19	~15,600
0907	3.15	200	6.94	48.7	0	0.71	26.9	3.20	~17,000

SIGNATURE(S): Eric J. Harrison

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GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD - Paris Is.
Project No.: 7394

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

Sample ID No.: PAI-01-GW-12-01 ~~PAI01GW01201~~
Sample Location: PAI01GW012
Sampled By: RLM / EJH
C.O.C. No.: 2251
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: 062998								
Time: 0842								
Method: Low Flow		6.81	35.6	23.7	0	0.98	2.26	

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 062998								
Method: Peristaltic Pump	Initial	6.69	34.6	23.4	0	1.11	2.19	
Monitor Reading (ppm): 0	1	6.76	35.2	23.5	0	0.65	2.23	
Well Casing Diameter & Material	2	6.81	35.6	23.7	0	0.98	2.26	
Type: 2" Sch 40 PVC	3							
Total Well Depth (TD): 36.51								
Static Water Level (WL): 4.93'								
One Casing Volume(gal/L): ~~1.14 gal~~	1.63							
Start Purge (hrs): 0752	JJB 12/28/99							
End Purge (hrs): 0842								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 2.5								

SAMPLE COLLECTION INFORMATION:

Analysis Appendix IX	Preservative	Container Requirements (ml)	Collected
TAL Metals	HNO_3	1000 plastic (1)	✓
Hardness	HNO_3		✓
[redacted]	[redacted]	500 plastic (1)	
Cyanide	NaOH	1000 plastic (1)	✓
TCL Pest / PCB		1000 Amber Glass (2)	✓
[redacted]		1000 Amber Glass (2)	
SVOC [redacted] TCL		1000 Amber Glass (2)	✓
[redacted]	HCl	40 glass (3)	
[redacted]		1000 Amber Glass (2)	
TCL VOC [redacted]	HCl	40 glass (3)	✓
TAL Metals (Filtered)	HNO_3	1000 plastic (1)	✓
TOC	H_2SO_4	1000 plastic (1)	✓
OBSERVATIONS / NOTES:			
TDS, TSS, Cl, F, SULFATE	[redacted]	125 Amber (1)	✓
[redacted]		1000 plastic (1)	
NO_3/NO_2	H_2SO_4	1000 plastic (1)	✓

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): RLM Eric J. Harrison

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Casing Vol = 7×0.163 = 1.14 gal Purge Vol = 2.3 gal
TD = 36.51' 8700 mL
9128 mL

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: 7394

WELL ID.: ~~PAI-01-GW-01-01~~ PAI-01-GW-12-01
DATE: 062998

Time (Hrs)	Water Level (Ft. Below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments
07.52	4.93	200							
0755	5.09	200	6.69	34.6	0	1.11	23.4	2.19	
0759	5.11	200	6.75	34.8	0	1.27	23.1	2.20	
0804	5.10	200	6.74	34.7	0	0.64	23.2	2.20	
0809	5.10	200	6.73	34.8	0	0.79	23.4	2.20	3400 mL
0814	5.10	200	6.76	35.2	0	0.65	23.5	2.23	
0819	5.10	200	6.78	35.4	0	0.84	23.5	2.25	5400 mL
0824	5.13	200	6.77	35.1	0	0.84	23.5	2.23	
0830	5.13	200	6.79	35.5	0	1.00	23.4	2.26	7600 mL
0836	5.13	200	6.81	35.3	0	1.07	23.4	2.24	8800 mL
0842	5.13	200	6.81	35.6	0	0.98	23.7	2.26	10000 mL

SIGNATURE(S): [illegible]

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GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD - Parris Is.
Project No.: 7394

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

Sample ID No.: PAI-01GW-1301
Sample Location: PAI01GW013
Sampled By: RLM / EJH
C.O.C. No.: 2251
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 062698	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1755	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: Low Flow	BROWN TINT	6.77	33.7	27.7	0	1.36	2.13	STRONG ODOR

PURGE DATA:

Date: 062698	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic Pump	Initial	6.80	32.9	27.9	0	0.45	2.08	-
Monitor Reading (ppm): 0	1	6.79	33.8	27.8	0	1.50	2.13	
Well Casing Diameter & Material	2	6.77	33.7	27.7	0	1.36	2.13	
Type: 2" Sch 40 PVC	3							
Total Well Depth (TD): 15.81								
Static Water Level (WL): 3.77								
One Casing Volume(gal/L): ~~2 gal~~	1.63							
Start Purge (hrs): 1645	JJB 12/8/99							
End Purge (hrs): 1752								
Total Purge Time (min): 67								
Total Vol. Purged (gal/L): 13.2 l								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)		Collected
TAL Metals	HNO_3	1000 plastic	(1)	✓
Hardness	HNO_3			✓
[redacted]	[redacted]	500 plastic	(1)	
Cyanide	NaOH	1000 plastic	(1)	✓
TCL Pest / PCB		1000 Amber Glass	(2)	✓
[redacted]		1000 Amber Glass	(2)	
SVOC [redacted] TCL		1000 Amber Glass	(2)	✓
[redacted]	[redacted]	40 glass	(3)	
[redacted]		1000 Amber Glass	(2)	
TCL VOC [redacted]	HCl	40 glass	(3)	✓
TAL Metals (Filtered)	HNO_3	1000 plastic	(1)	✓
TOC	H_2SO_4	1000 plastic	(1)	✓
OBSERVATIONS / NOTES:				
TDS, TSS, Cl, F, Sulfate	[redacted]	125 Amber	(1)	✓
[redacted]		1000 plastic	(1)	
NO_3/NO_2	H_2SO_4	1000 plastic	(1)	✓

vy. Strong "Land fill" odor.

RLM

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Emily J. Hanson

WL = 3.77 MISSPLACED @ 10'
TD = 15.81

LOW FLOW PURGE DATA SHEET

PAI-01-GW-13-01

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: 7394

WELL ID.: ~~PAI-01-GW-13-01~~ GG
DATE: 062698

Time (Hrs.)	Water Level (Below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments
1645	3.77	200	6.80	32.9	0	0.45	27.9	2.08	200 mL/min
1648	4.22	200	6.78	33.2	0	0.66	27.4	2.09	~600 mL
1650	4.12	200	6.76	32.9	0	0.94	27.4	2.07	~1000 mL
1654	4.17	200	6.78	32.5	0	1.67	28.1	2.04	~1800 mL
1657	4.17	200	6.78	32.6	0	1.97	27.6	2.05	~2400
1700	4.04	200	6.77	32.9	0	1.61	27.8	2.07	~3000
1704	4.06	200	6.77	33.3	0	1.25	27.8	2.10	~3800
1708	4.06	200	6.75	33.5	0	1.40	27.9	2.11	~4600
1711	4.06	200	6.77	33.6	0	1.48	27.8	2.13	~5200
1715	4.08	200	6.78	33.7	0	1.65	27.9	2.13	~6000
1719	4.08	200	6.79	33.8	0	1.50	27.8	2.13	~6800
1723	4.08	200	6.78	33.8	0	1.48	27.8	2.14	~7600
1727	4.08	200	6.77	33.8	0	1.27	27.7	2.13	~8400
1731	4.10	200	6.76	33.8	0	1.01	27.8	2.14	~9200
1735	4.08	200	6.75	33.7	0	0.89	27.7	2.13	~10000
1739	4.08	200	6.75	33.8	0	0.95	27.7	2.14	10800
1743	4.08	200	6.76	33.8	0	1.10	27.6	2.14	11600
1747	4.04	200	6.75	33.8	0	1.02	27.6	2.13	12400
1752	4.05	200	6.77	33.7	0	1.36	27.7	2.13	13200

SIGNATURE(S): Emily J. Hinson

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GROUNDWATER SAMPLE LOG SHEET

Dup

PAI-CI-GW-14-01

Project Site Name: MCRD - Parris Is.
Project No.: 7394

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

Sample ID No.: PAI016W014-01
Sample Location: PAI016W014
Sampled By: RLM / EJH
C.O.C. No.: 2251
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 062698	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1740	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: Low Flow	Clr.	6.52	10.6	24.2	0	2.01	0.59	—

PURGE DATA:

Date: 062698	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Peristaltic Pump	Initial	6.57	10.6	25.6	0	1.87	0.60	—
Monitor Reading (ppm): 0	1	6.56	11.5	24.6	0	2.01	0.65	
Well Casing Diameter & Material	2	6.52	10.6	24.2	0	2.01	0.59	—
Type: 2" Sch 40 PVC	3							
Total Well Depth (TD): 40.22								
Static Water Level (WL): 3.72								
One Casing Volume(gal/L): ~~1.141~~	1.63							
Start Purge (hrs): 1700	JJB 12/18/99							
End Purge (hrs): 1740								
Total Purge Time (min): 40								
Total Vol. Purged (gal/L): 8000 ml								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)		Collected
TAL Metals	HNO_3	1000 plastic	(1)	✓
Hardness	HNO_3			✓
[redacted]	[redacted]	500 plastic	(1)	
Cyanide	NaOH	1000 plastic	(1)	✓
TCL Pest / PCB		1000 Amber Glass	(2)	✓
[redacted]		1000 Amber Glass	(2)	
SVOC [redacted] TCL		1000 Amber Glass	(2)	✓
[redacted]	[redacted]	40 glass	(3)	
[redacted]		1000 Amber Glass	(2)	
TCL VOC [redacted]	HCl	40 glass	(3)	✓
TAL Metals (Filtered)	HNO_3	1000 plastic	(1)	✓
TOC	H_2SO_4	1000 plastic	(1)	✓
OBSERVATIONS / NOTES:				
TDS, TSS, Cl, F, SULFATE	[redacted]	125 Amber	(1)	✓
[redacted]		1000 plastic	(1)	
NO_3/NO_2	H_2SO_4	1000 plastic	(1)	✓

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

~~0.5 gal~~ 1.5 gal. ≅ 6000

WL = 3.72'
TD = 40.22'

LOW FLOW PURGE DATA SHEET

PAE-01-GW-14-01

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: 7394

WELL ID.: ~~PAI 01 GW 14 01~~
DATE: 062698 GG

Time (Hrs)	Water Level (ft) (Fe Below TOC)	Flow (mL/Min)	pH (S.U.)	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments
1700	3.72	200	—	—	—	—	—	—	Initial
1704	3.86	200	6.57	10.6	0	1.87	25.6	0.60	
1707	3.87	200	6.63	11.8	0	2.56	25.5	0.67	1400 ml.
1712	3.87	200	6.61	11.8	0	2.60	25.0	0.67	2400 ml.
1716	3.98	200	6.52	11.6	0	2.09	24.7	0.66	3200 ml.
1720	3.98	200	6.56	11.5	0	2.01	24.6	0.65	4000 ml.
1724	3.98	200	6.49	11.1	0	2.06	24.3	0.63	5200 ml.
1730	3.98	200	6.55	10.8	0	3.00	24.0	0.61	6000 ml.
1735	3.98	200	6.48	10.7	0	2.00	24.1	0.60	7000 ml.
1740	3.98	200	6.52	10.6	0	2.01	24.2	0.59	8000 ml

A-166

SIGNATURE(S): RM

A-11

CHAIN OF CUSTODY RECORDS

00249

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MERD Ports Is.

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC + TICs 40 ml	TCL SVOC 1000 ml glass	TAL Metals + HNO3 1000 ml plastic	TCL Pest + PCB 1000 ml amber	TOC + H2SO4 1000 ml plastic	pH 1000 ml plastic	TAL Metals, Hardness, HNO3 1000 ml plastic	Cyn + NaOH 250 ml plastic	TAL Metals + HNO3 Dissolved 100 ml plastic	REMARKS
	05/17 98	11 05		✓	PAI 03 SW 09	12	✓	✓	-	✓	✓	✓	✓	✓	✓	
	05/17 98	16 40		✓	PAI 03 SW 11	12	✓	✓		✓	✓	✓	✓	✓	✓	
	05/17 98	14 15		✓	PAI 01 SW 04	~~10~~ 12 RM	✓	✓	~~4~~ RM	✓	✓	✓	✓	✓	✓	
	05/17 98	14 25		✓	PAI 01 SW 03	12	✓	✓		✓	✓	✓	✓	✓	✓	
	05/17 98	15 00		✓	PAI 01 SW 09	12	✓	✓		✓	✓	✓	✓	✓	✓	
	05/17 98	16 15		✓	PAI 03 SW 021	10	✓	✓	✓	✓				✓	✓	
	05/17 98	00 00		✓	PAI 03 SW 021D	10	✓	✓	✓	✓				✓	✓	Dupe
	05/18 98				Temp. Blank	4										
					Trip Blank	2	✓									

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	051898 0900				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		X. Hem	SMAY 10:05	(11.5 16.2 16.8) (10.1 9.5 7.6) (7.6 7.3 9.8) Seal 56358, 56342 3809, 3510 (7.9 6.2 5.0)	

Order No. 70440 (0593)

A-167

01307

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: Pinckney Island

SAMPLERS (SIGNATURE): [signature] Jenna K. Laffey

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC Aqueous	TCL SVOC (S)	TAL Metals + CN 16oz.	TCL Pest/PCB 16oz.	TOC, PH 16oz		REMARKS
	0527 98	12 40		✓	PAI 01 SD 05	6	✓	✓	✓	✓	✓		
	0527 98	13 30		✓	PAI 01 SD 06	6	✓	✓	✓	✓	✓		
	0527 98	14 00		✓	PAI 01 SD 07	6	✓	✓	✓	✓	✓		

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	052798 1845				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): [signature]	DATE / TIME: 5/28/98 1420	REMARKS:	

(12.9, 1.6, 7.8)(8.4, 7.0, -5), 6.0°C

A-168

CHAIN OF CUSTODY RECORD

01306

031

PROJECT NO.: 7394

SITE NAME: Pine Knoll Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC 40 ml.	TCL SVOC 1000 ml. Amber	TAL Metals + Hardness 1000 ml. plastic	TAL Metals + Hardness Filtered 1000 ml plastic	TCL Pest / PCB 1000 ml. Amber	TOC + H2SO4 1000 ml. plastic	Cyanide 250 ml. plastic	pH 1000 ml. plastic	REMARKS
	0527 98	12 40		✓	PAI 01 SW05 W	12	✓	✓	✓	✓	✓	✓	✓	✓	
	0527 98	13 30		✓	PAI 01 SW06 W	12	✓	✓	✓	✓	✓	✓	✓	✓	
	0527 98	14 00		✓	PAI 01 SW 07 W	12	✓	✓	✓	✓	✓	✓	✓	✓	
					Temp. Blank	2									each Cooler
					Trip Blank	2	✓								Cooler #1 of 2

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	052798 1845				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	5/28/98 1420		

Order No. 70440 (0693)

A-169

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC	TCL Pesticides (S)	TCL SVOC	TAL Metals 16oz.	TAL Metals + CN 16oz.	TCL Pest/PCB 16oz.			REMARKS
	0601 98	10 15		✓	PAI01SS00101	6	✓	✓	✓	✓					
	0601 98	10 30		✓	PAI01SS00201	6	✓	✓	✓	✓					
	0601 98	10 55		✓	PAI01SS00301	6	✓	✓	✓	✓					
	0601 98	11 25	pm	✓	PAI41SS00101	6	✓	✓	✓	✓					
	0601 98	16 18		✓	PAI41SS00301	6	✓	✓	✓	✓					
	0601 98	15 38		✓	PAI41SS00401	6	✓	✓	✓	✓					
					Trip Blank	2	✓								Cooler 1 of 2
					Temp. Blank	1									Cooler 1 of 2

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
	060198 1800				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME: 6/6/98 1145	REMARKS: 2.8°C (10.4, 11.3, 6.1)	

A-170

CHAIN OF CUSTODY RECORD

00264

PROJECT NO.:	SITE NAME:
7394	MCRD Parris Is.

SAMPLERS (SIGNATURE): [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC + HCl 40 ml.	TCL SVOC 1000 ml. amber	TAL Metals + HNO3 1000 ml. plastic	TCL Pest/PCB 1000 ml. amber	CN + NaOH 250 ml.		REMARKS
	06/01/98	17 00		✓	PAI 41 RB 01 W	9	✓	✓	✓	✓	✓		

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]	06/01/98 1800				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[illegible]	6/2/98 1145	2.8, (10.4, 11.3, 6.1°)	

Order No. 70440 (0693)

A-171

013

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC Encore (5)	TCL SVOC 16oz.	TCL Pest/PCB 16oz.	Hex. Cr. 16oz.	TAL Metals + CN 16oz.	TOC, pH 16oz.	REMARKS
	0602 98	11 13		✓	PAI01SS00801	6	✓	✓	✓	✓	✓		
	0602 98	11 38		✓	PAI01SS00901	6	✓	✓	✓	✓	✓		
	0602 98	11 20		✓	PAI01SS01001	6	✓	✓	✓	~~✓~~ Run	✓	✓	
	0602 98	12 40		✓	PAI01SS01401	6	✓	✓	✓	✓	✓		
	0602 98	12 38		✓	PAI01SS00701	6	✓	✓	✓		✓	✓	
	0602 98	00 00		✓	PAI01SS01401D	6	✓	✓	✓	✓	✓		
	0602 98	00 00		✓	PAI01SSA01	6	✓	✓	✓	✓	✓		
					Trip Blank	2	✓						In Cooler 1 of 2
					Temp Blank	2							each cooler
	0602 98	17 12		✓	PAI01SS01201	6	✓	✓	✓		✓		
	0602 98	17 00		✓	PAI01SS01~~2~~01 3 run	6	✓	✓	✓		✓		
	0602 98	16 57		✓	PAI01SS01101	6	✓	✓	✓		✓		

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]	060298 1830				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: 4.2 (10.8 5.6 8.1) Seal 56354 56348	
		[illegible]	6/2/98 1150		

T.B. page date 5/11/98

Order No. 70440 (0693)

A-72

00266

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [illegible] Hunter

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC + TICs 40 ml	TCL SVOC 1000 ml amber	TAL Metals + HNO3 1000 ml plastic	TCL Pest + PCB 1000 ml amber	CN + NaOH [illegible]	Hex. Cr. 250 ml	TAL Metals + HNO3 Filtered 1000 ml plastic	REMARKS
	0602 98	15 00		✓	PAI01RB01	10	✓	✓	✓	✓	✓	✓		
	0602 98	17 30		✓	PAI03SW010	11	✓	✓	✓	✓	✓	✓	✓	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]	060298 1830				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): [illegible]	DATE / TIME: 6/3/98 1150	REMARKS: 4.2, (128.5.98.1) 56354, 56348	

Order No. 70440 (069 3)

A-173

6

00267

10

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC	Encore (5) TCL SVOC 16oz.	TAL Metals+CN 16oz.	TCL Pest/PCB 16oz.			REMARKS
	0603 98	10 11		✓	PAI41SS00201	6	✓	✓	✓	✓			
	0603 98	10 22		✓	PAI01SS00501	6	✓	✓	✓	✓			
	0603 98	10 45		✓	PAI01SS00601	6	✓	✓	✓	✓			

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	060398 1800				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	6/4/98 1152	(9.7°, 9.9, 8.7°) 56.394,	

Order No. 70440 (0693)

A-124

00268

11

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC + TICs 40 ml	TCL SVOC 1000 ml amber	TAL Metals + HNO3 (un 1000 ml amber plastic	TCL Pest/PCB 1000 ml amber	CN + NaOH 250 ml plastic		REMARKS
	06/03/98	12/18		✓	PAI01RB02	9	✓	✓	✓	✓	✓		
					Trip Blank	2	✓						
					Temp Blank								

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	06/03/98 1800				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	6/4/98 1150	(9.7-9.9 & 7°) 56.94	

Order No. 70440 (069[illegible])

A-175

00269

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Grain Size Analysis	Bulk Density	Natural Moisture Content	Atterberg Limits	Porosity	Specific Gravity	Vertical Conductivity Shelby Tube	REMARKS
	0530 98			✓	PAI035D01501	1	✓	✓						
	0530 98			✓	PAI035D01801	1	✓	✓						
	0530 98			✓	PAI035D02001	1	✓	✓						
	0530 98			✓	PAI035D02201	1	✓	✓						
	0602 98			✓	PAI015S01001	1	✓	✓	✓	✓	✓	✓		
	0602 98			✓	PAI015S00701	1	✓	✓	[illegible]		✓	✓		
	0521 98		✓		PAI015B00136		✓	✓	✓	✓	✓	✓		PAI016W06
	0520 98		✓		PAI015B00[illegible]0236		✓	✓	✓	✓	✓	✓		PAI016W08
	05[illegible] 98 AM		✓		PAI015B003[illegible]41								✓	PAI016W10
	0518 98		✓		PAI015B00438		✓	✓	✓	✓	✓	✓		PAI016W12
	0518 98		✓		PAI015B00536		✓	✓	✓	✓	✓	✓		PAI016W14
	0519 98		✓		PAI015B00336		✓	✓	✓	✓	✓	✓		PAI016W10

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible] P.O.	100578 1120	[illegible]			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	

A-176

CHAIN OF CUSTODY RECORD

01303

PROJECT NO.: 7394

SITE NAME: [redacted]

SAMPLERS (SIGNATURE): R. Hardman, P.G. (TTNUS)

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Grain Size Anal.	Bulk Density						REMARKS
				✓	PAI01SD00101	1	✓	✓						
				✓	PAI03SD01201	1	✓	✓						
				✓	PAI01SD00201	1	✓	✓						
				✓	PAI03SD01101	1	✓	✓						
				✓	PAI01SD00301	1	✓	✓						
				✓	PAI03SD00901	1	✓	✓						

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
R. Hardman	1/14/02	[illegible]			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	

Order No. 70440 (0693)

A-177

00271

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC + HCl 40 ml	TCL SVOC 1000 ml Amber	TCL Pest/PCB 1000 ml Amber	TAL Metals + HNO3 1000 ml plastic	Cn + NaOH 250 ml plastic	REMARKS
	06/10/98	12:10		✓	PA01RB03	9	✓	✓	✓	✓	✓	✓	
					Trip Blank	2	✓						Cooler # 1 of 2

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
	06/10/98 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: (11.3, 12.6, 8.7) 0.7 TIB. produced 5/11/98	

Order No. 70440 (0693)

A-178

CHAIN OF CUSTODY RECORD

00270

21

PROJECT NO.:	SITE NAME:
7394	MCRD Parris Is.

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC (5) ~~4oz. Encore~~	TCL SVOC 16oz.	TCL Pest/PCB 16oz.	TOC 16oz.	pH 4oz.	TAL Metals 16oz.	REMARKS
	06/10/98	11 07		✓	PAI01SD00401	6	✓	✓	✓	✓	✓	✓	
	06/10/98	13 50		✓	PAI01SD00301	6	✓	✓	✓	✓	✓	✓	
	06/10/98	10 40		✓	PAI01SD00201	6	✓	✓	✓	✓	✓	✓	
	06/10/98	10 15		✓	PAI01SD01201	6	✓	✓	✓	✓	✓	✓	
	06/10/98	09 48		✓	PAI01SD00101	6	✓	✓	✓	✓	✓	✓	
	06/10/98	15 25		✓	PAI01SD01101	6	✓	✓	✓	✓	✓	✓	
	06/10/98	00 00		✓	PAI01SD00301D	6	✓	✓	✓	✓	✓	✓	
	06/10/98	00 00		✓	PAI01SDA01	6	✓	✓	✓	✓	✓	✓	
	06/10/98	15 17		✓	PAI01SD00901	6	✓	✓	✓	✓	✓	✓	
					~~Trip~~ Temp Blank	2							each Cooler of 2

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	06/10/98 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: (11.3 12.6 8.7), 0.7°	
		[signature]	6/11/98 1225	MDS 56350, 56352	

Order No. 70440 (0693)

A-179

01309

12

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [illegible]

STATION NO.	DATE	TIME	COMP/	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC + HCl 40 ml.	TCL SVOC 1000 ml Amber	TAL Metals + HNO3 1000 ml. plastic + Hardness	TAL Metals + HNO3 Filtered 1000 ml plastic	Cn + NaOH 250 ml. Plastic	TOC + H2SO4 1000 ml. Plastic	Tcl Pest/PCB 1000 ml. Amber	pH + Salinity 1000 ml. plastic	Hex Cr. 1000 ml. plastic	TCL Pest/PCB 1 oz.	TCL SVOC 1 oz.	TCL Pest/PCB 1 oz.	TAL Metals 1 oz.	REMARKS
	06/16/98	1530		✓	PAI01SW001	13	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	06/16/98	00 00		✓	PAI01SW001D	13	✓	✓	✓	✓	✓	✓	✓	✓	✓					
	06/16/98	00 00		✓	PAI01SWA01	13	✓	✓	✓	✓	✓	✓	✓	✓	✓					
					Trip Blank	2	✓													Cooler #1 of 2
					Temp Blank	2														each cooler of 2
	06/15/98	1920	✓		PAI15SD00301	1										✓	✓	✓	✓	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]	6/18/98 1746				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): [illegible]	DATE / TIME: 6/17/98 11:00	REMARKS: seal 56320 56314 5.9 (9.5 10.0 8.4)	

A-180

01310

9806453

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: Parris Island

SAMPLERS (SIGNATURE): D. Hunter, J. Griffy

	STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TAL metals (ref. chart below)	CYANIDE	TAL metals filtered	TCL Pest/PCBs	TOC	CPC	TDS, TSS, Cl, F, SULFATE	NITRATE/NITRITE	REMARKS
1/2	1	9/16/98	0908		✓	PAI-01-GW-007-01	14	3	2	1	1	1	2	1	1	1	1	
3/4	2	9/16/98	1015		✓	PAI-01-GW-008-01	13	3	2	1	1	1	2	1	–	1	1	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
D. Hunter	6/16/98 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		Pam Johnson	6/17/98 0830		

Order No. 78440 (0693)

A-181

9806495

01301

18

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD-Parris Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TAL METALS (TOD) HARDNESS	TAL METALS (FILTERED)	CYANIDE	TCL PEST/PCBs	TOC	COD	TDS/TSS/CHLORIDE	NO3/NO2	SULFATE	APPENDIX IX		REMARKS
~~1~~	~~6/17~~			X	~~PAE-01-GW-009-01~~	~~14~~	~~3~~	~~3~~	~~1~~	~~1~~	~~1~~	~~2~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~			well Dry could NOT Sample
2	6/17			X	PAE-01-GW-010-01	22	-	-	-	1	-	-	1	1	1	1	1	1		
					Trip Blank	2	✓													

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	06/29/16 1600				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): [signature]	DATE / TIME:	REMARKS:	

A-182

CHAIN OF CUSTODY RECORD

01303

PROJECT NO.: 7394

SITE NAME: [redacted]

SAMPLERS (SIGNATURE): R. Markowski, P.G. (TTNUS)

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Grain Size Analysis	Bulk Density					REMARKS
				✓	PAI01SD00101	1	✓	✓					
				✓	PAI03SD01201	1	✓	✓					
				✓	PAI01SD00201	1	✓	✓					
				✓	PAI03SD01101	1	✓	✓					
				✓	PAI01SD00301	1	✓	✓					
				✓	PAI03SD00901	1	✓	✓					

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
R. Markowski	1/14/92	[illegible]			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	

Order No. 70440 (0693)

A-185

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [signature] Eric Johnson

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC + HCl 40 ml.	TCL SVOC 1000 ml. Amber	TAL metals + HLD3 Hardness 250 ml. plastic	TAL Metals + HNO3 Filtered 1000 ml. plastic	Cn + NaOH 250 ml. plastic	TOC + H2SO4 1000 ml. plastic	TCL Pest/PCB 1000 ml. Amber	pH + Salinity 1000 ml. plastic	REMARKS
	06 24 98	11 15		✓	PAI01SW010	12	✓	✓	✓	✓	✓	✓	✓	✓	
	06 24 98	11 30		✓	PAI01SW012	12	✓	✓	✓	✓	✓	✓	✓	✓	
					Trip Blank	2	✓								Cooler #1 of 1
					Temp Blank										

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	06 24 98 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): P. Buhl	DATE / TIME: 4 25 98 1905	REMARKS: seal - 58292 TB prep 5/18/98	(8.3, 8.9, 3.5)

Order No. (0693)

A-184

CHAIN OF CUSTODY RECORD

02253

024

PROJECT NO.: 7394

SITE NAME: MCRD - PARRIS ISLAND

SAMPLERS (SIGNATURE): Emily J. Hamilton, B. Meslaen

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC + HCl 40 mL	TCL SVOC 1000 mL AMBER	TAL METALS + HNO3 1000 mL PLASTIC	TAL METALS - FILTERED + HNO3 1000 mL PLASTIC	CN + NaOH 250 mL PLASTIC	TOC + H2SO4 1000 mL PLASTIC	TCL PEST/PCB 1000 mL AMBER	pH + SALINITY 1000 mL PLASTIC	Hex. Cr.	REMARKS
	6/26/98	1200		✓	PAI-01-SW-00201	12	✓	✓	✓	✓	✓	✓	✓	✓		
	6/26/98	00 00		✓	PAI01SW00201D	12	✓	✓	✓	✓	✓	✓	✓	✓		
					Trip Blank	2	✓									Cooler 1 of 2
	6/29/98	1430		✓	PAI01SW01101	1~~2~~3	✓	✓	✓	✓	✓	✓	✓	✓	✓	
					Temp. Blank	1 BM										Cooler 1 of 2

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
B. Meslaen	062998 1700				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		R. Heine	6/30/98 11:15	5.0 Seal 56406	

Order No. 70440 (0693)

A-185

9806697

02251

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD - PARRIS ISLAND

SAMPLERS (SIGNATURE): Eric Johnson, [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TAL METALS (HEXAVALENT)	CYANIDE	TAL METALS FILTERED	TCL PEST/PCBs	TOC	TDS/TSS/CL/F/SULFATE	NITRATE/NITRITE	HEXAVALENT CHROMIUM	
1,2	06/25/98	1720		✓	PAI-01-GW-004-01	13	✓	✓	✓	✓	✓	✓	✓	✓	✓		
3					TRIP BLANK	2	✓										Cooler 1 of 6
4,5	6/26/98	1755		✓	PAI-01-GW-013-01	13	✓	✓	✓	✓	✓	✓	✓	✓	✓		
6,7	6/26/98	1740		✓	PAI-01-GW-014-01	13	✓	✓	✓	✓	✓	✓	✓	✓	✓		
					~~TRIP BLANK~~ ESH	~~2~~	✓										
8,9	6/27/98	1734		✓	PAI-01-GW-005-01	13	✓	✓	✓	✓	✓	✓	✓	✓	✓		
10,11	6/27/98	1713		✓	PAI-01-GW-006-01	13	✓	✓	✓	✓	✓	✓	✓	✓	✓		
					~~TRIP BLANK~~ ESH	~~2~~	✓										
12,13	6/29/98	0842		✓	PAI-01-GW-012-01	13	✓	✓	✓	✓	✓	✓	✓	✓	✓		
14,15	6/29/98	0907		✓	PAI-01-GW-011-01	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
16,17	6/29/98	0907		✓	PAI-01-GW-011-01D	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
18,19	9/29/98	1130		✓	PAI-01-GW-09-01	13	✓	✓	✓	✓	✓	✓	✓	✓	✓		

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]	062998 2000				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		Joseph A Smith	6/30/98 18:30		

Order N[illegible] (0693)

A-186

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Island

SAMPLERS (SIGNATURE): Steve Barton, Seth Pegg

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	Pest/PCBs	Total Metals	Diss. Metals	Cyanide	Hex. Cr.	TOC	PH	REMARKS
	7/24/98	1110		✓	PAI-02-SW-~~003~~ 001-00	13	3	2	2	1	1	1	1	1	1	VOCs - 3 40ml
	7/24/98	1147		✓	PAI-02-SW-002-00	3				1	1	1				Hex Cr sample
	7/24/98	1153		✓	PAI-02-SW-~~003~~ 001-00	2				1	1					collected @ 1203
	7/24/98	1135		✓	PAI-02-SW-004-00	3				1	1	1				
	7/24/98	1330		✓	PAI-01-SB-005-04	1								✓	✓	
	7/24/98	1430		✓	PAI-01-SB-002-04	1								✓	✓	
	7/24/98	1350		✓	PAI-01-SB-003-04	1								✓	✓	
					Trip Blank											
					Temp Blank											

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Steve Barton	7/24/98 1700				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		L. Mem.	7-25-98 14:10	Seal 56404 5.9; 5.9	

Order No. 70440 (8693)

A-187

9808337

02208

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394 / 7803

SITE NAME: MCRD Parris Island

SAMPLERS (SIGNATURE): H Henley, Seth Pelopto

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL PEST/PCBs	TCL METALS & Hardness	Cyanide	NO3/NO2	TDS, TSS, Cl, F, SO4	Cr +6	TOC	REMARKS
1	8/12/98	1340		X	Source Water Swmu 01,02,03	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	Job# 7394
2	8/12/98	1345		X	Source Water Swmu 10	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	Job# 7803
3					trip blank		✓									

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
H Henley					
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		Jane A Smith	8/13/98 8:35		

Order No. 78440 (0693)

A-188

CHAIN OF CUSTODY RECORD 9809292 09-11-98 02288

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Palepko

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest./PCBs	TAL Metals	TCLP Metals	COD	Oil and Grease	Corrosivity (pH only)	TDS, TSS	Reactivity	REMARKS
2	9/11/98	1150	✓		PAI-01-IDW-S	6		1	1	1	1			1		1	*
1	9/11/98	1237	✓		PAI-02-IDW-S	6		1	1	1	1			1		1	*
6	9/11/98	1329	✓		PAI-03-IDW-S	6		1	1	1	1			1		1	*
	9/11/98	1410	✓		PAI-123-IDW-W			2	2	1		1	1	1			
	9/11/98	1410		✓	PAI-123-IDW-W		3										
											6P 09-11-98						

25

A-189

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth Palepko	09/11/98 1532				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		Tom Johnson	9/12/98	*all soils reactive with preservative	

Order No. 70440 (0693)

02293

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Grain Size	Bulk Density	Atterberg Limit	Natural Moisture Content	Porosity	Specific Gravity	REMARKS
	9/14/98	1200		✓	PAI-01-SB-005	1	✓	✓		✓			(4'-6')
	9/14/98	1253		✓	PAI-01-SB-002	1	✓	✓		✓			(4'-6')
	9/14/98	1259		✓	PAI-01-SB-003	1	✓	✓		✓			(4'-6')
	9/14/98	1500		✓	PAI-01-SD-002-02	1	✓	✓		✓			(0.5'-1.0')

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	9/14/98 1700	[signature] 9/15/98			
RELINQUISHED BY (SIGNATURE): FedEx	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	

A-190

#4804521

CHAIN OF CUSTODY RECORD

02294

PROJECT NO.: 7394

SITE NAME: MCRD Parris Island, SC

SAMPLERS (SIGNATURE): Mark W[illegible] / Seth Pe[illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	BOD & Reactivity	Fecal Coliform	TCL SVOCs & Pesticide PCBs	TAL Metals & CN, AVS/SEM	TOC & pH	REMARKS
1)	9/14/98	1000	✓	✓	PAI-01-IDW-S	5	5						Site 1 Soil IDW
2)	9/14/98	1029	✓	✓	PAI-02-IDW-S	5	5						Site 2 Soil IDW
3)	9/14/98	1032	✓	✓	PAI-03-IDW-S	5	5						Site 3 Soil IDW
	9/14/98	1045	✓	✓	PAI-123-IDW-W	2		1	1				Sites 1, 2, & 3 (Decon.) Water IDW
4)	9/14/98	1315		✓	PAI-01-SD-002-02	3	5			1	1	1	
5					TRIP BLANK		X						
													Note: ① TCL VOCs containers are Encore® sampling devices, ~~except~~
(*)	9/14/98				Trip Blanks	2	2						
(*)	9/14/98				Temperature Blank	1	—	—	—	—	—	—	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Mark W[illegible]	9/14/98 1635				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[illegible] Smith	9/15/98 8:35		

Order No. 70440 (0693)

A-161

02256

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): [signature] Craig J. Hanson

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC+HCl 40 mL	TPH QUICK 1000 mL AMBER	TPH METALS+ANIS 1000 mL PLASTIC	BOTH CN+NaOH 250 mL PLASTIC	TCL TOX TPCB 1L AMBER	Hex Cr 1L PLASTIC	REMARKS
	06/30/98	1500		✓	PAI02RB01	10	✓	✓	✓	✓	✓	✓	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	063098 1700				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	07/01/12:2		

A-192

02254

10

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7399

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Cindy J. Hamm, R.A. Markowski, P.G.

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs (8260B-5)	TCL SVOCs	TAL METALS (TOTAL)	CYANIDE	TCL PEST/PCBs	HEX Cr	REMARKS
	06/30/98	1310		✓	PAI025500101	6	✓	✓	✓	✓	✓	✓	
	06/30/98	1250		✓	PAI025500601	6	✓	✓	✓	✓	✓	✓	
	06/30/98	1305		✓	PAI025500801	6	✓	✓	✓	✓	✓	✓	
					Trip Blank	2	~~Run~~	✓	~~Run~~	✓	✓		Anal. TCL VOC only
					Temp. Blank	1							Temperature.

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
R.A. Markowski	063098 88				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): R. H. [illegible]	DATE / TIME: 6-7-98 1130	REMARKS: [illegible] 56.290 5.90	

Order No. 70440 (0693)

A-43

CHAIN OF CUSTODY RECORD

9809265

02280

PROJECT NO.: 7803

SITE NAME: MCRD Parris Island, SC

SAMPLERS (SIGNATURE): Steve Barton

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pes/PCBs	TAL Diss. Metals	TAL Total Metals/Hardness	CN	AVS/SEM	TOC	pH	REMARKS
1)	9/9/98	1449	1	✓	PAI-10-SS-015-01	8	5	✓	✓		✓	✓	✓			VOCs (encores)
2)	↓	1440		✓	PAI-10-SS-016-01	8	5	✓	✓		✓	✓	✓			collected on 9/10/98
3)	↓	1455		✓	PAI-10-SS-017-01	8	5	✓	✓		✓	✓	✓			
4)	9/9/98	1527		✓	PAI-10-SD-016-01	8	5	✓	✓		✓	✓	✓	✓	✓	soils are
5)	↓	1623		✓	PAI-10-SD-017-01	8	5	✓	✓		✓	✓	✓	✓	✓	reactive
6)	↓	1641		✓	PAI-10-SD-018-01	8	5	✓	✓		✓	✓	✓	✓	✓	↓
7)	9/10/98	1242		✓	PAI-10-SW-016-01	12	4	2	2	1	1	1		1		
	↓	1421		✓	PAI-10-SW-017-01	12	4	2	2	1	1	1		1		
	↓	1503		✓	PAI-10-SW-018-01	12	4	2	2	1	1	1		1		
					Trip Blanks	2										
					Temp Blanks	4										

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Steve Barton	9/10/98 2000	Fed Ex			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): Yvonne A Smith	DATE / TIME: 9/11/98 8:50	REMARKS: for soil & sediment samples 16oz jars were collected on 9/9/98, encores on 9/10/98 due to holding time constraints.	

Order No. 78440 (0693)

A-194

CHAIN OF CUSTODY RECORD 9809265 02278

PROJECT NO.: 7803

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Pelopter / Mark V. Day

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest./PCBs	TAL Metals	TCLP Metals	Reactivity	BOD	Corrosivity (pH only)	TDS, TSS	COD	Oil and Grease	Fecal Coliform	REMARKS
7)	9/10/96	~~1630~~ 1550		✓	PAI-10-IDW-S	5	5												
8)	9/10/96	1630	✓		PAI-10-IDW-S	6		1	1	1	1	1	1						
	9/10/96	1630	✓		PAI-10-IDW-W	13	3	2	2	1		1	1	1	1	1			

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth Pelopter	9/10/96 1647				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): Rosella Smith	DATE / TIME: 9/11/96 8:55	REMARKS: Soils reactive with preservative	

Order No. 70440 (0693)

A-195

CHAIN OF CUSTODY RECORD

02202 6

PROJECT NO.: 7803

SITE NAME: Jericho Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TOC, PH						REMARKS
1	7/24/93		X		PAE-10-SB-001-~~24~~ 22	1							~~24~~ 22-26 FT
													NOT ENOUGH SOIL REC. FROM
													ANY SPOON HAD TO
													COMPOSITE W/IN SCREEN
													INTERVAL

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	7/24/93 1700				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	7-25-93 1810	5.9	

Order No. 78448 (0693)

A-196

CHAIN CUSTODY RECORD

022

PROJECT NO.:	SITE NAME:
7803	JERICHO Island

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TOC	PH					REMARKS
1	7/23/15	0815		X	PAI-10-SB-002-10	1	✓						1-16 OZ JAR

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
	7/23/15 1400				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
			7-24-15 11:30		

Order No. 70440 (0693)

A-197

CHAIN CUSTODY RECORD

022

9

PROJECT NO.:	SITE NAME:
7803	Jericho Island
SAMPLER(SIGNATURE):	

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	PH, TOC						REMARKS
1	7/23/98	0730		X	PAI-10-SB-006-06	1	✓						1-16oz
2	7/23/98	0730 1634		X	PAI-10-SB-007-24.	1	✓						1-16oz

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
	7/23/98 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
			7/23/98 1600		

no seal 3.8

Order No. 70440 (0693)

A-168

00255

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7374

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC	Encore (5)	TCL SVOC	TAL Metals + CN	TCL Pest/PCB	TOC, pH	Hex Cr	REMARKS
	05/19/98	1315		✓	PAI 03 SS 01001	6	✓	✓	✓	✓			✓	
	05/19/98	1330		✓	PAI 03 SS 00901	6	✓	✓	✓	✓				
	05/19/98	1353		✓	PAI 03 SS 00701	6	✓	✓	✓	✓			✓	
	05/19/98	1406		✓	PAI 03 SS 00601	6	✓	✓	✓	✓				
	05/19/98	1432		✓	PAI 03 SS 01401	6	✓	✓	✓	✓				
	05/19/98	0600		✓	PAI 03 SS 01401 D	6	✓	✓	✓	✓				
	05/19/98	1630		✓	PAI 03 SD 02301	6	✓	✓	✓	✓				

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	051998 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		P. [signature]	5/20/98 1130		

Order No. 70440 (1/91)

56286 4.4°
56548 4.8

A-199

60

00254

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [signature] [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC + TICs 40 ml.	TCL SVOC 1000 ml. Amber	TAL Metals + HNO3 1000 ml. Plastic	TCL Pest/PCB 1000 ml. Amber	Cn + Hg 250 ml. Plastic	TAL Metals + HNO3 Dissolved 1000 ml. plastic	Hex Cr. 1000 ml. plastic	REMARKS
	05/19/98	16:45		✓	PAI 03 SW 023	10	✓	✓	✓	✓	✓	✓		
	05/19/98	09:30		✓	PAI 03 R1302	RUN #10	✓	✓	✓	✓	✓		✓	Shovel QA/QC
					Trip Blank	2	✓							In Cooler #1 only
					Temp Blank									each cooler

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	05/19/98 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): P. Buhl	DATE / TIME: 5/20/98 1130	REMARKS:	

Order No. 70440

A-200

010

00274

CHAIN OF CUSTODY RECORD

PROJECT NO.: 1394

SITE NAME: Parris Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Lead	TCL PCBs					REMARKS
1	6/15/98	0846		X	PAF-15-RB01	3	✓	✓					Rinse Blank For -
													PAF-15-SS-005
													PAF-15-SS-006
													PAF-15-SS-007
					Temp Blank.								Each Cooler of 3

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	6/15/98 0900				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): [signature]	DATE / TIME: 6/16/98 1055	REMARKS: 20 Seal 56316	

Order No. 70440 (0693)

A-201

Cooler 343

00272

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD - Parris Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Lead	Tot Pcba					REMARKS
1	6/4/98	1032		X	PAI-15-SS-001-01	1	✓	✓					
2	6/4/98	1043		X	PAI-15-SS-002-01	1	✓	✓					
3	6/4/98	1051		X	PAI-15-SS-003-01	1	✓	✓					
4	6/4/98	1057		X	PAI-15-SS-004-01	1	✓	✓					
5	6/4/98	0929		X	PAI-15-SS-005-01	1	✓	✓					
6	6/4/98	0934		X	PAI-15-SS-006-01	1	✓	✓					
7	6/4/98	0940		X	PAI-15-SS-007-01	1	✓	✓					

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	6/5/98 834				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: 1-7	
		[signature]	6/16/98 1045	Seal 56340	

Order No. 70440 (0693)

A-202

26

00273

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD-Parris Island

SAMPLERS (SIGNATURE): J Riffy, A Hunter

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL PCBs	TAL Metals Total	TCL SVOCs	TCL Pesticides			REMARKS
1.	6/15	1016	X		PAI-15-SD-001-01	1	✓	✓	✓	✓			
2	6/15	1101	X		PAI-15-SD-002-01	1	✓	✓	✓	✓			
~~3.~~	~~6/15~~		~~X~~		~~PAI-15-SD-003-01~~	~~1~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~			
		15 30		✓	PAI15RB02	5	✓	✓	✓	✓			Rinse Blank.
					1800								

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
A Hunter	6/15 1800				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): R. Hesse	DATE / TIME: 6/16/98 12:25	REMARKS:	

Order No. 70440 (0693)

A-203

25

00241 5

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: Parris Island

SAMPLERS (SIGNATURE): [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAHs	TAL Metals	TCL Pesticides	TCL VOCs, TCL SVOCs	TAL Metals (Cd) & Cyanide	TCL PCBs / Pesticides, TOC, Ph, PAH	REMARKS
1	4/21/99	1301		X	PAI-01-SS-015	1	✓	✓	✓				
2	4/21/99	1318		X	PAI-01-SS-016	1	✓		✓				
3	4/21/99	0855		X	PAI-01-SD-016	1	✓	✓	✓				
4	4/21/99	0815		X	PAI-01-SD-014	1	✓	✓	✓				
5	4/21/99	0958		X	PAI-01-SD-013	1	✓	✓	✓				
6	4/21/99	0958		X	PAI-01-SD-013-D	1	✓	✓	✓				
7	4/21/99	0830		X	PAI-01-SD-015	1	✓	✓	✓				
8	4/21/99	1035		X	PAI-01-SD-017	1	✓	✓	✓				
9	4/21/99	1145		X	PAI-01-SD-001	1				✓	✓	✓	CALL 1-800-245-2730
													EXT 8375 To confirm
													Parameters w/ Dave Breyack

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]	4/21/99 1400	FED X overnight			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[illegible]	4/22/99 0850	call DAVE Breyack To confirm Parameters for PAI-01-SD-001	

Order No. 70440 (0693)

62134 Seal

A-204

A-12

BACKGROUND SAMPLE DESCRIPTION, LOCATION, AND SUPPORTING COLLECTION DATA

BACKGROUND SAMPLE DESCRIPTION
PARRIS AND PINCKNEY ISLANDS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample Location	Sample Description
Surface Water	
PAI-01-SW-05*	Saline surface water sample collected on the northern edge of Pinckney Island at a submerged low tide elevation point.
PAI-01-SW-06*	Saline surface water sample collected in an intertidal area approximately 50 ft west of PAI-01-SW-05.
PAI-01-SW-07*	Saline surface water sample collected from flowing water at a point southwest of PAI-01-SW-05 and PAI-01-SW-06 over a high tide tidal flat in the marsh area.
PAI-10-SW-16	Saline surface water sample collected from a tidal stream adjacent to the Broad River, along the southwestern edge of Parris Island.
PAI-10-SW-17	Saline surface water sample collected from a tidal stream adjacent to the Broad River, along the southwestern edge of Parris Island.
PAI-10-SW-18	Saline surface water sample collected from a tidal stream adjacent to the Broad River, along the southwestern edge of Parris Island.
Sediment	
PAI-01-SD-05*	Sediment sample collected from the northern edge of Pinckney Island at a submerged low tide elevation point. Sample consisted of fine/medium grain sand.
PAI-01-SD-06*	Fine, medium grain sand sample collected in an intertidal area approximately 50 ft west of PAI-01-SD-05.
PAI-01-SD-07*	Collected from flowing water at a point west of PAI-01-SD-05 and PAI-01-SD-06, over a high tide tidal flat in the marsh area. Sample consisted of fine/medium grain sand.
PAI-10-SD-16	Silty clay sediment sample collected on the southwestern edge of Parris Island, near the Broad River
PAI-10-SD-17	Sediment sample with clay mud consistency collected approximately 500 ft south of the Ballast Creek on the southwestern edge of Parris Island.
PAI-10-SD-18	Sediment sample with clay mud consistency collected approximately 500 ft northeast of location PAI-10-SD-17.
Surface Soil	
PAI-01-SS-01*	Soil sample with fine/medium grain sand collected on the northern edge of Pinckney Island.
PAI-01-SS-02*	Located east of PAI-01-SS-01, consisting of fine/medium grain sand.
PAI-01-SS-03*	Fine/medium grain sand sample located southeast of PAI-01-SS-01.
PAI-10-SS-15	Silty, fine sand sample collected in a forest area on the southwestern edge of Parris Island.
PAI-10-SS-16	Collected in a forest area on the southwestern edge of Parris Island, approximately 600 ft northwest of PAI-01-SS-15. Surface soil sample consisted of silty fine sand.
PAI-10-SS-17	Silty, fine sand sample collected in a forest area on the southwestern edge of Parris Island, approximately 250 ft north of PAI-10-SS-16.

* Sample locations selected with input from the United States Fish and Wildlife Service. Additional description of samples and locations are provided on sample log sheets.

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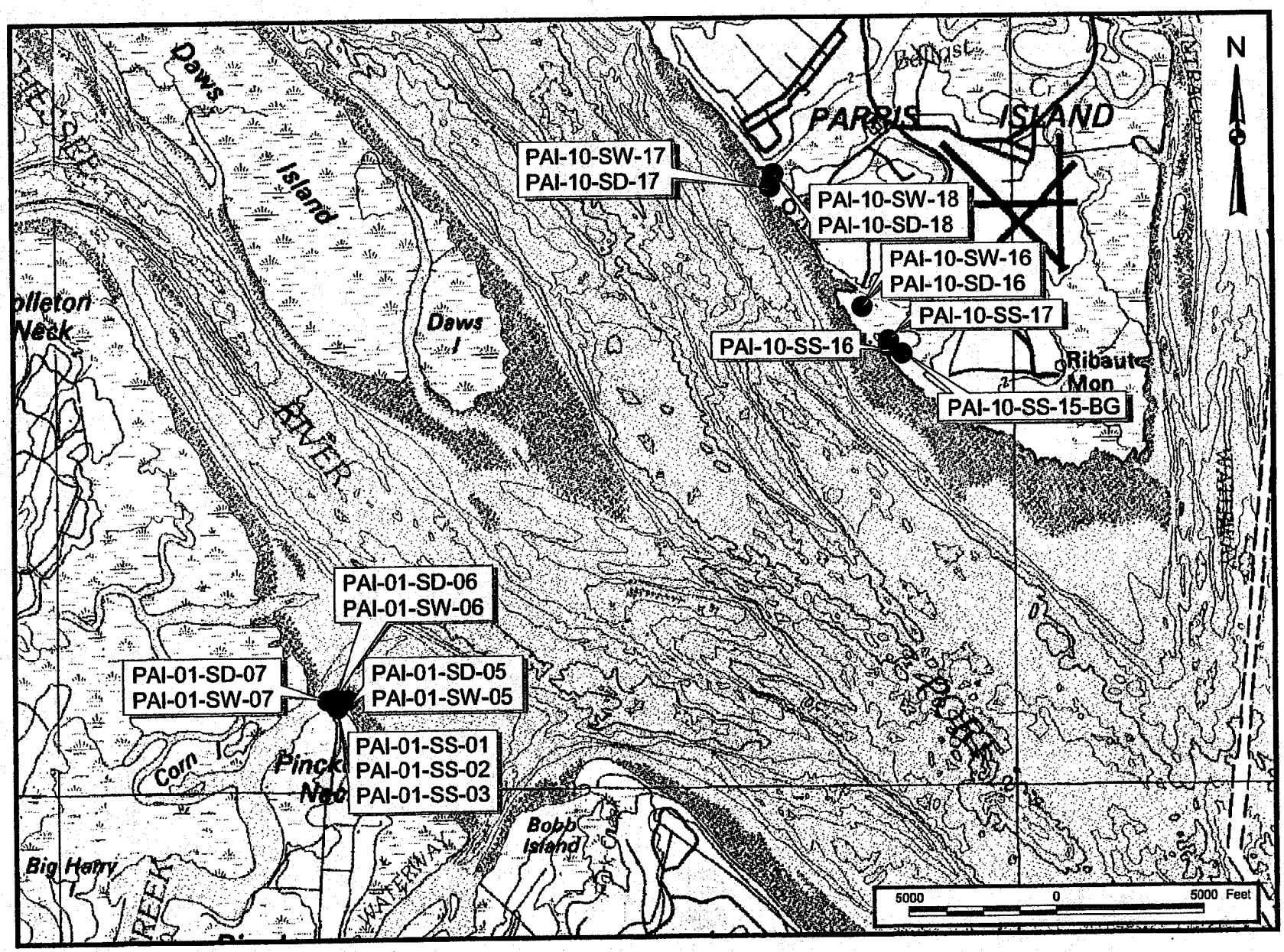
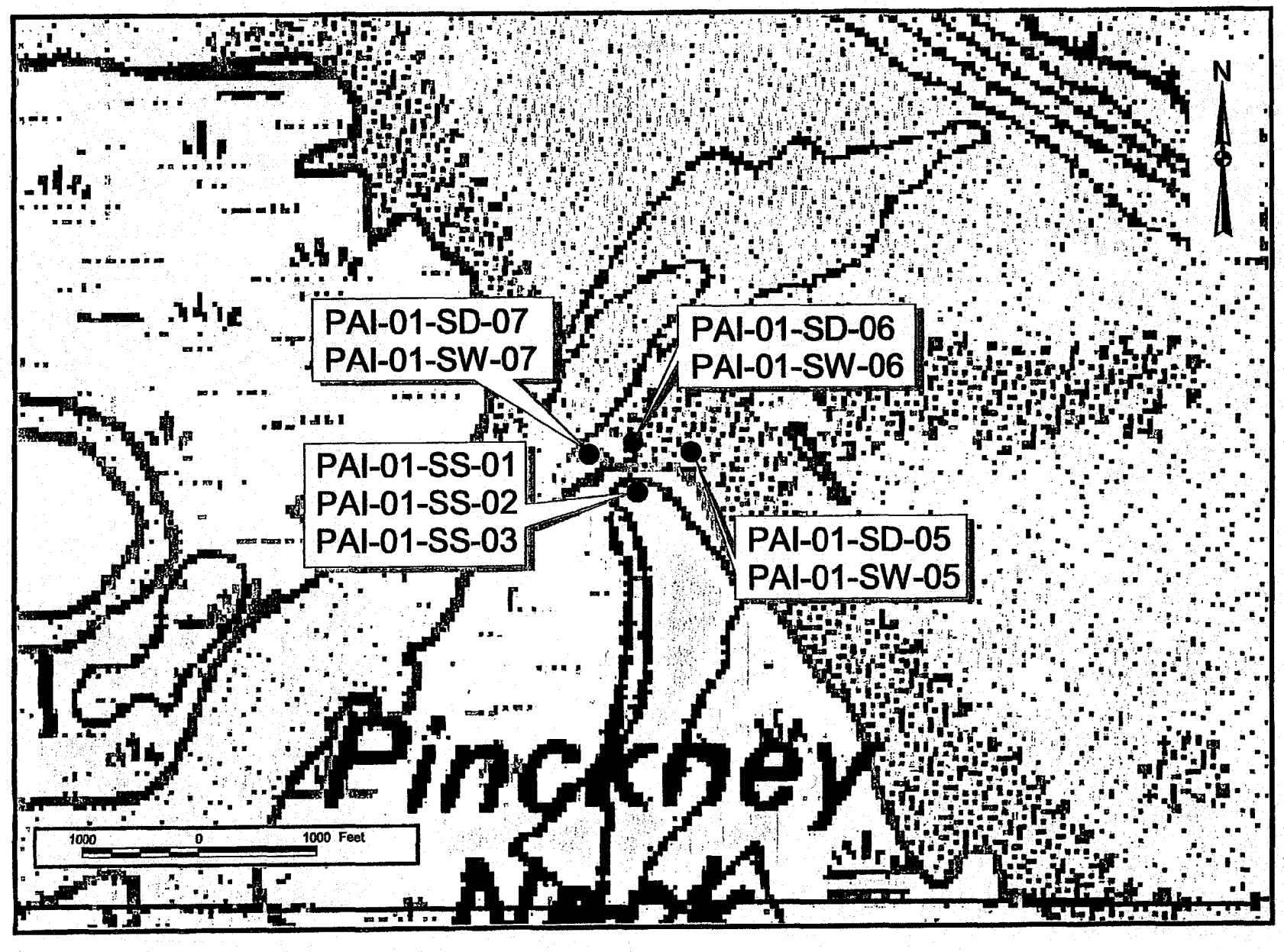

PAI-10-SW-17
PAI-10-SD-17
PAI-10-SW-18
PAI-10-SD-18
PAI-10-SW-16
PAI-10-SD-16
PAI-10-SS-17
PAI-10-SS-16
PAI-10-SS-15-BG
PAI-01-SD-06
PAI-01-SW-06
PAI-01-SD-07
PAI-01-SW-07
PAI-01-SD-05
PAI-01-SW-05
PAI-01-SS-01
PAI-01-SS-02
PAI-01-SS-03
PARRIS
ISLAND
Daws
Island
Daws
I
RIVER
Ribaut
Mon
Corn
Bobb
Island
Big Harry
WATERWAY
N
5000
0
5000 Feet

A-207

PAI-10-SW-17
PAI-10-SD-17
PAI-10-SW-18
PAI-10-SD-18
Parris Island
Airport
N
PAI-10-SW-16
PAI-10-SD-16
PAI-10-SS-17
PAI-10-SS-16
PAI-10-SS-15-BG
1000 0 1000 Feet

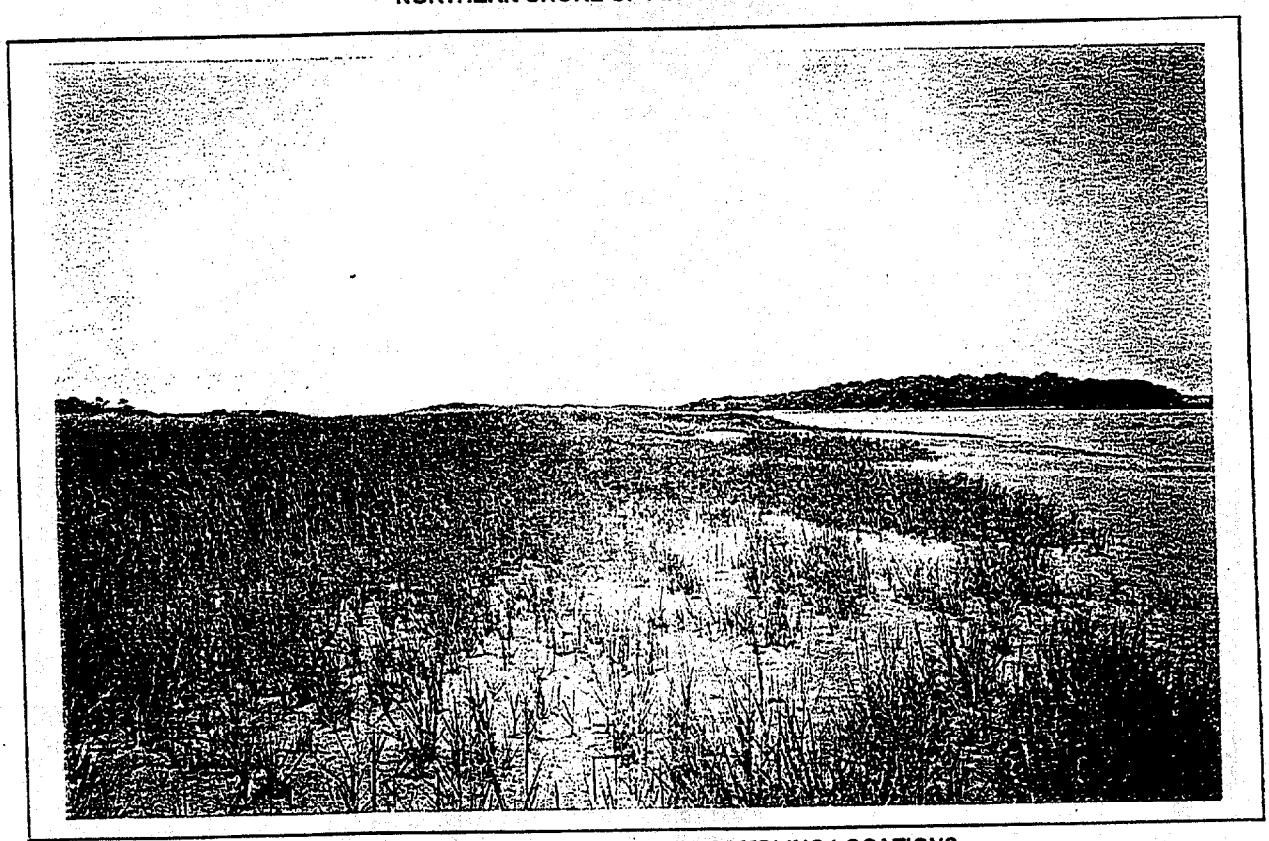
A-208


N
PAI-01-SD-07
PAI-01-SW-07
PAI-01-SD-06
PAI-01-SW-06
PAI-01-SS-01
PAI-01-SS-02
PAI-01-SS-03
PAI-01-SD-05
PAI-01-SW-05
Pinckbey
1000 0 1000 Feet

A-209

PHOTOS - BACKGROUND SAMPLE LOCATIONS

SURFACE SOIL LOCATION IMMEDIATELY ADJACENT TO THE NORTHERN SHORE OF PINCKNEY ISLAND.



SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS IN INTERTIDAL ZONE OF PINCKNEY ISLAND.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI 01 SW-05
Sample Location: Pinckney Is.
Sampled By: RLM / JFL
C.O.C. No.: 01366

- [ ] Stream
- [ ] Spring
- [ ] Pond
- [ ] Lake
- [x] Other: – TIDAL STREAM
- [ ] 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: 052798								
Time: 1240								
Depth:								
Method: Grab		7.7	39	28	8	10.3	2.5	

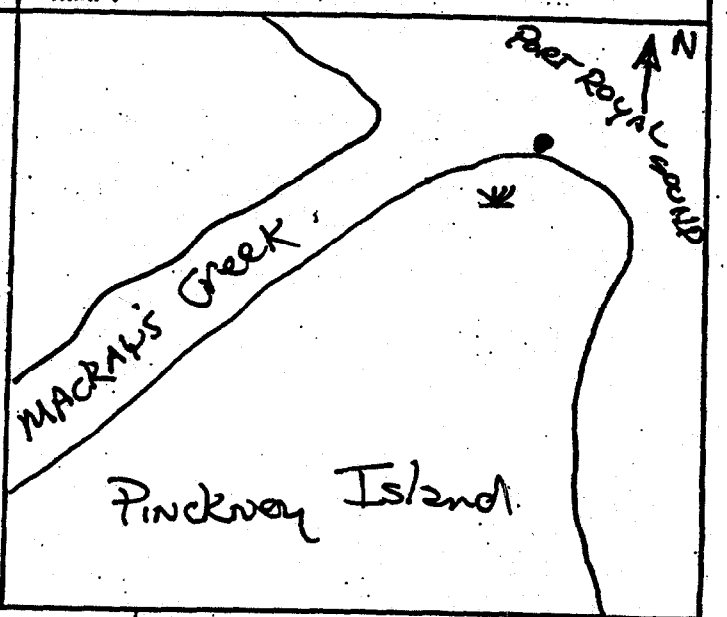
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H2SO4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

Sample area chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI01 SW06
Sample Location: Pinckney Is.
Sampled By: RCM/JFL
C.O.C. No.: 01306

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

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

SAMPLING DATA:

Date: 052798 / Time: 1330	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: / Method: Grab		7.7	38	29	36	9.1	2.5	

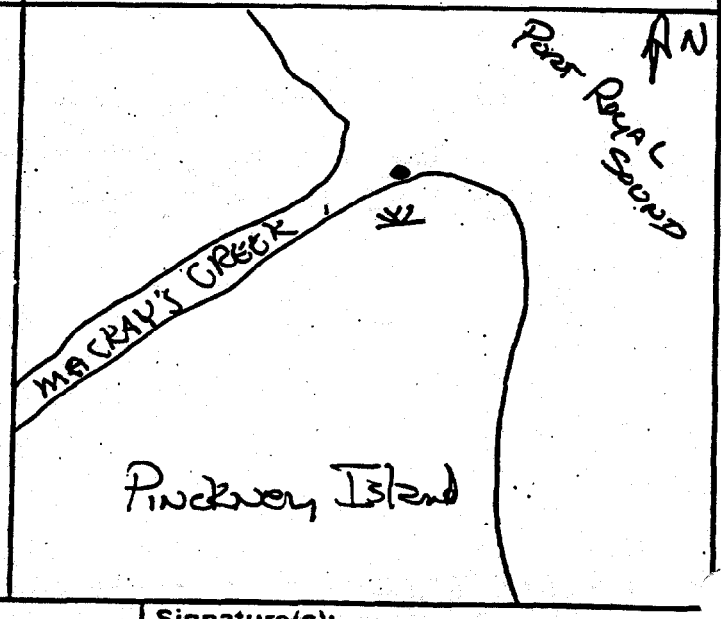
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H_2SO_4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

Sample area Chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI 01 SW 07
Sample Location: Pinckney Is.
Sampled By: RLM / JFL
C.O.C. No.: 01364

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

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

SAMPLING DATA:

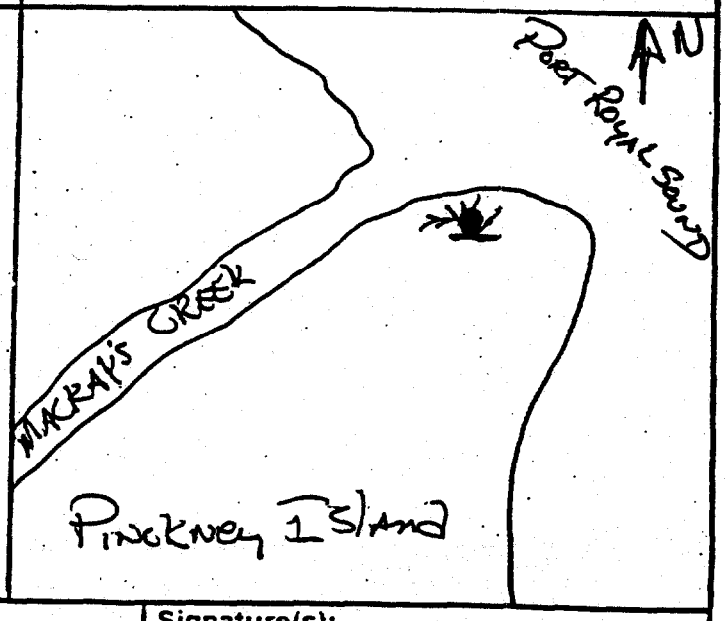
Date: / Time: / Depth: / Method: Grab	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
		6.8	38.0	31	18	11.4	2.4	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H2SO4	1000 plastic	1
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: PAI-10-SW-16-01
Sample Location: PAI-10-SW16
Sampled By: Skip Barton
C.O.C. No.: 2280

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

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

SAMPLING DATA:

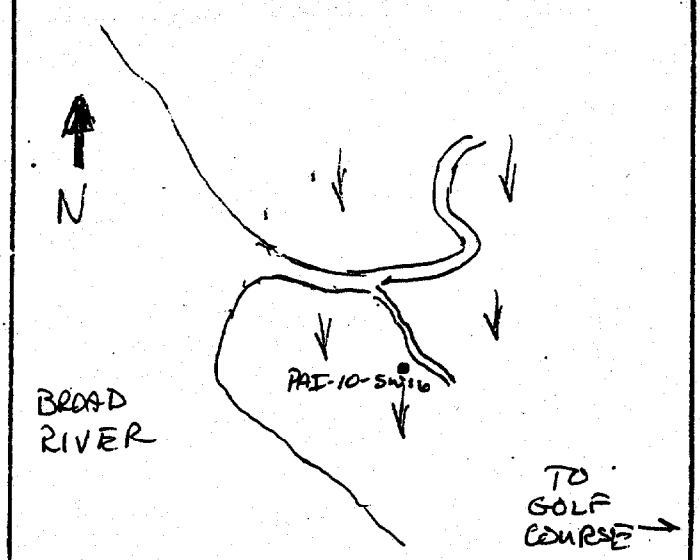
	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Date: 091098 Time: 1242 Depth: surface Method: Grab	cloudy	6.72	44.3	27.4	7	3.25	2.87	secci disk 0.75 ft.

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40 VOAs	~~3~~ 4
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals/Hardness	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NaOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H2SO4	1000 plastic	1
~~pH~~		~~1000 plastic~~	~~1~~

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: PAI-10-SW-17-01
Sample Location: PAI-10-SW17
Sampled By: Skip Barton
C.O.C. No.: 2280

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

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

SAMPLING DATA:

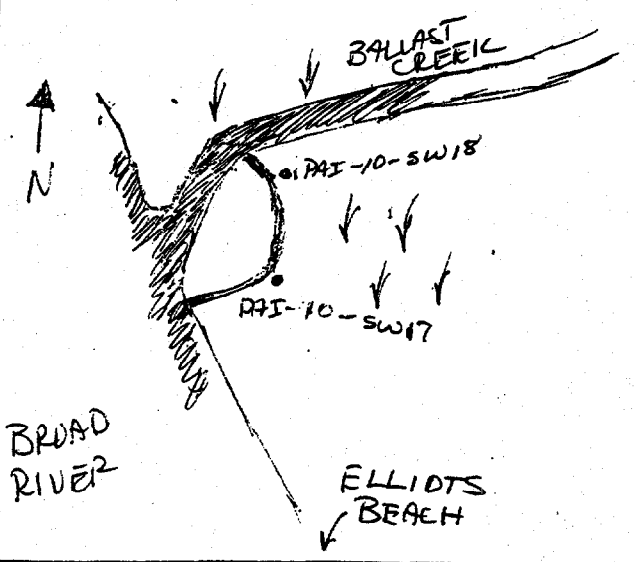
Date: 09/10/98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1421	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: Surface								
Method: Grab	Clear	7.65	44.7	28.7	-9	4.64	2.91	Secci disk 1.88 ft

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40 VOAs	~~3~~ 4
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NaOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H_2SO_4	1000 plastic	1
~~pH~~		~~1000 plastic~~	~~1~~

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

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

Sample ID No.: PAI-10-SW-18-0
Sample Location: PAI-10-SW18
Sampled By: Skip Benton
C.O.C. No.: 2250

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

SAMPLING DATA:

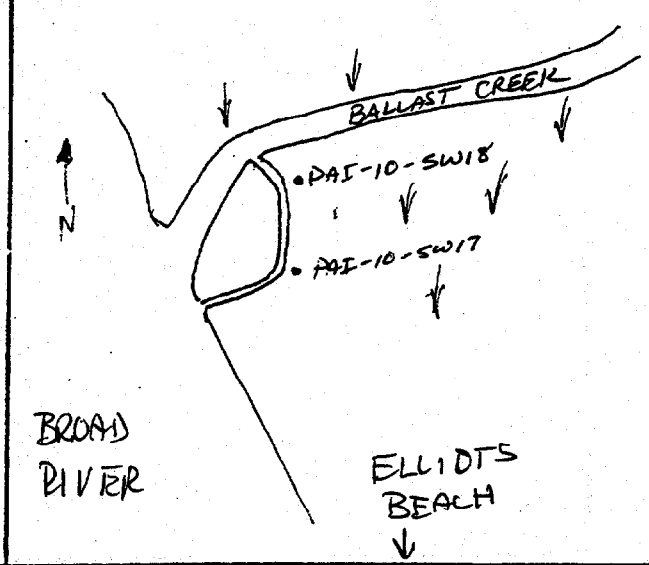
Date: / Time:	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: / Method: Grab	Cloudy	7.51	44.5	28.4	23	3.79	2.91	secci disk 0.26 ft.

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	~~3~~ 4
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H2SO4	1000 plastic	1
~~pH~~		~~1000 plastic~~	~~1~~

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Benton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

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

Sample ID No.: PAI 01 SD05
Sample Location: Pinckney Is.
Sampled By: RLM / JPL
C.O.C. No.: 01307

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 052798 Time: 1240 Method: Grab Monitor Reading (ppm):	0-6"	lt. br. - blk.	fn.-med. gr. sd.

COMPOSITE SAMPLE DATA:

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

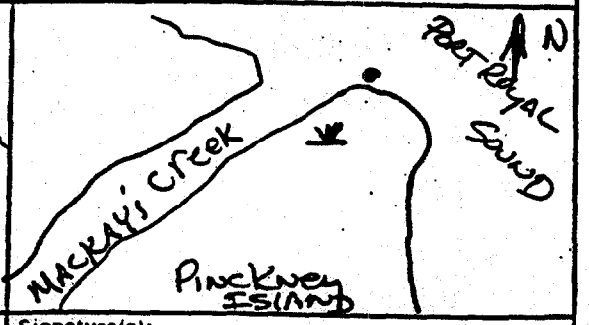
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	16oz	✓	
TAL METALS (TOTAL)	16oz	✓	
CYANIDE	16oz	✓	
TCL PESTICIDES / PCBs	16oz	✓	
TOC	16 oz	✓	
pH	16oz	✓	
~~HEXAVALENT CHROMIUM~~	16oz		

OBSERVATIONS / NOTES:

Sample Area Chosen by Diane Duncan of SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI 01 SD06
Sample Location: Pinckney Is.
Sampled By: RLM/JFL
C.O.C. No.: 01307

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

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

GRAB SAMPLE DATA:

Date:	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1330	0-6"	Hbr.-blk.	fn.-med. gr. sd.
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

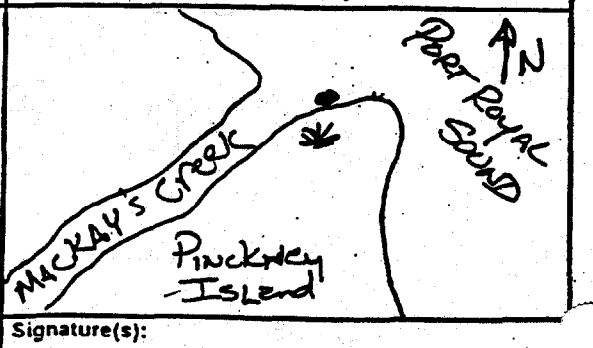
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.s	5 ENCORE SAMPLES	✓	
TCL SVOC.s	1/6 oz	✓	
TAL METALS (TOTAL)	1/6 oz	✓	
CYANIDE	1/6 oz	✓	
TCL PESTICIDES / PCBs	1/6 oz	✓	
TOC	1/6 oz	✓	
PH	1/6 oz	✓	
~~HEXAVALENT CHROMIUM~~	~~1/6 oz~~		

OBSERVATIONS / NOTES:

Sample Area Chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI01 SD07
Sample Location: Pinckney Isle
Sampled By: RLM/JCL
C.O.C. No.: 01307

[] 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: 052798 Time: 1400 Method: Grab Monitor Reading (ppm):	0-6"	br.-blk.	fn.-med. gr. sd.

COMPOSITE SAMPLE DATA:

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

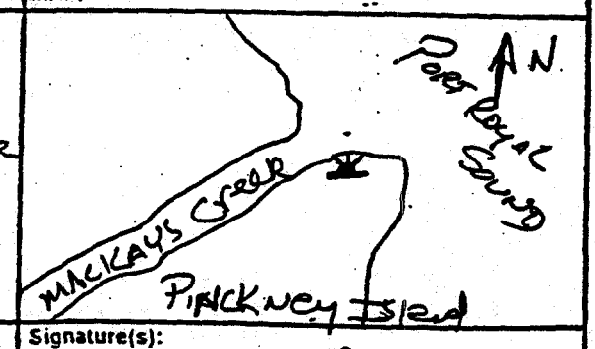
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16oz	✓	
TAL METALS (TOTAL)	16oz	✓	
CYANIDE	16oz	✓	
TCL PESTICIDES / PCBS	16oz	✓	
TOC	16oz	✓	
pH	16oz	✓	
~~HEXAVALENT CHROMIUM~~	~~16oz~~		

OBSERVATIONS / NOTES:

Sample Area Chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

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

Sample ID No.: PAI-10-SD-16-01
Sample Location: PAI-10-SD16
Sampled By: Shop Barton
C.O.C. No.: 2080

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 090998 Time: 1527 Method: GRAB Monitor Reading (ppm):	0-0.5 ft.	drk. gray	silty clay, v. moist

COMPOSITE SAMPLE DATA:

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

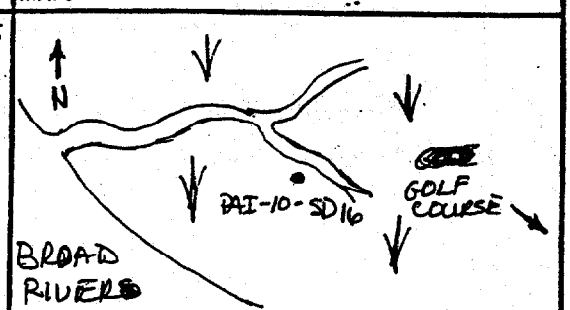
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	5	
TCL SVOCs	16 oz	TOTAL OF 3	
TAL METALS (TOTAL)	16 oz	16 OZ JARS	
CYANIDE	16 oz		
TCL PESTICIDES / PCBs	16 oz		
TOC	16 oz		
pH	16 oz		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES COLLECTED @ 0900 on 091098

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Shop Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD - Jericho Island
Project No.: 7803

Sample ID No.: ~~PAI-10-SD-01G-01A~~ PAI-10-SD-16-01A
Sample Location: PAI-10-SD16
Sampled By: GG, RD
C.O.C. No.: ~~2212~~ 2212

- [ ] 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: 12/15/98 Time: 1245 Method: Grab Monitor Reading (ppm): N/A	0. -0.5 Ft	dark Gray	Silty Clay, v. moist

COMPOSITE SAMPLE DATA:

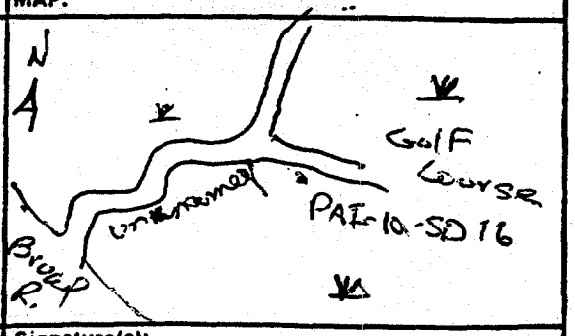
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH - SD846 - 8310	1	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

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

Sample ID No.: PAI-10-SD-17-01 ~~PAI-10-SD-017-01~~
Sample Location: PAI-10-SD17
Sampled By: [signature]
C.O.C. No.: 2280

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

GRAB SAMPLE DATA:

Date: 090998	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:	0-0.5 ft.	dark gray/ black	clay mud, saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

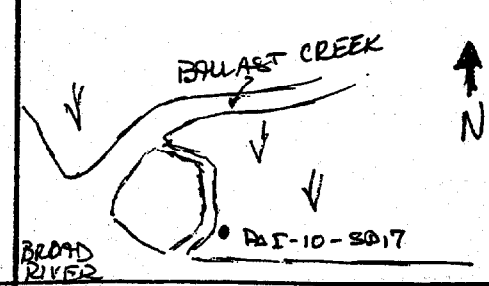
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	1/6 oz	Total of 3	
TAL METALS (TOTAL)	1/6 oz	16 oz jars	
CYANIDE	1/6 oz	↓	
TCL PESTICIDES / PCBS	1/6 oz		
TOC	1/6 oz		
pH	1/6 oz	↓	
~~HEXAVALENT CHROMIUM~~	~~1/6 oz~~		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES WERE COLLECTED @ 1429 ON 09.098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD - Jericho Island
Project No.: 7803

Sample ID No.: PAI-10-SD-17-01A ~~PAI-10-SD-017-01A~~
Sample Location: PAI-10-SD17
Sampled By: GG, RD
C.O.C. No.: 2212

[ ] 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: 12/15/98 Time: 1200 Method: Grab Monitor Reading (ppm): NA	0-0.5FT	Dark Gray Black	Clay mud, saturated

COMPOSITE SAMPLE DATA:

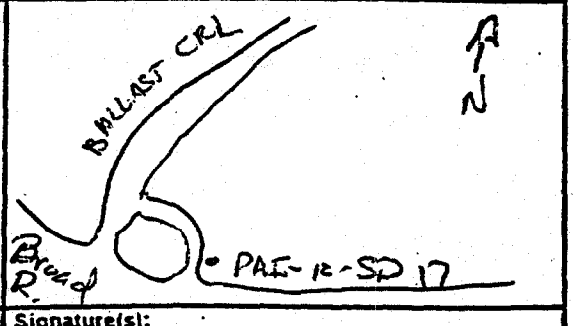
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH - SW 846 - 8310	1 - 8oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Gary L. Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

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

Sample ID No.: PAI-10-SD-18-01 ~~PAI-10-SD-018-01~~
Sample Location: PAI-10-SD18
Sampled By: [illegible]
C.O.C. No.: 2280

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

GRAB SAMPLE DATA:

Date: 090998	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time:	0-0.5 ft	dark. gray	clay mud, saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

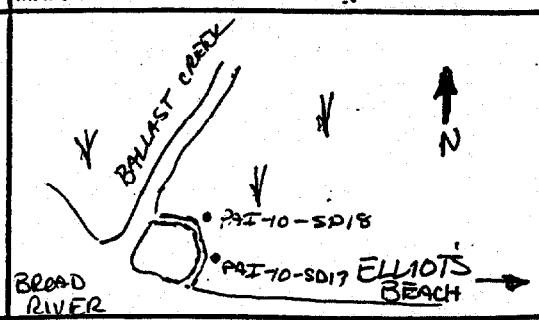
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE Samples	5	
TCL SVOC.A	~~1~~ 16oz	Total of 3	
TAL METALS (TOTAL)	~~1~~ 16oz	16 oz Jars	
CYANIDE	~~1~~ 16oz		
TCL PESTICIDES / PCBS	~~1~~ 16oz		
TOC	~~1~~ 16 oz		
pH	~~1~~ 16oz		
~~HEXAVALENT CHROMIUM~~	~~1~~ 16oz		

OBSERVATIONS / NOTES:

Due to shipping constraints VOC samples were collected @ 1515 on 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD - Jencho Island
Project No.: 7803

Sample ID No.: ~~PAI-10-SD-018-01A~~ PAI-10-SD-18-01A
Sample Location: PAI-10-SD18
Sampled By: RD, GG
C.O.C. No.: 2212

- [ ] 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: 12/15/98 Time: 1200 Method: Grab Monitor Reading (ppm): NA	0-0.5 Ft	dk Gray	Clay mud, Saturated

COMPOSITE SAMPLE DATA:

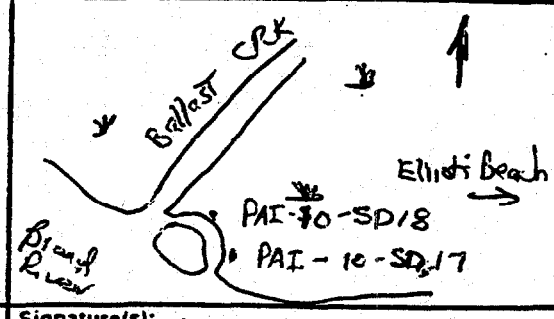
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH SW 846-8310	1 -	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Mary L Hunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI01SS001
Sample Location: Pinckney Is.
Sampled By: RLM/JFL
C.O.C. No.: 00263

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

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

GRAB SAMPLE DATA:

Date: 060198	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1015	0-1'	H.br.	fn.-med. sd., dry
Method: Grab			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

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

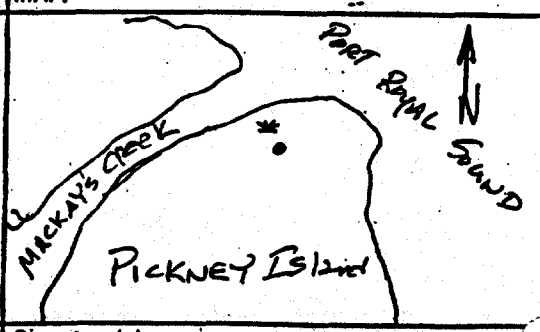
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

Sampling Area chosen by Duane Duncan - South Carolina Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI01SS00201
Sample Location: ~~BE~~ Pinckney Is.
Sampled By: RLM/JFL
C.O.C. No.: 00263

- [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: 060198 Time: 1030 Method: Grab Monitor Reading (ppm): —	0-1'	H.br.	fn.-med. sd. dry

COMPOSITE SAMPLE DATA:

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

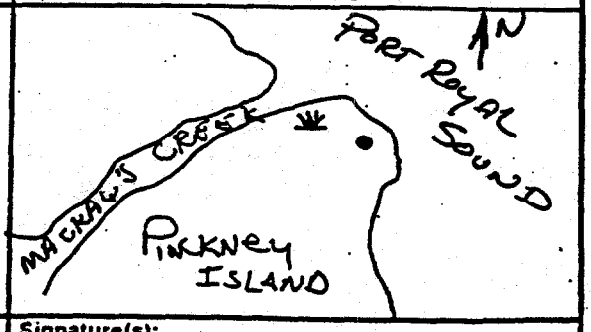
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE Samples	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

Sampling Area Chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7394

Sample ID No.: PAI0SS00301
Sample Location: Pinckney Is.
Sampled By: RUM LIFE
C.O.C. No.: 00263

- [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: 060198 Time: 1055 Method: Grab Monitor Reading (ppm): —	0-1'	H. br.	fn.-med. sd. dry

COMPOSITE SAMPLE DATA:

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

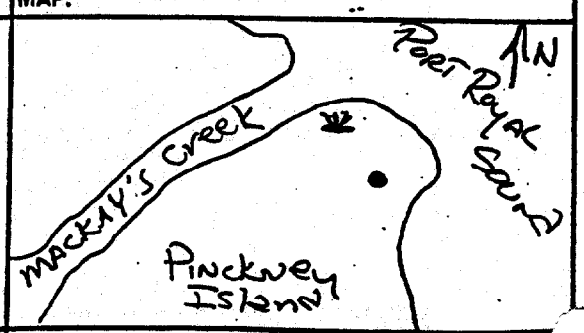
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBS	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

Sampling area chosen by Diane Duncan - SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

Sample ID No.: ~~PAE-10-SS-015-01~~ PAI-10-SS-15-01 BC
Sample Location: PAI-10-SS15
Sampled By: Shep Barton
C.O.C. No.: 2280

[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: 090998 Time: 1419 Method: disp. trowel Monitor Reading (ppm):	0-1 ft.	lt. gray	v. silty fine sand, dry, no odor

COMPOSITE SAMPLE DATA:

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

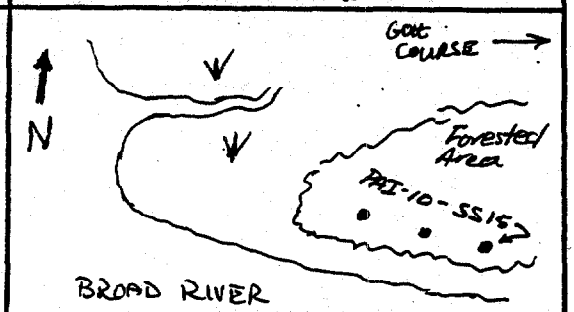
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE Samples	5	
TCL SVOC.A	16 oz	Total of 3	
TAL METALS (TOTAL) AVS/SEM	16 oz	16oz jars	
CYANIDE	16 oz		
TCL PESTICIDES / PCBS	16 oz		
TOC	16 oz		
pH	16 oz		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES WERE COLLECTED @ ~~1444~~ 0813 ON 090198 EB 9/10/98

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Shep Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

Sample ID No.: PAI-10-SS-16-01 ~~PAI-10-SS-016-01~~
Sample Location: PAI-10-SS16
Sampled By: ~~Shep Barton~~
C.O.C. No.: 2280

[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: 090998 Time: 1440 Method: disp. trowel Monitor Reading (ppm): –	0-1 ft.	lt. gray	v. silty fine sand, dry, no odor

COMPOSITE SAMPLE DATA:

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

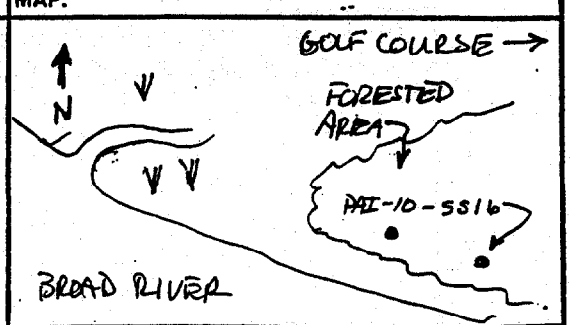
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	16 oz	TOTAL OF 3	
TAL METALS (TOTAL)/AVS/SEM	16 oz	16 oz JARS	
CYANIDE	16 oz		
TCL PESTICIDES / PCBs	16 oz		
TOC	16 oz		
pH	16 oz		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES WERE COLLECTED @ 0825 ON 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

Sample ID No.: PAI-10-SS-17-01 ~~PAI-10-SS-017-01~~
Sample Location: PAI-10-SS17
Sampled By: Shep Barton
C.O.C. No.: 2280

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

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

GRAB SAMPLE DATA:

Date: 090998	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1455	0-1 ft.	lt. gray	silty fine sand, dry, no odor
Method: disp. trowel			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

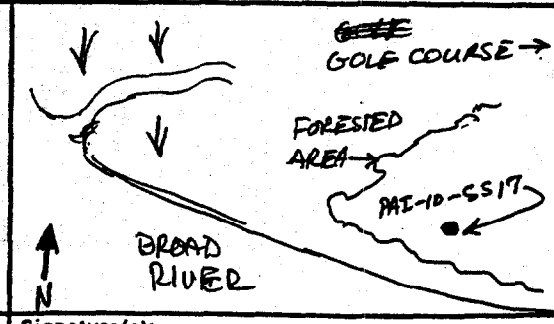
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	16 oz	TOTAL OF 3	
TAL METALS (TOTAL) AVS/SEM	16 oz	16 OZ JARS	
CYANIDE	16 oz		
TCL PESTICIDES / PCBS	16 oz		
TOC	16 oz		
PH	16 oz		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES WERE COLLECTED @ 0835 on 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Barton

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC	TCL Pesticides (S)	TCL SVOC	TAL Metals + CN	TCL Pest/PCB			REMARKS
	0601 98	10 15		✓	PAI01SS00101	6	✓	✓	✓	✓				
	0601 98	10 30		✓	PAI01SS00201	6	✓	✓	✓	✓				
	0601 98	10 55		✓	PAI01SS00301	6	✓	✓	✓	✓				
	0601 98	14 25 pm		✓	PAI41SS00101	6	✓	✓	✓	✓				
	0601 98	16 18		✓	PAI41SS00301	6	✓	✓	✓	✓				
	0601 98	15 35		✓	PAI41SS00401	6	✓	✓	✓	✓				
					Trip Blank	2	✓							Cooler 1 of 2
					Temp. Blank	1								Cooler 1 of 2

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
	060198 1800				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME: 6/6/98 1145	REMARKS: 2.8°C (10.4, 11.3, 6.1) 57.32 ft. no seal	

A-232

01306

29

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: Pine Knob Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC FHEI 40 ml	TCL SVOC 1000 ml Amber	TAL Metals + HNO3 Hardness 1000 ml plastic	TAL Metals + HNO3 Filtered 1000 ml plastic	TCL Pest / PCB 1000 ml Amber	TOC + H2SO4 1000 ml plastic	Cn + NaOH 250 ml plastic	pH 1000 ml plastic	REMARKS
	0527 98	12 40		✓	PAI 01 SW05	12	✓	✓	✓	✓	✓	✓	✓	✓	
	0527 98	13 30		✓	PAI 01 SW06	12	✓	✓	✓	✓	✓	✓	✓	✓	
	0527 98	14 00		✓	PAI 01 SW 07	12	✓	✓	✓	✓	✓	✓	✓	✓	
					Temp. Blank	2									each cooler
					Trip Blank	2	✓								Cooler #1 of 2

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	052798 1845				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	5/28/98 1420		

56356, 56304, 56360

A-233

01307 28

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: Pinckney Island

SAMPLERS (SIGNATURE): [signature] Janet K Laffey

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC Bottles (5)	TCL SVOC 16oz.	TAL Metals + CN 16oz.	TCL pest/PCB 16oz.	TOC, pH 16oz		REMARKS
	05/27/98	12 40		✓	PAI 01 SD 05	6	✓	✓	✓	✓	✓		
	05/27/98	13 30		✓	PAI 01 SD 06	6	✓	✓	✓	✓	✓		
	05/27/98	14 00		✓	PAI 01 SD 07	6	✓	✓	✓	✓	✓		

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	05/27/98 1845				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): [signature]	DATE / TIME: 5/28/98 1420	REMARKS:	

[illegible] 5240 (12.9, 1.6, 7.3)(8.4, 7.0, [illegible]), 6.0°C

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CHAIN OF CUSTODY RECORD

9812418

PROJECT NO.: 7803	SITE NAME: Jencho Island
SAMPLERS (SIGNATURE): Gary L Hunter [illegible]	

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH Suite 8310						REMARKS
15	12/14/98	1240		X	PAI-10-SD-002-01DA	1	✓						Duplicate
16	12/14/98	1240		X	PAI-10-SD-002-01A	1	✓						MS
17	12/14/98	1240		X	PAI-10-SD-002-01DA	1	✓						MSD
18	12/14/98	1507		X	PAI-10-SD-014-02A	1	✓						
19	12/14/98	1458		X	PAI-10-SD-015-01A	1	✓						
20	12/15/98	1200		X	PAI-10-SD-018-01A	1	✓						
21	12/15/98	1200		X	PAI-10-SD-017-01A	1	✓						
22	12/15/98	1245		X	PAI-10-SD-016-01A	1	✓						

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Gary L Hunter	12/15/98 1500				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): Josie A Smith	DATE / TIME: 12/16/98 8:40	REMARKS: Questions to Dave Brayack OTT2 Tech - Pittsburgh 412-921-8375	

Order No. 70440 (0693)

A-235

02280

9809265

OF CUSTODY RECORD

O.: 7803

SITE NAME: MCRD Parris Island, SC

(SIGNATURE): Jeff Barton

DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest/PCBs	TAL Diss. Metals	TAL Total Metals/Hardness	CN	AVS/SEM	TOC	pH	REMARKS
9/9/98	1419	1	✓	PAI-10-SS-015-01	8	5	✓	✓		✓	✓	✓			VOCs (encores)
	1440		✓	PAI-10-SS-016-01	8	5	✓	✓		✓	✓	✓			collected on 9/10/98
↓	1455		✓	PAI-10-SS-017-01	8	5	✓	✓		✓	✓	✓			
9/9/98	1527		✓	PAI-10-SD-016-01	8	5	✓	✓		✓	✓	✓	✓	✓	soils are
	1623		✓	PAI-10-SD-017-01	8	5	✓	✓		✓	✓	✓	✓	✓	reactive
↓	1641		✓	PAI-10-SD-018-01	8	5	✓	✓		✓	✓	✓	✓	✓	
9/10/98	1242		✓	PAI-10-SW-016-01	12	4	2	2	1	1	1		1		
	1421		✓	PAI-10-SW-017-01	12	4	2	2	1	1	1		1		
↓	1503		✓	PAI-10-SW-018-01	12	4	2	2	1	1	1		1		
				Trip Blanks	2										
				Temp Blanks	4										

SHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Jeff Barton	9/10/98 2000	Fed Ex			
SHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[redacted]HED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): Kevin A Smith	DATE / TIME: 9/10/98 8:55	REMARKS: for soil & sediment samples 16oz jars were collected on 9/9/98, encores on 9/10/98	

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SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAI-01-SS-015
Sample Location: PAI-01-SS15
Sampled By: GG
C.O.C. No.: 00241

[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: 4/21/99 Time: 1301 Method: Grab Monitor Reading (ppm): —	0-1.0 ft	Tan-Brn	F Sand dry

COMPOSITE SAMPLE DATA:

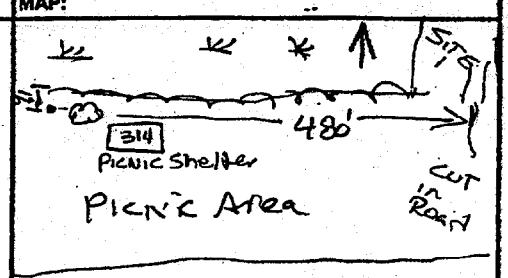
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAHs, TCL Pest	1-16 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): G Gunter

A-236 A

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: MCRD Parris Island
Project No.: 7394

Sample ID No.: PAI-01-SS-016
Sample Location: PAI-01-SS16
Sampled By: GG
C.O.C. No.: 00241

[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: 4/21/99 Time: 13:18 Method: GV26 Monitor Reading (ppm): —	0-1.0 Ft	Tan Brn	F Sand Dry

COMPOSITE SAMPLE DATA:

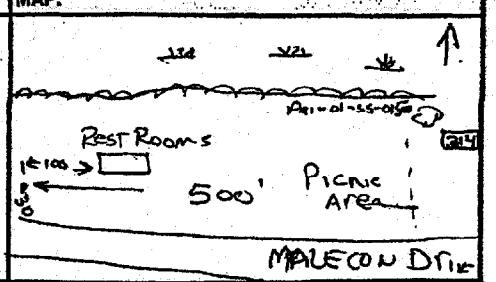
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH, TCL Pest	1-16oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-236 B

C. N OF CUSTODY RECORD

00241 5

PROJECT NO.: 7394

SITE NAME: Parris Island

SAMPLERS (SIGNATURE): [illegible]

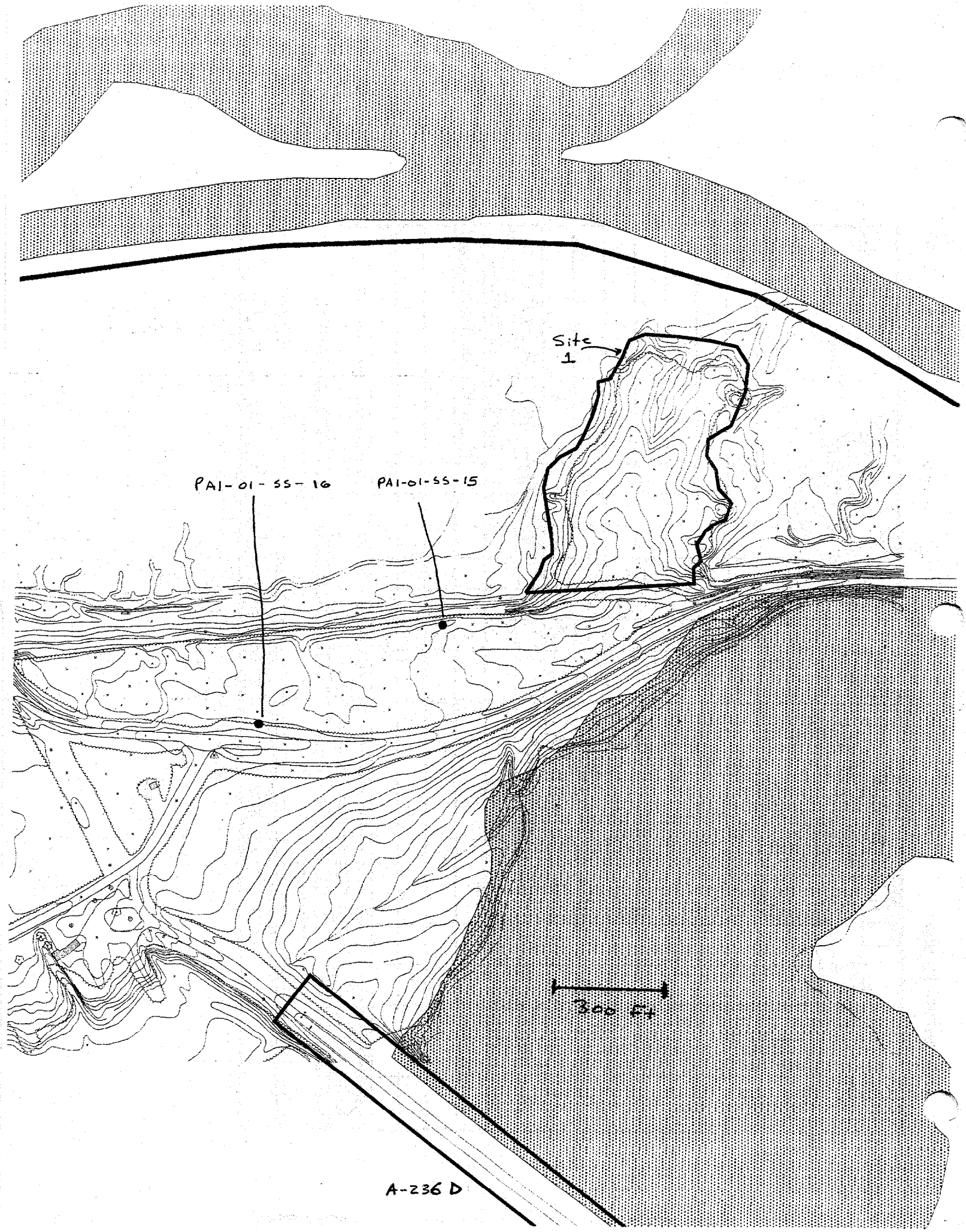
STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAHs	TCL Metals	TCL Pesticides	TCL VOCs, TCL SVOCs	TAL metals (Cr) Cyanide	TCL PCBs/Pesticides TCL PH. PAH	REMARKS
1	4/21/99	1301		X	PAI-01-SS-015	1	✓	✓	✓				
2	4/21/99	1318		X	PAI-01-SS-016	1	✓		✓				
3	4/21/99	0855		X	PAI-01-SD-016	1	✓	✓	✓				
4	4/21/99	0815		X	PAI-01-SD-014	1	✓	✓	✓				
5	4/21/99	0958		X	PAI-01-SD-013	1	✓	✓	✓				
6	4/21/99	0958		X	PAI-01-SD-013-D	1	✓	✓	✓				
7	4/21/99	0835		X	PAI-01-SD-015	1	✓	✓	✓				
8	4/21/99	1035		X	PAI-01-SD-017	1	✓	✓	✓				
9	4/21/99	1145		X	PAI-01-SD-001	1				✓	✓	✓	CALL 1-800-245-2730
													EXT 8375 To confirm
													Parameters w/ Dave Breyack

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]	4/21/99 1400	FED X overnight			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[illegible]	4/23/99 0850	Call Dave Breyack To Confirm Parameters for PAI-01-SD-001	

Order No. 70448 (0693)

3.2R 62134 [illegible]
T. Brown data 4/15/99

A-236 C



A-236 D

A-13

MONITORING WELL INSTALLATION RECORD

South Carolina DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division

2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI-01 MW-05(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:
Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum

* Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:
Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 13.5 ft.
Date Started: 5/21/98
Date Completed: 5/21/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ______ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ______

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized
☐ Steel ☐ Other
2 in. to 3.5 ft. depth
______ in. to ______ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ______ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .010 Length: 10.0'
Set Between: 13.5 ft. and 3.5 ft. **NOTE: MULTIPLE SCREENS**
______ ft. and ______ ft. **USE SECOND SHEET**
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
______ ft. after ______ hrs. Pumping ______ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 13.5 ft. to 2.5 ft.
Effective size ______ Uniformity Coefficient ______

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☑ Concrete ☐ Other ☐
Depth: From 1.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ______ ft. ______ direction
______ Type well disinfected ☐ Yes Type: ______
upon completion ☐ No Amount: ______

16. PUMP: Date installed: ______ Not installed ☑
Mfr. Name: ______ Model No.: ______
H.P. ______ Volts ______ Length of drop pipe ______ ft. Capacity ______ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF HEAL[TH AND ENVIRONM]ENTAL CONTROL (ADDRESS ABOVE)

A-237

US NAVAL HOSPITAL
PORT ROYAL ISLAND
Doggie Island
Jeriche Island
PAI-01-MW-07(S)
PAI-01-MW-08(D)
PAI-01-MW-09(S)
PAI-01-MW-10(D)
PAI-01-MW-11(S)
PAI-01-MW-12(D)
PAI-01-MW-05(S)
PAI-01-MW-06(D)
PAI-01-MW-13
PAI-01-MW-14(D)
Scout Island
ARCHERS
Horse Island
CREEK
RIBAUT
US NAVAL RESERVAT
MARINE RECRUIT DEP
BALLAST
WAKE
Trailer Park
1 of 2
A-238

South Carolina
DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI-01
MW-06(D)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum
* Indicate Water Bearing Zones		
(Use a 2nd sheet if needed)		

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:

Engineer: TETRA TECH NUS INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 36.0 ft. Date Started: 5/21/98 Date Completed: 5/21/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 31.0 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .020 Length: 5.0'
Set Between: 36.0 ft. and 31.0 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 36.0 ft. to 29.0 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 27.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected upon completion ☐ Yes ☐ No Type: ____ Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH NC 27278
Signed: [signature] Cert. No: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-239

US NAVAL HOSPITAL
PORT ROYAL ISLAND
Doggie Island
Jericho Island
PAT-01-MW-07(S)
PAT-01-MW-08(D)
PAT-01-MW-09(S)
PAT-01-MW-10(D)
PAT-01-MW-11(S)
PAT-01-MW-12(D)
PAT-01-MW-05(S)
PAT-01-MW-06(D)
PAT-01-MW-13(S)
PAT-01-MW-14(D)
Scout Island
ARCHERS CREEK
Horse Island
RIBBON CREEK
MARINE RECRUIT DEPOT
BALLAST
Trailer Park
1 of 2

South Carolina
DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI-01
MW-07(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum

* Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:
Engineer: TETRA TECH NUS INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 13.5 ft. Date Started: 5/21/98 Date Completed: 5/21/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2" in. to 3.5 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .010 Length: 10.0'
Set Between: 13.5 ft. and 3.5 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 13.5 ft. to 2.5 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☑ Other ☐ ____
Depth: From 1.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected upon completion ☐ Yes ☐ No Type: ____ Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-241

US NAVAL HOSPITAL
USNR
PORT ROYAL ISLAND
Doggie Island
Jericho Island
PAI-01-MW-07(S)
PAI-01-MW-08(D)
PAI-01-MW-09(S)
PAI-01-MW-10(D)
PAI-01-MW-11(S)
PAI-01-MW-12(D)
PAI-01-MW-05(S)
PAI-01-MW-06(D)
PAI-01-MW-13(S)
PAI-01-MW-14(D)
ARCHERS
CREEK
Scout Island
Horse Island
CREEK
RIBBON
NAVAL RESERVAT
MARINE RECRUIT DEP
BALDWIN
WAKE
Port Royal
Shell Park
1 of 2
A-242

South Carolina
DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI-01
MW-08(O)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum

* Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:

Engineer: TETRA TECH NUS INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 36.5 ft. Date Started: 5/20/98 Date Completed: 5/20/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2" in. to 31.5 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .020 Length: 5.0
Set Between: 36.5 ft. and 31.5 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 36.5 ft. to 29.5 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 27.5 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected ☐ Yes Type: ____
upon completion ☐ No Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-243

US NAVAL HOSPITAL
USNR
PORT ROYAL ISLAND
Doggie Island
Jericho Island
PAT-01-MW-07(S)
PAT-01-MW-08(D)
PAT-01-MW-09(S)
PAT-01-MW-10(D)
PAT-01-MW-11(S)
PAT-01-MW-12(D)
PAT-01-MW-05(S)
PAT-01-MW-06(D)
PAT-01-MW-13(S)
PAT-01-MW-14(D)
Scout Island
Horse Island
CREEK
ARCHERS
Port Royal
MARINE RECRUIT DEPOT
NAVAL RESERVATION
BALBOA
Miller Park
1 of 2
A-244

South Carolina
DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI-01
MW-09(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:
Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum
* Indicate Water Bearing Zones		
(Use a 2nd sheet if needed)		

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:
Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 13.5 ft. Date Started: 5/20/98 Date Completed: 5/20/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized
☐ Steel ☐ Other
2 in. to 3.5 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .010 Length: 10.0'
Set Between: 13.5 ft. and 3.5 ft. NOTE: MULTIPLE SCREENS
____ ft. and ____ ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 13.5 ft. to 2.5 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☑ Other ☐ ____
Depth: From 1.0 ft. to SURFACE ft.

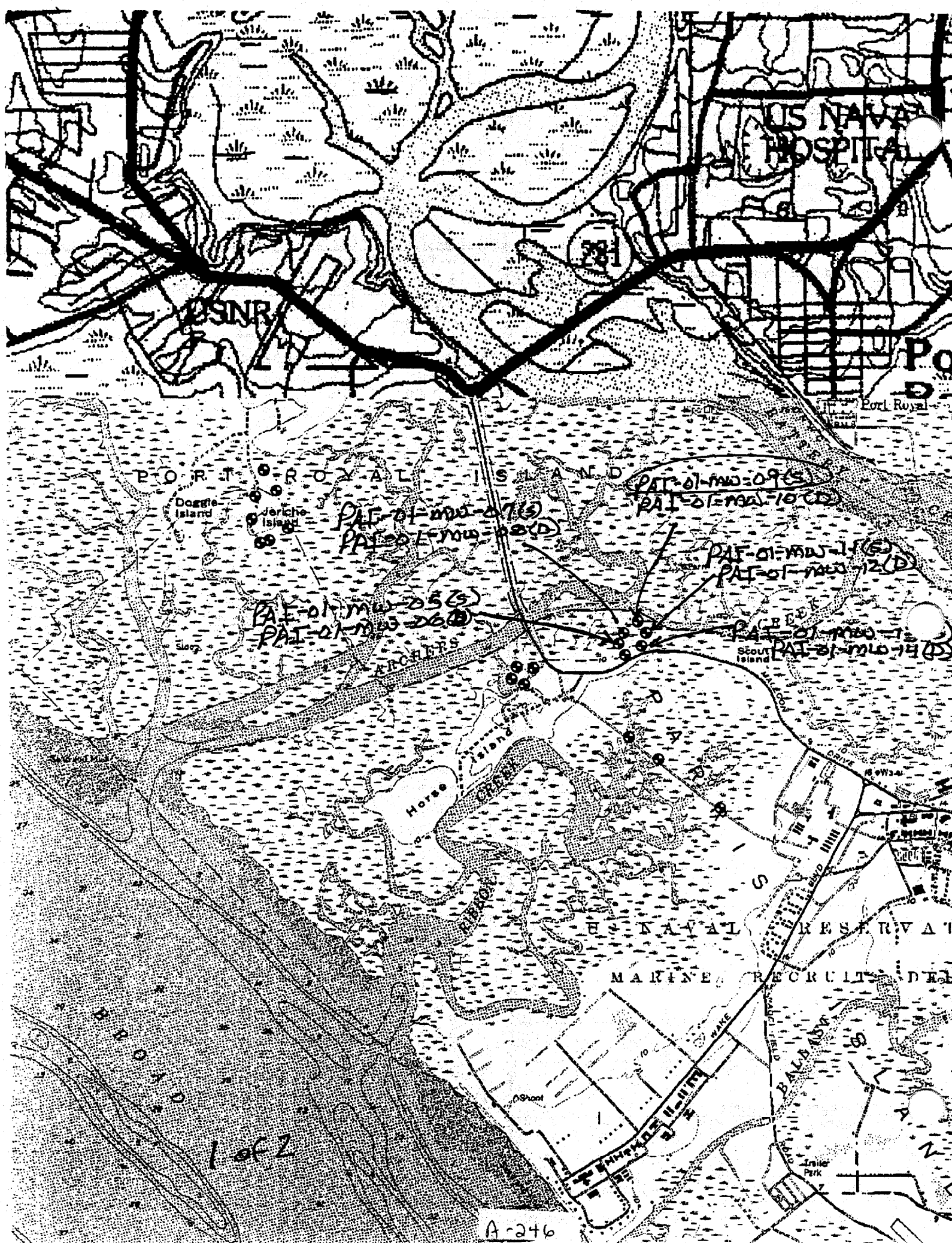
15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected ☐ Yes Type: ____
upon completion ☐ No Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-245


US NAVAL HOSPITAL
USNR
Port Royal
PORT ROYAL ISLAND
Doggie Island
Jericho Island
PAT-01-MW-09(S)
PAT-01-MW-10(D)
PAT-01-MW-07(S)
PAT-01-MW-08(D)
PAT-01-MW-11(S)
PAT-01-MW-12(D)
PAT-01-MW-05(S)
PAT-01-MW-06(D)
PAT-01-MW-13
PAT-01-MW-14(D)
Scout Island
ARCHERS
Horse Island
CREEK
NAVAL RESERVAT
MARINE RECRUIT
WAKE
BALBOA
Trailer Park
1 of 2
A-246

South Carolina
DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAT SOI
MW-10(D)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:
Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum
* Indicate Water Bearing Zones		
(Use a 2nd sheet if needed)		

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:
Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 35.0 ft. Date Started: 5/19/98 Date Completed: 5/20/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 30.0 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .020 Length: 5.0'
Set Between: 35.0 ft. and 30.0 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 36.0 ft. to 28.0 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 26.0 ft. to SURFACE ft.

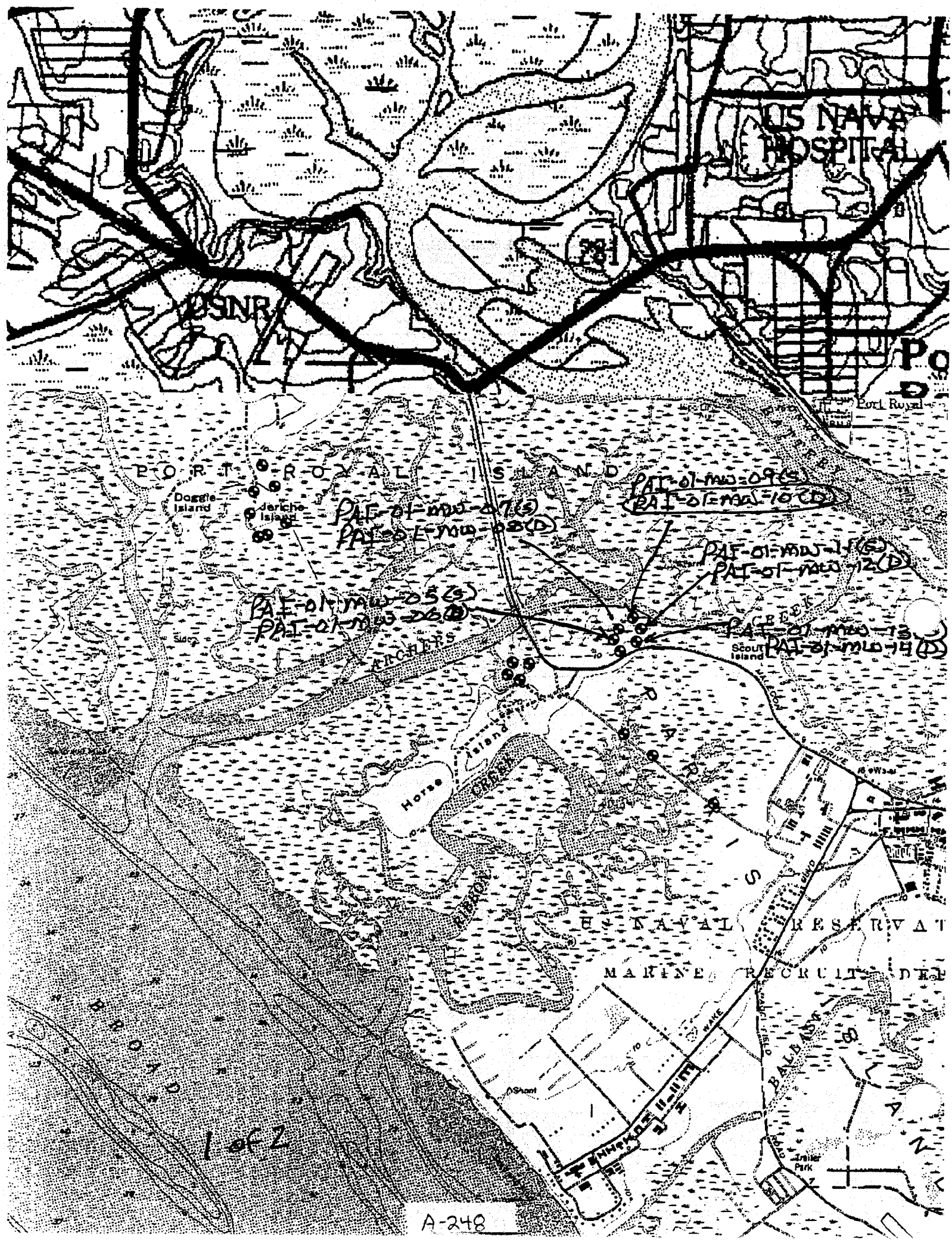
15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected upon completion ☐ Yes ☐ No Type: ____ Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 HILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-247


US NAVAL HOSPITAL
USNR
PORT ROYAL ISLAND
Doggie Island
Jericho Island
PAT-01-MW-07(S)
PAT-01-MW-08(D)
PAT-01-MW-09(S)
PAT-01-MW-10(D)
PAT-01-MW-11(S)
PAT-01-MW-12(D)
PAT-01-MW-05(S)
PAT-01-MW-06(D)
PAT-01-MW-13
PAT-01-MW-14(D)
Scout Island
Horse Island
CREEK
MARINE RECRUIT DEPOT
Trailer Park
1 of 2

South Carolina
DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI-01 MW-11(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:
Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum

* Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:
Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 13.5 ft. Date Started: 5/19/98 Date Completed: 5/19/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 3.5 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .010 Length: 10.0'
Set Between: 13.5 ft. and 3.5 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 13.5 ft. to 2.5 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☑ Other ☐ ____
Depth: From 1.0 ft. to SURFACE ft.

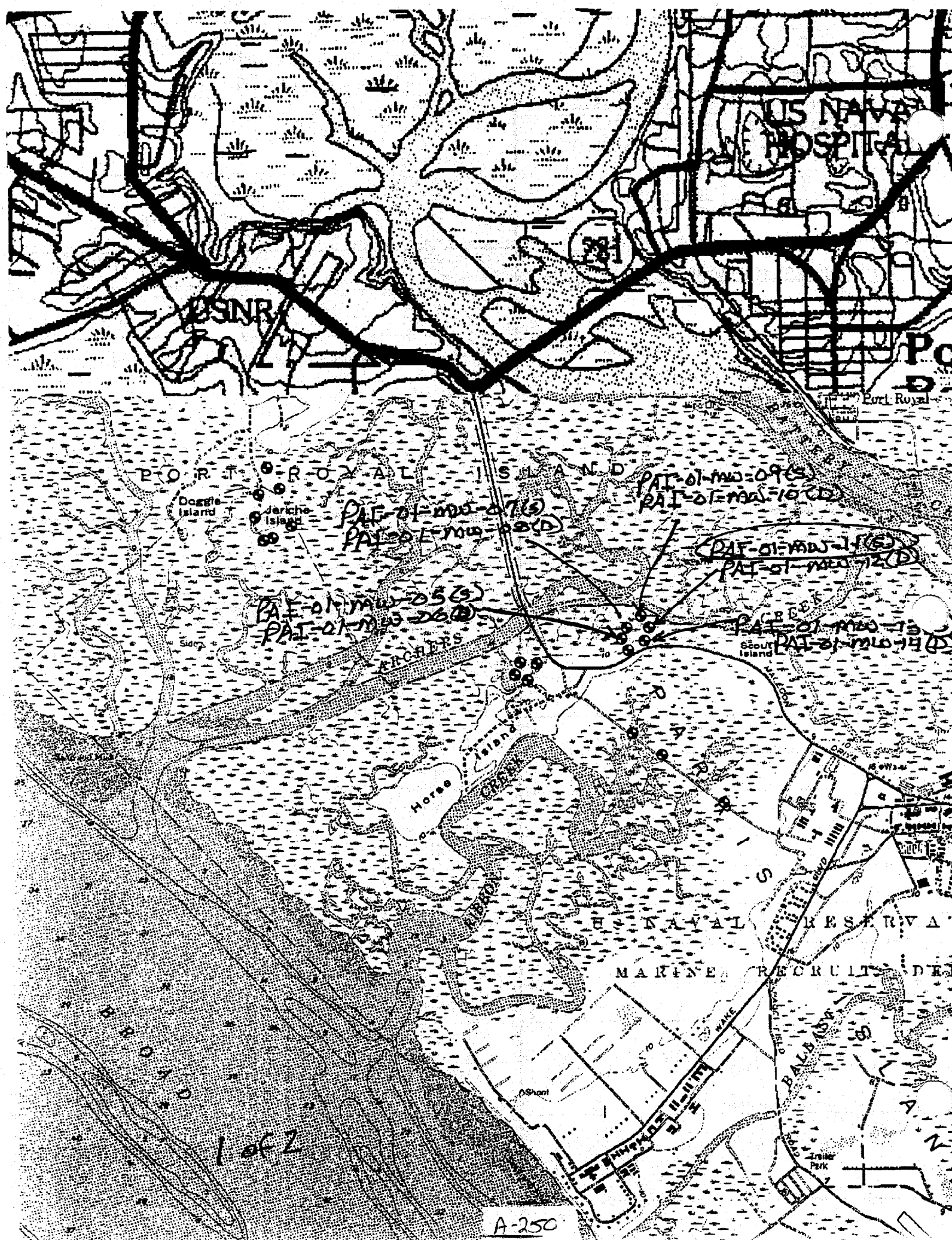
15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected ☐ Yes Type: ____
upon completion ☐ No Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR. HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-249


US NAVAL HOSPITAL
USNR
Port Royal
PORT ROYAL ISLAND
Doggie Island
Jericho Island
PAT-01-MW-07(S)
PAT-01-MW-08(D)
PAT-01-MW-09(S)
PAT-01-MW-10(D)
PAT-01-MW-11(S)
PAT-01-MW-12(D)
PAT-01-MW-05(S)
PAT-01-MW-06(D)
PAT-01-MW-13
PAT-01-MW-14(D)
Scout Island
ARCHERS
CREEK
Horse Island
CREEK
PARRIS
U.S. NAVAL RESERVA
MARINE RECRUIT DE
BAYMOND
BALDWIN
Shooting Range
Trailer Park
1 of 2
A-250

South Carolina DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI - 01 MW-12(D)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:
Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum

* Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:
Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 38.0 ft. Date Started: 5/18/98 Date Completed: 5/19/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2" in. to 33.0 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .020 Length: 5.0'
Set Between: 38.0 ft. and 33.0 ft. **NOTE: MULTIPLE SCREENS**
____ ft. and ____ ft. **USE SECOND SHEET**
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 38.0 ft. to 31.0 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 29.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected ☐ Yes Type: ____
upon completion ☐ No Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT - WOLFF, INC. Date: 9/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-251

US NAVAL HOSPITAL
USNR
PORT ROYAL ISLAND
Doggie Island
Jericho Island
PAF-01-MW-07(S)
PAF-01-MW-08(D)
PAF-01-MW-09(S)
PAF-01-MW-10(D)
PAF-01-MW-11(S)
PAF-01-MW-12(D)
PAF-01-MW-05(S)
PAF-01-MW-06(D)
PAF-01-MW-13
PAF-01-MW-14(D)
Scout Island
ARCHERS
Horse Island
CREEK
RIBBON
NAVAL RESERVAT
MARINE RECRUIT DEP
BOAT
WAKE
BALDWIN
Shoal
Inlet Park
1 of 2
A-252

South Carolina
DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI-01 MW-13(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:
Street Address & City of Well Location:
Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum
* Indicate Water Bearing zones (Use a 2nd sheet if needed)		

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:
Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 13.5 ft. Date Started: 5/19/98 Date Completed: 5/19/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE: ☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 3.5 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .010 Length: 10.0'
Set Between: 13.5 ft. and 3.5 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL 2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 13.5 ft. to 2.5 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☑ Other ☐ ____
Depth: From 1.0 ft. to SURFACE ft.

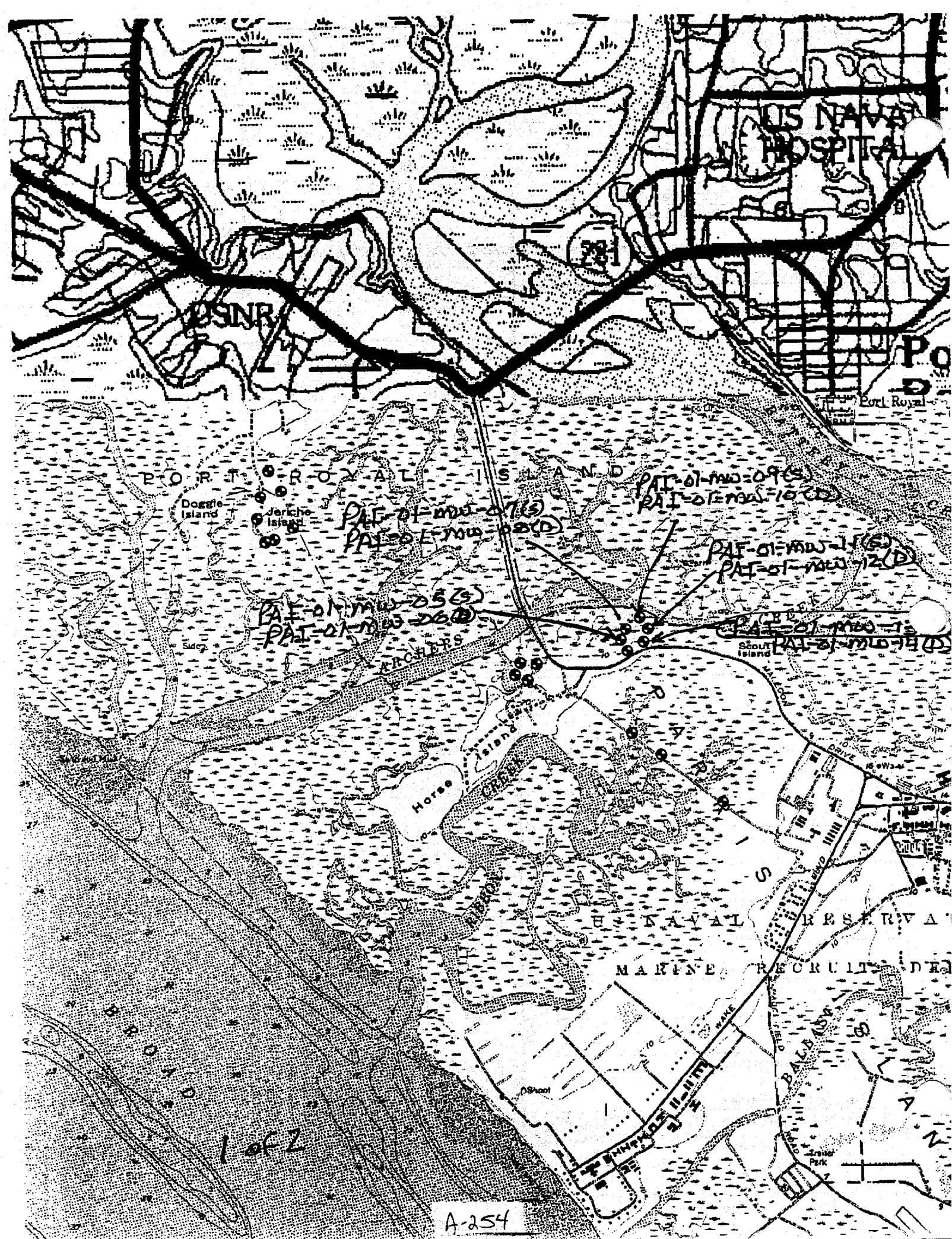
15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction ____
Type well disinfected upon completion ☐ Yes ☐ No Type: ____ Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Authorized Representative Cert. No.: 1361

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-253


US NAVAL HOSPITAL
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Port Royal
PORT ROYAL ISLAND
Doggie Island
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PAI-01-MW-07(S)
PAI-01-MW-08(D)
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PAI-01-MW-10(D)
PAI-01-MW-11(S)
PAI-01-MW-12(D)
PAI-01-MW-05(S)
PAI-01-MW-06(D)
PAI-01-MW-13(S)
PAI-01-MW-14(D)
ARCHERS
Scout Island
Horse Island
CREEK
MARINE RECRUIT
BALDWIN
Shoal
Trailer Park
1 of 2

South Carolina
DHEC
Department of Health and Environmental Control

Water Well Record
Ground Water Protection Division
2600 Bull Street, Columbia, SC 29201, (803) 734-5331

1. LOCATION OF WELL: MCRD PARRIS ISLAND
County: BEAUFORT System Name: PAI-01
MW-14(D)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum
* Indicate Water Bearing Zones		
(Use a 2nd sheet if needed)		

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:

Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 36.0 ft. Date Started: 5/19/98 Date Completed: 5/19/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized
☐ Steel ☐ Other
2 in. to 31.0 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .020 Length: 5.0'
Set Between: 36.0 ft. and 31.0 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: ____

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 36.0 ft. to 29.0 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 27.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected upon completion ☐ Yes ☐ No Type: ____ Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

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A-255

US NAVAL HOSPITAL
281
USNR
PORT ROYAL ISLAND
Doggie Island
Jericho Island
PAF-01-MW-07(S)
PAF-01-MW-08(D)
PAF-01-MW-09(S)
PAF-01-MW-10(D)
PAF-01-MW-11(S)
PAF-01-MW-12(D)
PAF-01-MW-05(S)
PAF-01-MW-06(D)
PAF-01-MW-13
PAF-01-MW-14(D)
Scout Island
Horse Island
CREEK
NAVAL RESERVAT
MARINE RECRUIT DEP
BALDWIN
Inlet Park
1 of 2
A-256

APPENDIX B

SLUG TEST CALCULATIONS AND TIDAL STUDY RESULTS

B-1 SLUG TEST CALCULATIONS
B-2 TIDAL STUDY RESULTS

B-1

SLUG TEST CALCULATIONS

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI 1-MW4(S) Rising Head Slug Test			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/19/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln L/R}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time For Water level to Rise or Fall to 37% of initial Charge.

r = 0.083 FT
R = 0.083 FT
L = 5.1 FT
T_0 = 0.8 min

$$K = \frac{r^2 \ln L/R}{2 L T_0} = \frac{(0.083\,FT)^2 \ln\left(\frac{5.1\,FT}{0.083\,FT}\right)}{2\,(5.1\,FT)(0.8\,min)}$$

$$= 3.48 \times 10^{-3}\ FT/min$$

$$3.48 \times 10^{-3}\ FT/min \times 1440\ min/day = 5.01\ FT/day$$

$$5.01\ FT/day \times \frac{3.528 \times 10^{-4}\ Cm/Sec}{FT/day} = 1.77 \times 10^{-3}\ Cm/Sec.$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: Parris Is. SC - Sumal Site 1 WELL/BORING NO.: PAFI-MW-1(S)

PROJECT NO.: 7394 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10 FT / 15 FT TEST NO.: 1

STATIC WATER LEVEL (Depth/Elevation): 12.70 (TOC) / TWD 17.8 (TOC) DATE: 8/19/98

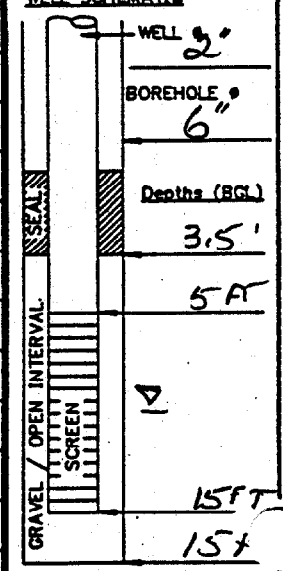
TEST TYPE (Rising/Falling/Constant Head): Rising Head Test CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug 2.5 FT Long PAGE 1 OF 1

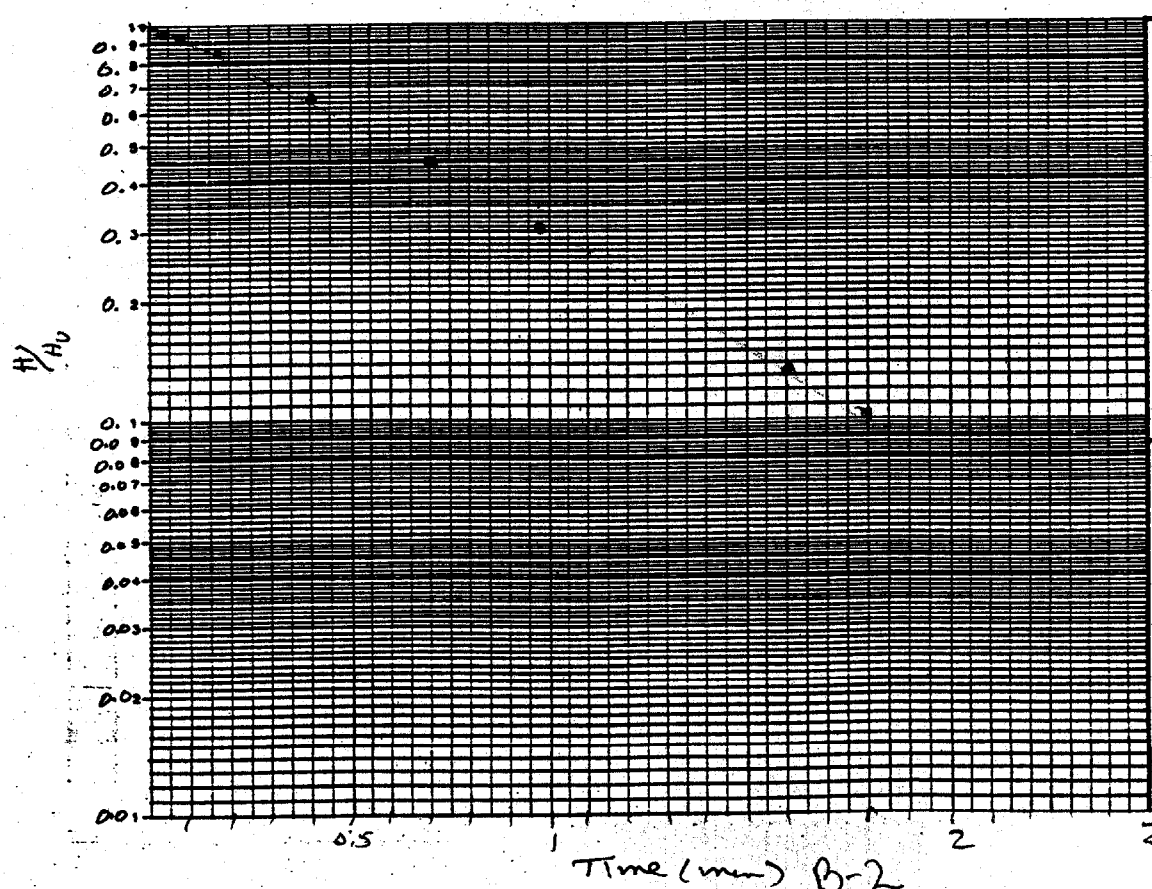
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC w/ Transducer

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	0.615	1			
.04	0.596	.969			
.08	0.577	.938			
.16	0.533	.867			
.41	0.406	.660			
.71	0.279	.454			
0.97	0.190	.309			
1.6	0.082	0.133			
1.8	0.063	0.10			
2.6	.006	0.009			

WELL SCHEMATIC



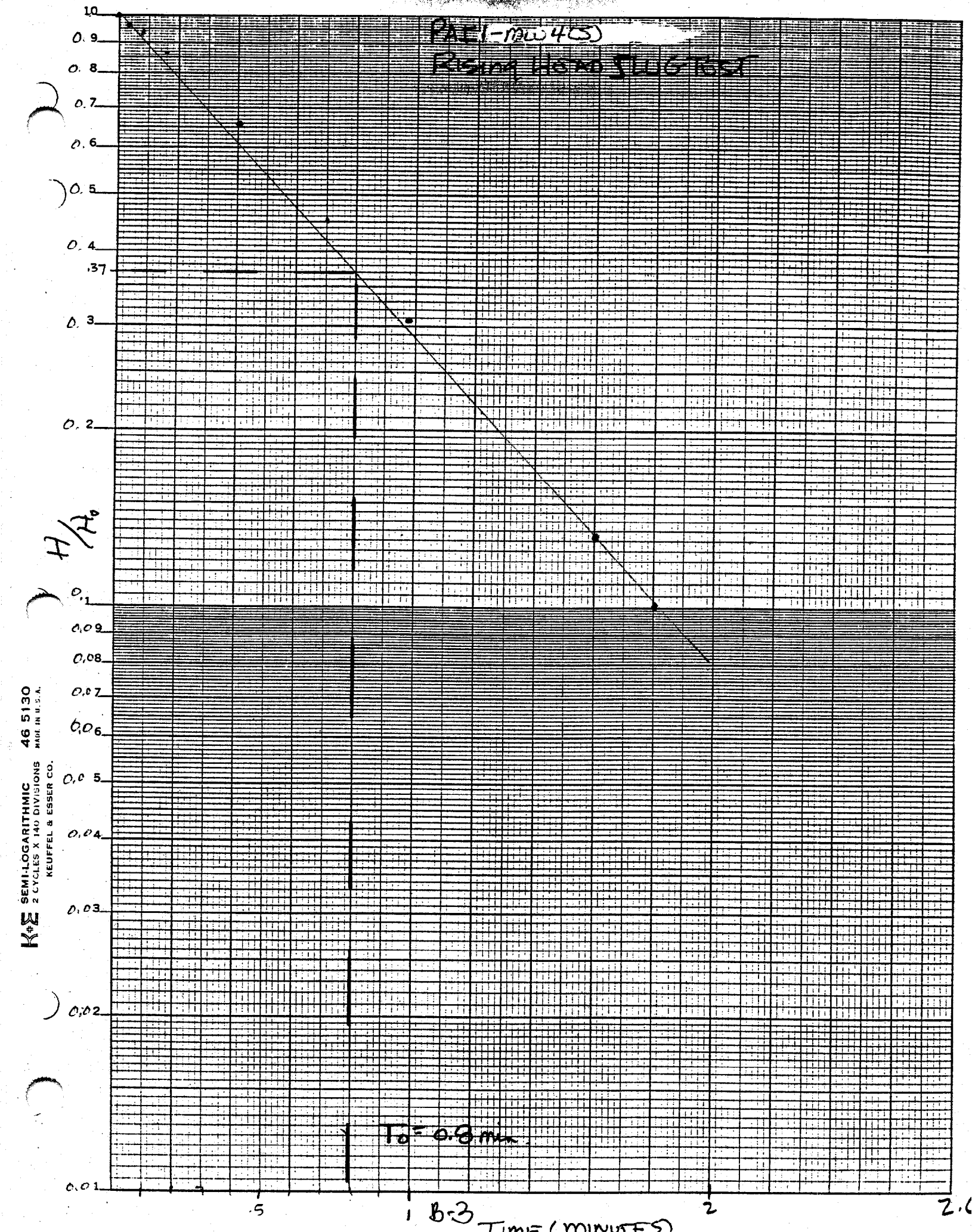
▽ Indicate SWL Depth on Drawing



REMARKS:

WC 5.1 FT

CALCS, SKETCH MAPS, ETC.:


PAE1-MW4(S)
RISING HEAD SLUG TEST
H/H₀
10
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
.5
1
2
2.0
T₀ = 0.8 min
B-3
TIME (MINUTES)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

PAI 1 – MW 4(S)
Test 1
Slug Out (Rise)

Rising Head Slug Test

BE10000
Environmental Logger
08/10 00:55

Unit# 00145 Test 1

Setups:	INPUT 1
Type	Level (F)
Mode	TOU
I.D.	00004
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	* 50.000

Step 0 08/10 08:20:10

Elapsed Time	INPUT 1
0.0000	0.000
0.0033	0.031
0.0066	0.000
0.0100	1.155
0.0133	0.736
0.0166	0.723
0.0200	0.606
0.0233	0.606
0.0266	0.602
0.0300	0.602
0.0333	0.602
0.0366	0.602
0.0400	0.665
0.0433	0.602
0.0466	0.602
0.0500	0.665
0.0533	0.665
0.0566	0.665
0.0600	0.665
0.0633	0.665
0.0666	0.665
0.0700	0.665
0.0733	0.665
0.0766	0.670
0.0800	0.670
0.0833	0.670
0.0866	0.672
0.0900	0.672
0.0933	0.672
0.0966	0.660
0.1000	0.660
0.1033	0.660
0.1066	0.653

PAFI-MW4(5)
Test 1
Slug Out-Rising Head Test

0.1100	0.653
0.1133	0.653
0.1166	0.647
0.1200	0.647
0.1233	0.647
0.1266	0.647
0.1300	0.647
0.1333	0.641
0.1366	0.634
0.1400	0.641
0.1433	0.641
0.1466	0.634
0.1500	0.641
0.1533	0.634
0.1566	0.634
0.1600	0.634
0.1633	0.634
0.1666	0.634
0.1700	0.628
0.1733	0.628
0.1766	0.628
0.1800	0.634
0.1833	0.628
0.1866	0.628
0.1900	0.628
0.1933	0.622
0.1966	0.615
0.2000	0.615
0.2033	0.622
0.2066	0.615
0.2100	0.622
0.2133	0.615
0.2166	0.615
0.2200	0.609
0.2233	0.615 T_0
0.2266	0.609
0.2300	0.609
0.2333	0.603
0.2366	0.609
0.2400	0.603
0.2433	0.603
0.2466	0.603
0.2500	0.596
0.2533	0.596
0.2566	0.596
0.2600	0.590
0.2633	0.590
0.2666	0.590
0.2700	0.590
0.2733	0.590
0.2766	0.590
0.2800	0.590
0.2833	0.584
0.2866	0.584
0.2900	0.584
0.2933	0.577
0.2966	0.577
0.3000	0.577
0.3033	0.577
0.3066	0.577

0.3100	0.571
0.3133	0.571
0.3166	0.571
0.3200	0.571
0.3233	0.565
0.3266	0.556
0.3300	0.565
0.3333	0.556
0.3500	0.552
0.3666	0.546
0.3833	0.533
0.4000	0.526
0.4166	0.514
0.4333	0.507
0.4500	0.495
0.4666	0.486
0.4833	0.478
0.5000	0.469
0.5166	0.463
0.5333	0.457
0.5500	0.450
0.5666	0.444
0.5833	0.431
0.6000	0.425
0.6166	0.412
0.6333	0.406
0.6500	0.400
0.6666	0.393
0.6833	0.387
0.7000	0.380
0.7166	0.368
0.7333	0.361
0.7500	0.349
0.7666	0.349
0.7833	0.336
0.8000	0.330
0.8166	0.323
0.8333	0.317
0.8500	0.311
0.8666	0.311
0.8833	0.298
0.9000	0.292
0.9166	0.285
0.9333	0.279
0.9500	0.273
0.9666	0.273
0.9833	0.260
1.0000	0.254
1.2000	0.190
1.4000	0.146
1.6000	0.114
1.8000	0.082
2.0000	0.063
2.2000	0.038
2.4000	0.031
2.6000	0.019
2.8000	0.006
3.0000	0.006
3.2000	0.006
3.4000	0.006

PAF1-MW4(S)

Test 1

Slug Out - Rising Head Test

3.6000	0.006
3.8000	0.000
4.0000	0.006
4.2000	0.006
4.4000	0.006
4.6000	0.006
4.8000	0.000
5.0000	0.006
5.2000	0.006
5.4000	0.006
5.6000	0.000
5.8000	0.006
6.0000	0.000
6.2000	0.000
6.4000	0.006
6.6000	0.006
6.8000	0.006
7.0000	0.000
7.2000	0.006
7.4000	0.006
7.6000	0.006
7.8000	0.000
8.0000	0.000
8.2000	0.000
8.4000	0.006

END

PAE1-MW4(S)
Test 1
Rising Head Test

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER 7394		
SUBJECT PAI-01-MW-05(S) RISING HEAD SLUG TEST			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/14/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of Well Screen
T_0 = Time for water Level to Rise or Fell to 37% of initial change.

r = 0.083 FT.
R = 0.083 FT.
L = 10 FT
T_0 = 0.44 minutes

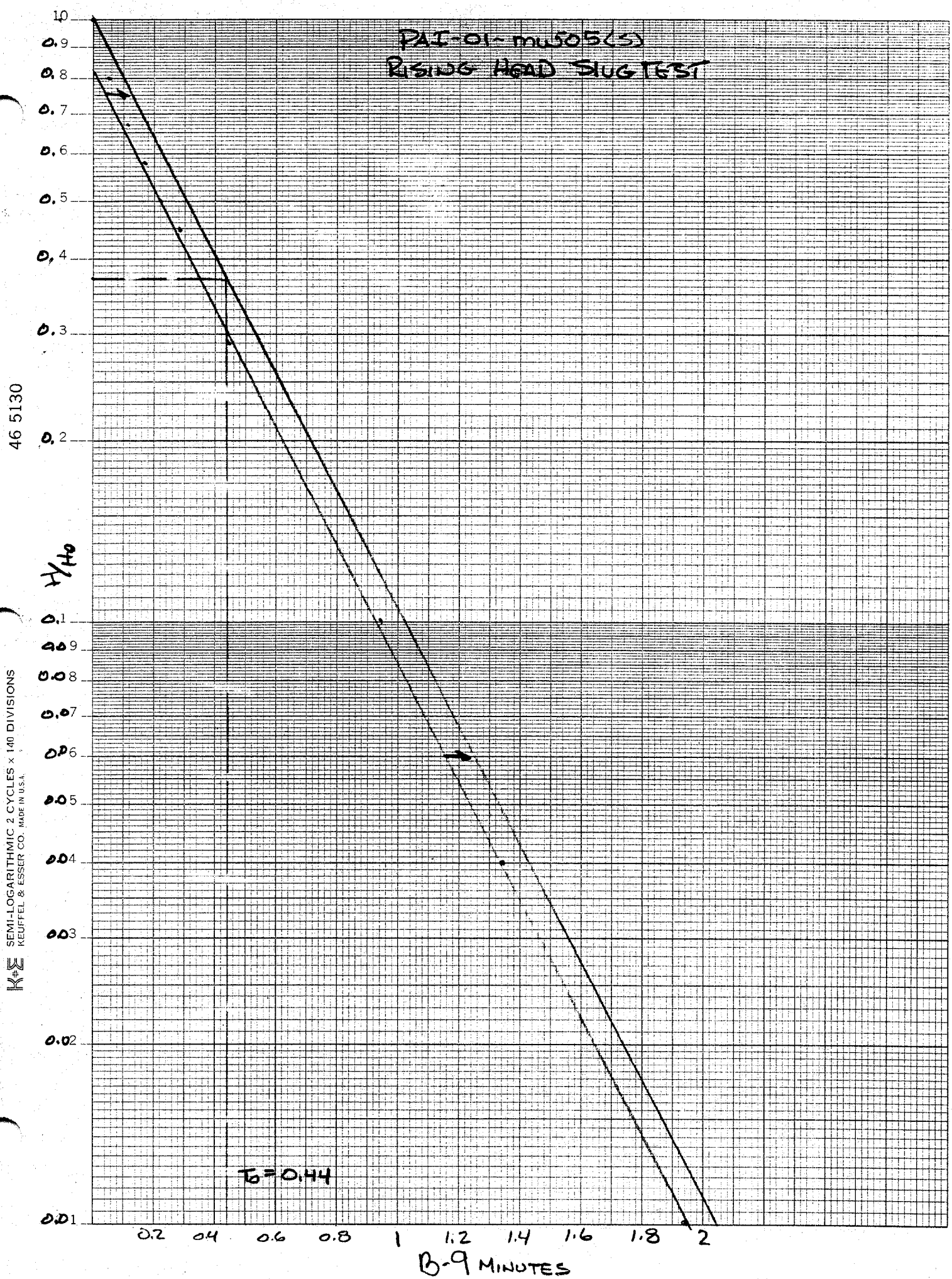
$$K = \frac{r^2 \ln(L/R)}{2 L T_0} = \frac{(0.083\,FT)^2 \ln(10\,FT / 0.083\,FT)}{2(10\,FT)(0.44\,min)}$$

$$= \frac{(6.89 \times 10^{-3}\,FT^2) \ln(120.48)}{8.8\,FT \cdot min}$$

$$3.75 \times 10^{-3}\,FT/min$$

$$3.75 \times 10^{-3}\,FT/min \times 1440\,min/day = 5.4\,FT/day$$

$$5.4\,FT/day \times 3.528 \times 10^{-4}\,cm/sec = 1.905 \times 10^{-3}\,cm/sec$$


PAI-01-MW505(S)
RISING HEAD SLUG TEST
H/Ho
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
T0=0.44
B-9 MINUTES
46 5130
K&E SEMI-LOGARITHMIC 2 CYCLES × 140 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-MW05 (S)

PROJECT NO.: 7394 **GEOLOGIST:** Mark Damington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 10 feet **TEST NO.:** 1 Step 9

STATIC WATER LEVEL (Depth/Elevation): 3.72 feet / TWD = 16.52 ft. **DATE:** 8/19/98

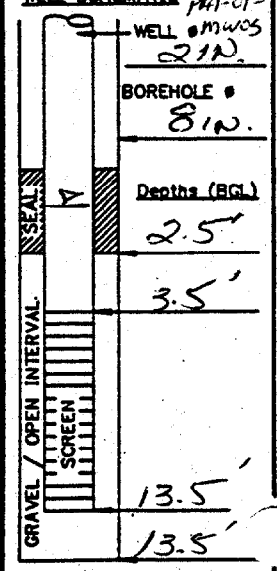
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) **PAGE** 1 **OF** 1

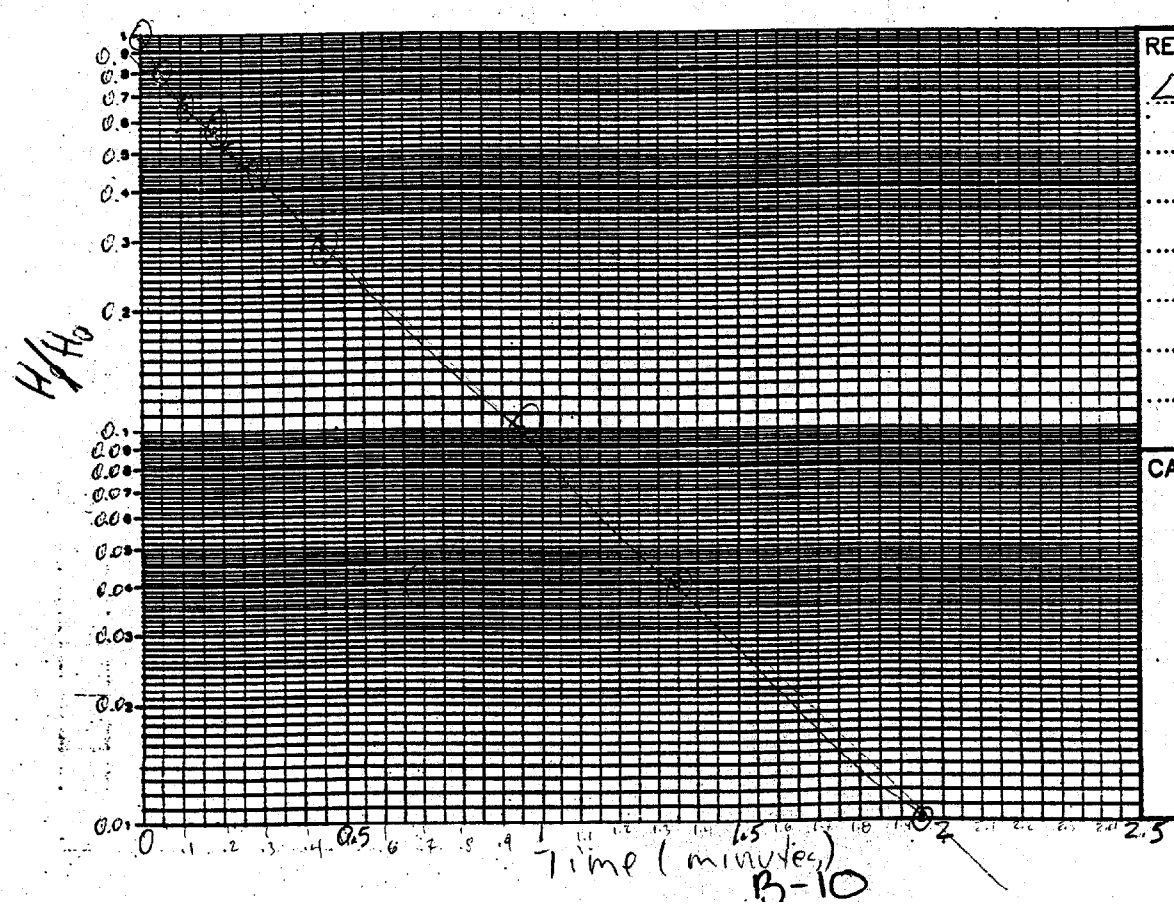
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	2.263	1			
0.05	1.818	0.80			
0.11	1.526	0.67			
0.17	1.316	0.58			
0.22	1.138	0.50			
0.28	1.011	0.45			
0.44	0.667	0.29			
0.94	0.722	0.10			
1.34	0.095	0.04			
1.94	0.031	0.01			
2.34	0.019	0.01			

WELL SCHEMATIC PAI-01-MW05



▽ Indicate SWL Depth on Drawing



REMARKS:

LWC = 12.80 ft.

CALCS, SKETCH MAPS, ETC.:

PAI-01-MW-05(S)
Test 1
Slug Out - (Rise)

Rising Head Slug Test

SE10000
Environmental Logger
08/19 13:13

Unit# 00145 Test 1

Setups:	INPUT 1
Type	Level (F)
Mode	TOU
I.D.	00004
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/19 11:16:31

Elapsed Time	INPUT 1
0.0000	0.000
0.0033	0.050
0.0066	0.044
0.0100	0.674
0.0133	0.585
0.0166	0.775
0.0200	0.803
0.0233	0.909
0.0266	1.026
0.0300	1.023
0.0333	1.748
0.0366	1.456
0.0400	2.339
0.0433	2.530
0.0466	2.403
0.0500	2.320
0.0533	2.244
0 0.0566	2.283 — T_0
0.0600	2.212
0.0633	2.155
0.0666	2.136
0.0700	2.098
0.0733	2.072
0.0766	2.041
0.0800	2.022
0.0833	1.996
0.0866	1.983
0.0900	1.952
0.0933	1.920

PAF-01-MW05(S)
Test 1
Slug Out - Rising Head Test

0.3000	1.100
0.3033	1.087
0.3066	1.074
0.3100	1.068
0.3133	1.062
0.3166	1.049
0.3200	1.043
0.3233	1.030
0.3266	1.030
0.3300	1.017
0.3333	1.011
0.3500	0.966
0.3666	0.922
0.3833	0.884
0.4000	0.852
0.4166	0.814
0.4333	0.782
0.4500	0.756
0.4666	0.725
0.4833	0.693
0.5000	0.667
0.5166	0.642
0.5333	0.610
0.5500	0.585
0.5666	0.566
0.5833	0.540
0.6000	0.527
0.6166	0.508
0.6333	0.489
0.6500	0.470
0.6666	0.451
0.6833	0.432
0.7000	0.419
0.7166	0.400
0.7333	0.388
0.7500	0.368
0.7666	0.362
0.7833	0.340
0.8000	0.337
0.8166	0.324
0.8333	0.311
0.8500	0.298
0.8666	0.286
0.8833	0.279
0.9000	0.267
0.9166	0.254
0.9333	0.248
0.9500	0.248
0.9666	0.235
0.9833	0.229
1.0000	0.222
1.2000	0.146
1.4000	0.095
1.6000	0.070
1.8000	0.057
2.0000	0.031
2.2000	0.031
2.4000	0.019

0.28
0.49
0.94
1.34
1.94
2.34

PAE-01-MW05(S)
Test 1
Slug Out - Rising Head Test

3.0000	0.006
3.2000	0.012
3.4000	0.006
3.6000	0.006
3.8000	0.006
4.0000	0.012
4.2000	0.006
4.4000	0.000
4.6000	0.006
4.8000	0.006
5.0000	0.006
5.2000	0.006
5.4000	0.000
5.6000	0.000
5.8000	0.006
6.0000	0.006
6.2000	0.006
6.4000	0.000
6.6000	0.000
6.8000	0.012
7.0000	0.006
7.2000	0.000
7.4000	0.006
7.6000	0.006
7.8000	0.006
8.0000	0.006
8.2000	0.000
8.4000	0.006
8.6000	0.006
8.8000	0.006
9.0000	0.006
9.2000	0.000
9.4000	0.000
9.6000	0.006
9.8000	0.000
10.0000	0.000
12.0000	0.006
14.0000	0.006

END

PAT-01-MW05(S)

TEST 1

SLUG OUT - Rising Head Test

0.1000	1.882
0.1033	1.863
0.1066	1.844
0.1100	1.818
0.1133	1.812
0.1166	1.774
0.1200	1.767
0.1233	1.748
0.1266	1.723
0.1300	1.710
0.1333	1.691
0.1366	1.672
0.1400	1.659
0.1433	1.647
0.1466	1.634
0.1500	1.615
0.1533	1.602
0.1566	1.577
0.1600	1.570
0.1633	1.558
0.1666	1.545
0.1700	1.526
0.1733	1.513
0.1766	1.513
0.1800	1.481
0.1833	1.475
0.1866	1.456
0.1900	1.443
0.1933	1.443
0.1966	1.418
0.2000	1.405
0.2033	1.405
0.2066	1.379
0.2100	1.373
0.2133	1.360
0.2166	1.348
0.2200	1.341
0.2233	1.322
0.2266	1.316
0.2300	1.303
0.2333	1.297
0.2366	1.278
0.2400	1.271
0.2433	1.259
0.2466	1.252
0.2500	1.240
0.2533	1.227
0.2566	1.221
0.2600	1.214
0.2633	1.202
0.2666	1.189
0.2700	1.182
0.2733	1.170
0.2766	1.163
0.2800	1.151
0.2833	1.138
0.2866	1.132
0.2900	1.125
[illegible]	1.112

0.05

0.11

0.17

0.22

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW-05(S) FALLING HEAD SLUG TEST	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time for water Level to Rise or Fall to 37% of initial Change

r = 0.083 FT
R = 0.083 FT
L = 10 FT
T_0 = 0.62 minutes

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\,FT)^2 \ln(10\,FT / 0.083\,FT)}{2(10\,FT)(0.62\,minutes)}$$

$$= \frac{(6.89 \times 10^{-3}\,FT^2)(\ln 120.48)}{12.4\,FT \cdot min}$$

$$= 2.66 \times 10^{-3}\,FT/min$$

$$2.66 \times 10^{-3}\,FT/min \times 1440\,min/day = 3.8\,FT/day$$

$$3.8\,FT/day \times 3.528 \times 10^{-4}\,cm/sec = 1.34 \times 10^{-3}\,cm/sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-MW05 <S

PROJECT NO.: 7394 **GEOLOGIST:** Mark Damington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 10 feet **TEST NO.:** 2/Step 4

STATIC WATER LEVEL (Depth/Elevation): 3.72 /Total well Depth=16.52 **DATE:** 8/19/98

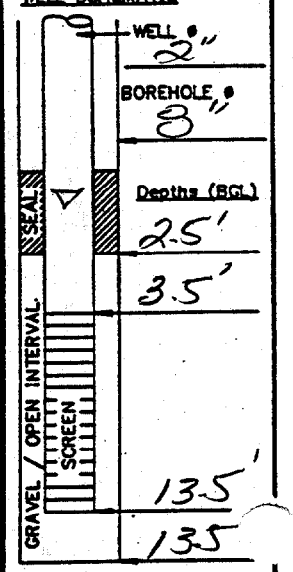
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid slug (7.54 ft long) **PAGE** ..... **OF** .....

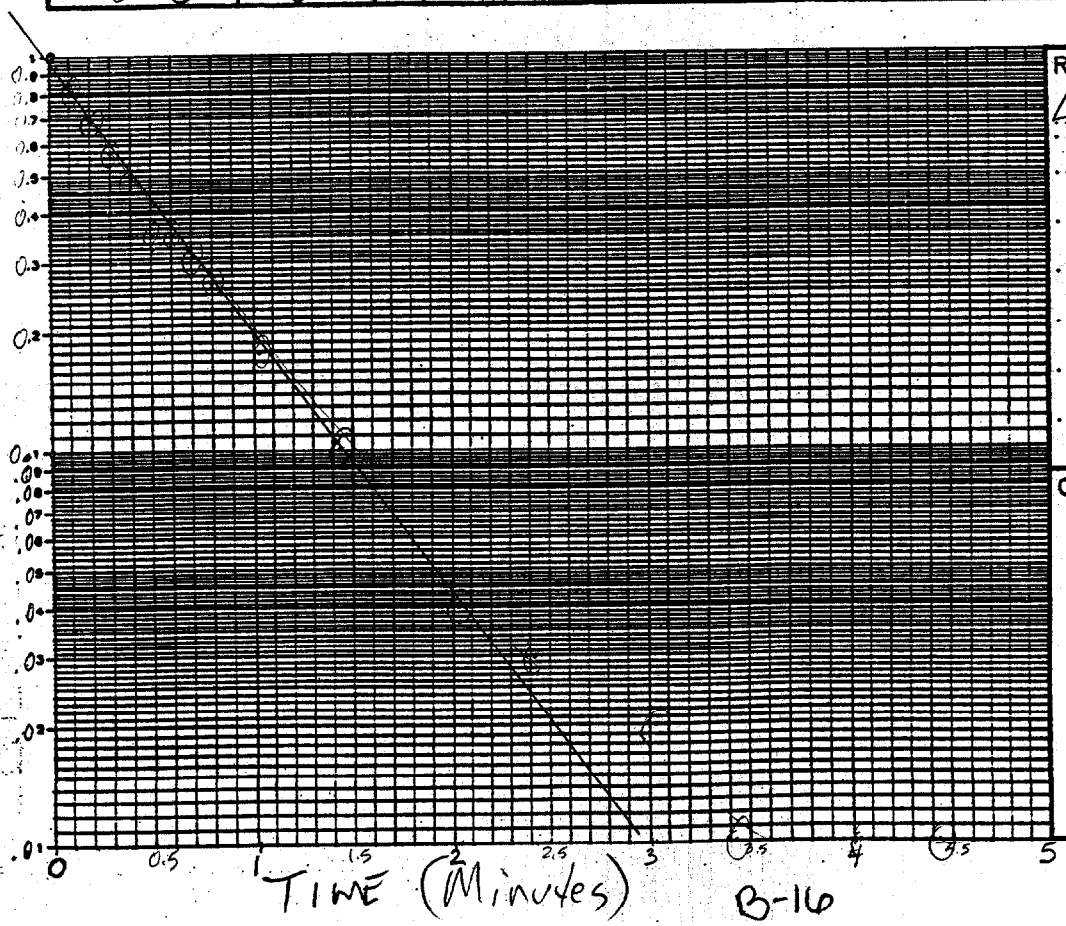
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-1.482	1	2.42	-0.050	0.03
0.1	-1.221	0.82	3.02	-0.025	0.02
0.2	-1.017	0.69	3.42	-0.019	0.01
0.3	-0.858	0.58	4.02	-0.012	0.01
0.4	-0.731	0.49	4.42	-0.012	0.01
0.5	-0.529	0.36			
0.6	-0.527	0.36			
0.7	-0.457	0.31			
0.8	-0.394	0.27			
1.02	-0.260	0.18			
1.42	-0.146	0.10			
2.02	-0.063	0.04			

WELL SCHEMATIC



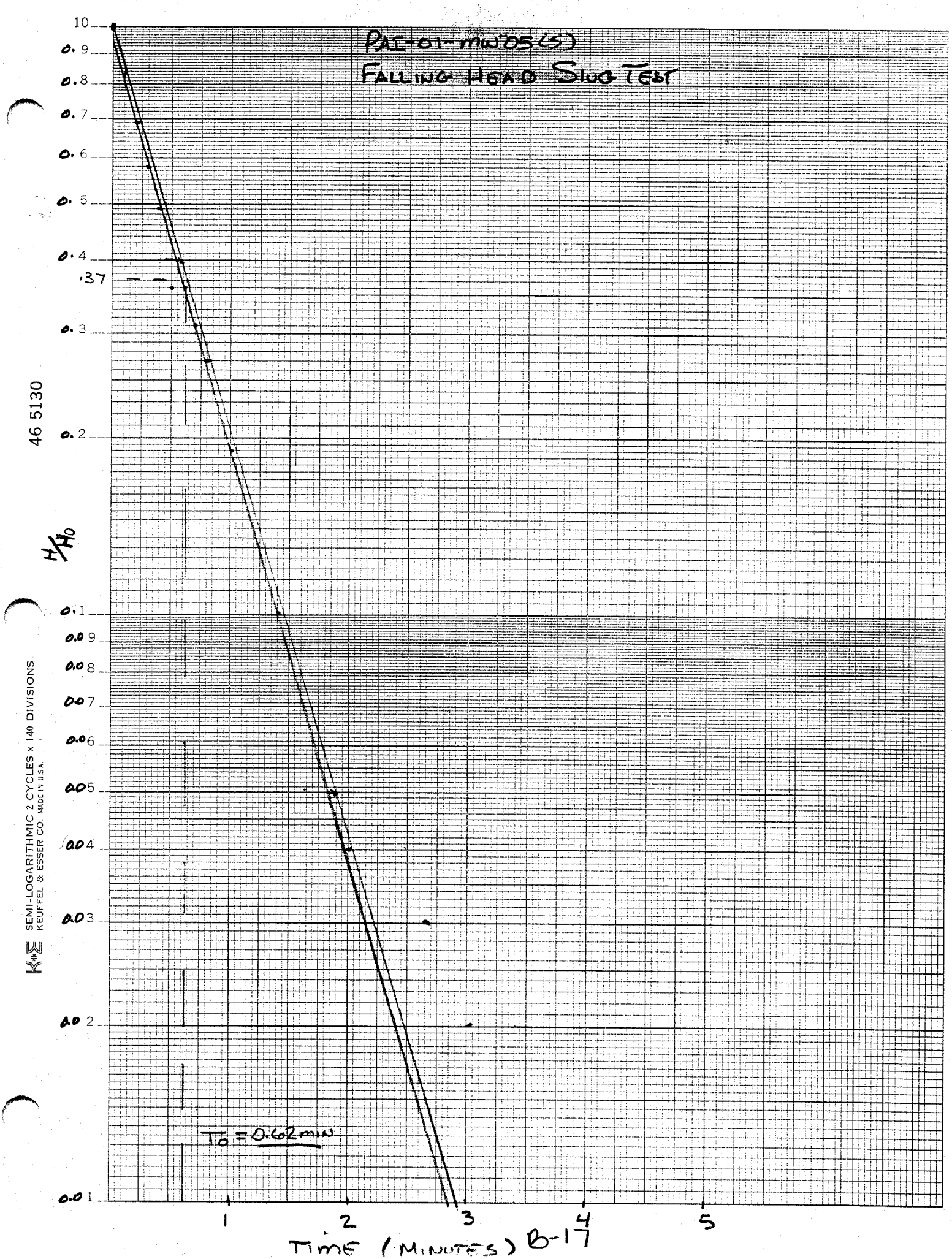
▽ Indicate SWL Depth on Drawing



H/40

REMARKS:
Length Water Column = 12.80

CALCS, SKETCH MAPS, ETC.:


PAI-01-MW05(S)
FALLING HEAD SLUG TEST
10
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
H/H0
1
2
3
4
5
TIME (MINUTES)
T0 = 0.62 min
46 5130
K+E SEMI-LOGARITHMIC 2 CYCLES x 140 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

PAI-01-MW-05(S)
Test 2
Slug In - (Fall)

Falling Head Slug Test

SE1000C
Environmental Logger
08/19 13:16

Unit# 00145 Test 2

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00004
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/19 11:32:51

Elapsed Time	INPUT 1
0.0000	0.000
0.0033	0.000
0.0066	0.000
0.0100	-0.025
0.0133	-0.006
0.0166	0.006
0.0200	-0.012
0.0233	0.000
0.0266	0.006
0.0300	-0.006
0.0333	-0.006
0.0366	0.006
0.0400	0.000
0.0433	0.038
0.0466	-0.171
0.0500	-0.680
0.0533	-0.903
0.0566	-0.896
0.0600	-1.049
0.0633	-1.157
0.0666	-1.679
0.0700	-2.328
0.0733	-2.392
0.0766	-2.328
0.0800	-2.035
0.0833	-1.685
0.0866	-1.033
0.0900	-2.322

PAT-01-MW05 5(5)
Test 2
Slug IN (Falling Test)

0.1000	-1.278
0.1033	-1.024
0.1066	-1.138
0.1100	-1.431
0.1133	-1.717
0.1166	-1.876
0.1200	-1.978
0.1233	-1.940
0.1266	-1.832
0.1300	-1.666
0.1333	-1.482
0.1366	-1.386
0.1400	-1.374
0.1433	-1.463
0.1466	-1.558
0.1500	-1.628
0.1533	-1.647
0.1566	-1.615
0.1600	-1.545
0.1633	-1.488
0.1666	-1.431
0.1700	-1.424
0.1733	-1.450
0.1766	-1.475 T.O.
0.1800	-1.482 ← T.O.
0.1833	-1.475 ← T.O.
0.1866	-1.450
0.1900	-1.424
0.1933	-1.412
0.1966	-1.399
0.2000	-1.393
0.2033	-1.393
0.2066	-1.386
0.2100	-1.380
0.2133	-1.374
0.2166	-1.367
0.2200	-1.354
0.2233	-1.342
0.2266	-1.329
0.2300	-1.323
0.2333	-1.316
0.2366	-1.316
0.2400	-1.304
0.2433	-1.297
0.2466	-1.291
0.2500	-1.285
0.2533	-1.278
0.2566	-1.265
0.2600	-1.253
0.2633	-1.253
0.2666	-1.240
0.2700	-1.234
0.2733	-1.234
0.2766	-1.221
0.2800	-1.221
0.2833	-1.208
0.2866	-1.208
0.2900	-1.195
0.2933	-1.180

0.1

PAI-01-MW05(S)
Test 2
Slug In (Falling Test)

0.3000	-1.176
0.3033	-1.170
0.3066	-1.164
0.3100	-1.157
0.3133	-1.151
0.3166	-1.145
0.3200	-1.145
0.3233	-1.132
0.3266	-1.132
0.3300	-1.119
0.3333	-1.113
0.3500	-1.081
0.3666	-1.049
0.2 0.3833	-1.017
0.4000	-0.985
0.4166	-0.960
0.4333	-0.935
0.4500	-0.909
0.4666	-0.884
0.3 0.4833	-0.858
0.5000	-0.839
0.5166	-0.814
0.5333	-0.795
0.5500	-0.769
0.5666	-0.758
0.4 0.5833	-0.731
0.6000	-0.712
0.6166	-0.693
0.6333	-0.674
0.6500	-0.661
0.6666	-0.642
0.5 0.6833	-0.629
0.7000	-0.610
0.7166	-0.591
0.7333	-0.572
0.7500	-0.559
0.7666	-0.547
0.6 0.7833	-0.527
0.8000	-0.521
0.8166	-0.502
0.8333	-0.489
0.8500	-0.477
0.8666	-0.470
0.7 0.8833	-0.457
0.9000	-0.445
0.9166	-0.438
0.9333	-0.419
0.9500	-0.407
0.9666	-0.407
0.8 0.9833	-0.394
1.0000	-0.375
1.02 1.2000	-0.250
1.4000	-0.190
1.42 1.6000	-0.146
1.8000	-0.101
2.0000	-0.082
2.2 2.2000	-0.063
2.4000	-0.057
2.6 2.6000	-0.050

PAI-01-MW05(S)
Test 2
Slug In (Falling Test)

3.0000	-0.031
3.2000	-0.025
3.4000	-0.025
3.6000	-0.019
3.8000	-0.012
4.0000	-0.019
4.2000	-0.012
4.4000	-0.019
4.6000	-0.012
4.8000	-0.006
5.0000	-0.006
5.2000	-0.006
5.4000	-0.012
5.6000	-0.006
5.8000	-0.006
6.0000	-0.006
6.2000	-0.006
6.4000	-0.006
6.6000	0.000
6.8000	0.000
7.0000	-0.006
7.2000	-0.006
7.4000	-0.006
7.6000	0.000
7.8000	0.000
8.0000	0.000
8.2000	-0.006
8.4000	0.000
8.6000	0.000
8.8000	-0.006
9.0000	-0.006
9.2000	0.000
9.4000	0.000
9.6000	0.000
9.8000	0.000
10.0000	0.000

END

CALCULATION WORKSHEET Order No. 19115 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW-06(D) Rising Head Slug Test	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

K = Hydraulic Conductivity
r = Radius of well casing — r = 0.083 FT
R = Radius of well Screen — R = 0.083 FT
L = Length of well Screen — L = 5 FT
T_0 = Time for water Level to Rise or fall to 37% of initial change — T_0 = 1.08 MINUTES

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\,FT)^2 \ln(5\,FT / 0.083\,FT)}{2(5\,FT)(1.08\,min)}$$

$$= \frac{6.89 \times 10^{-3}\,Ft \ \ln(60.24)}{10.8\ min}$$

$$= 2.61 \times 10^{-3}\,FT/min$$

$$2.61 \times 10^{-3}\,FT/min \times 1440\,min/day = 3.76\,FT/day$$

$$3.76\,Ft/day \times 3.528 \times 10^{-4}\,cm/sec = 1.33 \times 10^{-3}\,cm/sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-MW-0[illegible]

PROJECT NO.: 7394 **GEOLOGIST:** Mark Damington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 5 ft **TEST NO.:** 7/Step 0

STATIC WATER LEVEL (Depth/Elevation): 4.23 / TWD=39.76 / LWC=35.53 **DATE:** 8/19/98

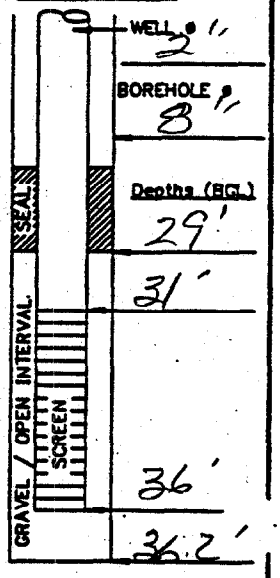
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) **PAGE** 2 **OF** 2

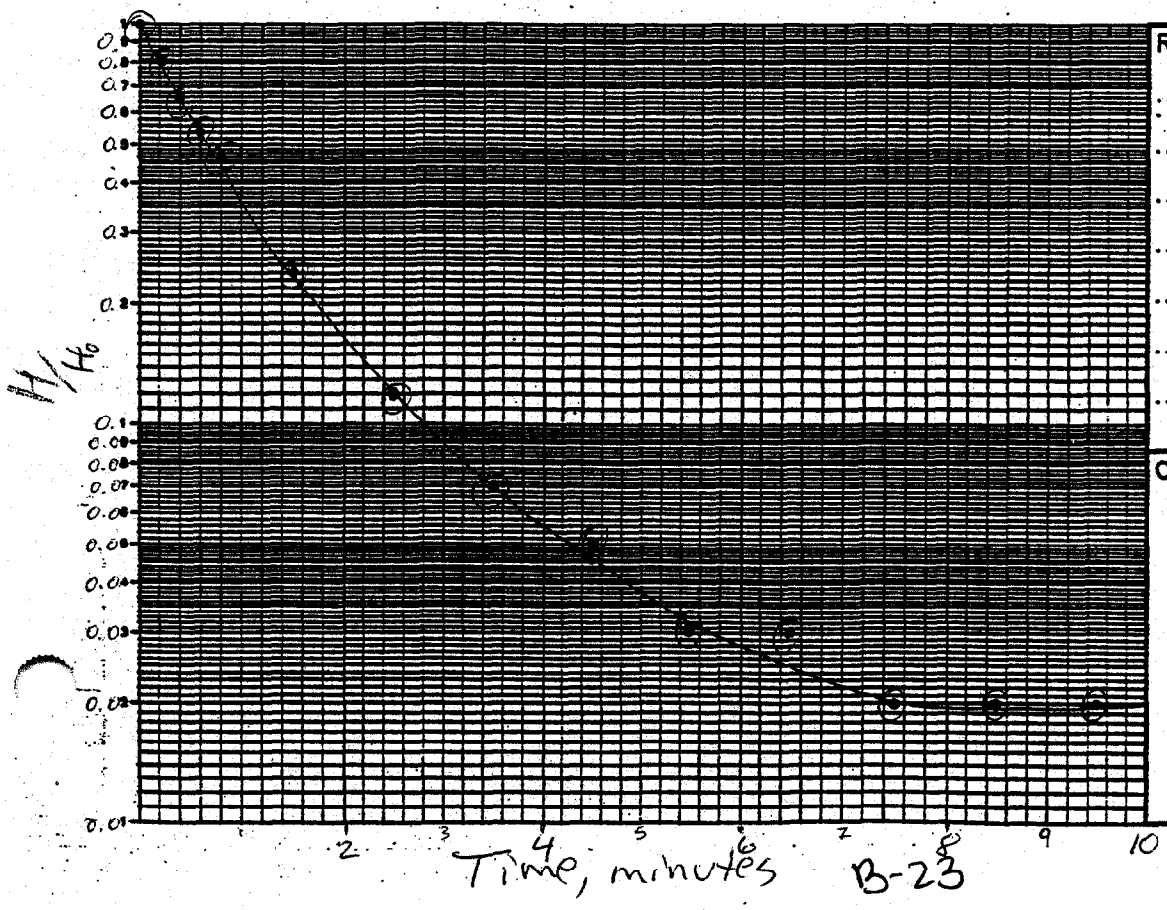
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	2.723	1	8.54	0.051	0.02
0.2	2.173	0.80	9.54	0.044	0.02
0.4	1.790	0.66			
0.6	1.482	0.54			
0.8	1.252	0.46			
1.54	0.658	0.24			
2.54	0.332	0.12			
3.54	0.148	0.07			
4.54	0.134	0.05			
5.54	0.095	0.03			
6.54	0.070	0.03			
7.54	0.057	0.02			

WELL SCHEMATIC

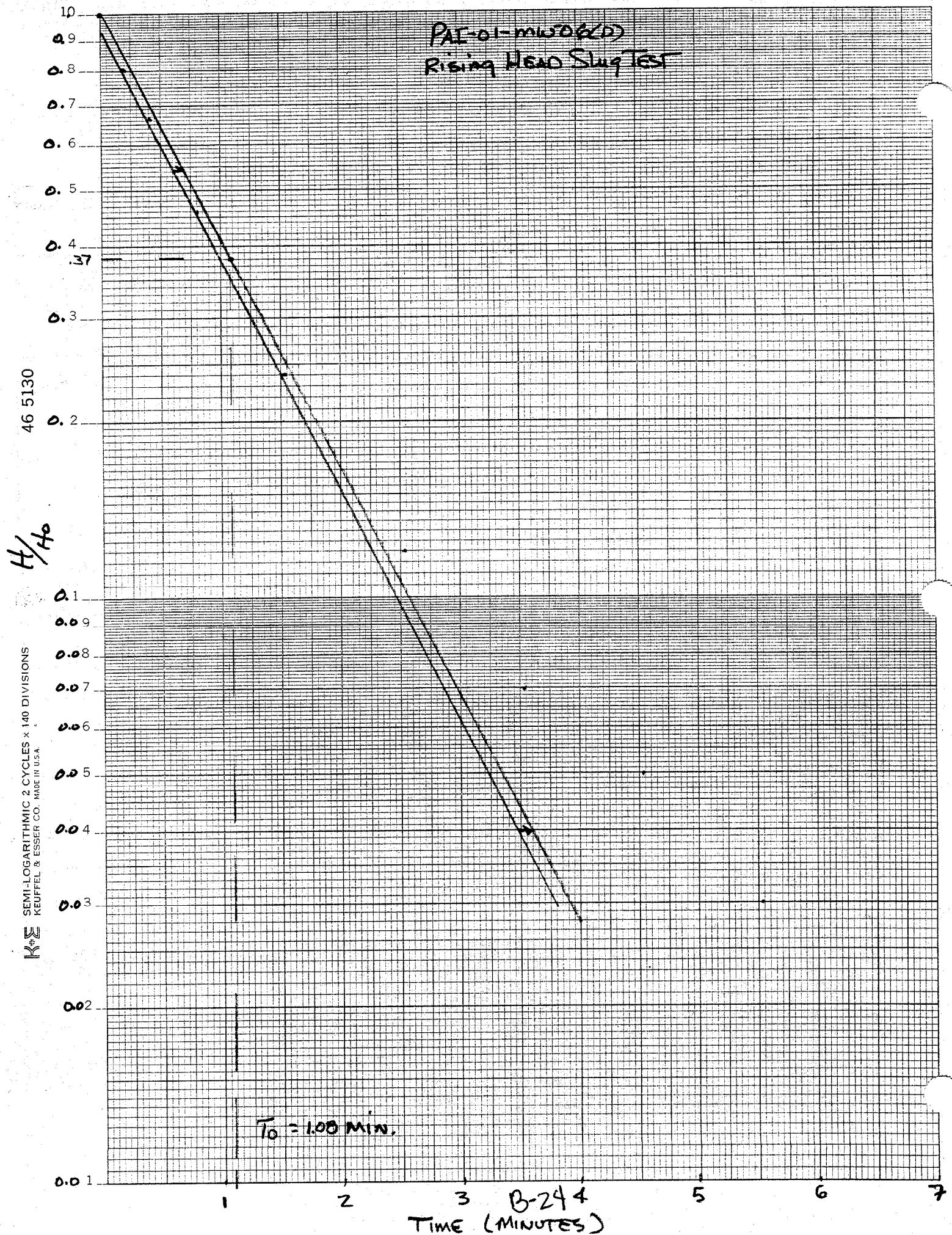


Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


PAE-01-MW06(D)
Rising Head Slug Test
H/Ho
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1
2
3
4
5
6
7
Time (Minutes)
To = 1.00 Min.
B-24
46 5130
K+E SEMI-LOGARITHMIC 2 CYCLES x 140 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

PAI-01-MW-06 (D)
Test 7
Slug Out (Rise)

Rising Head Slug Test

SE1000C
Environmental Logger
08/19 13:35

Unit# 00145 Test 7

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00006
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/19 12:48:37

Elapsed Time	INPUT 1
0.0000	0.000
0.0033	0.000
0.0066	0.006
0.0100	0.357
0.0133	1.674
0.0166	2.946
0.0200	2.933
0.0233	1.892
0.0266	1.342
0.0300	2.147
0.0333	3.340
0.0366	3.483
0.0400	2.869
0.0433	2.518
0.0466	2.672
0.0500	2.876
0.0533	2.793
0.0566	2.665
0.0600	2.672
0 0.0633	2.723 — T_0
0.0666	2.697
0.0700	2.658
0.0733	2.652
0.0766	2.646
0.0800	2.633
0.0833	2.620
0.0866	2.607
0.0900	2.601
0.0933	2.588

PAI-01-MW06 (D)
Test 7
Slug Out (Rising Head Test)

0.1000	2.560
0.1033	2.556
0.1066	2.550
0.1100	2.537
0.1133	2.531
0.1166	2.518
0.1200	2.512
0.1233	2.505
0.1266	2.493
0.1300	2.486
0.1333	2.473
0.1366	2.467
0.1400	2.460
0.1433	2.448
0.1466	2.441
0.1500	2.435
0.1533	2.422
0.1566	2.416
0.1600	2.410
0.1 — 0.1633	2.397
0.1666	2.390
0.1700	2.384
0.1733	2.377
0.1766	2.365
0.1800	2.358
0.1833	2.352
0.1866	2.345
0.1900	2.339
0.1933	2.326
0.1966	2.320
0.2000	2.314
0.2033	2.307
0.2066	2.301
0.2100	2.294
0.2133	2.281
0.2166	2.275
0.2200	2.268
0.2233	2.262
0.2266	2.256
0.2300	2.243
0.2333	2.237
0.2366	2.230
0.2400	2.224
0.2433	2.218
0.2466	2.211
0.2500	2.205
0.2533	2.198
0.2566	2.192
0.2600	2.186
0.2 — 0.2633	2.173
0.2666	2.173
0.2700	2.160
0.2733	2.154
0.2766	2.147
0.2800	2.141
0.2833	2.135
0.2866	2.128
0.2900	2.122

PAI-01-MW-06(D)
Slug Out (Rising Head Test)
Test 7

0.3000	2.103
0.3033	2.096
0.3066	2.090
0.3100	2.084
0.3133	2.084
0.3166	2.071
0.3200	2.064
0.3233	2.058
0.3266	2.051
0.3300	2.045
0.3333	2.039
0.3500	2.007
0.3 - 0.3666	1.968
0.3833	1.936
0.4000	1.904
0.4166	1.879
0.4333	1.847
0.4500	1.815
0.4 - 0.4666	1.790
0.4833	1.757
0.5000	1.732
0.5166	1.707
0.5333	1.681
0.5500	1.655
0.5 - 0.5666	1.630
0.5833	1.604
0.6000	1.578
0.6166	1.553
0.6333	1.534
0.6500	1.508
0.6 - 0.6666	1.482
0.6833	1.464
0.7000	1.444
0.7166	1.419
0.7333	1.399
0.7500	1.380
0.7 - 0.7666	1.361
0.7833	1.342
0.8000	1.323
0.8166	1.304
0.8333	1.285
0.8500	1.265
0.8 - 0.8666	1.252
0.8833	1.234
0.9000	1.214
0.9166	1.195
0.9333	1.176
0.9500	1.163
0.9 - 0.9666	1.144
0.9833	1.125
1.0000	1.112
1.2000	0.908
1.4000	0.773
1.54 - 1.6000	0.658
1.8000	0.569
2.0000	0.492
2.2000	0.434
2.4000	0.377
2.54 2.6000	0.332

PAI-01-MW06(D)

Test 7
Slugout (Rising Head Test)

	3.0000	0.268
	3.2000	0.236
	3.4000	0.210
3.54-	3.6000	0.198
	3.8000	0.179
	4.0000	0.166
	4.2000	0.153
	4.4000	0.140
4.54-	4.6000	0.134
	4.8000	0.121
	5.0000	0.114
	5.2000	0.102
	5.4000	0.102
5.54-	5.6000	0.095
	5.8000	0.089
	6.0000	0.083
	6.2000	0.076
	6.4000	0.076
6.54-	6.6000	0.070
	6.8000	0.063
	7.0000	0.063
	7.2000	0.063
	7.4000	0.057
7.54-	7.6000	0.057
	7.8000	0.057
	8.0000	0.051
	8.2000	0.051
	8.4000	0.051
8.54-	8.6000	0.051
	8.8000	0.051
	9.0000	0.051
	9.2000	0.051
	9.4000	0.051
9.54-	9.6000	0.044
	9.8000	0.044
	10.0000	0.044

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW06(D) Falling Head Slug Test	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

K = Hydraulic Conductivity
r = Radius of
R = Radius of well Screen
L = Length of well Screen
T_0 = Time For water Level to Rise or Fall 37% of initial Change.

r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_0 = 1.05 min

$$K = \frac{r^2 \ln(L/R)}{2 L T_0} = \frac{(0.083\,FT)^2 \ln\left(\frac{5\,FT}{0.083\,FT}\right)}{2(5\,FT)(1.05\,min)}$$

$$= \frac{(6.89\times10^{-3}\,Ft^2)\ln(60.24)}{10.5\,FT\cdot min}$$

$$= 2.69\times10^{-3}\,FT/min$$

$$2.69\times10^{-3}\,FT/min \times 1440\,min/day = 3.87\,FT/day$$

$$3.87\,Ft/day \times 3.528\times10^{-4}\,cm/sec = 1.37\times10^{-3}\,cm/sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) WELL/BORING NO.: PAI-01-MW-06C

PROJECT NO.: 7394 GEOLOGIST: Mark Dannington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 5 ft TEST NO.: 4/Step 0

STATIC WATER LEVEL (Depth/Elevation): 4.23/TWD=39.76/LWC=35.53 DATE: 8/19/96

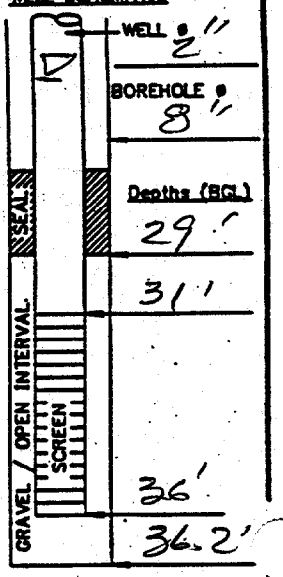
TEST TYPE (Rising/Falling/Constant Head): Falling (Slug in) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5ft) PAGE 1 OF 1

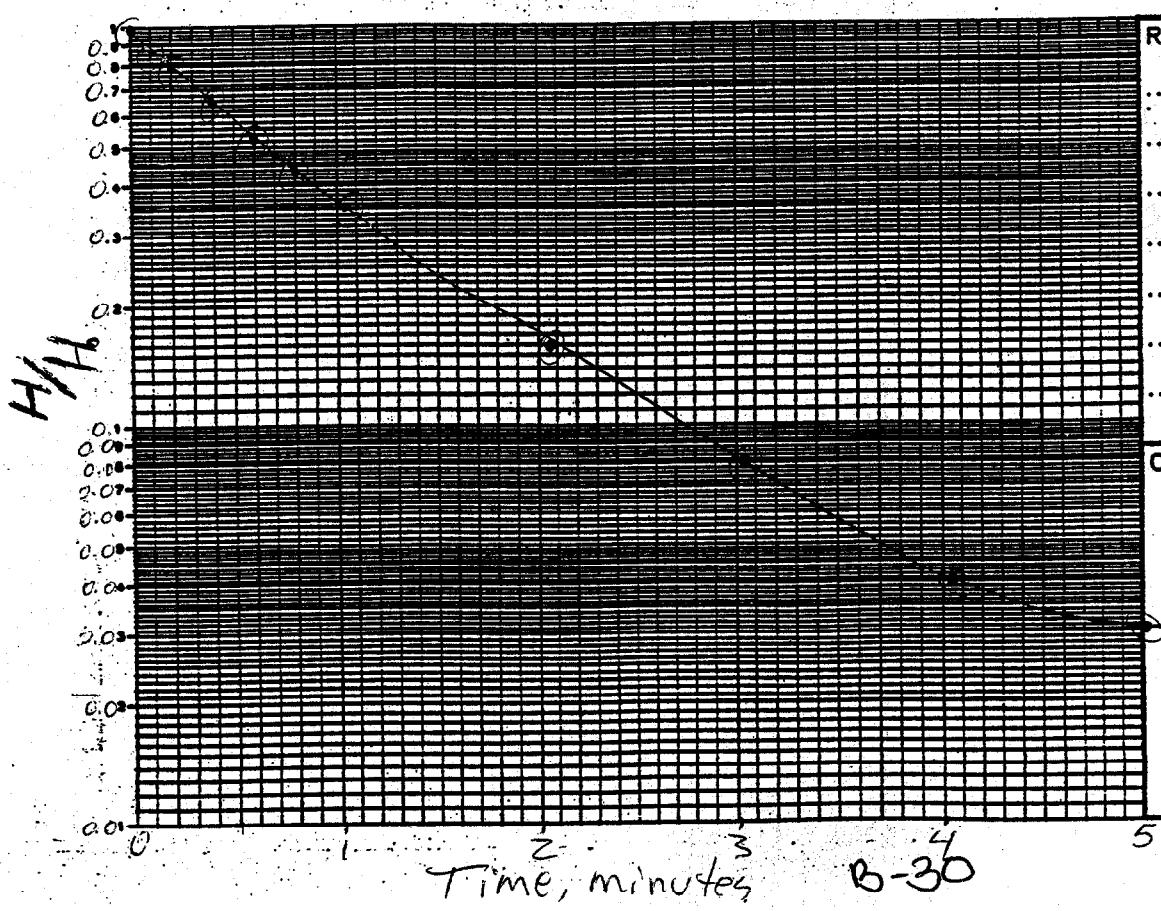
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-2.270	1	7.04	-0.018	0.01
0.1	-2.088	0.88	8.04	-0.006	0.002
0.2	-1.808	0.80	9.04	0.000	0.000
0.4	-1.476	0.65			
0.6	-1.214	0.53			
0.8	-1.001	0.44			
1.04	-0.786	0.35			
2.04	-0.357	0.16			
3.04	-0.179	0.08			
4.04	-0.095	0.04			
5.04	-0.057	0.03			
6.04	-0.031	0.01			

WELL SCHEMATIC

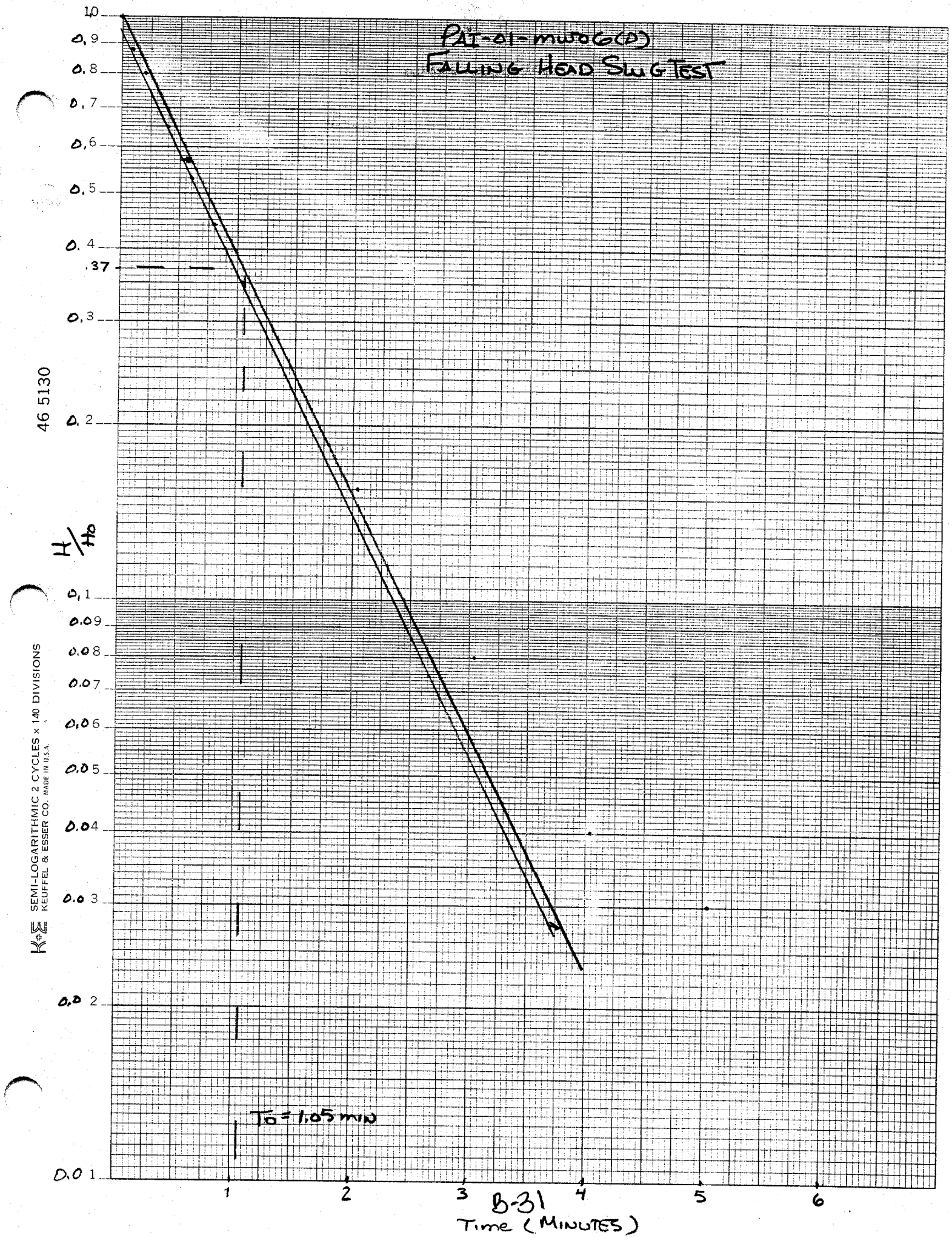


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


PAT-01-MW06(D)
FALLING HEAD SLUG TEST
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
H/Ho
T0 = 1.05 min
1
2
3
4
5
6
Time (MINUTES)
46 5130
K&E SEMI-LOGARITHMIC 2 CYCLES x 140 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

PAI-01-MW-06(D)
Test 4
Slug In (Fall)

Falling Head Slug Test

SE10000
Environmental Logger
08/19 13:24

Unit# 00145 Test 4

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00005
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0. 08/19 12:09:03

Elapsed Time	INPUT 1
0.0000	0.025
0.0033	0.025
0.0066	0.025
0.0100	0.025
0.0133	0.025
0.0166	0.031
0.0200	0.006
0.0233	0.025
0.0266	0.006
0.0300	0.019
0.0333	0.025
0.0366	0.013
0.0400	-0.005
0.0433	-0.594
0.0466	-0.830
0.0500	-1.061
0.0533	-1.566
0.0566	-1.931
0.0600	-2.366
0.0633	-2.839
0.0666	-3.083
0.0700	-3.102
0.0733	-3.140
0.0766	-3.211
0.0800	-3.242
0.0833	-3.108
0.0866	-2.462
0.0900	-1.918

PAI-01-MW05(D)

Test 4

Slug in (Falling Head Test)

	0.1000	-2.085
	0.1033	-2.456
	0.1066	-2.679
	0.1100	-2.731
	0.1133	-2.648
	0.1166	-2.494
	0.1200	-2.347
	0.1233	-2.238
	0.1266	-2.225
	0.1300	-2.289
	0.1333	-2.360
	0.1366	-2.392
	0.1400	-2.385
	0.1433	-2.340
	0.1466	-2.289
	0.1500	-2.264
	0.1533	-2.257
	0.1566	-2.251
	0.1600	-2.257
0	0.1633	-2.270 — T_0
	0.1666	-2.264
	0.1700	-2.251
	0.1733	-2.231
	0.1766	-2.219
	0.1800	-2.206
	0.1833	-2.200
	0.1866	-2.193
	0.1900	-2.187
	0.1933	-2.174
	0.1966	-2.168
	0.2000	-2.155
	0.2033	-2.148
	0.2066	-2.148
	0.2100	-2.135
	0.2133	-2.129
	0.2166	-2.117
	0.2200	-2.110
	0.2233	-2.103
	0.2266	-2.097
	0.2300	-2.085
	0.2333	-2.078
	0.2366	-2.065
	0.2400	-2.065
	0.2433	-2.052
	0.2466	-2.046
	0.2500	-2.040
	0.2533	-2.033
	0.2566	-2.027
	0.2600	-2.014
0.1	0.2633	-2.008
	0.2666	-2.008
	0.2700	-2.001
	0.2733	-1.995
	0.2766	-1.989
	0.2800	-1.976
	0.2833	-1.969
	0.2866	-1.963
	0.2900	-1.956
	0.2933	-1.950

PAI-01-MW-06(D)
Test 4
Slug In (Falling Head Test)

	0.3000	-1.937
	0.3033	-1.931
	0.3066	-1.925
	0.3100	-1.912
	0.3133	-1.912
	0.3166	-1.905
	0.3200	-1.893
	0.3233	-1.893
	0.3266	-1.880
	0.3300	-1.880
	0.3333	-1.867
	0.3500	-1.842
0.2	-0.3666	-1.800
	0.3833	-1.771
	0.4000	-1.745
	0.4166	-1.713
	0.4333	-1.688
	0.4500	-1.656
0.3	-0.4666	-1.630
	0.4833	-1.605
	0.5000	-1.573
	0.5166	-1.547
	0.5333	-1.522
	0.5500	-1.502
0.4	-0.5666	-1.476
	0.5833	-1.451
	0.6000	-1.426
	0.6166	-1.407
	0.6333	-1.381
	0.6500	-1.362
0.5	-0.6666	-1.336
	0.6833	-1.317
	0.7000	-1.298
	0.7166	-1.272
	0.7333	-1.253
	0.7500	-1.234
0.6	-0.7666	-1.214
	0.7833	-1.195
	0.8000	-1.176
	0.8166	-1.157
	0.8333	-1.138
	0.8500	-1.112
0.7	-0.8666	-1.099
	0.8833	-1.080
	0.9000	-1.067
	0.9166	-1.048
	0.9333	-1.035
	0.9500	-1.016
0.8	-0.9666	-1.004
	0.9833	-0.984
	1.0000	-0.972
1.0	-1.2000	-0.786
	1.4000	-0.658
	1.6000	-0.556
	1.8000	-0.479
	2.0000	-0.408
2.0	-2.2000	-0.357
	2.4000	-0.313

PAI-01-mw-06(D)
Test 4
Slug In (Falling Head Tes

	3.0000	-0.204
3.0	3.2000	-0.179
	3.4000	-0.153
	3.6000	-0.140
	3.8000	-0.121
	4.0000	-0.108
4.0	4.2000	-0.095
	4.4000	-0.083
	4.6000	-0.076
	4.8000	-0.070
	5.0000	-0.064
5.0	5.2000	-0.057
	5.4000	-0.051
	5.6000	-0.044
	5.8000	-0.038
	6.0000	-0.038
6.0	6.2000	-0.031
	6.4000	-0.031
	6.6000	-0.031
	6.8000	-0.025
	7.0000	-0.018
7.0	7.2000	-0.018
	7.4000	-0.018
	7.6000	-0.018
	7.8000	-0.012
	8.0000	-0.012
8.0	8.2000	-0.006
	8.4000	-0.006
	8.6000	+0.006
	8.8000	0.000
	9.0000	0.000
9.0	9.2000	0.000
	9.4000	0.006
	9.6000	0.000
	9.8000	0.006
	10.0000	0.006

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER	
SUBJECT PAI-01-MW07(S) FALLING-HEAD SLUG TEST			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/19/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of
R = Radius of Well Screen
L = Length of Screen
T_0 = Time For Water Level to Rise or Fall to 37% of initial Change

r = 0.083 FT
R = 0.083 FT
L = 10 FT
T_0 = 0.47 MIN.

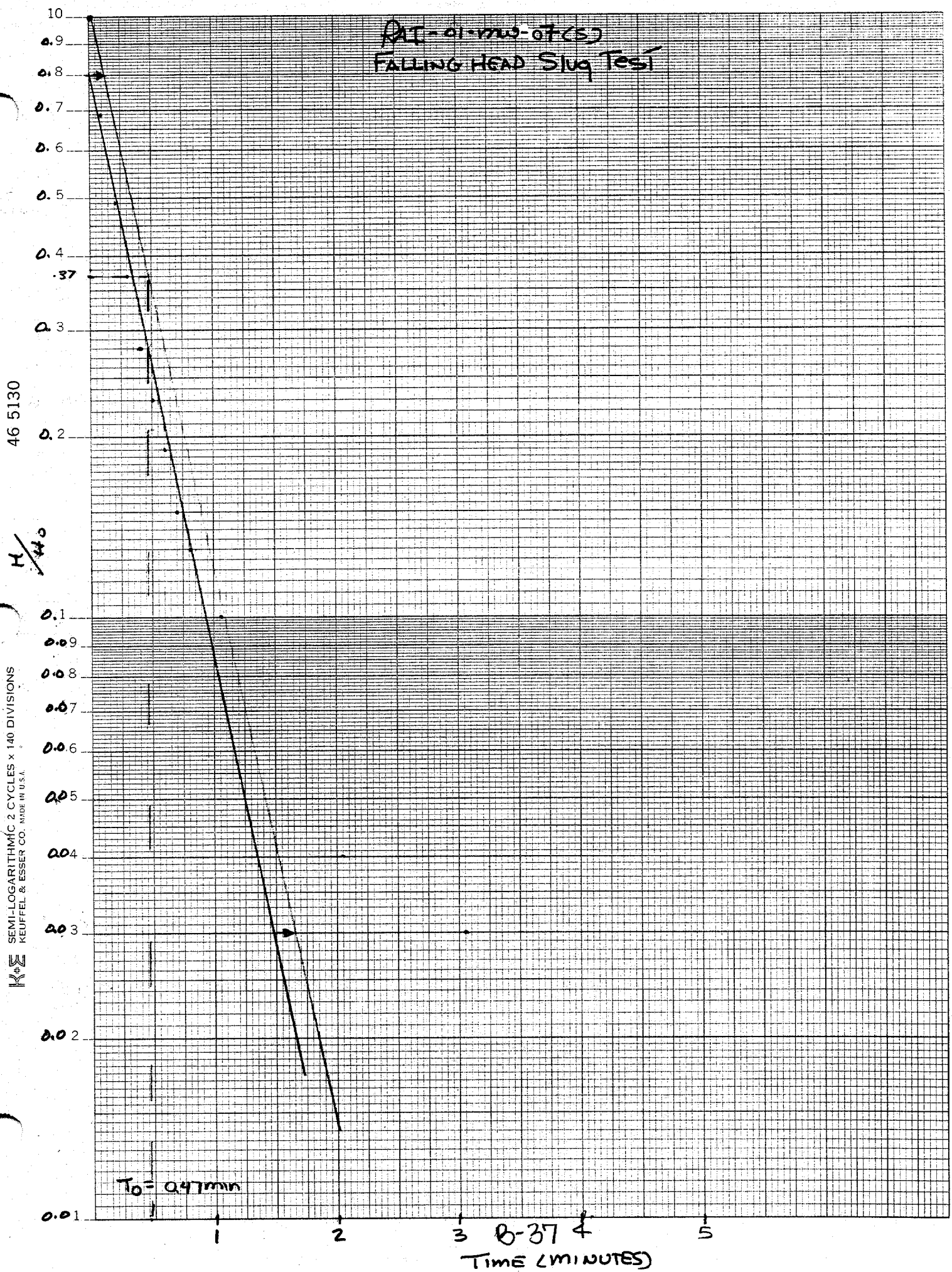
$$K = \frac{r^2 \ln(L/R)}{2 L T_0} = \frac{(0.083\,FT)^2 \ln(10\,FT / 0.083\,FT)}{2(10\,FT)(0.47\,min)}$$

$$= 6.89 \times 10^{-3} \frac{FT^2 \ln(120.48)}{9.4\,FT \cdot min}$$

$$= 3.51 \times 10^{-3}\ FT/min$$

$$3.51 \times 10^{-3}\ FT/min \times 1440\ min/day = 5.05\ FT/day$$

$$5.05\ FT/day \times 3.528 \times \frac{10^{-4}\ cm/sec}{FT/day} = 1.78 \times 10^{-3}\ cm/sec$$


RAI-01-MW-07(S)
FALLING HEAD SLUG TEST
10
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
H/H0
T0 = 0.47 min
1
2
3
4
5
TIME (MINUTES)
B-37
46 5130
K+E SEMI-LOGARITHMIC 2 CYCLES x 140 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-MW-07S

PROJECT NO.: 7394 **GEOLOGIST:** Mark Darrington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 10 ft. **TEST NO.:** 0/step

STATIC WATER LEVEL (Depth/Elevation): 3.60 / TWD=15.85 / LWC=12.19 **DATE:** 8/19/98

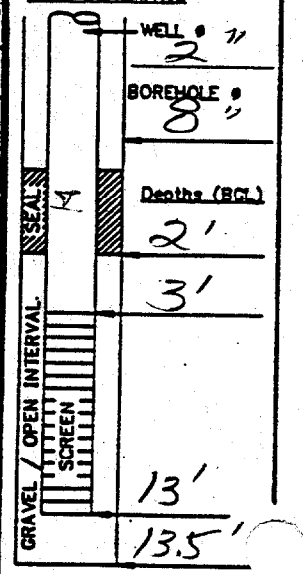
TEST TYPE (Rising/Falling/Constant Head): Falling (Slug in) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) **PAGE** 1 **OF** 2

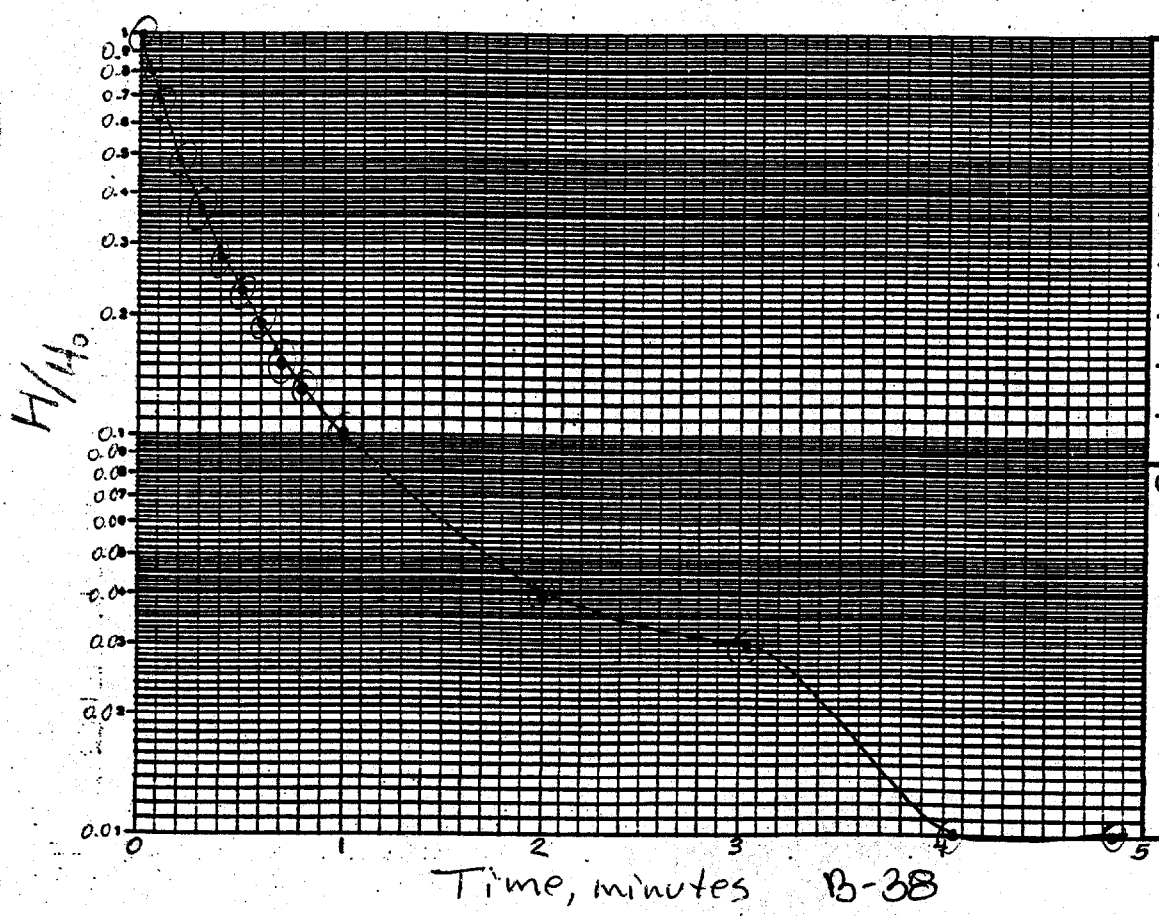
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-1.195	1	3.06	-0.038	0.03
0.05	-0.960	0.80	4.06	-0.012	0.01
0.10	-0.820	0.69	4.86	-0.012	0.01
0.21	-0.591	0.49			
0.31	-0.438	0.37			
0.41	-0.337	0.28			
0.51	-0.273	0.23			
0.61	-0.222	0.19			
0.71	-0.184	0.15			
0.81	-0.159	0.13			
1.06	-0.120	0.10			
2.06	-0.044	0.04			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

~~PAI-GW7~~
Test Q
Slug In (Falling)

PAI-01-MW-07(S)
Falling Head Slug Test

SE1000C
Environmental Logger
08/20 13:50

Unit# 00145 Test 0

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00007
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/19 14:05:15

Elapsed Time	INPUT 1
0.0000	0.000
0.0033	0.012
0.0066	0.006
0.0100	0.000
0.0133	-0.010
0.0166	-0.006
0.0200	-0.012
0.0233	-0.012
0.0266	0.000
0.0300	-0.012
0.0333	-0.407
0.0366	-0.763
0.0400	-1.043
0.0433	-0.960
0.0466	-1.285
0.0500	-1.590
0.0533	-1.304
0.0566	-1.265
0.0600	-1.444
0.0633	-1.583
0.0666	-1.800
0.0700	-2.023
0.0733	-2.150
0.0766	-1.984
0.0800	-1.609
0.0833	-1.348
0.0866	-1.170
0.0900	-1.087
0.0933	-0.947
0.0966	-1.024
0.1000	-1.335
0.1033	-1.367
0.1066	-1.453
0.1100	-1.482
0.1133	-1.431
0.1166	-1.335
0.1200	-1.240

PAI-01-MW07(S)
Test Ø
Slug In (Falling Head Test)

	0.1233	-1.154
	0.1266	-1.132
	0.1300	-1.138
	0.1333	-1.170
	0.1366	-1.195
0	0.1400	-1.195 — T_0
	0.1433	-1.164
	0.1466	-1.132
	0.1500	-1.113
	0.1533	-1.087
	0.1566	-1.075
	0.1600	-1.062
	0.1633	-1.055
	0.1666	-1.040
	0.1700	-1.035
	0.1733	-1.024
	0.1766	-1.011
	0.1800	-0.992
	0.1833	-0.979
	0.1866	-0.973
0.05 —	0.1900	-0.960
	0.1933	-0.947
	0.1966	-0.941
	0.2000	-0.935
	0.2033	-0.922
	0.2066	-0.909
	0.2100	-0.903
	0.2133	-0.890
	0.2166	-0.890
	0.2200	-0.865
	0.2233	-0.852
	0.2266	-0.858
	0.2300	-0.852
	0.2333	-0.846
	0.2366	-0.833
0.10 —	0.2400	-0.820
	0.2433	-0.807
	0.2466	-0.795
	0.2500	-0.788
	0.2533	-0.788
	0.2566	-0.782
	0.2600	-0.769
	0.2633	-0.763
	0.2666	-0.757
	0.2700	-0.750
	0.2733	-0.737
	0.2766	-0.737
	0.2800	-0.731
	0.2833	-0.718
	0.2866	-0.712
	0.2900	-0.706
	0.2933	-0.699
	0.2966	-0.693
	0.3000	-0.687
	0.3033	-0.674
	0.3066	-0.667
	0.3100	-0.667
	0.3133	-0.655
	0.3166	-0.655
	0.3200	-0.648

PAI-01-MW-07(S)
Test Ø
Slug In (Falling Head Test

	0.3233	-0.642
	0.3266	-0.635
	0.3300	-0.636
	0.3333	-0.623
0.21	-0.3500	-0.591
	0.3666	-0.559
	0.3833	-0.534
	0.4000	-0.508
	0.4166	-0.483
	0.4333	-0.464
0.31	-0.4500	-0.438
	0.4666	-0.426
	0.4833	-0.407
	0.5000	-0.388
	0.5166	-0.368
	0.5333	-0.356
0.41	-0.5500	-0.337
	0.5666	-0.330
	0.5833	-0.318
	0.6000	-0.305
	0.6166	-0.292
	0.6333	-0.279
0.51	-0.6500	-0.273
	0.6666	-0.260
	0.6833	-0.254
	0.7000	-0.248
	0.7166	-0.235
	0.7333	-0.229
0.61	-0.7500	-0.222
	0.7666	-0.209
	0.7833	-0.209
	0.8000	-0.203
	0.8166	-0.197
	0.8333	-0.190
0.71	-0.8500	-0.184
	0.8666	-0.178
	0.8833	-0.178
	0.9000	-0.165
	0.9166	-0.171
	0.9333	-0.159
0.81	-0.9500	-0.159
	0.9666	-0.146
	0.9833	-0.146
	1.0000	-0.146
1.06	-1.2000	-0.120
	1.4000	-0.082
	1.6000	-0.076
	1.8000	-0.063
	2.0000	-0.050
2.06	-2.2000	-0.044
	2.4000	-0.044
	2.6000	-0.031
	2.8000	-0.031
	3.0000	-0.031
3.06	-3.2000	-0.038
	3.4000	-0.031
	3.6000	-0.025
	3.8000	-0.019
	4.0000	-0.019
4.06	-4.2000	-0.012

PAI-01-MW07(S)
Test Ø
Slug In (Falling Head Test)

4.4000	-0.019
4.6000	-0.019
4.8000	-0.019
4.86 - 5.0000	-0.012
5.2000	-0.012
5.4000	-0.012
5.6000	-0.012
5.8000	-0.012
6.0000	-0.006
6.2000	-0.006
6.4000	-0.006
6.6000	-0.012
6.8000	-0.006
7.0000	-0.006
7.2000	-0.006
7.4000	-0.006
7.6000	-0.012
7.8000	-0.006
8.0000	-0.006
8.2000	-0.006
8.4000	-0.006
8.6000	-0.006
8.8000	-0.006
9.0000	-0.006
9.2000	-0.006
9.4000	0.000
9.6000	0.000
9.8000	0.000
10.0000	-0.006
12.0000	0.006

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW-07(S) RISING HEAD SLUG TEST	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln(L/R)}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of Well Casing — r = 0.083 FT.
R = Radius of Well Screen — R = 0.083 FT
L = Length of Well Screen — L = 10 FT
T_0 = Time For water Level to Rise or Fall to 37% of initial change — T_0 = 0.43 min.

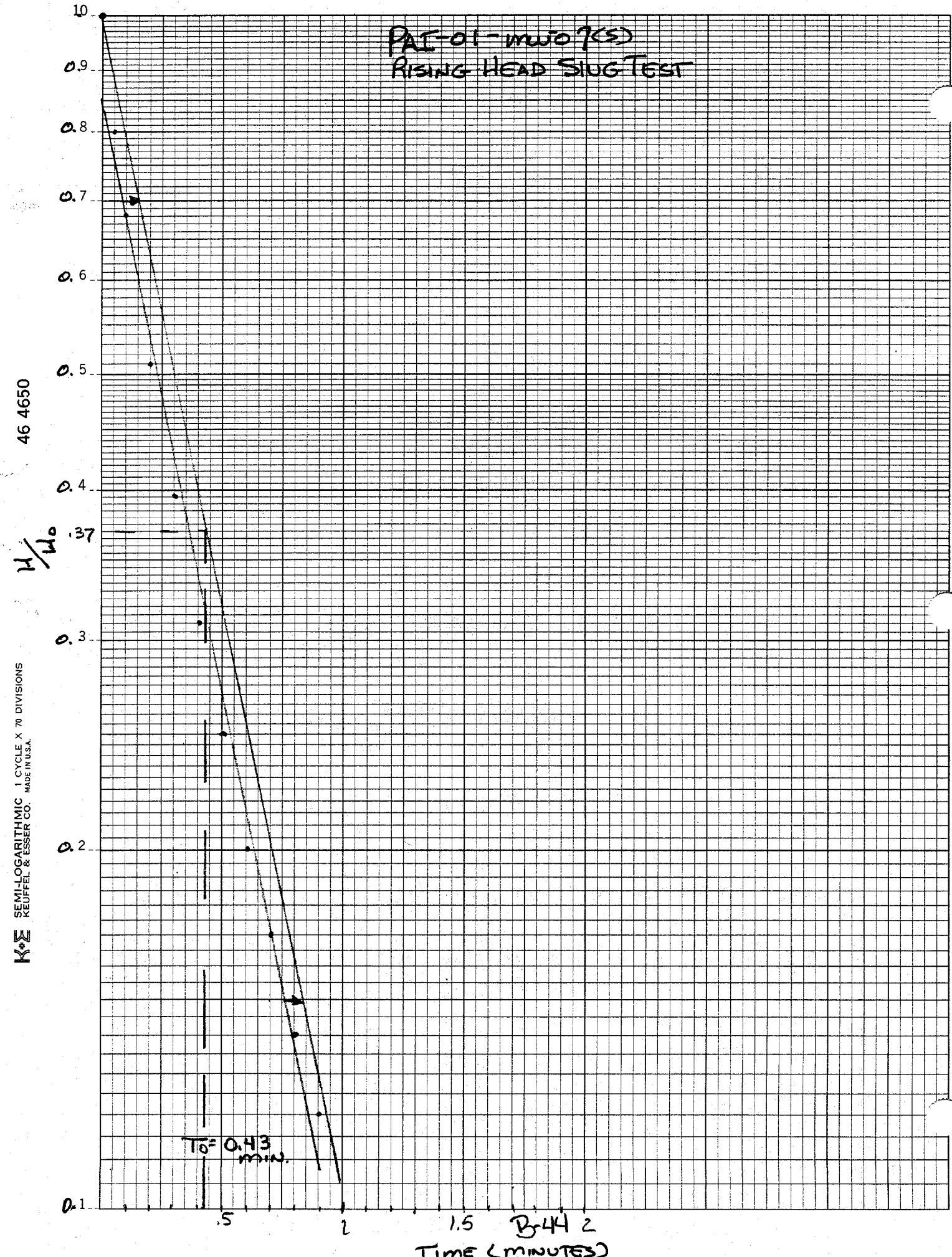
$$K = \frac{r^2 \ln(L/R)}{2 L T_0} = \frac{(0.083\,FT)^2 \ln\left(\frac{10\,FT}{0.083\,FT}\right)}{2\,(10\,FT)(0.43\,min)}$$

$$= \frac{(6.89 \times 10^{-3}\,FT^2) \ln(120.48)}{8.6\,FT \cdot min}$$

$$= 3.84 \times 10^{-3}\,FT/min$$

$$3.84 \times 10^{-3}\,FT/min \times 1440\,min/day = 5.53\,FT/day$$

$$5.53\,FT/day \times 3.528 \times \frac{10^{-4}\,cm/sec}{FT/day} = 1.95 \times 10^{-3}\,cm/sec.$$

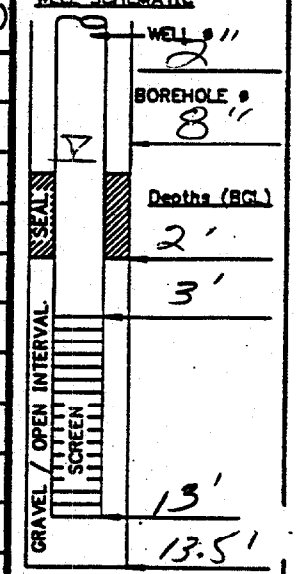

PAI-01-MW07(S)
RISING HEAD SLUG TEST
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
H/H₀
T₀= 0.43 MIN.
.5
1
1.5
2
TIME (MINUTES)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

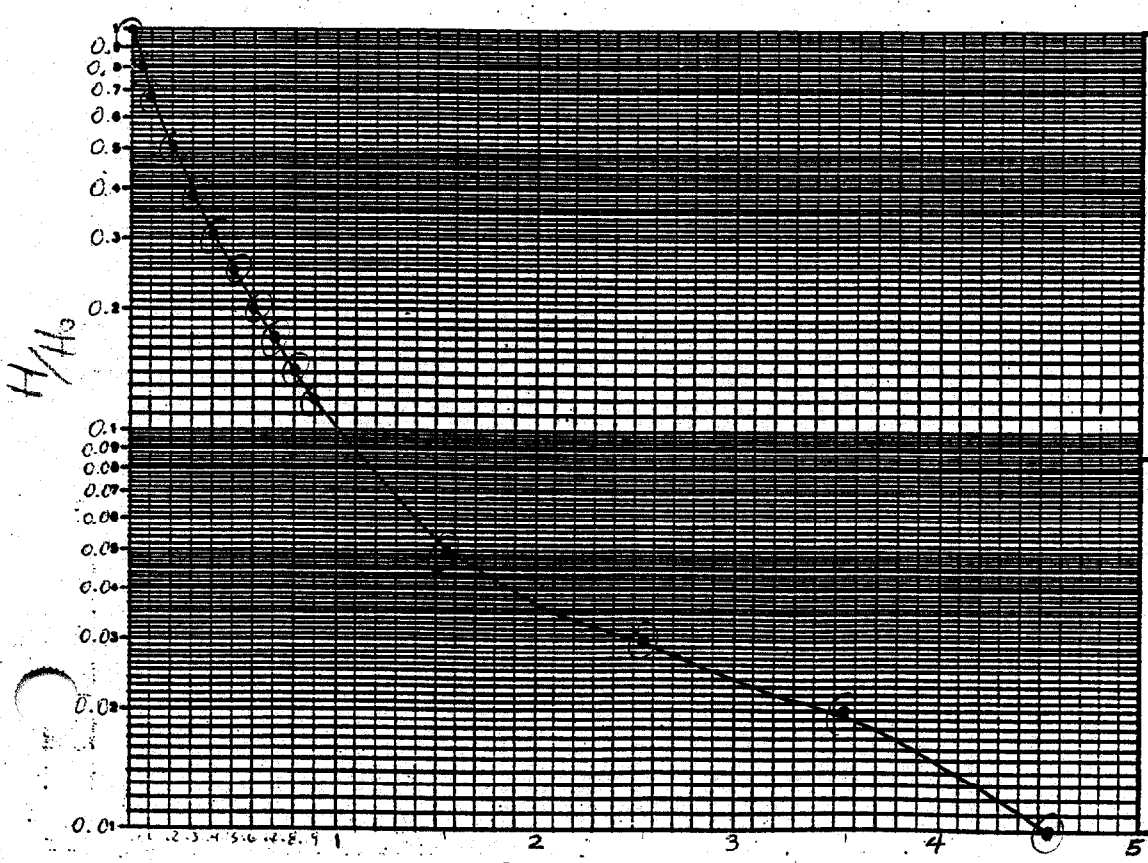
PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-MW-07CS
PROJECT NO.: 7394 **GEOLOGIST:** Mark Dannington
WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 10 ft **TEST NO.:** 3/Step C
STATIC WATER LEVEL (Depth/Elevation): 3.60 / TWD = 15.85 / LWC = 12.19 **DATE:** 8/19/98
TEST TYPE (Rising/Falling/Constant Head): Rising (Slug out) **CHECKED:**
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) **PAGE** 1 **OF** 1
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	1.780	1	2.54	0.050	0.03
0.05	1.430	0.80	3.54	0.038	0.02
0.1	1.214	0.68	4.54	0.025	0.01
0.2	0.909	0.51			
0.31	0.693	0.39			
0.41	0.546	0.31			
0.51	0.438	0.25			
0.61	0.356	0.20			
0.71	0.298	0.17			
0.81	0.241	0.14			
0.91	0.209	0.12			
1.54	0.089	0.05			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

PAI-01-MW-07(S)
Test 3
Slug Out (Rising)

Rising Head Slug Test

SE10000
Environmental Logger
08/20 14:01

Unit# 00145 Test 3

Setups:	INPUT 1
Type	Level (F)
Mode	TOD
I.D.	00007
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/19 14:50:34

	Elapsed Time	INPUT 1
	0.0000	0.000
	0.0033	-0.012
	0.0066	0.005
	0.0100	0.171
	0.0133	0.820
	0.0166	2.060
	0.0200	2.193
	0.0233	1.392
	0.0266	0.820
	0.0300	1.666
	0.0333	1.980
	0.0366	2.454
	0.0400	2.002
	0.0433	1.735
	0.0466	1.945
	0.0500	1.894
	0.0533	1.774
	0.0566	1.755
0	0.0600	1.780 → T_0
	0.0633	1.723
	0.0666	1.678
	0.0700	1.666
	0.0733	1.650
	0.0766	1.621
	0.0800	1.580
	0.0833	1.583
	0.0866	1.557
	0.0900	1.532
	0.0933	1.510
	0.0966	1.500
	0.1000	1.481
	0.1033	1.456
	0.1066	1.443
0.05	0.1100	1.430
	0.1133	1.411
	0.1166	1.392
	0.1200	1.379

PAI-01-MW-07(S)
TEST 3
Slug Out (Rising Head Test)

0.1233	1.357
0.1266	1.348
0.1300	1.329
0.1333	1.316
0.1366	1.303
0.1400	1.290
0.1433	1.271
0.1466	1.265
0.1500	1.246
0.1533	1.233
0.1566	1.221
0.1600	1.214
0.1633	1.195
0.1666	1.180
0.1700	1.170
0.1733	1.163
0.1766	1.151
0.1800	1.138
0.1833	1.131
0.1866	1.119
0.1900	1.106
0.1933	1.100
0.1966	1.081
0.2000	1.074
0.2033	1.062
0.2066	1.049
0.2100	1.036
0.2133	1.030
0.2166	1.017
0.2200	1.011
0.2233	1.004
0.2266	0.998
0.2300	0.979
0.2333	0.979
0.2366	0.966
0.2400	0.960
0.2433	0.953
0.2466	0.941
0.2500	0.928
0.2533	0.928
0.2566	0.922
0.2600	0.909
0.2633	0.896
0.2666	0.896
0.2700	0.883
0.2733	0.877
0.2766	0.871
0.2800	0.864
0.2833	0.852
0.2866	0.845
0.2900	0.839
0.2933	0.833
0.2966	0.826
0.3000	0.820
0.3033	0.814
0.3066	0.814
0.3100	0.801
0.3133	0.785
0.3166	0.788
0.3200	0.782

PAT-01-MW-07
TEST 3
SLUG OUT (RISING HEAD TEST)

	0.3233	0.775
	0.3266	0.769
	0.3300	0.756
	0.3333	0.756
	0.3500	0.725
0.31 -	0.3666	0.693
	0.3833	0.667
	0.4000	0.642
	0.4166	0.616
	0.4333	0.591
	0.4500	0.566
0.41 -	0.4666	0.545
	0.4833	0.521
	0.5000	0.502
	0.5166	0.483
	0.5333	0.470
	0.5500	0.451
0.51 -	0.5666	0.438
	0.5833	0.419
	0.6000	0.407
	0.6166	0.394
	0.6333	0.375
	0.6500	0.362
0.61 -	0.6666	0.356
	0.6833	0.343
	0.7000	0.330
	0.7166	0.324
	0.7333	0.311
	0.7500	0.305
0.71 -	0.7666	0.298
	0.7833	0.286
	0.8000	0.279
	0.8166	0.273
	0.8333	0.254
	0.8500	0.254
0.81 -	0.8666	0.241
	0.8833	0.241
	0.9000	0.228
	0.9166	0.222
	0.9333	0.222
	0.9500	0.216
0.91 -	0.9666	0.209
	0.9833	0.203
	1.0000	0.197
	1.2000	0.139
	1.4000	0.114
1.54 -	1.6000	0.089
	1.8000	0.076
	2.0000	0.063
	2.2000	0.063
	2.4000	0.057
2.54 -	2.6000	0.050
	2.8000	0.044
	3.0000	0.044
	3.2000	0.044
	3.4000	0.038
3.54 -	3.6000	0.038
	3.8000	0.038
	4.0000	0.031
	4.2000	0.025

PAF-01-MW-07(S)
TEST 3
Slug Out (Rising Head Test)

4.4000	0.031
4.54-4.6000	0.025
4.8000	0.025
5.0000	0.025
5.2000	0.025
5.4000	0.025
5.6000	0.031
5.8000	0.031
6.0000	0.025
6.2000	0.025
6.4000	0.025
6.6000	0.025
6.8000	0.019
7.0000	0.019
7.2000	0.025
7.4000	0.019
7.6000	0.019
7.8000	0.019
8.0000	0.019
8.2000	0.019
8.4000	0.019
8.6000	0.025
8.8000	0.019
9.0000	0.019
9.2000	0.019
9.4000	0.012
9.6000	0.019
9.8000	0.019
10.0000	0.019
12.0000	0.019

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW-08(D) FALLING HEAD TEST	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time for water level to Rise or Fall to 37% of Initial Change

r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_0 = 0.42 min.

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083FT)^2 \ln\left(\frac{5FT}{0.083FT}\right)}{2(5FT)(0.42min)}$$

$$= \frac{6.89 \times 10^{-3} FT^2 \ln(60.24)}{4.2 FT \cdot min.}$$

$$= 6.72 \times 10^{-3} FT/min.$$

$$6.72 \times 10^{-3} FT/min \times 1440 min/day = 9.68 FT/day$$

$$9.68 FT/day \times \frac{3.528 \times 10^{-4} cm/sec}{FT/day} = 3.42 \times 10^{-3} cm/sec.$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-MW08

PROJECT NO.: 7394 **GEOLOGIST:** Mark Damington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 5 ft. **TEST NO.:** 4 / Step 8

STATIC WATER LEVEL (Depth/Elevation): 4.99 / TWD=39.66 / LWC=34.67 **DATE:** 8/19/98

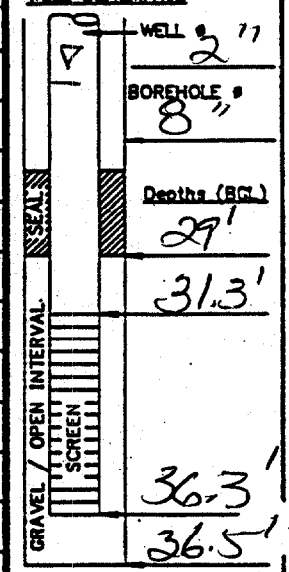
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) **PAGE** 1 **OF** 2

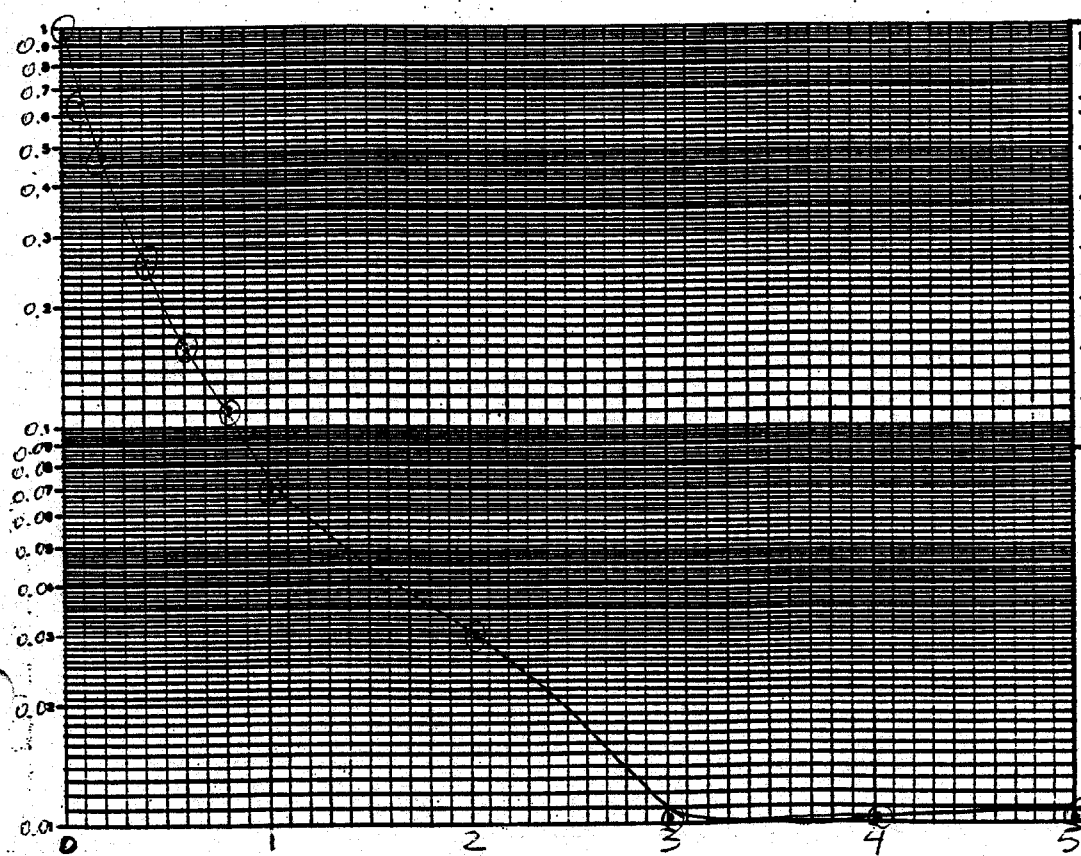
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-1.912	1			
0.10	-1.259	0.66			
0.20	-0.914	0.48			
0.41	-0.505	0.26			
0.61	-0.313	0.16			
0.81	-0.217	0.11			
1.09	-0.127	0.07			
2.09	-0.051	0.03			
3.09	-0.025	0.01			
4.09	-0.019	0.01			
5.09	-0.012	0.01			
6.09	-0.006	0.003			

WELL SCHEMATIC

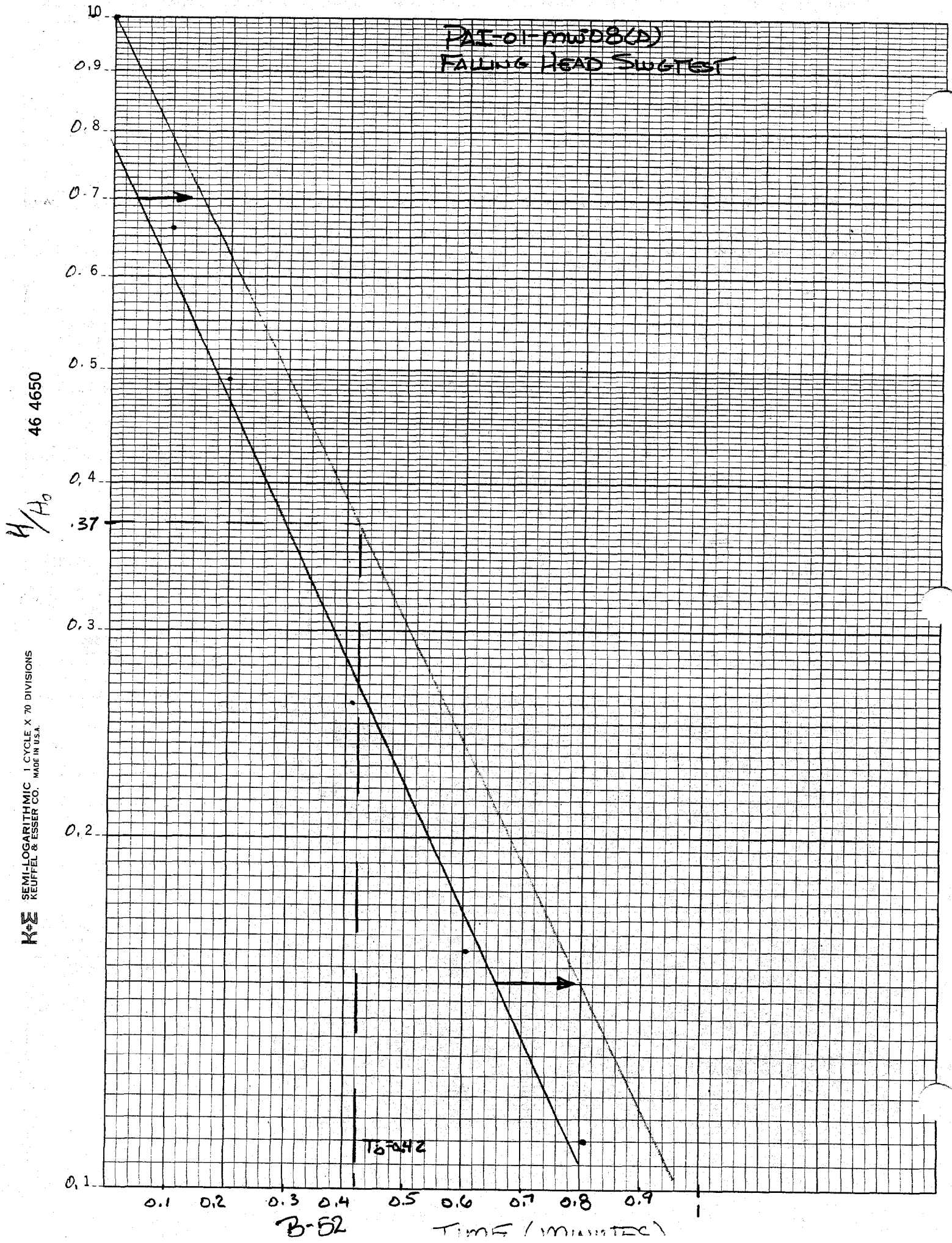


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


PAI-01-MW008(D)
FALLING HEAD SLUGTEST
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
H/H0
T0=0.42
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
TIME (MINUTES)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

B-52

VAI-04-mw-08 (D)
Test 4
Slug In (Falling)

Falling Head Slug Test

SE1000C
Environmental Logger
08/20 14:03

Unit# 00145 Test 4

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00008
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/19 15:11:42

Elapsed Time	INPUT 1
0.0000	0.012
0.0033	0.019
0.0066	0.006
0.0100	0.012
0.0133	0.006
0.0166	0.006
0.0200	0.006
0.0233	0.000
0.0266	0.019
0.0300	-0.230
0.0333	-0.447
0.0366	-0.665
0.0400	-1.035
0.0433	-1.598
0.0466	-1.912
0.0500	-2.116
0.0533	-2.212
0.0566	-2.327
0.0600	-2.481
0.0633	-2.564
0.0666	-2.622
0.0700	-2.634
0.0733	-2.602
0.0766	-2.609
0.0800	-2.250
0.0833	-1.848
0.0866	-1.636
0.0900	-1.547
0.0933	-1.457
0.0966	-1.617
0.1000	-1.803
0.1033	-1.918
0.1066	-1.850
0.1100	-1.912
0.1133	-1.828
0.1166	-1.752
0.1200	-1.700

0 T0

PAI-01-MW08(D)
Test 4
Slug In (Falling Head Test)

	0.1233	-1.675
	0.1266	-1.668
	0.1300	-1.662
	0.1333	-1.656
	0.1366	-1.635
	0.1400	-1.611
	0.1433	-1.592
	0.1466	-1.566
	0.1500	-1.547
	0.1533	-1.528
	0.1566	-1.509
	0.1600	-1.496
	0.1633	-1.477
	0.1666	-1.464
	0.1700	-1.445
	0.1733	-1.426
	0.1766	-1.406
	0.1800	-1.387
	0.1833	-1.374
	0.1866	-1.368
	0.1900	-1.342
	0.1933	-1.330
	0.1966	-1.317
	0.2000	-1.297
	0.2033	-1.285
	0.2066	-1.272
0.10 –	0.2100	-1.259
	0.2133	-1.240
	0.2166	-1.227
	0.2200	-1.214
	0.2233	-1.202
	0.2266	-1.189
	0.2300	-1.176
	0.2333	-1.163
	0.2366	-1.150
	0.2400	-1.138
	0.2433	-1.125
	0.2466	-1.112
	0.2500	-1.100
	0.2533	-1.086
	0.2566	-1.080
	0.2600	-1.067
	0.2633	-1.055
	0.2666	-1.042
	0.2700	-1.035
	0.2733	-1.023
	0.2766	-1.010
	0.2800	-0.997
	0.2833	-0.991
	0.2866	-0.978
	0.2900	-0.971
	0.2933	-0.959
	0.2966	-0.952
	0.3000	-0.940
	0.3033	-0.933
	0.3066	-0.920
0.20 –	0.3100	-0.914
	0.3133	-0.901
	0.3166	-0.895
	0.3200	-0.888

PAI-01-MW08(D)
Test 4
Slug In (Falling Head Test)

	0.3233	-0.876
	0.3266	-0.869
	0.3300	-0.863
	0.3333	-0.850
	0.3500	-0.805
	0.3666	-0.767
	0.3833	-0.728
	0.4000	-0.696
	0.4166	-0.658
	0.4333	-0.630
	0.4500	-0.601
	0.4666	-0.575
	0.4833	-0.549
	0.5000	-0.530
0.41	-0.5166	-0.505
	0.5333	-0.486
	0.5500	-0.466
	0.5666	-0.447
	0.5833	-0.428
	0.6000	-0.409
	0.6166	-0.396
	0.6333	-0.377
	0.6500	-0.364
	0.6666	-0.351
	0.6833	-0.339
	0.7000	-0.332
0.61	-0.7166	-0.313
	0.7333	-0.306
	0.7500	-0.294
	0.7666	-0.287
	0.7833	-0.274
	0.8000	-0.268
	0.8166	-0.262
	0.8333	-0.249
	0.8500	-0.242
	0.8666	-0.236
	0.8833	-0.230
	0.9000	-0.223
0.81	-0.9166	-0.217
	0.9333	-0.210
	0.9500	-0.204
	0.9666	-0.198
	0.9833	-0.191
	1.0000	-0.185
1.09	-1.2000	-0.127
	1.4000	-0.102
	1.6000	-0.083
	1.8000	-0.070
	2.0000	-0.057
2.09	-2.2000	-0.051
	2.4000	-0.044
	2.6000	-0.038
	2.8000	-0.031
	3.0000	-0.025
3.09	-3.2000	-0.025
	3.4000	-0.019
	3.6000	-0.025
	3.8000	-0.025
	4.0000	-0.025
4.09	-4.2000	-0.019

PAI-01-MW08(D)
Test 4
Slug In (Falling Head Test)

	4.4000	-0.019
	4.6000	-0.019
	4.8000	-0.012
	5.0000	-0.012
5.09 -	5.2000	-0.012
	5.4000	-0.012
	5.6000	-0.012
	5.8000	-0.006
	6.0000	-0.006
6.09 -	6.2000	-0.006
	6.4000	-0.006
	6.6000	-0.006
	6.8000	-0.006
	7.0000	-0.006
7.09 -	7.2000	-0.006
	7.4000	-0.006
	7.6000	-0.006
	7.8000	-0.006
	8.0000	-0.006
8.09 -	8.2000	0.000
	8.4000	0.000
	8.6000	0.000
	8.8000	0.000
	9.0000	0.000
	9.2000	0.000
	9.4000	0.000
	9.6000	0.000
	9.8000	0.000
	10.0000	0.000

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-01-MW-08(D) RISING HEAD SLUG TEST			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/19/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of well Casing — r = 0.083 FT
R = Radius of well Screen — R = 0.083 FT.
L = Length of well Screen — L = 5 FT
T_0 = Time for water level to Rise or Fall to 37% of initial change. — T_0 = 0.36 min.

$$K = \frac{r^2 \ln(L/R)}{2 L T_0} = \frac{(0.083\,FT)^2 \ln(5FT/0.083FT)}{2(5FT)(0.36min)}$$

$$= 6.89 \times 10^{-3} \frac{FT^2 \ln(60.24)}{3.6\,FT \cdot min}$$

$$= 7.84 \times 10^{-3}\ FT/min.$$

$$7.84 \times 10^{-3} FT/min \times 1440\ min/day = 11.3\ FT/day$$

$$11.3 FT/day \times 3.528 \times 10^{-4} \frac{cm/sec}{FT/day} = 3.98 \times 10^{-3} cm/sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-mw08

PROJECT NO.: 7394 **GEOLOGIST:** Mark Damington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 5 ft **TEST NO.:** 7/Slug

STATIC WATER LEVEL (Depth/Elevation): 4.99 / TWD=39.66 / LWC=34.67 **DATE:** 8/19/98

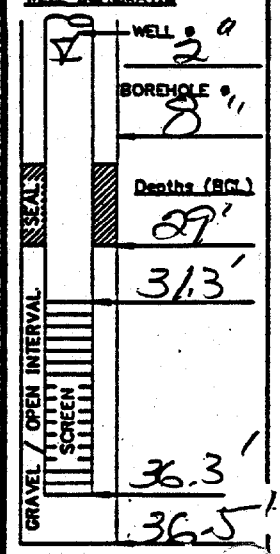
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) **PAGE** 2 **OF** 2

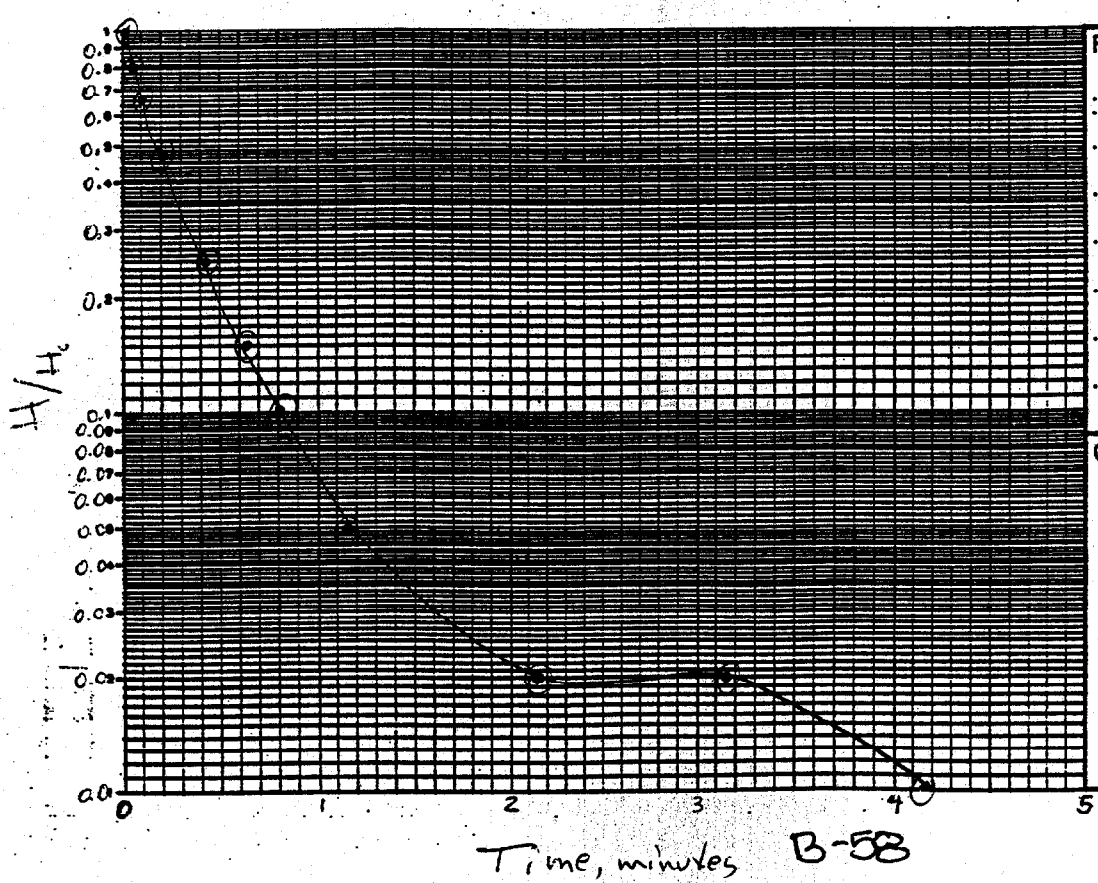
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	2.479	1			
0.05	1.994	0.80			
0.10	1.668	0.67			
0.20	1.201	0.48			
0.42	0.613	0.25			
0.62	0.364	0.15			
0.82	0.236	0.10			
1.15	0.127	0.05			
2.15	0.057	0.02			
3.15	0.038	0.02			
4.15	0.025	0.01			

WELL SCHEMATIC

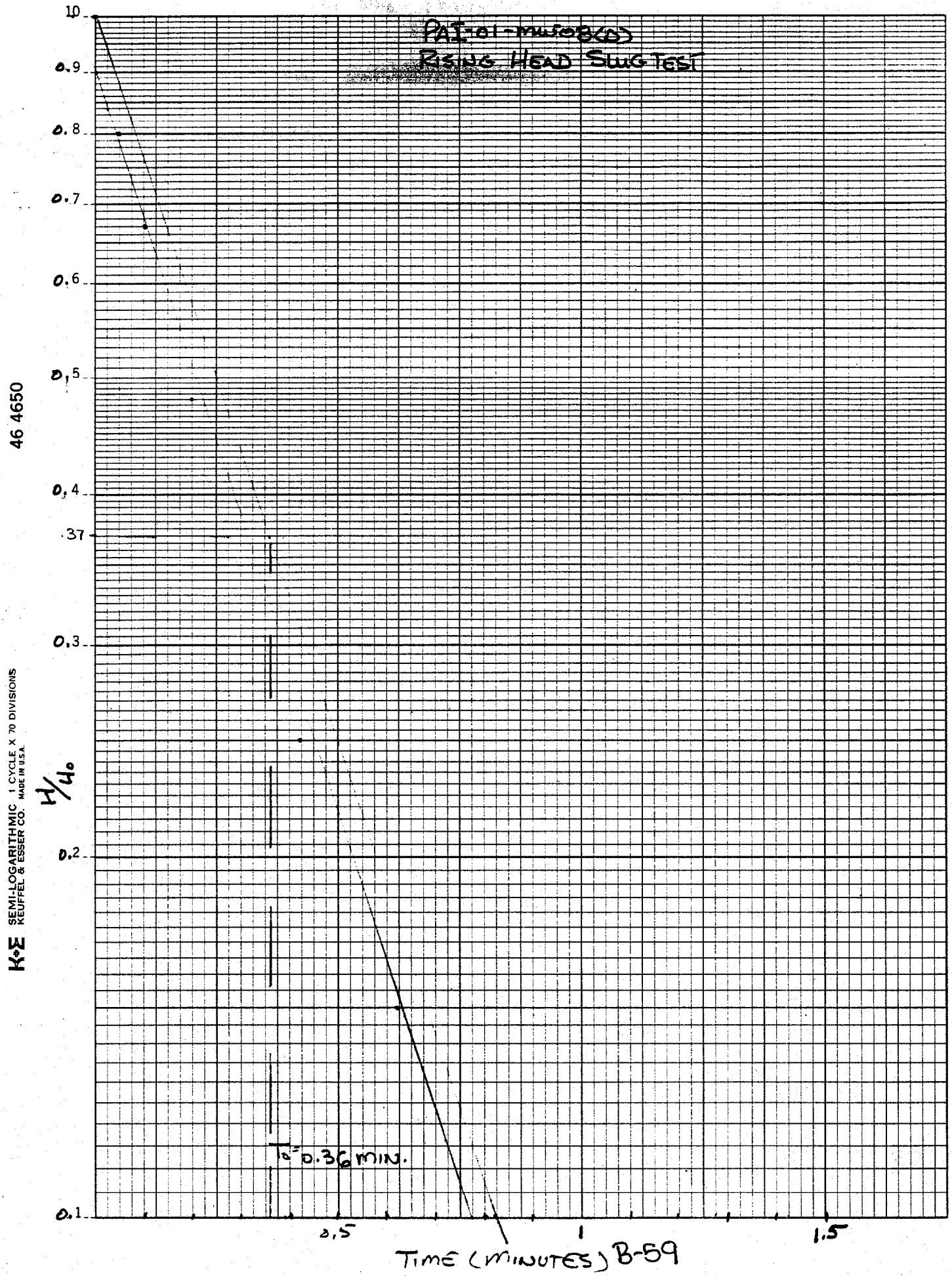


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


PAT-01-MW08(D)
RISING HEAD SLUG TEST
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
H/Ho
To=0.36 MIN.
0.5
1
1.5
TIME (MINUTES) B-59
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

PAI-01-MW-08(D)
Test 7
Slug Out (Rising)

Rising Head Slug Test

SE10000
Environmental Logger
08/20 14:12

Unit# 00145 Test 7

Setups:	INPUT 1
Type	Level (F)
Mode	TOS
I.D.	00008
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/19 15:52:58

Elapsed Time	INPUT 1
0.0000	0.006
0.0033	0.006
0.0066	0.057
0.0100	0.338
0.0133	1.271
0.0166	2.128
0.0200	2.249
0.0233	1.814
0.0266	1.603
0.0300	2.077
0.0333	2.428
0.0366	2.729
0.0400	2.805
0.0433	2.677
0 0.0466	2.479 T_0
0.0500	2.377
0.0533	2.358
0.0566	2.339
0.0600	2.326
0.0633	2.269
0.0666	2.249
0.0700	2.205
0.0733	2.179
0.0766	2.147
0.0800	2.121
0.0833	2.096
0.0866	2.070
0.0900	2.045
0.0933	2.019
0.05 - 0.0966	1.994
0.1000	1.968
0.1033	1.942
0.1066	1.923
0.1100	1.898
0.1133	1.872
0.1166	1.853
0.1200	1.834

B-60

PAI-01-MW08(D)
Test 7
Rising Head Test

0.1233	1.808
0.1266	1.789
0.1300	1.770
0.1333	1.751
0.1366	1.725
0.1400	1.706
0.1433	1.687
0.10 — 0.1466	1.668
0.1500	1.649
0.1533	1.629
0.1566	1.610
0.1600	1.591
0.1633	1.578
0.1666	1.559
0.1700	1.540
0.1733	1.521
0.1766	1.508
0.1800	1.489
0.1833	1.470
0.1866	1.450
0.1900	1.438
0.1933	1.425
0.1966	1.412
0.2000	1.393
0.2033	1.380
0.2066	1.367
0.2100	1.348
0.2133	1.336
0.2166	1.323
0.2200	1.310
0.2233	1.291
0.2266	1.278
0.2300	1.265
0.2333	1.252
0.2366	1.240
0.2400	1.227
0.2433	1.214
0.20 — 0.2466	1.201
0.2500	1.188
0.2533	1.176
0.2566	1.163
0.2600	1.150
0.2633	1.137
0.2666	1.125
0.2700	1.118
0.2733	1.105
0.2766	1.093
0.2800	1.080
0.2833	1.073
0.2866	1.060
0.2900	1.048
0.2933	1.041
0.2966	1.029
0.3000	1.022
0.3033	1.009
0.3066	0.987
0.3100	0.990
0.3133	0.977
0.3166	0.971
0.3200	0.958

PAF-01-MW-08(D)
Test 7
Rising Head Test

	0.3233	0.952
	0.3266	0.939
	0.3300	0.933
	0.3333	0.920
	0.3500	0.869
	0.3666	0.830
	0.3833	0.792
	0.4000	0.747
	0.4166	0.709
	0.4333	0.677
	0.4500	0.645
0.42	0.4666	0.613
	0.4833	0.586
	0.5000	0.562
	0.5166	0.537
	0.5333	0.511
	0.5500	0.492
	0.5666	0.472
	0.5833	0.447
	0.6000	0.428
	0.6166	0.409
	0.6333	0.386
	0.6500	0.377
0.62	0.6666	0.364
	0.6833	0.351
	0.7000	0.338
	0.7166	0.325
	0.7333	0.313
	0.7500	0.300
	0.7666	0.287
	0.7833	0.281
	0.8000	0.268
	0.8166	0.261
	0.8333	0.255
	0.8500	0.249
0.82	0.8666	0.236
	0.8833	0.230
	0.9000	0.223
	0.9166	0.217
	0.9333	0.211
	0.9500	0.204
	0.9666	0.198
	0.9833	0.191
	1.0000	0.185
1.15	1.2000	0.127
	1.4000	0.102
	1.6000	0.083
	1.8000	0.076
	2.0000	0.063
2.15	2.2000	0.057
	2.4000	0.051
	2.6000	0.051
	2.8000	0.044
	3.0000	0.038
3.15	3.2000	0.038
	3.4000	0.031
	3.6000	0.025
	3.8000	0.025
	4.0000	0.025
4.15	4.2000	0.025

PAF-01-MW08(D)
Test 7
Rising Head Test

4.4000	0.025
4.6000	0.025
4.8000	0.025
5.0000	0.025
5.2000	0.019
5.4000	0.025
5.6000	0.019
5.8000	0.012
6.0000	0.019
6.2000	0.019
6.4000	0.019
6.6000	0.019
6.8000	0.019
7.0000	0.012
7.2000	0.019
7.4000	0.012
7.6000	0.012
7.8000	0.019
8.0000	0.019
8.2000	0.012
8.4000	0.012
8.6000	0.012
8.8000	0.012
9.0000	0.012
9.2000	0.012
9.4000	0.012
9.6000	0.012
9.8000	0.012
10.0000	0.012
12.0000	0.000
14.0000	0.000

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-01-MW07A(S) FALLING HEAD SLUG TEST			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/19/09	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

K = Hydraulic Conductivity
r = Radius of borehole
R = Radius of well screen
L = Length of well screen
T_0 = Time for water level to Rise or Fall to 37% of Initial change

r = 0.333 FT
R = 0.083 FT
L = 10 FT
T_0 = 63.5 min.

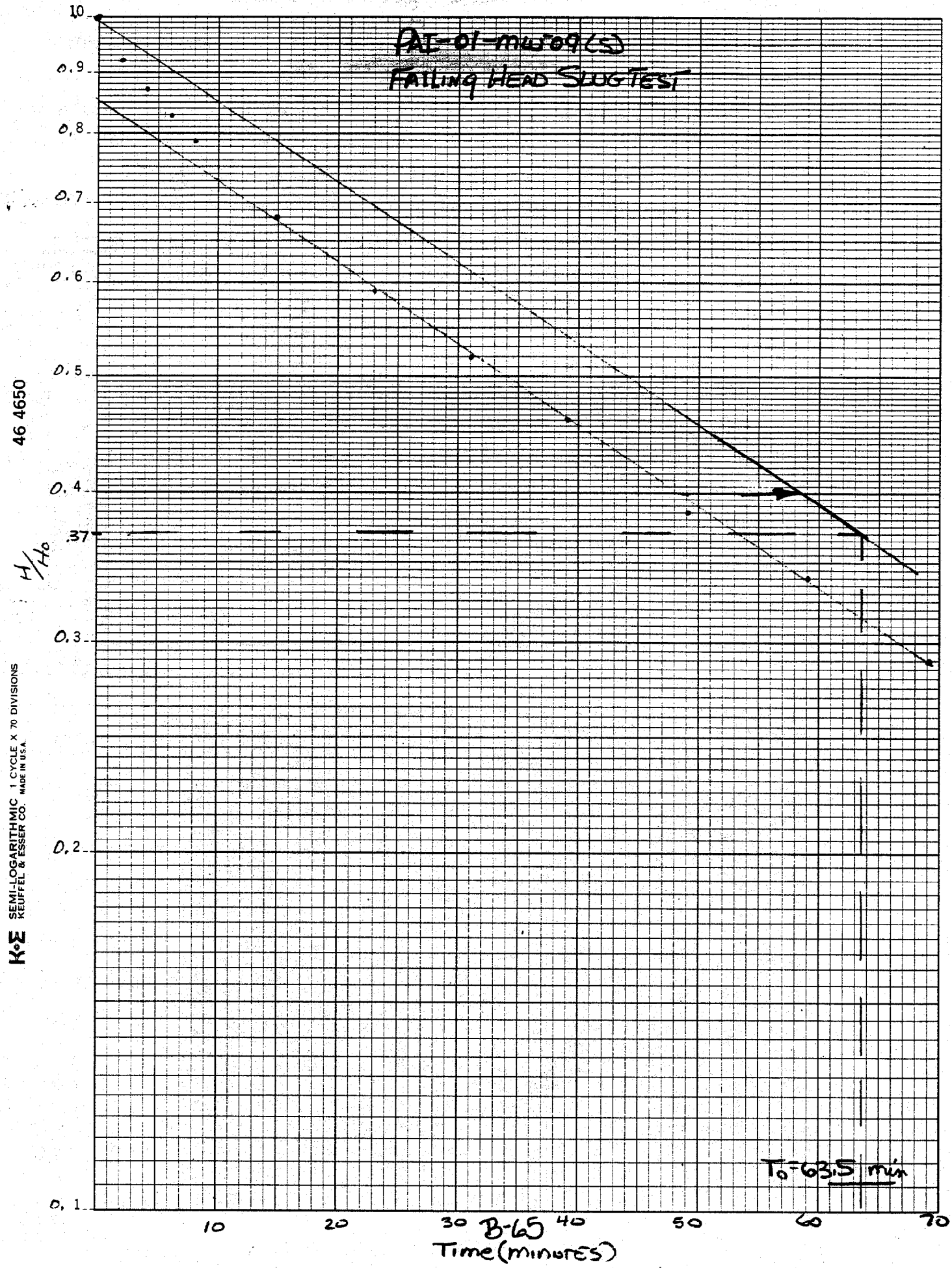
$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.333\,FT)^2 \ln\left(\frac{10\,FT}{0.083\,FT}\right)}{2(10\,FT)(63.5\,min)}$$

$$= 0.111 \frac{FT^2 \ln(120.48)}{1270\,FT \cdot min}$$

$$= 4.19 \times 10^{-4}\,FT/min$$

$$4.19 \times 10^{-4}\,FT/min \times 1440\,min/day = 0.603\,FT/day$$

$$0.603\,FT/day \times \frac{3.528 \times 10^{-4}\,cm/sec}{Ft/day} = 2.13 \times 10^{-4}\,cm/sec$$


PAI-01-MW09(S)
FAILING HEAD SLUG TEST
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
H/Ho
10
20
30
40
50
60
70
Time (MINUTES)
To=63.5 min
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

B-65

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-MW-09

PROJECT NO.: 7394 **GEOLOGIST:** Mark Damington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 10 ft. **TEST NO.:** 8/step 8

STATIC WATER LEVEL (Depth/Elevation): 3.89 / TWD=16.14 / LWC=12.25 **DATE:** 8/20/98

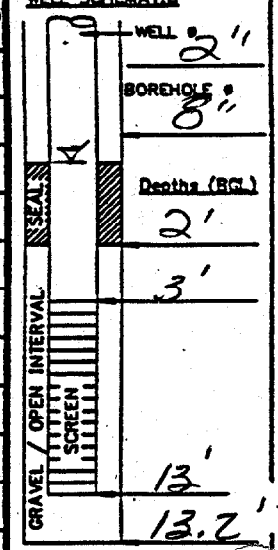
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid slug (7.5 ft.) **PAGE** 1 **OF** 2

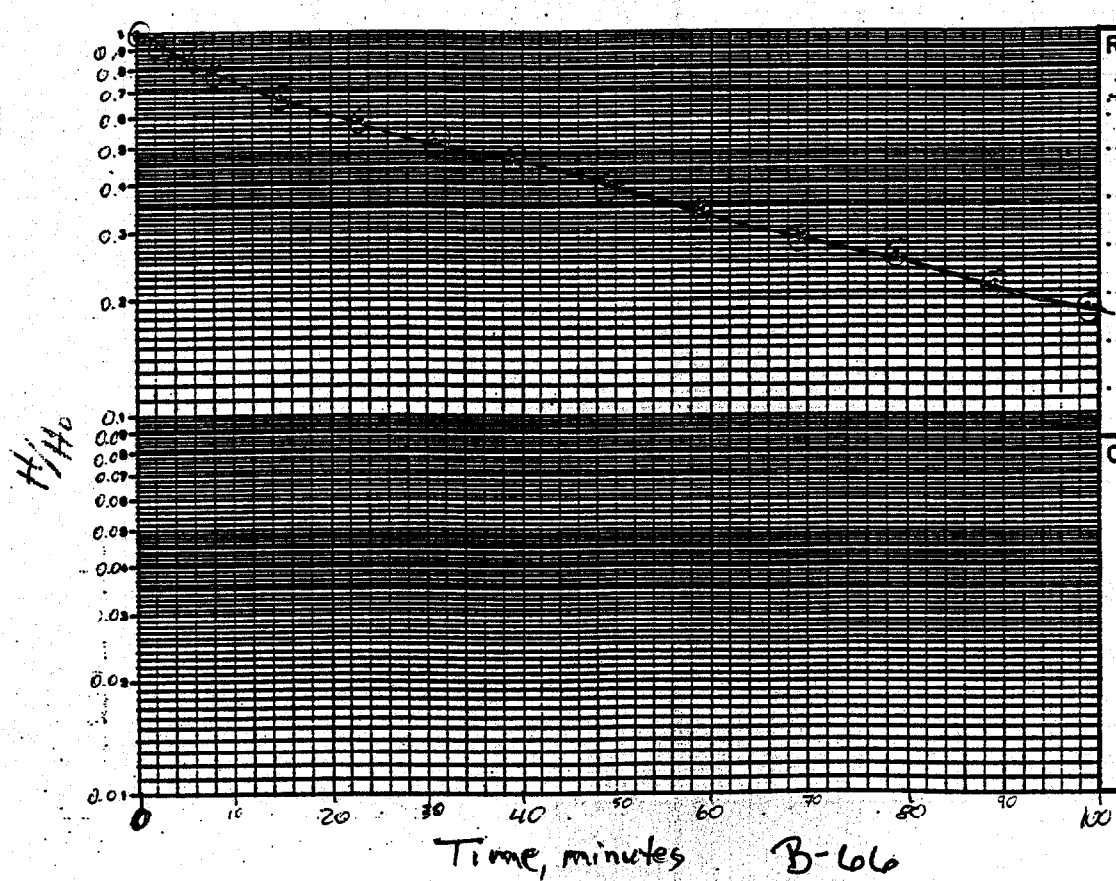
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-1.704	1	79.02	-0.438	0.26
2.02	-1.571	0.92	89.02	-0.381	0.22
4.02	-1.482	0.87	99.02	-0.324	0.19
6.02	-1.412	0.83			
8.02	-1.348	0.79			
15.02	-1.164	0.68			
23.02	-0.998	0.59			
31.02	-0.890	0.52			
39.02	-0.776	0.46			
49.02	-0.667	0.39			
59.02	-0.585	0.34			
69.02	-0.502	0.29			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

ID - 00009

CALCS, SKETCH MAPS, ETC.:

PHL-01-MW-07(S)
Test 8, Step 0
Slug In (Falling)

SE10000
Environmental Logger
08/20 14:15

Unit# 00145 Test 8

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00009
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/20 07:10:25

Elapsed Time	INPUT 1
0.0000	-0.025
0.0033	-0.025
0.0066	-0.025
0.0100	-0.025
0.0133	-0.025
0.0166	-0.019
0.0200	-0.019
0.0233	0.000
0.0266	-0.025
0.0300	-0.089
0.0333	-0.483
0.0366	-0.534
0.0400	-1.005
0.0433	-1.297
0.0466	-1.291
0.0500	-1.335
0.0533	-1.309
0.0566	-1.774
0.0600	-2.182
0.0633	-2.532
0.0666	-2.806
0.0700	-2.939
0.0733	-2.634
0.0766	-2.016
0.0800	-1.641
0.0833	-1.412
0.0866	-1.017
0.0900	-1.119
0.0933	-1.450
0.0966	-1.717
0.1000	-1.978
0.1033	-2.163
0.1066	-2.226
0.1100	-2.188
0.1133	-2.093
0.1166	-1.934
0.1200	-1.781

PAI-01-MW09(S)
Test 8 Step Ø
Slug In (Falling Head Test)

0.1233	-1.666
0.1266	-1.699
0.1300	-1.634
0.1333	-1.735
0.1366	-1.844
0.1400	-1.908
0.1433	-1.953
0.1466	-1.946
0.1500	-1.914
0.1533	-1.857
0.1566	-1.800
0.1600	-1.768
0.1633	-1.762
0.1666	-1.787
0.1700	-1.813
0.1733	-1.844
0.1766	-1.864
0.1800	-1.864
0.1833	-1.844
0.1866	-1.825
0.1900	-1.794
0.1933	-1.806
0.1966	-1.813
0.2000	-1.825
0.2033	-1.800
0.2066	-1.832
0.2100	-1.832
0.2133	-1.819
0.2166	-1.813
0.2200	-1.806
0.2233	-1.806
0.2266	-1.806
0.2300	-1.813
0.2333	-1.806
0.2366	-1.819
0.2400	-1.819
0.2433	-1.813
0.2466	-1.813
0.2500	-1.806
0.2533	-1.800
0.2566	-1.794
0.2600	-1.806
0.2633	-1.806
0.2666	-1.806
0.2700	-1.800
0.2733	-1.800
0.2766	-1.800
0.2800	-1.800
0.2833	-1.794
0.2866	-1.800
0.2900	-1.800
0.2933	-1.800
0.2966	-1.800
0.3000	-1.794
0.3033	-1.794
0.3066	-1.800
0.3100	-1.794
0.3133	-1.794
0.3166	-1.794
0.3200	-1.794

PAF-01-MW09(S)
Test 8 Step Ø
Slug In (Falling Head Test)

0.3233	-1.794	
0.3266	-1.794	
0.3300	-1.794	
0.3333	-1.794	
0.3500	-1.787	
0.3666	-1.787	
0.3833	-1.781	
0.4000	-1.774	
0.4166	-1.774	
0.4333	-1.774	
0.4500	-1.768	
0.4666	-1.768	
0.4833	-1.768	
0.5000	-1.762	
0.5166	-1.755	
0.5333	-1.755	
0.5500	-1.755	
0.5666	-1.755	
0.5833	-1.749	
0.6000	-1.743	
0.6166	-1.749	
0.6333	-1.743	
0.6500	-1.743	
0.6666	-1.743	
0.6833	-1.736	
0.7000	-1.736	
0.7166	-1.736	
0.7333	-1.730	
0.7500	-1.730	
0.7666	-1.730	
0.7833	-1.730	
0.8000	-1.730	
0.8166	-1.724	
0.8333	-1.724	
0.8500	-1.724	
0.8666	-1.724	
0.8833	-1.717	
0.9000	-1.717	
0.9166	-1.717	
0.9333	-1.711	
0.9500	-1.711	
0.9666	-1.717	
0.9833	-1.704	T_0
1.0000	-1.704	
1.2000	-1.685	
1.4000	-1.673	
1.6000	-1.654	
1.8000	-1.641	
2.0000	-1.622	
2.2000	-1.609	
2.4000	-1.603	
2.6000	-1.590	
2.8000	-1.577	
2.02 3.0000	-1.571	
3.2000	-1.558	
3.4000	-1.552	
3.6000	-1.539	
3.8000	-1.526	
4.0000	-1.520	
4.2000	-1.514	

PAI-01-MW-09(S)
Test 8 Step Ø
Slug In (Falling Head Test)

	4.4000	-1.501
	4.6000	-1.495
	4.8000	-1.482
4.02	5.0000	-1.482
	5.2000	-1.475
	5.4000	-1.469
	5.6000	-1.456
	5.8000	-1.456
	6.0000	-1.437
	6.2000	-1.431
	6.4000	-1.424
	6.6000	-1.424
	6.8000	-1.412
6.02	7.0000	-1.412
	7.2000	-1.399
	7.4000	-1.399
	7.6000	-1.393
	7.8000	-1.380
	8.0000	-1.367
	8.2000	-1.367
	8.4000	-1.361
	8.6000	-1.361
	8.8000	-1.348
8.02	9.0000	-1.348
	9.2000	-1.342
	9.4000	-1.335
	9.6000	-1.329
	9.8000	-1.323
	10.0000	-1.310
	12.0000	-1.259
	14.0000	-1.208
15.02	16.0000	-1.164
	18.0000	-1.125
	20.0000	-1.081
	22.0000	-1.043
23.02	24.0000	-0.995
	26.0000	-0.973
	28.0000	-0.947
	30.0000	-0.922
31.02	32.0000	-0.890
	34.0000	-0.865
	36.0000	-0.826
	38.0000	-0.801
39.02	40.0000	-0.776
	42.0000	-0.756
	44.0000	-0.744
	46.0000	-0.712
	48.0000	-0.693
49.02	50.0000	-0.667
	52.0000	-0.648
	54.0000	-0.629
	56.0000	-0.610
	58.0000	-0.597
59.02	60.0000	-0.585
	62.0000	-0.566
	64.0000	-0.553
	66.0000	-0.527
	68.0000	-0.521
69.02	70.0000	-0.502
	72.0000	-0.489

	74.0000	-0.477
	76.0000	-0.458
	78.0000	-0.445
79.02	80.0000	-0.438
	82.0000	-0.432
	84.0000	-0.407
	86.0000	-0.394
	88.0000	-0.388
89.02	90.0000	-0.381
	92.0000	-0.368
	94.0000	-0.356
	96.0000	-0.340
	98.0000	-0.337
99.02	100.000	-0.324

END

PAI-01-MW-09(S)
Test 8 Step Ø
Slug In (Falling Head Test)

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-01-MW-09(S) Rising Head Slug Test			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB	APPROVED BY	DATE

$$K = \frac{r^2 \ln L/R}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of Borehole
R = Radius of well Screen
L = Length of well Screen
T_0 = Time For water level to Rise or Fall to 37% of initial Change

r = 0.333 Ft
R = 0.083 Ft
L = 10 Ft
T_0 = 43.5 min

$$K = \frac{r^2 \ln L/R}{2 L T_0} = \frac{(0.333\ \text{Ft})^2 \ln\left(\frac{10\ \text{Ft}}{0.08}\right)}{2(10\ \text{Ft})(43.5\ \text{min})}$$

$$= 6.11 \times 10^{-4}\ \text{Ft/min}$$

$$6.11 \times 10^{-4}\ \text{Ft/min} \times 1440\ \text{min/day} = \underline{0.879\ \text{Ft/day}}$$

$$0.879\ \text{Ft/day} \times \frac{3.528 \times 10^{-4}\ \text{cm/sec}}{\text{Ft/day}} = \underline{3.10 \times 10^{-4}\ \text{cm/sec}}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island SC (Site 1) **WELL/BORING NO.:** PAI-01-MW04

PROJECT NO.: 7394 **GEOLOGIST:** Mark Darrington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 10 ft. **TEST NO.:** 8 / Step 1

STATIC WATER LEVEL (Depth/Elevation): 3.89 / TWD = 16.14 / LWC = 12.25 **DATE:** 8/20/98

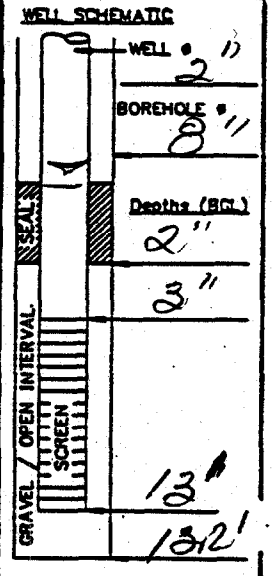
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) **PAGE** 2 **OF** 2

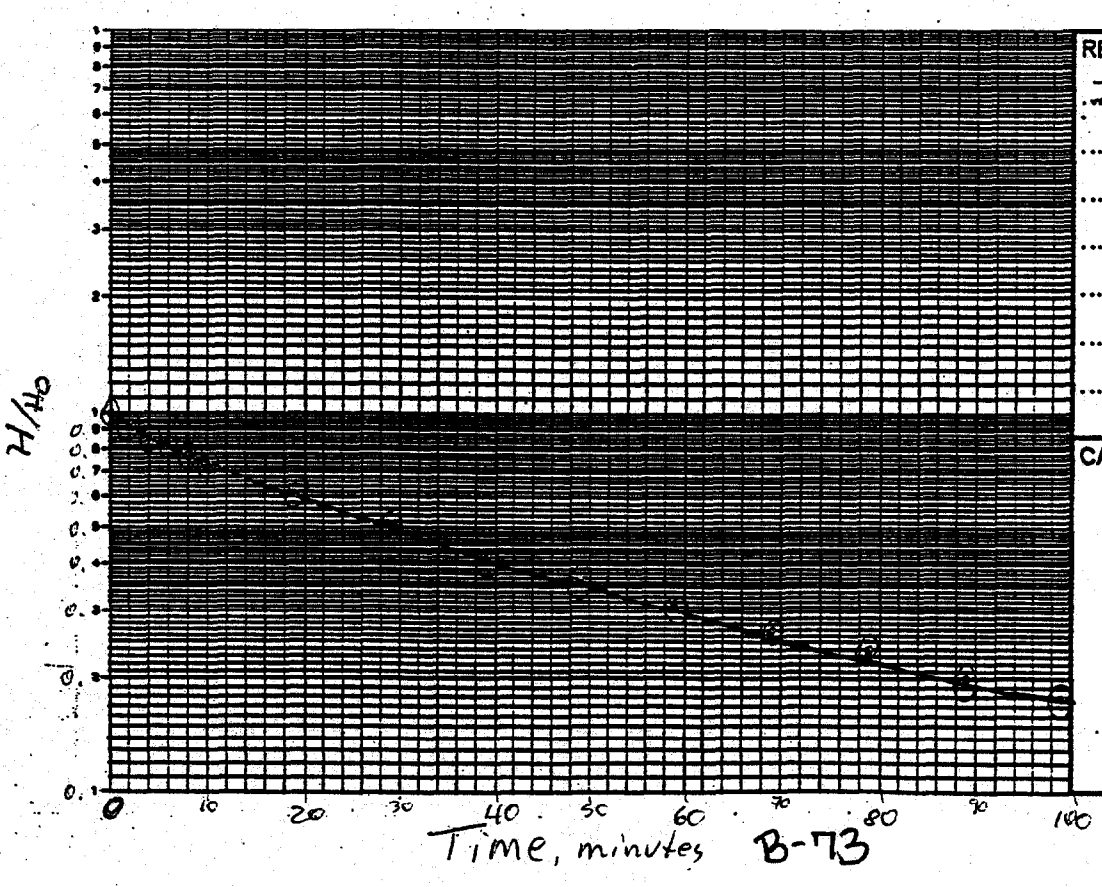
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	1.831	1	79.18	0.432	0.24
1.98	1.685	0.92	89.18	0.375	0.20
3.98	1.583	0.86	99.18	0.330	0.18
5.98	1.500	0.82			
7.98	1.430	0.78			
9.18	1.380	0.75			
19.18	1.118	0.61			
29.18	0.928	0.51			
39.18	0.788	0.43			
49.18	0.661	0.36			
59.18	0.572	0.31			
69.18	0.496	0.27			

WELL SCHEMATIC



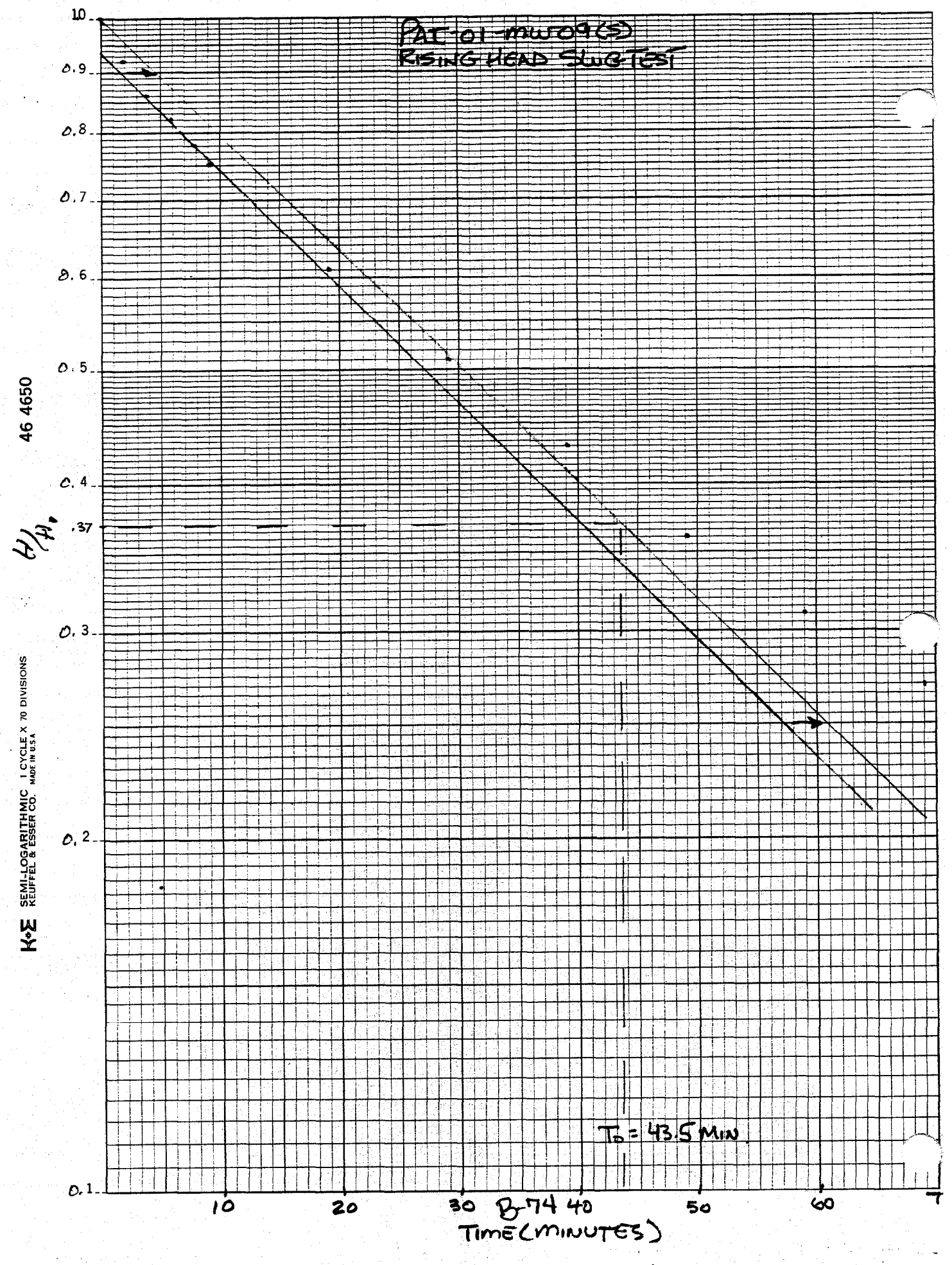
▽ Indicate SWL Depth on Drawing



REMARKS:

ID = 00009

CALCS, SKETCH MAPS, ETC.:


PAT-01-MW09(S)
RISING HEAD SLUG TEST
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
H/H₀
10
20
30
40
50
60
TIME (MINUTES)
T₀ = 43.5 MIN
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

B-74

PHI-01-MW-04(S)
Test 8, Step 1
Slug Out (Rising)

Rising Head Slug Test

SE19000
Environmental Logger
08/20 14:18

Unit# 00145 Test 8

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00009
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 08/20 09:03:18

Elapsed Time	INPUT 1
0.0000	-0.279
0.0033	-0.279
0.0066	-0.286
0.0100	-0.279
0.0133	0.807
0.0166	2.047
0.0200	2.607
0.0233	1.818
0.0266	0.152
0.0300	-0.585
0.0333	1.373
0.0366	3.128
0.0400	3.033
0.0433	1.895
0.0466	1.017
0.0500	1.558
0.0533	2.441
0.0566	2.473
0.0600	1.700
0.0633	1.424
0.0666	1.767
0.0700	2.193
0.0733	2.143
0.0766	1.780
0.0800	1.634
0.0833	1.844
0.0866	2.054
0.0900	1.996
0.0933	1.799
0.0966	1.742
0.1000	1.869
0.1033	1.971
0.1066	1.914
0.1100	1.812
0.1133	1.806
0.1166	1.882
0.1200	1.914

PAF-01-MW-09(S)
TEST 8 STEP 1
Slug out (Rising Head Test)

0.1233	1.882
0.1266	1.831
0.1300	1.837
0.1333	1.860
0.1366	1.888
0.1400	1.857
0.1433	1.831
0.1466	1.837
0.1500	1.869
0.1533	1.860
0.1566	1.850
0.1600	1.837
0.1633	1.844
0.1666	1.857
0.1700	1.857
0.1733	1.844
0.1766	1.837
0.1800	1.844
0.1833	1.857
0.1866	1.850
0.1900	1.837
0.1933	1.844
0.1966	1.850
0.2000	1.844
0.2033	1.844
0.2066	1.837
0.2100	1.844
0.2133	1.837
0.2166	1.844
0.2200	1.844
0.2233	1.837
0.2266	1.844
0.2300	1.837
0.2333	1.844
0.2366	1.844
0.2400	1.844
0.2433	1.837
0.2466	1.837
0.2500	1.844
0.2533	1.844
0.2566	1.844
0.2600	1.844
0.2633	1.844
0.2666	1.837
0.2700	1.837
0.2733	1.837
0.2766	1.837
0.2800	1.837
0.2833	1.837
0.2866	1.844
0.2900	1.844
0.2933	1.837
0.2966	1.831
0.3000	1.837
0.3033	1.831
0.3066	1.837
0.3100	1.831
0.3133	1.837
0.3166	1.837
0.3200	1.837

PAF-01-MW-09(S)
TEST 8 Step 1
Slug Out (Rising Head Test)

0.3233	1.831
0.3266	1.837
0.3300	1.831
0.3333	1.837
0.3500	1.837
0.3666	1.831
0.3833	1.825
0.4000	1.831
0.4166	1.825
0.4333	1.825
0.4500	1.837
0.4666	1.825
0.4833	1.831
0.5000	1.831
0.5166	1.831
0.5333	1.831
0.5500	1.831
0.5666	1.831
0.5833	1.831
0.6000	1.831
0.6166	1.831
0.6333	1.831
0.6500	1.831
0.6666	1.831
0.6833	1.825
0.7000	1.831
0.7166	1.825
0.7333	1.831
0.7500	1.831
0.7666	1.825
0.7833	1.831
0.8000	1.825
0.8166	1.831 To
0.8333	1.831
0.8500	1.831
0.8666	1.825
0.8833	1.825
0.9000	1.825
0.9166	1.818
0.9333	1.818
0.9500	1.818
0.9666	1.818
0.9833	1.812
1.0000	1.812
1.2000	1.793
1.4000	1.780
1.6000	1.767
1.8000	1.761
2.0000	1.742
2.2000	1.729
2.4000	1.704
2.6000	1.704
1.98 — 2.8000	1.685
3.0000	1.672
3.2000	1.666
3.4000	1.653
3.6000	1.647
3.8000	1.628
4.0000	1.615
4.2000	1.609

PAI-01-MW09(S)
Test 8 Step 1
Slug Out (Rising Head Test)

	4.4000	1.595
	4.6000	1.589
3.98	4.8000	1.583
	5.0000	1.577
	5.2000	1.564
	5.4000	1.558
	5.6000	1.551
	5.8000	1.545
	6.0000	1.526
	6.2000	1.520
	6.4000	1.520
	6.6000	1.513
5.98	6.8000	1.500
	7.0000	1.488
	7.2000	1.488
	7.4000	1.469
	7.6000	1.469
	7.8000	1.456
	8.0000	1.456
	8.2000	1.443
	8.4000	1.443
	8.6000	1.430
7.98	8.8000	1.430
	9.0000	1.418
	9.2000	1.411
	9.4000	1.405
	9.6000	1.399
	9.8000	1.392
9.18	10.0000	1.380
	12.0000	1.329
	14.0000	1.285
	16.0000	1.221
	18.0000	1.176
19.18	20.0000	1.119
	22.0000	1.087
	24.0000	1.043
	26.0000	1.011
	28.0000	0.979
29.18	30.0000	0.928
	32.0000	0.896
	34.0000	0.865
	36.0000	0.839
	38.0000	0.814
39.18	40.0000	0.788
	42.0000	0.756
	44.0000	0.737
	46.0000	0.718
	48.0000	0.686
49.18	50.0000	0.661
	52.0000	0.642
	54.0000	0.629
	56.0000	0.610
	58.0000	0.591
59.18	60.0000	0.572
	62.0000	0.553
	64.0000	0.547
	66.0000	0.528
	68.0000	0.508
69.18	70.0000	0.496
	72.0000	0.477

74.0000	0.454
76.0000	0.445
78.0000	0.445
79.18-80.0000	0.432
82.0000	0.419
84.0000	0.413
86.0000	0.394
88.0000	0.388
89.18-90.0000	0.375
92.0000	0.362
94.0000	0.349
96.0000	0.340
98.0000	0.337
99.18-100.000	0.330

END

PAI-01-MW09(S)
Test 8 Step 1
Slug Out (Rising Head Test)

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-01-MW-10(D) RISING HEAD SLUG TEST			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/19/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln L/R}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well screen
L = Length of well screen
T_0 = Time for water level to rise or fall to 37% of initial change

r = 0.083 FT
R = 0.083 FT
L = 5 FT.
T_0 = 4.5 min.

$$K = \frac{r^2 \ln L/R}{2 L T_0} = \frac{(0.083\,FT)^2 \ln(5\,FT/0.083\,FT)}{2(5\,FT)(4.5\,min)}$$

$$= 6.27 \times 10^{-4}\ Ft/min$$

$$6.27 \times 10^{-4}\ Ft/min \times 1440\ min/day = 0.90\ FT/day$$

$$0.90\ Ft/day \times \frac{3.528 \times 10^{-4}\ Cm/sec}{Ft/day} = 3.16 \times 10^{-4}\ Cm/sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHE

PROJECT NAME: MCRD Parris Island, SC (Site 1) WELL/BORING NO.: PAE-01-m

PROJECT NO.: 7394 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 5 ft TEST NO.: 9/step

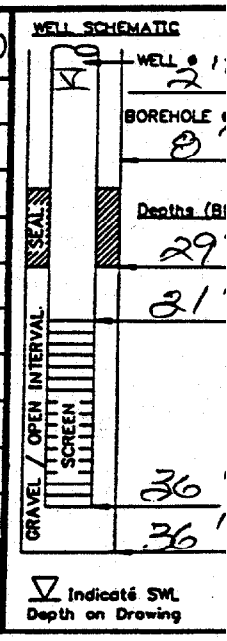
STATIC WATER LEVEL (Depth/Elevation): 4.84/TWD=37.61/LWC=32.77 DATE: 8/20/98

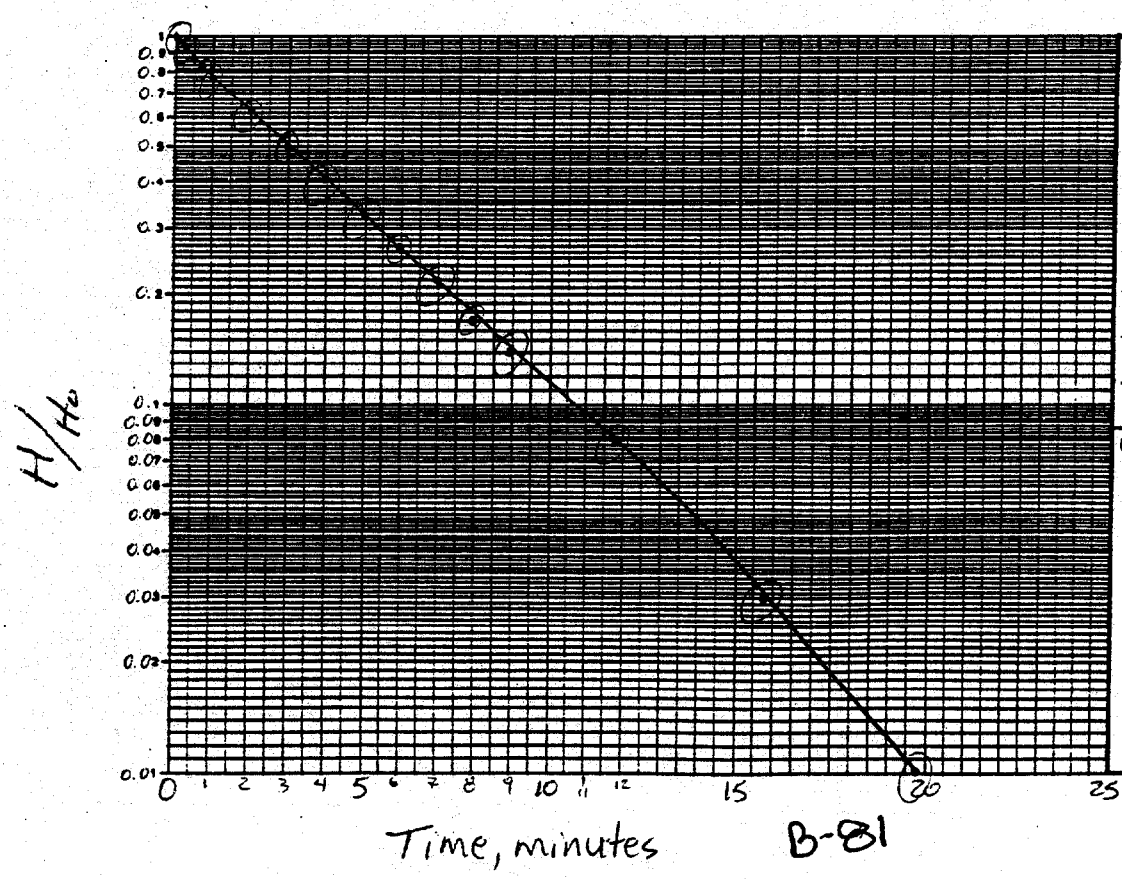
TEST TYPE (Rising/Falling/Constant Head): Rising (Slug out) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) PAGE 2 OF 2

REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	2.395	1	8.97	0.345	0.14
0.31	2.210	0.92	11.97	0.185	0.08
0.51	2.108	0.88	15.77	0.083	0.03
0.71	2.012	0.84	19.77	0.032	0.01
0.97	1.878	0.78			
1.97	1.501	0.63			
2.97	1.207	0.50			
3.97	0.977	0.41			
4.97	0.792	0.33			
5.97	0.639	0.27			
6.97	0.523	0.22			
7.97	0.415	0.17			

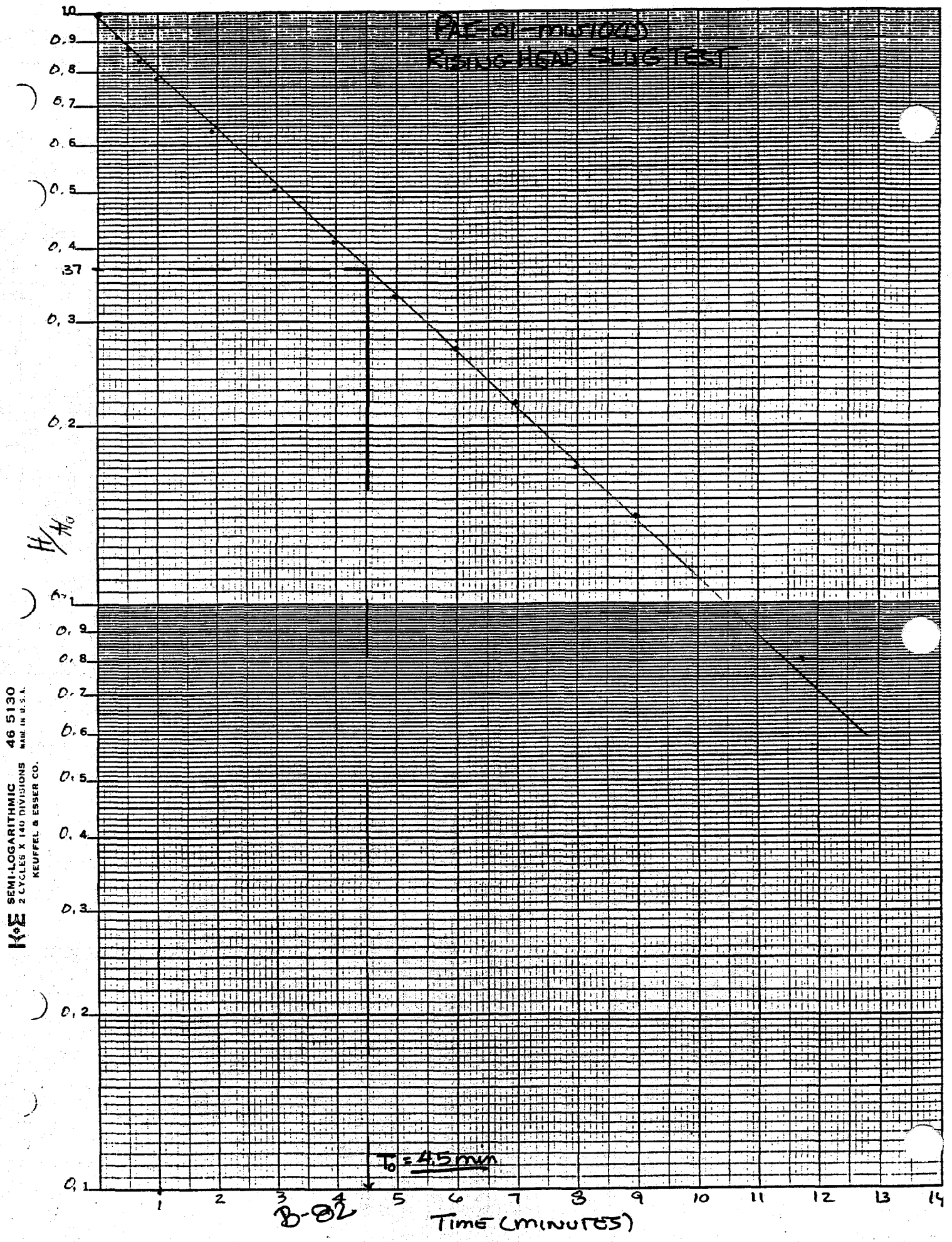




REMARKS:

I.D=0.00.10

CALCS,SKETCH MAPS, ETC.:


PAE-01-MW10(2)
RISING HEAD SLUG TEST
H/H0
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
T0 = 4.5 min
1
2
3
4
5
6
7
8
9
10
11
12
13
14
TIME (MINUTES)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

B-82

PAE9-mar-10 (D)
Test9, step3
Slug Out (Rising)

SE10000
Environmental Logger
08/20 14:32

Unit# 00145 Test 9

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00010
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Rising Head Slug Test

Step 3 08/20 13:07:51

Elapsed Time	INPUT 1
0.0000	-0.025
0.0033	-0.031
0.0066	0.153
0.0100	1.444
0.0133	2.778
0.0166	2.823
0.0200	1.335
0.0233	1.437
0.0266	2.695
0.0300	3.257
0.0333	2.836
0.0366	2.312
0.0400	2.580
0.0433	2.670
0.0466	2.516
0.0500	2.523
0.0533	2.555
0.0566	2.555
0.0600	2.504
0.0633	2.523
0.0666	2.523
0.0700	2.516
0.0733	2.504
0.0766	2.504
0.0800	2.504
0.0833	2.497
0.0866	2.497
0.0900	2.491
0.0933	2.491
0.0966	2.491
0.1000	2.484
0.1033	2.478
0.1066	2.478
0.1100	2.478
0.1133	2.472
0.1166	2.465
0.1200	2.465

PAI-01-MW-10 (D)
Test 9 Step 3
Slug Out (Rising Head Test)

	0.1233	2.465
	0.1266	2.459
	0.1300	2.459
	0.1333	2.459
	0.1366	2.453
	0.1400	2.453
	0.1433	2.446
	0.1466	2.446
	0.1500	2.446
	0.1533	2.440
	0.1566	2.440
	0.1600	2.433
	0.1633	2.433
	0.1666	2.433
	0.1700	2.433
	0.1733	2.427
	0.1766	2.427
	0.1800	2.421
	0.1833	2.421
	0.1866	2.421
	0.1900	2.414
	0.1933	2.414
	0.1966	2.414
	0.2000	2.408
	0.2033	2.408
	0.2066	2.408
	0.2100	2.402
	0.2133	2.402
	0.2166	2.402
	0.2200	2.395
	0.2233	2.389 · T_0
0	0.2266	2.395
	0.2300	2.389
	0.2333	2.389
	0.2366	2.382
	0.2400	2.382
	0.2433	2.382
	0.2466	2.376
	0.2500	2.376
	0.2533	2.376
	0.2566	2.370
	0.2600	2.370
	0.2633	2.370
	0.2666	2.363
	0.2700	2.363
	0.2733	2.363
	0.2766	2.357
	0.2800	2.357
	0.2833	2.357
	0.2866	2.357
	0.2900	2.357
	0.2933	2.350
	0.2966	2.350
	0.3000	2.350
	0.3033	2.344
	0.3066	2.344
	0.3100	2.344
	0.3133	2.338
	0.3166	2.338
	0.3200	2.338

PAI-01-MW-10(D)
Test 9 Step 3
Slug Out (Rising Head Test)

	0.3233	2.338
0.1	-0.3266	2.331
	0.3300	2.331
	0.3333	2.331
	0.3500	2.318
	0.3666	2.306
	0.3833	2.299
	0.4000	2.287
	0.4166	2.280
0.21	-0.4333	2.267
	0.4500	2.255
	0.4666	2.248
	0.4833	2.242
	0.5000	2.229
	0.5166	2.216
0.31	-0.5333	2.210
	0.5500	2.203
	0.5666	2.197
	0.5833	2.184
	0.6000	2.178
	0.6166	2.165
0.41	-0.6333	2.159
	0.6500	2.152
	0.6666	2.140
	0.6833	2.133
	0.7000	2.120
	0.7166	2.114
0.51	-0.7333	2.108
	0.7500	2.101
	0.7666	2.089
	0.7833	2.082
	0.8000	2.076
	0.8166	2.069
0.61	-0.8333	2.057
	0.8500	2.050
	0.8666	2.044
	0.8833	2.031
	0.9000	2.025
	0.9166	2.025
0.71	-0.9333	2.012
	0.9500	2.006
	0.9666	1.999
	0.9833	1.993
	1.0000	1.986
0.97	-1.2000	1.878
	1.4000	1.705
	1.6000	1.712
	1.8000	1.641
	2.0000	1.565
1.97	-2.2000	1.501
	2.4000	1.437
	2.6000	1.373
	2.8000	1.322
	3.0000	1.265
2.97	-3.2000	1.207
	3.4000	1.156
	3.6000	1.111
	3.8000	1.060
	4.0000	1.015
3.97	-4.2000	0.977

PAI-01-MW-10(D)
Test 9 Step 3
Slug out (Rising Head Test)

	4.4000	0.932
	4.6000	0.894
	4.8000	0.856
	5.0000	0.824
4.97 -	5.2000	0.792
	5.4000	0.753
	5.6000	0.722
	5.8000	0.696
	6.0000	0.671
5.97 -	6.2000	0.639
	6.4000	0.613
	6.6000	0.588
	6.8000	0.562
	7.0000	0.543
6.97 -	7.2000	0.523
	7.4000	0.498
	7.6000	0.479
	7.8000	0.460
	8.0000	0.434
7.97 -	8.2000	0.415
	8.4000	0.402
	8.6000	0.389
	8.8000	0.377
	9.0000	0.358
8.97 -	9.2000	0.345
	9.4000	0.332
	9.6000	0.313
	9.8000	0.306
	10.0000	0.294
11.77 -	12.0000	0.185
	14.0000	0.128
15.77 -	16.0000	0.083
	18.0000	0.051
19.77 -	20.0000	0.032
	22.0000	0.025
	24.0000	0.013

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW-10(D) Falling HEAD Slug TEST	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln L/R}{2 L T_o}$$

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well Screen
L = Length of well Screen
T_o = Time For water Level to Rise or Fall to 37% of initial Charge.

r = 0.083 FT.
R = 0.083 FT.
L = 5 FT
T_o = 2.36 min.

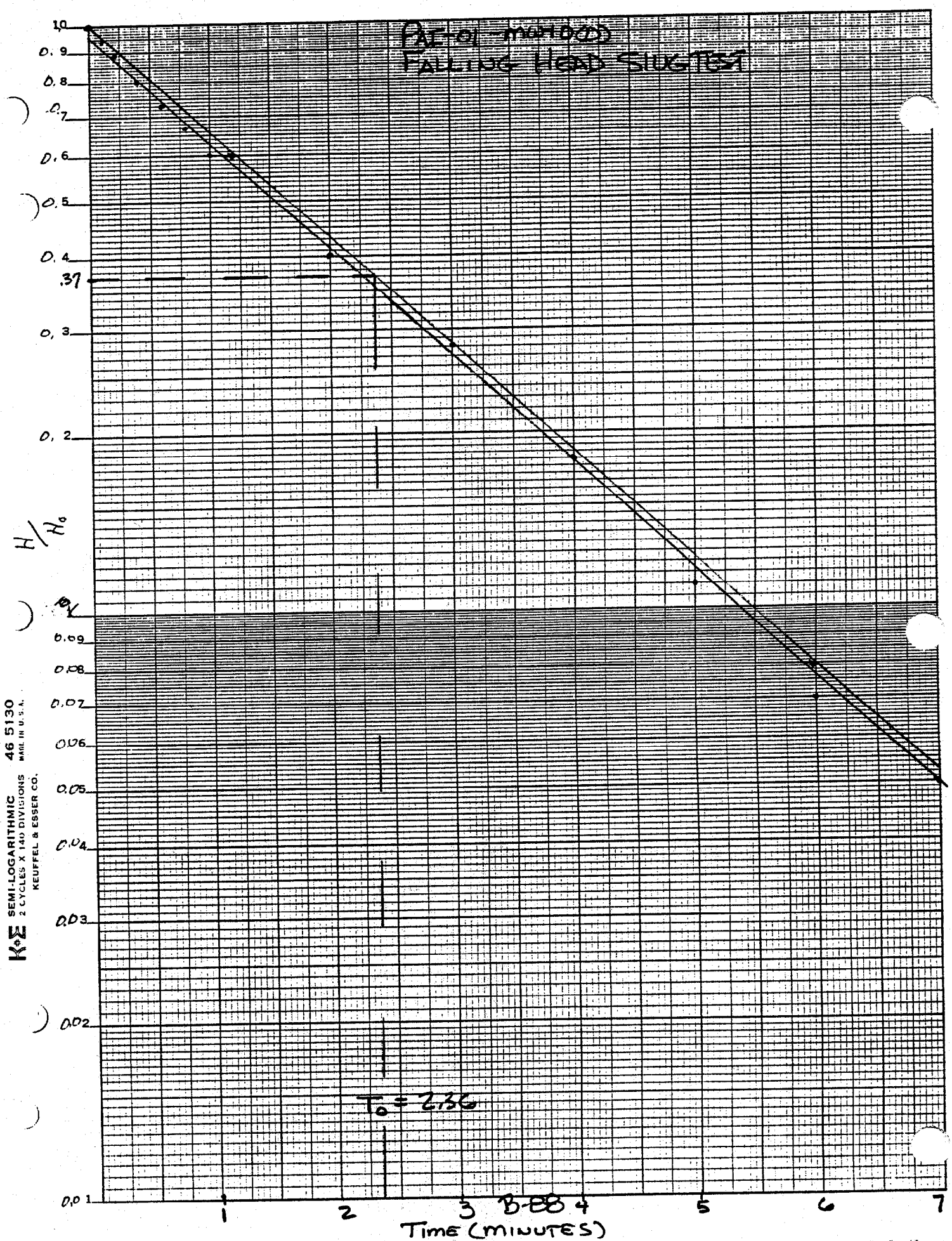
$$K = \frac{r^2 \ln L/R}{2 L T_o} = \frac{(0.083\,FT)^2 \ln (5\,FT / 0.083\,FT)}{2\,(5\,FT)(2.36\,min)}$$

$$= 6.89 \times 10^{-3} \frac{Ft^2 \ln (60.24)}{23.6\ Ft \cdot min}$$

$$= 1.20 \times 10^{-3}\ Ft/min$$

$$1.20 \times 10^{-3}\ Ft/min \times 1440\ min/day = 1.73\ Ft/day$$

$$1.73\ Ft/day \times 3.528 \times 10^{-4} \frac{cm/sec}{Ft/day} = 6.10 \times 10^{-4}\ cm/sec.$$


PZ-01 - MW10(2)
FALLING HEAD SLUG TEST
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
H/H₀
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T₀ = 2.36
1
2
3
4
5
6
7
TIME (MINUTES)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

B-88

HYDRAULIC CONDUCTIVITY TESTING DATA SHE

PROJECT NAME: MCRD Parris Island, SC (Site 1) WELL/BORING NO.: PA1-[illegible]

PROJECT NO.: 7394 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 5 ft. TEST NO.: 9/Step 2

STATIC WATER LEVEL (Depth/Elevation): 4.84 / TWD=37.61 / LWC=32.77 DATE:

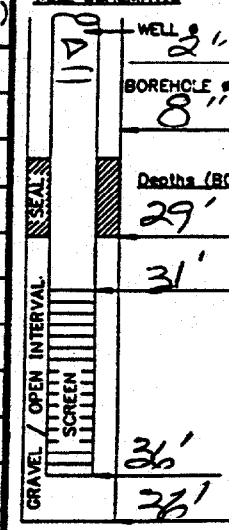
TEST TYPE (Rising/Falling/Constant Head): Falling (Slug in) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) PAGE 1 OF 2

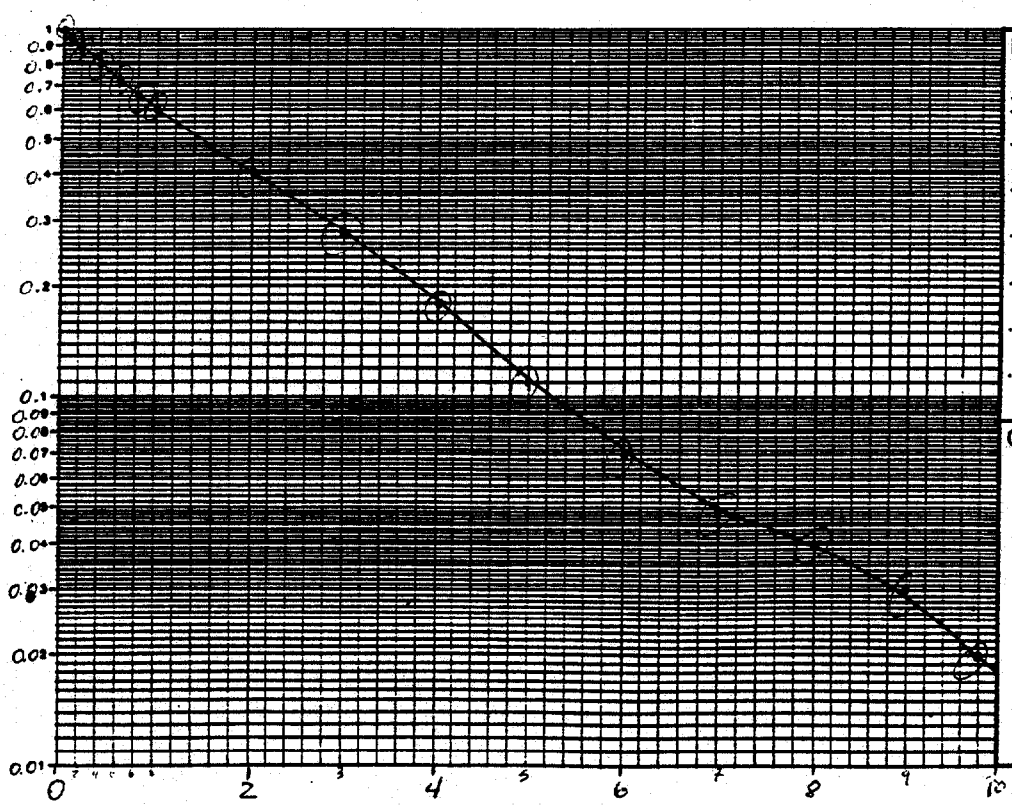
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-2.294	1	7.0	-0.114	0.05
0.1	-2.166	0.94	8.0	-0.083	0.04
0.2	-2.045	0.89	9.0	-0.063	0.03
0.4	-1.846	0.80	9.8	-0.044	0.02
0.6	-1.680	0.73			
0.8	-1.533	0.67			
1.0	-1.373	0.60			
2.0	-0.920	0.40			
3.0	-0.632	0.28			
4.0	-0.408	0.18			
5.0	-0.261	0.11			
6.0	-0.172	0.07			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

T.D = 00010

CALCS, SKETCH MAPS, ETC.:

B-89

PAE-01-MW-10 (D)
Test 9, Step 2
Slug In (Falling)

SE10000
Environmental Logger
08/20 14:29

Unit# 00145 Test 9

Falling Head Slug Test

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00010
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 2 08/20 12:52:18

Elapsed Time	INPUT 1
0.0000	0.006
0.0033	0.006
0.0066	0.006
0.0100	0.006
0.0133	-0.006
0.0166	-0.155
0.0200	-0.466
0.0233	-0.772
0.0266	-0.955
0.0300	-1.124
0.0333	-1.104
0.0366	-1.137
0.0400	-1.137
0.0433	-1.220
0.0466	-1.163
0.0500	-1.246
0.0533	-1.591
0.0566	-2.294
0.0600	-2.160
0.0633	-1.744
0.0666	-1.866
0.0700	-2.038
0.0733	-2.217
0.0766	-2.460
0.0800	-2.761
0.0833	-3.023
0.0866	-3.183
0.0900	-3.227
0.0933	-3.163
0.0966	-3.029
0.1000	-2.665
0.1033	-1.540
0.1066	-1.111
0.1100	-1.546
0.1133	-2.240
0.1166	-2.703
0.1200	-2.921

PAI-01-MW-10(D)
Test 9, Step 2
Slug In (Falling Head Test)

	0.1233	-2.021
	0.1266	-2.748
	0.1300	-2.448
	0.1333	-2.205
	0.1366	-2.102
	0.1400	-2.172
	0.1433	-2.332
	0.1466	-2.460
	0.1500	-2.505
	0.1533	-2.466
	0.1566	-2.377
	0.1600	-2.294
	0.1633	-2.268
	0.1666	-2.294
	0.1700	-2.332
	0.1733	-2.358
	0.1766	-2.364
	0.1800	-2.332
	0.1833	-2.307
	0.1866	-2.287
	0.1900	-2.287
	0.1933	-2.294
0	0.1966	-2.294 T_0
	0.2000	-2.294
	0.2033	-2.287
	0.2066	-2.281
	0.2100	-2.281
	0.2133	-2.268
	0.2166	-2.262
	0.2200	-2.262
	0.2233	-2.262
	0.2266	-2.256
	0.2300	-2.249
	0.2333	-2.243
	0.2366	-2.237
	0.2400	-2.230
	0.2433	-2.230
	0.2466	-2.223
	0.2500	-2.223
	0.2533	-2.217
	0.2566	-2.211
	0.2600	-2.211
	0.2633	-2.205
	0.2666	-2.198
	0.2700	-2.198
	0.2733	-2.192
	0.2766	-2.192
	0.2800	-2.185
	0.2833	-2.179
	0.2866	-2.172
	0.2900	-2.172
	0.2933	-2.172
0.1	0.2966	-2.166
	0.3000	-2.160
	0.3033	-2.160
	0.3066	-2.153
	0.3100	-2.147
	0.3133	-2.147
	0.3166	-2.140
	0.3200	-2.134

PAI-01-MW-10(D)
Test 9 Step 2
Slug In (Falling Head Test)

	0.3233	-2.134
	0.3266	-2.134
	0.3300	-2.128
	0.3333	-2.121
	0.3500	-2.102
	0.3666	-2.083
	0.3833	-2.064
0.2	-0.4000	-2.045
	0.4166	-2.032
	0.4333	-2.013
	0.4500	-1.993
	0.4666	-1.981
	0.4833	-1.961
0.3	-0.5000	-1.942
	0.5166	-1.923
	0.5333	-1.910
	0.5500	-1.891
	0.5666	-1.878
	0.5833	-1.859
0.4	-0.6000	-1.846
	0.6166	-1.834
	0.6333	-1.821
	0.6500	-1.808
	0.6666	-1.789
	0.6833	-1.776
0.5	-0.7000	-1.763
	0.7166	-1.750
	0.7333	-1.731
	0.7500	-1.719
	0.7666	-1.706
	0.7833	-1.693
0.6	-0.8000	-1.680
	0.8166	-1.667
	0.8333	-1.655
	0.8500	-1.642
	0.8666	-1.629
	0.8833	-1.616
0.7	-0.9000	-1.604
	0.9166	-1.591
	0.9333	-1.578
	0.9500	-1.571
	0.9666	-1.559
	0.9833	-1.546
0.8	-1.0000	-1.533
1.0	-1.2000	-1.373
	1.4000	-1.258
	1.6000	-1.163
	1.8000	-1.073
	2.0000	-0.990
2.00	-2.2000	-0.920
	2.4000	-0.850
	2.6000	-0.786
	2.8000	-0.728
	3.0000	-0.677
3.00	-3.2000	-0.632
	3.4000	-0.587
	3.6000	-0.549
	3.8000	-0.498
	4.0000	-0.447
4.00	-4.2000	-0.408

PAI-01-MW-10(D)
Test 9 Step 2
Slug Test (Falling Head Test)

	4.4000	-0.370
	4.6000	-0.338
	4.8000	-0.306
	5.0000	-0.281
5.0	-5.2000	-0.261
	5.4000	-0.236
	5.6000	-0.217
	5.8000	-0.204
	6.0000	-0.185
6.0	-6.2000	-0.172
	6.4000	-0.153
	6.6000	-0.153
	6.8000	-0.140
	7.0000	-0.127
7.0	-7.2000	-0.114
	7.4000	-0.108
	7.6000	-0.102
	7.8000	-0.095
	8.0000	-0.095
8.0	-8.2000	-0.083
	8.4000	-0.076
	8.6000	-0.076
	8.8000	-0.070
	9.0000	-0.070
9.0	-9.2000	-0.063
	9.4000	-0.057
	9.6000	-0.057
	9.8000	-0.051
9.80	-10.0000	-0.044
11.80	-12.0000	-0.031
13.80	14.0000	-0.018

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW11(S) RISING HEAD SLUGTEST	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time for water Level to Rise or Fall to 37% of Initial Change.

r = 0.083 FT
R = 0.083 FT
L = 10 FT
T_0 = 2.7 min

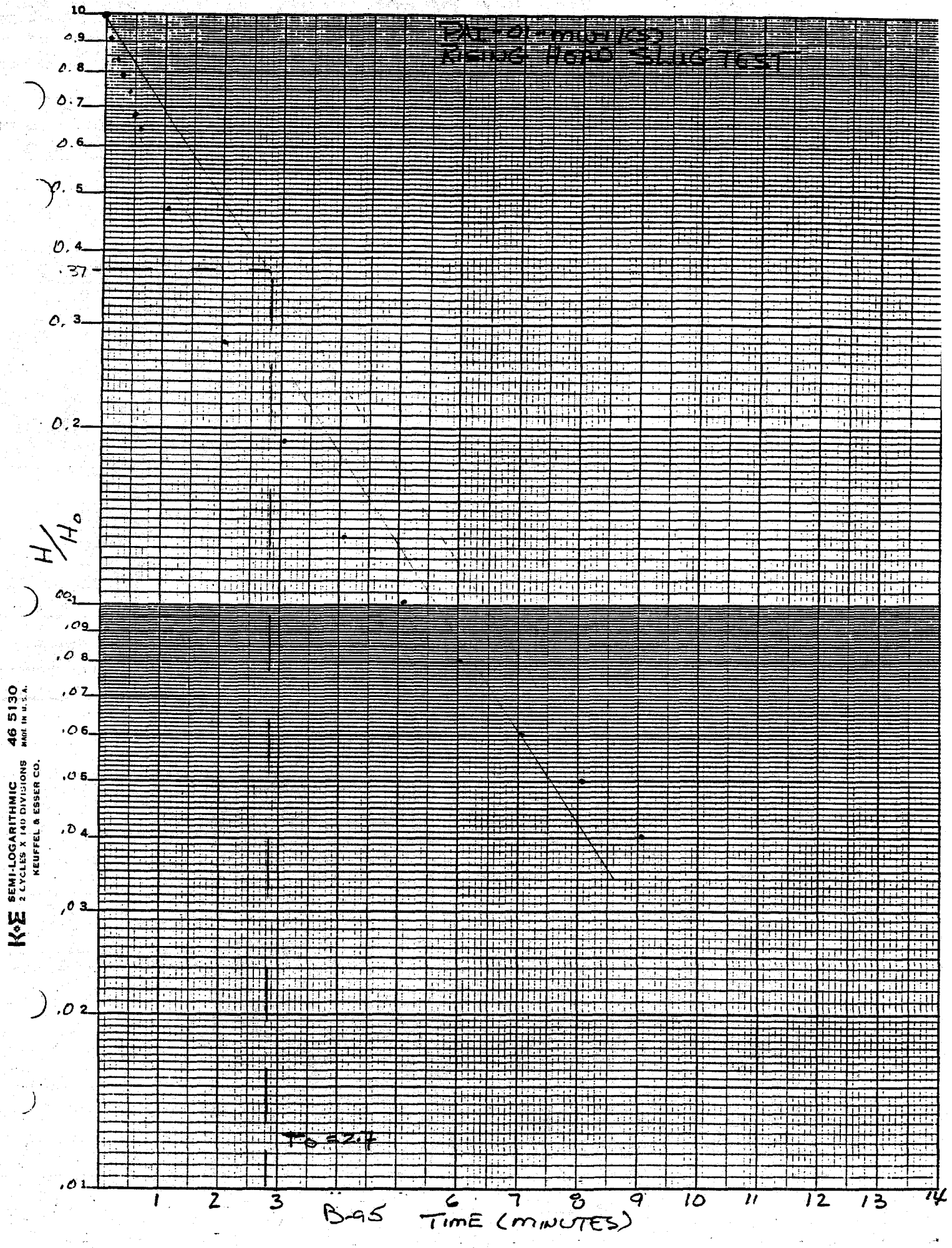
$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083FT)^2 \ln(10FT/0.083FT)}{2(10FT)(2.7min)}$$

$$= \frac{6.89\times10^{-3} FT^2 \ln(120.48)}{54 FT\,min}$$

$$= 6.11\times10^{-4} FT/min.$$

$$6.11\times10^{-4} FT/min \times 1440\ min/day = 8.80\times10^{-1} FT/day$$

$$8.80\times10^{-1} FT/day \times \frac{3.528\times10^{-4} cm/sec}{FT/Day} = 3.11\times10^{-4} cm/sec$$


PAT. 01-MW1(S2)
RISING HEAD SLUG TEST
H/H0
10
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
.09
.08
.07
.06
.05
.04
.03
.02
.01
1
2
3
6
7
8
9
10
11
12
13
14
TIME (MINUTES)
T0 = 2.4
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

B-95

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island SC (Site 1) WELL/BORING NO.: PAI-01-MW11(S)

PROJECT NO.: 7394 GEOLOGIST: Mark Dannington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft. TEST NO.: 0/Step

STATIC WATER LEVEL (Depth/Elevation): 2.98 / TWD = 16.29 / LWC = 13.31 DATE: 8/24/98

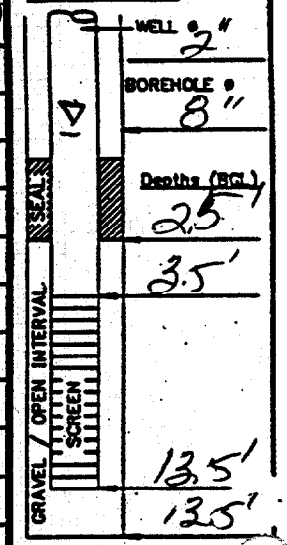
TEST TYPE (Rising/Falling/Constant Head): ~~Falling~~ RISING (Slug OUT) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 1 OF 2

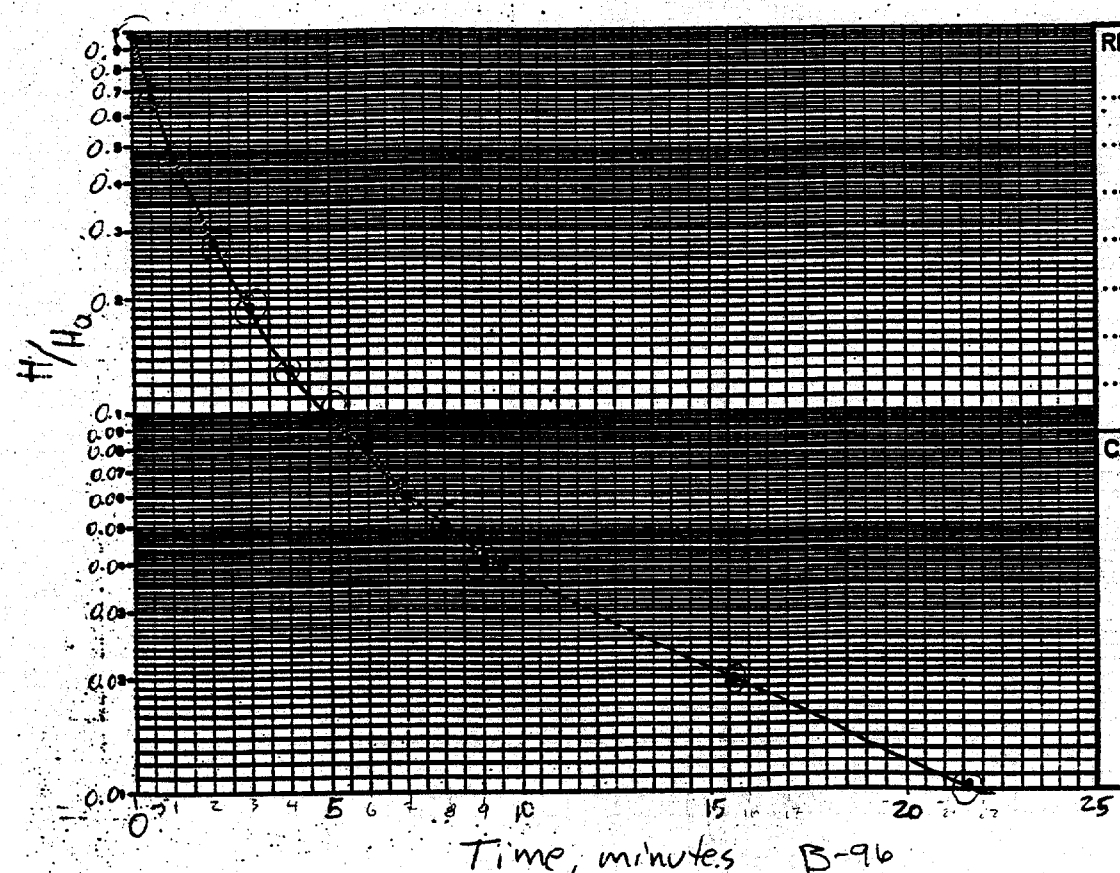
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	1.418	1	6.07	0.108	0.08
0.1	1.297	0.91	7.07	0.089	0.06
0.2	1.195	0.84	8.07	0.069	0.05
0.3	1.119	0.79	9.07	0.063	0.04
0.4	1.030	0.73	9.67	0.057	0.04
0.5	0.966	0.68	15.67	0.031	0.02
0.6	0.903	0.64	21.67	0.012	0.01
1.07	0.667	0.47			
2.07	0.400	0.28			
3.07	0.267	0.19			
4.07	0.190	0.13			
5.07	0.139	0.10			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

B-96

~~PAI 01 GNII~~ mw
TEST 0, STEP 3
SLUG OUT (Rising)

PAE-01-MW-11(S)
Rising Head Slug Test

SE1000C
Environmental Logger
08/24 15:58

Unit# 00145 Test 0

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00011
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 3 08/24 09:15:22

Elapsed Time	INPUT 1
0.0000	-0.012
0.0033	0.451
0.0066	1.901
0.0100	2.855
0.0133	2.225
0.0166	0.553
0.0200	0.553
0.0233	1.863
0.0266	3.268
0.0300	2.938
0.0333	1.749
0.0366	1.170
0.0400	1.615
0.0433	2.442
0.0466	2.435
0.0500	1.895
0.0533	1.469
0.0566	1.640
0.0600	2.054
0.0633	2.155
0.0666	1.888
0.0700	1.621
0.0733	1.666
0.0766	1.888
0.0800	1.984
0.0833	1.850
0.0866	1.685
0.0900	1.672
0.0933	1.787
0.0966	1.857
0.1000	1.806
0.1033	1.698
0.1066	1.685
0.1100	1.729
0.1133	1.774
0.1166	1.755
0.1200	1.698

PAI-01-mw211(s)
Slug out (Rising Head Test)

0.1233	1.672
0.1266	1.698
0.1300	1.723
0.1333	1.710
0.1366	1.672
0.1400	1.653
0.1433	1.660
0.1466	1.672
0.1500	1.672
0.1533	1.653
0.1566	1.634
0.1600	1.634
0.1633	1.640
0.1666	1.640
0.1700	1.621
0.1733	1.615
0.1766	1.609
0.1800	1.615
0.1833	1.609
0.1866	1.602
0.1900	1.590
0.1933	1.583
0.1966	1.583
0.2000	1.583
0.2033	1.577
0.2066	1.564
0.2100	1.558
0.2133	1.558
0.2166	1.551
0.2200	1.551
0.2233	1.545
0.2266	1.539
0.2300	1.545
0.2333	1.532
0.2366	1.526
0.2400	1.520
0.2433	1.520
0.2466	1.513
0.2500	1.513
0.2533	1.501
0.2566	1.501
0.2600	1.488
0.2633	1.494
0.2666	1.488
0.2700	1.481
0.2733	1.475
0.2766	1.475
0.2800	1.475
0.2833	1.469
0.2866	1.462
0.2900	1.456
0.2933	1.456
0.2966	1.456
0.3000	1.450
0.3033	1.437
0.3066	1.437
0.3100	1.431
0.3133	1.431
0.3166	1.424
0.3200	1.424

PAI-01-MW-11(S)
Slug Out (Rising Head Test)

	0.3233	1.412
	0.3266	1.412
	0.3300	1.412
0	0.3333	1.418 — T_0
	0.3500	1.386
	0.3666	1.367
	0.3833	1.348
	0.4000	1.329
	0.4166	1.322
0.10 —	0.4333	1.297
	0.4500	1.278
	0.4666	1.259
	0.4833	1.246
	0.5000	1.227
	0.5166	1.214
0.20 —	0.5333	1.195
	0.5500	1.183
	0.5666	1.164
	0.5833	1.151
	0.6000	1.144
	0.6166	1.119
0.30 —	0.6333	1.119
	0.6500	1.094
	0.6666	1.087
	0.6833	1.074
	0.7000	1.062
	0.7166	1.043
0.40 —	0.7333	1.030
	0.7500	1.030
	0.7666	1.011
	0.7833	0.998
	0.8000	0.992
	0.8166	0.973
0.50 —	0.8333	0.966
	0.8500	0.954
	0.8666	0.947
	0.8833	0.941
	0.9000	0.928
	0.9166	0.922
0.60 —	0.9333	0.903
	0.9500	0.896
	0.9666	0.884
	0.9833	0.877
	1.0000	0.871
	1.2000	0.756
1.07 —	1.4000	0.667
	1.6000	0.597
	1.8000	0.534
	2.0000	0.489
	2.2000	0.445
2.07 —	2.4000	0.400
	2.6000	0.368
	2.8000	0.343
	3.0000	0.311
	3.2000	0.286
3.07 —	3.4000	0.267
	3.6000	0.248
	3.8000	0.229
	4.0000	0.209
	4.2000	0.203

PAI-01-MW-11(US)
Slugout Rising Head Test.

4.07	-4.4000	0.190
	4.6000	0.171
	4.8000	0.165
	5.0000	0.152
	5.2000	0.152
5.07	-5.4000	0.139
	5.6000	0.133
	5.8000	0.127
	6.0000	0.114
	6.2000	0.108
6.07	-6.4000	0.108
	6.6000	0.101
	6.8000	0.095
	7.0000	0.095
	7.2000	0.089
7.07	-7.4000	0.089
	7.6000	0.089
	7.8000	0.076
	8.0000	0.082
	8.2000	0.076
8.07	-8.4000	0.069
	8.6000	0.063
	8.8000	0.063
	9.0000	0.063
	9.2000	0.063
9.07	-9.4000	0.063
	9.6000	0.063
	9.8000	0.050
9.67	-10.0000	0.057
	12.0000	0.050
	14.0000	0.038
15.67	-16.0000	0.031
	18.0000	0.025
	20.0000	0.019
21.67	-22.0000	0.012
	24.0000	0.012
	26.0000	0.000
	28.0000	0.000
	30.0000	0.000
	32.0000	-0.006

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-01-MW 11 @ FALLING HEAD SLUG TEST			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RmB 3/19/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln L/R}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of Well Screen
L = Length of Well Screen
T_0 = Time For water to Fall or Rise To 37% of initial change.

r = 0.083 FT
R = 0.083 FT
L = 10 FT
T_0 = 1.32 min

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,FT)^2 \ln\left(\frac{10\,FT}{0.083\,FT}\right)}{2(10\,FT)(1.32\,min)}$$

$$= \frac{6.89 \times 10^{-3} FT^2 \ln(120.48)}{26.4\ FT \cdot min}$$

$$= 1.25 \times 10^{-3}\ FT/min$$

$$1.25 \times 10^{-3} FT/min \times 1440\ min/day = 1.8\ FT/day$$

$$1.8\ FT/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{FT/day} = 6.35 \times 10^{-4}\ cm/sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) WELL/BORING NO.: PAE-01-MW-11(B)

PROJECT NO.: 7394 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft. TEST NO.: 0/Slug

STATIC WATER LEVEL (Depth/Elevation): 2.98 / TWD=16.29 / LWC=13.31 DATE: 8/24/98

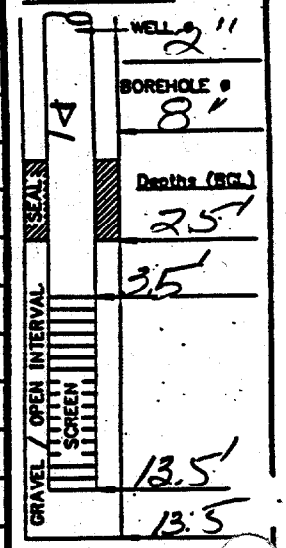
TEST TYPE (Rising/Falling/Constant Head): ~~Rising~~ FALLING (Slug IN) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 2 OF 2

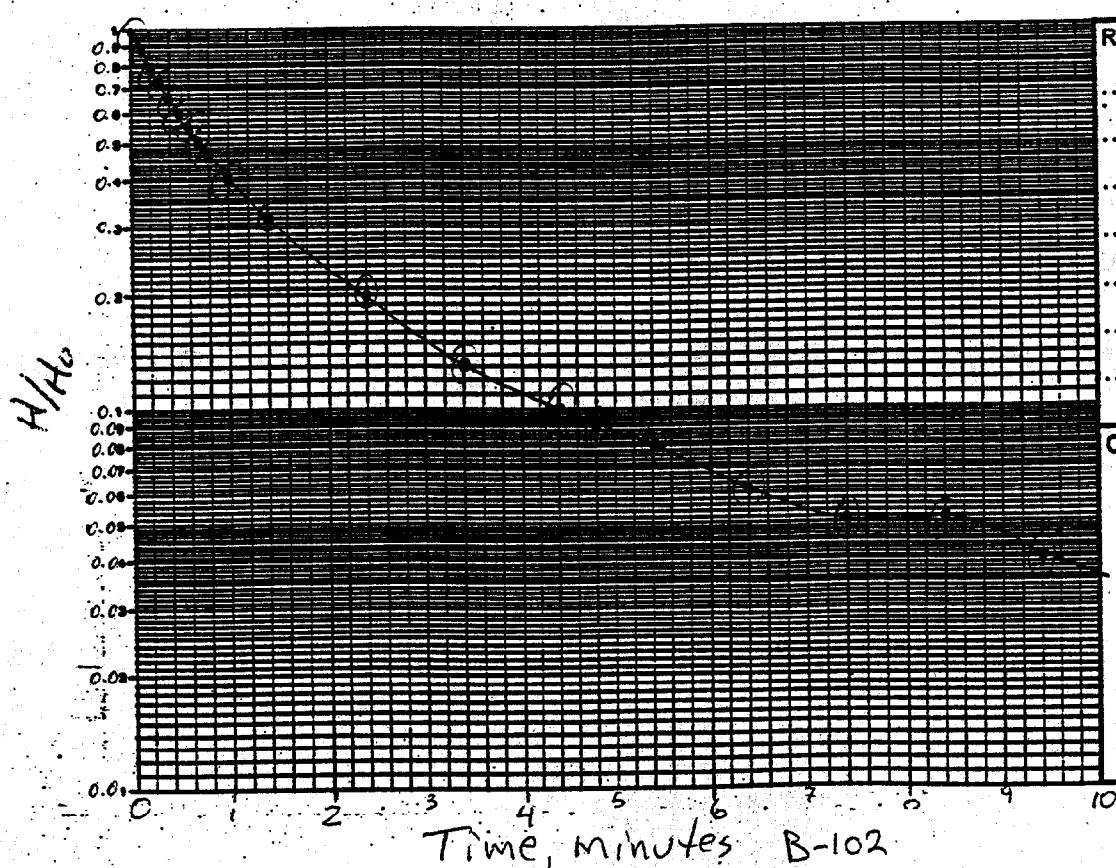
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-1.329	1	2.42	-0.260	0.20
0.05	-1.247	0.94	3.42	-0.178	0.13
0.10	-1.177	0.89	4.42	-0.133	0.10
0.21	-1.056	0.79	4.82	-0.114	0.09
0.31	-0.954	0.72	5.42	-0.101	0.08
0.41	-0.871	0.66	6.42	-0.082	0.06
0.51	-0.801	0.60	7.42	-0.070	0.05
0.61	-0.744	0.56	8.42	-0.063	0.05
0.71	-0.680	0.51	9.42	-0.057	0.04
0.81	-0.629	0.47			
1.02	-0.534	0.40			
1.42	-0.419	0.32			

WELL SCHEMATIC

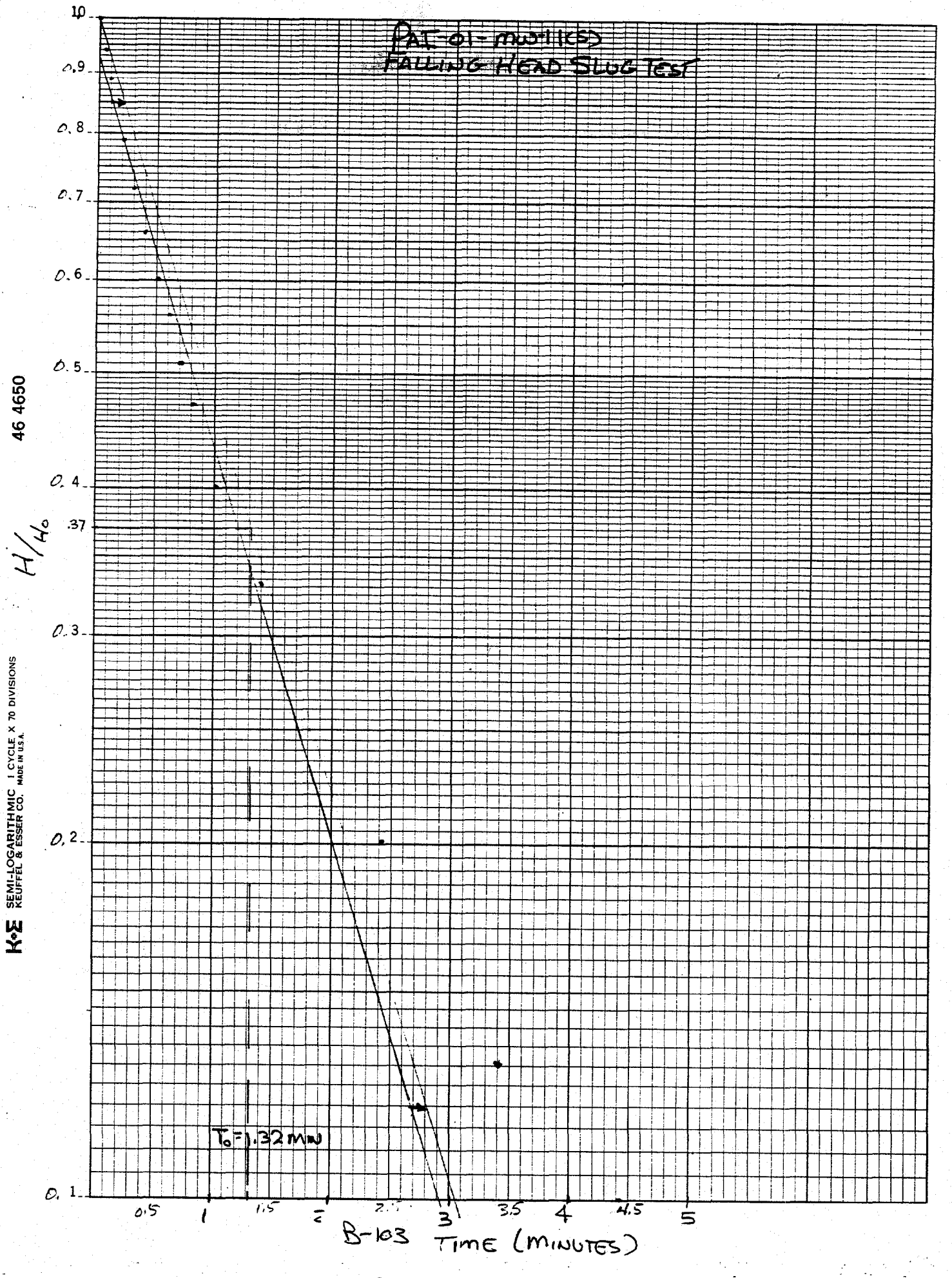


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


PAL-01-MW-11(S)
FALLING HEAD SLUG TEST
H/Ho
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
T0 = 1.32 MIN
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
B-103
TIME (MINUTES)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

~~PAI-01-GWH~~
TEST 0, STEP 0
SLUG IN (FALL)

PAI-01-MW-11(S)
Falling Head Test

SE1000C
Environmental Logger
08/24 15:49

Unit# 00145 Test 0

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00011
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/24 07:36:37

Elapsed Time	INPUT 1
0.0000	-0.044
0.0033	-0.451
0.0066	-0.833
0.0100	-1.240
0.0133	-1.667
0.0166	-1.902
0.0200	-2.099
0.0233	-2.303
0.0266	-2.481
0.0300	-2.513
0.0333	-2.201
0.0366	-1.660
0.0400	-1.240
0.0433	-1.030
0.0466	-0.769
0.0500	-0.788
0.0533	-1.202
0.0566	-1.463
0.0600	-1.667
0.0633	-1.813
0.0666	-1.898
0.0700	-1.889
0.0733	-1.800
0.0766	-1.673
0.0800	-1.520
0.0833	-1.387
0.0866	-1.278
0.0900	-1.240
0.0933	-1.259
0.0966	-1.348
0.1000	-1.450
0.1033	-1.520
0.1066	-1.558
0.1100	-1.565
0.1133	-1.527
0.1166	-1.478
0.1200	-1.406

PAI-01-MW11(S)
Test of
Slug In (Falling Head Test)

	0.1233	-1.361
	0.1266	-1.329
	0.1300	-1.329
	0.1333	-1.342
	0.1366	-1.374
	0.1400	-1.399
	0.1433	-1.412
	0.1466	-1.406
	0.1500	-1.393
	0.1533	-1.361
	0.1566	-1.342
	0.1600	-1.323
	0.1633	-1.317
	0.1666	-1.317
	0.1700	-1.323
	0.1733	-1.317
0	0.1766	-1.329
	0.1800	-1.323 T_0
	0.1833	-1.310
	0.1866	-1.310
	0.1900	-1.291
	0.1933	-1.291
	0.1966	-1.278
	0.2000	-1.272
	0.2033	-1.272
	0.2066	-1.266
	0.2100	-1.266
	0.2133	-1.266
	0.2166	-1.259
	0.2200	-1.259
	0.2233	-1.247
0.05	0.2266	-1.247
	0.2300	-1.234
	0.2333	-1.234
	0.2366	-1.227
	0.2400	-1.221
	0.2433	-1.221
	0.2466	-1.215
	0.2500	-1.215
	0.2533	-1.202
	0.2566	-1.202
	0.2600	-1.196
	0.2633	-1.196
	0.2666	-1.189
	0.2700	-1.183
	0.2733	-1.177
0.1	0.2766	-1.177
	0.2800	-1.170
	0.2833	-1.164
	0.2866	-1.170
	0.2900	-1.158
	0.2933	-1.158
	0.2966	-1.151
	0.3000	-1.145
	0.3033	-1.145
	0.3066	-1.132
	0.3100	-1.132
	0.3133	-1.132
	0.3166	-1.132
	0.3200	-1.126

PAT-01 - MW-11(S)

Test Ø

Slug In (Falling Head Test)

	0.3233	-1.126
	0.3266	-1.119
	0.3300	-1.113
	0.3333	-1.113
	0.3500	-1.094
	0.3666	-1.075
0.21	-0.3833	-1.056
	0.4000	-1.037
	0.4166	-1.018
	0.4333	-1.005
	0.4500	-0.979
	0.4666	-0.967
0.31	-0.4833	-0.954
	0.5000	-0.941
	0.5166	-0.928
	0.5333	-0.909
	0.5500	-0.903
	0.5666	-0.890
0.41	-0.5833	-0.871
	0.6000	-0.858
	0.6166	-0.846
	0.6333	-0.839
	0.6500	-0.827
	0.6666	-0.820
0.51	-0.6833	-0.801
	0.7000	-0.788
	0.7166	-0.782
	0.7333	-0.769
	0.7500	-0.763
	0.7666	-0.744
0.61	-0.7833	-0.744
	0.8000	-0.738
	0.8166	-0.725
	0.8333	-0.712
	0.8500	-0.706
	0.8666	-0.699
0.71	-0.8833	-0.680
	0.9000	-0.674
	0.9166	-0.668
	0.9333	-0.655
	0.9500	-0.655
	0.9666	-0.642
0.81	-0.9833	-0.629
	1.0000	-0.629
1.02	-1.2000	-0.534
	1.4000	-0.470
1.42	-1.6000	-0.419
	1.8000	-0.375
	2.0000	-0.337
	2.2000	-0.305
	2.4000	-0.279
2.42	-2.6000	-0.260
	2.8000	-0.235
	3.0000	-0.216
	3.2000	-0.197
	3.4000	-0.184
3.42	-3.6000	-0.178
	3.8000	-0.159
	4.0000	-0.152
	4.2000	-0.140

PAI-01-MW11(S)
Test Ø
Slug In (Falling Head Test)

	4.4000	-0.140
4.42-	4.6000	-0.133
	4.8000	-0.120
4.82-	5.0000	-0.114
5.02-	5.2000	-0.108
	5.4000	-0.108
5.42-	5.6000	-0.101
	5.8000	-0.101
	6.0000	-0.089
	6.2000	-0.089
	6.4000	-0.089
6.42-	6.6000	-0.082
	6.8000	-0.076
	7.0000	-0.076
	7.2000	-0.070
	7.4000	-0.076
7.42-	7.6000	-0.070
	7.8000	-0.070
	8.0000	-0.070
	8.2000	-0.070
	8.4000	-0.057
8.42-	8.6000	-0.063
	8.8000	-0.063
	9.0000	-0.063
	9.2000	-0.057
	9.4000	-0.063
9.42-	9.6000	-0.057
	9.8000	-0.057
	10.0000	-0.063
	12.0000	-0.038
	14.0000	-0.038
	16.0000	-0.031
	18.0000	-0.025
	20.0000	-0.025
	22.0000	-0.012
	24.0000	-0.012
	26.0000	-0.012
	28.0000	-0.019
	30.0000	-0.012
	32.0000	-0.012
	34.0000	-0.006

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW12(D) FALLING HEAD SLUG TEST	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln L/R}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of well Casing — r = 0.083 FT
R = Radius of well Screen — R = 0.083 FT
L = Length of well Screen — L = 5 FT
T_0 = Time for water level to rise or fall to 37% of initial change — T_0 = 0.9 min.

$$K = \frac{r^2 \ln L/R}{2 L T_0} = \frac{(0.083\,FT)^2 \ln(5\,FT/0.083\,FT)}{2(5\,FT)(0.9\,min)}$$

$$= \frac{6.89 \times 10^{-3}\,FT^2 \ln(60.24)}{9\,FT \cdot min}$$

$$= 3.14 \times 10^{-3}\,FT/min$$

$$3.14 \times 10^{-3}\,FT/min \times 1440\,min./day = 4.52\,FT/Day$$

$$4.52\,FT/day \times 3.528 \times 10^{-4}\,\frac{cm/Sec}{FT/Day} = 1.59 \times 10^{-3}\,cm/Sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) WELL/BORING NO.: PAI-01-MW12D

PROJECT NO.: 7394 GEOLOGIST: Mark Dennington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 5 ft TEST NO.: Test 2/Slug 1

STATIC WATER LEVEL (Depth/Elevation): 4.97 / TWD=41.51 / LWC=36.54 DATE: 8/20/98

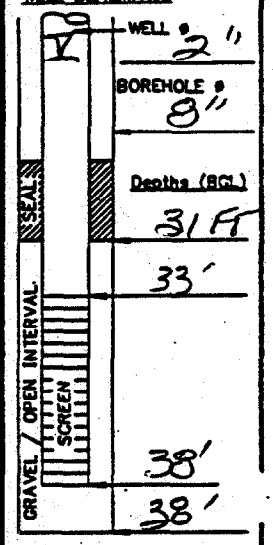
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 2 OF 2

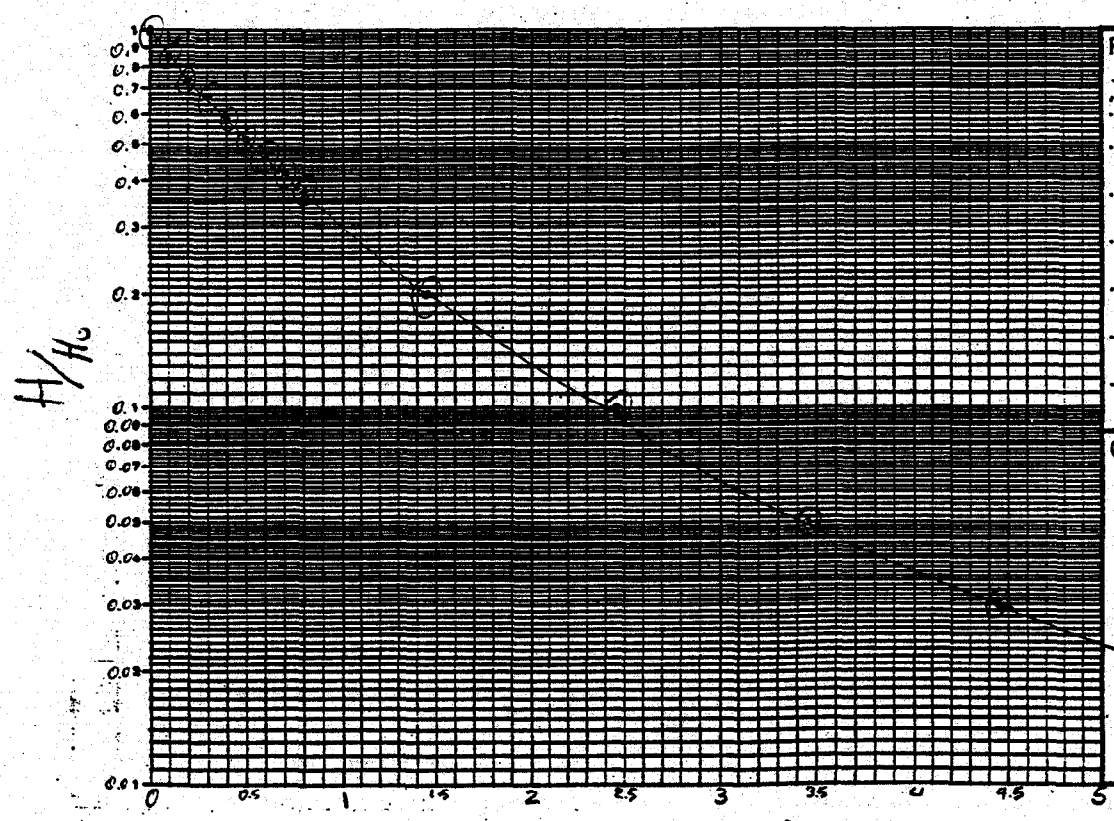
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-2.315	1	4.47	-0.076	0.03
0.10	-1.989	0.86	5.47	-0.057	0.02
0.20	-1.740	0.75			
0.30	-1.541	0.67			
0.40	-1.362	0.59			
0.50	-1.215	0.52			
0.60	-1.087	0.47			
0.70	-0.978	0.42			
0.80	-0.882	0.38			
1.47	-0.466	0.20			
2.47	-0.224	0.10			
3.47	-0.121	0.05			

WELL SCHEMATIC



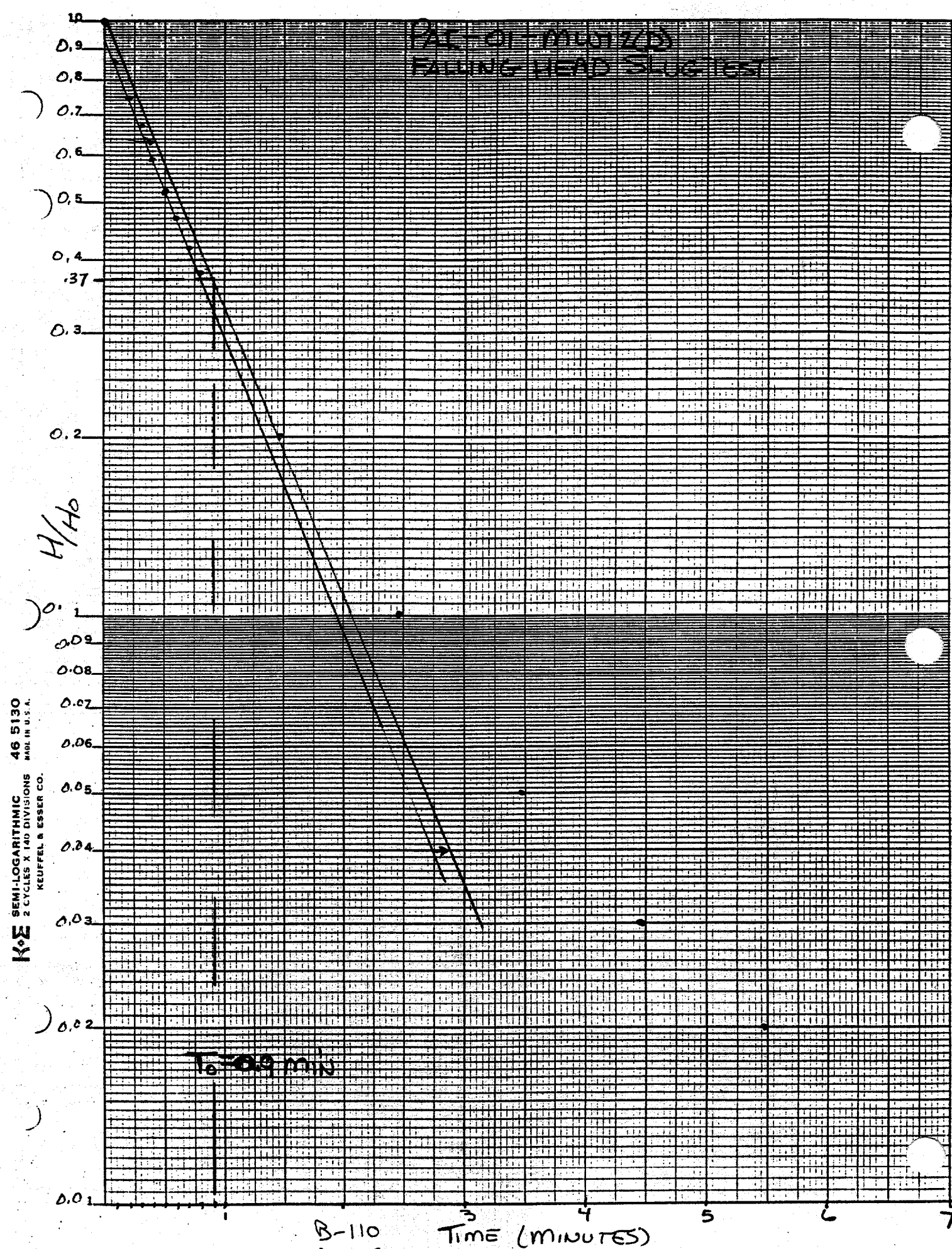
▽ Indicate SWL Depth on Drawing



REMARKS:

ID=00012

CALCS, SKETCH MAPS, ETC.:


PAE-01-MW12/D
FALLING HEAD SLUG TEST
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
H/Ho
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T0 = 0.9 min
1
3
4
5
6
7
TIME (MINUTES)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

B-110

~~PAI-GW12~~
Test 2
Slug In (Falling)

PAI-01-MW-12(D)
Falling Head Slug Test

8210000
Environmental Logger
08/21 06:23

Unit# 00145 Test 2

Setups:	INPUT 1
Type	Level (F)
Mode	TOU
I.D.	00012
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/20 16:16:12

Elapsed Time	INPUT 1
0.0000	-0.006
0.0033	0.000
0.0066	-0.080
0.0100	-0.466
0.0133	-0.825
0.0166	-1.266
0.0200	-1.548
0.0233	-1.625
0.0266	-1.573
0.0300	-1.701
0.0333	-2.008
0.0366	-2.124
0.0400	-2.258
0.0433	-2.450
0.0466	-2.572
0.0500	-2.296
0.0533	-2.070
0.0566	-2.047
0.0600	-2.610
0.0633	-2.930
0.0666	-3.260
0.0700	-3.384
0.0733	-3.253
0.0766	-2.885
0.0800	-2.501
0.0833	-2.264
0.0866	-2.252
0.0900	-2.476
0.0933	-2.232
0.0966	-1.721
0.1000	-1.861
0.1033	-2.271
0.1066	-2.552
0.1100	-2.635
0.1133	-2.508
0.1166	-2.328
0.1200	-2.230

PAI-01-MW12(D)
Test 2
Slug In (Falling Head Test)

0.1233	-2.239
0.1266	-2.284
0.1300	-2.309
0.1333	-2.315 • T_0
0.1366	-2.284
0.1400	-2.245
0.1433	-2.277
0.1466	-2.252
0.1500	-2.226
0.1533	-2.220
0.1566	-2.207
0.1600	-2.194
0.1633	-2.181
0.1666	-2.175
0.1700	-2.162
0.1733	-2.149
0.1766	-2.136
0.1800	-2.136
0.1833	-2.130
0.1866	-2.111
0.1900	-2.104
0.1933	-2.088
0.1966	-2.085
0.2000	-2.085
0.2033	-2.066
0.2066	-2.059
0.2100	-2.053
0.2133	-2.047
0.2166	-2.028
0.2200	-2.028
0.2233	-2.015
0.2266	-2.002
0.2300	-1.996
0.10 0.2333	-1.989
0.2366	-1.976
0.2400	-1.957
0.2433	-1.957
0.2466	-1.957
0.2500	-1.944
0.2533	-1.931
0.2566	-1.925
0.2600	-1.919
0.2633	-1.906
0.2666	-1.900
0.2700	-1.893
0.2733	-1.887
0.2766	-1.880
0.2800	-1.868
0.2833	-1.861
0.2866	-1.855
0.2900	-1.842
0.2933	-1.836
0.2966	-1.829
0.3000	-1.823
0.3033	-1.817
0.3066	-1.804
0.3100	-1.797
0.3133	-1.797
0.3166	-1.797
0.3200	-1.775

PAI-01-MW-12(D)
Test 2
Slug In (Falling Head Test)

0.3233	-1.765
0.3266	-1.772
0.3300	-1.752
0.3333	-1.740
0.3500	-1.708
0.3666	-1.676
0.3833	-1.637
0.4000	-1.605
0.4166	-1.573
0.4333	-1.541
0.4500	-1.509
0.4666	-1.477
0.4833	-1.445
0.5000	-1.420
0.5166	-1.388
0.5333	-1.362
0.5500	-1.337
0.5666	-1.311
0.5833	-1.286
0.6000	-1.260
0.6166	-1.234
0.6333	-1.215
0.6500	-1.189
0.6666	-1.170
0.6833	-1.145
0.7000	-1.125
0.7166	-1.100
0.7333	-1.087
0.7500	-1.068
0.7666	-1.049
0.7833	-1.029
0.8000	-1.010
0.8166	-0.991
0.8333	-0.978
0.8500	-0.959
0.8666	-0.940
0.8833	-0.927
0.9000	-0.908
0.9166	-0.895
0.9333	-0.882
0.9500	-0.863
0.9666	-0.857
0.9833	-0.837
1.0000	-0.825
1.2000	-0.658
1.4000	-0.550
1.6000	-0.466
1.8000	-0.396
2.0000	-0.338
2.2000	-0.284
2.4000	-0.255
2.6000	-0.224
2.8000	-0.198
3.0000	-0.172
3.2000	-0.153
3.4000	-0.134
3.6000	-0.121
3.8000	-0.108
4.0000	-0.102
4.2000	-0.095

PAI-01-MW-12(D)
TEST 2
Slug In (Falling Head Tes

4.4000	-0.089
4.6000	-0.076
4.8000	-0.076
5.0000	-0.070
5.2000	-0.063
5.4000	-0.063
5.6000	-0.057
5.8000	-0.051
6.0000	-0.051
6.2000	-0.044
6.4000	-0.044
6.6000	-0.044
6.8000	-0.044
7.0000	-0.044
7.2000	-0.038
7.4000	-0.038
7.6000	-0.038
7.8000	-0.038
8.0000	-0.032
8.2000	-0.032
8.4000	-0.032
8.6000	-0.032
8.8000	-0.032
9.0000	-0.032
9.2000	-0.032
9.4000	-0.032
9.6000	-0.032
9.8000	-0.032
10.0000	-0.032
12.0000	-0.032
14.0000	-0.032

END

CALCULATION WORKSHEET Order No. 19116 (01-01)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW42(D) Rising Head Slug Test	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln L/R}{2LT_0}$$

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well screen
L = Length of well Screen
T_0 = Time For Water to Rise or Fall to 37% of initial change

r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_0 = 0.7 min.

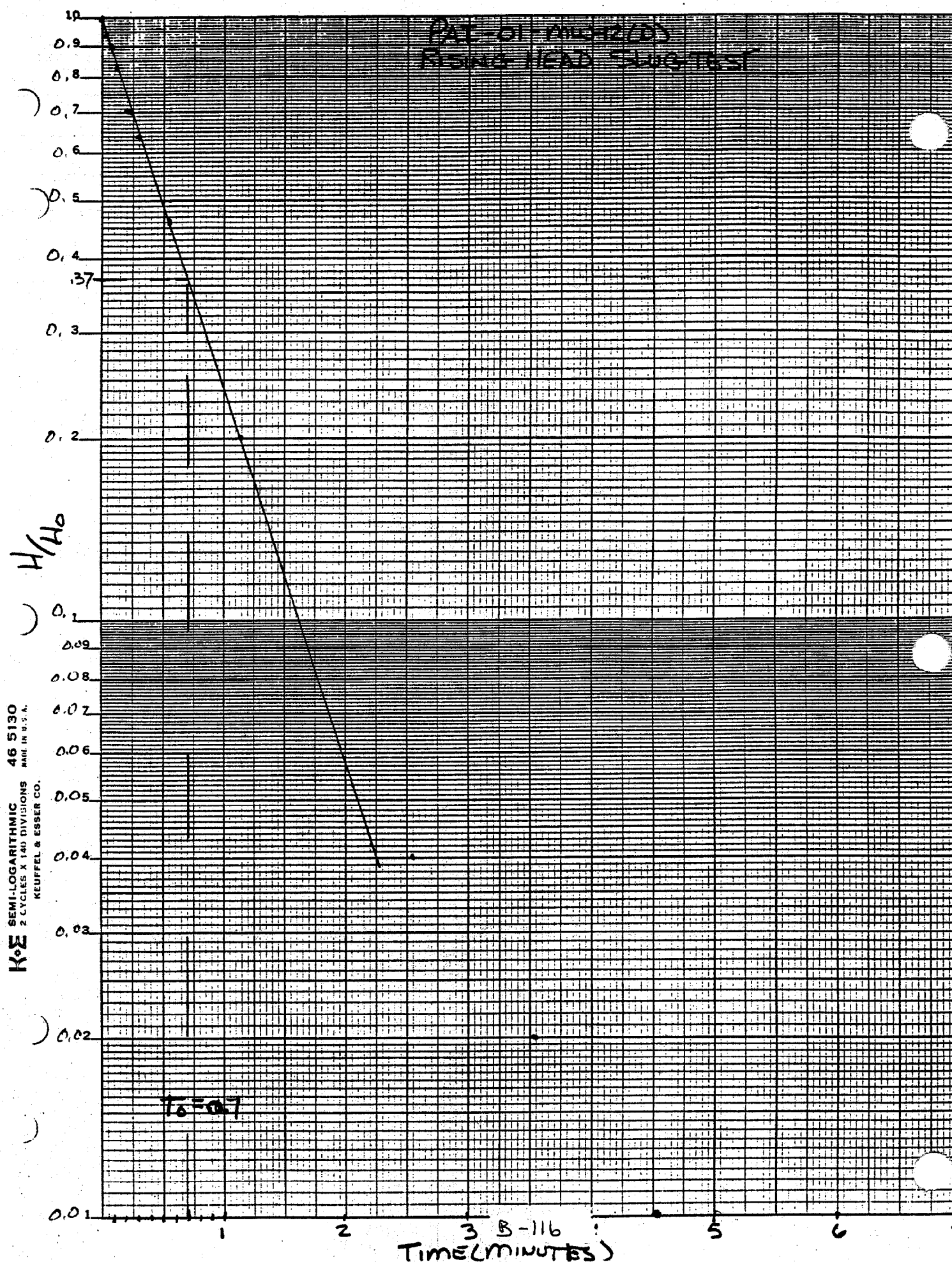
$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,FT)^2 \ln\left(5\,FT / 0.083\,FT\right)}{2(5\,FT)(0.7\,min)}$$

$$= \frac{6.89 \times 10^{-3}\,FT^2 \ln(60.24)}{7\,FT\,min}$$

$$= 4.03 \times 10^{-3}\,FT/min$$

$$4.03 \times 10^{-3}\,FT/min \times 1440\,min/day = 5.81\,FT/day$$

$$5.81\,FT/day \times \frac{3.528 \times 10^{-4}\,cm/sec}{FT/day} = 2.05 \times 10^{-3}\,cm/sec$$


PAL-01-MW-12(D)
RISING HEAD SLUG TEST
H/H0
10
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T0=0.7
1
2
3
5
6
TIME (MINUTES)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAI-01-MW120

PROJECT NO.: 7394 **GEOLOGIST:** Mark Damington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 5 ft **TEST NO.:** Test 1 / Step 0

STATIC WATER LEVEL (Depth/Elevation): 4.97 / TWD=41.51 / LWC=36.54 **DATE:** 8/20/98

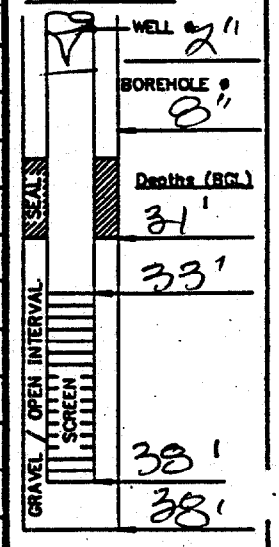
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) **PAGE** 1 **OF** 2

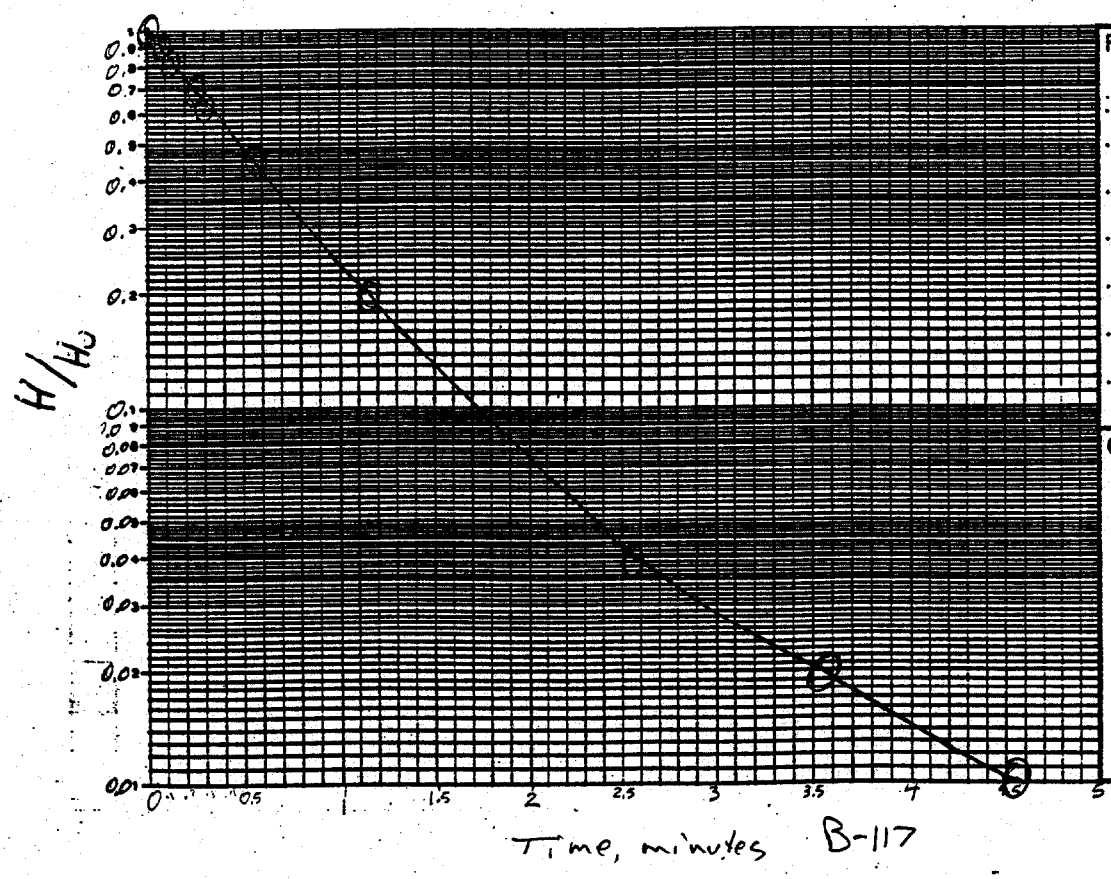
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	2.685	1			
0.03	2.532	0.94			
0.06	2.423	0.90			
0.12	2.225	0.83			
0.24	1.886	0.70			
0.31	1.720	0.64			
0.54	1.241	0.46			
1.14	0.531	0.20			
2.54	0.115	0.04			
3.54	0.051	0.02			
4.54	0.032	0.01			
5.54	0.019	0.01			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

K = 0.0012

CALCS, SKETCH MAPS, ETC.:

~~RAI GW4Z~~
Test 1
Slug Out (Rising)

PAI-01-MW-12(D)
Rising Head Slug Test

SE10000
Environmental Logger
08/21 08:19

Unit# 00145 Test 1

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00012
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/20 15:59:18

Elapsed Time	INPUT 1
0.0000	-0.006
0.0033	0.006
0.0066	1.025
0.0100	5.069
0.0133	3.305
0.0166	1.259
0.0200	0.818
0.0233	2.334
0.0266	3.855
0.0300	3.740
0.0333	2.870
0.0366	2.404
0.0400	2.532
0.0433	2.670
0.0466	2.626
0.0500	2.628
0.0533	2.506
0.0566	2.647
0.0600	2.685 · T_0
0.0633	2.640
0.0666	2.608
0.0700	2.596
0.0733	2.586
0.0766	2.580
0.0800	2.557
0.0833	2.551
0.0866	2.538
0.03 0.0900	2.532
0.0933	2.513
0.0966	2.506
0.1000	2.493
0.1033	2.481
0.1066	2.468
0.1100	2.455
0.1133	2.442
0.1166	2.430

PAt-01-MW-2(D)
Test 1
Slug Out (Rising Head Test)

.06	0.1200	2.423
	0.1233	2.411
	0.1266	2.391
	0.1300	2.385
	0.1333	2.372
	0.1366	2.366
	0.1400	2.353
	0.1433	2.340
	0.1466	2.327
	0.1500	2.314
	0.1533	2.334
	0.1566	2.276
	0.1600	2.231
	0.1633	2.225
	0.1666	2.270
	0.1700	2.276
	0.1733	2.231
	0.1766	2.231
.12	0.1800	2.225
	0.1833	2.212
	0.1866	2.206
	0.1900	2.193
	0.1933	2.187
	0.1966	2.187
	0.2000	2.167
	0.2033	2.136
	0.2066	2.180
	0.2100	2.148
	0.2133	2.110
	0.2166	2.110
	0.2200	2.123
	0.2233	2.123
	0.2266	2.065
	0.2300	2.078
	0.2333	2.059
	0.2366	2.059
	0.2400	2.053
	0.2433	2.040
	0.2466	2.027
	0.2500	2.020
	0.2533	2.008
	0.2566	2.001
	0.2600	1.995
	0.2633	1.982
	0.2666	1.976
	0.2700	1.969
	0.2733	1.957
	0.2766	1.944
	0.2800	1.944
	0.2833	1.931
	0.2866	1.925
	0.2900	1.912
	0.2933	1.905
	0.2966	1.899
0.24	0.3000	1.886
	0.3033	1.880
	0.3066	1.874
	0.3100	1.861
	0.3133	1.854
	0.3166	1.848

PAF-01-MW-12(D)
Test 1
Slug out (Rising Head Test)

0.3200	1.841
0.3233	1.835
0.3266	1.829
0.3300	1.816
0.3333	1.810
0.3500	1.765
.31 - 0.3666	1.720
0.3833	1.682
0.4000	1.643
0.4166	1.605
0.4333	1.567
0.4500	1.528
0.4666	1.406
0.4833	1.458
0.5000	1.426
0.5166	1.394
0.5333	1.362
0.5500	1.330
0.5666	1.304
0.5833	1.272
.54 - 0.6000	1.241
0.6166	1.215
0.6333	1.189
0.6500	1.164
0.6666	1.138
0.6833	1.113
0.7000	1.087
0.7166	1.061
0.7333	1.042
0.7500	1.017
0.7666	0.991
0.7833	0.972
0.8000	0.952
0.8166	0.927
0.8333	0.908
0.8500	0.889
0.8666	0.869
0.8833	0.850
0.9000	0.831
0.9166	0.812
0.9333	0.799
0.9500	0.780
0.9666	0.761
0.9833	0.748
1.0000	0.729
1.14 - 1.2000	0.531
1.4000	0.415
1.6000	0.326
1.8000	0.262
2.0000	0.211
2.2000	0.166
2.4000	0.140
2.54 - 2.6000	0.115
2.8000	0.096
3.0000	0.083
3.2000	0.070
3.4000	0.057
3.54 - 3.6000	0.051
3.8000	0.051
4.0000	0.045

PAI-01-MW-12(D)
Test 1
Slug out (Rising Head Test)

4.0	0.035
4.2000	0.032
4.4000	0.032
4.6000	0.032
4.8000	0.025
5.0000	0.025
5.2000	0.019
5.4000	0.019
5.6000	0.012
5.8000	0.019
6.0000	0.019
6.2000	0.012
6.4000	0.012
6.6000	0.012
6.8000	0.012
7.0000	0.006
7.2000	0.006
7.4000	0.006
7.6000	0.006
7.8000	0.006
8.0000	0.006
8.2000	0.006
8.4000	0.006
8.6000	0.006
8.8000	0.006
9.0000	0.006
9.2000	0.006
9.4000	0.006
9.6000	0.000
9.8000	0.000
10.0000	0.000
12.0000	-0.012
14.0000	-0.012

END

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE ____ OF ____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-01-MW-13(S) Falling HEAD Slug Test			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB	APPROVED BY	DATE

$$K = \frac{r^2 \ln L/R}{2LT_0}$$

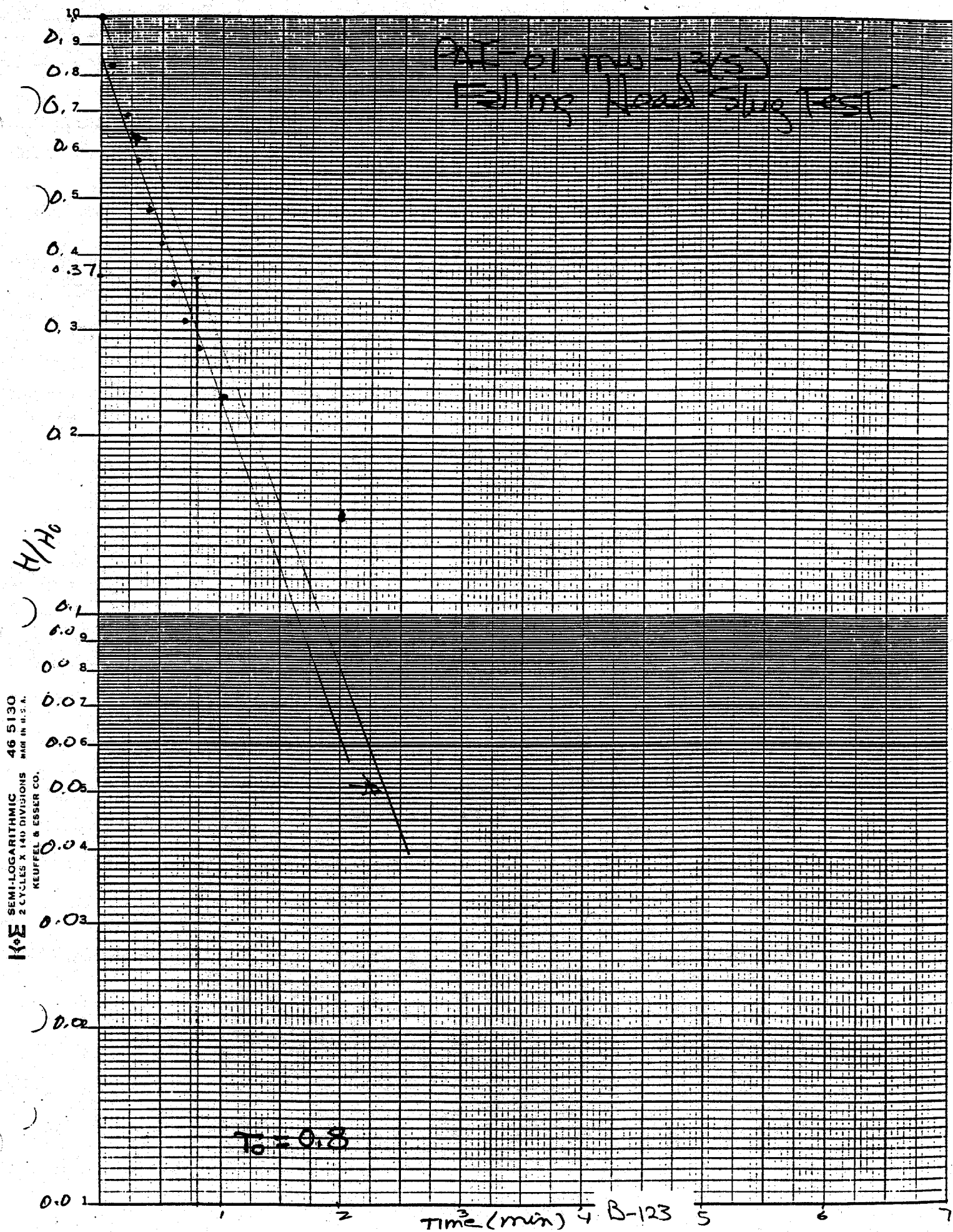
K = Hydraulic Conductivity
r = Radius of well casing — r = 0.083 FT
R = Radius of well Screen — R = 0.083 FT
L = Length of well Screen — L = 10 FT.
T_0 = Time for water level to rise or Fall to 37% of initial change — T_0 = 0.8 min

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,FT)^2 \ln\left(\frac{10\,FT}{0.083\,FT}\right)}{2(10\,FT)(0.8\,min)}$$

$$= 2.1 \times 10^{-3}\ Ft/min$$

2.1×10^{-3} Ft/min x 1440 min/day = 3.02 Ft/day

3.02 Ft/day x 3.52×10^{-4} cm/sec / Ft/day = 1.07×10^{-3} cm/s

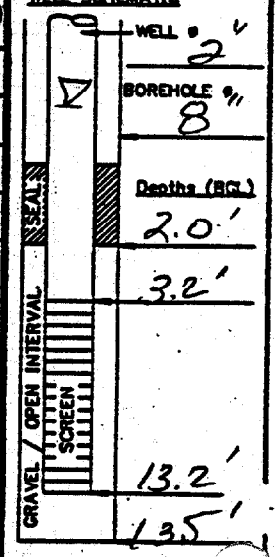

MW-01-MW-13(S)
Falling Head Slug Test
H/H0
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T0 = 0.8
1
2
3
4
5
6
7
Time (min)
B-123
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

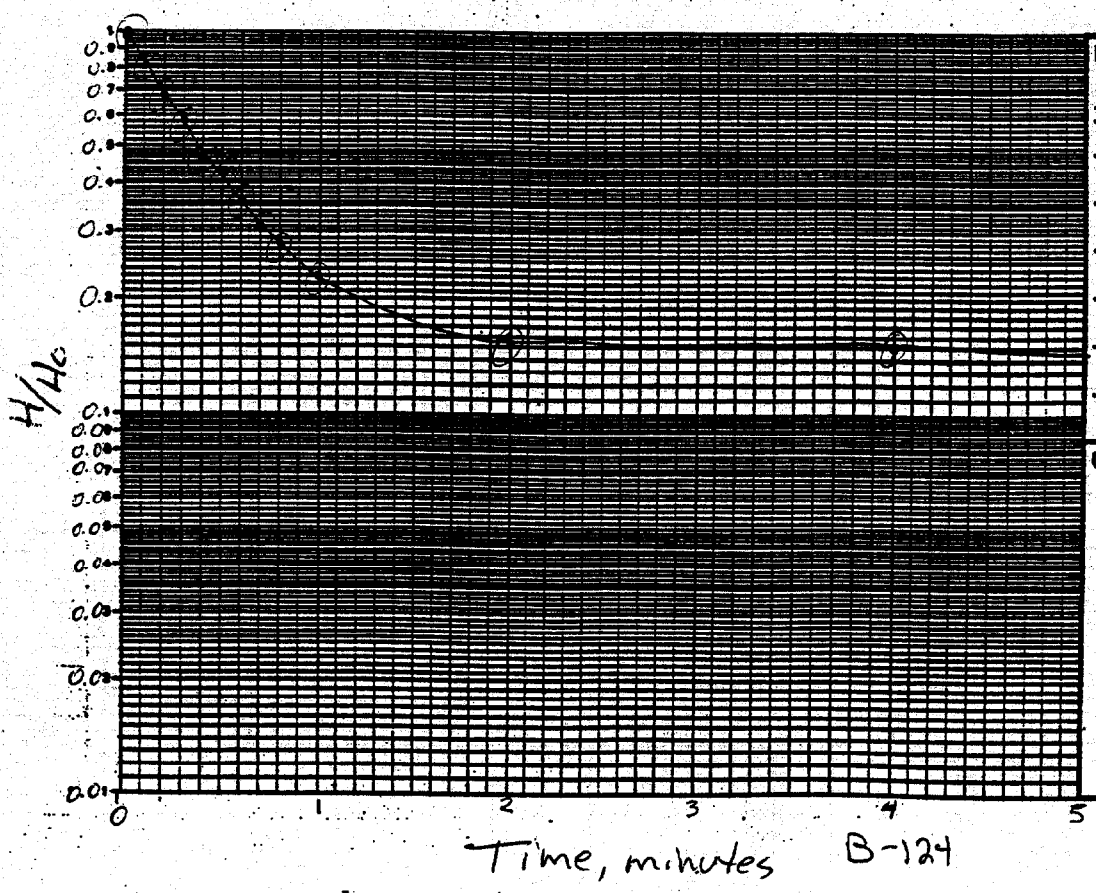
PROJECT NAME: MCRD Parris Island SC (Site 1) WELL/BORING NO.: PAI-01-MW13
PROJECT NO.: 7394 GEOLOGIST: Mark Darrington
WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft. TEST NO.: 2/Step
STATIC WATER LEVEL (Depth/Elevation): 3.58 / TWD=16.07 / LWC=12.49 DATE: 8/21/98
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) CHECKED:
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 1 OF 2
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-1.176	1			
0.1	-0.979	0.83			
0.21	-0.814	0.69			
0.31	-0.680	0.58			
0.41	-0.566	0.48			
0.51	-0.489	0.42			
0.61	-0.426	0.36			
0.71	-0.369	0.31			
0.81	-0.330	0.28			
1.01	-0.267	0.23			
2.01	-0.178	0.15			
4.01	-0.171	0.15			

WELL SCHEMATIC



Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:

~~PAI-GW13~~
Test 2, Step 2
Slug In (Fall)

PAI-01-MW-13(S)
Falling Head Slug Test

SE10000
Environmental Logger
08/22 14:09

Unit# 00145 Test 2

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00013
Reference	0.000
Linearity	0.110
Scale Factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 2 08/21 11:41:14

Elapsed Time	INPUT 1
0.0000	0.095
0.0033	0.089
0.0066	0.082
0.0100	0.089
0.0133	0.101
0.0166	0.082
0.0200	0.095
0.0233	-0.591
0.0266	-1.208
0.0300	-1.361
0.0333	-1.221
0.0366	-1.857
0.0400	-2.230
0.0433	-3.117
0.0466	-3.703
0.0500	-1.781
0.0533	-1.335
0.0566	-1.062
0.0600	-0.610
0.0633	-0.515
0.0666	-1.310
0.0700	-1.666
0.0733	-1.832
0.0766	-1.883
0.0800	-1.832
0.0833	-1.552
0.0866	-1.323
0.0900	-1.227
0.0933	-1.125
0.0966	-1.348
0.1000	-1.482
0.1033	-1.526
0.1066	-1.488
0.1100	-1.393
0.1133	-1.320
0.1166	-1.316
0.1200	-1.348

PAI-0.1-MW13(S)

Test 2

Slug In (Falling Head Test

	0.1233	-1.374
	0.1266	-1.361
	0.1300	-1.316
	0.1333	-1.297
	0.1366	-1.297
	0.1400	-1.291
	0.1433	-1.284
	0.1466	-1.278
	0.1500	-1.265
	0.1533	-1.253
	0.1566	-1.240
	0.1600	-1.227
	0.1633	-1.227
	0.1666	-1.221
	0.1700	-1.215
	0.1733	-1.208
	0.1766	-1.195
	0.1800	-1.195
	0.1833	-1.189
	0.1866	-1.170
	0.1900	-1.170
0	0.1933	-1.176 → T0
	0.1966	-1.157
	0.2000	-1.151
	0.2033	-1.151
	0.2066	-1.145
	0.2100	-1.132
	0.2133	-1.132
	0.2166	-1.119
	0.2200	-1.113
	0.2233	-1.106
	0.2266	-1.100
	0.2300	-1.094
	0.2333	-1.094
	0.2366	-1.075
	0.2400	-1.075
	0.2433	-1.068
	0.2466	-1.062
	0.2500	-1.055
	0.2533	-1.049
	0.2566	-1.043
	0.2600	-1.036
	0.2633	-1.036
	0.2666	-1.030
	0.2700	-1.024
	0.2733	-1.017
	0.2766	-1.011
	0.2800	-0.998
	0.2833	-0.998
	0.2866	-0.992
	0.2900	-0.986
0.1	-0.2933	-0.979
	0.2966	-0.979
	0.3000	-0.973
	0.3033	-0.966
	0.3066	-0.960
	0.3100	-0.954
	0.3133	-0.947
	0.3166	-0.941
	0.3200	-0.941

PAI-01-MW13(S)
Test 2
Slug In (Falling Head Test)

	0.3233	-0.935
	0.3266	-0.922
	0.3300	-0.922
	0.3333	-0.909
	0.3500	-0.890
	0.3666	-0.871
	0.3833	-0.839
0.21	-0.4000	-0.814
	0.4166	-0.795
	0.4333	-0.763
	0.4500	-0.737
	0.4666	-0.718
	0.4833	-0.699
0.31	-0.5000	-0.680
	0.5166	-0.661
	0.5333	-0.642
	0.5500	-0.617
	0.5666	-0.597
	0.5833	-0.585
0.41	-0.6000	-0.566
	0.6166	-0.559
	0.6333	-0.547
	0.6500	-0.521
	0.6666	-0.521
	0.6833	-0.502
0.51	-0.7000	-0.489
	0.7166	-0.477
	0.7333	-0.464
	0.7500	-0.445
	0.7666	-0.438
	0.7833	-0.426
0.61	-0.8000	-0.426
	0.8166	-0.413
	0.8333	-0.407
	0.8500	-0.394
	0.8666	-0.388
	0.8833	-0.381
0.71	-0.9000	-0.369
	0.9166	-0.356
	0.9333	-0.356
	0.9500	-0.349
	0.9666	-0.343
	0.9833	-0.337
0.81	-1.0000	-0.330
1.01	-1.2000	-0.267
	1.4000	-0.229
	1.6000	-0.210
	1.8000	-0.190
	-2.0000	-0.184
2.01	-2.2000	-0.178
	2.4000	-0.178
	2.6000	-0.178
	2.8000	-0.171
	3.0000	-0.171
	3.2000	-0.165
	3.4000	-0.171
	3.6000	-0.171
	3.8000	-0.165
	4.0000	-0.171
4.01	-4.2000	-0.171

PAI-01 - MW-13(S)
TEST 2
Slug In (Falling Head Test)

	4.4000	-0.171
	4.6000	-0.159
	4.8000	-0.165
	5.0000	-0.159
	5.2000	-0.159
	5.4000	-0.165
	5.6000	-0.152
	5.8000	-0.159
	6.0000	-0.165
6.01 -	6.2000	-0.146
	6.4000	-0.152
	6.6000	-0.152
	6.8000	-0.152
	7.0000	-0.146
	7.2000	-0.152
	7.4000	-0.159
	7.6000	-0.152
	7.8000	-0.159
	8.0000	-0.152
8.01 -	8.2000	-0.152
	8.4000	-0.159
	8.6000	-0.152
	8.8000	-0.152
	9.0000	-0.152
	9.2000	-0.152
	9.4000	-0.152
	9.6000	-0.152
	9.8000	-0.146
9.81 -	10.0000	-0.152
	12.0000	-0.146
	14.0000	-0.140
15.81 -	16.0000	-0.140
	18.0000	-0.146
19.81 -	20.0000	-0.140
	22.0000	-0.127
	24.0000	-0.120
25.81 -	26.0000	-0.133
	28.0000	-0.127
	30.0000	-0.127

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER
SUBJECT PAI-01-MW-13(S) RISING HEAD SLUG TEST	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB 3/19/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln L/R}{2 L T_0}$$

K = Hydraulic Conductivity
r = Radius of well casing — r = 0.083 FT
R = Radius of well Screen — R = 0.083 FT
L = Length of well Screen — L = 10 FT
T_0 = Time for water level to Rise or Fall to 37% of Initial change — T_0 = 2.0 min

$$K = \frac{r^2 \ln L/R}{2 L T_0} = \frac{(0.083\,FT)^2 \ln(10\,FT/0.083\,FT)}{2(10\,FT)(2.0\,min)}$$

$$= \frac{6.89 \times 10^{-3}\,FT^2 \ln(120.48)}{40}$$

$$= 8.25 \times 10^{-4}\ Ft/min$$

$$8.25 \times 10^{-4}\ Ft/min \times 1440\ min/Day = 1.19\ Ft/day$$

$$1.19\ Ft/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{Ft/day} = 4.19 \times 10^{-4}\ cm/sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) **WELL/BORING NO.:** PAE-01-MW43

PROJECT NO.: 7394 **GEOLOGIST:** Mark Darrington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 10 ft **TEST NO.:** 2/Step

STATIC WATER LEVEL (Depth/Elevation): 3.58 / TWD=16.07 / LWC=12.49 **DATE:** 8/21/98

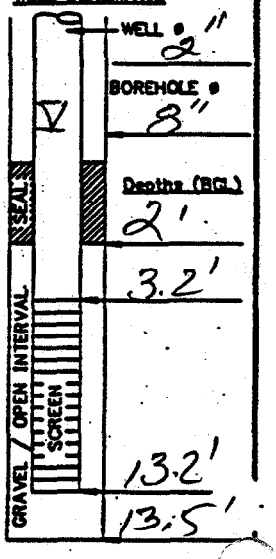
TEST TYPE (Rising/Falling/Constant Head): Rising (Slug out) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) **PAGE** 2 **OF** 2

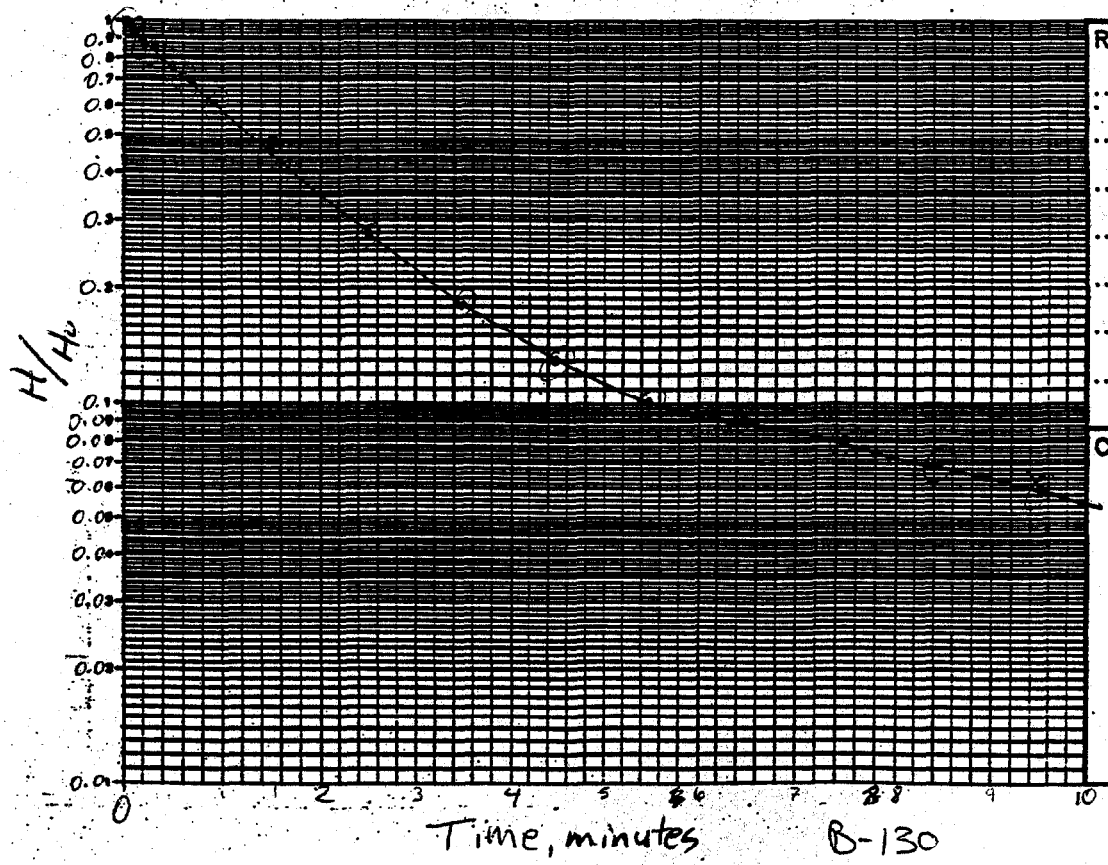
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	1.939	1	4.52	0.254	0.13
0.10	1.831	0.94	5.52	0.197	0.10
0.20	1.729	0.89	6.52	0.165	0.09
0.30	1.646	0.85	7.52	0.146	0.08
0.40	1.557	0.80	8.52	0.127	0.07
0.50	1.481	0.76	9.52	0.114	0.06
0.60	1.418	0.73			
0.70	1.341	0.69			
0.92	1.176	0.61			
1.52	0.877	0.45			
2.52	0.546	0.28			
3.52	0.349	0.18			

WELL SCHEMATIC

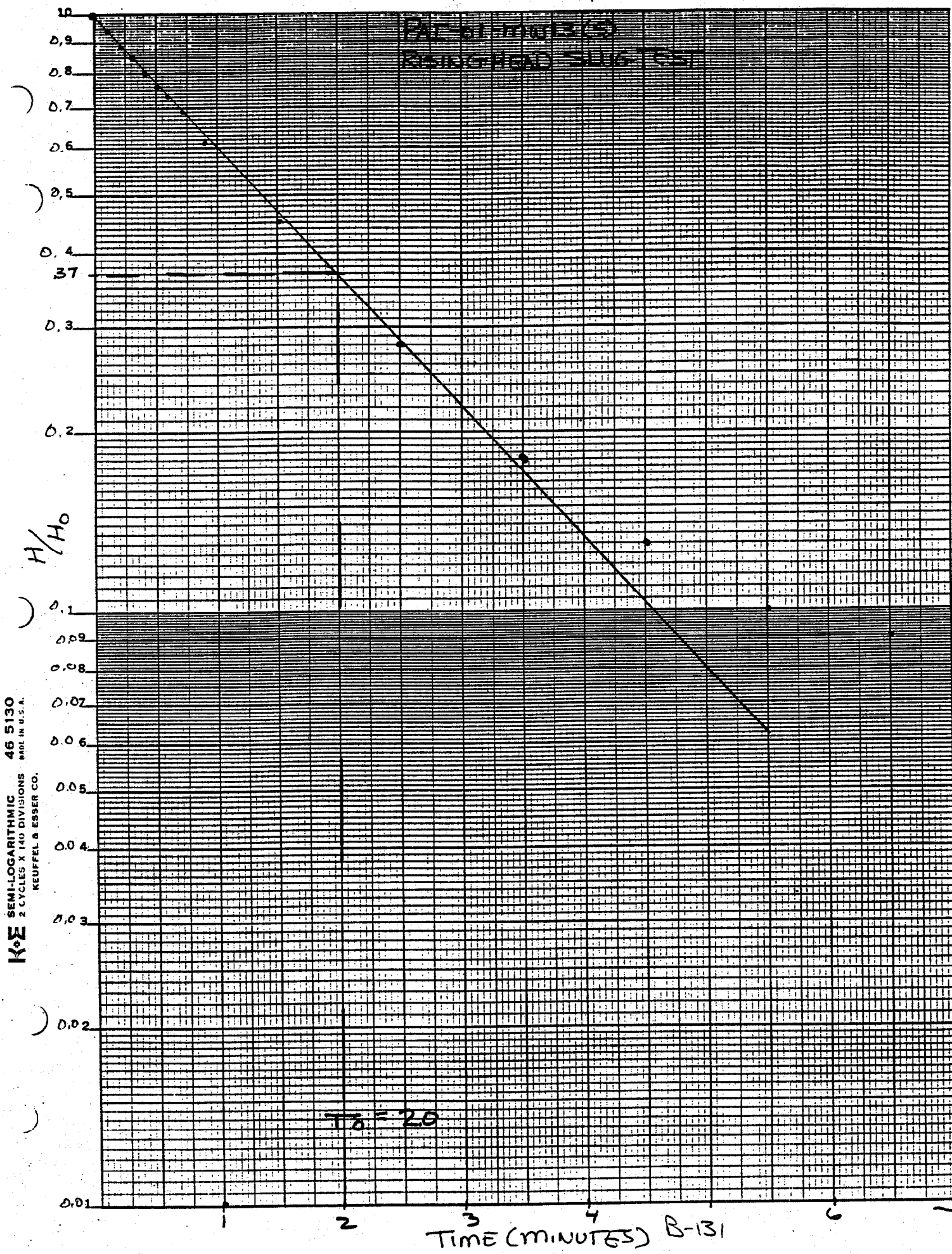


▽ Indicate SWL Depth on Drawing



REMARKS:

CALCS, SKETCH MAPS, ETC.:


PAL-01-MW13(S)
RISING HEAD SLUG TEST
H/Ho
1.0
0.9
0.8
0.7
0.6
0.5
0.4
37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
To = 20
1
2
3
4
6
TIME (MINUTES)
B-131
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

~~PAEI - GWB~~
Test 2, Step 1
Slug Out (Rise)

PAI-01-MW-13(S)
Rising Head Slug Test

SE10000
Environmental Logger
08/22 14:07

Unit# 00145 Test 2

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00013
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 08/21 11:23:13

Elapsed Time	INPUT 1
0.0000	-0.082
0.0033	0.184
0.0066	2.517
0.0100	4.246
0.0133	0.432
0.0166	-0.050
0.0200	2.395
0.0233	2.816
0.0266	2.568
0.0300	2.276
0.0333	2.455
0.0366	2.263
0.0400	2.403
0.0433	2.327
0.0466	2.358
0.0500	2.250
0.0533	2.288
0.0566	2.288
0.0600	2.257
0.0633	2.263
0.0666	2.257
0.0700	2.238
0.0733	2.231
0.0766	2.212
0.0800	2.212
0.0833	2.206
0.0866	2.206
0.0900	2.193
0.0933	2.187
0.0966	2.180
0.1000	2.174
0.1033	2.155
0.1066	2.168
0.1100	2.168
0.1133	2.155
0.1166	2.149
0.1200	2.149

PAT-01-MW-13(S)
Test 2
Slug Out (Rising Head Test

0.1233	2.136	
0.1266	2.130	
0.1300	2.130	
0.1333	2.130	
0.1366	2.117	
0.1400	2.117	
0.1433	2.117	
0.1466	2.104	
0.1500	2.098	
0.1533	2.091	
0.1566	2.091	
0.1600	2.085	
0.1633	2.085	
0.1666	2.072	
0.1700	2.066	
0.1733	2.066	
0.1766	2.060	
0.1800	2.053	
0.1833	2.047	
0.1866	2.047	
0.1900	2.041	
0.1933	2.041	
0.1966	2.028	
0.2000	2.028	
0.2033	2.028	
0.2066	2.021	
0.2100	2.015	
0.2133	2.015	
0.2166	2.015	
0.2200	2.002	
0.2233	2.002	
0.2266	1.996	
0.2300	1.996	
0.2333	1.990	
0.2366	1.983	
0.2400	1.977	
0.2433	1.971	
0.2466	1.977	
0.2500	1.971	
0.2533	1.964	
0.2566	1.958	
0.2600	1.958	
0.2633	1.952	
0.2666	1.952	
0.2700	1.945	
0.2733	1.952	
0.2766	1.945	
0.2800	1.932	
0.2833	1.939	T_0
0.2866	1.932	
0.2900	1.926	
0.2933	1.920	
0.2966	1.920	
0.3000	1.913	
0.3033	1.913	
0.3066	1.913	
0.3100	1.907	
0.3133	1.901	
0.3166	1.901	
0.3200	1.894	

	4.4000	0.292
	4.6000	0.257
4.52 –	4.8000	0.254
	5.0000	0.241
	5.2000	0.228
	5.4000	0.209
	5.6000	0.209
5.52 –	5.8000	0.197
	6.0000	0.184
	6.2000	0.184
	6.4000	0.171
	6.6000	0.171
6.52 –	6.8000	0.165
	7.0000	0.165
	7.2000	0.152
	7.4000	0.152
	7.6000	0.146
7.52 –	7.8000	0.146
	8.0000	0.139
	8.2000	0.139
	8.4000	0.133
	8.6000	0.133
8.52 –	8.8000	0.127
	9.0000	0.120
	9.2000	0.127
	9.4000	0.114
	9.6000	0.120
9.52 –	9.8000	0.114
	10.0000	0.120
11.72 –	12.0000	0.101
13.72	14.0000	0.114
15.72 –	16.0000	0.108
17.72 –	18.0000	0.089

END

PAF-01-MW-13(S)
Test 2
Slug out (Rising Head Test)

PAF-01-MW13(S)
Test 2
Slug Out (Rising Head Test)

	0.3233	1.894
	0.3266	1.888
	0.3300	1.882
	0.3333	1.882
	0.3500	1.863
	0.3666	1.850
0.10	0.3833	1.831
	0.4000	1.818
	0.4166	1.793
	0.4333	1.780
	0.4500	1.774
	0.4666	1.742
0.20	0.4833	1.729
	0.5000	1.715
	0.5166	1.704
	0.5333	1.685
	0.5500	1.672
	0.5666	1.650
0.30	0.5833	1.646
	0.6000	1.627
	0.6166	1.615
	0.6333	1.602
	0.6500	1.589
	0.6666	1.576
0.40	0.6833	1.557
	0.7000	1.551
	0.7166	1.526
	0.7333	1.513
	0.7500	1.507
	0.7666	1.494
0.50	0.7833	1.481
	0.8000	1.462
	0.8166	1.462
	0.8333	1.443
	0.8500	1.437
	0.8666	1.418
0.60	0.8833	1.418
	0.9000	1.392
	0.9166	1.386
	0.9333	1.373
	0.9500	1.367
	0.9666	1.348
0.70	0.9833	1.341
	1.0000	1.335
0.92	1.2000	1.175
	1.4000	1.068
	1.6000	0.966
1.52	1.8000	0.877
	2.0000	0.801
	2.2000	0.724
	2.4000	0.667
	2.6000	0.597
2.52	2.8000	0.546
	3.0000	0.496
	3.2000	0.457
	3.4000	0.418
	3.6000	0.381
3.52	3.8000	0.348
	4.0000	0.330
	4.2000	0.311

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT	JOB NUMBER 7394
SUBJECT PAI-01-MW-14(D) Falling Head Slug Test	
BASED ON HVORSLEV	DRAWING NUMBER
BY GLG / CHECKED BY RMB	APPROVED BY / DATE

$$K = \frac{r^2 \ln L/R}{2LT_0}$$

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well screen
L = Length of well screen
T_0 = Time for water level to Rise or Fall to 37% of initial Change.

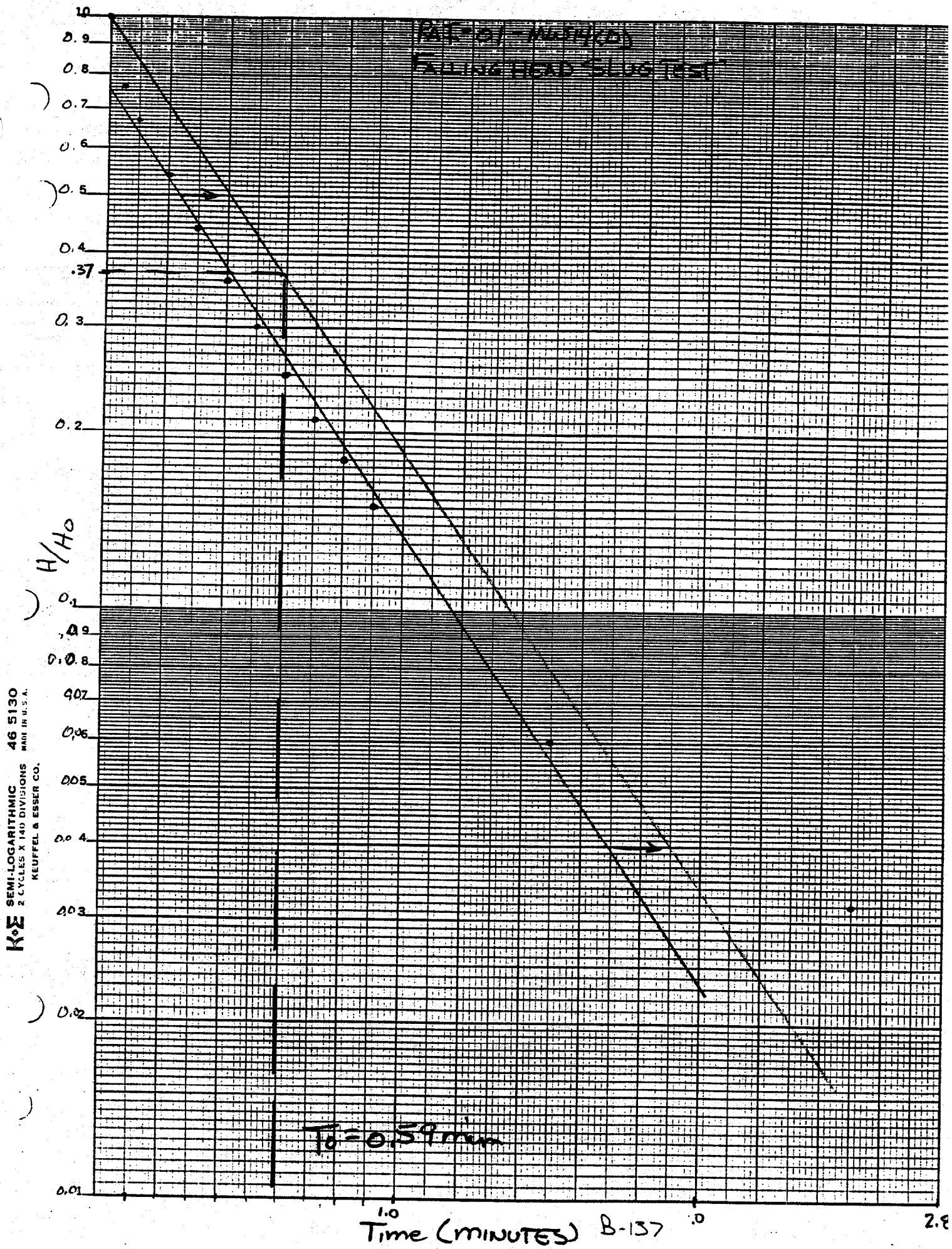
r = 0.083 Ft
R = 0.083 Ft
L = 5 Ft
T_0 = 0.59 min

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083)^2 \ln\left(\frac{5\,Ft}{0.083\,Ft}\right)}{2\,(5\,Ft)(0.59\,min)}$$

$$= 4.79 \times 10^{-3}\ Ft/min$$

$$4.79 \times 10^{-3}\ Ft/min \times 1440\ min/day = \underline{6.89\ Ft/day}$$

$$6.89\ Ft/day \times 3.528 \times 10^{-4}\ \frac{cm/sec}{Ft/day} = \underline{2.43 \times 10^{-3}\ cm/sec}$$


RAF-31 - MW14CD
FALLING HEAD SLUG TEST
H/Ho
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
To = 0.59 min
1.0
.0
2.8
Time (MINUTES)
B-137
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site D) **WELL/BORING NO.:** PAI-01-MW14

PROJECT NO.: 7394 **GEOLOGIST:** Mark Darrington

WELL DIAMETER: 2 inch **SCREEN LENGTH/DEPTH:** 5 ft. **TEST NO.:** 1/step

STATIC WATER LEVEL (Depth/Elevation): 3.63/TWD=40.56/LWC=36.93 **DATE:** 8/21/98

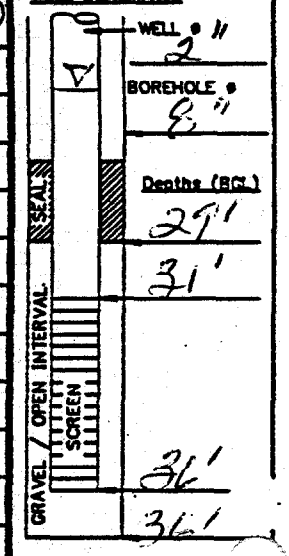
TEST TYPE (Rising/Falling/Constant Head): Falling (Slug In) **CHECKED:**

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) **PAGE** 1 **OF** 2

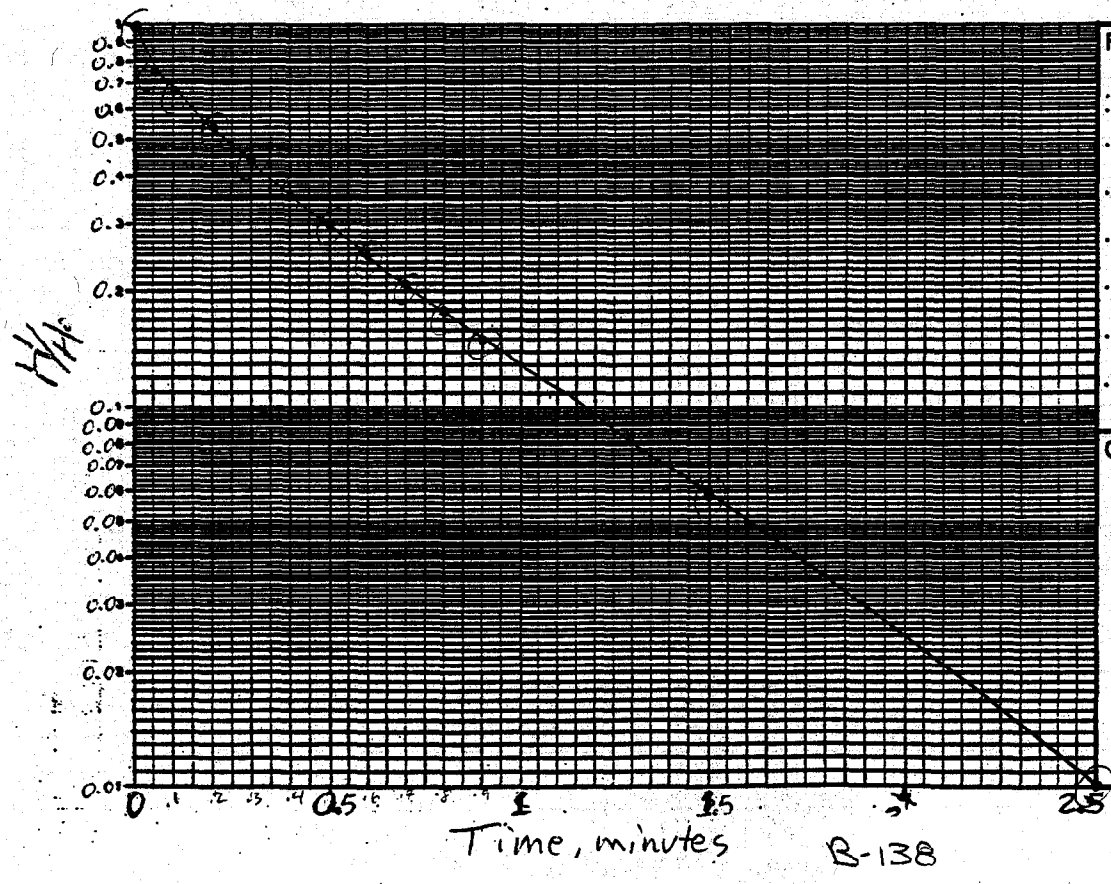
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-2.322	1	2.50	-0.032	0.01
0.05	-1.765	0.76	3.50	0.000	0.00
0.10	-1.567	0.67			
0.20	-1.260	0.54			
0.30	-1.029	0.44			
0.40	-0.838	0.36			
0.50	-0.691	0.30			
0.60	-0.575	0.25			
0.70	-0.479	0.21			
0.80	-0.409	0.18			
0.90	-0.351	0.15			
1.50	-0.134	0.06			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

XD 36.10

CALCS, SKETCH MAPS, ETC.:

~~PAL 1 - GW14~~ MW
Test 1, Step 0
Slug In (Fall)

PAT-01-MW-14(D)
Falling Head Slug Test

SE1000C
Environmental Logger
08/22 13:35

Unit# 00145 Test 1

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00014
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/21 09:46:15

Elapsed Time	INPUT 1
0.0000	0.018
0.0033	0.018
0.0066	0.018
0.0100	0.025
0.0133	-0.256
0.0166	-0.620
0.0200	-0.876
0.0233	-1.330
0.0266	-1.426
0.0300	-1.554
0.0333	-2.060
0.0366	-2.540
0.0400	-2.770
0.0433	-2.866
0.0466	-2.885
0.0500	-2.974
0.0533	-3.096
0.0566	-3.019
0.0600	-2.450
0.0633	-1.452
0.0666	-1.388
0.0700	-1.925
0.0733	-2.200
0.0766	-2.290
0.0800	-2.194
0.0833	-2.111
0.0866	-2.073
0.0900	-1.950
0.0933	-1.663
0.0966	-2.111
0 0.1000	-2.322 T0
0.1033	-2.117
0.1066	-2.040
0.1100	-1.944
0.1133	-1.906
0.1166	-1.900
0.1200	-1.893

PAI-01-MW-14(D)
Test 1 Step Ø
Slug In (Falling Head Test)

	0.1233	-1.887
	0.1266	-1.874
	0.1300	-1.855
	0.1333	-1.836
	0.1366	-1.823
	0.1400	-1.804
	0.1433	-1.791
	0.1466	-1.778
0.05 –	0.1500	-1.765
	0.1533	-1.746
	0.1566	-1.733
	0.1600	-1.721
	0.1633	-1.701
	0.1666	-1.695
	0.1700	-1.682
	0.1733	-1.663
	0.1766	-1.656
	0.1800	-1.644
	0.1833	-1.631
	0.1866	-1.611
	0.1900	-1.599
	0.1933	-1.586
	0.1966	-1.580
0.10 –	0.2000	-1.567
	0.2033	-1.554
	0.2066	-1.541
	0.2100	-1.535
	0.2133	-1.522
	0.2166	-1.509
	0.2200	-1.490
	0.2233	-1.490
	0.2266	-1.471
	0.2300	-1.464
	0.2333	-1.452
	0.2366	-1.445
	0.2400	-1.433
	0.2433	-1.414
	0.2466	-1.407
	0.2500	-1.400
	0.2533	-1.388
	0.2566	-1.375
	0.2600	-1.375
	0.2633	-1.362
	0.2666	-1.349
	0.2700	-1.336
	0.2733	-1.336
	0.2766	-1.324
	0.2800	-1.311
	0.2833	-1.298
	0.2866	-1.292
	0.2900	-1.292
	0.2933	-1.279
	0.2966	-1.273
0.20 –	0.3000	-1.260
	0.3033	-1.247
	0.3066	-1.253
	0.3100	-1.247
	0.3133	-1.234
	0.3166	-1.228
	0.3200	-1.215

PAF-01-MW-14(D)
Test 1 Step 0
Slug In (Falling Head Test)

	0.3233	-1.215
	0.3266	-1.222
	0.3300	-1.202
	0.3333	-1.170
	0.3500	-1.151
	0.3666	-1.113
	0.3833	-1.068
0.30	-0.4000	-1.029
	0.4166	-0.991
	0.4333	-0.950
	0.4500	-0.927
	0.4666	-0.895
	0.4833	-0.863
0.40	-0.5000	-0.838
	0.5166	-0.812
	0.5333	-0.786
	0.5500	-0.760
	0.5666	-0.735
	0.5833	-0.716
0.50	-0.6000	-0.691
	0.6166	-0.671
	0.6333	-0.646
	0.6500	-0.626
	0.6666	-0.614
	0.6833	-0.588
0.60	-0.7000	-0.575
	0.7166	-0.556
	0.7333	-0.543
	0.7500	-0.524
	0.7666	-0.511
	0.7833	-0.499
0.70	-0.8000	-0.479
	0.8166	-0.473
	0.8333	-0.454
	0.8500	-0.441
	0.8666	-0.428
	0.8833	-0.422
0.80	-0.9000	-0.409
	0.9166	-0.396
	0.9333	-0.390
	0.9500	-0.377
	0.9666	-0.364
	0.9833	-0.358
0.90	-1.0000	-0.351
	1.2000	-0.236
	1.4000	-0.172
1.50	-1.6000	-0.134
	1.8000	-0.096
	2.0000	-0.070
	2.2000	-0.057
	2.4000	-0.044
2.50	-2.6000	-0.032
	2.8000	-0.025
	3.0000	-0.019
	3.2000	-0.012
	3.4000	-0.006
3.50	-3.6000	0.000
	3.8000	0.000
	4.0000	0.006
	4.2000	0.000

PAF-01-MW-14(D)
TEST 1 Step Ø
Slug In (Falling Head Test)

4.4000	0.006
4.50 4.6000	0.006
4.8000	0.012
5.0000	0.012
5.2000	0.012
5.4000	0.012
5.6000	0.012
5.8000	0.018
6.0000	0.018
6.2000	0.012
6.4000	0.018
6.6000	0.018
6.8000	0.018
7.0000	0.018
7.2000	0.025
7.4000	0.025
7.6000	0.025
7.8000	0.025
8.0000	0.025
8.2000	0.025
8.4000	0.025
8.6000	0.025
8.8000	0.025
9.0000	0.032
9.2000	0.032
9.4000	0.032
9.6000	0.032
9.8000	0.032
10.0000	0.032
12.0000	0.038
14.0000	0.044

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-01-MW-14(D) RISING HEAD SLUG TEST			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/19/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln L/R}{2LT_0}$$

K = Hydraulic Conductivity
r = Radius of well Casing — r = 0.083 FT
R = Radius of well Screen — R = 0.083 FT
L = Length of well Screen — L = 5 FT
T_0 = Time For Water Level to Rise or Fall to 37% of initial change — T_0 = 0.6 min

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,FT)^2 \ln(5\,FT/0.083\,FT)}{2(5\,FT)(0.6\,min)}$$

$$= \frac{6.89 \times 10^{-3}\,Ft^2 \ln(60.24)}{6}$$

$$= 4.71 \times 10^{-3}\ FT/min$$

4.71×10^{-3} FT/min x 1440 min/day = 6.7 FT/day

6.7 FT/day x 3.528×10^{-4} cm/sec = 2.39×10^{-3} cm/sec.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 1) WELL/BORING NO.: PAI-01-MW14C

PROJECT NO.: 7394 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 5 ft. TEST NO.: 1/slug

STATIC WATER LEVEL (Depth/Elevation): 3.63 / TWD=40.56 / LWC=36.93 DATE: 8/21/98

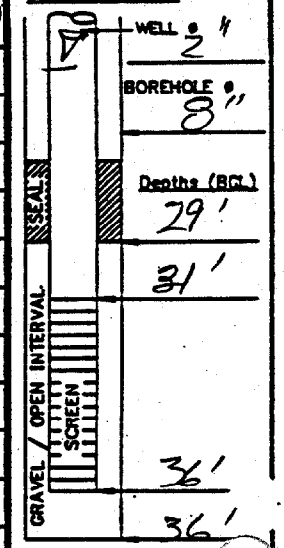
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) PAGE 2 OF 2

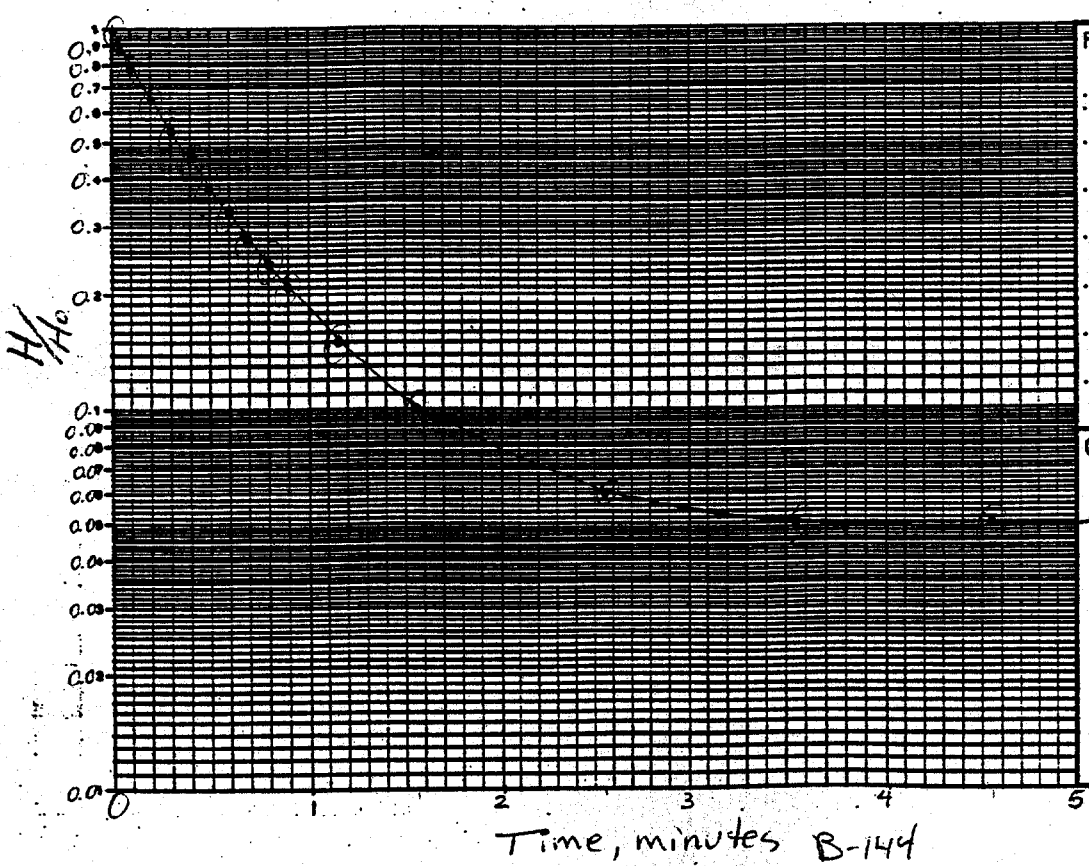
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	2.723	1	1.55	0.275	0.10
0.05	2.378	0.87	2.55	0.172	0.06
0.1	2.148	0.79	3.55	0.147	0.05
0.2	1.783	0.65	4.55	0.140	0.05
0.3	1.483	0.54	5.55	0.140	0.05
0.4	1.240	0.46			
0.5	1.048	0.38			
0.6	0.895	0.33			
0.7	0.761	0.28			
0.8	0.665	0.24			
0.9	0.575	0.21			
1.15	0.409	0.15			

WELL SCHEMATIC



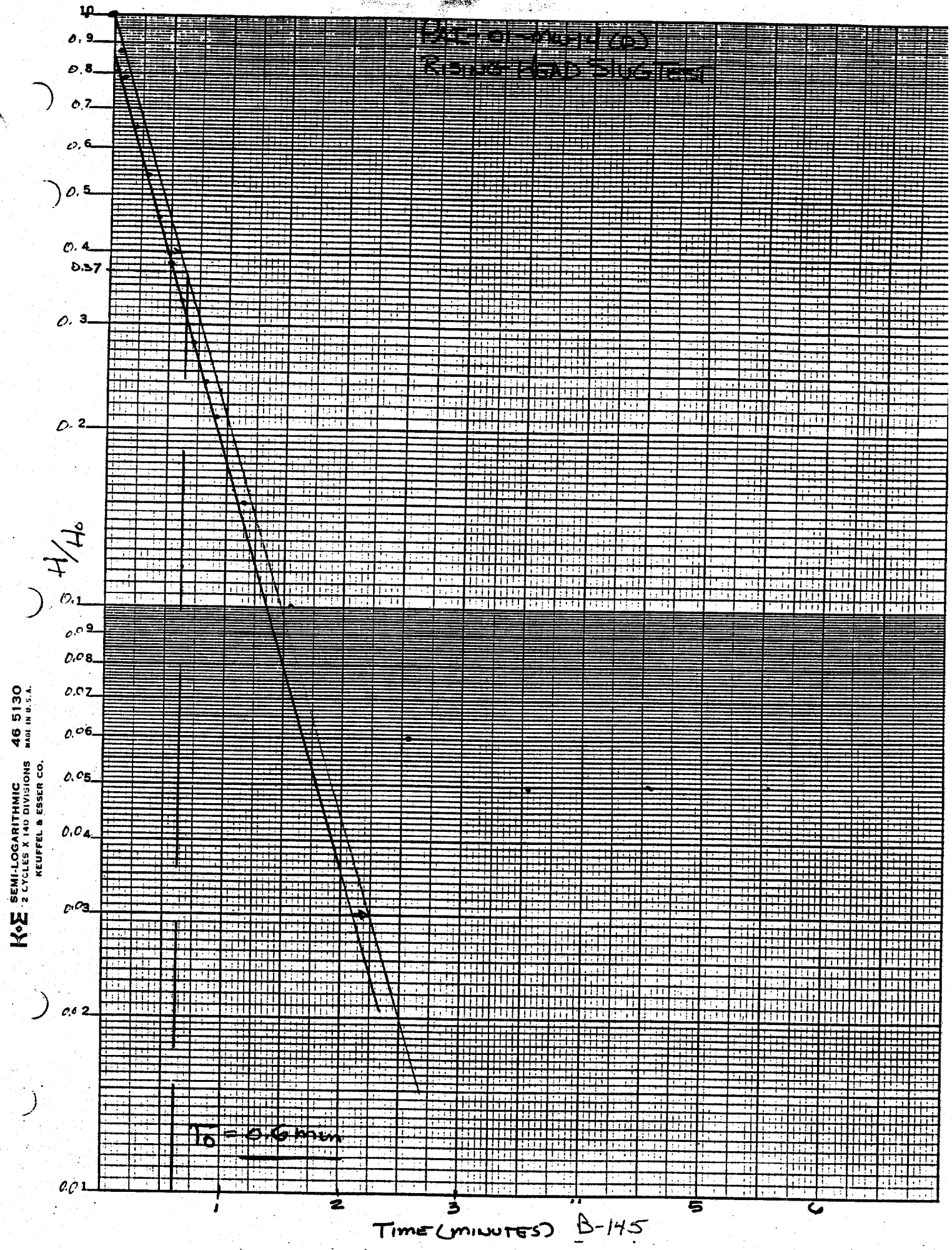
Indicate SWL Depth on Drawing



REMARKS:

XD: 36.10

CALCS, SKETCH MAPS, ETC.:


RATE OF WATER (AD)
RISING HEAD SLUG TEST
H/Ho
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1
2
3
4
5
6
TIME (MINUTES)
To = 0.6 min
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

B-145

~~PAI-GW14~~
Test 1, Step 3
Slug ~~In (Falling)~~ Out (Rise)

PAI-01-MW-14(D)
Rising Head Slug Test

S210000
Environmental Logger
08/22 14:01

Unit# 00145 Test 1

Setups:	INPUT 1
Type	Level (F)
Mode	TOU
I.D.	00014

Reference	0.000
Linearity	0.110
Scale Factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 3 08/21 10:36:17

	Elapsed Time	INPUT 1	
	0.0000	0.115	
	0.0033	0.115	
	0.0066	0.684	
	0.0100	2.493	
	0.0133	3.548	
	0.0166	2.602	
	0.0200	1.879	
	0.0233	2.308	
	0.0266	3.037	
	0.0300	3.139	
	0.0333	2.992	
	0.0366	2.755	
	0.0400	2.697	
	0.0433	2.717	
0	0.0466	2.723	T_0
	0.0500	2.653	
	0.0533	2.634	
	0.0566	2.595	
	0.0600	2.589	
	0.0633	2.570	
	0.0666	2.535	
	0.0700	2.525	
	0.0733	2.500	
	0.0766	2.487	
	0.0800	2.468	
	0.0833	2.448	
	0.0866	2.429	
	0.0900	2.410	
	0.0933	2.391	
0.05	0.0966	2.378	
	0.1000	2.359	
	0.1033	2.340	
	0.1066	2.327	
	0.1100	2.314	
	0.1133	2.295	
	0.1166	2.276	
	0.1200	2.263	

PAF-01-MW-14(D)
Test 1 STEP 7
Slug out (Rising Head Test)

	0.1233	2.250
	0.1266	2.231
	0.1300	2.218
	0.1333	2.205
	0.1366	2.186
	0.1400	2.174
	0.1433	2.160
0.1	0.1466	2.148
	0.1500	2.135
	0.1533	2.122
	0.1566	2.103
	0.1600	2.091
	0.1633	2.077
	0.1666	2.071
	0.1700	2.052
	0.1733	2.039
	0.1766	2.026
	0.1800	2.014
	0.1833	2.001
	0.1866	1.988
	0.1900	1.982
	0.1933	1.969
	0.1966	1.956
	0.2000	1.943
	0.2033	1.930
	0.2066	1.918
	0.2100	1.912
	0.2133	1.892
	0.2166	1.879
	0.2200	1.873
	0.2233	1.860
	0.2266	1.847
	0.2300	1.835
	0.2333	1.829
	0.2366	1.816
	0.2400	1.809
	0.2433	1.796
0.2	0.2466	1.783
	0.2500	1.771
	0.2533	1.764
	0.2566	1.751
	0.2600	1.745
	0.2633	1.732
	0.2666	1.720
	0.2700	1.713
	0.2733	1.700
	0.2766	1.694
	0.2800	1.681
	0.2833	1.675
	0.2866	1.662
	0.2900	1.656
	0.2933	1.643
	0.2966	1.637
	0.3000	1.624
	0.3033	1.617
	0.3066	1.605
	0.3100	1.598
	0.3133	1.592
	0.3166	1.579
	0.3200	1.573

PAF-01-MW14(D)
Test 1 Step 3
Slug Out (Rising Head Test)

	0.3233	1.560
	0.3266	1.553
	0.3300	1.541
	0.3333	1.534
0.3	-0.3500	1.483
	0.3666	1.445
	0.3833	1.400
	0.4000	1.355
	0.4166	1.317
	0.4333	1.278
0.4	-0.4500	1.240
	0.4666	1.208
	0.4833	1.176
	0.5000	1.138
	0.5166	1.112
	0.5333	1.080
0.5	-0.5500	1.048
	0.5666	1.023
	0.5833	0.991
	0.6000	0.965
	0.6166	0.939
	0.6333	0.920
0.6	-0.6500	0.895
	0.6666	0.869
	0.6833	0.844
	0.7000	0.824
	0.7166	0.805
	0.7333	0.786
0.7	-0.7500	0.761
	0.7666	0.748
	0.7833	0.728
	0.8000	0.709
	0.8166	0.697
	0.8333	0.677
0.8	-0.8500	0.665
	0.8666	0.645
	0.8833	0.633
	0.9000	0.620
	0.9166	0.607
	0.9333	0.588
0.9	-0.9500	0.575
	0.9666	0.569
	0.9833	0.556
	1.0000	0.543
1.15	-1.2000	0.409
	1.4000	0.332
1.55	-1.6000	0.275
	1.8000	0.242
	2.0000	0.217
	2.2000	0.198
	2.4000	0.179
2.55	-2.6000	0.172
	2.8000	0.166
	3.0000	0.159
	3.2000	0.153
	3.4000	0.147
3.55	-3.6000	0.147
	3.8000	0.147
	4.0000	0.147
	4.2000	0.140

	4.4000	0.140
4.55 –	4.6000	0.140
	4.8000	0.140
	5.0000	0.140
	5.2000	0.140
	5.4000	0.140
5.55 –	5.6000	0.140
	5.8000	0.140
	6.0000	0.140
	6.2000	0.140
	6.4000	0.140
	6.6000	0.140
	6.8000	0.140
	7.0000	0.140
	7.2000	0.140
	7.4000	0.140
	7.6000	0.140
	7.8000	0.140
	8.0000	0.140
	8.2000	0.140
	8.4000	0.140
	8.6000	0.140
	8.8000	0.140
	9.0000	0.140
	9.2000	0.140
	9.4000	0.140
	9.6000	0.134
	9.8000	0.140
	10.0000	0.140
	12.0000	0.134
	14.0000	0.147
	16.0000	0.140

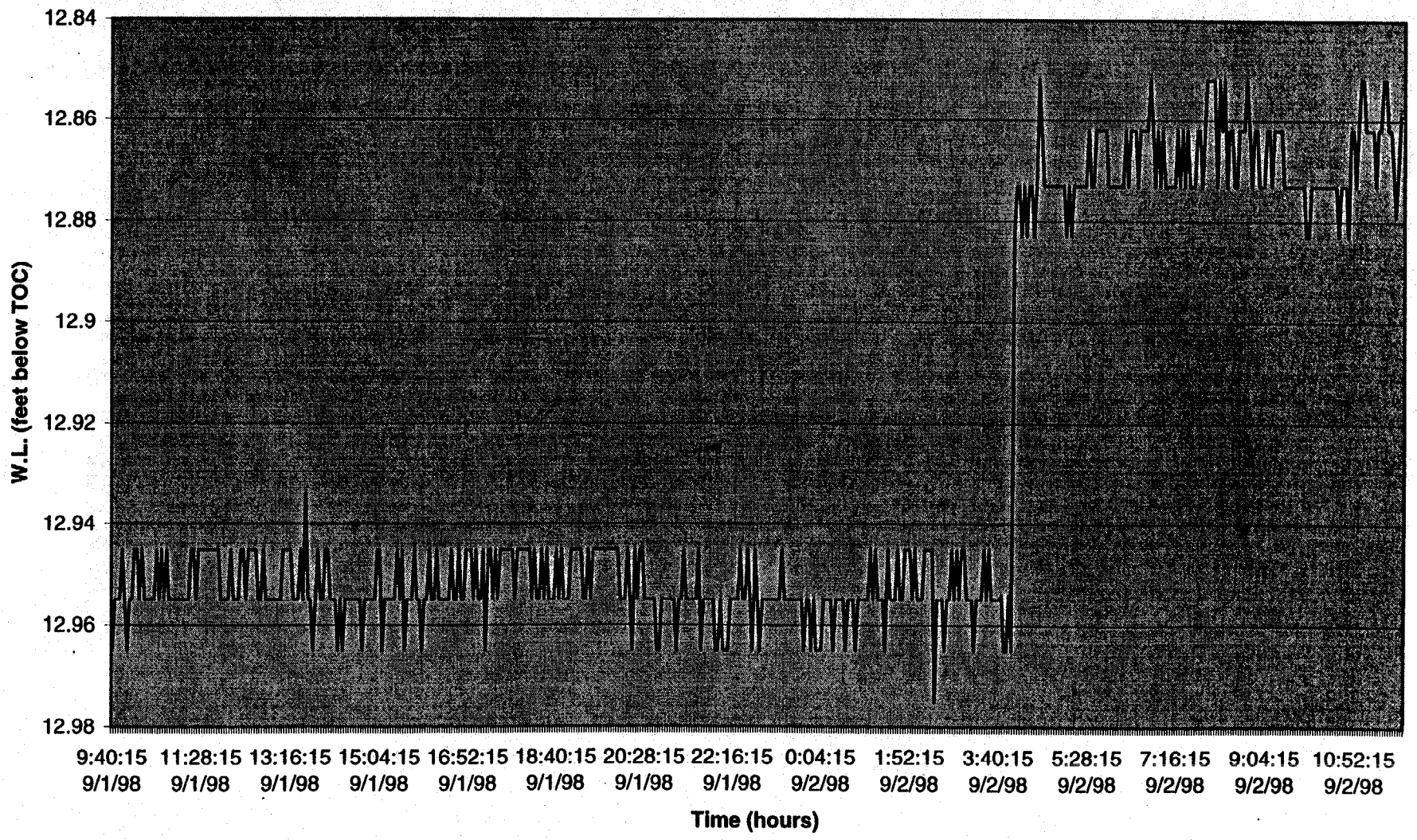
END

PAI-01-MW-14(D)
Test 1 Step 3
Slug out (Rising Head Test)

B-2

TIDAL STUDY RESULTS

Tidal Study Conducted at Site 1 on September 2- 3, 1998
Water Level as a Function of Time for PAI-01-MW-04(D)



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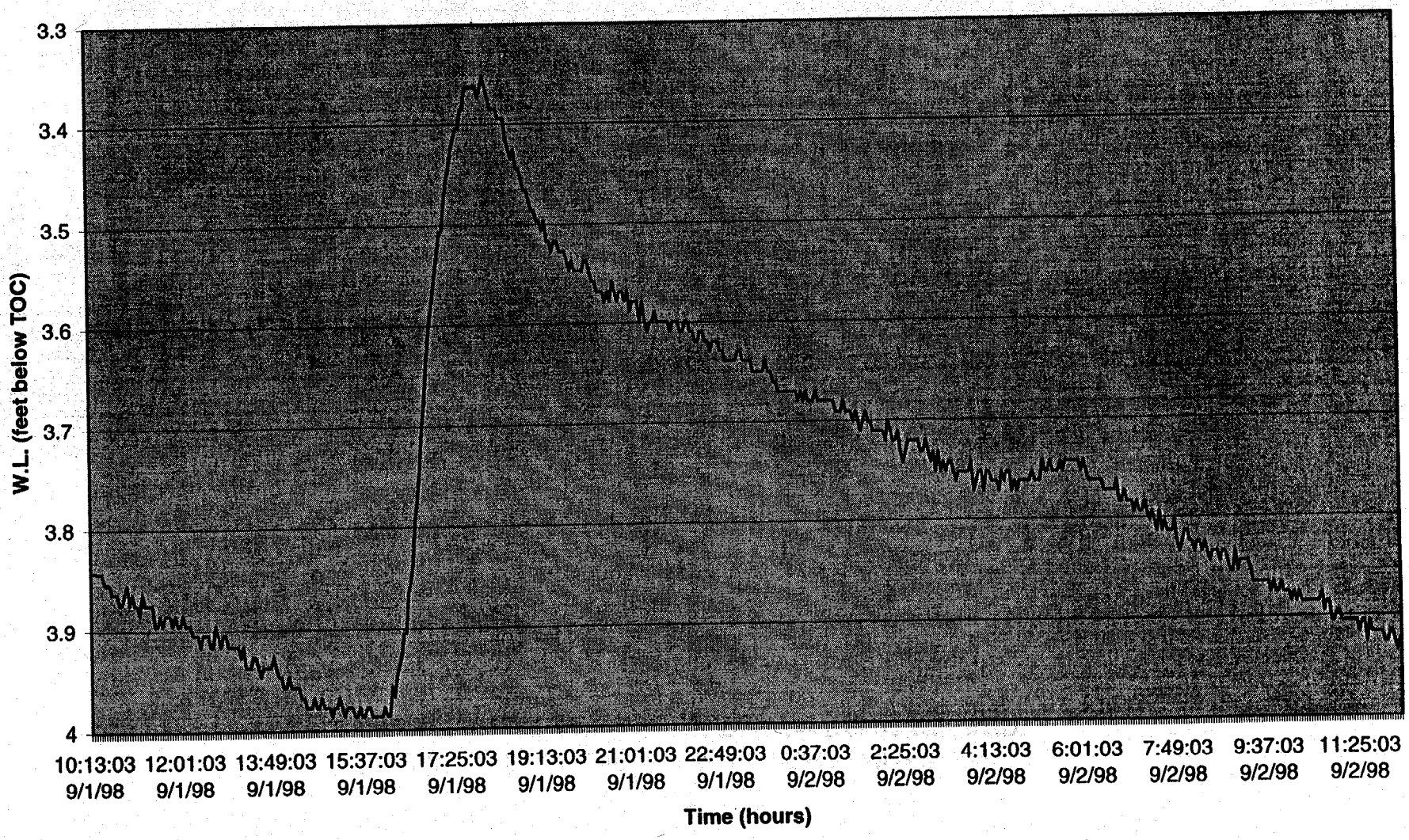
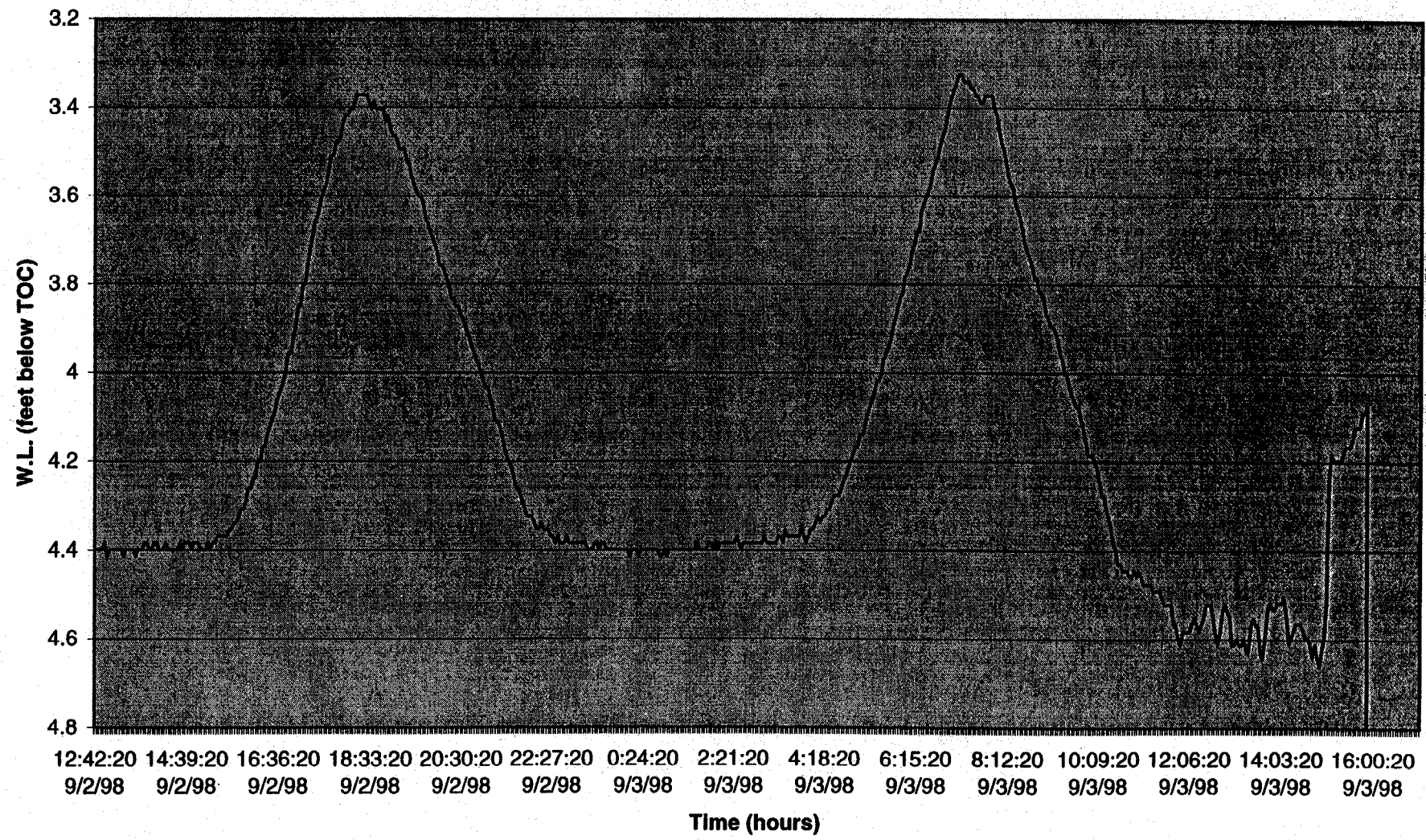
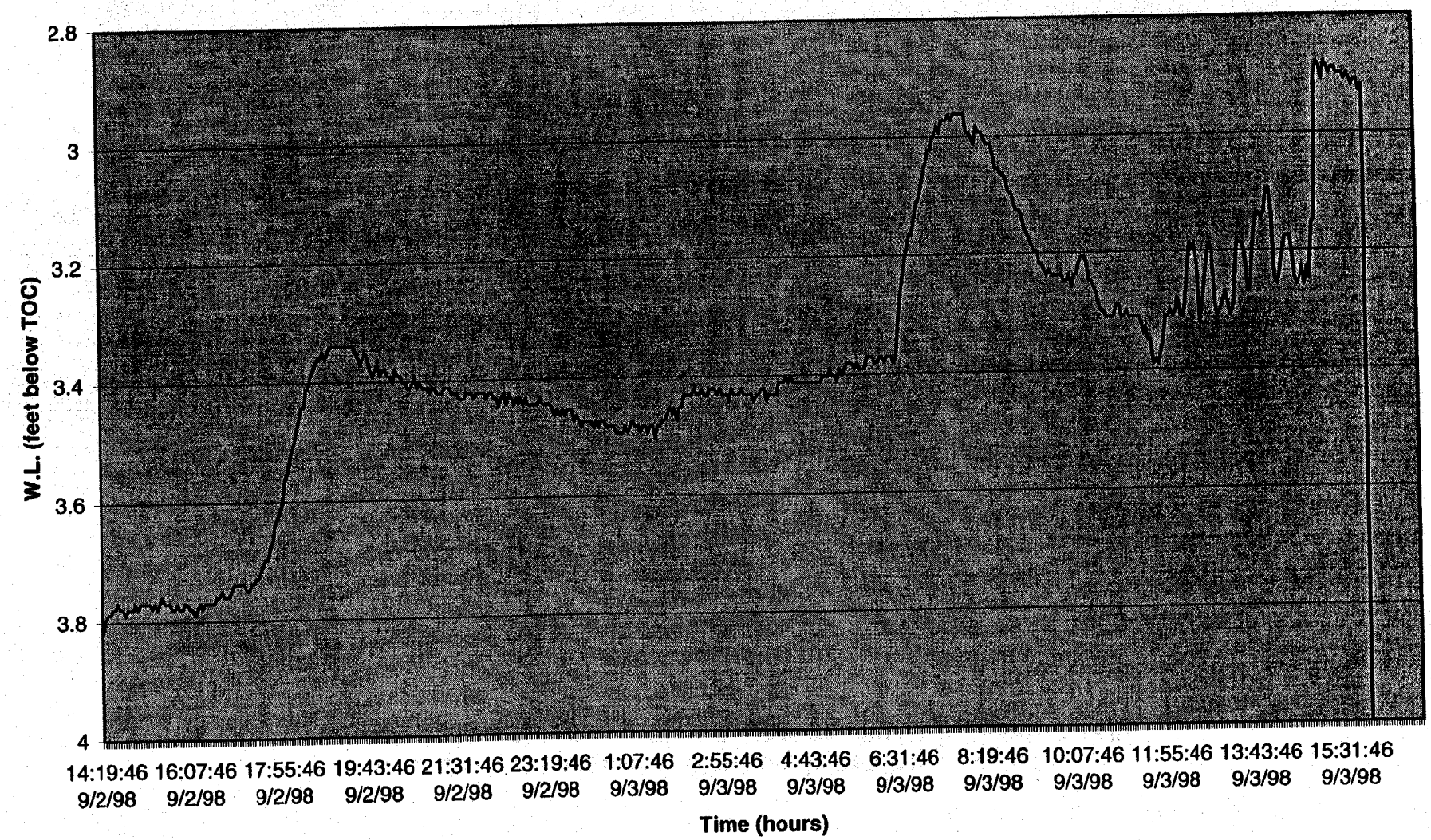
Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-05(S)



Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-06(D) (control well)



Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-07(S)



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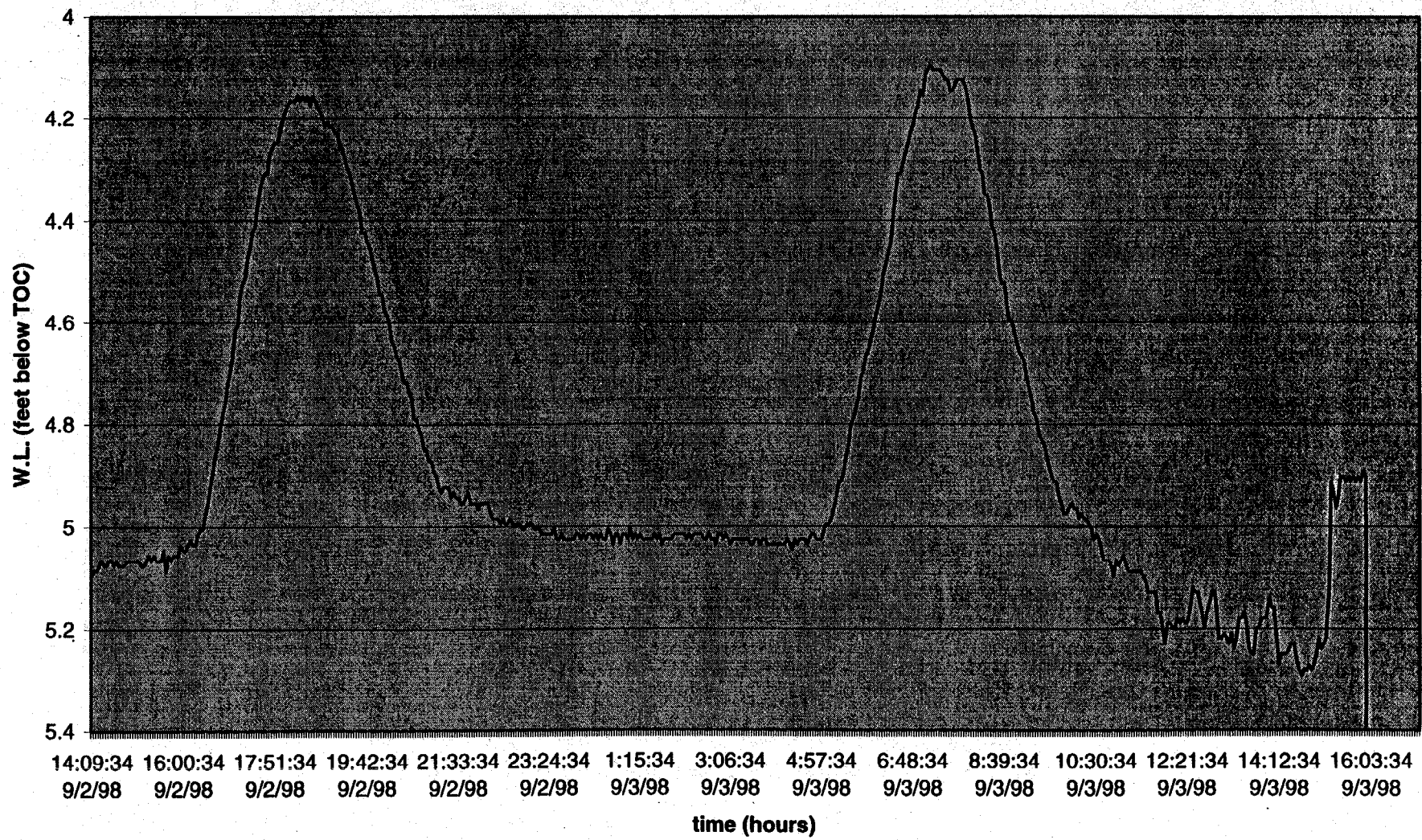
Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-08(D)



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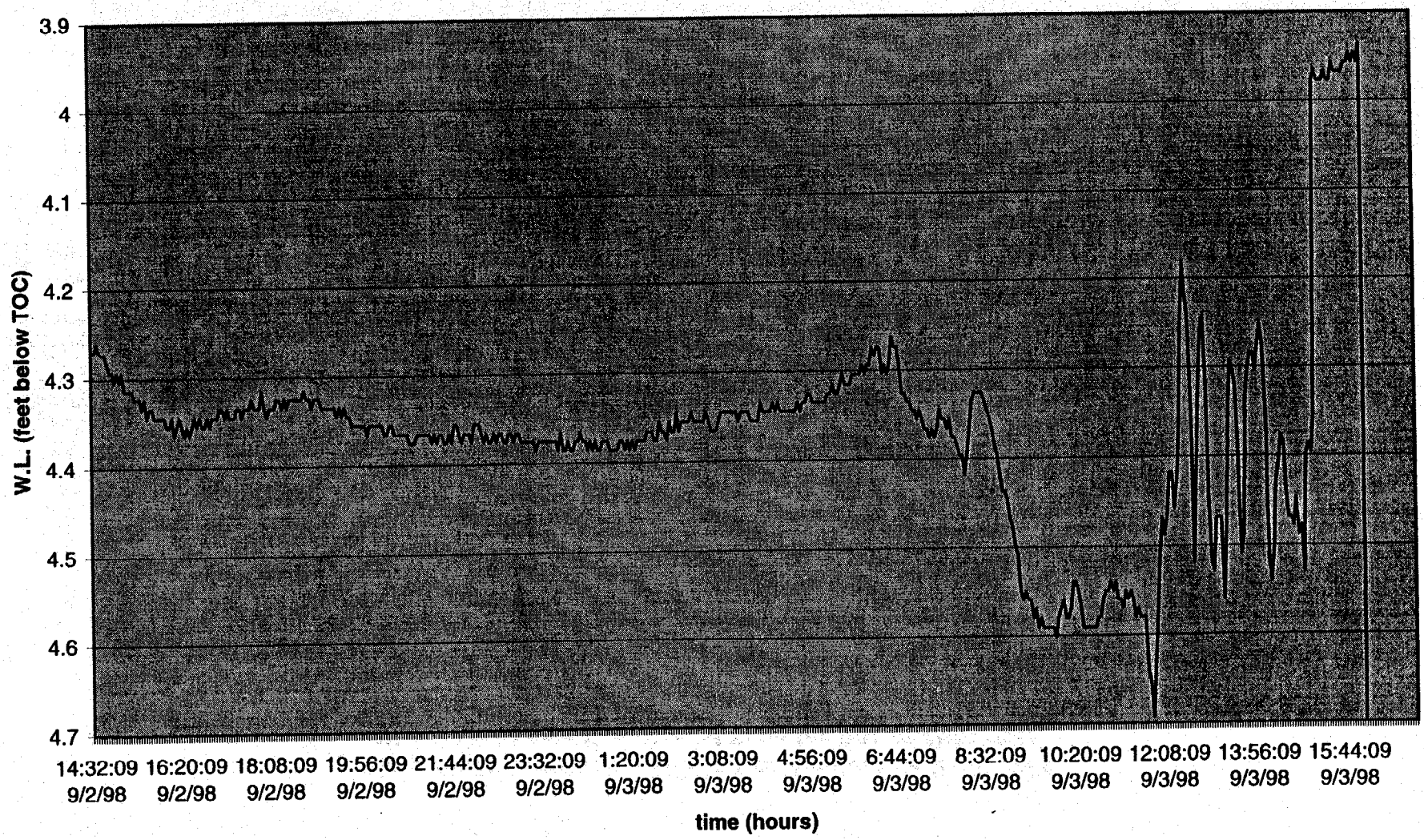
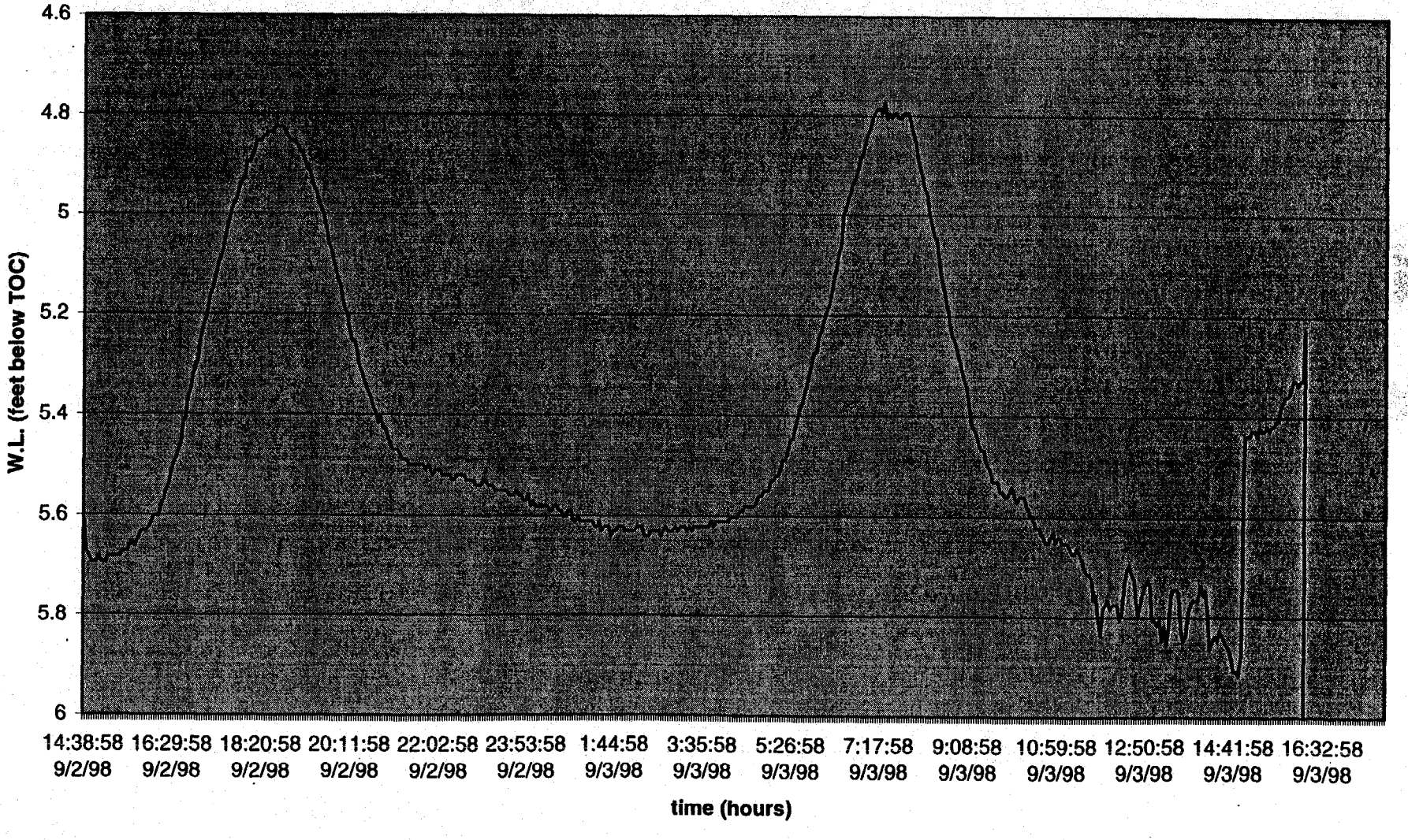
Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-09(S)



Tidal Study Conducted at site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-10(D)



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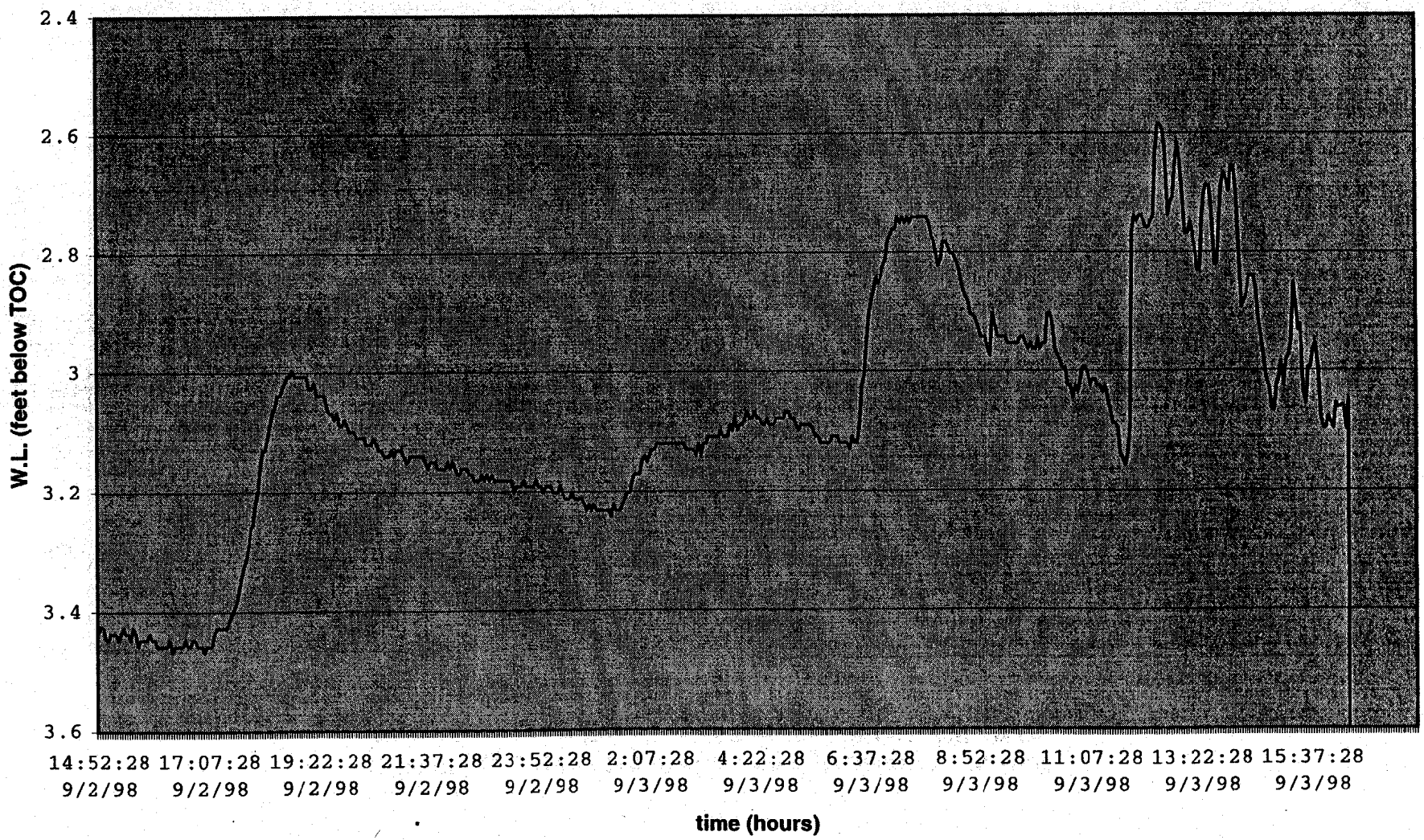
Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a function of Time for PAI-01-MW-11(S)



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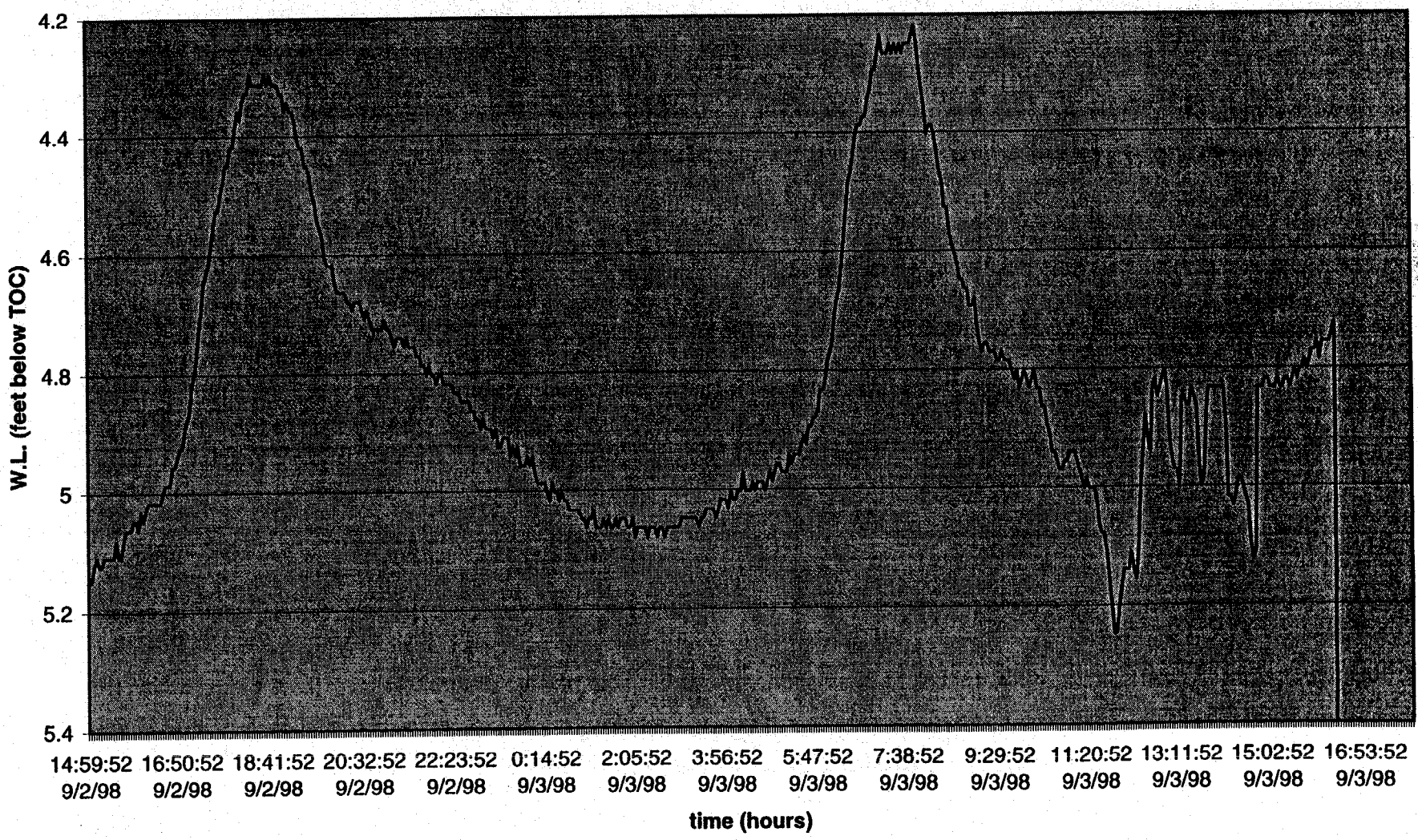
Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-12(D)



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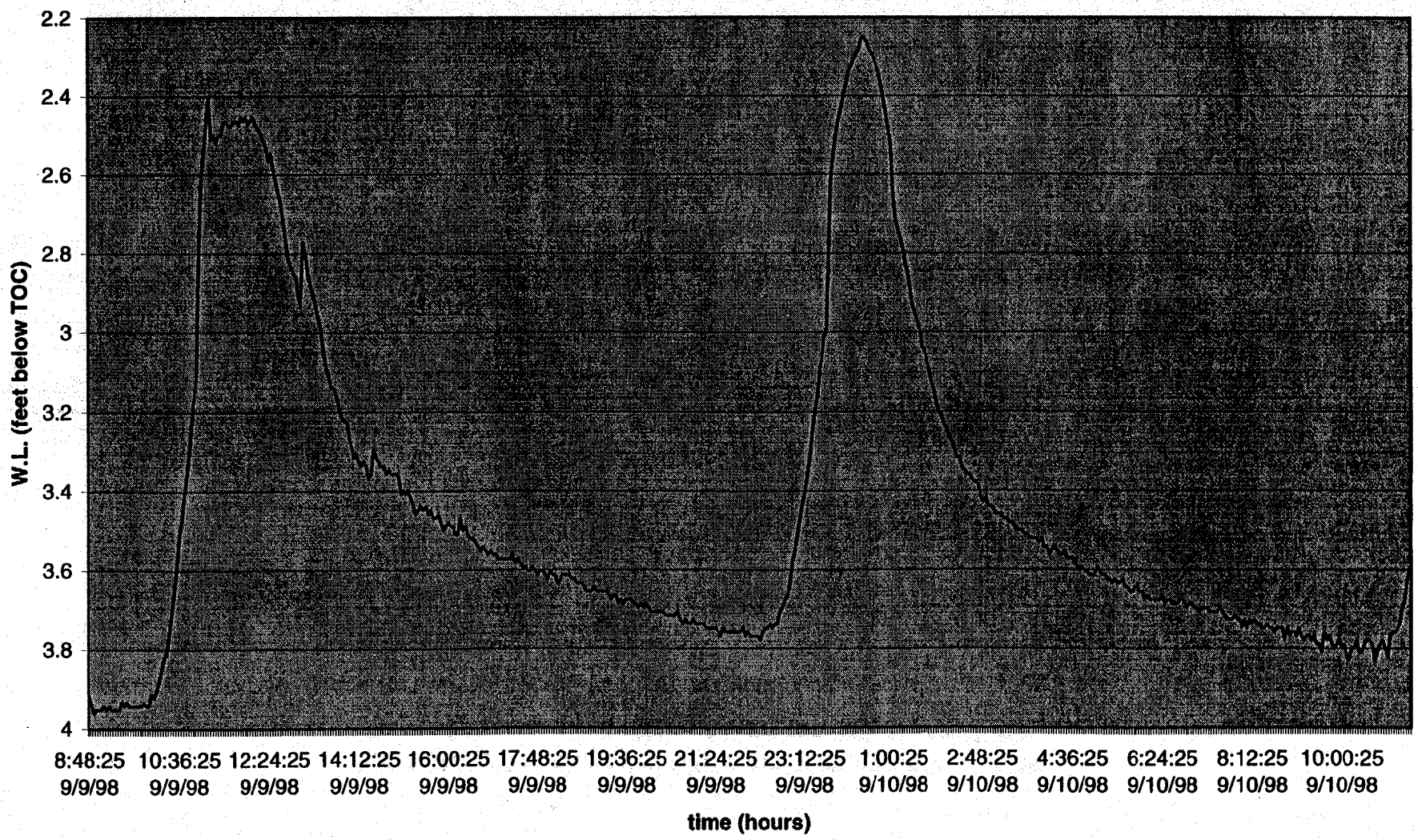
Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-13(S)



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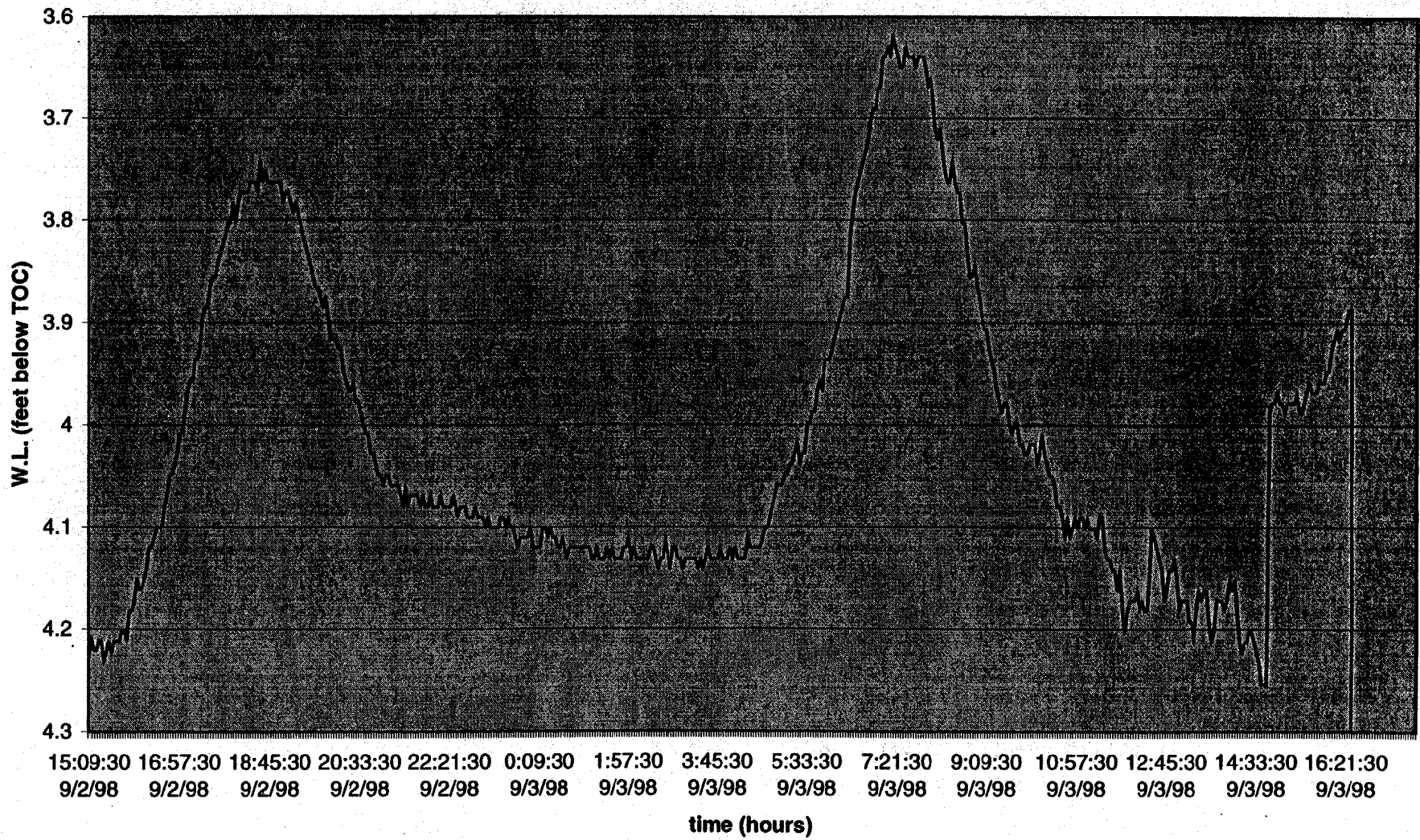
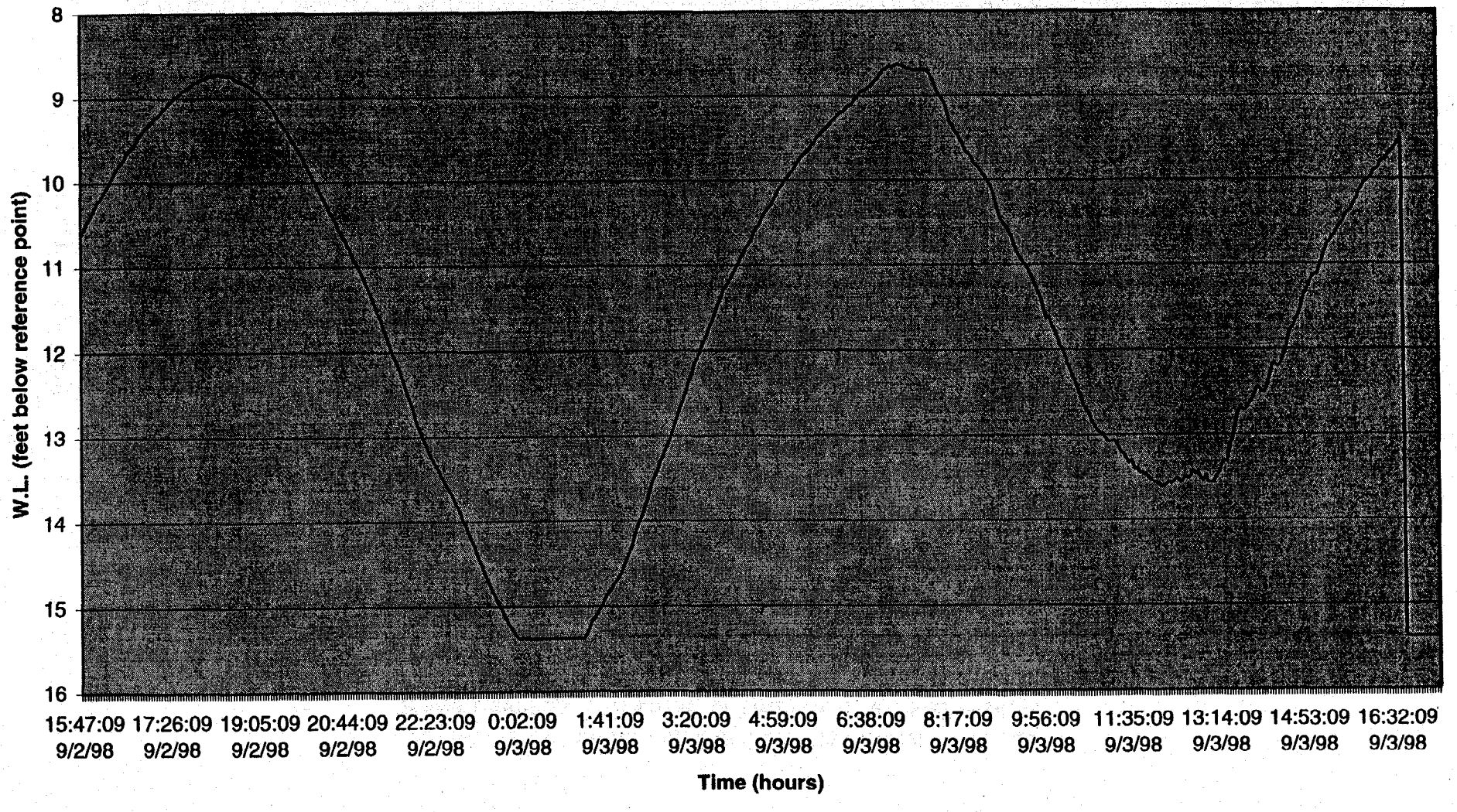
Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for PAI-01-MW-14(D)



B-160

Tidal Study Conducted at Site 1 on September 2 - 3, 1998
Water Level as a Function of Time for Control Point at Archer's Creek Bridge



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APPENDIX C

ANALYTICAL DATA

C-1 BACKGROUND DATA – Site 1
C-2 SEDIMENT – Site 1
C-3 GROUNDWATER – Site 1
C-4 SURFACE WATER – Site 1
C-5 SURFACE SOIL – Site 1
C-6 SURFACE SOIL – SWMU 41

C-1

BACKGROUND DATA – Site 1

For consistency between reports and EGIS, sample nomenclature was modified for Sample IDs and Sample location. In each case, a '0' was removed. For example:

Sediment sample location PAI-02-SD-002 is referred to as PAI-02-SD-02.

Surface soil sample location PAI-02-SS-002 is called PAI-02-SS-02.

Surface water sample location PAI-02-SW-002 is referred to as PAI-02-SW-02.

For groundwater locations, monitoring wells 1,2, and 3 will be referred to in the following manner:

PAI2-MW1(S)
PAI2-MW2(S)
PAI2-MW3(S)

Monitoring wells 4 and 5 will follow the same change as the other media and are named as follows:

PAI-02-MW-04(S)
PAI-02-MW-05(D)

Groundwater sample IDs will follow the same pattern as for the location, however, the MW will be replaced with GW.

For <u>all</u> media, any modifier will be placed at the end of the sample identification name. For example, a surface soil sample from location PAI-02-SS-02 may be referred to as:

PAI-02-SS-02-01.

The above modifications also apply to Site 15 Sample IDs and locations. For example:

Sediment sample location PAI-15-SD-002 is referred to as PAI-15-SD-02.

Surface soil sample location PAI-15-SS-002 is referred to as PAI-15-SS-02.

For <u>all</u> media, any modifier will be placed at the end of the sample identification name. For example, a surface soil sample from location PAI-15-SS-02 may be referred to as:

PAI-15-SS-02-01.

PARRIS ISLAND

BACKGROUND SURFACE SOIL - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SS-001-01	PAI-01-SS-002-01	PAI-01-SS-003-01	PAI-10-SS-015-01	PAI-10-SS-016-01	PAI-10-SS-017-01	/ /
COLLECTION DATE:	06/01/98	06/01/98	06/01/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SS-001	PAI-01-SS-002	PAI-01-SS-003	PAI-10-SS-015	PAI-10-SS-016	PAI-10-SS-017	
SAMPLE DEPTH:	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	
VOLATILES (µg/kg)							
1,1,1-TRICHLOROETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
1,1,2,2-TETRACHLOROETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
1,1,2-TRICHLOROETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
1,1-DICHLOROETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
1,1-DICHLOROETHENE	7 U	8 U	7 U	4 U	4 U	4 U	
1,2-DICHLOROETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
1,2-DICHLOROETHENE (TOTAL)	7 U	8 U	7 U	4 U	4 U	4 U	
1,2-DICHLOROPROPANE	7 U	8 U	7 U	4 U	4 U	4 U	
2-BUTANONE	7 U	8 U	7 U	6 U	6 U	6 U	
2-HEXANONE	7 U	8 U	7 U	6 U	6 U	6 U	
4-METHYL-2-PENTANONE	7 U	8 U	7 U	6 U	4 J	4 J	
ACETONE	220 J	40 J	500 J	7 U	26	20 U	
BENZENE	7 U	8 U	7 U	4 U	4 U	4 U	
BROMODICHLOROMETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
BROMOFORM	7 U	8 U	7 U	4 U	4 U	4 U	
BROMOMETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
CARBON DISULFIDE	7 U	8 U	7 U	4 U	4 U	4 U	
CARBON TETRACHLORIDE	7 U	8 U	7 U	4 U	4 U	4 U	
CHLOROBENZENE	7 U	8 U	7 U	4 U	4 U	4 U	
CHLOROETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
CHLOROFORM	7 U	8 U	7 U	4 U	4 U	4 U	
CHLOROMETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
CIS-1,3-DICHLOROPROPENE	7 U	8 U	7 U	4 U	4 U	4 U	
DIBROMOCHLOROMETHANE	7 U	8 U	7 U	4 U	4 U	4 U	
ETHYLBENZENE	7 U	8 U	7 U	4 U	4 U	4 U	
METHYLENE CHLORIDE	7 U	8 U	7 U	5 U	6 U	6 U	
STYRENE	7 U	8 U	7 U	4 U	4 U	4 U	
TETRACHLOROETHENE	7 U	8 U	7 U	4 U	4 U	4 U	
TOLUENE	7 U	8 U	7 U	4 U	4 U	2 J	
TRANS-1,3-DICHLOROPROPENE	7 U	8 U	7 U	4 U	4 U	4 U	
TRICHLOROETHENE	7 U	8 U	7 U	4 U	4 U	4 U	

PARRIS ISLAND

BACKGROUND SURFACE SOIL - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SS-001-01	PAI-01-SS-002-01	PAI-01-SS-003-01	PAI-10-SS-015-01	PAI-10-SS-016-01	PAI-10-SS-017-01	/ /
COLLECTION DATE:	06/01/98	06/01/98	06/01/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SS-001	PAI-01-SS-002	PAI-01-SS-003	PAI-10-SS-015	PAI-10-SS-016	PAI-10-SS-017	
SAMPLE DEPTH:	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	
VOLATILES (µg/kg)							
VINYL CHLORIDE	7 U	8 U	7 U	4 U	4 U	4 U	
XYLENES, TOTAL	7 U	8 U	7 U	4 U	4 U	4 U	
SEMIVOLATILES (µg/kg)							
1,2,4-TRICHLOROBENZENE	340 U	390 U	360 U	370 U	360 U	360 U	
1,2-DICHLOROBENZENE	340 U	390 U	360 U	370 U	360 U	360 U	
1,3-DICHLOROBENZENE	340 U	390 U	360 U	370 U	360 U	360 U	
1,4-DICHLOROBENZENE	340 U	390 U	360 U	370 U	360 U	360 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	340 U	390 U	360 U	370 U	360 U	360 U	
2,4,5-TRICHLOROPHENOL	1700 U	2000 U	1800 U	370 U	360 U	360 U	
2,4,6-TRICHLOROPHENOL	340 U	390 U	360 U	370 U	360 U	360 U	
2,4-DICHLOROPHENOL	340 U	390 U	360 U	370 U	360 U	360 U	
2,4-DIMETHYLPHENOL	340 U	390 U	360 U	370 U	360 U	360 U	
2,4-DINITROPHENOL	1700 U	2000 U	1800 U	730 U	720 U	720 U	
2,4-DINITROTOLUENE	340 U	390 U	360 U	370 U	360 U	360 U	
2,6-DINITROTOLUENE	340 U	390 U	360 U	370 U	360 U	360 U	
2-CHLORONAPHTHALENE	340 U	390 U	360 U	370 U	360 U	360 U	
2-CHLOROPHENOL	340 U	390 U	360 U	370 U	360 U	360 U	
2-METHYLNAPHTHALENE	340 U	390 U	360 U	370 U	360 U	360 U	
2-METHYLPHENOL	340 U	390 U	360 U	370 U	360 U	360 U	
2-NITROANILINE	1700 U	2000 U	1800 U	370 U	360 U	360 U	
2-NITROPHENOL	340 U	390 U	360 U	370 U	360 U	360 U	
3,3'-DICHLOROBENZIDINE	690 U	780 U	710 U	370 U	360 U	360 U	
3-NITROANILINE	1700 U	2000 U	1800 U	370 U	360 U	360 U	
4,6-DINITRO-2-METHYLPHENOL	1700 U	2000 U	1800 U	730 U	720 U	720 U	
4-BROMOPHENYL PHENYL ETHER	340 U	390 U	360 U	370 U	360 U	360 U	
4-CHLORO-3-METHYLPHENOL	690 U	780 U	710 U	370 U	360 U	360 U	
4-CHLOROANILINE	340 U	390 U	360 U	370 U	360 U	360 U	
4-CHLOROPHENYL PHENYL ETHER	340 U	390 U	360 U	370 U	360 U	360 U	
4-METHYLPHENOL	340 U	390 U	360 U	370 U	360 U	360 U	
4-NITROANILINE	1700 U	2000 U	1800 U	370 U	360 U	360 U	
4-NITROPHENOL	1700 U	2000 U	1800 U	730 U	720 U	720 U	

PARRIS ISLAND

BACKGROUND SURFACE SOIL - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SS-001-01	PAI-01-SS-002-01	PAI-01-SS-003-01	PAI-10-SS-015-01	PAI-10-SS-016-01	PAI-10-SS-017-01	/ /
COLLECTION DATE:	06/01/98	06/01/98	06/01/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SS-001	PAI-01-SS-002	PAI-01-SS-003	PAI-10-SS-015	PAI-10-SS-016	PAI-10-SS-017	
SAMPLE DEPTH:	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	
SEMIVOLATILES (µg/kg)							
ACENAPHTHENE	870 U	980 U	890 U	370 U	360 U	360 U	
ACENAPHTHYLENE	430 U	490 U	450 U	370 U	360 U	360 U	
ANTHRACENE	17 U	20 U	18 U	370 U	360 U	360 U	
BENZO(A)ANTHRACENE	43 U	49 U	45 U	370 U	360 U	360 U	
BENZO(A)PYRENE	43 U	49 U	45 U	370 U	360 U	360 U	
BENZO(B)FLUORANTHENE	17 U	20 U	18 U	370 U	360 U	360 U	
BENZO(G,H,I)PERYLENE	69 U	78 U	71 U	370 U	360 U	360 U	
BENZO(K)FLUORANTHENE	17 U	20 U	18 U	370 U	360 U	360 U	
BIS(2-CHLOROETHOXY)METHANE	340 U	390 U	360 U	370 U	360 U	360 U	
BIS(2-CHLOROETHYL)ETHER	340 U	390 U	360 U	370 U	360 U	360 U	
BIS(2-ETHYLHEXYL)PHTHALATE	340 U	390 U	360 U	370 U	360 U	360 U	
BUTYLBENZYL PHTHALATE	340 U	390 U	360 U	370 U	360 U	360 U	
CARBAZOLE	340 U	390 U	360 U	370 U	360 U	360 U	
CHRYSENE	43 U	49 U	45 U	370 U	360 U	360 U	
DI-N-BUTYL PHTHALATE	340 U	390 U	360 U	370 U	360 U	360 U	
DI-N-OCTYL PHTHALATE	340 U	390 U	360 U	370 U	360 U	360 U	
DIBENZO(A,H)ANTHRACENE	170 U	200 U	180 U	370 U	360 U	360 U	
DIBENZOFURAN	340 U	390 U	360 U	370 U	360 U	360 U	
DIETHYL PHTHALATE	340 U	390 U	360 U	370 U	360 U	360 U	
DIMETHYL PHTHALATE	340 U	390 U	360 U	370 U	360 U	360 U	
FLUORANTHENE	43 U	49 U	45 U	370 U	360 U	360 U	
FLUORENE	87 U	800	550	370 U	360 U	360 U	
HEXACHLOROBENZENE	340 U	390 U	360 U	370 U	360 U	360 U	
HEXACHLOROBUTADIENE	340 U	390 U	360 U	370 U	360 U	360 U	
HEXACHLOROCYCLOPENTADIENE	340 U	390 U	360 U	370 U	360 U	360 U	
HEXACHLOROETHANE	340 U	390 U	360 U	370 U	360 U	360 U	
INDENO(1,2,3-CD)PYRENE	43 U	49 U	45 U	370 U	360 U	360 U	
ISOPHORONE	340 U	390 U	360 U	370 U	360 U	360 U	
N-NITROSO-DI-N-PROPYLAMINE	340 U	390 U	360 U	370 U	360 U	360 U	
N-NITROSODIPHENYLAMINE	340 U	390 U	360 U	370 U	360 U	360 U	
NAPHTHALENE	430 U	490 U	450 U	370 U	360 U	360 U	

PARRIS ISLAND

BACKGROUND SURFACE SOIL - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SS-001-01	PAI-01-SS-002-01	PAI-01-SS-003-01	PAI-10-SS-015-01	PAI-10-SS-016-01	PAI-10-SS-017-01	/ /
COLLECTION DATE:	06/01/98	06/01/98	06/01/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SS-001	PAI-01-SS-002	PAI-01-SS-003	PAI-10-SS-015	PAI-10-SS-016	PAI-10-SS-017	
SAMPLE DEPTH:	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	
SEMIVOLATILES (µg/kg)							
NITROBENZENE	340 U	390 U	360 U	370 U	360 U	360 U	
PENTACHLOROPHENOL	1700 U	2000 U	1800 U	730 U	720 U	720 U	
PHENANTHRENE	35 U	39 U	36 U	370 U	360 U	360 U	
PHENOL	340 U	390 U	360 U	370 U	360 U	360 U	
PYRENE	87 U	98 U	89 U	370 U	360 U	360 U	
PESTICIDES/PCBs (µg/kg)							
4,4'-DDD	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
4,4'-DDE	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
4,4'-DDT	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
ALDRIN	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
ALPHA-BHC	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
ALPHA-CHLORDANE	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
AROCLOR-1016	8.7 U	9.8 U	8.9 U	36 U	36 U	36 U	
AROCLOR-1221	8.7 U	9.8 U	8.9 U	73 U	72 U	72 U	
AROCLOR-1232	8.7 U	9.8 U	8.9 U	36 U	36 U	36 U	
AROCLOR-1242	8.7 U	9.8 U	8.9 U	36 U	36 U	36 U	
AROCLOR-1248	8.7 U	9.8 U	8.9 U	36 U	36 U	36 U	
AROCLOR-1254	8.7 U	9.8 U	8.9 U	36 U	36 U	36 U	
AROCLOR-1260	8.7 U	9.8 U	8.9 U	36 U	36 U	36 U	
BETA-BHC	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
DELTA-BHC	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
DIELDRIN	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
ENDOSULFAN I	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
ENDOSULFAN II	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
ENDOSULFAN SULFATE	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
ENDRIN	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
ENDRIN ALDEHYDE	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
ENDRIN KETONE	17 U	9.8 U	18 U	3.6 U	3.6 U	3.6 U	
GAMMA-BHC (LINDANE)	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
GAMMA-CHLORDANE	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
HEPTACHLOR	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	

PARRIS ISLAND

BACKGROUND SURFACE SOIL - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SS-001-01	PAI-01-SS-002-01	PAI-01-SS-003-01	PAI-10-SS-015-01	PAI-10-SS-016-01	PAI-10-SS-017-01	/ /
COLLECTION DATE:	06/01/98	06/01/98	06/01/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SS-001	PAI-01-SS-002	PAI-01-SS-003	PAI-10-SS-015	PAI-10-SS-016	PAI-10-SS-017	
SAMPLE DEPTH:	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	0.0 - 1.0'	
PESTICIDES/PCBs (µg/kg)							
HEPTACHLOR EPOXIDE	8.7 U	4.9 U	8.9 U	1.9 U	1.8 U	1.8 U	
METHOXYCHLOR	87 U	49 U	89 U	19 U	18 U	18 U	
TOXAPHENE	170 U	98 U	180 U	190 U	180 U	180 U	
INORGANICS (mg/kg)							
ALUMINUM	3080	3300	4850	2680	3150	4750	
ANTIMONY	0.16 U	0.17 U	0.15 U	2.1 U	1.8 U	1.9 U	
ARSENIC	0.44	0.57	0.6	0.97	0.79	0.94	
BARIUM	11.3	13.1	23.5	5.4	7.1	10.5	
BERYLLIUM	0.02 U	0.02	0.06	0.11 U	0.11 U	0.17 U	
CADMIUM	0.03 U	0.05 U	0.07 U	0.22 U	0.18 U	0.2 U	
CALCIUM	256	474	887	147	213	322	
CHROMIUM	2.5	2.2	3	3.8	3.7	3.5	
COBALT	0.09	0.08	0.28	0.37 U	0.58 U	0.33 U	
COPPER	1 U	1.5	1.3	0.68 U	1.1 U	0.73 U	
CYANIDE	0.49 U	0.48 U	0.39 U	0.6 U	0.6 U	0.5 U	
IRON	1730	1550	2030	2020	2070	2360	
LEAD	6.5	6.4	6.4	6.6 J	6.3 J	5.4 J	
MAGNESIUM	165	193	273	258	330	326	
MANGANESE	66.8	54.1	209	9.4	14.4	31.8	
MERCURY	0.06	0.09	0.07	0.04	0.04 U	0.05	
NICKEL	0.79	0.66	1.2	1.5 U	1.7 U	2.3 U	
POTASSIUM	130	180	167	137	142	182	
SELENIUM	0.22	0.34	0.18	0.07 U	0.06 U	0.1 U	
SILVER	0.06 U	0.06 U	0.05 U	0.6 U	0.49 U	0.43 U	
SODIUM	166	169	219	115 U	97.9 U	124 U	
THALLIUM	0.15 U	0.16 U	0.14 U	0.18	0.17 U	0.19 U	
VANADIUM	4.5	3.7	4.8	5.3	4.9	5.3	
ZINC	4	3.5	5.2	5.4	5.4	5.6	

PARRIS ISLAND

BACKGROUND SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SD-05-01	PAI-01-SD-06-01	PAI-01-SD-07-01	PAI-10-SD-016-01	PAI-10-SD-017-01	PAI-10-SD-018-01	/ /
COLLECTION DATE:	05/27/98	05/27/98	05/27/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SD-005	PAI-01-SD-006	PAI-01-SD-007	PAI-10-SD-016	PAI-10-SD-017	PAI-10-SD-018	
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
VOLATILES (µg/kg)							
1,1,1-TRICHLOROETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
1,1,2,2-TETRACHLOROETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
1,1,2-TRICHLOROETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
1,1-DICHLOROETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
1,1-DICHLOROETHENE	7 U	7 U	7 U	10 U	18 U	13 U	
1,2-DICHLOROETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
1,2-DICHLOROETHENE (TOTAL)	7 U	7 U	7 U	10 U	18 U	13 U	
1,2-DICHLOROPROPANE	7 U	7 U	7 U	10 U	18 U	13 U	
2-BUTANONE	7 U	7 U	7 U	16 U	38	21 U	
2-HEXANONE	7 U	7 U	7 U	16 U	31 U	21 U	
4-METHYL-2-PENTANONE	7 U	7 U	7 U	15 J	35	18 J	
ACETONE	7 UR	7 UR	7 UR	52 U	110 U	56 U	
BENZENE	7 U	7 U	7 U	10 U	18 U	13 U	
BROMODICHLOROMETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
BROMOFORM	7 U	7 U	7 U	10 U	18 U	13 U	
BROMOMETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
CARBON DISULFIDE	7 U	2 J	7 U	10 U	7 J	13 U	
CARBON TETRACHLORIDE	7 U	7 U	7 U	10 U	18 U	13 U	
CHLOROBENZENE	7 U	7 U	7 U	10 U	18 U	13 U	
CHLOROETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
CHLOROFORM	7 U	7 U	7 U	10 U	18 U	13 U	
CHLOROMETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
CIS-1,3-DICHLOROPROPENE	7 U	7 U	7 U	10 U	18 U	13 U	
DIBROMOCHLOROMETHANE	7 U	7 U	7 U	10 U	18 U	13 U	
ETHYLBENZENE	7 U	7 U	7 U	10 U	18 U	13 U	
METHYLENE CHLORIDE	7 U	7 U	7 U	20 U	29 U	19 U	
STYRENE	7 U	7 U	7 U	10 U	18 U	13 U	
TETRACHLOROETHENE	7 U	7 U	7 U	10 U	18 U	13 U	
TOLUENE	7 U	7 U	7 U	4 J	8 J	13 U	
TRANS-1,3-DICHLOROPROPENE	7 U	7 U	7 U	10 U	18 U	13 U	
TRICHLOROETHENE	7 U	7 U	7 U	10 U	18 U	13 U	

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BACKGROUND SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SD-05-01	PAI-01-SD-06-01	PAI-01-SD-07-01	PAI-10-SD-016-01	PAI-10-SD-017-01	PAI-10-SD-018-01	/ /
COLLECTION DATE:	05/27/98	05/27/98	05/27/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SD-005	PAI-01-SD-006	PAI-01-SD-007	PAI-10-SD-016	PAI-10-SD-017	PAI-10-SD-018	
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
VOLATILES (µg/kg)							
VINYL CHLORIDE	7 U	7 U	7 U	10 U	18 U	13 U	
XYLENES, TOTAL	7 U	7 U	7 U	10 U	18 U	13 U	
SEMIVOLATILES (µg/kg)							
1,2,4-TRICHLOROBENZENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
1,2-DICHLOROBENZENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
1,3-DICHLOROBENZENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
1,4-DICHLOROBENZENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	450 U	400 U	440 U	810 U	1200 U	1000 U	
2,4,5-TRICHLOROPHENOL	2300 U	2000 U	2200 U	810 U	1200 U	1000 U	
2,4,6-TRICHLOROPHENOL	450 U	400 U	440 U	810 U	1200 U	1000 U	
2,4-DICHLOROPHENOL	450 U	400 U	440 U	810 U	1200 U	1000 U	
2,4-DIMETHYLPHENOL	450 U	400 U	440 U	810 U	1200 U	1000 U	
2,4-DINITROPHENOL	2300 U	2000 U	2200 U	1600 U	2400 U	2100 U	
2,4-DINITROTOLUENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
2,6-DINITROTOLUENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
2-CHLORONAPHTHALENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
2-CHLOROPHENOL	450 U	400 U	440 U	810 U	1200 U	1000 U	
2-METHYLNAPHTHALENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
2-METHYLPHENOL	450 U	400 U	440 U	810 U	1200 U	1000 U	
2-NITROANILINE	2300 U	2000 U	2200 U	810 U	1200 U	1000 U	
2-NITROPHENOL	450 U	400 U	440 U	810 U	1200 U	1000 U	
3,3'-DICHLOROBENZIDINE	910 U	810 U	880 U	810 U	1200 U	1000 U	
3-NITROANILINE	2300 U	2000 U	2200 U	810 U	1200 U	1000 U	
4,6-DINITRO-2-METHYLPHENOL	2300 U	2000 U	2200 U	1600 U	2400 U	2100 U	
4-BROMOPHENYL PHENYL ETHER	450 U	400 U	440 U	810 U	1200 U	1000 U	
4-CHLORO-3-METHYLPHENOL	910 U	810 U	880 U	810 U	1200 U	1000 U	
4-CHLOROANILINE	450 U	400 U	440 U	810 U	1200 U	1000 U	
4-CHLOROPHENYL PHENYL ETHER	450 U	400 U	440 U	810 U	1200 U	1000 U	
4-METHYLPHENOL	450 U	400 U	440 U	810 U	1200 U	1000 U	
4-NITROANILINE	2300 U	2000 U	2200 U	810 U	1200 U	1000 U	
4-NITROPHENOL	2300 U	2000 U	2200 U	1600 U	2400 U	2100 U	

PARRIS ISLAND

BACKGROUND SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SD-05-01	PAI-01-SD-06-01	PAI-01-SD-07-01	PAI-10-SD-016-01	PAI-10-SD-017-01	PAI-10-SD-018-01	/ /
COLLECTION DATE:	05/27/98	05/27/98	05/27/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SD-005	PAI-01-SD-006	PAI-01-SD-007	PAI-10-SD-016	PAI-10-SD-017	PAI-10-SD-018	
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
SEMIVOLATILES (µg/kg)							
ACENAPHTHENE	1100 U	100 U	550 U	810 U	1200 U	1000 U	
ACENAPHTHYLENE	570 U	51 U	280 U	810 U	1200 U	1000 U	
ANTHRACENE	23 U	2 U	11 U	810 U	1200 U	1000 U	
BENZO(A)ANTHRACENE	57 U	5.1 U	28 U	810 U	1200 U	1000 U	
BENZO(A)PYRENE	57 U	5.1 U	28 U	810 U	1200 U	1000 U	
BENZO(B)FLUORANTHENE	23 U	2 U	11 U	810 U	1200 U	1000 U	
BENZO(G,H,I)PERYLENE	91 U	8.1 U	44 U	810 U	1200 U	1000 U	
BENZO(K)FLUORANTHENE	23 U	2 U	11 U	810 U	1200 U	1000 U	
BIS(2-CHLOROETHOXY)METHANE	450 U	400 U	440 U	810 U	1200 U	1000 U	
BIS(2-CHLOROETHYL)ETHER	450 U	400 U	440 U	810 U	1200 U	1000 U	
BIS(2-ETHYLHEXYL)PHTHALATE	450 U	400 U	440 U	810 U	150 J	62 J	
BUTYLBENZYL PHTHALATE	450 U	400 U	440 U	810 U	1200 U	1000 U	
CARBAZOLE	450 U	400 U	440 U	810 U	1200 U	1000 U	
CHRYSENE	57 U	5.1 U	28 U	810 U	1200 U	1000 U	
DI-N-BUTYL PHTHALATE	450 U	400 U	440 U	810 U	1200 U	1000 U	
DI-N-OCTYL PHTHALATE	450 U	400 U	440 U	810 U	1200 U	1000 U	
DIBENZO(A,H)ANTHRACENE	230 U	20 U	110 U	810 U	1200 U	1000 U	
DIBENZOFURAN	450 U	400 U	440 U	810 U	1200 U	1000 U	
DIETHYL PHTHALATE	450 U	400 U	440 U	810 U	1200 U	1000 U	
DIMETHYL PHTHALATE	450 U	400 U	440 U	810 U	1200 U	1000 U	
FLUORANTHENE	57 U	5.1 U	28 U	810 U	1200 U	1000 U	
FLUORENE	110 U	10 U	55 U	810 U	1200 U	1000 U	
HEXACHLOROBENZENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
HEXACHLOROBUTADIENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
HEXACHLOROCYCLOPENTADIENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
HEXACHLOROETHANE	450 U	400 U	440 U	810 U	1200 U	1000 U	
INDENO(1,2,3-CD)PYRENE	32 J	3.2 J	14 J	810 U	1200 U	1000 U	
ISOPHORONE	450 U	400 U	440 U	810 U	1200 U	1000 U	
N-NITROSO-DI-N-PROPYLAMINE	450 U	400 U	440 U	810 U	1200 U	1000 U	
N-NITROSODIPHENYLAMINE	450 U	400 U	440 U	810 U	1200 U	1000 U	
NAPHTHALENE	570 U	51 U	280 U	810 U	1200 U	1000 U	

PARRIS ISLAND

BACKGROUND SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SD-05-01	PAI-01-SD-06-01	PAI-01-SD-07-01	PAI-10-SD-016-01	PAI-10-SD-017-01	PAI-10-SD-018-01	/ /
COLLECTION DATE:	05/27/98	05/27/98	05/27/98	09/09/98	09/09/98	09/09/98	
LOCATION:	PAI-01-SD-005	PAI-01-SD-006	PAI-01-SD-007	PAI-10-SD-016	PAI-10-SD-017	PAI-10-SD-018	
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
SEMIVOLATILES (µg/kg)							
NITROBENZENE	450 U	400 U	440 U	810 U	1200 U	1000 U	
PENTACHLOROPHENOL	2300 U	2000 U	2200 U	1600 U	2400 U	2100 U	
PHENANTHRENE	46 U	4 U	22 U	810 U	1200 U	1000 U	
PHENOL	450 U	400 U	440 U	810 U	1200 U	1000 U	
PYRENE	110 U	10 U	55 U	810 U	1200 U	1000 U	
PESTICIDES/PCBs (µg/kg)							
4,4'-DDD	22 U	2 U	22 U	8 U	12 U	10 U	
4,4'-DDE	22 U	2 U	22 U	8 U	12 U	10 U	
4,4'-DDT	22 U	2 U	22 U	8 U	12 U	10 U	
ALDRIN	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	
ALPHA-BHC	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	
ALPHA-CHLORDANE	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	
AROCLOR-1016	11 U	9.9 U	11 U	80 U	120 U	100 U	
AROCLOR-1221	11 U	9.9 U	11 U	160 U	240 U	210 U	
AROCLOR-1232	11 U	9.9 U	11 U	80 U	120 U	100 U	
AROCLOR-1242	11 U	9.9 U	11 U	80 U	120 U	100 U	
AROCLOR-1248	11 U	9.9 U	11 U	80 U	120 U	100 U	
AROCLOR-1254	11 U	9.9 U	11 U	80 U	120 U	100 U	
AROCLOR-1260	11 U	9.9 U	11 U	80 U	120 U	100 U	
BETA-BHC	11 U	2.4	11 U	4.1 U	6.1 U	5.3 U	
DELTA-BHC	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	
DIELDRIN	22 U	2 U	22 U	8 U	12 U	10 U	
ENDOSULFAN I	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	
ENDOSULFAN II	22 U	2 U	22 U	8 U	12 U	10 U	
ENDOSULFAN SULFATE	22 U	2 U	22 U	8 U	12 U	10 U	
ENDRIN	22 U	2 U	22 U	8 U	12 U	10 U	
ENDRIN ALDEHYDE	22 U	2 U	22 U	8 U	12 U	10 U	
ENDRIN KETONE	22 U	2 U	22 U	8 U	12 U	10 U	
GAMMA-BHC (LINDANE)	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	
GAMMA-CHLORDANE	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	
HEPTACHLOR	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	

PARRIS ISLAND

BACKGROUND SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-01-SD-05-01	PAI-01-SD-06-01	PAI-01-SD-07-01	PAI-10-SD-016-01	PAI-10-SD-017-01	PAI-10-SD-018-01	
COLLECTION DATE:	05/27/98	05/27/98	05/27/98	09/09/98	09/09/98	09/09/98	/ /
LOCATION:	PAI-01-SD-005	PAI-01-SD-006	PAI-01-SD-007	PAI-10-SD-016	PAI-10-SD-017	PAI-10-SD-018	
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'	
PESTICIDES/PCBs (µg/kg)							
HEPTACHLOR EPOXIDE	11 U	0.99 U	11 U	4.1 U	6.1 U	5.3 U	
METHOXYCHLOR	110 U	9.9 U	110 U	41 U	61 U	53 U	
TOXAPHENE	220 U	20 U	220 U	410 U	610 U	530 U	
INORGANICS (mg/kg)							
ALUMINUM	2370	621	2160	22100	24500	21100	
ANTIMONY	0.19 U	0.17 U	0.19 U	9 U	6.3 U	4.4 U	
ARSENIC	1.4	0.13	0.43	11.6	12.2	10.9	
BARIUM	4.4	1.5	3.5	23.7	26.1	24.7	
BERYLLIUM	0.02 U	0.02 U	0.02 U	0.97	1	0.93	
CADMIUM	0.05 U	0.03 U	0.04 U	0.41 U	0.67 U	0.47 U	
CALCIUM	763	123	1040	1750	2220	6110	
CHROMIUM	4.1	1.3	3.2	32.7	33.6	30.8	
COBALT	0.25	0.06 U	0.27	4.1 U	6.2 U	4.4 U	
COPPER	0.95 U	0.33 U	0.73 U	9.5	10.1	9.8	
CYANIDE	0.62 U	0.53 U	0.61 U	1 U	2 U	8 U	
IRON	2110	411	1430	19800	20700	19900	
LEAD	1.9	1	1.6	18.4 J	22.6 J	16.3 J	
MAGNESIUM	694	259	568	5320	6200	6270	
MANGANESE	22.4	3.1	8.6	128	177	218	
MERCURY	0.02 U	0.03 U	0.02 U	0.07 U	0.1	0.1	
NICKEL	0.58	0.1 U	0.67	10.9 U	11.8 U	10.4 U	
POTASSIUM	389	133	328	2680	3210	2830	
SELENIUM	0.19 U	0.17 U	0.19 U	0.76 U	1.2 U	0.19 U	
SILVER	0.07 U	0.06 U	0.07 U	0.87 U	1.9 U	1.5 U	
SODIUM	2180	1670	2180	13200	20500	17600	
THALLIUM	0.18 U	0.16 U	0.17 U	0.41	0.61 U	0.49 U	
VANADIUM	5.2	1.3	3.9	47	46.6	44.9	
ZINC	3.5	0.63 U	2.9	45.8	42.2	40.2	
MISCELLANEOUS PARAMETERS ()							
ACID VOLATILE SULFIDE (UMOLE/G)				7.9	16	13	
TOTAL ORGANIC CARBON (%)	0.47	0.2	0.23 U	2.8	3	2.7	

PARRIS ISLAND

BACKGROUND UNFILTERED SURFACE WATER - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-01-SW-05 05/27/98 PAI-01-SW-05	PAI-01-SW-06 05/27/98 PAI-01-SW-06	PAI-01-SW-07 05/27/98 PAI-01-SW-07	PAI-10-SW-016-01 09/10/98 PAI-01-SW-016	PAI-10-SW-017-01 09/10/98 PAI-01-SW-017	PAI-10-SW-018-01 09/10/98 PAI-01-SW-018	/ /
VOLATILES (ug/L)							
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
1,1-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
1,2-DICHLOROETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
1,2-DICHLOROETHENE (TOTAL)	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
2-BUTANONE	2 UR	2 UR	2 UR	5 UR	5 UR	5 UR	
2-HEXANONE	2 U	2 U	2 U	5 UR	5 UR	5 UR	
4-METHYL-2-PENTANONE	2 U	2 U	2 U	5 UR	5 UR	5 UR	
ACETONE	2 UR	2 UR	2 UR	5 U	5 U	5 UR	
BENZENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
BROMODICHLOROMETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
BROMOFORM	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
BROMOMETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
CARBON DISULFIDE	2 U	2 U	2 U	1 U	1 U	1 U	
CARBON TETRACHLORIDE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
CHLOROBENZENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
CHLOROETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
CHLOROFORM	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
CHLOROMETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	0.3 J	
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
DIBROMOCHLOROMETHANE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
ETHYLBENZENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
METHYLENE CHLORIDE	0.5 U	0.5 U	0.5 U	2 U	2 U	2 U	
STYRENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
TETRACHLOROETHENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	

PARRIS ISLAND

BACKGROUND UNFILTERED SURFACE WATER - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-01-SW-05 05/27/98 PAI-01-SW-05	PAI-01-SW-06 05/27/98 PAI-01-SW-06	PAI-01-SW-07 05/27/98 PAI-01-SW-07	PAI-10-SW-016-01 09/10/98 PAI-01-SW-016	PAI-10-SW-017-01 09/10/98 PAI-01-SW-017	PAI-10-SW-018-01 09/10/98 PAI-01-SW-018	/ /
VOLATILES (µg/L)							
TOLUENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
TRICHLOROETHENE	0.5 U	0.5 U	0.5 U	1 U	1 U	1 U	
VINYL CHLORIDE	0.5 U	0.5 U	0.5 U	0.3 U	0.3 U	0.3 U	
XYLENES, TOTAL	1	0.5 U	0.5 U	1 U	1 U	1 U	
SEMIVOLATILES (µg/L)							
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	5 U	5 U	5 U	
1,2-DICHLOROBENZENE	10 U	10 U	10 U	5 U	5 U	5 U	
1,3-DICHLOROBENZENE	10 U	10 U	10 U	5 U	5 U	5 U	
1,4-DICHLOROBENZENE	10 U	10 U	10 U	5 U	5 U	5 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U	10 U	10 U	5 U	5 U	5 U	
2,4,5-TRICHLOROPHENOL	49 U	50 U	52 U	5 U	5 U	5 U	
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	5 U	5 U	5 U	
2,4-DICHLOROPHENOL	10 U	10 U	10 U	5 U	5 U	5 U	
2,4-DIMETHYLPHENOL	10 U	10 U	10 U	5 U	5 U	5 U	
2,4-DINITROPHENOL	49 U	50 U	52 U	10 U	10 U	10 U	
2,4-DINITROTOLUENE	10 U	10 U	10 U	5 U	5 U	5 U	
2,6-DINITROTOLUENE	10 U	10 U	10 U	5 U	5 U	5 U	
2-CHLORONAPHTHALENE	10 U	10 U	10 U	5 U	5 U	5 U	
2-CHLOROPHENOL	10 U	10 U	10 U	5 U	5 U	5 U	
2-METHYLNAPHTHALENE	10 U	10 U	10 U	5 U	5 U	5 U	
2-METHYLPHENOL	10 U	10 U	10 U	5 U	5 U	5 U	
2-NITROANILINE	49 U	50 U	52 U	5 U	5 U	5 U	
2-NITROPHENOL	10 U	10 U	10 U	5 U	5 U	5 U	
3,3'-DICHLOROBENZIDINE	20 U	20 U	21 U	5 U	5 U	5 U	
3-NITROANILINE	49 U	50 U	52 U	5 U	5 U	5 U	
4,6-DINITRO-2-METHYLPHENOL	49 U	50 U	52 U	10 U	10 U	10 U	
4-BROMOPHENYL PHENYL ETHER	10 U	10 U	10 U	5 U	5 U	5 U	

PARRIS ISLAND

BACKGROUND UNFILTERED SURFACE WATER - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-01-SW-05 05/27/98 PAI-01-SW-05	PAI-01-SW-06 05/27/98 PAI-01-SW-06	PAI-01-SW-07 05/27/98 PAI-01-SW-07	PAI-10-SW-016-01 09/10/98 PAI-01-SW-016	PAI-10-SW-017-01 09/10/98 PAI-01-SW-017	PAI-10-SW-018-01 09/10/98 PAI-01-SW-018	/ /
SEMIVOLATILES (µg/L)							
4-CHLORO-3-METHYLPHENOL	20 U	20 U	21 U	5 U	5 U	5 U	
4-CHLOROANILINE	10 U	10 U	10 U	5 U	5 U	5 U	
4-CHLOROPHENYL PHENYL ETHER	10 U	10 U	10 U	5 U	5 U	5 U	
4-METHYLPHENOL	10 U	10 U	10 U	5 U	5 U	5 U	
4-NITROANILINE	49 U	50 U	52 U	5 U	5 U	5 U	
4-NITROPHENOL	49 U	50 U	52 U	10 U	10 U	10 U	
ACENAPHTHENE	2.6 U	2.5 U	2.4 U	5 U	5 U	5 U	
ACENAPHTHYLENE	1.3 U	1.2 U	1.2 U	5 U	5 U	5 U	
ANTHRACENE	0.05 U	0.05 U	0.05 U	5 U	5 U	5 U	
BENZO(A)ANTHRACENE	0.13 U	0.12 U	0.12 U	5 U	5 U	5 U	
BENZO(A)PYRENE	0.13 U	0.12 U	0.12 U	5 U	5 U	5 U	
BENZO(B)FLUORANTHENE	0.05 U	0.05 U	0.05 U	5 U	5 U	5 U	
BENZO(G,H,I)PERYLENE	0.2 U	0.2 U	0.2 U	5 U	5 U	5 U	
BENZO(K)FLUORANTHENE	0.05 U	0.05 U	0.05 U	5 U	5 U	5 U	
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U	10 U	5 U	5 U	5 U	
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U	5 U	5 U	5 U	
BIS(2-ETHYLHEXYL)PHTHALATE	2 J	10 U	120	5 U	5 U	5 U	
BUTYLBENZYL PHTHALATE	10 U	10 U	10 U	5 U	5 U	5 U	
CARBAZOLE	10 U	10 U	10 U	5 U	5 U	5 U	
CHRYSENE	0.13 U	0.12 U	0.12 U	5 U	5 U	5 U	
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	5 U	5 U	5 U	
DI-N-OCTYL PHTHALATE	10 U	10 U	10 U	5 U	5 U	5 U	
DIBENZO(A,H)ANTHRACENE	0.05 U	0.5 U	0.49 U	5 U	5 U	5 U	
DIBENZOFURAN	10 U	10 U	10 U	5 U	5 U	5 U	
DIETHYL PHTHALATE	10 U	10 U	10 U	5 U	5 U	5 U	
DIMETHYL PHTHALATE	10 U	10 U	10 U	5 U	5 U	5 U	
FLUORANTHENE	0.13 U	0.12 U	0.12 U	5 U	5 U	5 U	
FLUORENE	0.26 U	0.25 U	0.24 U	5 U	5 U	5 U	

PARRIS ISLAND

BACKGROUND UNFILTERED SURFACE WATER - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-01-SW-05 05/27/98 PAI-01-SW-05	PAI-01-SW-06 05/27/98 PAI-01-SW-06	PAI-01-SW-07 05/27/98 PAI-01-SW-07	PAI-10-SW-016-01 09/10/98 PAI-01-SW-016	PAI-10-SW-017-01 09/10/98 PAI-01-SW-017	PAI-10-SW-018-01 09/10/98 PAI-01-SW-018	/ /
SEMIVOLATILES (µg/L)							
HEXACHLOROBENZENE	10 U	10 U	10 U	5 U	5 U	5 U	
HEXACHLOROBUTADIENE	10 U	10 U	10 U	5 U	5 U	5 U	
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	10 U	5 U	5 U	5 U	
HEXACHLOROETHANE	10 U	10 U	10 U	5 U	5 U	5 U	
INDENO(1,2,3-CD)PYRENE	0.097 J	0.099 J	0.099 J	5 U	5 U	5 U	
ISOPHORONE	10 U	10 U	10 U	5 U	5 U	5 U	
N-NITROSO-DI-N-PROPYLAMINE	10 U	10 U	10 U	5 U	5 U	5 U	
N-NITROSODIPHENYLAMINE	10 U	10 U	10 U	5 U	5 U	5 U	
NAPHTHALENE	1.3 U	1.2 U	1.2 U	5 U	5 U	5 U	
NITROBENZENE	10 U	10 U	10 U	5 U	5 U	5 U	
PENTACHLOROPHENOL	49 U	50 U	52 U	10 U	10 U	10 U	
PHENANTHRENE	0.1 U	0.099 U	0.098 U	5 U	5 U	5 U	
PHENOL	10 U	10 U	10 U	5 U	5 U	5 U	
PYRENE	0.26 U	0.25 U	0.24 U	5 U	5 U	5 U	
PESTICIDES/PCBs (µg/L)							
4,4'-DDD	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
4,4'-DDE	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
4,4'-DDT	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
ALDRIN	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
ALPHA-BHC	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
ALPHA-CHLORDANE	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
AROCLOR-1016	0.25 U	0.24 U	0.26 U	1 U	1 U	1 U	
AROCLOR-1221	0.25 U	0.24 U	0.26 U	2 U	2 U	2 U	
AROCLOR-1232	0.25 U	0.24 U	0.26 U	1 U	1 U	1 U	
AROCLOR-1242	0.25 U	0.24 U	0.26 U	1 U	1 U	1 U	
AROCLOR-1248	0.25 U	0.24 U	0.26 U	1 U	1 U	1 U	
AROCLOR-1254	0.25 U	0.24 U	0.26 U	1 U	1 U	1 U	
AROCLOR-1260	0.25 U	0.24 U	0.26 U	1 U	1 U	1 U	

PARRIS ISLAND

BACKGROUND UNFILTERED SURFACE WATER - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-01-SW-05 05/27/98 PAI-01-SW-05	PAI-01-SW-06 05/27/98 PAI-01-SW-06	PAI-01-SW-07 05/27/98 PAI-01-SW-07	PAI-10-SW-016-01 09/10/98 PAI-01-SW-016	PAI-10-SW-017-01 09/10/98 PAI-01-SW-017	PAI-10-SW-018-01 09/10/98 PAI-01-SW-018	/ /
PESTICIDES/PCBs (µg/L)							
BETA-BHC	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
DELTA-BHC	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
DIELDRIN	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
ENDOSULFAN I	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
ENDOSULFAN II	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
ENDOSULFAN SULFATE	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
ENDRIN	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
ENDRIN ALDEHYDE	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
ENDRIN KETONE	0.05 U	0.049 U	0.051 U	0.1 U	0.1 U	0.1 U	
GAMMA-BHC (LINDANE)	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
GAMMA-CHLORDANE	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
HEPTACHLOR	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
HEPTACHLOR EPOXIDE	0.025 U	0.024 U	0.026 U	0.05 U	0.05 U	0.05 U	
METHOXYCHLOR	0.25 U	0.24 U	0.26 U	0.5 U	0.5 U	0.5 U	
TOXAPHENE	0.5 U	0.49 U	0.51 U	5 U	5 U	5 U	
INORGANICS (µg/L)							
ALUMINUM	172 U	316 U	160 U	966	1490	6560	
ANTIMONY	1.8 U	1.7 U	1.7 U	19 U	19 U	19 U	
ARSENIC	2 U	2 U	2 U	4.5 U	4.5 U	7.9	
BARIUM	12.7	13.1	12.2	23.7	24.6	29	
BERYLLIUM	0.2 U	0.2 U	0.2 U	0.4 U	0.6 U	0.8 U	
CADMIUM	0.3 U	0.3 U	0.3 U	2 U	2 U	2 U	
CALCIUM	249000	241000	244000	392000	393000	392000	
CHROMIUM	0.7 U	0.7 U	0.7 U	20.2	23.5	22.8	
COBALT	0.6 U	0.6 U	0.6 U	3.7 U	3.3 U	3.3 U	
COPPER	2.8 U	3.2 U	3.6 U	4.7	4.7	6.7	
CYANIDE	10 U	10 U	10 U	20 U	20 U	20 U	
IRON	16.6 U	248	33.2 U	584	885	4530	

PARRIS ISLAND

BACKGROUND UNFILTERED SURFACE WATER - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-01-SW-05 05/27/98 PAI-01-SW-05	PAI-01-SW-06 05/27/98 PAI-01-SW-06	PAI-01-SW-07 05/27/98 PAI-01-SW-07	PAI-10-SW-016-01 09/10/98 PAI-01-SW-016	PAI-10-SW-017-01 09/10/98 PAI-01-SW-017	PAI-10-SW-018-01 09/10/98 PAI-01-SW-018	/ /
INORGANICS (µg/L)							
LEAD	1 U	1 U	1 U	11 U	11 U	11 U	
MAGNESIUM	703000	680000	683000	1230000	1230000	1230000	
MANGANESE	8.1 U	21.9	3.2 U	17.6	27.3	86.8	
MERCURY	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	0.2 U	
NICKEL	1 U	1 U	1 U	4.4 U	4.4 U	4.4 U	
POTASSIUM	485000	477000	304000	409000	414000	405000	
SELENIUM	1.7 U	1.7 U	1.7 U	7 U	7 U	7 U	
SILVER	0.6 U	0.6 U	0.6 U	86 U	86 U	86 U	
SODIUM	6060000	6260000	6060000	10100000	10100000	10100000	
THALLIUM	1.6 U	1.6 U	1.6 U	18 U	18 U	18 U	
VANADIUM	0.5 U	0.51 U	1.6 U	13.9	13.6	25.9	
ZINC	5.5 U	5.9 U	3.6 U	11.9	4.3 U	10.3	
MISCELLANEOUS PARAMETERS (mg/L)							
HARDNESS as CaCO3	3520	3400	3420	6300	6300	6300	
SALINITY (PSU)		24.6 J	24.5 J				
TOTAL ORGANIC CARBON	6.8	5 U	5 U	3.6	2.4	2.6	

PARRIS ISLAND

BACKGROUND FILTERED SURFACE WATER - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-01-SW-05-F 05/27/98 PAI-01-SW-05	PAI-01-SW-06-F 05/27/98 PAI-01-SW-06	PAI-01-SW-07-F 05/27/98 PAI-01-SW-07	PAI-10-SW-016-01-F 09/10/98 PAI-10-SW-016	PAI-10-SW-017-01-F 09/10/98 PAI-10-SW-017	PAI-10-SW-018-01-F 09/10/98 PAI-10-SW-018	/ /
INORGANICS (µg/L)							
ALUMINUM	57.5 U	60.6 U	99.4 U	22 U	22 U	22 U	
ANTIMONY	1.8 U	1.7 U	1.7 U	19 U	19 U	19 U	
ARSENIC	2 U	2 U	2 U	4.5 U	4.5 U	5.3	
BARIUM	233	234	233	20.3	24.3	23.9	
BERYLLIUM	0.2 U	0.2 U	0.2 U	0.5 U	0.6 U	0.6 U	
CADMIUM	0.3 U	0.3 U	0.3 U	2 U	2 U	2 U	
CALCIUM	249000	254000	255000	382000	398000	398000	
CHROMIUM	0.7 U	0.7 U	0.7 U	20.7	17.1	21.7	
COBALT	0.6 U	0.6 U	0.6 U	3.3 U	3.3 U	3.7 U	
COPPER	2.6 U	55.9 U	4.7 U	2.6 U	2.6 U	5.1	
IRON	16.6 U	16.6 U	16.6 U	8 U	8 U	22	
LEAD	10.3	5 U	5 U	11 U	11 U	11 U	
MAGNESIUM	697000	709000	708000	1210000	1210000	1220000	
MANGANESE	0.4 U	5.3 U	1.6 U	13.1	18.5	20.1	
MERCURY	0.1 U	0.1 U	0.1 U	0.2 U	0.2 U	0.2 U	
NICKEL	1 U	1 U	1 U	4.4 U	4.4 U	4.4 U	
POTASSIUM	473000	492000	478000	396000	418000	415000	
SELENIUM	1.7 U	1.7 U	1.7 U	7 U	7 U	7 U	
SILVER	0.6 U	0.6 U	0.6 U	86 U	86 U	86 U	
SODIUM	6150000	6110000	5760000	9850000	9990000	10100000	
THALLIUM	1.6 U	1.6 U	1.6 U	18 U	18 U	18 U	
VANADIUM	0.5 U	0.5 U	0.5 U	13.8	15.5	13.9	
ZINC	58.6	86.7	45.7	4.1 U	4.1 U	4.1 U	

C-2

SEDIMENT – Site 1

site 01
summary of analytical results
sediment

order	01	02	03	04	05	06	07	08	09	10	11
location	JONNET	PAI-01-SD-01	JONNET	JONNET	JONNET	JONNET	JONNET	JONNET	PAI-01-SD-02	PAI-01-SD-02	PAI-01-SD-03
matrix	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
nsample	PAI-01-SD-001	PAI-01-SD-01-01	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	PAI-01-SD-02-01	PAI-01-SD-02-02	PAI-01-SD-03-01
sample	PAI-01-SD-001	PAI-01-SD-001-01	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	PAI-01-SD-002-01	PAI-01-SD-002-02	PAI-01-SD-003-01
sample_dat	21-Apr-99	10-Jun-98	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	10-Jun-98	14-Sep-98	10-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10	c_11
Volatile Organics (ug/kg)											
1,1,1-TRICHLOROETHANE	33 U	6 U							8 U	1200 U	12 U
1,1,2,2-TETRACHLOROETHANE	33 U	6 U							8 U	1200 U	12 U
1,1,2-TRICHLOROETHANE	33 U	6 U							8 U	1200 U	12 U
1,1-DICHLOROETHANE	33 U	6 U							8 U	1200 U	12 U
1,1-DICHLOROETHENE	33 U	6 U							8 U	1200 U	12 U
1,2-DICHLOROETHANE	33 U	6 U							8 U	1200 U	12 U
1,2-DICHLOROETHENE (TOTAL)	33 U	6 U							8 U	1200 U	12 U
1,2-DICHLOROPROPANE	33 U	6 U							8 U	1200 U	12 U
2-BUTANONE	33 U	6 U							8 U	1200 U	12 U
2-HEXANONE	33 U	6 U							8 U	2000 U	12 U
4-METHYL-2-PENTANONE	33 U	6 U							8 U	2000 U	12 U
ACETONE	33 UR	6 UR							8 U	2000 U	12 U
BENZENE	33 U	6 U							8 UR	2000 UR	16
BROMODICHLOROMETHANE	33 U	6 U							8 U	1200 U	12 U
BROMOFORM	33 U	6 U							8 U	1200 U	12 U
BROMOMETHANE	33 U	6 U							8 U	1200 U	12 U
CARBON DISULFIDE	24 J	6 U							8 U	1200 U	12 U
CARBON TETRACHLORIDE	33 U	6 U							7 J	1200 U	14
CHLOROBENZENE	33 U	6 U							8 U	1200 U	12 U
CHLOROETHANE	33 U	6 U							8 U	1200 U	12 U
CHLOROFORM	33 U	6 U							8 U	1200 U	12 U
CHLOROMETHANE	33 U	6 U							8 U	1200 U	12 U
CIS-1,3-DICHLOROPROPENE	33 U	6 U							8 U	1200 U	12 U
DIBROMOCHLOROMETHANE	33 U	6 U							8 U	1200 U	12 U
ETHYLBENZENE	33 U	6 U							8 U	1200 U	12 U
METHYLENE CHLORIDE	33 U	6 U							8 U	1200 U	12 U
STYRENE	33 U	6 U							8 U	1200 U	12 U
TETRACHLOROETHENE	33 U	6 U							8 U	1200 U	12 U
TOLUENE	33 U	2 J							8 U	1200 U	12 U
TRANS-1,3-DICHLOROPROPENE	33 U	6 U							3 J	1200 U	5 J
TRICHLOROETHENE	33 U	6 U							8 U	1200 U	12 U
VINYL CHLORIDE	33 U	6 U							8 U	1200 U	12 U
XYLENES, TOTAL	33 U	6 U							8 U	1200 U	12 U
Semivolatile Organics (ug/kg)											
1,2,4-TRICHLOROBENZENE	1200 U	450 U							520 U	850 U	650 U
1,2-DICHLOROBENZENE	1200 U	450 U							520 U	850 U	650 U
1,3-DICHLOROBENZENE	1200 U	450 U							520 U	850 U	650 U
1,4-DICHLOROBENZENE	1200 U	450 U							520 U	850 U	650 U
2,2'-OXYBIS(1-CHLOROPROPANE)	1200 U	450 U							520 U	850 U	650 U
2,4,5-TRICHLOROPHENOL	6000 U	2200 U							2600 U	850 U	3300 U
2,4,6-TRICHLOROPHENOL	1200 U	450 U							520 U	850 U	650 U
2,4-DICHLOROPHENOL	1200 U	450 U							520 U	850 U	650 U
2,4-DIMETHYLPHENOL	1200 U	450 U							520 U	850 U	650 U
2,4-DINITROPHENOL	6000 U	2200 U							2600 U	1700 U	3300 U
2,4-DINITROTOLUENE	1200 U	450 U							520 U	850 U	650 U
2,6-DINITROTOLUENE	1200 U	450 U							520 U	850 U	650 U

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site 01
summary of analytical results
sediment

order	01	02	03	04	05	06	07	08	09	10	11
location	JONNET	PAI-01-SD-01	JONNET	JONNET	JONNET	JONNET	JONNET	JONNET	PAI-01-SD-02	PAI-01-SD-02	PAI-01-SD-03
matrix	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
nsample	PAI-01-SD-001	PAI-01-SD-01-01	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	PAI-01-SD-02-01	PAI-01-SD-02-02	PAI-01-SD-03-01
sample	PAI-01-SD-001	PAI-01-SD-001-01	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	PAI-01-SD-002-01	PAI-01-SD-002-02	PAI-01-SD-003-01
sample_dat	21-Apr-99	10-Jun-98	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	10-Jun-98	14-Sep-98	10-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10	c_11
2-CHLORONAPHTHALENE	1200 U	450 U							520 U	850 U	650 U
2-CHLOROPHENOL	1200 U	450 U							520 U	850 U	650 U
2-METHYLNAPHTHALENE	1200 U	450 U							520 U	850 U	650 U
2-METHYLPHENOL	1200 U	450 U							520 U	850 U	650 U
2-NITROANILINE	6000 U	2200 U							2600 U	850 U	3300 U
2-NITROPHENOL	1200 U	450 U							520 U	850 U	650 U
3,3'-DICHLOROBENZIDINE	2400 U	900 U							1000 U	850 U	1300 U
3-NITROANILINE	6000 U	2200 U							2600 U	850 U	3300 U
4,6-DINITRO-2-METHYLPHENOL	6000 U	2200 U							2600 U	1700 U	3300 U
4-BROMOPHENYL PHENYL ETHER	1200 U	450 U							520 U	850 U	650 U
4-CHLORO-3-METHYLPHENOL	1200 U	900 U							1000 U	850 U	1300 U
4-CHLOROANILINE	1200 U	900 U							1000 U	850 U	1300 U
4-CHLOROPHENYL PHENYL ETHER	1200 U	450 U							520 U	850 U	650 U
4-METHYLPHENOL	1200 U	450 U							520 U	850 U	650 U
4-NITROANILINE	6000 U	2200 U							2600 U	850 U	3300 U
4-NITROPHENOL	6000 U	2200 U							2600 U	1700 U	3300 U
ACENAPHTHENE	1200 U	560 U	310 U	320 UJ	230 U	260 U	140 U	7300 U	1300 U	850 U	1600 U
ACENAPHTHYLENE	1200 U	280 U	150 U	160 UJ	120 U	130 U	71 U	3600 U	380 J	850 U	810 U
ANTHRACENE	770	11 U	6.2 U	6.5 UJ	4.7 U	5.2 U	2.8 U	540	47	850 U	240
BENZO(A)ANTHRACENE	1200	13 J	15 U	16 UJ	12 U	13 U	7.1 U	2200	250	850 U	730
BENZO(A)PYRENE	980	22 J	15 U	16 UJ	12 U	7.8 J	7.1 U	1700	260	850 U	770
BENZO(B)FLUORANTHENE	940	22	6.2 U	6.5 UJ	4.7 U	10	2.8 U	1800	270	850 U	720
BENZO(G,H,I)PERYLENE	550	45 U	25 U	26 UJ	19 U	21 U	11 U	990	160	850 U	440
BENZO(K)FLUORANTHENE	410	6.7 J	6.2 U	6.5 UJ	4.7 U	3.1 J	2.8 U	850	84	850 U	240
BIS(2-CHLOROETHOXY)METHANE	1200 U	450 U							520 U	850 U	650 U
BIS(2-CHLOROETHYL)ETHER	1200 U	450 U							520 U	850 U	650 U
BIS(2-ETHYLHEXYL)PHTHALATE	1200 U	450 U							520 U	850 U	650 U
BUTYLBENZYL PHTHALATE	1200 U	450 U							520 U	850 U	650 U
CARBAZOLE	1200 U	450 U							580	850 U	270 J
CHRYSENE	1100	40	15 U	16 UJ	12 U	13 U	7.1 U	2300	370	850 U	1000
DI-N-BUTYL PHTHALATE	1200 U	450 U							520 U	850 U	650 U
DI-N-OCTYL PHTHALATE	1200 U	450 U							520 U	850 U	650 U
DIBENZO(A,H)ANTHRACENE	480 U	110 U	25 U	26 UJ	19 U	21 U	11 U	1600	260 U	850 U	320 U
DIBENZOFURAN	1200 U	450 U							520 U	850 U	650 U
DIETHYL PHTHALATE	1200 U	450 U							520 U	850 U	650 U
DIMETHYL PHTHALATE	1200 U	450 U							520 U	850 U	650 U
FLUORANTHENE	3200	44	15 U	16 UJ	12 U	25	7.1 U	6600	590	850 U	1500
FLUORENE	590 U	56 U	31 U	32 UJ	23 U	26 U	14 U	730 U	130 U	850 U	160 J
HEXACHLOROBENZENE	1200 U	450 U							520 U	850 U	650 U
HEXACHLOROBUTADIENE	1200 U	450 U							520 U	850 U	650 U
HEXACHLOROCYCLOPENTADIENE	1200 U	450 U							520 U	850 U	650 U
HEXACHLOROETHANE	1200 U	450 U							520 U	850 U	650 U
INDENO(1,2,3-CD)PYRENE	620	17 J	15 U	16 UJ	12 U	13 U	7.1 U	1100	170	850 U	480
ISOPHORONE	1200 U	450 U							520 U	850 U	650 U
N-NITROSO-DI-N-PROPYLAMINE	1200 U	450 U							520 U	850 U	650 U
N-NITROSODIPHENYLAMINE	1200 U	450 U							520 U	850 U	650 U
NAPHTHALENE	1200 U	280 U	150 U	160 UJ	120 U	130 U	71 U	3600 U	660 U	850 U	810 U

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site 01
summary of analytical results
sediment

order	01	02	03	04	05	06	07	08	09	10	11
location	JONNET	PAI-01-SD-01	JONNET	JONNET	JONNET	JONNET	JONNET	JONNET	PAI-01-SD-02	PAI-01-SD-02	PAI-01-SD-03
matrix	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
nsample	PAI-01-SD-001	PAI-01-SD-01-01	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	PAI-01-SD-02-01	PAI-01-SD-02-02	PAI-01-SD-03-01
sample	PAI-01-SD-001	PAI-01-SD-001-01	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	PAI-01-SD-002-01	PAI-01-SD-002-02	PAI-01-SD-003-01
sample_dat	21-Apr-99	10-Jun-98	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	10-Jun-98	14-Sep-98	10-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10	c_11
NITROBENZENE	1200 U	450 U							520 U	850 U	650 U
PENTACHLOROPHENOL	6000 U	2200 U							2600 U	1700 U	3300 U
PHENANTHRENE	2600	18 J	12 U	13 UJ	9.3 U	10 U	5.7 U	1500	160	850 U	1100
PHENOL	1200 U										
PYRENE	3200	38 J	31 U	32 UJ	23 U	26 U	14 U	5400	420	850 U	1100
TOTAL PHENOL		450 U							520 U	850 U	650 U
Pesticides/PCBs (ug/kg)											
4,4'-DDD	30 U	7.6	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	20	8.5 U	16 U
4,4'-DDE	22 J	47	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	24	8.5 U	16 U
4,4'-DDT	30 UR	11	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	3.2 J	8.5 U	16 U
ALDRIN	15 U	2.2 U	15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U	2.7 U	4.4 U	8.1 U
ALPHA CHLORDANE	15 U		15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U			
ALPHA-BHC	15 U	2.2 U	15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U	2.7	4.4 U	8.1 U
ALPHA-CHLORDANE		6.7							2.7 U	4.4 U	8.1 U
AROCLOR-1016	150 U	11 U							13 U	85 U	16 U
AROCLOR-1221	150 U	11 U							13 U	170 U	16 U
AROCLOR-1232	150 U	11 U							13 U	85 U	16 U
AROCLOR-1242	150 U	11 U							13 U	85 U	16 U
AROCLOR-1248	150 U	11 U							13 U	85 U	16 U
AROCLOR-1254	150 U	11 U							13 U	85 U	16 U
AROCLOR-1260	150 U	11 U							13 U	85 U	16 U
BETA-BHC	15 U	2.2 U	15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U	5.4	4.4 U	8.1 U
DELTA-BHC	15 U	2.2 U	15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U	2.7	4.4 U	8.1 U
DIELDRIN	30 U	4.5 U	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	5.4 U	8.5 U	16 U
ENDOSULFAN I	15 U	2.2 U	15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U	2.7 U	4.4 U	8.1 U
ENDOSULFAN II	30 U	4.5 U	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	5.4 U	8.5 U	16 U
ENDOSULFAN SULFATE	30 U	4.5 U	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	5.4 U	8.5 U	16 U
ENDRIN	30 U	4.5 U	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	5.4 U	8.5 U	16 U
ENDRIN ALDEHYDE	30 U	4.5 U	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	5.4 U	8.5 U	16 U
ENDRIN KETONE	30 U	4.5 U	31 U	33 U	9.3 U	10 U	5.7 U	5.8 U	5.4 U	8.5 U	16 U
GAMMA-BHC (LINDANE)	15 U	2.2 U	15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U	2.1 J	4.4 U	8.1 U
GAMMA-CHLORDANE	15 U	7.6	15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U	2.7 U	4.4 U	8.1 U
HEPTACHLOR	15 U	2.2 U	15 U	16 U	4.6 U	5.2 U	2.9 U	2.9 U	2.7 U	4.4 U	8.1 U
HEPTACHLOR EPOXIDE	15 U	2.2 U	15 U	16 U	4.6 U	5.2 U	2.9 U	7 R	2.7 U	4.4 U	8.1 U
METHOXYCHLOR	150 U	22 U	150 U	160 U	46 U	52 U	29 U	29 U	27 U	44 U	81 U
TOXAPHENE	300 U	45 U	310 U	330 U	93 U	100 U	57 U	58 U	54 U	440 U	160 U
Inorganics (mg/kg)											
ALUMINUM	16200		14300	18600	10900	13800	4050	5000	4750	23400	7830
ANTIMONY	1.3		0.82 U	0.87	0.71	0.74 U	0.55	0.39 U	0.6 U	6 U	1.6 U
ARSENIC	7.2		10.8	11.5	6.8	12.6	3	4.3	1.7	11.7	3.6
BARIUM	30.6		19.5	23.6	13.7	17.2	6.1	7.5	14.1	26.1	65.7
BERYLLIUM	0.61 U		0.99	0.85 U	0.56 U	0.79 U	0.17 U	0.24 U	0.29 U	1.1	0.43 U
CADMIUM	0.09 U		0.09 U	0.09 U	0.07 U	0.08 U	0.04 U	0.04 U	0.04 U	0.79	0.05 U
CALCIUM	3500		2620	2660	2620	2270	922	1330	727	3250	1130
CHROMIUM	32.2		31.1	37.2	22.6	27.9	9.3	10.7	9.1	30	21.8
COBALT	3.1		3.5	4.1	1.9	3.3	0.78	1.3	0.77	5.7 U	1.4
COPPER	95.3		13.5	16.6	8.7	10.4	3.3 U	18.3	28	8.7	58.3

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site 01
summary of analytical results
sediment

order	01	02	03	04	05	06	07	08	09	10	11
location	JONNET	PAI-01-SD-01	JONNET	JONNET	JONNET	JONNET	JONNET	JONNET	PAI-01-SD-02	PAI-01-SD-02	PAI-01-SD-03
matrix	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD	SD
nsample	PAI-01-SD-001	PAI-01-SD-01-01	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	PAI-01-SD-02-01	PAI-01-SD-02-02	PAI-01-SD-03-01
sample	PAI-01-SD-001	PAI-01-SD-001-01	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	PAI-01-SD-002-01	PAI-01-SD-002-02	PAI-01-SD-003-01
sample_dat	21-Apr-99	10-Jun-98	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	21-Apr-99	10-Jun-98	14-Sep-98	10-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10	c_11
CYANIDE									0.45 U	1 U	0.78 U
IRON	23100		20700	23500	16100	20400	5500	7990	5740	24000	10500
LEAD	88.5		24.4	28	13.8	16.2	6.6	16.5	48.5	14.2 J	138
MAGNESIUM	6740		6620	8090	4970	5750	2090	2170	1460	5980	2050
MANGANESE	134		176	204	88.3	169	34.2	59.8	45.3	170	62.3
MERCURY	0.16		0.19 U	0.17 U	0.14 U	0.13 U	0.07 U	0.08 U	0.19 U	0.1 U	0.11 U
NICKEL	7.9		6.5	8.4	4.5	6.3	1.5	2.4	2.1	11.3 U	4.3
POTASSIUM	4020		3880	5070	2980	3240	1210	1200	946	3220	1350
SELENIUM	1.3 U		1.8 U	1.7 U	0.56 U	1.3 U	0.89 U	0.53 U	0.28 U	0.78 U	0.45 U
SILVER	0.39 U		0.12 U	0.12 U	0.17 U	0.11 U	0.06 U	0.06 U	0.09 U	1.1 U	0.31
SODIUM	23500		22000	29100	18900	19800	8430	7880	6040	15500	8070
THALLIUM	1.1 U		1.1 U	1.3	0.83 U	0.98 U	0.53 U	0.51 U	0.39 U	0.4 U	0.49 U
VANADIUM	42.3		46.1	55.2	29.2	40	12.7	14.4	11.4	47.8	20.4
ZINC	97.6		39.5	45.7	28.9	37.9	11.7	20.1	29.7	43.2	86
AVS/SEM Inorganics (umole/g)											
CADMIUM										0.0006 U	
COPPER										0.005 U	
LEAD										0.014	
MERCURY										0.15 U	
NICKEL										0.008	
ZINC										0.75	
Miscellaneous Parameters (mg/kg)											
ACID VOLATILE SULFIDE (umoles/G)										5.7 UMOLES/G	
CYANIDE	1.8 U										
PH	7.5	7.3 NONE							8 NONE	8.3 NONE	7.6 NONE
TOTAL ORGANIC CARBON											
TOTAL ORGANIC CARBON (%)	2.94 %	0.8 %							1.4 %	2.1 %	2.5 %

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site 01
summary of analytical results
sediment

order	12	13	14	15	16	17
location	PAI-01-SD-03	PAI-01-SD-04	PAI-01-SD-09	PAI-01-SD-10	PAI-01-SD-11	PAI-01-SD-12
matrix	SD	SD	SD	SD	SD	SD
nsample	PAI-01-SD-03-01-D	PAI-01-SD-04-01	PAI-01-SD-09-01	PAI-01-SD-10-01	PAI-01-SD-11-01	PAI-01-SD-12-01
sample	PAI-01-SD-003-01-D	PAI-01-SD-004-01	PAI-01-SD-009-01	PAI-01-SD-010-01	PAI-01-SD-011-01	PAI-01-SD-012-01
sample_dat	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98
sort	c_12	c_13	c_14	c_15	c_16	c_17
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE	15 U	11 U	20 U	19 U	7 U	8 U
1,1,2,2-TETRACHLOROETHANE	15 U	11 U	20 U	19 U	7 U	8 U
1,1,2-TRICHLOROETHANE	15 U	11 U	20 U	19 U	7 U	8 U
1,1-DICHLOROETHANE	15 U	11 U	20 U	19 U	7 U	8 U
1,1-DICHLOROETHENE	15 U	11 U	20 U	19 U	7 U	8 U
1,2-DICHLOROETHANE	15 U	11 U	20 U	19 U	7 U	8 U
1,2-DICHLOROETHENE (TOTAL)	15 U	11 U	20 U	19 U	7 U	8 U
1,2-DICHLOROPROPANE	15 U	11 U	20 U	19 U	7 U	8 U
2-BUTANONE	15 U	11 U	20 U	19 U	7 U	8 U
2-HEXANONE	15 U	11 U	20 U	19 U	7 U	8 U
4-METHYL-2-PENTANONE	15 U	11 U	20 U	19 U	7 U	8 U
ACETONE	15 UR	32	63	19 UR	7 UR	8 UR
BENZENE	15 U	11 U	20 U	19 U	7 U	8 U
BROMODICHLOROMETHANE	15 U	11 U	20 U	19 U	7 U	8 U
BROMOFORM	15 U	11 U	20 U	19 U	7 U	8 U
BROMOMETHANE	15 U	11 U	20 U	19 U	7 U	8 U
CARBON DISULFIDE	10 J	15	18 J	19 U	2 J	8 U
CARBON TETRACHLORIDE	15 U	11 U	20 U	19 U	7 U	8 U
CHLOROBENZENE	15 U	11 U	20 U	19 U	7 U	8 U
CHLOROETHANE	15 U	11 U	20 U	19 U	7 U	8 U
CHLOROFORM	15 U	11 U	20 U	19 U	7 U	8 U
CHLOROMETHANE	15 U	11 U	20 U	19 U	7 U	8 U
CIS-1,3-DICHLOROPROPENE	15 U	11 U	20 U	19 U	7 U	8 U
DIBROMOCHLOROMETHANE	15 U	11 U	20 U	19 U	7 U	8 U
ETHYLBENZENE	15 U	11 U	20 U	19 U	7 U	8 U
METHYLENE CHLORIDE	15 U	11 U	20 U	19 U	7 U	8 U
STYRENE	15 U	11 U	20 U	19 U	7 U	8 U
TETRACHLOROETHENE	15 U	11 U	20 U	19 U	7 U	8 U
TOLUENE	8 J	6 J	7 J	19 U	3 J	5 J
TRANS-1,3-DICHLOROPROPENE	15 U	11 U	20 U	19 U	7 U	8 U
TRICHLOROETHENE	15 U	11 U	20 U	19 U	7 U	8 U
VINYL CHLORIDE	15 U	11 U	20 U	19 U	7 U	8 U
XYLENES, TOTAL	15 U	11 U	20 U	19 U	7 U	8 U
Semivolatile Organics (ug/kg)						
1,2,4-TRICHLOROBENZENE	780 U	580 U	970 U	840 U	460 U	470 U
1,2-DICHLOROBENZENE	780 U	580 U	970 U	840 U	460 U	470 U
1,3-DICHLOROBENZENE	780 U	580 U	970 U	840 U	460 U	470 U
1,4-DICHLOROBENZENE	780 U	580 U	970 U	840 U	460 U	470 U
2,2'-OXYBIS(1-CHLOROPROPANE)	780 U	580 U	970 U	840 U	460 U	470 U
2,4,5-TRICHLOROPHENOL	3900 U	2900 U	4900 U	4200 U	2300 U	2400 U
2,4,6-TRICHLOROPHENOL	780 U	580 U	970 U	840 U	460 U	470 U
2,4-DICHLOROPHENOL	780 U	580 U	970 U	840 U	460 U	470 U
2,4-DIMETHYLPHENOL	780 U	580 U	970 U	840 U	460 U	470 U
2,4-DINITROPHENOL	3900 U	2900 U	4900 U	4200 U	2300 U	2400 U
2,4-DINITROTOLUENE	780 U	580 U	970 U	840 U	460 U	470 U
2,6-DINITROTOLUENE	780 U	580 U	970 U	840 U	460 U	470 U

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site 01
summary of analytical results
sediment

order	12	13	14	15	16	17
location	PAI-01-SD-03	PAI-01-SD-04	PAI-01-SD-09	PAI-01-SD-10	PAI-01-SD-11	PAI-01-SD-12
matrix	SD	SD	SD	SD	SD	SD
nsample	PAI-01-SD-03-01-D	PAI-01-SD-04-01	PAI-01-SD-09-01	PAI-01-SD-10-01	PAI-01-SD-11-01	PAI-01-SD-12-01
sample	PAI-01-SD-003-01-D	PAI-01-SD-004-01	PAI-01-SD-009-01	PAI-01-SD-010-01	PAI-01-SD-011-01	PAI-01-SD-012-01
sample_dat	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98
sort	c_12	c_13	c_14	c_15	c_16	c_17
2-CHLORONAPHTHALENE	780 U	580 U	970 U	840 U	460 U	470 U
2-CHLOROPHENOL	780 U	580 U	970 U	840 U	460 U	470 U
2-METHYLNAPHTHALENE	780 U	580 U	970 U	840 U	460 U	470 U
2-METHYLPHENOL	780 U	580 U	970 U	840 U	460 U	470 U
2-NITROANILINE	3900 U	2900 U	4900 U	4200 U	2300 U	2400 U
2-NITROPHENOL	780 U	580 U	970 U	840 U	460 U	470 U
3,3'-DICHLOROBENZIDINE	1600 U	1200 U	1900 U	1700 U	910 U	950 U
3-NITROANILINE	3900 U	2900 U	4900 U	4200 U	2300 U	2400 U
4,6-DINITRO-2-METHYLPHENOL	3900 U	2900 U	4900 U	4200 U	2300 U	2400 U
4-BROMOPHENYL PHENYL ETHER	780 U	580 U	970 U	840 U	460 U	470 U
4-CHLORO-3-METHYLPHENOL	1600 U	1200 U	1900 U	1700 U	910 U	950 U
4-CHLOROANILINE	1600 U	1200 U	1900 U	1700 U	910 U	950 U
4-CHLOROPHENYL PHENYL ETHER	780 U	580 U	970 U	840 U	460 U	470 U
4-METHYLPHENOL	780 U	580 U	970 U	840 U	460 U	470 U
4-NITROANILINE	3900 U	2900 U	4900 U	4200 U	2300 U	2400 U
4-NITROPHENOL	3900 U	2900 U	4900 U	4200 U	2300 U	2400 U
ACENAPHTHENE	1900 U	730 U	1200 U	420 U	1100 U	590 U
ACENAPHTHYLENE	970 U	360 U	600 U	210 U	570 U	300 U
ANTHRACENE	59	15 U	24 U	8.5 U	30	11 J
BENZO(A)ANTHRACENE	360	30 J	50 J	21 U	150	46
BENZO(A)PYRENE	470	50	170	21 U	170	57
BENZO(B)FLUORANTHENE	410	52	170	8.1 J	150	54
BENZO(G,H,I)PERYLENE	270	58 U	100	34 U	89 J	30 J
BENZO(K)FLUORANTHENE	130 J	16	50	8.5 U	48	13
BIS(2-CHLOROETHOXY)METHANE	780 U	580 U	970 U	840 U	460 U	470 U
BIS(2-CHLOROETHYL)ETHER	780 U	580 U	970 U	840 U	460 U	470 U
BIS(2-ETHYLHEXYL)PHTHALATE	780 U	580 U	970 U	840 U	460 U	470 U
BUTYLBENZYL PHTHALATE	780 U	580 U	970 U	840 U	460 U	470 U
CARBAZOLE	780 U	580 U	970 U	840 U	86 J	470 U
CHRYSENE	490	60	95	13 J	250	75
DI-N-BUTYL PHTHALATE	780 U	580 U	970 U	840 U	460 U	470 U
DI-N-OCTYL PHTHALATE	780 U	580 U	970 U	840 U	460 U	470 U
DIBENZO(A,H)ANTHRACENE	390 U	150 U	240 U	85 U	230 U	120 U
DIBENZOFURAN	780 U	580 U	970 U	840 U	460 U	470 U
DIETHYL PHTHALATE	780 U	580 U	970 U	840 U	460 U	470 U
DIMETHYL PHTHALATE	780 U	580 U	970 U	840 U	460 U	470 U
FLUORANTHENE	680	80	150	21 U	360	100
FLUORENE	190 U	73 U	120 U	42 U	110 U	59 U
HEXACHLOROBENZENE	780 U	580 U	970 U	840 U	460 U	470 U
HEXACHLOROBUTADIENE	780 U	580 U	970 U	840 U	460 U	470 U
HEXACHLOROCYCLOPENTADIENE	780 U	580 U	970 U	840 U	460 U	470 U
HEXACHLOROETHANE	780 U	580 U	970 U	840 U	460 U	470 U
INDENO(1,2,3-CD)PYRENE	330	30 J	140	21 U	110	39
ISOPHORONE	780 U	580 U	970 U	840 U	460 U	470 U
N-NITROSO-DI-N-PROPYLAMINE	780 U	580 U	970 U	840 U	460 U	470 U
N-NITROSODIPHENYLAMINE	780 U	580 U	970 U	840 U	460 U	470 U
NAPHTHALENE	970 U	360 U	600 U	210 U	570 U	300 U

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order	12	13	14	15	16	17
location	PAI-01-SD-03	PAI-01-SD-04	PAI-01-SD-09	PAI-01-SD-10	PAI-01-SD-11	PAI-01-SD-12
matrix	SD	SD	SD	SD	SD	SD
nsample	PAI-01-SD-03-01-D	PAI-01-SD-04-01	PAI-01-SD-09-01	PAI-01-SD-10-01	PAI-01-SD-11-01	PAI-01-SD-12-01
sample	PAI-01-SD-003-01-D	PAI-01-SD-004-01	PAI-01-SD-009-01	PAI-01-SD-010-01	PAI-01-SD-011-01	PAI-01-SD-012-01
sample_dat	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98
sort	c_12	c_13	c_14	c_15	c_16	c_17
NITROBENZENE	780 U	580 U	970 U	840 U	460 U	470 U
PENTACHLOROPHENOL	3900 U	2900 U	4900 U	4200 U	2300 U	2400 U
PHENANTHRENE	290	25 J	61	17 U	160	70
PHENOL						
PYRENE	510	64 J	120 U	42 U	240	88
TOTAL PHENOL	780 U	580 U	970 U	840 U	460 U	470 U
Pesticides/PCBs (ug/kg)						
4,4'-DDD	7.8 U	15 U	260	8.5 U	3.6 J	9.5
4,4'-DDE	5.5 J	15 U	120	8.5 U	8.2	19
4,4'-DDT	9.4	15 U	270	8.5 U	4.6 U	9.5
ALDRIN	3.9 U	7.4 U	4.9 U	4.2 U	2.3 U	2.4 U
ALPHA CHLORDANE						
ALPHA-BHC	3.9 U	7.4 U	4.9 U	4.2 U	2.3 U	2.4 U
ALPHA-CHLORDANE	3.9 U	7.4 U	52	4.2 U	2.3 U	2.4 U
AROCLOR-1016	20 U	15 U	24 U	21 U	11 U	12 U
AROCLOR-1221	20 U	15 U	24 U	21 U	11 U	12 U
AROCLOR-1232	20 U	15 U	24 U	21 U	11 U	12 U
AROCLOR-1242	20 U	15 U	24 U	21 U	11 U	12 U
AROCLOR-1248	20 U	15 U	24 U	21 U	11 U	12 U
AROCLOR-1254	20 U	15 U	24 U	21 U	11 U	12 U
AROCLOR-1260	20 U	15 U	24 U	21 U	11 U	12 U
BETA-BHC	3.9 U	7.4 U	4.9 U	4.2 U	2.3 U	2.4 U
DELTA-BHC	3.9 U	7.4 U	4.9 U	4.2 U	2.3 U	2.4 U
DIELDRIN	7.8 U	15 U	9.8 U	8.5 U	4.6 U	4.8 U
ENDOSULFAN I	3.9 U	7.4 U	4.9 U	4.2 U	2.3 U	2.4 U
ENDOSULFAN II	7.8 U	15 U	9.8 U	8.5 U	4.6 U	4.8 U
ENDOSULFAN SULFATE	7.8 U	15 U	9.8 U	8.5 U	4.6 U	4.8 U
ENDRIN	7.8 U	15 U	9.8 U	8.5 U	4.6 U	4.8 U
ENDRIN ALDEHYDE	7.8 U	15 U	9.8 U	8.5 U	4.6 U	4.8 U
ENDRIN KETONE	7.8 U	15 U	9.8 U	8.5 U	4.6 U	4.8 U
GAMMA-BHC (LINDANE)	3.9 U	7.4 U	4.9 U	4.2 U	2.3 U	2.4 U
GAMMA-CHLORDANE	3.9 U	7.4 U	130	4.2 U	2.3 U	2.4 U
HEPTACHLOR	3.9 U	7.4 U	4.9 U	4.2 U	2.3 U	2.4 U
HEPTACHLOR EPOXIDE	3.9 U	7.4 U	4.9 U	4.2 U	2.3 U	2.4 U
METHOXYCHLOR	39 U	74 U	49 U	42 U	23 U	24 U
TOXAPHENE	78 U	150 U	98 U	85 U	46 U	48 U
Inorganics (mg/kg)						
ALUMINUM	6510	4000	13800	17400	3470	2110
ANTIMONY	2.2 U	0.9 U	0.62 U	0.79 U	0.66 U	0.52 U
ARSENIC	4.8	1.2	6	15.6	1.9	0.27 U
BARIUM	69.3	8.4	88.5	21.9	5.7	6.1
BERYLLIUM	0.55 U	0.35 U	0.95 U	1.2	0.28 U	0.2 U
CADMIUM	0.06 U	0.04 U	0.07 U	0.06 U	0.04 U	0.04 U
CALCIUM	2060	948	14500	1800	466	387
CHROMIUM	25.8	8.8	26.8	34.4	7.1	10.6
COBALT	1.5	1	2.4	3.9	0.61	0.19
COPPER	105	12.7	77.8	12.6	7.6	5.5

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site 01
summary of analytical results
sediment

order	12	13	14	15	16	17
location	PAI-01-SD-03	PAI-01-SD-04	PAI-01-SD-09	PAI-01-SD-10	PAI-01-SD-11	PAI-01-SD-12
matrix	SD	SD	SD	SD	SD	SD
nsample	PAI-01-SD-03-01-D	PAI-01-SD-04-01	PAI-01-SD-09-01	PAI-01-SD-10-01	PAI-01-SD-11-01	PAI-01-SD-12-01
sample	PAI-01-SD-003-01-D	PAI-01-SD-004-01	PAI-01-SD-009-01	PAI-01-SD-010-01	PAI-01-SD-011-01	PAI-01-SD-012-01
sample_dat	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98	10-Jun-98
sort	c_12	c_13	c_14	c_15	c_16	c_17
CYANIDE	1.2 U	0.78 U	1.2 U	1.1 U	0.6 U	0.58 U
IRON	12400	5510	14400	22200	4670	1930
LEAD	201	24	194	20.5	20.8	19.1
MAGNESIUM	3000	1760	4080	5180	1120	597
MANGANESE	62.4	49.1	84.5	164	32.4	12.3
MERCURY	0.28 U	0.22 U	0.67	0.28 U	0.14 U	0.15 U
NICKEL	5.1	2	6.9	7.9	1.4	0.75 U
POTASSIUM	1720	997	2660	3340	665	331
SELENIUM	0.46 U	0.38 U	0.52 U	0.47 U	0.27 U	0.3 U
SILVER	0.41	0.1 U	2.4	0.15 U	0.09 U	0.09 U
SODIUM	13200	6290	14300	13900	4260	2620
THALLIUM	0.64 U	0.44 U	0.73 U	0.66 U	0.38 U	0.39 U
VANADIUM	23.6	12.6	37.1	48.3	9.2	4.3
ZINC	123	23.3	124	39.6	16.2	10.5
AVS/SEM Inorganics (umole/g)						
CADMIUM						
COPPER						
LEAD						
MERCURY						
NICKEL						
ZINC						
Miscellaneous Parameters (mg/kg)						
ACID VOLATILE SULFIDE (umoles/G)						
CYANIDE						
PH	7.3 NONE	7.7 NONE	7 NONE	7.1 NONE	7.6 NONE	7.1 NONE
TOTAL ORGANIC CARBON						
TOTAL ORGANIC CARBON (%)	4.3 %	2.3 %	3.6 %	4.2 %	1.5 %	1.4 %

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from sd01_res.dbf
from sd01_res.xls
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GROUNDWATER – Site 1

site 01
summary of analytical results
groundwater

order	01	02	03	04	05	06	07	08	09
location	PAI-01-MW-05(S)	PAI-01-MW-05(S)	PAI-01-MW-06(D)	PAI-01-MW-06(D)	PAI-01-MW-07(S)	PAI-01-MW-07(S)	PAI-01-MW-08(D)	PAI-01-MW-08(D)	PAI-01-MW-09(S)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-05-01	PAI-01-GW-05-01-F	PAI-01-GW-06-01	PAI-01-GW-06-01-F	PAI-01-GW-07-01	PAI-01-GW-07-01-F	PAI-01-GW-08-01	PAI-01-GW-08-01-F	PAI-01-GW-09-01
sample	PAI-01-GW-005-01	PAI-01-GW-005-01-F	PAI-01-GW-006-01	PAI-01-GW-006-01-F	PAI-01-GW-007-01	PAI-01-GW-007-01-F	PAI-01-GW-008-01	PAI-01-GW-008-01-F	PAI-01-GW-009-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
sample_dat	27-Jun-98	27-Jun-98	27-Jun-98	27-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	29-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09
Volatile Organics (ug/L)									
1,1,1,2-TETRACHLOROETHANE									
1,1,1-TRICHLOROETHANE	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
1,1,2-TRICHLOROETHANE	1 U		1 U		1 U		1 U		1 U
1,1-DICHLOROETHANE	1 U		1 U		1 U		1 U		1 U
1,1-DICHLOROETHENE	1 U		1 U		1 U		1 U		1 U
1,2,3-TRICHLOROPROPANE									
1,2-DIBROMO-3-CHLOROPROPANE									
1,2-DIBROMOETHANE									
1,2-DICHLOROETHANE	1 U		1 U		1 U		1 U		1 U
1,2-DICHLOROETHENE (TOTAL)	1 U		1 U		1 U		1 U		1 U
1,2-DICHLOROPROPANE	1 U		1 U		1 U		1 U		1 U
1,4-DIOXANE									
2-BUTANONE	5 UR		5 UR		5 UR		5 UR		5 UR
2-HEXANONE	5 UR		5 UR		5 U		5 U		5 UR
3-CHLOROPROPENE									
4-METHYL-2-PENTANONE	5 U		5 U		5 U		5 U		5 U
ACETONE	5 UR		5 UR		1.4 J		2.1 J		5 UR
ACETONITRILE									
ACROLEIN									
ACRYLONITRILE									
BENZENE	1 U		1 U		1 U		1 U		1 U
BROMODICHLOROMETHANE	1 U		1 U		1 U		1 U		1 U
BROMOFORM	1 U		1 U		1 U		1 U		1 U
BROMOMETHANE	1 U		1 U		1 U		1 U		1 U
CARBON DISULFIDE	1 U		1 U		1 U		1.7		1 U
CARBON TETRACHLORIDE	1 U		1 U		1 UJ		1 UJ		1 U
CHLOROBENZENE	1 U		1 U		1 U		1 U		1 U
CHLOROETHANE	1 U		1 U		1 U		1 U		1 U
CHLOROFORM	1 U		1 U		1 U		0.4 J		1 U
CHLOROMETHANE	1 U		1 U		1 U		1 U		1 U
CHLOROPRENE									
CIS-1,3-DICHLOROPROPENE	1 U		1 U		1 U		1 U		1 U
DIBROMOCHLOROMETHANE	1 U		1 U		1 U		1 U		1 U
DIBROMOMETHANE									
DICHLORODIFLUOROMETHANE									
ETHYL CYANIDE									
ETHYL METHACRYLATE									
ETHYLBENZENE	1 U		1 U		1 U		1 U		1 U
IODOMETHANE									
ISOBUTYL ALCOHOL									
METHACRYLONITRILE									
METHYL METHACRYLATE									
METHYLENE CHLORIDE	2 U		2 U		2 U		1 U		2 U
STYRENE	1 U		1 U		1 U		1 U		1 U

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site 01
summary of analytical results
groundwater

order	01	02	03	04	05	06	07	08	09
location	PAI-01-MW-05(S)	PAI-01-MW-05(S)	PAI-01-MW-06(D)	PAI-01-MW-06(D)	PAI-01-MW-07(S)	PAI-01-MW-07(S)	PAI-01-MW-08(D)	PAI-01-MW-08(D)	PAI-01-MW-09(S)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-05-01	PAI-01-GW-05-01-F	PAI-01-GW-06-01	PAI-01-GW-06-01-F	PAI-01-GW-07-01	PAI-01-GW-07-01-F	PAI-01-GW-08-01	PAI-01-GW-08-01-F	PAI-01-GW-09-01
sample	PAI-01-GW-005-01	PAI-01-GW-005-01-F	PAI-01-GW-006-01	PAI-01-GW-006-01-F	PAI-01-GW-007-01	PAI-01-GW-007-01-F	PAI-01-GW-008-01	PAI-01-GW-008-01-F	PAI-01-GW-009-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
sample_dat	27-Jun-98	27-Jun-98	27-Jun-98	27-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	29-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09
TETRACHLOROETHENE	1 U		1 U		1 U		1 U		1 U
TOLUENE	1 U		1 U		2		1 U		1 U
TRANS-1,3-DICHLOROPROPENE	1 U		1 U		1 U		1 U		1 U
TRANS-1,4-DICHLORO-2-BUTENE									
TRICHLOROETHENE	1 U		1 U		1 U		1 U		1 U
TRICHLOROFLUOROMETHANE									
VINYL ACETATE									
VINYL CHLORIDE	0.3 U		0.3 U		0.3 U		0.3 U		0.3 U
XYLENES, TOTAL	1 U		1 U		1 U		1 U		2
Semivolatile Organics (ug/L)									
1,2,4,5-TETRACHLOROBENZENE									
1,2,4-TRICHLOROBENZENE	6 UJ		5 U		5 U		5 U		6 U
1,2-DICHLOROBENZENE	3 J		5 U		5 U		5 U		6 U
1,3,5-TRINITROBENZENE									
1,3-DICHLOROBENZENE	6 UJ		5 U		5 U		5 U		6 U
1,3-DINITROBENZENE									
1,4-DICHLOROBENZENE	6 UJ		5 U		5 U		5 U		6 U
1,4-NAPHTHOQUINONE									
1-NAPHTHYLAMINE									
2,2'-OXYBIS(1-CHLOROPROPANE)	6 UJ		5 U		5 U		5 U		6 U
2,3,4,6-TETRACHLOROPHENOL									
2,4,5-TRICHLOROPHENOL	6 UJ		5 U		5 U		5 U		6 U
2,4,6-TRICHLOROPHENOL	6 UJ		5 U		5 U		5 U		6 U
2,4-DICHLOROPHENOL	6 UJ		5 U		5 U		5 U		6 U
2,4-DIMETHYLPHENOL	6 UJ		5 U		5 U		5 U		5 J
2,4-DINITROPHENOL	11 UJ		11 U		10 U		10 U		11 U
2,4-DINITROTOLUENE	6 UJ		5 U		5 U		5 U		6 U
2,6-DICHLOROPHENOL									
2,6-DINITROTOLUENE	6 UJ		5 U		5 U		5 U		6 U
2-ACETYLAMINOFLUORENE									
2-CHLORONAPHTHALENE	6 UJ		5 U		5 U		5 U		6 U
2-CHLOROPHENOL	6 UJ		5 U		5 U		5 U		6 U
2-METHYLNAPHTHALENE	6 UJ		5 U		5 U		5 U		6 U
2-METHYLPHENOL	6 UJ		5 U		5 U		5 U		6 U
2-NAPHTHYLAMINE									
2-NITROANILINE	6 UJ		5 U		5 UJ		5 UJ		6 U
2-NITROPHENOL	6 UJ		5 U		5 U		5 U		6 U
2-PICOLINE									
2-TOLUIDINE									
3,3'-DICHLOROBENZIDINE	11 UJ		11 U		10 U		10 U		11 U
3,3'-DIMETHYLBENZIDINE									
3-METHYLCHOLANTHRENE									
3-NITROANILINE	6 UJ		5 U		5 U		5 U		6 U
4,6-DINITRO-2-METHYLPHENOL	11 UJ		11 U		10 U		10 U		11 U
4-AMINOBIPHENYL									
4-BROMOPHENYL PHENYL ETHER	6 UJ		5 U		5 U		5 U		6 U

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from gw01_res.xls
9/27/997:

site 01
summary of analytical results
groundwater

order	01	02	03	04	05	06	07	08	09
location	PAI-01-MW-05(S)	PAI-01-MW-05(S)	PAI-01-MW-06(D)	PAI-01-MW-06(D)	PAI-01-MW-07(S)	PAI-01-MW-07(S)	PAI-01-MW-08(D)	PAI-01-MW-08(D)	PAI-01-MW-09(S)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-05-01	PAI-01-GW-05-01-F	PAI-01-GW-06-01	PAI-01-GW-06-01-F	PAI-01-GW-07-01	PAI-01-GW-07-01-F	PAI-01-GW-08-01	PAI-01-GW-08-01-F	PAI-01-GW-09-01
sample	PAI-01-GW-005-01	PAI-01-GW-005-01-F	PAI-01-GW-006-01	PAI-01-GW-006-01-F	PAI-01-GW-007-01	PAI-01-GW-007-01-F	PAI-01-GW-008-01	PAI-01-GW-008-01-F	PAI-01-GW-009-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
sample_dat	27-Jun-98	27-Jun-98	27-Jun-98	27-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	29-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09
4-CHLORO-3-METHYLPHENOL	6 UJ		5 U		5 U		5 U		6 U
4-CHLOROANILINE	6 UJ		5 U		5 U		5 U		6 U
4-CHLOROPHENYL PHENYL ETHER	6 UJ		5 U		5 U		5 U		6 U
4-DIMETHYLAMINOAZOBENZENE									
4-METHYLPHENOL	6 UJ		5 U		5 U		5 U		6 U
4-NITROANILINE	6 UJ		5 U		5 U		5 U		6 U
4-NITROPHENOL	11 UJ		11 U		10 UJ		10 UJ		11 U
4-NITROQUINOLINE-1-OXIDE									
4-PHENYLENEDIAMINE									
5-NITRO-O-TOLUIDINE									
7,12-DIMETHYLBENZ(A)ANTHRACENE									
A,A-DIMETHYLPHENETHYLAMINE									
ACENAPHTHENE	6 UJ		5 U		5 U		5 U		6 U
ACENAPHTHYLENE	6 UJ		5 U		5 U		5 U		6 U
ACETOPHENONE									
ANILINE									
ANTHRACENE	6 UJ		5 U		5 U		5 U		6 U
BENZO(A)ANTHRACENE	6 UJ		5 U		5 U		5 U		6 U
BENZO(A)PYRENE	6 UJ		5 U		5 U		5 U		6 U
BENZO(B)FLUORANTHENE	6 UJ		5 U		5 U		5 U		6 U
BENZO(G,H,I)PERYLENE	6 UJ		5 U		5 U		5 U		6 U
BENZO(K)FLUORANTHENE	6 UJ		5 U		5 U		5 U		6 U
BENZYL ALCOHOL									
BIS(2-CHLOROETHOXY)METHANE	6 UJ		5 U		5 U		5 U		6 U
BIS(2-CHLOROETHYL)ETHER	6 UJ		5 U		5 U		5 U		6 U
BIS(2-ETHYLHEXYL)PHTHALATE	6 U		5 U		1 J		1 J		6 U
BUTYLBENZYL PHTHALATE	6 UJ		5 U		5 UJ		5 UJ		6 U
CARBAZOLE	6 UJ		5 U		5 U		5 U		6 U
CHLOROBENZILATE									
CHRYSENE	6 UJ		5 U		5 U		5 U		6 U
DI-N-BUTYL PHTHALATE	6 UJ		1 J		1 J		1 J		1 J
DI-N-OCTYL PHTHALATE	6 UJ		5 U		5 U		5 U		6 U
DIALLATE									
DIBENZO(A,H)ANTHRACENE	6 UJ		5 U		5 U		5 U		6 U
DIBENZOFURAN	6 UJ		5 U		5 U		5 U		6 U
DIETHYL PHTHALATE	6 UJ		1 J		5 U		1 J		1 J
DIMETHOATE									
DIMETHYL PHTHALATE	6 UJ		5 U		5 U		5 U		6 U
DIPHENYLAMINE									
ETHYL METHANESULFONATE									
FLUORANTHENE	6 UJ		5 U		5 U		5 U		6 U
FLUORENE	6 UJ		5 U		5 U		5 U		6 U
HEXACHLOROBENZENE	6 UJ		5 U		5 U		5 U		6 U
HEXACHLOROBUTADIENE	6 UJ		5 U		5 U		5 U		6 U
HEXACHLOROCYCLOPENTADIENE	6 UJ		5 U		5 U		5 U		6 U
HEXACHLOROETHANE	6 UJ		5 U		5 U		5 U		6 U

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from gw01_res.xls
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site 01
summary of analytical results
groundwater

order	01	02	03	04	05	06	07	08	09
location	PAI-01-MW-05(S)	PAI-01-MW-05(S)	PAI-01-MW-06(D)	PAI-01-MW-06(D)	PAI-01-MW-07(S)	PAI-01-MW-07(S)	PAI-01-MW-08(D)	PAI-01-MW-08(D)	PAI-01-MW-09(S)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-05-01	PAI-01-GW-05-01-F	PAI-01-GW-06-01	PAI-01-GW-06-01-F	PAI-01-GW-07-01	PAI-01-GW-07-01-F	PAI-01-GW-08-01	PAI-01-GW-08-01-F	PAI-01-GW-09-01
sample	PAI-01-GW-005-01	PAI-01-GW-005-01-F	PAI-01-GW-006-01	PAI-01-GW-006-01-F	PAI-01-GW-007-01	PAI-01-GW-007-01-F	PAI-01-GW-008-01	PAI-01-GW-008-01-F	PAI-01-GW-009-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
sample_dat	27-Jun-98	27-Jun-98	27-Jun-98	27-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	29-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09
HEXACHLOROPROPENE									
INDENO(1,2,3-CD)PYRENE	6 UJ		5 U		5 U		5 U		6 U
ISODRIN									
ISOPHORONE	6 UJ		5 U		5 UJ		5 UJ		6 U
ISOSAFROLE									
KEPONE									
METHAPYRILENE									
METHYL METHANESULFONATE									
N-NITROSO-DI-N-PROPYLAMINE	6 UJ		5 U		5 U		5 U		6 U
N-NITROSODI-N-BUTYLAMINE									
N-NITROSODIETHYLAMINE									
N-NITROSODIMETHYLAMINE									
N-NITROSODIPHENYLAMINE	6 UJ		5 U		5 U		5 U		6 U
N-NITROSOMETHYLETHYLAMINE									
N-NITROSOMORPHOLINE									
N-NITROSOPIPERIDINE									
N-NITROSOPYRROLIDINE									
NAPHTHALENE	6 UJ		5 U		1 J		5 U		6
NITROBENZENE	6 UJ		5 U		5 UJ		5 UJ		6 U
O,O,O-TRIETHYLPHOSPHOROTHIOATE									
PENTACHLOROBENZENE									
PENTACHLOROETHANE									
PENTACHLORONITROBENZENE									
PENTACHLOROPHENOL	11 UJ		11 U		10 U		10 U		11 U
PHENACETIN									
PHENANTHRENE	6 UJ		5 U		5 U		1 J		6 U
PRONAMIDE									
PYRENE	6 UJ		5 U		5 U		5 U		6 U
PYRIDINE									
SAFROLE									
SULFOTEP									
THIONAZIN									
TOTAL PHENOL	6 UJ		5 U		5 U		5 U		6 U
Pesticides/PCBs (ug/L)									
4,4'-DDD	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
4,4'-DDE	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
4,4'-DDT	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
ALDRIN	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
ALPHA-BHC	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
ALPHA-CHLORDANE	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
AROCLOR-1016	1 U		1 U		1 U		1 U		1 U
AROCLOR-1221	2.1 U		2.1 U		2 U		2 U		2.1 U
AROCLOR-1232	1 U		1 U		1 U		1 U		1 U
AROCLOR-1242	1 U		1 U		1 U		1 U		1 U
AROCLOR-1248	1 U		1 U		1 U		1 U		1 U
AROCLOR-1254	1 U		1 U		1 U		1 U		1 U

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from gw01_res.dbf
from gw01_res.xls
9/27/997

site 01
summary of analytical results
groundwater

order	01	02	03	04	05	06	07	08	09
location	PAI-01-MW-05(S)	PAI-01-MW-05(S)	PAI-01-MW-06(D)	PAI-01-MW-06(D)	PAI-01-MW-07(S)	PAI-01-MW-07(S)	PAI-01-MW-08(D)	PAI-01-MW-08(D)	PAI-01-MW-09(S)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-05-01	PAI-01-GW-05-01-F	PAI-01-GW-06-01	PAI-01-GW-06-01-F	PAI-01-GW-07-01	PAI-01-GW-07-01-F	PAI-01-GW-08-01	PAI-01-GW-08-01-F	PAI-01-GW-09-01
sample	PAI-01-GW-005-01	PAI-01-GW-005-01-F	PAI-01-GW-006-01	PAI-01-GW-006-01-F	PAI-01-GW-007-01	PAI-01-GW-007-01-F	PAI-01-GW-008-01	PAI-01-GW-008-01-F	PAI-01-GW-009-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
sample_dat	27-Jun-98	27-Jun-98	27-Jun-98	27-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	29-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09
AROCLOR-1260	1 U		1 U		1 U		1 U		1 U
BETA-BHC	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
CHLORDANE									
DELTA-BHC	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
DIELDRIN	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
ENDOSULFAN I	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
ENDOSULFAN II	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
ENDOSULFAN SULFATE	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
ENDRIN	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
ENDRIN ALDEHYDE	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
ENDRIN KETONE	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
GAMMA-BHC (LINDANE)	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
GAMMA-CHLORDANE	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
HEPTACHLOR	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
HEPTACHLOR EPOXIDE	0.052 U		0.052 U		0.05 U		0.05 U		0.052 U
METHOXYCHLOR	0.52 U		0.52 U		0.5 U		0.5 U		0.52 U
TOXAPHENE	5.2 U		5.2 U		5 U		5 U		5.2 U
Herbicides (ug/L)									
2,4,5-T									
2,4,5-TP (SILVEX)									
2,4-D									
2-SEC-BUTYL-4,6-DINITROPHENOL (DINOSEB									
Inorganics (ug/L)									
ALUMINUM	22 U	22 U	23.3	22 U	27 U	27 U	91	27 U	22 U
ANTIMONY	19 U	19 U	19 U	19 U	12 U	12 U	12 U	12 U	19 U
ARSENIC	2.6	2.6	1.1 U	1.1 U	2.2 U	2.2 U	2.2 U	2.2 U	4.4
BARIUM	182	401	172	388	1030	1200	804	941	163
BERYLLIUM	0.2 U	0.3	0.2 U	0.2	0.3 U	0.3 U	0.3 U	0.4 U	0.7
CADMIUM	2 U	2 U	2 U	2 U	1.4 U	1.7	1.4 U	1.4 U	2 U
CALCIUM	243000	241000	211000	216000	107000	110000	191000	186000	494000
CHROMIUM	10.6	9.8	9.4	8.9	6.4	6.4 U	6.4 U	12.3	18.4
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	2.9 UJ	2.9 UJ	2.9 UJ	2.9 UJ	3.3 U
COPPER	7.8	2.6 U	2.6 U	3.3	2.1 U	2.1 U	2.1 U	2.1 U	2.6 U
CYANIDE	10 U		10 U		20 U		20 U		10 U
IRON	3720	3540	12700	13300	259	292	1070	816	7190
LEAD	12.2	6.8	2.6	1	20.9 J	5.7 J	1.2 J	0.9 J	34.7
MAGNESIUM	641000	629000	491000	486000	733000	745000	484000	480000	1180000
MANGANESE	1320	1300	208	222	40.3 J	45.1 J	101 J	93.3 J	96.6 U
MERCURY	0.2 U	0.23	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 U
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	3.6 UJ	3.6 UJ	3.6 UJ	3.6 UJ	4.4 U
POTASSIUM	303000	306000	158000	158000	238000	252000	143000	147000	477000
SELENIUM	4.5 U	4.5 U	4.5 U	4.5 U	18 UJ	4.5 UJ	1.8 UJ	1.8 UJ	9 U
SILVER	4.3 U	4.3 U	4.3 U	4.3 U	3 U	3 U	3 U	3 U	43 U
SODIUM	6380000	6330000	4080000	4060000	6200000	6240000	4090000	4090000	10100000
THALLIUM	10 U	20 U	10 U	10 U	10 UJ	10 UJ	2 UJ	3.1 J	10 U
TIN									

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site 01
summary of analytical results
groundwater

order	01	02	03	04	05	06	07	08	09
location	PAI-01-MW-05(S)	PAI-01-MW-05(S)	PAI-01-MW-06(D)	PAI-01-MW-06(D)	PAI-01-MW-07(S)	PAI-01-MW-07(S)	PAI-01-MW-08(D)	PAI-01-MW-08(D)	PAI-01-MW-09(S)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-05-01	PAI-01-GW-05-01-F	PAI-01-GW-06-01	PAI-01-GW-06-01-F	PAI-01-GW-07-01	PAI-01-GW-07-01-F	PAI-01-GW-08-01	PAI-01-GW-08-01-F	PAI-01-GW-09-01
sample	PAI-01-GW-005-01	PAI-01-GW-005-01-F	PAI-01-GW-006-01	PAI-01-GW-006-01-F	PAI-01-GW-007-01	PAI-01-GW-007-01-F	PAI-01-GW-008-01	PAI-01-GW-008-01-F	PAI-01-GW-009-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
sample_dat	27-Jun-98	27-Jun-98	27-Jun-98	27-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	29-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09
VANADIUM	5.1	4.2	5.4	4.4	7.5 U	9 U	6.3 U	6.2 U	32.6
ZINC	16.9	56.4	11.6	112	7.9	17.5	9.7	16.7	11.7
Miscellaneous Parameters (mg/L)									
CHLORIDE	13000		7900		13000		7400		20000
FLUORIDE	20 U		20 U		17		11		37
HARDNESS as CaCO3	3300		2700		4000		2400		6300
HEXAVALENT CHROMIUM					0.005 U				
NITRATE/NITRITE, AS NITROGEN	0.04		0.05		0.02 U		0.01 U		0.04
SULFATE	1100		1500		380 J		540 J		53
SULFIDE									
TOTAL DISSOLVED SOLIDS	21000 J		13000 J		19000		12000		35000 J
TOTAL ORGANIC CARBON	8.2		4		17		9.2		45
TOTAL SUSPENDED SOLIDS	75 J		49 J		92		88		42 J

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site 01
summary of analytical results
groundwater

order	10	11	12	13	14	15	16	17	18
location	PAI-01-MW-09(S)	PAI-01-MW-10(D)	PAI-01-MW-10(D)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-12(D)	PAI-01-MW-12(D)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-09-01-F	PAI-01-GW-10-01	PAI-01-GW-10-01-F	PAI-01-GW-11-01	PAI-01-GW-11-01-D	PAI-01-GW-11-01-F	PAI-01-GW-11-01-F-D	PAI-01-GW-12-01	PAI-01-GW-12-01-F
sample	PAI-01-GW-009-01-F	PAI-01-GW-010-01	PAI-01-GW-010-01-F	PAI-01-GW-011-01	PAI-01-GW-011-01D	PAI-01-GW-011-01-F	PAI-01-GW-011-01D-F	PAI-01-GW-012-01	PAI-01-GW-012-01-F
sacode	NORMAL	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL
sample_dat	29-Jun-98	17-Jun-98	17-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98
sort	c_10	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18
Volatile Organics (ug/L)									
1,1,1,2-TETRACHLOROETHANE		1 U							
1,1,1-TRICHLOROETHANE		1 U		1 U	1 U			1 U	
1,1,2,2-TETRACHLOROETHANE		1 U		1 U	1 U			1 U	
1,1,2-TRICHLOROETHANE		1 U		1 U	1 U			1 U	
1,1-DICHLOROETHANE		1 U		1 U	1 U			1 U	
1,1-DICHLOROETHENE		1 U		1 U	1 U			1 U	
1,2,3-TRICHLOROPROPANE		1 U							
1,2-DIBROMO-3-CHLOROPROPANE		1 U							
1,2-DIBROMOETHANE		1 U							
1,2-DICHLOROETHANE		1 U		1 U	1 U			1 U	
1,2-DICHLOROETHENE (TOTAL)		1 U		1 U	1 U			1 U	
1,2-DICHLOROPROPANE		1 U		1 U	1 U			1 U	
1,4-DIOXANE		100 U							
2-BUTANONE		3.4 J		5 UR	5 UR			5 UR	
2-HEXANONE		5 U		5 UR	5 UR			5 UR	
3-CHLOROPROPENE		1 U							
4-METHYL-2-PENTANONE		5 U		5 U	5 U			5 U	
ACETONE		9.6 J		5 UR	5 UR			5 UR	
ACETONITRILE		40 U							
ACROLEIN		5 UR							
ACRYLONITRILE		1 UR							
BENZENE		1 U		1 U	1 U			1 U	
BROMODICHLOROMETHANE		1 U		1 U	1 U			1 U	
BROMOFORM		1 U		1 U	1 U			1 U	
BROMOMETHANE		1 U		1 U	1 U			1 U	
CARBON DISULFIDE		12		3.2	1.7			2.7	
CARBON TETRACHLORIDE		1 U		1 U	1 U			1 U	
CHLOROBENZENE		1 U		1 U	1 U			1 U	
CHLOROETHANE		1 U		1 U	1 U			1 U	
CHLOROFORM		0.3 J		1 U	1 U			1 U	
CHLOROMETHANE		1 U		1 U	1 U			1 U	
CHLOROPRENE		1 U							
CIS-1,3-DICHLOROPROPENE		1 U		1 U	1 U			1 U	
DIBROMOCHLOROMETHANE		1 U		1 U	1 U			1 U	
DIBROMOMETHANE		1 U							
DICHLORODIFLUOROMETHANE		1 U							
ETHYL CYANIDE		40 U							
ETHYL METHACRYLATE		1 U							
ETHYLBENZENE		0.2 J		1 U	1 U			1 U	
IODOMETHANE		1 U							
ISOBUTYL ALCOHOL		40 U							
METHACRYLONITRILE		1 UR							
METHYL METHACRYLATE		1 U							
METHYLENE CHLORIDE		1 U		2 U	2 U			2 U	
STYRENE		1 U		1 U	1 U			1 U	

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site 01
summary of analytical results
groundwater

order	10	11	12	13	14	15	16	17	18
location	PAI-01-MW-09(S)	PAI-01-MW-10(D)	PAI-01-MW-10(D)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-12(D)	PAI-01-MW-12(D)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-09-01-F	PAI-01-GW-10-01	PAI-01-GW-10-01-F	PAI-01-GW-11-01	PAI-01-GW-11-01-D	PAI-01-GW-11-01-F	PAI-01-GW-11-01-F-D	PAI-01-GW-12-01	PAI-01-GW-12-01-F
sample	PAI-01-GW-009-01-F	PAI-01-GW-010-01	PAI-01-GW-010-01-F	PAI-01-GW-011-01	PAI-01-GW-011-01D	PAI-01-GW-011-01-F	PAI-01-GW-011-01D-F	PAI-01-GW-012-01	PAI-01-GW-012-01-F
sacode	NORMAL	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL
sample_dat	29-Jun-98	17-Jun-98	17-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98
sort	c_10	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18
TETRACHLOROETHENE		1 U		1 U	1 U			1 U	
TOLUENE		0.5 J		1 U	1 U			1 U	
TRANS-1,3-DICHLOROPROPENE		1 U		1 U	1 U			1 U	
TRANS-1,4-DICHLORO-2-BUTENE		5 U							
TRICHLOROETHENE		1 U		1 U	1 U			1 U	
TRICHLOROFLUOROMETHANE		1 U							
VINYL ACETATE		1 U							
VINYL CHLORIDE		1 U		0.3 U	0.3 U			0.3 U	
XYLENES, TOTAL		1.4		1 U	1 U			1 U	
Semivolatile Organics (ug/L)									
1,2,4,5-TETRACHLOROBENZENE		10 U							
1,2,4-TRICHLOROBENZENE		5 U		6 U	6 U			5 U	
1,2-DICHLOROBENZENE		5 U		6 U	6 U			5 U	
1,3,5-TRINITROBENZENE		10 U							
1,3-DICHLOROBENZENE		5 U		6 U	6 U			5 U	
1,3-DINITROBENZENE		10 U							
1,4-DICHLOROBENZENE		5 U		6 U	6 U			5 U	
1,4-NAPHTHOQUINONE		10 U							
1-NAPHTHYLAMINE		10 U							
2,2'-OXYBIS(1-CHLOROPROPANE)		5 U		6 U	6 U			5 U	
2,3,4,6-TETRACHLOROPHENOL		10 U							
2,4,5-TRICHLOROPHENOL		5 U		6 U	6 U			5 U	
2,4,6-TRICHLOROPHENOL		5 U		6 U	6 U			5 U	
2,4-DICHLOROPHENOL		5 U		6 U	6 U			5 U	
2,4-DIMETHYLPHENOL		2 J		6 U	6 U			5 U	
2,4-DINITROPHENOL		10 U		12 U	11 U			10 U	
2,4-DINITROTOLUENE		5 U		6 U	6 U			5 U	
2,6-DICHLOROPHENOL		10 U							
2,6-DINITROTOLUENE		5 U		5 U	6 U			5 U	
2-ACETYLAMINOFLUORENE		10 U							
2-CHLORONAPHTHALENE		5 U		6 U	6 U			5 U	
2-CHLOROPHENOL		5 U		6 U	6 U			5 U	
2-METHYLNAPHTHALENE		7		6 U	6 U			5 U	
2-METHYLPHENOL		1 J		6 U	6 U			5 U	
2-NAPHTHYLAMINE		10 U							
2-NITROANILINE		5 U		6 U	6 U			5 U	
2-NITROPHENOL		5 U		6 U	6 U			5 U	
2-PICOLINE		10 U							
2-TOLUIDINE		10 U							
3,3'-DICHLOROBENZIDINE		10 U		12 U	11 U			10 U	
3,3'-DIMETHYLBENZIDINE		10 U							
3-METHYLCHOLANTHRENE		10 U							
3-NITROANILINE		5 U		6 U	6 U			5 U	
4,6-DINITRO-2-METHYLPHENOL		10 U		12 U	11 U			10 U	
4-AMINOBIPHENYL		10 U							
4-BROMOPHENYL PHENYL ETHER		5 U		6 U	6 U			5 U	

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site 01
summary of analytical results
groundwater

order	10	11	12	13	14	15	16	17	18
location	PAI-01-MW-09(S)	PAI-01-MW-10(D)	PAI-01-MW-10(D)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-12(D)	PAI-01-MW-12(D)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-09-01-F	PAI-01-GW-10-01	PAI-01-GW-10-01-F	PAI-01-GW-11-01	PAI-01-GW-11-01-D	PAI-01-GW-11-01-F	PAI-01-GW-11-01-F-D	PAI-01-GW-12-01	PAI-01-GW-12-01-F
sample	PAI-01-GW-009-01-F	PAI-01-GW-010-01	PAI-01-GW-010-01-F	PAI-01-GW-011-01	PAI-01-GW-011-01D	PAI-01-GW-011-01-F	PAI-01-GW-011-01D-F	PAI-01-GW-012-01	PAI-01-GW-012-01-F
sacode	NORMAL	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL
sample_dat	29-Jun-98	17-Jun-98	17-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98
sort	c_10	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18
4-CHLORO-3-METHYLPHENOL		5 U		6 U	6 U			5 U	
4-CHLOROANILINE		5 U		6 U	6 U			5 U	
4-CHLOROPHENYL PHENYL ETHER		5 U		6 U	6 U			5 U	
4-DIMETHYLAMINOAZOBENZENE		10 U							
4-METHYLPHENOL		5 U		6 U	6 U			5 U	
4-NITROANILINE		5 U		6 U	6 U			5 U	
4-NITROPHENOL		10 U		12 U	11 U			10 U	
4-NITROQUINOLINE-1-OXIDE		10 UR							
4-PHENYLENEDIAMINE		10 UR							
5-NITRO-O-TOLUIDINE		10 U							
7,12-DIMETHYLBENZ(A)ANTHRACENE		10 U							
A,A-DIMETHYLPHENETHYLAMINE		10 U							
ACENAPHTHENE		7		6 U	6 U			5 U	
ACENAPHTHYLENE		5 U		6 U	6 U			5 U	
ACETOPHENONE		10 U							
ANILINE		5 U							
ANTHRACENE		1 J		6 U	6 U			5 U	
BENZO(A)ANTHRACENE		5 U		6 U	6 U			5 U	
BENZO(A)PYRENE		5 U		6 U	6 U			5 U	
BENZO(B)FLUORANTHENE		5 U		6 U	6 U			5 U	
BENZO(G,H,I)PERYLENE		5 U		6 U	6 U			5 U	
BENZO(K)FLUORANTHENE		5 U		6 U	6 U			5 U	
BENZYL ALCOHOL		5 U							
BIS(2-CHLOROETHOXY)METHANE		5 U		6 U	6 U			5 U	
BIS(2-CHLOROETHYL)ETHER		5 U		6 U	6 U			5 U	
BIS(2-ETHYLHEXYL)PHTHALATE		1 J		6 U	6 U			5 U	
BUTYLBENZYL PHTHALATE		5 U		6 U	6 U			5 U	
CARBAZOLE				6 U	6 U			5 U	
CHLOROBENZILATE		10 U							
CHRYSENE		5 U		6 U	6 U			5 U	
DI-N-BUTYL PHTHALATE		1 J		1 J	1 J			1 J	
DI-N-OCTYL PHTHALATE		5 U		6 U	6 U			5 U	
DIALLATE		10 U							
DIBENZO(A,H)ANTHRACENE		5 U		6 U	6 U			5 U	
DIBENZOFURAN		3 J		6 U	6 U			5 U	
DIETHYL PHTHALATE		1 J		6 U	6 U			5 U	
DIMETHOATE		10 U							
DIMETHYL PHTHALATE		5 U		6 U	6 U			5 U	
DIPHENYLAMINE		10 U							
ETHYL METHANESULFONATE		10 U							
FLUORANTHENE		1 J		6 U	6 U			5 U	
FLUORENE		6		6 U	6 U			5 U	
HEXACHLOROBENZENE		5 U		6 U	6 U			5 U	
HEXACHLOROBUTADIENE		5 U		6 U	6 U			5 U	
HEXACHLOROCYCLOPENTADIENE		5 U		6 U	6 U			5 U	
HEXACHLOROETHANE		5 U		6 U	6 U			5 U	

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site 01
summary of analytical results
groundwater

order	10	11	12	13	14	15	16	17	18
location	PAI-01-MW-09(S)	PAI-01-MW-10(D)	PAI-01-MW-10(D)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-12(D)	PAI-01-MW-12(D)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-09-01-F	PAI-01-GW-10-01	PAI-01-GW-10-01-F	PAI-01-GW-11-01	PAI-01-GW-11-01-D	PAI-01-GW-11-01-F	PAI-01-GW-11-01-F-D	PAI-01-GW-12-01	PAI-01-GW-12-01-F
sample	PAI-01-GW-009-01-F	PAI-01-GW-010-01	PAI-01-GW-010-01-F	PAI-01-GW-011-01	PAI-01-GW-011-01D	PAI-01-GW-011-01-F	PAI-01-GW-011-01D-F	PAI-01-GW-012-01	PAI-01-GW-012-01-F
sacode	NORMAL	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL
sample_dat	29-Jun-98	17-Jun-98	17-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98
sort	c_10	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18
HEXACHLOROPROPENE		10 U							
INDENO(1,2,3-CD)PYRENE		5 U		6 U	6 U			5 U	
ISODRIN		10 U							
ISOPHORONE		5 U		6 U	6 U			5 U	
ISOSAFROLE		10 U							
KEPONE		10 U							
METHAPYRILENE		10 U							
METHYL METHANESULFONATE		10 U							
N-NITROSO-DI-N-PROPYLAMINE		5 U		6 U	6 U			5 U	
N-NITROSODI-N-BUTYLAMINE		10 U							
N-NITROSODIETHYLAMINE		10 U							
N-NITROSODIMETHYLAMINE		5 U							
N-NITROSODIPHENYLAMINE		5 U		6 U	6 U			5 U	
N-NITROSOMETHYLETHYLAMINE		10 U							
N-NITROSOMORPHOLINE		10 U							
N-NITROSOPIPERIDINE		10 U							
N-NITROSOPYRROLIDINE		10 U							
NAPHTHALENE		57		6 U	6 U			5 U	
NITROBENZENE		5 U		6 U	6 U			5 U	
O,O,O-TRIETHYLPHOSPHOROTHIOATE		10 U							
PENTACHLOROBENZENE		10 U							
PENTACHLOROETHANE		10 U							
PENTACHLORONITROBENZENE		10 U							
PENTACHLOROPHENOL		10 U		12 U	11 U			10 U	
PHENACETIN		10 U							
PHENANTHRENE		8		6 U	6 U			5 U	
PRONAMIDE		10 U							
PYRENE		1 J		6 U	6 U			5 U	
PYRIDINE		5 U							
SAFROLE		10 U							
SULFOTEP		10 U							
THIONAZIN		10 U							
TOTAL PHENOL		5 U		6 U	6 U			5 U	
Pesticides/PCBs (ug/L)									
4,4'-DDD		0.1 U		0.11 U	0.11 U			0.1 U	
4,4'-DDE		0.1 U		0.11 U	0.11 U			0.1 U	
4,4'-DDT		0.1 U		0.11 U	0.11 U			0.1 U	
ALDRIN		0.05 U		0.056 U	0.056 U			0.052 U	
ALPHA-BHC		0.05 U		0.056 U	0.056 U			0.052 U	
ALPHA-CHLORDANE				0.056 U	0.056 U			0.052 U	
AROCLOR-1016		1 U		1.1 U	1.1 U			1 U	
AROCLOR-1221		2 U		2.2 U	2.2 U			2.1 U	
AROCLOR-1232		1 U		1.1 U	1.1 U			1 U	
AROCLOR-1242		1 U		1.1 U	1.1 U			1 U	
AROCLOR-1248		1 U		1.1 U	1.1 U			1 U	
AROCLOR-1254		1 U		1.1 U	1.1 U			1 U	

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site 01
summary of analytical results
groundwater

order	10	11	12	13	14	15	16	17	18
location	PAI-01-MW-09(S)	PAI-01-MW-10(D)	PAI-01-MW-10(D)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-12(D)	PAI-01-MW-12(D)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-09-01-F	PAI-01-GW-10-01	PAI-01-GW-10-01-F	PAI-01-GW-11-01	PAI-01-GW-11-01-D	PAI-01-GW-11-01-F	PAI-01-GW-11-01-F-D	PAI-01-GW-12-01	PAI-01-GW-12-01-F
sample	PAI-01-GW-009-01-F	PAI-01-GW-010-01	PAI-01-GW-010-01-F	PAI-01-GW-011-01	PAI-01-GW-011-01D	PAI-01-GW-011-01-F	PAI-01-GW-011-01D-F	PAI-01-GW-012-01	PAI-01-GW-012-01-F
sacode	NORMAL	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL
sample_dat	29-Jun-98	17-Jun-98	17-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98
sort	c_10	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18
AROCLOR-1260		1 U		1.1 U	1.1 U			1 U	
BETA-BHC		0.05 U		0.056 U	0.056 U			0.052 U	
CHLORDANE		0.5 U							
DELTA-BHC		0.05 U		0.056 U	0.056 U			0.052 U	
DIELDRIN		0.1 U		0.11 U	0.11 U			0.1 U	
ENDOSULFAN I		0.05 U		0.056 U	0.056 U			0.052 U	
ENDOSULFAN II		0.1 U		0.11 U	0.11 U			0.1 U	
ENDOSULFAN SULFATE		0.1 U		0.11 U	0.11 U			0.1 U	
ENDRIN		0.1 U		0.11 U	0.11 U			0.1 U	
ENDRIN ALDEHYDE		0.1 U		0.11 U	0.11 U			0.1 U	
ENDRIN KETONE				0.11 U	0.11 U			0.1 U	
GAMMA-BHC (LINDANE)		0.05 U		0.056 U	0.056 U			0.052 U	
GAMMA-CHLORDANE				0.056 U	0.056 U			0.052 U	
HEPTACHLOR		0.05 U		0.056 U	0.056 U			0.052 U	
HEPTACHLOR EPOXIDE		0.05 U		0.056 U	0.056 U			0.052 U	
METHOXYCHLOR		0.5 U		0.56 U	0.56 U			0.52 U	
TOXAPHENE		5 U		5.6 U	5.6 U			5.2 U	
Herbicides (ug/L)									
2,4,5-T		0.04 U							
2,4,5-TP (SILVEX)		0.04 U							
2,4-D		0.051 U							
2-SEC-BUTYL-4,6-DINITROPHENOL (DINOSEB		0.081 U							
Inorganics (ug/L)									
ALUMINUM	22 U		27 U	22 U	22 U	22 U	22 U	47.9	22 U
ANTIMONY	19 U	12 U	12 U	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	4	2.2 U	2.2 U	1.2	1.1	1.1 U	1.1 U	2.3	2.4
BARIUM	349	961	1230	551	535	783	613	322	595
BERYLLIUM	0.2	0.7 U	0.5 U	0.2 U	0.2 U	0.2 U	0.2	0.2	0.2
CADMIUM	2 U	1.4 U	1.4 U	2 U	2 U	2 U	2 U	2 U	2.7
CALCIUM	462000		274000	419000	410000	402000	450000	280000	294000
CHROMIUM	26.9	10.4	7.1	18.3	17.2	26	17.4	18.1	12.8
COBALT	3.3 U	2.9 U	2.9 UJ	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER	4.6	3.7 U	2.1 U	2.6 U	3.8	2.6 U	4.8	2.6 U	2.6 U
CYANIDE		20 U		10 U	10 U			10 U	
IRON	5100		114	9.2 U	8 U	27.1 U	11.5 U	84.6 U	23.7 U
LEAD	36.4	0.5	2.7 J	26.2	25.3	25.8	30.5	10.5	12.1
MAGNESIUM	1140000		788000	977000	984000	984000	994000	864000	864000
MANGANESE	89.4 U		96.3 J	219	206	212	220	78.1	75.3
MERCURY	0.2 U	0.2 U	0.2 UJ	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	4.4 U	3.6 U	3.6 UJ	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
POTASSIUM	440000		216000	431000	423000	413000	461000	275000	286000
SELENIUM	9 U	18 U	18 UJ	9 U	4.5 U	9 U	4.5 U	4.5 U	9 U
SILVER	4.3 U	3 U	3 U	43 U	4.3 U	43 U	43 U	4.3 U	43 U
SODIUM	9940000		5730000	9170000	9450000	9180000	9230000	6660000	6660000
THALLIUM	10 U	5 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
TIN		6 U							

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site 01
summary of analytical results
groundwater

order	10	11	12	13	14	15	16	17	18
location	PAI-01-MW-09(S)	PAI-01-MW-10(D)	PAI-01-MW-10(D)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-11(S)	PAI-01-MW-12(D)	PAI-01-MW-12(D)
matrix	GW	GW	GW	GW	GW	GW	GW	GW	GW
nsample	PAI-01-GW-09-01-F	PAI-01-GW-10-01	PAI-01-GW-10-01-F	PAI-01-GW-11-01	PAI-01-GW-11-01-D	PAI-01-GW-11-01-F	PAI-01-GW-11-01-F-D	PAI-01-GW-12-01	PAI-01-GW-12-01-F
sample	PAI-01-GW-009-01-F	PAI-01-GW-010-01	PAI-01-GW-010-01-F	PAI-01-GW-011-01	PAI-01-GW-011-01D	PAI-01-GW-011-01-F	PAI-01-GW-011-01D-F	PAI-01-GW-012-01	PAI-01-GW-012-01-F
sacode	NORMAL	NORMAL	NORMAL	DUP	DUP	DUP	DUP	NORMAL	NORMAL
sample_dat	29-Jun-98	17-Jun-98	17-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98	29-Jun-98
sort	c_10	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18
VANADIUM	27.8	8.8 U	9.8 U	9.2	10.5	9.1	13.2	9.9	8
ZINC	81.6	4.3 U	28.4	5.4	5.1	53.3	13.8	5.4	37.5
Miscellaneous Parameters (mg/L)									
CHLORIDE		11000		18000	19000			13000	
FLUORIDE		16		20 U	300			20 U	
HARDNESS as CaCO3				5800	5400			4500	
HEXAVALENT CHROMIUM		0.005 U		0.0005 U	0.005 U				
NITRATE/NITRITE, AS NITROGEN		0.03 U		0.01	0.02			0.01	
SULFATE		490 J		1500	1400			640	
SULFIDE		16							
TOTAL DISSOLVED SOLIDS		18000		31000 J	31000 J			22000 J	
TOTAL ORGANIC CARBON		18		19	16			23	
TOTAL SUSPENDED SOLIDS		270		79 J	87 J			73 J	

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site 01
summary of analytical results
groundwater

order	19	20	21	22	23	24	
location	PAI-01-MW-13(S)	PAI-01-MW-13(S)	PAI-01-MW-14(D)	PAI-01-MW-14(D)	PAI1-MW4(S)	PAI1-MW4(S)	
matrix	GW	GW	GW	GW	GW	GW	
nsample	PAI-01-GW-13-01	PAI-01-GW-13-01-F	PAI-01-GW-14-01	PAI-01-GW-14-01-F	PAI1-GW4-01	PAI1-GW4-01-F	
sample	PAI-01-GW-013-01	PAI-01-GW-013-01-F	PAI-01-GW-014-01	PAI-01-GW-014-01-F	PAI-01-GW-004-01	PAI-01-GW-004-01-F	
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	
sample_dat	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	25-Jun-98	25-Jun-98	
sort	c_19	c_20	c_21	c_22	c_23	c_24	count
Volatile Organics (ug/L)							
1,1,1,2-TETRACHLOROETHANE							1
1,1,1-TRICHLOROETHANE	1 U		1 U		1 U		12
1,1,2,2-TETRACHLOROETHANE	1 U		1 U		1 U		12
1,1,2-TRICHLOROETHANE	1 U		1 U		1 U		12
1,1-DICHLOROETHANE	1 U		1 U		1 U		12
1,1-DICHLOROETHENE	1 U		1 U		1 U		12
1,2,3-TRICHLOROPROPANE							1
1,2-DIBROMO-3-CHLOROPROPANE							1
1,2-DIBROMOETHANE							1
1,2-DICHLOROETHANE	1 U		1 U		1 U		12
1,2-DICHLOROETHENE (TOTAL)	1 U		1 U		1 U		12
1,2-DICHLOROPROPANE	1 U		1 U		1 U		12
1,4-DIOXANE							1
2-BUTANONE	5 UR		5 UR		5 UR		12
2-HEXANONE	5 UR		5 UR		5 UR		12
3-CHLOROPROPENE							1
4-METHYL-2-PENTANONE	5 U		5 U		5 U		12
ACETONE	5 UR		13 J		5 UR		12
ACETONITRILE							1
ACROLEIN							1
ACRYLONITRILE							1
BENZENE	1 U		1 U		1 U		12
BROMODICHLOROMETHANE	1 U		1 U		1 U		12
BROMOFORM	1 U		1 U		1 U		12
BROMOMETHANE	1 U		1 U		1 U		12
CARBON DISULFIDE	0.7 J		16		1 U		12
CARBON TETRACHLORIDE	1 U		1 U		1 U		12
CHLOROBENZENE	1 U		1 U		1 U		12
CHLOROETHANE	1 U		1 U		1 U		12
CHLOROFORM	1 U		0.9 J		1 U		12
CHLOROMETHANE	1 U		1 U		1 U		12
CHLOROPRENE							1
CIS-1,3-DICHLOROPROPENE	1 U		1 U		1 U		12
DIBROMOCHLOROMETHANE	1 U		1 U		1 U		12
DIBROMOMETHANE							1
DICHLORODIFLUOROMETHANE							1
ETHYL CYANIDE							1
ETHYL METHACRYLATE							1
ETHYLBENZENE	1 U		1 U		1 U		12
IODOMETHANE							1
ISOBUTYL ALCOHOL							1
METHACRYLONITRILE							1
METHYL METHACRYLATE							1
METHYLENE CHLORIDE	2 U		2 U		2 U		12
STYRENE	1 U		1 U		1 U		12

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site 01
summary of analytical results
groundwater

order	19	20	21	22	23	24	
location	PAI-01-MW-13(S)	PAI-01-MW-13(S)	PAI-01-MW-14(D)	PAI-01-MW-14(D)	PAI1-MW4(S)	PAI1-MW4(S)	
matrix	GW	GW	GW	GW	GW	GW	
nsample	PAI-01-GW-13-01	PAI-01-GW-13-01-F	PAI-01-GW-14-01	PAI-01-GW-14-01-F	PAI1-GW4-01	PAI1-GW4-01-F	
sample	PAI-01-GW-013-01	PAI-01-GW-013-01-F	PAI-01-GW-014-01	PAI-01-GW-014-01-F	PAI-01-GW-004-01	PAI-01-GW-004-01-F	
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	
sample_dat	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	25-Jun-98	25-Jun-98	
sort	c_19	c_20	c_21	c_22	c_23	c_24	count
TETRACHLOROETHENE	1 U		1 U		1 U		12
TOLUENE	1 U		0.5 J		1 U		12
TRANS-1,3-DICHLOROPROPENE	1 U		1 U		1 U		12
TRANS-1,4-DICHLORO-2-BUTENE							1
TRICHLOROETHENE	1 U		1 U		1 U		12
TRICHLOROFLUOROMETHANE							1
VINYL ACETATE							1
VINYL CHLORIDE	0.3 U		0.3 U		0.3 U		12
XYLENES, TOTAL	1 U		1 U		1 U		12
Semivolatile Organics (ug/L)							
1,2,4,5-TETRACHLOROBENZENE							1
1,2,4-TRICHLOROBENZENE	5 U		5 U		5 U		12
1,2-DICHLOROBENZENE	5 U		5 U		5 U		12
1,3,5-TRINITROBENZENE							1
1,3-DICHLOROBENZENE	5 U		5 U		5 U		12
1,3-DINITROBENZENE							1
1,4-DICHLOROBENZENE	5 U		5 U		5 U		12
1,4-NAPHTHOQUINONE							1
1-NAPHTHYLAMINE							1
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U		5 U		5 U		12
2,3,4,6-TETRACHLOROPHENOL							1
2,4,5-TRICHLOROPHENOL	5 U		5 U		5 U		12
2,4,6-TRICHLOROPHENOL	5 U		5 U		5 U		12
2,4-DICHLOROPHENOL	5 U		5 U		5 U		12
2,4-DIMETHYLPHENOL	5 U		5 U		5 U		12
2,4-DINITROPHENOL	10 U		10 U		10 U		12
2,4-DINITROTOLUENE	5 U		5 U		5 U		12
2,6-DICHLOROPHENOL							1
2,6-DINITROTOLUENE	5 U		5 U		5 U		12
2-ACETYLAMINOFLUORENE							1
2-CHLORONAPHTHALENE	5 U		5 U		5 U		12
2-CHLOROPHENOL	5 U		5 U		5 U		12
2-METHYLNAPHTHALENE	5 U		5 U		5 U		12
2-METHYLPHENOL	5 U		5 U		5 U		12
2-NAPHTHYLAMINE							1
2-NITROANILINE	5 U		5 U		5 U		12
2-NITROPHENOL	5 U		5 U		5 U		12
2-PICOLINE							1
2-TOLUIDINE							1
3,3'-DICHLOROBENZIDINE	10 U		10 U		10 U		12
3,3'-DIMETHYLBENZIDINE							1
3-METHYLCHOLANTHRENE							1
3-NITROANILINE	5 U		5 U		5 U		12
4,6-DINITRO-2-METHYLPHENOL	10 U		10 U		10 U		12
4-AMINOBIPHENYL							1
4-BROMOPHENYL PHENYL ETHER	5 U		5 U		5 U		12

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site 01
summary of analytical results
groundwater

order	19	20	21	22	23	24	
location	PAI-01-MW-13(S)	PAI-01-MW-13(S)	PAI-01-MW-14(D)	PAI-01-MW-14(D)	PAI1-MW4(S)	PAI1-MW4(S)	
matrix	GW	GW	GW	GW	GW	GW	
nsample	PAI-01-GW-13-01	PAI-01-GW-13-01-F	PAI-01-GW-14-01	PAI-01-GW-14-01-F	PAI1-GW4-01	PAI1-GW4-01-F	
sample	PAI-01-GW-013-01	PAI-01-GW-013-01-F	PAI-01-GW-014-01	PAI-01-GW-014-01-F	PAI-01-GW-004-01	PAI-01-GW-004-01-F	
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	
sample_dat	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	25-Jun-98	25-Jun-98	
sort	c_19	c_20	c_21	c_22	c_23	c_24	count
4-CHLORO-3-METHYLPHENOL	5 U		5 U		5 U		12
4-CHLOROANILINE	5 U		5 U		5 U		12
4-CHLOROPHENYL PHENYL ETHER	5 U		5 U		5 U		12
4-DIMETHYLAMINOAZOBENZENE							1
4-METHYLPHENOL	5 U		5 U		5 U		12
4-NITROANILINE	5 U		5 U		5 U		12
4-NITROPHENOL	10 U		10 U		10 U		12
4-NITROQUINOLINE-1-OXIDE							1
4-PHENYLENEDIAMINE							1
5-NITRO-O-TOLUIDINE							1
7,12-DIMETHYLBENZ(A)ANTHRACENE							1
A,A-DIMETHYLPHENETHYLAMINE							1
ACENAPHTHENE	1 J		5 U		5 U		12
ACENAPHTHYLENE	5 U		5 U		5 U		12
ACETOPHENONE							1
ANILINE							1
ANTHRACENE	1 J		5 U		5 U		12
BENZO(A)ANTHRACENE	5 U		5 U		5 U		12
BENZO(A)PYRENE	5 U		5 U		5 U		12
BENZO(B)FLUORANTHENE	5 U		5 U		5 U		12
BENZO(G,H,I)PERYLENE	5 U		5 U		5 U		12
BENZO(K)FLUORANTHENE	5 U		5 U		5 U		12
BENZYL ALCOHOL							1
BIS(2-CHLOROETHOXY)METHANE	5 U		5 U		5 U		12
BIS(2-CHLOROETHYL)ETHER	5 U		5 U		5 U		12
BIS(2-ETHYLHEXYL)PHTHALATE	5 U		10 U		5 U		12
BUTYLBENZYL PHTHALATE	5 U		5 U		5 U		12
CARBAZOLE	2 J		5 U		5 U		11
CHLOROBENZILATE							1
CHRYSENE	5 U		5 U		5 U		12
DI-N-BUTYL PHTHALATE	5 U		5 U		5 U		12
DI-N-OCTYL PHTHALATE	5 U		5 U		7		12
DIALLATE							1
DIBENZO(A,H)ANTHRACENE	5 U		5 U		5 U		12
DIBENZOFURAN	1 J		5 U		5 U		12
DIETHYL PHTHALATE	5 U		5 U		5 U		12
DIMETHOATE							1
DIMETHYL PHTHALATE	5 U		5 U		5 U		12
DIPHENYLAMINE							1
ETHYL METHANESULFONATE							1
FLUORANTHENE	1 J		5 U		5 U		12
FLUORENE	1 J		5 U		5 U		12
HEXACHLOROBENZENE	5 U		5 U		5 U		12
HEXACHLOROBUTADIENE	5 U		5 U		5 U		12
HEXACHLOROCYCLOPENTADIENE	5 U		5 U		5 U		12
HEXACHLOROETHANE	5 U		5 U		5 U		12

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site 01
summary of analytical results
groundwater

order	19	20	21	22	23	24	
location	PAI-01-MW-13(S)	PAI-01-MW-13(S)	PAI-01-MW-14(D)	PAI-01-MW-14(D)	PAI1-MW4(S)	PAI1-MW4(S)	
matrix	GW	GW	GW	GW	GW	GW	
nsample	PAI-01-GW-13-01	PAI-01-GW-13-01-F	PAI-01-GW-14-01	PAI-01-GW-14-01-F	PAI1-GW4-01	PAI1-GW4-01-F	
sample	PAI-01-GW-013-01	PAI-01-GW-013-01-F	PAI-01-GW-014-01	PAI-01-GW-014-01-F	PAI-01-GW-004-01	PAI-01-GW-004-01-F	
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	
sample_dat	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	25-Jun-98	25-Jun-98	
sort	c_19	c_20	c_21	c_22	c_23	c_24	count
HEXACHLOROPROPENE							1
INDENO(1,2,3-CD)PYRENE	5 U		5 U		5 U		12
ISODRIN							1
ISOPHORONE	5 U		5 U		5 U		12
ISOSAFROLE							1
KEPONE							1
METHAPYRILENE							1
METHYL METHANESULFONATE							1
N-NITROSO-DI-N-PROPYLAMINE	5 U		5 U		5 U		12
N-NITROSODI-N-BUTYLAMINE							1
N-NITROSODIETHYLAMINE							1
N-NITROSODIMETHYLAMINE							1
N-NITROSODIPHENYLAMINE	5 U		5 U		5 U		12
N-NITROSOMETHYLETHYLAMINE							1
N-NITROSOMORPHOLINE							1
N-NITROSOPIPERIDINE							1
N-NITROSOPYRROLIDINE							1
NAPHTHALENE	1 J		5 U		5 U		12
NITROBENZENE	5 U		5 U		5 U		12
O,O,O-TRIETHYLPHOSPHOROTHIOATE							1
PENTACHLOROBENZENE							1
PENTACHLOROETHANE							1
PENTACHLORONITROBENZENE							1
PENTACHLOROPHENOL	10 U		10 U		10 U		12
PHENACETIN							1
PHENANTHRENE	1 J		1 J		5 U		12
PRONAMIDE							1
PYRENE	1 J		5 U		5 U		12
PYRIDINE							1
SAFROLE							1
SULFOTEP							1
THIONAZIN							1
TOTAL PHENOL	5 U		5 U		5 U		12
Pesticides/PCBs (ug/L)							
4,4'-DDD	0.1 U		0.1 U		0.1 U		12
4,4'-DDE	0.1 U		0.1 U		0.1 U		12
4,4'-DDT	0.1 U		0.1 U		0.1 U		12
ALDRIN	0.051 U		0.05 U		0.05 U		12
ALPHA-BHC	0.051 U		0.05 U		0.05 U		12
ALPHA-CHLORDANE	0.051 U		0.05 U		0.05 U		11
AROCLOR-1016	1 U		1 U		1 U		12
AROCLOR-1221	2 U		2 U		2 U		12
AROCLOR-1232	1 U		1 U		1 U		12
AROCLOR-1242	1 U		1 U		1 U		12
AROCLOR-1248	1 U		1 U		1 U		12
AROCLOR-1254	1 U		1 U		1 U		12

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from gw01_res.dbf
from gw01_res.xls
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site 01
summary of analytical results
groundwater

order	19	20	21	22	23	24	
location	PAI-01-MW-13(S)	PAI-01-MW-13(S)	PAI-01-MW-14(D)	PAI-01-MW-14(D)	PAI1-MW4(S)	PAI1-MW4(S)	
matrix	GW	GW	GW	GW	GW	GW	
nsample	PAI-01-GW-13-01	PAI-01-GW-13-01-F	PAI-01-GW-14-01	PAI-01-GW-14-01-F	PAI1-GW4-01	PAI1-GW4-01-F	
sample	PAI-01-GW-013-01	PAI-01-GW-013-01-F	PAI-01-GW-014-01	PAI-01-GW-014-01-F	PAI-01-GW-004-01	PAI-01-GW-004-01-F	
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	
sample_dat	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	25-Jun-98	25-Jun-98	
sort	**c_19**	**c_20**	**c_21**	**c_22**	**c_23**	**c_24**	**count**
AROCLOR-1260	1 U		1 U		1 U		12
BETA-BHC	0.051 U		0.05 U		0.05 U		12
CHLORDANE							1
DELTA-BHC	0.051 U		0.05 U		0.05 U		12
DIELDRIN	0.1 U		0.1 U		0.1 U		12
ENDOSULFAN I	0.051 U		0.05 U		0.05 U		12
ENDOSULFAN II	0.1 U		0.1 U		0.1 U		12
ENDOSULFAN SULFATE	0.1 U		0.1 U		0.1 U		12
ENDRIN	0.1 U		0.1 U		0.1 U		12
ENDRIN ALDEHYDE	0.1 U		0.1 U		0.1 U		12
ENDRIN KETONE	0.1 U		0.1 U		0.1 U		11
GAMMA-BHC (LINDANE)	0.051 U		0.05 U		0.05 U		12
GAMMA-CHLORDANE	0.051 U		0.05 U		0.05 U		11
HEPTACHLOR	0.051 U		0.05 U		0.05 U		12
HEPTACHLOR EPOXIDE	0.051 U		0.05 U		0.05 U		12
METHOXYCHLOR	0.51 U		0.5 U		0.5 U		12
TOXAPHENE	5.1 U		5 U		5 U		12
Herbicides (ug/L)							
2,4,5-T							1
2,4,5-TP (SILVEX)							1
2,4-D							1
2-SEC-BUTYL-4,6-DINITROPHENOL (DINOSEB							1
Inorganics (ug/L)							
ALUMINUM	22 U	22 U	116	22 U	3970	44.4	23
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U	24
ARSENIC	1.1 U	1.3	2.1	1.1 U	1.3	1.1 U	24
BARIUM	396	590	69.8	283	16.2	252	24
BERYLLIUM	0.2	0.2 U	0.2	0.2	0.5	0.2 U	24
CADMIUM	2 U	2	2 U	2.3	2 U	2 U	24
CALCIUM	302000	287000	67200	62400	84600	85700	23
CHROMIUM	16.2	17.1	6.4 U	6.4 U	11.4	6.4 U	24
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	24
COPPER	4.7	3.1	2.6 U	2.6 U	4.2	2.6 U	24
CYANIDE	10 U		10 U		10 U		12
IRON	15.2 U	10.7 U	4090	2580	1150	112 U	23
LEAD	4.2	5	0.9 U	19.8	12.7	0.9 U	24
MAGNESIUM	724000	730000	169000	161000	9650	9430	23
MANGANESE	181	164	85.1 U	72.7 U	13.7 U	14	23
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	24
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	24
POTASSIUM	284000	270000	110000	106000	6980	6740	23
SELENIUM	8.7 U	4.5 U	0.9 U	9 U	0.9 U	0.9 U	24
SILVER	43 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	24
SODIUM	6160000	6010000	1770000	1770000	19400	23000	23
THALLIUM	10 U	10 U	10.5 U	2 U	2 U	2 U	24
TIN							1

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site 01
summary of analytical results
groundwater

order	19	20	21	22	23	24	
location	PAI-01-MW-13(S)	PAI-01-MW-13(S)	PAI-01-MW-14(D)	PAI-01-MW-14(D)	PAI1-MW4(S)	PAI1-MW4(S)	
matrix	GW	GW	GW	GW	GW	GW	
nsample	PAI-01-GW-13-01	PAI-01-GW-13-01-F	PAI-01-GW-14-01	PAI-01-GW-14-01-F	PAI1-GW4-01	PAI1-GW4-01-F	
sample	PAI-01-GW-013-01	PAI-01-GW-013-01-F	PAI-01-GW-014-01	PAI-01-GW-014-01-F	PAI-01-GW-004-01	PAI-01-GW-004-01-F	
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	
sample_dat	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	25-Jun-98	25-Jun-98	
sort	c_19	c_20	c_21	c_22	c_23	c_24	count
VANADIUM	7.4	7.4	3.1	2.8	3.1	2.6 U	24
ZINC	4.6	48.9	8.7	72.3	16.2	102	24
Miscellaneous Parameters (mg/L)							
CHLORIDE	7900		3700		28		12
FLUORIDE	20 U		20 U		2 U		12
HARDNESS as CaCO3	4600		840		200		11
HEXAVALENT CHROMIUM							4
NITRATE/NITRITE, AS NITROGEN	0.02		0.03		0.06		12
SULFATE	1200		630		24		12
SULFIDE							1
TOTAL DISSOLVED SOLIDS	20000 J		5700 J		290 J		12
TOTAL ORGANIC CARBON	12		4.8		6.2		12
TOTAL SUSPENDED SOLIDS	61 J		19 J		17 J		12

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SURFACE WATER – Site 1

site 01
summary of analytical results
surface water

order	01	02	03	04	05	06	07	08	09	10
location	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-03	PAI-01-SW-03
matrix	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
nsample	PAI-01-SW-01-00	PAI-01-SW-01-00-D	PAI-01-SW-01-00-F	PAI-01-SW-01-00-F-D	PAI-01-SW-02-00	PAI-01-SW-02-00-D	PAI-01-SW-02-00-F	PAI-01-SW-02-00-F-D	PAI-01-SW-03-00	PAI-01-SW-03-00-F
sample	PAI-01-SW-001	PAI-01-SW-001D	PAI-01-SW-001-F	PAI-01-SW-001D-F	PAI-01-SW-002-01	PAI-01-SW-002-01D	PAI-01-SW-002-01-F	PAI-01-SW-002-01D-F	PAI-01-SW-003	PAI-01-SW-003-F
sample_dat	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	17-May-98	17-May-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10
Volatile Organics (ug/L)										
1,1,1-TRICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
1,1,2,2-TETRACHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
1,1,2-TRICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
1,1-DICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
1,1-DICHLOROETHENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
1,2-DICHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
1,2-DICHLOROETHENE (TOTAL)	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
1,2-DICHLOROPROPANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
2-BUTANONE	2 U	2 U			2 UR	2 UR			2 UR	
2-HEXANONE	2 U	2 U			2 U	2 U			2 U	
4-METHYL-2-PENTANONE	2 U	2 U			2 U	2 U			2 U	
ACETONE	2 U	2 U			2 UR	2 UR			2 UR	
BENZENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
BROMODICHLOROMETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
BROMOFORM	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
BROMOMETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
CARBON DISULFIDE	2 U	2 U			2 U	2 U			2 U	
CARBON TETRACHLORIDE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
CHLOROBENZENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
CHLOROETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
CHLOROFORM	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
CHLOROMETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
CIS-1,3-DICHLOROPROPENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
DIBROMOCHLOROMETHANE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
ETHYLBENZENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
METHYLENE CHLORIDE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
STYRENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
TETRACHLOROETHENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
TOLUENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
TRANS-1,3-DICHLOROPROPENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
TRICHLOROETHENE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
VINYL CHLORIDE	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
XYLENES, TOTAL	0.5 U	0.5 U			0.5 U	0.5 U			0.5 U	
Semivolatile Organics (ug/L)										
1,2,4-TRICHLOROBENZENE	12 U	11 U			10 U	10 U			10 U	
1,2-DICHLOROBENZENE	12 U	11 U			10 U	10 U			10 U	
1,3-DICHLOROBENZENE	12 U	11 U			10 U	10 U			10 U	
1,4-DICHLOROBENZENE	12 U	11 U			10 U	10 U			10 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	12 U	11 U			10 U	10 U			10 U	
2,4,5-TRICHLOROPHENOL	59 U	55 U			50 U	48 U			50 U	
2,4,6-TRICHLOROPHENOL	12 U	11 U			10 U	10 U			10 U	
2,4-DICHLOROPHENOL	12 U	11 U			10 U	10 U			10 U	
2,4-DIMETHYLPHENOL	12 U	11 U			10 U	10 U			10 U	
2,4-DINITROPHENOL	59 U	55 U			50 U	48 U			50 U	
2,4-DINITROTOLUENE	12 U	11 U			10 U	10 U			10 U	
2,6-DINITROTOLUENE	12 U	11 U			10 U	10 U			10 U	

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site 01
summary of analytical results
surface water

order	01	02	03	04	05	06	07	08	09	10
location	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-03	PAI-01-SW-03
matrix	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
nsample	PAI-01-SW-01-00	PAI-01-SW-01-00-D	PAI-01-SW-01-00-F	PAI-01-SW-01-00-F-D	PAI-01-SW-02-00	PAI-01-SW-02-00-D	PAI-01-SW-02-00-F	PAI-01-SW-02-00-F-D	PAI-01-SW-03-00	PAI-01-SW-03-00-F
sample	PAI-01-SW-001	PAI-01-SW-001D	PAI-01-SW-001-F	PAI-01-SW-001D-F	PAI-01-SW-002-01	PAI-01-SW-002-01D	PAI-01-SW-002-01-F	PAI-01-SW-002-01D-F	PAI-01-SW-003	PAI-01-SW-003-F
sample_dat	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	17-May-98	17-May-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10
2-CHLORONAPHTHALENE	12 U	11 U			10 U	10 U			10 U	
2-CHLOROPHENOL	12 U	11 U			10 U	10 U			10 U	
2-METHYLNAPHTHALENE	12 U	11 U			10 U	10 U			10	
2-METHYLPHENOL	12 U	11 U			10 U	10 U			10 U	
2-NITROANILINE	59 U	55 U			50 U	48 U			50 U	
2-NITROPHENOL	12 U	11 U			10 U	10 U			10 U	
3,3'-DICHLOROBENZIDINE	24 U	22 U			20 U	19 U			20 U	
3-NITROANILINE	59 U	55 U			50 U	48 U			50 U	
4,6-DINITRO-2-METHYLPHENOL	59 U	55 U			50 U	48 U			50 U	
4-BROMOPHENYL PHENYL ETHER	12 U	11 U			10 U	10 U			10 U	
4-CHLORO-3-METHYLPHENOL	24 U	22 U			20 U	19 U			20 U	
4-CHLOROANILINE	24 U	22 U			20 U	19 U			20 U	
4-CHLOROPHENYL PHENYL ETHER	12 U	11 U			10 U	10 U			10 U	
4-METHYLPHENOL	12 U	11 U			10 U	10 U			10 U	
4-NITROANILINE	59 U	55 U			50 U	48 U			50 U	
4-NITROPHENOL	59 U	55 U			50 U	48 U			50 U	
ACENAPHTHENE	2.7 U	3 U			2.4 U	2.4 U			2.5 U	
ACENAPHTHYLENE	1.3 U	1.5 U			1.2 U	1.2 U			1.2 U	
ANTHRACENE	0.054 U	0.06 U			0.047 U	0.047 U			0.05 U	
BENZO(A)ANTHRACENE	0.13 U	0.15 U			0.12 U	0.12 U			0.12 U	
BENZO(A)PYRENE	0.13 U	0.15 U			0.12 U	0.12 U			0.12 U	
BENZO(B)FLUORANTHENE	0.054 U	0.06 U			0.047 U	0.047 U			0.05 U	
BENZO(G,H,I)PERYLENE	0.22 U	0.24 U			0.19 U	0.19 U			0.2 U	
BENZO(K)FLUORANTHENE	0.054 U	0.06 U			0.047 U	0.047 U			0.05 U	
BIS(2-CHLOROETHOXY)METHANE	12 U	11 U			10 U	10 U			10 U	
BIS(2-CHLOROETHYL)ETHER	12 U	11 U			10 U	10 U			10 U	
BIS(2-ETHYLHEXYL)PHTHALATE	12 U	11 U			40	10 U			56	
BUTYLBENZYL PHTHALATE	12 U	11 U			10 U	10 U			10 U	
CARBAZOLE	12 U	11 U			10 U	10 U			10 U	
CHRYSENE	0.13 U	0.15 U			0.12 U	0.12 U			0.12 U	
DI-N-BUTYL PHTHALATE	12 U	11 U			10 U	10 U			10 U	
DI-N-OCTYL PHTHALATE	12 U	11 U			10 U	10 U			10 U	
DIBENZO(A,H)ANTHRACENE	0.54 U	0.6 U			0.47 U	0.47 U			0.5 U	
DIBENZOFURAN	12 U	11 U			10 U	10 U			10	
DIETHYL PHTHALATE	12 U	11 U			10 U	10 U			10 U	
DIMETHYL PHTHALATE	12 U	11 U			10 U	10 U			10 U	
FLUORANTHENE	0.13 U	0.15 U			0.12 U	0.42 U			0.12 U	
FLUORENE	0.27 U	0.3 U			0.24 U	0.24 U			0.25 U	
HEXACHLOROBENZENE	12 U	11 U			10 U	10 U			10 U	
HEXACHLOROBUTADIENE	12 U	11 U			10 U	10 U			10 U	
HEXACHLOROCYCLOPENTADIENE	12 U	11 U			10 U	10 U			10 U	
HEXACHLOROETHANE	12 U	11 U			10 U	10 U			10 U	
INDENO(1,2,3-CD)PYRENE	0.13 U	0.15 U			0.12 U	0.12 U			0.12 U	
ISOPHORONE	12 U	11 U			10 U	10 U			10 U	
N-NITROSO-DI-N-PROPYLAMINE	12 U	11 U			10 U	10 U			10 U	
N-NITROSODIPHENYLAMINE	12 U	11 U			10 U	10 U			10 U	
NAPHTHALENE	1.3 U	1.5 U			1.2 U	1.2 U			1.2 U	

from sw01_res.dbf
from sw01_res.xls
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site 01
summary of analytical results
surface water

order	01	02	03	04	05	06	07	08	09	10
location	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-03	PAI-01-SW-03
matrix	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
nsample	PAI-01-SW-01-00	PAI-01-SW-01-00-D	PAI-01-SW-01-00-F	PAI-01-SW-01-00-F-D	PAI-01-SW-02-00	PAI-01-SW-02-00-D	PAI-01-SW-02-00-F	PAI-01-SW-02-00-F-D	PAI-01-SW-03-00	PAI-01-SW-03-00-F
sample	PAI-01-SW-001	PAI-01-SW-001D	PAI-01-SW-001-F	PAI-01-SW-001D-F	PAI-01-SW-002-01	PAI-01-SW-002-01D	PAI-01-SW-002-01-F	PAI-01-SW-002-01D-F	PAI-01-SW-003	PAI-01-SW-003-F
sample_dat	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	17-May-98	17-May-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10
NITROBENZENE	12 U	11 U			10 U	10 U			10 U	
PENTACHLOROPHENOL	59 U	55 U			50 U	48 U			110	
PHENANTHRENE	0.11 U	0.12 U			0.094 U	0.094 U			0.099 U	
PYRENE	0.27 U	0.3 U			0.24 U	0.24 U			0.25 U	
TOTAL PHENOL	12 U	11 U			10 U	10 U			10 U	
Pesticides/PCBs (ug/L)										
4,4'-DDD	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
4,4'-DDE	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
4,4'-DDT	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
ALDRIN	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
ALPHA-BHC	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
ALPHA-CHLORDANE	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
AROCLOR-1016	0.28 U	0.28 U			0.24 U	0.24 U			0.25 U	
AROCLOR-1221	0.28 U	0.28 U			0.24 U	0.24 U			0.25 U	
AROCLOR-1232	0.28 U	0.28 U			0.24 U	0.24 U			0.25 U	
AROCLOR-1242	0.28 U	0.28 U			0.24 U	0.24 U			0.25 U	
AROCLOR-1248	0.28 U	0.28 U			0.24 U	0.24 U			0.25 U	
AROCLOR-1254	0.28 U	0.28 U			0.24 U	0.24 U			0.25 U	
AROCLOR-1260	0.28 U	0.28 U			0.24 U	0.24 U			0.25 U	
BETA-BHC	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
DELTA-BHC	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
DIELDRIN	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
ENDOSULFAN I	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
ENDOSULFAN II	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
ENDOSULFAN SULFATE	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
ENDRIN	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
ENDRIN ALDEHYDE	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
ENDRIN KETONE	0.057 U	0.057 U			0.048 U	0.048 U			0.05 U	
GAMMA-BHC (LINDANE)	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
GAMMA-CHLORDANE	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
HEPTACHLOR	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
HEPTACHLOR EPOXIDE	0.028 U	0.028 U			0.024 U	0.024 U			0.025 U	
METHOXYCHLOR	0.28 U	0.28 U			0.24 U	0.24 U			0.25 U	
TOXAPHENE	0.57 U	0.57 U			0.48 U	0.48 U			0.5 U	
Inorganics (ug/L)										
ALUMINUM	7470	19400	56.5 U	60.2 U	781	582	74.7 U	72.9 U	262 U	76.7 U
ANTIMONY	1.7 U	1.7 U	1.7 U	3.3	1.8 U	1.8 U	1.8 U	1.8 U	2.3 U	2.1 U
ARSENIC	6 U	10.6 U	4.4 U	2.8 U	2.1 U	2.1 U	2.1 U	2.1 U	2 U	2 U
BARIUM	30.3	44	39.9	29.9	15.6	14.7	184	34.4	16.1	219
BERYLLIUM	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
CADMIUM	0.3 U	0.69	0.3 U	0.3 U	0.31	0.3	0.3 U	0.3 U	0.3 U	0.3 U
CALCIUM	286000	271000	275000	278000	259000	245000	207000	243000	244000	244000
CHROMIUM	6.4	21.8	0.7 U	0.7 U	0.8 U	0.8 U	0.8 U	0.8 U	0.7 U	0.7 U
COBALT	0.91	2.6	0.6 U	0.6 U	0.4 U	0.4 U	0.4 U	0.4 U	0.6 U	0.6 U
COPPER	39.6	86.3	2.4 U	2.8 U	10.2 U	3 U	2.4 U	0.6 U	9 U	4.5 U
CYANIDE	10 U	10 U			10 U	10 U			10 U	
IRON	4460	12700	16.6 U	16.6 U	601	348	12.5 U	12.5 U	203	16.6 U

from sw01_res.dbf
from sw01_res.xls
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site 01
summary of analytical results
surface water

order	01	02	03	04	05	06	07	08	09	10
location	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-01	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-02	PAI-01-SW-03	PAI-01-SW-03
matrix	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
nsample	PAI-01-SW-01-00	PAI-01-SW-01-00-D	PAI-01-SW-01-00-F	PAI-01-SW-01-00-F-D	PAI-01-SW-02-00	PAI-01-SW-02-00-D	PAI-01-SW-02-00-F	PAI-01-SW-02-00-F-D	PAI-01-SW-03-00	PAI-01-SW-03-00-F
sample	PAI-01-SW-001	PAI-01-SW-001D	PAI-01-SW-001-F	PAI-01-SW-001D-F	PAI-01-SW-002-01	PAI-01-SW-002-01D	PAI-01-SW-002-01-F	PAI-01-SW-002-01D-F	PAI-01-SW-003	PAI-01-SW-003-F
sample_dat	16-Jun-98	16-Jun-98	16-Jun-98	16-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	26-Jun-98	17-May-98	17-May-98
sort	**c_01**	**c_02**	**c_03**	**c_04**	**c_05**	**c_06**	**c_07**	**c_08**	**c_09**	**c_10**
LEAD	44	111	1 U	1 U	1.7 U	1.7 U	1.7 U	1.7 U	3.8 U	1 U
MAGNESIUM	848000	810000	822000	826000	799000	764000	648000	757000	738000	739000
MANGANESE	85.9	131	42	45.6	23.6	19.7	13.7 U	14.4 U	38.6	33.7
MERCURY	0.1 U	0.13	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.11 U	0.12 U	0.1 U
NICKEL	1.8	5.9	1 U	1 U	0.6 U	0.6 U	0.6 U	0.6 U	1 U	1 U
POTASSIUM	345000	340000	348000	352000	425000	409000	452000	398000	483000	487000
SELENIUM	1.7 U	1.7 U	1.7 U	1.7 U	2.2 U	2.2 U	2.2 U	2.2 U	1.7 U	1.7 U
SILVER	0.6 U	0.6 U	0.6 U	0.6 U	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	0.6 U
SODIUM	7510000	7370000	7570000	7620000	6660000	6460000	5560000	6350000	6050000	6130000
THALLIUM	1.6 U	1.6 U	1.6 U	1.6 U	3.1 U	3.1 U	3.1 U	3.1 U	1.6 U	1.6 U
VANADIUM	14.4	34	3 U	3 U	1.7 U	0.6 U	0.6 U	0.6 U	0.5 U	0.5 U
ZINC	40.7 U	81.7	18 U	10.9 U	46.3 U	10.2 U	53 U	20.4 U	13.9	51.5
Miscellaneous Parameters										
HARDNESS as CaCO3	4210	4010			3940	3760			3650	
HEXAVALENT CHROMIUM	0.2 U	0.2 U								
PH	7.7 NONE	7.7 NONE			7.5 NONE	7.6 NONE			7.8 NONE	
SALINITY	21.3 PSU	21.2 PSU			22.5 PSU	20.4 PSU			19.8 PSU	
TOTAL ORGANIC CARBON	5	5 U			2.8	2.3			5.4 J	

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site 01
summary of analytical results
surface water

order	11	12	13	14	15	16	17	18	19	20
location	PAI-01-SW-04	PAI-01-SW-04	PAI-01-SW-09	PAI-01-SW-09	PAI-01-SW-10	PAI-01-SW-10	PAI-01-SW-11	PAI-01-SW-11	PAI-01-SW-12	PAI-01-SW-12
matrix	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
nsample	PAI-01-SW-04-00	PAI-01-SW-04-00-F	PAI-01-SW-09-00	PAI-01-SW-09-00-F	PAI-01-SW-10-00	PAI-01-SW-10-00-F	PAI-01-SW-11-00	PAI-01-SW-11-00-F	PAI-01-SW-12-00	PAI-01-SW-12-00-F
sample	PAI-01-SW-004	PAI-01-SW-004-F	PAI-01-SW-009	PAI-01-SW-009-F	PAI-01-SW-010	PAI-01-SW-010-F	PAI-01-SW-011-01	PAI-01-SW-011-01-F	PAI-01-SW-012	PAI-01-SW-012-F
sample_dat	17-May-98	17-May-98	17-May-98	17-May-98	24-Jun-98	24-Jun-98	29-Jun-98	29-Jun-98	24-Jun-98	24-Jun-98
sort	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18	c_19	c_20
Volatile Organics (ug/L)										
1,1,1-TRICHLOROETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
1,1,2,2-TETRACHLOROETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
1,1,2-TRICHLOROETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
1,1-DICHLOROETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
1,1-DICHLOROETHENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
1,2-DICHLOROETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
1,2-DICHLOROETHENE (TOTAL)	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
1,2-DICHLOROPROPANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
2-BUTANONE	2 UR		2 UR		2 UR		2 UR		2 UR	
2-HEXANONE	2 U		2 U		2 U		2 U		2 U	
4-METHYL-2-PENTANONE	2 U		2 U		2 U		2 U		2 U	
ACETONE	2 UR		7 J		2 UR		2 UR		2 UR	
BENZENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
BROMODICHLOROMETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
BROMOFORM	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
BROMOMETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
CARBON DISULFIDE	2 U		2 U		2 U		2 U		2 U	
CARBON TETRACHLORIDE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
CHLOROBENZENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
CHLOROETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
CHLOROFORM	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
CHLOROMETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
CIS-1,3-DICHLOROPROPENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
DIBROMOCHLOROMETHANE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
ETHYLBENZENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
METHYLENE CHLORIDE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
STYRENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
TETRACHLOROETHENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
TOLUENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
TRANS-1,3-DICHLOROPROPENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
TRICHLOROETHENE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
VINYL CHLORIDE	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
XYLENES, TOTAL	0.5 U		0.5 U		0.5 U		0.5 U		0.5 U	
Semivolatile Organics (ug/L)										
1,2,4-TRICHLOROBENZENE	10 U		10 U		10 U		10 U		11 U	
1,2-DICHLOROBENZENE	10 U		10 U		10 U		10 U		11 U	
1,3-DICHLOROBENZENE	10 U		10 U		10 U		10 U		11 U	
1,4-DICHLOROBENZENE	10 U		10 U		10 U		10 U		11 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U		10 U		10 U		10 U		11 U	
2,4,5-TRICHLOROPHENOL	49 U		48 U		51 U		51 U		54 U	
2,4,6-TRICHLOROPHENOL	10 U		10 U		10 U		10 U		11 U	
2,4-DICHLOROPHENOL	10 U		10 U		10 U		10 U		11 U	
2,4-DIMETHYLPHENOL	10 U		10 U		10 U		10 U		11 U	
2,4-DINITROPHENOL	49 U		48 U		51 U		51 U		54 U	
2,4-DINITROTOLUENE	10 U		10 U		10 U		10 U		11 U	
2,6-DINITROTOLUENE	10 U		10 U		10 U		10 U		11 U	

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site 01
summary of analytical results
surface water

order	11	12	13	14	15	16	17	18	19	20
location	PAI-01-SW-04	PAI-01-SW-04	PAI-01-SW-09	PAI-01-SW-09	PAI-01-SW-10	PAI-01-SW-10	PAI-01-SW-11	PAI-01-SW-11	PAI-01-SW-12	PAI-01-SW-12
matrix	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
nsample	PAI-01-SW-04-00	PAI-01-SW-04-00-F	PAI-01-SW-09-00	PAI-01-SW-09-00-F	PAI-01-SW-10-00	PAI-01-SW-10-00-F	PAI-01-SW-11-00	PAI-01-SW-11-00-F	PAI-01-SW-12-00	PAI-01-SW-12-00-F
sample	PAI-01-SW-004	PAI-01-SW-004-F	PAI-01-SW-009	PAI-01-SW-009-F	PAI-01-SW-010	PAI-01-SW-010-F	PAI-01-SW-011-01	PAI-01-SW-011-01-F	PAI-01-SW-012	PAI-01-SW-012-F
sample_dat	17-May-98	17-May-98	17-May-98	17-May-98	24-Jun-98	24-Jun-98	29-Jun-98	29-Jun-98	24-Jun-98	24-Jun-98
sort	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18	c_19	c_20
2-CHLORONAPHTHALENE	10 U		10 U		10 U		10 U		11 U	
2-CHLOROPHENOL	10 U		10 U		10 U		10 U		11 U	
2-METHYLNAPHTHALENE	10 U		10 U		10 U		10 U		11 U	
2-METHYLPHENOL	10 U		10 U		10 U		10 U		11 U	
2-NITROANILINE	49 U		48 U		51 U		51 U		54 U	
2-NITROPHENOL	10 U		10 U		10 U		10 U		11 U	
3,3'-DICHLOROBENZIDINE	20 U		19 U		20 U		20 U		22 U	
3-NITROANILINE	49 U		48 U		51 U		51 U		54 U	
4,6-DINITRO-2-METHYLPHENOL	49 U		48 U		51 U		51 U		54 U	
4-BROMOPHENYL PHENYL ETHER	10 U		10 U		10 U		10 U		11 U	
4-CHLORO-3-METHYLPHENOL	20 U		19 U		20 U		20 U		22 U	
4-CHLOROANILINE	20 U		19 U		20 U		20 U		22 U	
4-CHLOROPHENYL PHENYL ETHER	10 U		10 U		10 U		10 U		11 U	
4-METHYLPHENOL	10 U		10 U		10 U		10 U		11 U	
4-NITROANILINE	49 U		48 U		51 U		51 U		54 U	
4-NITROPHENOL	49 U		48 U		51 U		51 U		54 U	
ACENAPHTHENE	2.6 U		4.9 U		2.5 U		2.4 U		2.6 U	
ACENAPHTHYLENE	1.3 U		2.4 U		1.2 U		1.2 U		1.3 U	
ANTHRACENE	0.062 U		0.098 U		0.05 U		0.049 U		0.05 U	
BENZO(A)ANTHRACENE	0.13 U		0.24 U		0.12 U		0.12 U		0.13 U	
BENZO(A)PYRENE	0.13 U		0.24 U		0.12 U		0.12 U		0.13 U	
BENZO(B)FLUORANTHENE	0.052 U		0.098 U		0.05 U		0.049 U		0.05 U	
BENZO(G,H,I)PERYLENE	0.21 U		0.39 U		0.2 U		0.2 U		0.21 U	
BENZO(K)FLUORANTHENE	0.052 U		0.098 U		0.05 U		0.049 U		0.05 U	
BIS(2-CHLOROETHOXY)METHANE	10 U		10 U		10 U		10 U		11 U	
BIS(2-CHLOROETHYL)ETHER	10 U		10 U		10 U		10 U		11 U	
BIS(2-ETHYLHEXYL)PHTHALATE	10 U		10 U		10 U		14		11 U	
BUTYLBENZYL PHTHALATE	10 U		10 U		10 U		10 U		11 U	
CARBAZOLE	10 U		10 U		10 U		10 U		11 U	
CHRYSENE	0.13 U		0.24 U		0.1 J		0.12 U		0.13 U	
DI-N-BUTYL PHTHALATE	10 U		10 U		10 U		10 U		11 U	
DI-N-OCTYL PHTHALATE	10 U		10 U		10 U		10 U		11 U	
DIBENZO(A,H)ANTHRACENE	0.52 U		0.98 U		0.5 U		0.49 U		0.53 U	
DIBENZOFURAN	10 U		10 U		10 U		10 U		11 U	
DIETHYL PHTHALATE	10 U		10 U		10 U		10 U		11 U	
DIMETHYL PHTHALATE	10 U		10 U		10 U		10 U		11 U	
FLUORANTHENE	0.082 J		0.24 U		0.12 U		0.12 U		0.13 U	
FLUORENE	0.26 U		0.49 U		0.25 U		0.24 U		0.26 U	
HEXACHLOROBENZENE	10 U		10 U		10 U		10 U		11 U	
HEXACHLOROBUTADIENE	10 U		10 U		10 U		10 U		11 U	
HEXACHLOROCYCLOPENTADIENE	10 U		10 U		10 U		10 U		11 U	
HEXACHLOROETHANE	10 U		10 U		10 U		10 U		11 U	
INDENO(1,2,3-CD)PYRENE	0.13 U		0.24 U		0.12 U		0.12 U		0.13 U	
ISOPHORONE	10 U		10 U		10 U		10 U		11 U	
N-NITROSO-DI-N-PROPYLAMINE	10 U		10 U		10 U		10 U		11 U	
N-NITROSODIPHENYLAMINE	10 U		10 U		10 U		10 U		11 U	
NAPHTHALENE	1.3 U		2.4 U		1.2 U		1.2 U		1.3 U	

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site 01
summary of analytical results
surface water

order	11	12	13	14	15	16	17	18	19	20
location	PAI-01-SW-04	PAI-01-SW-04	PAI-01-SW-09	PAI-01-SW-09	PAI-01-SW-10	PAI-01-SW-10	PAI-01-SW-11	PAI-01-SW-11	PAI-01-SW-12	PAI-01-SW-12
matrix	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
nsample	PAI-01-SW-04-00	PAI-01-SW-04-00-F	PAI-01-SW-09-00	PAI-01-SW-09-00-F	PAI-01-SW-10-00	PAI-01-SW-10-00-F	PAI-01-SW-11-00	PAI-01-SW-11-00-F	PAI-01-SW-12-00	PAI-01-SW-12-00-F
sample	PAI-01-SW-004	PAI-01-SW-004-F	PAI-01-SW-009	PAI-01-SW-009-F	PAI-01-SW-010	PAI-01-SW-010-F	PAI-01-SW-011-01	PAI-01-SW-011-01-F	PAI-01-SW-012	PAI-01-SW-012-F
sample_dat	17-May-98	17-May-98	17-May-98	17-May-98	24-Jun-98	24-Jun-98	29-Jun-98	29-Jun-98	24-Jun-98	24-Jun-98
sort	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18	c_19	c_20
NITROBENZENE	10 U		10 U		10 U		10 U		11 U	
PENTACHLOROPHENOL	49 U		48 U		51 U		51 U		54 U	
PHENANTHRENE	0.1 U		0.2 U		0.1 U		0.098 U		0.1 U	
PYRENE	0.26 U		0.49 U		0.25 U		0.24 U		0.26 U	
TOTAL PHENOL	10 U		10 U		10 U		3 J		11 U	
Pesticides/PCBs (ug/L)										
4,4'-DDD	0.05 U		0.049 U				0.048 U			
4,4'-DDE	0.05 U		0.049 U				0.048 U			
4,4'-DDT	0.05 U		0.049 U				0.048 U			
ALDRIN	0.025 U		0.024 U				0.024 U			
ALPHA-BHC	0.025 U		0.024 U				0.024 U			
ALPHA-CHLORDANE	0.025 U		0.024 U				0.024 U			
AROCLOR-1016	0.25 U		0.24 U		0.25 U		0.24 U		0.29 U	
AROCLOR-1221	0.25 U		0.24 U		0.25 U		0.24 U		0.29 U	
AROCLOR-1232	0.25 U		0.24 U		0.25 U		0.24 U		0.29 U	
AROCLOR-1242	0.25 U		0.24 U		0.25 U		0.24 U		0.29 U	
AROCLOR-1248	0.25 U		0.24 U		0.25 U		0.24 U		0.29 U	
AROCLOR-1254	0.25 U		0.24 U		0.25 U		0.24 U		0.29 U	
AROCLOR-1260	0.25 U		0.24 U		0.25 U		0.24 U		0.29 U	
BETA-BHC	0.025 U		0.024 U				0.024 U			
DELTA-BHC	0.025 U		0.024 U				0.024 U			
DIELDRIN	0.05 U		0.049 U				0.048 U			
ENDOSULFAN I	0.025 U		0.024 U				0.024 U			
ENDOSULFAN II	0.05 U		0.049 U				0.048 U			
ENDOSULFAN SULFATE	0.05 U		0.049 U				0.048 U			
ENDRIN	0.05 U		0.049 U				0.048 U			
ENDRIN ALDEHYDE	0.05 U		0.049 U				0.048 U			
ENDRIN KETONE	0.05 U		0.049 U				0.048 U			
GAMMA-BHC (LINDANE)	0.025 U		0.024 U				0.024 U			
GAMMA-CHLORDANE	0.025 U		0.024 U				0.024 U			
HEPTACHLOR	0.025 U		0.024 U				0.024 U			
HEPTACHLOR EPOXIDE	0.025 U		0.024 U				0.024 U			
METHOXYCHLOR	0.25 U		0.24 U				0.24 U			
TOXAPHENE	0.5 U		0.49 U				0.48 U			
Inorganics (ug/L)										
ALUMINUM	551	80 U	309 U	84.6 U	13300	103 U	1970	56.2 U	434	29.9 U
ANTIMONY	1.7 U	1.7 U	2.2 U	2.2 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
ARSENIC	2 U	2 U	2 U	2 U	13.9	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
BARIUM	14.6	213	12.6	224	27.6 J	229	18.8	216	20.6 J	263
BERYLLIUM	0.2 U	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 U	0.2 U	0.2 UJ	0.2 UJ
CADMIUM	0.3 U	0.3 U	0.3 U	0.3 U	0.3 UJ	0.3 UJ	0.3 U	0.3 U	0.3 UJ	0.3 UJ
CALCIUM	241000	235000	228000	241000	266000	268000	260000	244000	290000	287000
CHROMIUM	0.7 U	0.7 U	0.7 U	0.7 U	19.2	0.8 UJ	0.8 U	0.8 U	0.8 UJ	0.8 UJ
COBALT	0.6 U	0.6 U	0.6 U	0.6 U	2.9 J	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
COPPER	1.4 U	1.3 U	2.7 U	1.2 U	13.6 J	3.7 U	3.7 U	1.2 U	6.2 U	4.5 U
CYANIDE	10 U		10 U		10 U		10 U		10 U	
IRON	320	16.6 U	175	16.6 U	15600	12.5 U	1560	12.5 U	324	12.5 U

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site 01
summary of analytical results
surface water

order	11	12	13	14	15	16	17	18	19	20
location	PAI-01-SW-04	PAI-01-SW-04	PAI-01-SW-09	PAI-01-SW-09	PAI-01-SW-10	PAI-01-SW-10	PAI-01-SW-11	PAI-01-SW-11	PAI-01-SW-12	PAI-01-SW-12
matrix	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
nsample	PAI-01-SW-04-00	PAI-01-SW-04-00-F	PAI-01-SW-09-00	PAI-01-SW-09-00-F	PAI-01-SW-10-00	PAI-01-SW-10-00-F	PAI-01-SW-11-00	PAI-01-SW-11-00-F	PAI-01-SW-12-00	PAI-01-SW-12-00-F
sample	PAI-01-SW-004	PAI-01-SW-004-F	PAI-01-SW-009	PAI-01-SW-009-F	PAI-01-SW-010	PAI-01-SW-010-F	PAI-01-SW-011-01	PAI-01-SW-011-01-F	PAI-01-SW-012	PAI-01-SW-012-F
sample_dat	17-May-98	17-May-98	17-May-98	17-May-98	24-Jun-98	24-Jun-98	29-Jun-98	29-Jun-98	24-Jun-98	24-Jun-98
sort	c_11	c_12	c_13	c_14	c_15	c_16	c_17	c_18	c_19	c_20
LEAD	5 U	5 U	1 U	1 U	9.9 U	17 UJ	20.9	1.7 U	17 UJ	17 UJ
MAGNESIUM	731000	713000	693000	729000	812000	816000	800000	756000	883000	873000
MANGANESE	38	30	44.4	41.8	124	11 J	45.8	31.8	45.8	38.8
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.12	0.1 U	0.1 U	0.12 U	0.1 U	0.1 U
NICKEL	1 U	1 U	1 U	1 U	5 J	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
POTASSIUM	446000	467000	452000	477000	453000 J	439000 J	398000	405000	492000 J	485000 J
SELENIUM	1.7 U	1.7 U	1.7 U	1.7 U	1.6 U	1.6 U	2.2 U	2.2 U	1.6 U	1.6 U
SILVER	0.6 U	0.6 U	0.6 U	0.6 U	0.7 U	0.7 U	0.89	0.7 U	0.7 U	0.7 U
SODIUM	5810000	5860000	5710000	5990000	6890000	6760000	6480000	6460000	7390000	7280000
THALLIUM	1.6 U	1.6 U	1.6 U	1.6 U	3.1 UJ	3.1 UJ	3.1 U	3.1 U	3.1 UJ	3.1 UJ
VANADIUM	1.1 U	0.5 U	0.5 U	0.5 U	36.1 J	0.6 UJ	4.1 U	0.99 U	1 U	0.6 UJ
ZINC	5 U	56.6	7.9 U	51.4	43.4	67.9	12.8 U	74.3	7.3 J	96.4
Miscellaneous Parameters										
HARDNESS as CaCO3	3610		3430		4010		3940		4360	
HEXAVALENT CHROMIUM							0.02 U			
PH	7.8 NONE		7.7 NONE		8.3 NONE		7.8 NONE		7.2 NONE	
SALINITY	19.6 PSU		18.7 PSU		21.7 PSU		23.4 PSU		22.1 PSU	
TOTAL ORGANIC CARBON	9.1 J		6 J		2.6		3.2		3	

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from sw01_res.dbf
from sw01_res.xls
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site 01
summary of analytical results
surface water

order	21	22	
location	FIRELINE	QA/QC	
matrix	SW	SW	
nsample	PAI-01-SW-A01	PAI-01-SW-A01-F	
sample	PAI-01-SW-A01	PAI-01-SW-A01-F	
sample_dat	16-Jun-98	16-Jun-98	
sort	**c_21**	**c_22**	**count**
Volatile Organics (ug/L)			
1,1,1-TRICHLOROETHANE	0.5 U		11
1,1,2,2-TETRACHLOROETHANE	0.5 U		11
1,1,2-TRICHLOROETHANE	0.5 U		11
1,1-DICHLOROETHANE	0.5 U		11
1,1-DICHLOROETHENE	0.5 U		11
1,2-DICHLOROETHANE	0.5 U		11
1,2-DICHLOROETHENE (TOTAL)	0.5 U		11
1,2-DICHLOROPROPANE	0.5 U		11
2-BUTANONE	2 U		11
2-HEXANONE	2 U		11
4-METHYL-2-PENTANONE	2 U		11
ACETONE	2 U		11
BENZENE	0.5 U		11
BROMODICHLOROMETHANE	0.5 U		11
BROMOFORM	0.5 U		11
BROMOMETHANE	0.5 U		11
CARBON DISULFIDE	2 U		11
CARBON TETRACHLORIDE	0.5 U		11
CHLOROBENZENE	0.5 U		11
CHLOROETHANE	0.5 U		11
CHLOROFORM	0.5 U		11
CHLOROMETHANE	0.5 U		11
CIS-1,3-DICHLOROPROPENE	0.5 U		11
DIBROMOCHLOROMETHANE	0.5 U		11
ETHYLBENZENE	0.5 U		11
METHYLENE CHLORIDE	0.5 U		11
STYRENE	0.5 U		11
TETRACHLOROETHENE	0.5 U		11
TOLUENE	0.5 U		11
TRANS-1,3-DICHLOROPROPENE	0.5 U		11
TRICHLOROETHENE	0.5 U		11
VINYL CHLORIDE	0.5 U		11
XYLENES, TOTAL	0.5 U		11
Semivolatile Organics (ug/L)			
1,2,4-TRICHLOROBENZENE	11 U		11
1,2-DICHLOROBENZENE	11 U		11
1,3-DICHLOROBENZENE	11 U		11
1,4-DICHLOROBENZENE	11 U		11
2,2'-OXYBIS(1-CHLOROPROPANE)	11 U		11
2,4,5-TRICHLOROPHENOL	53 U		11
2,4,6-TRICHLOROPHENOL	11 U		11
2,4-DICHLOROPHENOL	11 U		11
2,4-DIMETHYLPHENOL	11 U		11
2,4-DINITROPHENOL	53 U		11
2,4-DINITROTOLUENE	11 U		11
2,6-DINITROTOLUENE	11 U		11

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site 01
summary of analytical results
surface water

order	21	22	
location	FIRELINE	QA/QC	
matrix	SW	SW	
nsample	PAI-01-SW-A01	PAI-01-SW-A01-F	
sample	PAI-01-SW-A01	PAI-01-SW-A01-F	
sample_dat	16-Jun-98	16-Jun-98	
sort	c_21	c_22	count
2-CHLORONAPHTHALENE	11 U		11
2-CHLOROPHENOL	11 U		11
2-METHYLNAPHTHALENE	11 U		11
2-METHYLPHENOL	11 U		11
2-NITROANILINE	53 U		11
2-NITROPHENOL	11 U		11
3,3'-DICHLOROBENZIDINE	21 U		11
3-NITROANILINE	53 U		11
4,6-DINITRO-2-METHYLPHENOL	53 U		11
4-BROMOPHENYL PHENYL ETHER	11 U		11
4-CHLORO-3-METHYLPHENOL	21 U		11
4-CHLOROANILINE	21 U		11
4-CHLOROPHENYL PHENYL ETHER	11 U		11
4-METHYLPHENOL	11 U		11
4-NITROANILINE	53 U		11
4-NITROPHENOL	53 U		11
ACENAPHTHENE	2.7 U		11
ACENAPHTHYLENE	1.4 U		11
ANTHRACENE	0.054 U		11
BENZO(A)ANTHRACENE	0.14 U		11
BENZO(A)PYRENE	0.14 U		11
BENZO(B)FLUORANTHENE	0.054 U		11
BENZO(G,H,I)PERYLENE	0.22 U		11
BENZO(K)FLUORANTHENE	0.054 U		11
BIS(2-CHLOROETHOXY)METHANE	11 U		11
BIS(2-CHLOROETHYL)ETHER	11 U		11
BIS(2-ETHYLHEXYL)PHTHALATE	11 U		11
BUTYLBENZYL PHTHALATE	11 U		11
CARBAZOLE	11 U		11
CHRYSENE	0.66		11
DI-N-BUTYL PHTHALATE	11 U		11
DI-N-OCTYL PHTHALATE	11 U		11
DIBENZO(A,H)ANTHRACENE	0.54 U		11
DIBENZOFURAN	11 U		11
DIETHYL PHTHALATE	11 U		11
DIMETHYL PHTHALATE	11 U		11
FLUORANTHENE	0.22		11
FLUORENE	0.27 U		11
HEXACHLOROBENZENE	11 U		11
HEXACHLOROBUTADIENE	11 U		11
HEXACHLOROCYCLOPENTADIENE	11 U		11
HEXACHLOROETHANE	11 U		11
INDENO(1,2,3-CD)PYRENE	0.14 U		11
ISOPHORONE	11 U		11
N-NITROSO-DI-N-PROPYLAMINE	11 U		11
N-NITROSODIPHENYLAMINE	11 U		11
NAPHTHALENE	1.4 U		11

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site 01
summary of analytical results
surface water

order	21	22	
location	FIRELINE	QA/QC	
matrix	SW	SW	
nsample	PAI-01-SW-A01	PAI-01-SW-A01-F	
sample	PAI-01-SW-A01	PAI-01-SW-A01-F	
sample_dat	16-Jun-98	16-Jun-98	
sort	**c_21**	**c_22**	**count**
NITROBENZENE	11 U		11
PENTACHLOROPHENOL	53 U		11
PHENANTHRENE	0.06 U		11
PYRENE	0.27 U		11
TOTAL PHENOL	11 U		11
Pesticides/PCBs (ug/L)			
4,4'-DDD	0.053 U		9
4,4'-DDE	0.053 U		9
4,4'-DDT	0.053 U		9
ALDRIN	0.026 U		9
ALPHA-BHC	0.026 U		9
ALPHA-CHLORDANE	0.026 U		9
AROCLOR-1016	0.26 U		11
AROCLOR-1221	0.26 U		11
AROCLOR-1232	0.26 U		11
AROCLOR-1242	0.26 U		11
AROCLOR-1248	0.26 U		11
AROCLOR-1254	0.26 U		11
AROCLOR-1260	0.26 U		11
BETA-BHC	0.026 U		9
DELTA-BHC	0.026 U		9
DIELDRIN	0.053 U		9
ENDOSULFAN I	0.026 U		9
ENDOSULFAN II	0.053 U		9
ENDOSULFAN SULFATE	0.053 U		9
ENDRIN	0.053 U		9
ENDRIN ALDEHYDE	0.053 U		9
ENDRIN KETONE	0.053 U		9
GAMMA-BHC (LINDANE)	0.026 U		9
GAMMA-CHLORDANE	0.026 U		9
HEPTACHLOR	0.026 U		9
HEPTACHLOR EPOXIDE	0.026 U		9
METHOXYCHLOR	0.26 U		9
TOXAPHENE	0.53 U		9
Inorganics (ug/L)			
ALUMINUM	8550	50 U	22
ANTIMONY	1.7 U	1.7 U	22
ARSENIC	4.7 U	4.1 U	22
BARIUM	29	231	22
BERYLLIUM	0.2 U	0.2 U	22
CADMIUM	0.3 U	0.3 U	22
CALCIUM	265000	260000	22
CHROMIUM	7.7	0.7 U	22
COBALT	0.86	0.6 U	22
COPPER	37.1	2.5 U	22
CYANIDE	10 U		11
IRON	5140	16.6 U	22

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from sw01_res.xls
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site 01
summary of analytical results
surface water

order	21	22	
location	FIRELINE	QA/QC	
matrix	SW	SW	
nsample	PAI-01-SW-A01	PAI-01-SW-A01-F	
sample	PAI-01-SW-A01	PAI-01-SW-A01-F	
sample_dat	16-Jun-98	16-Jun-98	
sort	**c_21**	**c_22**	**count**
LEAD	46.3	1 U	22
MAGNESIUM	786000	769000	22
MANGANESE	86.2	43.4	22
MERCURY	0.1 U	0.1 U	22
NICKEL	2	1 U	22
POTASSIUM	335000	333000	22
SELENIUM	1.7 U	1.7 U	22
SILVER	0.6 U	0.6 U	22
SODIUM	7250000	7270000	22
THALLIUM	1.6 U	1.6 U	22
VANADIUM	15.3	3.2 U	22
ZINC	37.1 U	54.3 U	22
Miscellaneous Parameters			
HARDNESS as CaCO3	3900		11
HEXAVALENT CHROMIUM	0.2 U		4
PH	7.6 NONE		11
SALINITY	21.2 PSU		11
TOTAL ORGANIC CARBON	5 U		11

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SURFACE SOIL – Site 1

site 01
summary of analytical results
surface soil

order	01	02	03	04	05	06	07	08	09	10	11
aoc	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01
location	PAI-01-MW-14(D)	PAI-01-MW-08(D)	PAI-01-MW-10(D)	PAI-01-SS-05	PAI-01-SS-06	PAI-01-SS-07	PAI-01-SS-08	PAI-01-SS-09	PAI-01-SS-10	PAI-01-SS-11	PAI-01-SS-12
matrix	SB	SB	SB	SS	SS	SS	SS	SS	SS	SS	SS
nsample	PAI-01-SB-05-04	PAI-01-SB-02-04	PAI-01-SB-03-04	PAI-01-SS-05-01	PAI-01-SS-06-01	PAI-01-SS-07-01	PAI-01-SS-08-01	PAI-01-SS-09-01	PAI-01-SS-10-01	PAI-01-SS-11-01	PAI-01-SS-12-01
sample	PAI-01-SB-005-04	PAI-01-SB-002-04	PAI-01-SB-003-04	PAI-01-SS-005-01	PAI-01-SS-006-01	PAI-01-SS-007-01	PAI-01-SS-008-01	PAI-01-SS-009-01	PAI-01-SS-010-01	PAI-01-SS-011-01	PAI-01-SS-012-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
top_depth	0	0	0	0	0	0	0	0	0	0	0
bottom_dep	4	4	4	1	1	1	1	1	1	1	1
sample_dat	24-Jul-98	24-Jul-98	24-Jul-98	03-Jun-98	03-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10	c_11
Volatile Organics (ug/kg)											
1,1,1-TRICHLOROETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
1,1,2,2-TETRACHLOROETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
1,1,2-TRICHLOROETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
1,1-DICHLOROETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
1,1-DICHLOROETHENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
1,2-DICHLOROETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
1,2-DICHLOROETHENE (TOTAL)				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
1,2-DICHLOROPROPANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
2-BUTANONE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
2-HEXANONE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
4-METHYL-2-PENTANONE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
ACETONE				8 UR	9 UR	9 UR	9 U	6 UR	11 U	6 UR	6 UR
BENZENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
BROMODICHLOROMETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
BROMOFORM				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
BROMOMETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
CARBON DISULFIDE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
CARBON TETRACHLORIDE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
CHLOROBENZENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
CHLOROETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
CHLOROFORM				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
CHLOROMETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
CIS-1,3-DICHLOROPROPENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
DIBROMOCHLOROMETHANE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
ETHYLBENZENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
METHYLENE CHLORIDE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
STYRENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
TETRACHLOROETHENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
TOLUENE				3 J	9 U	9 U	8 U	6 U	6 U	6 U	6 U
TRANS-1,3-DICHLOROPROPENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
TRICHLOROETHENE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
VINYL CHLORIDE				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
XYLENES, TOTAL				8 U	9 U	9 U	8 U	6 U	6 U	6 U	6 U
Semivolatile Organics (ug/kg)											
1,2,4-TRICHLOROBENZENE				370 U	530 U	140 J	380 U	360 U	340 U	400 U	400 U
1,2-DICHLOROBENZENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
1,3-DICHLOROBENZENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
1,4-DICHLOROBENZENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2,2'-OXYBIS(1-CHLOROPROPANE)				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2,4,5-TRICHLOROPHENOL				1900 U	2600 U	1700 U	1900 U	1800 U	1700 U	2000 U	2000 U
2,4,6-TRICHLOROPHENOL				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2,4-DICHLOROPHENOL				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U

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site 01
summary of analytical results
surface soil

order	01	02	03	04	05	06	07	08	09	10	11
aoc	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01
location	PAI-01-MW-14(D)	PAI-01-MW-08(D)	PAI-01-MW-10(D)	PAI-01-SS-05	PAI-01-SS-06	PAI-01-SS-07	PAI-01-SS-08	PAI-01-SS-09	PAI-01-SS-10	PAI-01-SS-11	PAI-01-SS-12
matrix	SB	SB	SB	SS	SS	SS	SS	SS	SS	SS	SS
nsample	PAI-01-SB-05-04	PAI-01-SB-02-04	PAI-01-SB-03-04	PAI-01-SS-05-01	PAI-01-SS-06-01	PAI-01-SS-07-01	PAI-01-SS-08-01	PAI-01-SS-09-01	PAI-01-SS-10-01	PAI-01-SS-11-01	PAI-01-SS-12-01
sample	PAI-01-SB-005-04	PAI-01-SB-002-04	PAI-01-SB-003-04	PAI-01-SS-005-01	PAI-01-SS-006-01	PAI-01-SS-007-01	PAI-01-SS-008-01	PAI-01-SS-009-01	PAI-01-SS-010-01	PAI-01-SS-011-01	PAI-01-SS-012-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
top_depth	0	0	0	0	0	0	0	0	0	0	0
bottom_dep	4	4	4	1	1	1	1	1	1	1	1
sample_dat	24-Jul-98	24-Jul-98	24-Jul-98	03-Jun-98	03-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10	c_11
2,4-DIMETHYLPHENOL				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2,4-DINITROPHENOL				1900 U	2600 U	1700 U	1900 U	1800 U	1700 U	2000 U	2000 U
2,4-DINITROTOLUENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2,6-DINITROTOLUENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2-CHLORONAPHTHALENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2-CHLOROPHENOL				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2-METHYLNAPHTHALENE				370 U	530 U	130 J	380 U	360 U	340 U	400 U	400 U
2-METHYLPHENOL				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
2-NITROANILINE				1900 U	2600 U	1700 U	1900 U	1800 U	1700 U	2000 U	2000 U
2-NITROPHENOL				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
3,3'-DICHLOROBENZIDINE				740 U	1000 U	690 U	750 U	710 U	680 U	810 U	800 U
3-NITROANILINE				1900 U	2600 U	1700 U	1900 UR	1800 U	1700 U	2000 U	2000 UR
4,6-DINITRO-2-METHYLPHENOL				1900 U	2600 U	1700 U	1900 U	1800 U	1700 U	2000 U	2000 U
4-BROMOPHENYL PHENYL ETHER				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
4-CHLORO-3-METHYLPHENOL				740 U	1000 U	690 U	750 U	710 U	680 U	810 U	800 U
4-CHLOROANILINE				740 U	1000 U	690 U	750 U	710 U	680 U	810 U	800 U
4-CHLOROPHENYL PHENYL ETHER				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
4-METHYLPHENOL				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
4-NITROANILINE				1900 U	2600 U	1700 U	1900 U	1800 U	1700 U	2000 U	2000 U
4-NITROPHENOL				1900 U	2600 U	1700 U	1900 U	1800 U	1700 U	2000 U	2000 U
ACENAPHTHENE				940 U	1300 U	4400 U	930 U	900 U	420 U	1000 U	500 U
ACENAPHTHYLENE				470 U	640 U	2200 U	470 U	450 U	210 U	510 U	250 U
ANTHRACENE				19 U	17 J	88 U	19 U	35	8.5 U	12 J	10 U
BENZO(A)ANTHRACENE				29 J	160	280	62	200	29	76	18 J
BENZO(A)PYRENE				40 J	220	310	110	220	33	90	20 J
BENZO(B)FLUORANTHENE				53	300	510	110	220	34	81	20
BENZO(G,H,I)PERYLENE				38 J	180	210 J	150	120	34 U	81 U	40 U
BENZO(K)FLUORANTHENE				15 J	96	160	39	92	16	27	11
BIS(2-CHLOROETHOXY)METHANE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
BIS(2-CHLOROETHYL)ETHER				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
BIS(2-ETHYLHEXYL)PHTHALATE				370 U	530 U	62 J	91 J	360 U	60 J	400 U	5600
BUTYLBENZYL PHTHALATE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	2000
CARBAZOLE				370 U	260 J	420	380 U	360 U	370	400 U	400 U
CHRYSENE				56	230	330	74	210	32	80	19 J
DI-N-BUTYL PHTHALATE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	72 J
DI-N-OCTYL PHTHALATE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	6400
DIBENZO(A,H)ANTHRACENE				190 U	260 U	880 U	190 U	180 U	85 U	200 U	100 U
DIBENZOFURAN				370 U	530 U	180 J	380 U	170 J	340 U	400 U	400 U
DIETHYL PHTHALATE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
DIMETHYL PHTHALATE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
FLUORANTHENE				77	340	630	91	300	61	160	33
FLUORENE				95	130 U	440 U	93 U	90 U	42 U	100 U	50 U
HEXACHLOROBENZENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U

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site 01
summary of analytical results
surface soil

order	01	02	03	04	05	06	07	08	09	10	11
aoc	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01
location	PAI-01-MW-14(D)	PAI-01-MW-08(D)	PAI-01-MW-10(D)	PAI-01-SS-05	PAI-01-SS-06	PAI-01-SS-07	PAI-01-SS-08	PAI-01-SS-09	PAI-01-SS-10	PAI-01-SS-11	PAI-01-SS-12
matrix	SB	SB	SB	SS	SS	SS	SS	SS	SS	SS	SS
nsample	PAI-01-SB-05-04	PAI-01-SB-02-04	PAI-01-SB-03-04	PAI-01-SS-05-01	PAI-01-SS-06-01	PAI-01-SS-07-01	PAI-01-SS-08-01	PAI-01-SS-09-01	PAI-01-SS-10-01	PAI-01-SS-11-01	PAI-01-SS-12-01
sample	PAI-01-SB-005-04	PAI-01-SB-002-04	PAI-01-SB-003-04	PAI-01-SS-005-01	PAI-01-SS-006-01	PAI-01-SS-007-01	PAI-01-SS-008-01	PAI-01-SS-009-01	PAI-01-SS-010-01	PAI-01-SS-011-01	PAI-01-SS-012-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
top_depth	0	0	0	0	0	0	0	0	0	0	0
bottom_dep	4	4	4	1	1	1	1	1	1	1	1
sample_dat	24-Jul-98	24-Jul-98	24-Jul-98	03-Jun-98	03-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10	c_11
HEXACHLOROBUTADIENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
HEXACHLOROCYCLOPENTADIENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
HEXACHLOROETHANE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
INDENO(1,2,3-CD)PYRENE				47 U	180	230	130	160	19 J	41 J	25 U
ISOPHORONE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
N-NITROSO-DI-N-PROPYLAMINE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
N-NITROSODIPHENYLAMINE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
NAPHTHALENE				470 U	640 U	2200 U	470 U	450 U	210 U	510 U	250 U
NITROBENZENE				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
PENTACHLOROPHENOL				1900 U	2600 U	1700 U	1900 U	1800 U	1700 U	2000 U	2000 U
PHENANTHRENE				37 U	180	170 J	63	170	21	70	23
PYRENE				94 U	290	510	86 J	240	42 J	100 J	30 J
TOTAL PHENOL				370 U	530 U	340 U	380 U	360 U	340 U	400 U	400 U
Pesticides/PCBs (ug/kg)											
4,4'-DDD				87	29	180 J	9.4 U	10	2.1	11	10 U
4,4'-DDE				790 J	210 J	4200 J	9.1 J	30	5.6	11	29
4,4'-DDT				580 J	140 J	4400 J	6.8 J	11	2.1	3.3 J	6.9 J
ALDRIN				1.9 U	2.6 U	4.4 U	4.7 U	4.4 U	0.87 U	2 U	5 U
ALPHA CHLORDANE											
ALPHA-BHC				1.9 U	3.7	42	4.7 U	4.4 U	0.87 U	2 U	5 U
ALPHA-CHLORDANE				1.9 U	2.6 U	18	4.7 U	9.5	0.87 U	2 U	5 U
AROCLOR-1016				47 U	13 U	88 U	9.4 U	8.8 U	8.7 U	10 U	10 U
AROCLOR-1221				47 U	13 U	88 U	9.4 U	8.8 U	8.7 U	10 U	10 U
AROCLOR-1232				47 U	13 U	88 U	9.4 U	8.8 U	8.7 U	10 U	10 U
AROCLOR-1242				47 U	13 U	88 U	9.4 U	8.8 U	8.7 U	10 U	10 U
AROCLOR-1248				47 U	13 U	88 U	9.4 U	8.8 U	8.7 U	10 U	10 U
AROCLOR-1254				47 U	13 U	88 U	9.4 U	8.8 U	8.7 U	10 U	10 U
AROCLOR-1260				47 U	13 U	88 U	9.4 U	80	37	10 U	10 U
BETA-BHC				1.9 U	8.9	33	4.7 U	4.4 U	0.87 U	2 U	5 U
DELTA-BHC				1.9 U	2.6 U	45	4.7 U	4.4 U	0.87 U	2 U	5 U
DIELDRIN				3.8 U	5.2 U	8.8 U	9.4 U	8.8 U	1.7 U	4.1 U	10 U
ENDOSULFAN I				1.9 U	2.6 U	4.4 U	4.7 U	4.4 U	0.87 U	2 U	5 U
ENDOSULFAN II				3.8 U	5.2 U	8.8 U	9.4 U	8.8 U	1.7 U	4.1 U	10 U
ENDOSULFAN SULFATE				3.8 U	5.2 U	8.8 U	9.4 U	8.8 U	1.7 U	4.1 U	10 U
ENDRIN				3.8 U	5.2 U	8.8 U	9.4 U	8.8 U	1.7 U	4.1 U	10 U
ENDRIN ALDEHYDE				3.8 U	5.2 U	8.8 U	9.4 U	8.8 U	1.7 U	4.1 U	10 U
ENDRIN KETONE				3.8 U	5.2 U	12	9.4 U	8.8 U	1.7 U	4.1 U	10 U
GAMMA-BHC (LINDANE)				1.9 U	2.6 U	75	4.7 U	4.4 U	0.87 U	2 U	5 U
GAMMA-CHLORDANE				1.9 U	2.6 U	6	4.7 U	8.1	0.87 U	2 U	5 U
HEPTACHLOR				1.9 U	2.6 U	4.4 U	4.7 U	4.4 U	0.87 U	2 U	5 U
HEPTACHLOR EPOXIDE				1.9 U	2.6 U	4.4 U	4.7 U	4.4 U	0.87 U	2 U	5 U
METHOXYCHLOR				19 U	26 U	44 U	47 U	44 U	8.7 U	20 U	50 U
TOXAPHENE				38 U	52 U	88 U	94 U	88 U	17 U	41 U	100 U

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site 01
summary of analytical results
surface soil

order	01	02	03	04	05	06	07	08	09	10	11
aoc	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01
location	PAI-01-MW-14(D)	PAI-01-MW-08(D)	PAI-01-MW-10(D)	PAI-01-SS-05	PAI-01-SS-06	PAI-01-SS-07	PAI-01-SS-08	PAI-01-SS-09	PAI-01-SS-10	PAI-01-SS-11	PAI-01-SS-12
matrix	SB	SB	SB	SS	SS	SS	SS	SS	SS	SS	SS
nsample	PAI-01-SB-05-04	PAI-01-SB-02-04	PAI-01-SB-03-04	PAI-01-SS-05-01	PAI-01-SS-06-01	PAI-01-SS-07-01	PAI-01-SS-08-01	PAI-01-SS-09-01	PAI-01-SS-10-01	PAI-01-SS-11-01	PAI-01-SS-12-01
sample	PAI-01-SB-005-04	PAI-01-SB-002-04	PAI-01-SB-003-04	PAI-01-SS-005-01	PAI-01-SS-006-01	PAI-01-SS-007-01	PAI-01-SS-008-01	PAI-01-SS-009-01	PAI-01-SS-010-01	PAI-01-SS-011-01	PAI-01-SS-012-01
sacode	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL
top_depth	0	0	0	0	0	0	0	0	0	0	0
bottom_dep	4	4	4	1	1	1	1	1	1	1	1
sample_dat	24-Jul-98	24-Jul-98	24-Jul-98	03-Jun-98	03-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98	02-Jun-98
sort	c_01	c_02	c_03	c_04	c_05	c_06	c_07	c_08	c_09	c_10	c_11
Inorganics (mg/kg)											
ALUMINUM				5120	3880	4260	8610	5600	4620	7450	7480
ANTIMONY				0.68	0.43	1.4	2.5	90.6	0.15 U	0.37	1.1
ARSENIC				2.6	1.4	3.7	13.4	24.9	0.58	1.2	1.6
BARIUM				128	38	96.2	178	112	15.2	21.4	110
BERYLLIUM				0.51 U	0.26 U	0.25 U	0.06 U	0.09 U	0.13 U	0.13 U	0.16 U
CADMIUM				0.51	0.17	1.3	5.4	3.2	0.1	0.13	0.27
CALCIUM				13100	2390	3130	11100	1060	751	1490	420
CHROMIUM				16	10.6	13.4	53.2	23.5	7	9.5	13.3
COBALT				2.2	1.4	1.6	13.7	5.5	0.33	0.67	1.8
COPPER				38.4	58.7	35.5	131	118	6.5	14.8	39.6
CYANIDE				0.49 U	0.56 U	0.73	0.86	0.42 U	0.5 U	0.42 U	0.57 U
IRON				6760	5370	4830	147000	50400	2560	5590	11900
LEAD				239	399	529	1170	8380	58.4	90.8	240
MAGNESIUM				516	1280	360	885	589	233	827	821
MANGANESE				53.6	143	89.1	752	275	35.3	34	81.4
MERCURY				0.15	0.41	1.1	0.22	0.16	0.04	0.06	0.12
NICKEL				8.4	4.5	3.6	47.8	18.1	2.3	2	5.8
POTASSIUM				692	578	433	466	235	190	460	559
SELENIUM				0.73	0.33	0.34	0.17 U	0.2	0.18	0.18 U	0.2 U
SILVER				2.1	0.44 U	0.67	1.3	2.4	0.16 U	0.06 U	0.48
SODIUM				495	3530	227	551	68	793	1180	1710
THALLIUM				0.15 U	0.2 U	0.13 U	0.65 U	1.1 U	0.14 U	0.16 U	0.16 U
VANADIUM				11.8	8	9.1	12.7	47.4	5.7	12.3	11.4
ZINC				173	232	433	497	471	66	85.6	130
Miscellaneous Parameters (mg/kg)											
HEXAVALENT CHROMIUM							0.85 U	0.83 U			
PH	7.7 NONE	7.6 NONE	7.6 NONE			6.6 NONE			6.3 NONE		
TOTAL ORGANIC CARBON (%)	2.5 %	1.5 %	2.5 %			2 %			0.98 %		

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site 01
summary of analytical results
surface soil

order	12	13	14	15	16	
aoc	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	
location	PAI-01-SS-13	PAI-01-SS-14	PAI-01-SS-14	JONNET	JONNET	
matrix	SS	SS	SS	SS	SS	
nsample	PAI-01-SS-13-01	PAI-01-SS-14-01	PAI-01-SS-14-01-D	PAI-01-SS-015	PAI-01-SS-016	
sample	PAI-01-SS-013-01	PAI-01-SS-014-01	PAI-01-SS-014-01-D	PAI-01-SS-015	PAI-01-SS-016	
sacode	NORMAL	DUP	DUP	NORMAL	NORMAL	
top_depth	0	0	0	0	0	
bottom_dep	1	1	1	0	0	
sample_dat	02-Jun-98	02-Jun-98	02-Jun-98	21-Apr-99	21-Apr-99	
sort	c_12	c_13	c_14	c_15	c_16	count
Volatile Organics (ug/kg)						
1,1,1-TRICHLOROETHANE	7 U	6 U	6 U			11
1,1,2,2-TETRACHLOROETHANE	7 U	6 U	6 U			11
1,1,2-TRICHLOROETHANE	7 U	6 U	6 U			11
1,1-DICHLOROETHANE	7 U	6 U	6 U			11
1,1-DICHLOROETHENE	7 U	6 U	6 U			11
1,2-DICHLOROETHANE	7 U	6 U	6 U			11
1,2-DICHLOROETHENE (TOTAL)	7 U	6 U	6 U			11
1,2-DICHLOROPROPANE	7 U	6 U	6 U			11
2-BUTANONE	7 U	6 U	6 U			11
2-HEXANONE	7 U	6 U	6 U			11
4-METHYL-2-PENTANONE	7 U	6 U	6 U			11
ACETONE	27 U	21 U	13 U			11
BENZENE	7 U	6 U	6 U			11
BROMODICHLOROMETHANE	7 U	6 U	6 U			11
BROMOFORM	7 U	6 U	6 U			11
BROMOMETHANE	7 U	6 U	6 U			11
CARBON DISULFIDE	7 U	6 U	6 U			11
CARBON TETRACHLORIDE	7 U	6 U	6 U			11
CHLOROBENZENE	7 U	6 U	6 U			11
CHLOROETHANE	7 U	6 U	6 U			11
CHLOROFORM	7 U	6 U	6 U			11
CHLOROMETHANE	7 U	6 U	6 U			11
CIS-1,3-DICHLOROPROPENE	7 U	6 U	6 U			11
DIBROMOCHLOROMETHANE	7 U	6 U	6 U			11
ETHYLBENZENE	7 U	6 U	6 U			11
METHYLENE CHLORIDE	7 U	6 U	6 U			11
STYRENE	7 U	6 U	6 U			11
TETRACHLOROETHENE	7 U	6 U	6 U			11
TOLUENE	7 U	6 U	6 U			11
TRANS-1,3-DICHLOROPROPENE	7 U	6 U	6 U			11
TRICHLOROETHENE	7 U	6 U	6 U			11
VINYL CHLORIDE	7 U	6 U	6 U			11
XYLENES, TOTAL	7 U	6 U	6 U			11
Semivolatile Organics (ug/kg)						
1,2,4-TRICHLOROBENZENE	420 U	420 U	410 U			11
1,2-DICHLOROBENZENE	420 U	420 U	410 U			11
1,3-DICHLOROBENZENE	420 U	420 U	410 U			11
1,4-DICHLOROBENZENE	420 U	420 U	410 U			11
2,2'-OXYBIS(1-CHLOROPROPANE)	420 U	420 U	410 U			11
2,4,5-TRICHLOROPHENOL	2100 U	2100 U	2100 U			11
2,4,6-TRICHLOROPHENOL	420 U	420 U	410 U			11
2,4-DICHLOROPHENOL	420 U	420 U	410 U			11

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from ss01_res.dbf
from ss01_sam.dbf
9/27/997:59 AM

site 01
summary of analytical results
surface soil

order	12	13	14	15	16	
aoc	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	
location	PAI-01-SS-13	PAI-01-SS-14	PAI-01-SS-14	JONNET	JONNET	
matrix	SS	SS	SS	SS	SS	
nsample	PAI-01-SS-13-01	PAI-01-SS-14-01	PAI-01-SS-14-01-D	PAI-01-SS-015	PAI-01-SS-016	
sample	PAI-01-SS-013-01	PAI-01-SS-014-01	PAI-01-SS-014-01-D	PAI-01-SS-015	PAI-01-SS-016	
sacode	NORMAL	DUP	DUP	NORMAL	NORMAL	
top_depth	0	0	0	0	0	
bottom_dep	1	1	1	0	0	
sample_dat	02-Jun-98	02-Jun-98	02-Jun-98	21-Apr-99	21-Apr-99	
sort	c_12	c_13	c_14	c_15	c_16	count
2,4-DIMETHYLPHENOL	420 U	420 U	410 U			11
2,4-DINITROPHENOL	2100 U	2100 U	2100 U			11
2,4-DINITROTOLUENE	420 U	420 U	410 U			11
2,6-DINITROTOLUENE	420 U	420 U	410 U			11
2-CHLORONAPHTHALENE	420 U	420 U	410 U			11
2-CHLOROPHENOL	420 U	420 U	410 U			11
2-METHYLNAPHTHALENE	420 U	420 U	410 U			11
2-METHYLPHENOL	420 U	420 U	410 U			11
2-NITROANILINE	2100 U	2100 U	2100 U			11
2-NITROPHENOL	420 U	420 U	410 U			11
3,3'-DICHLOROBENZIDINE	850 U	840 U	830 U			11
3-NITROANILINE	2100 U	2100 U	2100 U			11
4,6-DINITRO-2-METHYLPHENOL	2100 U	2100 U	2100 U			11
4-BROMOPHENYL PHENYL ETHER	420 U	420 U	410 U			11
4-CHLORO-3-METHYLPHENOL	850 U	840 U	830 U			11
4-CHLOROANILINE	850 U	840 U	830 U			11
4-CHLOROPHENYL PHENYL ETHER	420 U	420 U	410 U			11
4-METHYLPHENOL	420 U	420 U	410 U			11
4-NITROANILINE	2100 U	2100 U	2100 U			11
4-NITROPHENOL	2100 U	2100 U	2100 U			11
ACENAPHTHENE	530 U	530 U	520 U	5700	420 U	13
ACENAPHTHYLENE	260 U	260 U	260 U	86 U	210 U	13
ANTHRACENE	19	44	10 U	3.4 U	8.5 U	13
BENZO(A)ANTHRACENE	120	170	37	8.6 U	11 J	13
BENZO(A)PYRENE	130	160	53	8.6 U	20 J	13
BENZO(B)FLUORANTHENE	130	140	54	3.4 U	26	13
BENZO(G,H,I)PERYLENE	67	77	28 J	14 U	34 U	13
BENZO(K)FLUORANTHENE	49	57	22	3.4 U	8.5 U	13
BIS(2-CHLOROETHOXY)METHANE	420 U	420 U	410 U			11
BIS(2-CHLOROETHYL)ETHER	420 U	420 U	410 U			11
BIS(2-ETHYLHEXYL)PHTHALATE	420 U	420 U	410 U			11
BUTYLBENZYL PHTHALATE	420 U	420 U	410 U			11
CARBAZOLE	470	460	520			11
CHRYSENE	120	230	64	8.6 U	24	13
DI-N-BUTYL PHTHALATE	420 U	420 U	410 U			11
DI-N-OCTYL PHTHALATE	420 U	420 U	410 U			11
DIBENZO(A,H)ANTHRACENE	100 U	100 U	100 U	34 U	85 U	13
DIBENZOFURAN	420 U	420 U	200 J			11
DIETHYL PHTHALATE	420 U	420 U	410 U			11
DIMETHYL PHTHALATE	420 U	420 U	410 U			11
FLUORANTHENE	230	330	70	8.6 U	36	13
FLUORENE	53 U	53 U	52 U	17 U	42 U	13
HEXACHLOROBENZENE	420 U	420 U	410 U			11

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from ss01_res.dbf
from ss01_sam.dbf
9/27/997:F

site 01
summary of analytical results
surface soil

order	12	13	14	15	16	
aoc	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	
location	PAI-01-SS-13	PAI-01-SS-14	PAI-01-SS-14	JONNET	JONNET	
matrix	SS	SS	SS	SS	SS	
nsample	PAI-01-SS-13-01	PAI-01-SS-14-01	PAI-01-SS-14-01-D	PAI-01-SS-015	PAI-01-SS-016	
sample	PAI-01-SS-013-01	PAI-01-SS-014-01	PAI-01-SS-014-01-D	PAI-01-SS-015	PAI-01-SS-016	
sacode	NORMAL	DUP	DUP	NORMAL	NORMAL	
top_depth	0	0	0	0	0	
bottom_dep	1	1	1	0	0	
sample_dat	02-Jun-98	02-Jun-98	02-Jun-98	21-Apr-99	21-Apr-99	
sort	c_12	c_13	c_14	c_15	c_16	count
HEXACHLOROBUTADIENE	420 U	420 U	410 U			11
HEXACHLOROCYCLOPENTADIENE	420 U	420 U	410 U			11
HEXACHLOROETHANE	420 U	420 U	410 U			11
INDENO(1,2,3-CD)PYRENE	84	82	30	4.3 J	11 J	13
ISOPHORONE	420 U	420 U	410 U			11
N-NITROSO-DI-N-PROPYLAMINE	420 U	420 U	410 U			11
N-NITROSODIPHENYLAMINE	420 U	420 U	410 U			11
NAPHTHALENE	260 U	260 U	260 U	86 U	210 U	13
NITROBENZENE	420 U	420 U	410 U			11
PENTACHLOROPHENOL	2100 U	2100 U	2100 U			11
PHENANTHRENE	100	200	24	130	17 U	13
PYRENE	180	260	53 J	17 U	26 J	13
TOTAL PHENOL	420 U	420 U	410 U			11
Pesticides/PCBs (ug/kg)						
4,4'-DDD	13	18	12	1.7 U	3.4 U	13
4,4'-DDE	29	10	9.2	3.8 J	76 J	13
4,4'-DDT	50	5.1	69	5.2 J	70 J	13
ALDRIN	2.1 U	1 U	1 U	0.86 U	1.7 U	13
ALPHA CHLORDANE				0.86 U	1.7 U	2
ALPHA-BHC	2.1 U	1 U	1 U	0.86 U	1.7 U	13
ALPHA-CHLORDANE	2.1 U	1 U	1 U			11
AROCLOR-1016	10 U	10 U	10 U			11
AROCLOR-1221	10 U	10 U	10 U			11
AROCLOR-1232	10 U	10 U	10 U			11
AROCLOR-1242	10 U	10 U	10 U			11
AROCLOR-1248	10 U	10 U	10 U			11
AROCLOR-1254	10 U	10 U	10 U			11
AROCLOR-1260	21	10 U	10 U			11
BETA-BHC	2.1 U	1 U	1 U	1 R	1.7 U	13
DELTA-BHC	2.1 U	1 U	1 U	0.86 U	1.7 U	13
DIELDRIN	4.2 U	2.1 U	2.1 U	1.7 U	3.4 U	13
ENDOSULFAN I	2.1 U	1 U	1 U	0.86 U	1.7 U	13
ENDOSULFAN II	4.2 U	2.1 U	2.1 U	1.7 U	3.4 U	13
ENDOSULFAN SULFATE	4.2 U	2.1 U	2.1 U	1.7 U	3.4 U	13
ENDRIN	4.2 U	2.1 U	2.1 U	1.7 U	3.4 U	13
ENDRIN ALDEHYDE	4.2 U	2.1 U	2.1 U	1.7 U	3.4 U	13
ENDRIN KETONE	4.2 U	2.1 U	2.1 U	1.7 U	3.4 U	13
GAMMA-BHC (LINDANE)	2.1 U	1 U	1 U	0.86 U	1.7 U	13
GAMMA-CHLORDANE	2.1 U	1 U	1 U	0.86 U	1.7 U	13
HEPTACHLOR	2.1 U	1 U	1 U	0.86 U	1.7 U	13
HEPTACHLOR EPOXIDE	2.1 U	1 U	1 U	0.86 U	1.7 U	13
METHOXYCHLOR	21 U	10 U	10 U	8.6 U	17 U	13
TOXAPHENE	42 U	21 U	21 U	17 U	34 U	13

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from ss01_res.dbf
from ss01_sam.dbf
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site 01
summary of analytical results
surface soil

order	12	13	14	15	16	
aoc	SITE 01	SITE 01	SITE 01	SITE 01	SITE 01	
location	PAI-01-SS-13	PAI-01-SS-14	PAI-01-SS-14	JONNET	JONNET	
matrix	SS	SS	SS	SS	SS	
nsample	PAI-01-SS-13-01	PAI-01-SS-14-01	PAI-01-SS-14-01-D	PAI-01-SS-015	PAI-01-SS-016	
sample	PAI-01-SS-013-01	PAI-01-SS-014-01	PAI-01-SS-014-01-D	PAI-01-SS-015	PAI-01-SS-016	
sacode	NORMAL	DUP	DUP	NORMAL	NORMAL	
top_depth	0	0	0	0	0	
bottom_dep	1	1	1	0	0	
sample_dat	02-Jun-98	02-Jun-98	02-Jun-98	21-Apr-99	21-Apr-99	
sort	c_12	c_13	c_14	c_15	c_16	count
Inorganics (mg/kg)						
ALUMINUM	6600	8400	6070			11
ANTIMONY	0.26	0.17 U	0.29			11
ARSENIC	0.74	2.6	1.9			11
BARIUM	21.5	17.1	31.2			11
BERYLLIUM	0.09 U	0.19 U	0.15 U			11
CADMIUM	0.13	0.11	0.14			11
CALCIUM	475	443	538			11
CHROMIUM	8.8	11.6	9.1			11
COBALT	0.56	0.94	0.82			11
COPPER	31.8	6.5	10			11
CYANIDE	0.61 U	0.42 U	0.61 U			11
IRON	4950	9030	12100			11
LEAD	83.1	30.4	189			11
MAGNESIUM	675	876	662			11
MANGANESE	17.4	15	22.3			11
MERCURY	0.2	0.06	0.05			11
NICKEL	1.8	1.9	2			11
POTASSIUM	488	692	575			11
SELENIUM	0.18 U	0.21 U	0.19 U			11
SILVER	0.16 U	0.06 U	0.06 U			11
SODIUM	2490	1940	1740			11
THALLIUM	0.17 U	0.29 U	0.28 U			11
VANADIUM	8.7	16	14.7			11
ZINC	68.4	34.6	56.7			11
Miscellaneous Parameters (mg/kg)						
HEXAVALENT CHROMIUM		0.89 U	0.94 U			4
PH						5
TOTAL ORGANIC CARBON (%)						5

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from ss01_res.dbf
from ss01_sam.dbf
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SURFACE SOIL – SWMU 41

MCRD Paris Island
SWMU 41 - surface soils
Analytical Results

order	01	02	03	04
site	SITE 41	SITE 41	SITE 41	SITE 41
location	PAI-41-SS-01	PAI-41-SS-02	PAI-41-SS-03	PAI-41-SS-04
matrix	SS	SS	SS	SS
nsample	PAI-41-SS-01-01	PAI-41-SS-02-01	PAI-41-SS-03-01	PAI-41-SS-04-01
sample_dat	01-Jun-98	03-Jun-98	01-Jun-98	01-Jun-98
Volatile Organics (ug/kg)				
1,1,1-TRICHLOROETHANE	7 U	8 U	7 U	6 U
1,1,2,2-TETRACHLOROETHANE	7 U	8 U	7 U	6 U
1,1,2-TRICHLOROETHANE	7 U	8 U	7 U	6 U
1,1-DICHLOROETHANE	7 U	8 U	7 U	6 U
1,1-DICHLOROETHENE	7 U	8 U	7 U	6 U
1,2-DICHLOROETHANE	7 U	8 U	7 U	6 U
1,2-DICHLOROETHENE (TOTAL)	7 U	8 U	7 U	6 U
1,2-DICHLOROPROPANE	7 U	8 U	7 U	6 U
2-BUTANONE	7 U	8 U	7 U	6 U
2-HEXANONE	7 U	8 U	7 U	6 U
4-METHYL-2-PENTANONE	7 U	8 U	7 U	6 U
ACETONE	7 UR	730 J	7 UR	6 UR
BENZENE	7 U	8 U	7 U	6 U
BROMODICHLOROMETHANE	7 U	8 U	7 U	6 U
BROMOFORM	7 U	8 U	7 U	6 U
BROMOMETHANE	7 U	8 U	7 U	6 U
CARBON DISULFIDE	7 U	8 U	7 U	6 U
CARBON TETRACHLORIDE	7 U	8 U	7 U	6 U
CHLOROBENZENE	7 U	8 U	7 U	6 U
CHLOROETHANE	7 U	8 U	7 U	6 U
CHLOROFORM	7 U	8 U	7 U	6 U
CHLOROMETHANE	7 U	8 U	7 U	6 U
CIS-1,3-DICHLOROPROPENE	7 U	8 U	7 U	6 U
DIBROMOCHLOROMETHANE	7 U	8 U	7 U	6 U
ETHYLBENZENE	7 U	8 U	7 U	6 U
METHYLENE CHLORIDE	7 U	8 U	7 U	6 U
STYRENE	7 U	8 U	7 U	6 U
TETRACHLOROETHENE	7 U	8 U	7 U	6 U
TOLUENE	7 U	8 U	7 U	6 U
TRANS-1,3-DICHLOROPROPENE	7 U	8 U	7 U	6 U
TRICHLOROETHENE	7 U	8 U	7 U	6 U
VINYL CHLORIDE	7 U	8 U	7 U	6 U
XYLENES, TOTAL	7 U	8 U	7 U	6 U
Semivolatile Organics (ug/kg)				
1,2,4-TRICHLOROBENZENE	350 U	350 U	360 U	350 U
1,2-DICHLOROBENZENE	350 U	350 U	360 U	350 U
1,3-DICHLOROBENZENE	350 U	350 U	360 U	350 U
1,4-DICHLOROBENZENE	350 U	350 U	360 U	350 U
2,2'-OXYBIS(1-CHLOROPROPANE)	350 U	350 U	360 U	350 U
2,4,5-TRICHLOROPHENOL	1700 U	1800 U	1800 U	1700 U
2,4,6-TRICHLOROPHENOL	350 U	350 U	360 U	350 U
2,4-DICHLOROPHENOL	350 U	350 U	360 U	350 U
2,4-DIMETHYLPHENOL	350 U	350 U	360 U	350 U
2,4-DINITROPHENOL	1700 U	1800 U	1800 U	1700 U
2,4-DINITROTOLUENE	350 U	350 U	360 U	350 U
2,6-DINITROTOLUENE	350 U	350 U	360 U	350 U
2-CHLORONAPHTHALENE	350 U	350 U	360 U	350 U
2-CHLOROPHENOL	350 U	350 U	360 U	350 U
2-METHYLNAPHTHALENE	350 U	350 U	360 U	350 U
2-METHYLPHENOL	350 U	350 U	360 U	350 U
2-NITROANILINE	1700 U	1800 U	1800 U	1700 U
2-NITROPHENOL	350 U	350 U	360 U	350 U
3,3'-DICHLOROBENZIDINE	700 U	700 U	720 U	690 U
3-NITROANILINE	1700 U	1800 U	1800 U	1700 U
4,6-DINITRO-2-METHYLPHENOL	1700 U	1800 U	1800 U	1700 U
4-BROMOPHENYL PHENYL ETHER	350 U	350 U	360 U	350 U
4-CHLORO-3-METHYLPHENOL	700 U	700 U	720 U	690 U
4-CHLOROANILINE	350 U	700 U	360 U	350 U
4-CHLOROPHENYL PHENYL ETHER	350 U	350 U	360 U	350 U
4-METHYLPHENOL	350 U	350 U	360 U	350 U
4-NITROANILINE	1700 U	1800 U	1800 U	1700 U
4-NITROPHENOL	1700 U	1800 U	1800 U	1700 U
ACENAPHTHENE	870 U	440 U	890 U	430 U
ACENAPHTHYLENE	440 U	220 U	440 U	210 U
ANTHRACENE	17 U	8.9 U	18 U	8.6 U
BENZO(A)ANTHRACENE	24 J	22 U	63	21 U

MCRD Paris Island
SWMU 41 - surface soils
Analytical Results

order	01	02	03	04
site	SITE 41	SITE 41	SITE 41	SITE 41
location	PAI-41-SS-01	PAI-41-SS-02	PAI-41-SS-03	PAI-41-SS-04
matrix	SS	SS	SS	SS
nsample	PAI-41-SS-01-01	PAI-41-SS-02-01	PAI-41-SS-03-01	PAI-41-SS-04-01
sample_dat	01-Jun-98	03-Jun-98	01-Jun-98	01-Jun-98
BENZO(A)PYRENE	32 J	22 U	37 J	21 U
BENZO(B)FLUORANTHENE	43	13	68	10
BENZO(G,H,I)PERYLENE	70 U	36 U	70	34 U
BENZO(K)FLUORANTHENE	19	8.9 U	18 U	8.6 U
BIS(2-CHLOROETHOXY)METHANE	350 U	350 U	360 U	350 U
BIS(2-CHLOROETHYL)ETHER	350 U	350 U	360 U	350 U
BIS(2-ETHYLHEXYL)PHTHALATE	350 U	350 U	360 U	350 U
BUTYLBENZYL PHTHALATE	350 U	350 U	360 U	350 U
CARBAZOLE	350 U	350 U	360 U	350 U
CHRYSENE	44 U	22 U	44 U	12 J
DI-N-BUTYL PHTHALATE	350 U	350 U	360 U	350 U
DI-N-OCTYL PHTHALATE	350 U	350 U	360 U	350 U
DIBENZO(A,H)ANTHRACENE	170 U	89 U	180 U	86 U
DIBENZOFURAN	350 U	350 U	360 U	350 U
DIETHYL PHTHALATE	350 U	350 U	360 U	350 U
DIMETHYL PHTHALATE	350 U	350 U	360 U	350 U
FLUORANTHENE	63	26	200	26
FLUORENE	87 U	44 U	28	43 U
HEXACHLOROBENZENE	350 U	350 U	360 U	350 U
HEXACHLOROBUTADIENE	350 U	350 U	360 U	350 U
HEXACHLOROCYCLOPENTADIENE	350 U	350 U	360 U	350 U
HEXACHLOROETHANE	350 U	350 U	360 U	350 U
INDENO(1,2,3-CD)PYRENE	26 J	22 U	44 U	21 U
ISOPHORONE	350 U	350 U	360 U	350 U
N-NITROSO-DI-N-PROPYLAMINE	350 U	350 U	360 U	350 U
N-NITROSODIPHENYLAMINE	350 U	350 U	360 U	350 U
NAPHTHALENE	440 U	220 U	440 U	210 U
NITROBENZENE	350 U	350 U	360 U	350 U
PENTACHLOROPHENOL	1700 U	1800 U	1800 U	1700 U
PHENANTHRENE	30 J	69	190	31
PYRENE	87 U	44 U	120	43 U
TOTAL PHENOL	350 U	350 U	360 U	350 U
Pesticides/PCBs (ug/kg)				
4,4'-DDD	17 U	3.5 U	180 U	85 U
4,4'-DDE	43	34	180 U	85 U
4,4'-DDT	65	12	180 U	85 U
ALDRIN	8.7 U	1.8 U	88 U	42 U
ALPHA-BHC	8.7 U	1.8 U	88 U	42 U
ALPHA-CHLORDANE	8.7 U	1.8 U	88 U	42 U
AROCLOR-1016	8.7 U	8.9 U	8.8 U	8.5 U
AROCLOR-1221	8.7 U	8.9 U	8.8 U	8.5 U
AROCLOR-1232	8.7 U	8.9 U	8.8 U	8.5 U
AROCLOR-1242	8.7 U	8.9 U	8.8 U	8.5 U
AROCLOR-1248	8.7 U	8.9 U	8.8 U	8.5 U
AROCLOR-1254	8.7 U	8.9 U	8.8 U	8.5 U
AROCLOR-1260	8.7 U	8.9 U	8.8 U	8.5 U
BETA-BHC	8.7 U	1.8 U	88 U	42 U
DELTA-BHC	8.7 U	1.8 U	88 U	42 U
DIELDRIN	17 U	3.5 U	180 U	85 U
ENDOSULFAN I	8.7 U	1.8 U	88 U	42 U
ENDOSULFAN II	17 U	3.5 U	180 U	85 U
ENDOSULFAN SULFATE	17 U	3.5 U	180 U	85 U
ENDRIN	17 U	3.5 U	180 U	85 U
ENDRIN ALDEHYDE	17 U	3.5 U	180 U	85 U
ENDRIN KETONE	17 U	3.5 U	180 U	85 U
GAMMA-BHC (LINDANE)	8.7 U	1.8 U	88 U	42 U
GAMMA-CHLORDANE	8.7 U	1.8 U	88 U	42 U
HEPTACHLOR	8.7 U	1.8 U	88 U	42 U
HEPTACHLOR EPOXIDE	8.7 U	1.8 U	88 U	42 U
METHOXYCHLOR	87 U	18 U	880 U	420 U
TOXAPHENE	170 U	35 U	1800 U	850 U
Inorganics (mg/kg)				
ALUMINUM	3240	3130	5830	6290
ANTIMONY	0.47 U	0.16 U	0.89 U	0.15 U
ARSENIC	0.87	0.48	6.3	0.69
BARIUM	44.1	20.7	151	29.6
BERYLLIUM	0.05	0.14 U	0.51	0.13

MCRD Paris Island
SWMU 41 - surface soils
Analytical Results

order	01	02	03	04
site	SITE 41	SITE 41	SITE 41	SITE 41
location	PAI-41-SS-01	PAI-41-SS-02	PAI-41-SS-03	PAI-41-SS-04
matrix	SS	SS	SS	SS
nsample	PAI-41-SS-01-01	PAI-41-SS-02-01	PAI-41-SS-03-01	PAI-41-SS-04-01
sample_dat	01-Jun-98	03-Jun-98	01-Jun-98	01-Jun-98
CADMIUM	0.32	0.11	1.1	0.13 U
CALCIUM	1620	1640	1830	384
CHROMIUM	9.6	4.8	13.4	5.1
COBALT	0.51	0.36	4.3	0.54
COPPER	10.5	9	114	4.8
CYANIDE	0.43 U	0.4 U	0.47 U	0.48 U
IRON	3320	2150	15500	2910
LEAD	161	34.5	156	26.4
MAGNESIUM	281	187	604	292
MANGANESE	31.8	28.3	95.7	71.8
MERCURY	0.04	0.16	0.18	0.05
NICKEL	1.6	1.1	13.9	2.4
POTASSIUM	249	148	1170	205
SELENIUM	0.22	0.23	1.1	0.23
SILVER	0.18	0.25 U	0.89	0.05 U
SODIUM	263	358	425	408
THALLIUM	0.14 U	0.15 U	0.15 U	0.14 U
VANADIUM	5.4	4.8	11	6.6
ZINC	63.3	30.9	158	27.8

APPENDIX D

PARCC PARAMETERS/DATA VALIDATION LETTERS

D-1 PARCC PARAMETERS
D-2 DATA VALIDATION LETTERS

D-1

PARCC PARAMETERS

DATA QUALITY

Various quality control measures were implemented during the 1998 and 1999 field sampling and laboratory analysis performed by Tetra Tech NUS at Site 1 and SWMU 41. These measures were conducted to ensure that the resultant data were suitable for their intended uses (i.e., nature and extent determination, risk assessment, etc.). A brief summary of the measures is provided in this appendix. Section 1.0 contains a summary of the Data Quality Objectives (DQOs). Field Quality Control Samples are discussed in Section 2.0. A summary of the data validation procedures and the results of the data validation process are provided in Section 3.0.

1.0 DATA QUALITY OBJECTIVES

A detailed discussion of the DQOs for the 1998 and 1999 field sampling is provided in the Quality Assurance section of the MCRD Parris Island Work Plan (Tetra Tech NUS, March 1998). DQOs for all field and laboratory analyses, which includes requirements for precision, accuracy, and completeness, are summarized in the remainder of this section.

1.1 Precision

Precision characterizes the amount of variability and bias inherent in a data set. This parameter also describes the reproducibility of measurements of the same parameters for samples under similar conditions. Precision is expressed as a Relative Percent Difference (RPD), which is defined as the relation of the range relative to the mean RPDs, which are typically expressed as percentages, are used to evaluate both field and laboratory duplicate precision and are calculated, as follows:

$$RPD = \frac{V1 - V2}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference
V1, V2 = two results obtained by analyzing duplicate samples

The precision objectives for CLP parameters are specified in the associated analytical protocols. For non-CLP data, the precision objective of ±50 percent for solid matrices and ±30 percent for aqueous matrices were employed for this project.

Field duplicates monitor the consistency with which environmental samples were obtained and analyzed. Laboratory duplicates measure the reproducibility of laboratory generated results. RPDs were calculated for each set of field and laboratory duplicates generated for the investigation. Failures in meeting the precision objectives resulted in the qualification (as per data validation protocols) of the associated analytical data. The qualification of the 1998 analytical data for SWMUS 1 and 41, as well as the implication of the data qualifications, is discussed in Section 3.0 of this appendix.

1.2 Accuracy

The degree of accuracy of a measurement, which is expressed as a percent recovery, is based on a comparison of the measured value with an accepted reference or true value. Accuracy measurements are determined by the analysis of "spiked" samples (i.e., blank, surrogate, or matrix spikes). These analyses measure the accuracy of the laboratory operations as affected by the sample matrix. Percent recovery is calculated using the following equation:

$$\%R = \frac{Ss - So}{S} \times 100$$

where %R = percent recovery
Ss = result of spiked sample
So = result of non-spiked sample
S = concentration of spiked amount.

In general, the accuracy objective for the 1998 and 1999 analytical data is defined as 75 to 125 percent recovery. Failures in meeting the accuracy objectives resulted in the qualification (as per data validation protocols) of the associated analytical data. A discussion of the qualification of the 1998 and 1999 analytical data for SWMUS 1 and 41 and the implication of the data qualifications is provided in Section 3.0 of this appendix.

1.3 Completeness

Completeness is a measure of the amount of valid data obtained from the field and laboratory analyses in relation to the total amount of data collected. Completeness is typically expressed as a percentage and is determined using the following equation:

$$\%C = \frac{V}{T} \times 100$$

where %C = percent completeness
V = number of results determined to be valid
T = total number of results

Under ideal conditions, the completeness objective would be 100 percent. However, samples can be rendered unusable during shipping or preparation (e.g., bottles broken or extracts accidentally destroyed) or analysis (e.g., loss of instrument sensitivity, strong matrix effects). The completeness objective for this project is 90%, as stated in the Work Plan. The calculated percent completeness for all chemical analytical data collected during the 1998 and 1999 sampling event for SWMUS 1 and 41 is 98.9% (i.e., 112 chemical analytical results out of a total of 10,744 data points were qualified as unusable), indicating that the data completeness objective for the project was achieved.

Table 1 of this appendix contains a list of those sample results that were determined to be invalid and unusable via data validation. Section 3.0 of this appendix contains a summary of the data validation results and describes, in general, the rationale behind the rejection of these analytical results.

2.0 FIELD QUALITY CONTROL SAMPLES

The following field quality control (QC) samples were collected for the 1998 and 1999 sampling effort and analyzed in accordance with DQO requirements, as specified in the Work Plan:

- Field duplicates were obtained at a frequency of one per every ten samples (10% per matrix). Field duplicates for soil samples are two separate samples collected from the same source. Aqueous sample duplicates are collected simultaneously. Duplicates assess the overall precision of the sampling and analysis program.

- Trip blanks of analyte-free water were generated by the laboratory, taken to the sampling site, and returned to the laboratory with the environmental samples to be analyzed for volatile organic compounds. Analytical results for trip blanks are used to determine the level of contamination associated with the transportation of environmental samples. One trip blank was collected per each cooler and analyzed for volatile organics.

- Rinsate blanks were obtained by pouring analyte-free water over sample collection equipment (e.g., bailers, etc.) after decontamination to assess the effectiveness of field decontamination procedures. Samples were obtained at a frequency of one per day per media per analysis. However, only samples generated every other day were subjected to chemical analysis.

- Field blanks consisted of source water samples used in steam cleaning and/or decontamination and are used to determine the level of contamination associated with the source water. Field blanks were obtained at a frequency of one per event per decontamination water source.

Documentation for the actual collection of the aforementioned field QC samples for all 1998 and 1999 SWMUS 1 and 41 analytical data is provided in Appendix C, Chain of Custody (COCs).

3.0 DATA VALIDATION

All samples collected as part of the 1998 and 1999 field effort and sent to the laboratory for chemical analysis were subjected to data validation. Data validation is an objective systematic process in which analytical data are reviewed to ascertain the validity of the reported results and to identify for the data user the possible limitation of these results. This section summarizes the various aspects of the data validation process.

3.1 General Data Validation Procedures

Validation of data generated for samples collected during the 1998 and 1999 field effort was completed in accordance with the procedures for Level D data validation as outlined in Navy guidance (Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program, NEESA 20.2-047B). Level D data validation was performed for all samples analyzed via the USEPA's Contract Laboratory Program (CLP) methods, as well as for some samples analyzed via SW-846 methods which are similar to the CLP methods (e.g., the 8000 series methods). Data were validated in accordance with the USEPA's CLP Functional Guidelines for Organic and Inorganic Data Review, as amended for use in USEPA Region IV.

At a minimum, the validation process included consideration of the following: data completeness, holding time compliance, mass calibrations, field QC and laboratory generated blanks, internal standards, surrogate spikes, blank spikes, matrix spikes, field duplicate precision, chemical interferences, quantitation, detection limits, and system performance.

Evaluation of laboratory and field QC blank analyses aided in the elimination of false positive results that were identified as laboratory artifacts. The overall determination of data utility or reliability was based upon laboratory compliance with specified methods and adherence to quality control requirements. Noncompliances observed during the validation process typically resulted in the qualification of the associated analytical data. The qualifiers alert the data user to imprecise or estimated results and, in the worst case, unreliable and unusable data.

The net results of the validation process were summarized in sample delivery group-specific technical reports consisting of a memorandum, a section of qualified analytical results, and a supporting documentation section which provided the rationale for changes and/or qualification of the data. These memoranda provide a detailed explanation of the results of the data validation review. All data validation documentation is currently retained on file by Tetra Tech NUS, in the Pittsburgh, Pennsylvania office.

3.2 Data Validation Qualifiers

As mentioned previously, the qualification of analytical data during the validation process (i.e., application of U, J, UJ, UR, and R qualifiers) was conducted as required by the USEPA Functional Guidelines. The

attachment of the data qualifiers to analytical results signifies the occurrence of quality control noncompliances which were noted during the course of data validation. The various data qualifiers are defined, as follows:

- U - Indicates that the chemical was not detected at the numerical detection limit (sample-specific quantitation limit) noted. Nondetected results from the laboratory are reported in this manner. This qualifier is added to a positive result (reported by the laboratory) if the detected concentration is determined to be attributable to contamination introduced during field sampling or laboratory analysis.

- UJ - Indicates that the chemical was not detected. However, the detection limit (sample-specific quantitation limit) is considered to be estimated based on problems encountered during laboratory analysis. The associated numerical detection limit is regarded as inaccurate or imprecise.

- J - Indicates that the chemical was detected. However, the associated numerical result is not a precise representation of the amount that is actually present in the sample. The laboratory reported concentration is considered to be an estimate of the true concentration.

- UR - Indicates that the chemical may or may not be present. The nondetected analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies (i.e., holding times missed by a factor of two times the specified time limit, severe calibration noncompliances, and extremely low quality control recoveries).

- R - Indicates that the chemical may or may not be present. The positive analytical result reported by the laboratory is considered to be unreliable and unusable. This qualifier is applied in cases of gross technical deficiencies.

The preceding data qualifiers may be categorized as indicative of major or minor problems. Major problems are defined as issues that result in the rejection of data, qualified with UR and R data validation qualifiers. These data are considered invalid and are not used for risk assessment and decision making purposes. A summary of the rejected results for the 1998 and 1999 analytical data for SWMUS 1 and 41 is contained in Table 1. Minor problems are defined as issues resulting in the estimation of data, qualified with U, J, and UJ data validation qualifiers. Estimated analytical results are considered to be suitable for risk assessment and decision making purposes.

3.3 Summary of Data Validation Results

A brief summary of the data validation results for the 1998 and 1999 sampling effort for SWMUS 1 and 41 is provided in the remainder of this section. All validated analytical results are presented in Appendix C.

3.3.1 Organic Analyses

Bis(2-ethylhexyl)phthalate was identified as a laboratory blank contaminants on a frequent basis. Bis(2-ethylhexyl)phthalate, acetone, methylene chloride, and toluene were identified as field blank contaminants. Detection limits for these compounds in the affected environmental samples were elevated during the data validation process because positive results for these chemicals are considered to be attributable to blank contamination.

In general, analytical results for organic compounds were qualified as estimated, J or UJ, for observed noncompliances with hold times, calibrations, surrogates, percent breakdown of 4,4'-DDT (pesticides only), and percent difference between columns (pesticides only). Positive results reported at concentrations less than the Contract Required Quantitation Limit (CRQL) were also qualified as estimated because of potential uncertainty near the CRQL.

Nondetected results in some samples were rejected due to gross technical noncompliance with calibration criteria (i.e., relative response factors < 0.050). The compounds 4-nitroquinoline-1-oxide, 4-phenylenediamine, acrolein, acrylonitrile, methyacrylonitrile, 4-methyl-2-butanone, 2-butanone, 2-hexanone, and acetone were the most frequently affected. Aqueous and solid samples were affected by the noncompliances. Refer to Table 1 for a listing of the affected samples and compounds.

Nondetected results for b-BHC and Heptachlor epoxide in solid samples PAI-01-SS-15-01 and PAI-01-SD-17-01 were rejected due to a percent difference between analytical columns greater than 100%. The nondetected result for 4,4'-DDT in sample PAI-01-SD-001was rejected due to the percent breakdown of 4,4'-DDT greater than 20% in the performance evaluation samples.

Semivolatile results for groundwater sample PAI-01-GW-05-01 were qualified as estimated, UJ, due to holding time noncompliance. Positive pesticide results for 4,4'-DDD, 4,4'-DDE and 4,4'-DDT in surface soils PAI-01-SS-05-01, PAI-01-SS-06-01, and PAI-01-SS-07-01 were also qualified as estimated, J, due to holding time noncompliance.

None of the organic analytical results for aqueous or solid samples collected at SWMUS 1 and 41 during the 1998 sampling effort were qualified due to matrix spike (MS) noncompliance, laboratory control sample (LCS) noncompliance, field duplicate imprecision, sample preservation, internal standard recovery, or other problems.

3.3.2 Inorganic Analysis

Several inorganic chemicals were detected as contaminants in the laboratory blanks at varying concentrations. The following compounds were detected as contaminants in the field quality control blanks: beryllium, copper, thallium, vanadium, and tin. The detection limits of those results that were found to be attributable to blank contamination introduced during sampling or laboratory analysis were raised during the validation process.

Inorganic sample results were typically qualified as estimated based on problems noted with calibration, matrix spikes, serial dilution (ICP only), and chemical interferences (ICP only).

None of the inorganic analytical results collected at SWMUS 1 and 41 during the 1998 field effort were qualified as unusable, rejected. It should also be noted that all holding times were met for inorganic analyses for solid and aqueous samples. In addition, no qualifiers were applied on the basis of field duplicate imprecision.

Sediment samples were qualified due to laboratory method blank contamination and calibration noncompliance only. Groundwater and surface waters were qualified due to serial dilution and chemical interferences (ICP only). In addition, groundwater samples were qualified due to matrix spike noncompliance.

3.3.3 Miscellaneous Analyses

Results for surface water samples for total organic carbon, salinity, total dissolved solids, and total suspended solids were qualified as estimated, (J), due to holding time noncompliance.

Positive results for groundwater samples for sulfate were qualified as estimated, (J), due to matrix spike noncompliance.

No other qualifiers were applied to miscellaneous parameters analyzed for SWMUS 1 and 41.

All validated results for SWMUS 1 AND 41 are presented in Appendix C (Data Base). This database is inclusive of all positive results (i.e.,1998 and 1999 data) and is used to defined the nature and extent of contamination, assess contaminant fate and transport, and characterize potential risks.

TABLE 1

SAMPLE	MATRIX	REJECTED RESULTS
PAI-01-GW-05-01	GW	2-butanone, 2-hexanone, acetone
PAI-01-GW-06-01	GW	2-butanone, 2-hexanone, acetone
PAI-01-GW-07-01	GW	2-butanone
PAI-01-GW-08-01	GW	2-butanone
PAI-01-GW-09-01	GW	2-butanone, 2-hexanone, acetone
PAI-01-GW-10-01	GW	4-nitroquinoline-1-oxide, p-phenylenediamine, acrolein, acrylonitrile, methacrylonitrile
PAI-01-GW-11-01	GW	2-butanone, 2-hexanone, acetone
PAI-01-GW-11-01-D	GW	2-butanone, 2-hexanone, acetone
PAI-01-GW-12-01	GW	2-butanone, 2-hexanone, acetone
PAI-01-GW-13-01	GW	2-butanone, 2-hexanone, acetone
PAI-01-GW-14-01	GW	2-butanone, 2-hexanone
PAI1-GW4-01	GW	2-butanone, 2-hexanone
PAI-01-RB-01	QC	2-butanone
PAI-01-RB-02	QC	2-butanone, acetone
PAI-01-RB-03	QC	2-butanone, acetone
PAI-41-RB-01	QC	2-butanone
TB-041599	QC	2-butanone, 2-hexanone, acetone
TB-051998	QC	2-butanone, acetone
TB-060298	QC	2-butanone, acetone
TB-060398	QC	2-butanone, acetone
TB-061698	QC	2-butanone, acetone
TB-061798	QC	2-butanone, acetone, acrolein, acrylonitrile, methacrylonitrile
TB-062698	QC	2-butanone, acetone
TB-063098	QC	2-butanone, acetone, 2-hexanone
TB-063098-2	QC	2-butanone, acetone
TB-091498	QC	2-hexanone, 4-methyl-2-pentanone
PAI-01-SW-02-00	SW	2-butanone, acetone
PAI-01-SW-02-00-D	SW	2-butanone, acetone
PAI-01-SW-03-00	SW	2-butanone, acetone
PAI-01-SW-04-00	SW	2-butanone, acetone
PAI-01-SW-05-00	SW	2-butanone, acetone
PAI-01-SW-06-00	SW	2-butanone, acetone
PAI-01-SW-07-00	SW	2-butanone, acetone
PAI-01-SW-09-00	SW	2-butanone
PAI-01-SW-10-00	SW	2-butanone, acetone
PAI-01-SW-11-00	SW	2-butanone, acetone
PAI-01-SW-12-00	SW	2-butanone, acetone
PAI-01-SD-01-01	SD	acetone
PAI-01-SD-02-01	SD	acetone
PAI-01-SD-02-02	SD	acetone
PAI-01-SD-03-01-D	SD	acetone
PAI-01-SD-05-01	SD	acetone
PAI-01-SD-06-01	SD	acetone
PAI-01-SD-07-01	SD	acetone
PAI-01-SD-10-01	SD	acetone
PAI-01-SD-11-01	SD	acetone
PAI-01-SD-12-01	SD	acetone
PAI-01-SD-001	SD	acetone, 4,4'-DDT

SAMPLE	MATRIX	REJECTED RESULTS
PAI-01-SD-17-01	SD	Heptachlor epoxide
PAI-01-SS-05-01	SS	acetone
PAI-01-SS-06-01	SS	acetone
PAI-01-SS-07-01	SS	acetone
PAI-01-SS-08-01	SS	3-nitroaniline
PAI-01-SS-09-01	SS	acetone
PAI-01-SS-11-01	SS	acetone
PAI-01-SS-12-01	SS	3-nitroaniline, acetone
PAI-41-SS-01-01	SS	acetone
PAI-41-SS-03-01	SS	acetone
PAI-41-SS-04-01	SS	acetone
PAI-01-SS-15-01	SS	b-BHC

D-2

DATA VALIDATION LETTERS

Brown & Root Environmental

INTERNAL CORRESPONDENCE

TO: D. BRAYACK

DATE: AUGUST 11, 1998

FROM: DANIEL MENICUCCI

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - TARGET COMPOUND LIST VOLATILES, SEMIVOLATILES & PESTICIDES / PCBs;
CTO 0020, MCRD PARRIS ISLAND
SDG TTP02

SAMPLES: 3/Aqueous

PAI-01-GW-007-01 PAI-01-GW-008-01 TB-061698

The sample set for the CTO 0020 MCRD Parris Island site SDG TTP02 consists of two (2) aqueous environmental samples and one (1) aqueous trip blank. The field crew specified sample PAI-01-GW-007-01 for matrix spike / matrix spike duplicate analysis in this SDG. All samples were analyzed for volatiles. All samples except the trip blanks were analyzed for semivolatiles and pest / PCBs.

The samples were collected by Tetra Tech NUS, on June 16th, 1998 and analyzed by Laucks Testing Laboratories. The Volatile and Semivolatile Organic Analysis were conducted according to SW-846 Methods 8260B and 8270C, respectively. Pesticide analysis was conducted according to SW-846 Method 8081A. PCB analysis was conducted according to SW-846 Method 8082. The data was evaluated according to the following parameters:

* • Data completeness
* • Holding times
* • GC/MS tuning and mass calibration
  • Initial and continuing calibrations
  • Matrix Spike and Matrix Spike Duplicate
  • Laboratory and field blank analyses
* • Surrogate spike recoveries
  • Laboratory control sample results
* • Internal standard performance
  • Detection limits
* • Sample identification
* • Sample quantitation

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below and the attached Table 1 summarizes the validation qualifications.

Volatile Fraction

The initial and continuing calibration analysis of acetone and 2-butanone contained relative response factors (RRFs) below the 0.050 quality control limit. Nondetected results for the aforementioned compounds in all samples were qualified as unreliable, (UR). Positive results for acetone were qualified as estimated, (J).

The continuing calibration analysis of carbon tetrachloride contained a percent difference (%D) greater than the 25% quality control limit. Nondetected results for the aforementioned compound in all samples were qualified as estimated, (UJ).

The following contaminant was detected in the laboratory method and field quality control blanks at the following maximum concentration:

Analyte	Maximum Concentration	Action-Level
Methylene Chloride	1 ug/L	10 ug/L

Sample aliquot and dilution factors were considered prior to the application of all action levels. Positive results for this compound found below the action level have been replaced by the CRQL value and qualified as a nondetect, (U).

Several compounds in all samples contained positive results below the Contract Required Quantitation Limits (CRQL). These compounds have been qualified as estimated, (J).

Semivolatile Fraction

The continuing calibration analysis of nitrobenzene, isophorone, 2-nitroaniline, 4-nitrophenol and butylbenzylphthalate contained %Ds greater than the 25% quality control limit. Nondetected results for the aforementioned compounds in all samples were qualified as estimated, (UJ).

The surrogate recovery for 2-fluorophenol was below the quality control limit in sample PAI-01-GW-008-01. Since only one fractional surrogate was outside of QC limits, no validation action is required.

The matrix spike / matrix spike duplicate analysis of pentachlorophenol contained low recoveries in sample PAI-01-GW-007-01. As per EPA guidance, no validation action is required for MS / MSD noncompliance alone.

The blank spike sample contained recoveries for 4-chloro-3-methylphenol and 2,4-dinitrotoluene below the lower quality control limit. Recoveries for phenol, 2-chlorophenol, 4-nitrophenol and pentachlorophenol were below the 10% quality control limit. Low recoveries were a result of low surrogate recoveries in the blank spike. Since the environmental samples contained acceptable recoveries and the MS/MSD recoveries were acceptable, no validation action was taken.

Several compounds in all samples contained positive results below the Contract Required Quantitation Limits (CRQL). These compounds have been qualified as estimated, (J).

Pesticides/PCBs

No noncompliances were found in these fractions.

Executive Summary

Laboratory Performance: Methylene chloride was detected in the laboratory method quality control blank. Several semivolatile samples contained low surrogate recoveries. Calibration noncompliances were noted in both volatile and semivolatile analyses.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", February 1994 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 Menicucci
Brown and Root Environmental
Daniel J Menicucci
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

MCRD PARRIS ISLAND
SDG NO. TTP02

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	Volatile	Semivolatile	Pest/PCB
PAI-01-GW-007-01	R^1 $J^{1,2,3}$	$J^{3,4}$	
PAI-01-GW-008-01	A^1 R^1 $J^{1,2,3}$	$J^{3,4}$	
TRIP BLANK 1	A^1 R^1 $J^{2,3}$		

A^1 - Accept data, but qualify positive results for methylene chloride below the action level as nondetected, (U) as a result of blank contamination.

R^1 - Reject data, and qualify nondetected results as unreliable (UR) as a result of the RRFs for acetone and/or 2-butanone falling below the 0.050 quality control limit.

J^1 - Accept data, but qualify positive results for acetone as estimated, (J) as a result of the RRF for acetone falling below the 0.050 quality control limit.

J^2 - Accept data, but qualify nondetected results as estimated, (UJ) as a result of the %D for carbon tetrachloride exceeding the 25% quality control limit.

J^3 - Accept data, but qualify positive result below the CRQL as estimated, (J).

J^4 - Accept data, but qualify nondetected results as estimated, (UJ) as a result of the %Ds for nitrobenzene, isophorone, 2-nitroaniline, 4-nitrophenol and butylbenzylphthalate exceeding the 25% quality control limit.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
J	-	Positive value is considered estimated.
UJ	-	Nondetected value is considered estimated.
UR	-	Value is considered unreliable.

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's r < 0.995
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning r < 0.995 (correlation coefficient)

Brown & Root Environmental

INTERNAL CORRESPONDENCE

TO: [redacted]

DATE: AUGUST 13, 1998

FROM: DANIEL MENICUCCI

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - APPENDIX IX VOLATILES, SEMIVOLATILES, PESTICIDES / PCBs & HERBICIDES;
CTO 0020, MCRD PARRIS ISLAND
SDG TTP03

SAMPLES: 2/Aqueous

PAI-01-GW-010-01 TB061798

The sample set for the CTO 0020 MCRD Parris Island site SDG TTP03 consists of one (1) aqueous environmental sample and one (1) aqueous trip blank. Both samples were analyzed for volatiles. The environmental sample was analyzed for semivolatiles, pest / PCBs and herbicides.

The samples were collected by Tetra Tech NUS, on June 17th, 1998 and analyzed by Laucks Testing Laboratories. The Volatile and Semivolatile Organic Analysis were conducted according to SW-846 Methods 8260B and 8270C, respectively. Pesticide / PCB analysis was conducted according to SW-846 Method 8081A / 8082. Herbicide analysis was conducted according to SW-846 Method 8151A. The data was evaluated according to the following parameters:

* Data completeness
* Holding times
- Initial and continuing calibrations
- Laboratory and field blank analyses
- Detection Limits

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below and the attached Table 1 summarizes the validation qualifications.

Volatile Fraction

The initial and continuing calibration analysis of acetone, 2-butanone, acrolein, acrylonitrile and methacrylonitrile contained relative response factors (RRFs) below the 0.050 quality control limit. Nondetected results for the aforementioned compounds in all samples were qualified as unreliable, (UR). Positive results were qualified as estimated, (J).

The following contaminant was detected in the laboratory method and field quality control blanks at the following maximum concentration:

Analyte	Maximum Concentration	Action-Level
Methylene Chloride	0.4 ug/L	4 ug/L

Sample aliquot and dilution factors were considered prior to the application of all action levels. Positive results for these compound found below the action level have been replaced by the CRQL value and qualified as a nondetect, (U).

Sample PAI-01-010-01 contained positive results below the Contract Required Quantitation Limit (CRQL). These results were qualified as estimated, (J).

Semivolatile Fraction

The initial and continuing calibration analysis of 4-nitroquinoline-n-oxide and 1,4-phenylenediamine contained RRFs below the 0.050 quality control limit. Nondetected results for the aforementioned compounds were qualified as unreliable, (UR).

Sample PAI-01-GW-010-01 contained positive results below the CRQL. These results were qualified as estimated, (J).

Pesticides/PCBs

No noncompliances were found in this fraction.

Herbicides

No noncompliances were found in this fraction.

Executive Summary

Laboratory Performance: Methylene chloride was detected in the laboratory method quality control blank. Several volatile and semivolatile calibrations samples contained poor RRFs.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", February 1994 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)."

Tetra Tech NUS
Daniel J Menicucci
Data Validator

Tetra Tech NUS
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

MCRD PARRIS ISLAND
SDG NO. TTP03

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	Volatile	Semivolatile	Pest/PCB
PAI-01-GW-010-01	A^1 R^1 $J^{1,2}$	R^2 J^2	
TB061798	A^1 R^1		

A^1 - Accept data, but qualify positive results for methylene chloride below the action level as nondetected, (U) as a result of blank contamination.

R^1 - Reject data, and qualify nondetected results as unreliable (UR) as a result of the RRFs for acetone, 2-butanone, acrolein, acrylonitrile and methacrylonitrile falling below the 0.050 quality control limit.

R^2 - Reject data, and qualify nondetected results as unreliable (UR) as a result of the RRFs for 4-nitroquinoline-n-oxide and 1,4-phenylenediamine falling below the 0.050 quality control limit.

J^1 - Accept data, but qualify the positive result for acetone as estimated, (J) as a result of the RRF falling below the 0.050 quality control limit.

J^2 - Accept data, but qualify positive results below the CRQL as estimated, (J).

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
J	-	Positive value is considered estimated.
UJ	-	Nondetected value is considered estimated.
UR	-	Value is considered unreliable.

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's r < 0.995
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning r < 0.995 (correlation coefficient)

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-08-8-083

TO: [redacted] DATE: AUGUST 13, 1998

FROM: TERRI L. SOLOMON COPIES: DV FILE

SUBJECT: INORGANIC DATA VALIDATION - CHLORIDE, CYANIDE, FLUORIDE, HARDNESS, HEXAVALENT CHROMIUM, NITRATE/NITRITE, SULFATE, TOTAL DISSOLVED SOLIDS, TOTAL ORGANIC CARBON, TOTAL SUSPENDED SOLIDS
CTO 020 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG - TTP02

SAMPLES: 3/Aqueous/

PAI-01-GW-007-01 PAI-01-GW-008-01 PAI-01-GW-010-01

Overview

The sample set for MCRD Parris Island, SDG TTP02, consists of three (3) aqueous environmental samples. No field duplicate pairs were included within this SDG.

All samples were analyzed for chloride, fluoride, nitrate/nitrite, sulfate, total dissolved solids, total organic carbon and total suspended solids. Sample PAI-01-GW-007-01 was also analyzed for cyanide, hardness and hexavalent chromium, Sample PAI-01-GW-008-01 was also analyzed for cyanide and hardness. Sample PAI-01-GW-010-01 was also analyzed for hexavalent chromium. The samples were collected by Tetra Tech NUS on June 16 and 17, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Chloride, fluoride and sulfate analyses were conducted using EPA method 300.0. Cyanide analyses were conducted using SW-846 method 9012A. Hardness analyses were conducted using EPA method 130.2. Hexavalent chromium analyses were conducted using SW-846 method 7196A. Nitrate/nitrite analyses were conducted using EPA method 353.3. Total dissolved solids analyses were conducted using EPA method 160.1. Total organic carbon analyses were conducted using SW-846 method 9060. Total suspended solids analyses were conducted using EPA method 160.2.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
  • Laboratory Blank Analyses
* • Laboratory Control Sample Results
  • Matrix Spike Results
* • Laboratory Duplicate Results
* • Sample Quantitation
* • Detection Limits

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (aqueous)
nitrate/nitrite	0.012 mg/L	0.06 mg/L

Samples affected: All

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action level for nitrate/nitrite have been qualified as nondetected "U". No actions were required for the remaining analytes as all results were either greater than the action levels or were nondetects.

Matrix Spike Results

The Matrix Spike (MS) Percent Recovery (%R) for sulfate was > 125% quality control limit. Positive results reported the aforementioned parameter were qualified as estimated, "J".

Notes - None.

Executive Summary

Laboratory Performance: Nitrate/nitrite was present in the laboratory preparation blank.

Other Factors Affecting Data Quality: The MS %R for sulfate was > 125% quality control limit.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Tetra Tech NUS
Terri L. Solomon
Chemist

Tetra Tech NUS
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.

MCRD PARRIS ISLAND
SDG TTP02

TABLE 1 - RECOMMENDATION SUMMARY

chloride	
cyanide	
fluoride	
hardness	
hexavalent chromium	
nitrate/nitrite	A[1]
sulfate	
total dissolved solids	
total organic carbon	
total suspended solids	

If the field is left blank, the qualifier is A - Accept all data.

A[1] - Accept data but qualify as nondetected ,"U", as a result of laboratory blank contamination.

J[1] - Accept data but qualify positive results as estimated, "J", as a result of MS noncompliance.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

TO: [redacted]

DATE: AUGUST 13, 1998

FROM: DANIEL MENICUCCI

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - TARGET COMPOUND LIST VOLATILES, SEMIVOLATILES & PESTICIDES / PCBs;
CTO 0020, MCRD PARRIS ISLAND
SDG TTP04

SAMPLES: 10/Aqueous

PAI-01-GW-004-01	PAI-01-GW-005-01	PAI-01-GW-006-01
PAI-01-GW-011-01	PAI-01-GW-011-01D	PAI-01-GW-012-01
PAI-01-GW-013-01	PAI-01-GW-014-01	PAI-01-GW-09-01
TB063098		

The sample set for the CTO 0020 MCRD Parris Island site SDG TTP04 consists of nine (9) aqueous environmental samples and one (1) aqueous trip blank. One field duplicate pair PAI-01-GW-011-01 / PAI-01-GW-011-01D was specified in this SDG. All samples were analyzed for volatiles. All samples except the trip blank were analyzed for semivolatiles and pesticides / PCBs.

The samples were collected by Tetra Tech NUS, between June 26th - 30th, 1998 and analyzed by Laucks Testing Laboratories. The Volatile and Semivolatile Organic Analysis were conducted according to SW-846 Methods 8260B and 8270C, respectively. Pesticide / PCB analysis was conducted according to SW-846 Method 8081A / 8082. The data was evaluated according to the following parameters:

* • Data completeness
  • Holding times
  • Initial and continuing calibrations
  • Laboratory and field blank analyses

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below and the attached Table 1 summarizes the validation qualifications.

Volatile Fraction

The initial and continuing calibration analysis of acetone, 2-butanone and 2-hexanone contained relative response factors (RRFs) below the 0.050 quality control limit. Nondetected results for the aforementioned compounds in all samples were qualified as unreliable, (UR). A positive result for acetone in sample PAI-01-GW-014-01 was qualified as estimated, (J).

The following contaminant was detected in the laboratory method and field quality control blanks at the following maximum concentration:

Analyte	Maximum Concentration	Action-Level
Methylene Chloride	1.1 ug/L	11 ug/L

Sample aliquot and dilution factors were considered prior to the application of all action levels. Since no positive results were reported for the aforementioned compound, no validation action was required.

Semivolatile Fraction

The acid surrogates in sample PAI-01-GW-005-01 were below the 10% quality control limit. The sample was subsequently reanalyzed six days outside of the technical holding time. The reanalysis was chosen for data validation since the qualifications were less severe. Positive and nondetected results were qualified as estimated, (J) and (UJ).

The following contaminant was detected in the laboratory method quality control blanks at the following maximum concentration:

Analyte	Maximum Concentration	Action-Level
bis(2-ethylhexyl)phthalate	1 ug/L	10 ug/L

Sample aliquot and dilution factors were considered prior to the application of all action levels. Positive results for the aforementioned compound below the action level have been replace by the CRQL and qualified as nondetected, (U).

Pesticides/PCBs

No noncompliances were found in this fraction.

Executive Summary

Laboratory Performance: Methylene chloride and bis(2-ethylhexyl)phthalate were detected in the laboratory method and field quality control blank. All volatile calibrations contained RRFs noncompliances for acetone, 2-hexanone and 2-butanone. A semivolatile sample was analyzed outside of the technical holding time.

Other Factors Affecting Data: Low surrogate recoveries were detected in a semivolatile sample.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", February 1994 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)."

Tetra Tech NUS
Daniel J Menicucci
Data Validator

Tetra Tech NUS
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

MCRD PARRIS ISLAND
SDG NO. TTP04

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	Volatile	Semivolatile	Pest/PCB
PAI-01-GW-004-01	R^1	A^1	
PAI-01-GW-005-01	R^1	A^1 $J^{2,3}$	
PAI-01-GW-006-01	R^1	A^1 J^3	
PAI-01-GW-011-01	R^1	A^1 J^3	
PAI-01-GW-011-01D	R^1	A^1 J^3	
PAI-01-GW-012-01	R^1	A^1 J^3	
PAI-01-GW-013-01	R^1 J^3	A^1 J^3	
PAI-01-GW-014-01	R^1 $J^{1,3}$	A^1 J^3	
PAI-01-GW-09-01	R^1	A^1 J^3	
TB063098	R^1		

A^1 - Accept data, but qualify positive results for bis(2-ethylhexyl)phthalate below the action level as nondetected, (U) as a result of blank contamination.

R^1 - Reject data, and qualify nondetected results as unreliable (UR) as a result of the RRFs for acetone, 2-butanone, and 2-hexanone falling below the 0.050 quality control limit.

J^1 - Accept data, but qualify the positive result for acetone as estimated, (J) as a result of the RRF falling below the 0.050 quality control limit.

J^2 - Accept data, but qualify the positive and nondetected results as estimated, (J) and (UJ) as a result of a technical holding time exceedance.

J^3 - Accept data, but qualify positive results below the CRQL as estimated, (J).

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory.
J	-	Positive value is considered estimated.
UJ	-	Nondetected value is considered estimated.
UR	-	Value is considered unreliable.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-08-8-081

TO: D. BRAYACK DATE: AUGUST 13, 1998

FROM: TERRI L. SOLOMON COPIES: DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS
CTO 020 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG - TTP02

SAMPLES: 5/Aqueous/

PAI-01-GW-007-01	PAI-01-GW-007-01-F	PAI-01-GW-008-01
PAI-01-GW-008-01-F	PAI-01-GW-010-01-F	

Overview

The sample set for MCRD Parris Island, SDG TTP02, consists of five (5) aqueous environmental samples. No field duplicate pairs were included within this SDG.

All samples, with the exception of those designated -F were analyzed for Target Analyte List (TAL) metals. The samples designated -F were qualified for dissolved TAL metals. The samples were collected by Tetra Tech NUS on June 16 and 17, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metals analyses, with the exception of arsenic, lead, mercury, selenium and thallium, were conducted using SW-846 method 6010A. Arsenic, lead, selenium and thallium analyses were conducted using SW-846 method 7000A. Mercury analyses were conducted using SW-846 method 7470A. A CLP-like deliverable was provided.

All analyses, with the exception of arsenic, lead, mercury, selenium and thallium, were conducted using Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium analyses were conducted using Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Calibration Verifications
• Laboratory Blank Analyses
• ICP Interference Check Sample Results
* • Laboratory Control Sample Results
• Matrix Spike Results
* • Laboratory Duplicate Results
* • ICP Serial Dilution Results
* • GFAA Analytical Spike Recoveries
* • Sample Quantitation
* • Detection Limits

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (aqueous)
barium	2.9 ug/L	14.5 ug/L
beryllium	0.3 ug/L	1.5 ug/L
calcium	49.1 ug/L	245.5 ug/L
cobalt	3.2 ug/L	16.0 ug/L
copper	2.5 ug/L	12.5 ug/L
magnesium	31.8 ug/L	159 ug/L
manganese[1]	1.40 ug/L	7.0 ug/L
potassium	204.5 ug/L	1022.5 ug/L
selenium	0.9 ug/L	4.5 ug/L
sodium	177.1 ug/L	885.5 ug/L
vanadium	2.0 ug/L	10.0 ug/L

Samples affected: All

[1] Maximum concentration present in an aqueous preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action level for beryllium and vanadium have been qualified as nondetected "U". No actions were required for the remaining analytes as all results were either greater than the action levels or were nondetects.

ICP Interference Check Sample Results

The interfering analyte magnesium was present in samples PAI-01-GW-008-01 and PAI-01-GW-008-01-F at a concentration which was comparable to the level of magnesium in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, cobalt, manganese, nickel, potassium, sodium and vanadium were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (IDL). Interference affects exist for cobalt, nickel and vanadium in the affected samples. The nondetected results reported for cobalt and nickel in the affected samples were qualified as estimated, "UJ". The positive results reported for vanadium were qualified as a result of blank contamination.

The interfering analytes calcium and magnesium were present in sample PAI-01-GW-010-01-F at concentrations which were comparable to the levels of calcium and magnesium in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, cobalt, manganese, nickel, potassium, sodium and vanadium were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (IDL). Interference affects exist for cobalt, nickel and vanadium in the affected sample. The nondetected results reported for cobalt and nickel in the affected sample were qualified as estimated, "UJ". The positive result reported for vanadium was qualified as a result of blank contamination.

The interfering analyte magnesium was present in sample PAI-01-GW-007-01 at a concentration which was comparable to the level of magnesium in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, cobalt, manganese, nickel, potassium, sodium and vanadium were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (IDL). Interference affects exist for cobalt, nickel and manganese in the affected

sample. The nondetected results reported for cobalt and nickel in the affected samples were qualified as estimated, "UJ". The positive result reported for manganese was qualified as estimated, "J".

The interfering analyte magnesium was present in sample PAI-01-GW-007-01-F at a concentration which was comparable to the level of magnesium in the Interference Check Sample (ICS) solution. Several analytes namely barium, cadmium, cobalt, manganese, nickel, potassium, sodium and vanadium were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (IDL). Interference affects exist for cobalt and nickel in the affected samples. The nondetected results reported for cobalt and nickel in the affected samples were qualified as estimated, "UJ".

Matrix Spike Results

The Matrix Spike (MS) Percent Recoveries (%Rs) for lead, mercury, selenium and thallium were < 75% quality control limit. Positive results and nondetects reported for the aforementioned analytes were qualified as estimated, "J" and "UJ', respectively.

ICP Serial Dilution Results

The ICP Serial Dilution Percent Difference (%D) for manganese was > 10% quality control limit. Positive results reported for the aforementioned analyte were qualified as estimated, "J".

Notes

The GFAA percent recoveries were calculated and entered on the laboratory bench sheets.

It was noted in the case narrative that the single point method of standard addition (MSA) technique was used to calculate the sample results for lead, selenium and thallium for all samples.

The Contract Required Detection Limit (CRDL) Percent Recoveries for chromium, lead and mercury were outside the 80-120% quality control limits. However, no validation actions are required for CRDL noncompliances.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks.

Other Factors Affecting Data Quality: The interfering analyte magnesium was present in all samples. The interfering analyte calcium was present in sample PAI-01-GW-010-01-F. The MS %Rs for lead, mercury, selenium and thallium were < 75% quality control limit. The ICP Serial Dilution %D for manganese was > 10% quality control limit.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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

Tetra Tech NUS
Terri L. Solomon
Chemist

Tetra Tech NUS
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.

MCRD PARRIS ISLAND
SDG TTP02

TABLE 1 - RECOMMENDATION SUMMARY

Aluminum			Magnesium		
Antimony			Manganese		$J^{3,4}$
Arsenic			Mercury		J^2
Barium			Nickel		J^1
Beryllium	A^1		Potassium		
Cadmium			Selenium		J^2
Calcium			Silver		
Chromium			Sodium		
Cobalt		J^1	Thallium		J^2
Copper			Vanadium	A^1	
Iron			Zinc		
Lead		J^2			

If the field is left blank, the qualifier is A - Accept all data.

A^1 - Accept data but qualify as nondetected ,"U", as a result of laboratory blank contamination.

J^1 - Accept data but qualify nondetected results as estimated, "UJ", as a result of ICP Interference.

J^2 - Accept data but qualify positive results and nondetects as estimated, "J" and "UJ", respectively, as a result of MS noncompliances.

J^3 - Accept data but qualify positive results as estimated, "J", as a result of ICP Serial Dilution %D > 10%.

J^4 - Accept data but qualify positiveresults as estimated, "J", as a result of ICP Interference.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-07-8-140

TO: [redacted]

DATE: AUGUST 18, 1998

FROM: DANA PIETO

CC: DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS & CYANIDE
CTO 020, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG U05737

SAMPLES: 6 Solids:

PAI-03-SS-006-01	PAI-03-SS-007-01	PAI-03-SS-009-01
PAI-03-SS-010-01	PAI-03-SS-014-01	PAI-03-SS-014-01-D

7 Aqueous:

PAI-01-SW-03	PAI-01-SW-03-F	PAI-01-SW-04
PAI-01-SW-04-F	PAI-01-SW-09	PAI-01-SW-09-F
PAI-03-RB-02		

The sample set for the CTO 020, MCRD Parris Island, South Carolina, SDG U05737, consists of six solid and six aqueous environmental samples and one rinsate blank (designated RB). All samples were analyzed for TAL metals. Dissolved metal fractions are designated (-F). One field duplicate pair (PAI-03-SS-014-01/PAI-03-SS-014-01-D) was included in this SDG.

The samples were collected by Tetra Tech NUS on May 17 and 19, 1998, and analyzed by RECRA LabNet under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Metal analyses, with the exception of mercury, were conducted using SW-846 Method 6010B. Mercury analyses were conducted using SW-846 Method 7471A. Cyanide analyses were conducted using SW-846 9010B.

The data were evaluated according to the following parameters:

- * Data Completeness
- * Holding Times
- * Calibration Verifications
- Laboratory Blank Analyses
- * Detection Limits

The symbol (*) indicates that quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

MEMO TO: D. BRAYACK
DATE: AUGUST 18, 1998 - PAGE 2

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method/preparation and/or rinsate blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Aqueous Action Level	Soil Action Level
Aluminum	76.8 µg/L	384 µg/L	38.4 mg/kg
Antimony	3.1 µg/L	15.5 µg/L	—
Antimony[2]	3.5 µg/L	—	1.75 mg/kg
Barium	0.26 µg/L	1.3 µg/L	0.13 mg/kg
Beryllium	0.9 µg/L	4.5 µg/L	0.45 mg/kg
Calcium[2]	102 µg/L	—	51 mg/kg
Chromium	1.1 µg/L	5.5 µg/L	0.55 mg/kg
Copper	56.0	280 µg/L	—
Copper	3.1 µg/L	15.5 µg/L	1.55 mg/kg
Iron[2]	83.8 µg/L	—	41.9 mg/kg
Lead	2.46 µg/L	12.3 µg/L	—
Lead[2]	3.4 µg/L	—	1.7 mg/kg
Magnesium	42.6 µg/L	213.0 µg/L	—
Magnesium[2]	144 µg/L	—	72 mg/kg
Manganese	0.8 µg/L	4.0 µg/L	0.4 mg/kg
Potassium	136.7 µg/L	683.5 µg/L	—
Potassium[2]	184 µg/L	—	92 mg/kg
Sodium	401.45 µg/L	2007 µg/L	—
Sodium[2]	1310 µg/L	—	655 mg/kg
Vanadium	1.2 µg/L	6.0 µg/L	0.6 mg/kg
Zinc[1]	2.68 µg/L	13.4 µg/L	—

[1]Maximum concentration found in the aqueous preparation blank.

[2]Maximum concentration found in the rinsate blank.

Samples Affected: All soil samples

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot, percent solids, and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action level for aluminum, antimony, beryllium, copper, lead, sodium, vanadium, and zinc have been qualified "U". No action was taken for the remaining analytes since the results were greater than the action level. It should be noted that field quality control samples are not qualified for field blank contamination.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method/preparation blanks and/or the rinsate blanks.

Other Factors Affecting Data Quality: None.

MEMO TO: **D. BRAYACK**
DATE: **AUGUST 18, 1998 - PAGE 3**

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Inorganic Data Evaluation" (2/94) 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

Tetra Tech NUS
Data Validator

Joseph A. Samchuck

Tetra Tech NUS
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

PARRIS ISLAND
SDG NO. U05737

TABLE 1 - RECOMMENDATION SUMMARY

Aluminum	A[1]	Magnesium	
Antimony	A[1]	Manganese	
Arsenic		Mercury	
Barium		Nickel	
Beryllium	A[1]	Potassium	
Cadmium		Selenium	
Calcium		Silver	
Chromium		Sodium	A[1]
Cobalt		Thallium	
Copper	A[1]	Vanadium	A[1]
Iron		Zinc	A[1]
Lead	A[1]	Cyanide	

If field is left blank, the qualifier is A - accept all data.

A[1] - Accept data, but qualify results as "U", as a result of laboratory blank contamination.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory and should not be considered present.

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's $r < 0.995$
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)

INTERNAL CORRESPONDENCE

Brown & Root Environmental

TO: [redacted] **DATE:** **AUGUST 19, 1998**

FROM: **LINDA KARSONOVICH** **COPIES:** **DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PAH/PEST/PCB**
PARRIS ISLAND
SDG U05737

SAMPLES: 5/Aqueous/

PAI-01-SW-03
PAI-01-SW-09
TB-051998
PAI-01-SW-04
PAI-03-RB-02

6/Solid/

PAI-03-SS-006-01
PAI-03-SS-009-01
PAI-03-SS-014-01
PAI-03-SS-007-01
PAI-03-SS-010-01
PAI-03-SS-014-01D

OVERVIEW

The sample set for Parris Island, SDG U05737 consists of two (2) aqueous field quality control blanks, three(3) aqueous environmental samples, and six (6) solid environmental samples. All samples were analyzed for Target Compound List (TCL) volatile organic compounds. The environmental samples and rinsate blank (designated RB) were also analyzed for semivolatile organic compounds, polynuclear aromatic hydrocarbons (PAH), organochlorine pesticides, and polychlorinated biphenyls (PCBs).

The samples were collected by Tetra Tech NUS on May 17th and 19th, 1998 and analyzed by RECRA Labnet. All analyses were conducted using SW-846 Methods 8260B, 8270C, 8310, 8081A, and 8082 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
• Initial/continuing calibrations
• Laboratory method and field quality control blank results
• Surrogates
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings are presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Volatile

Initial and/or continuing calibration relative response factors (RRFs) fell below the 0.05 quality control limit for acetone and 2-butanone. Nondetected results were qualified as rejected, UR, in the aqueous samples. Positive results for acetone were qualified as estimated; J.

Initial and/or continuing calibration RRFs fell below the 0.05 quality control limit for acetone. Nondetected results for were qualified as rejected, UR, in the soil samples.

The following table summarizes the maximum concentration of volatile compounds detected in the laboratory method and field quality control blanks (*) in this SDG.

Compound	Maximum Concentration	Action Level
Acetone	24 µg/Kg	240 µg/Kg
2-Butanone	7 µg/Kg	70 µg/Kg
Methylene chloride**	2 µg/L	20 µg/L and 20 µg/Kg
1,2-Dichloroethene (total)*	23 µg/L	115 µg/Kg
Tetrachloroethene*	4 µg/L	20 µg/Kg
Trichloroethene*	14 µg/L	70 µg/Kg

** Contamination present in trip blank.
* Contamination present in rinsate blank.

Dilution factors, percent solids, and sample aliquot were taken into consideration when applying blank action levels. Positive results for acetone below the action level were qualified as nondetected, U.

Samples PAI-03-SS-009-01 and 007-01 were diluted 50X due to the presence of acetone above the instrument's linear calibration range. Results from the dilution were transposed over the undiluted sample results and used for validation purposes.

Semivolatile

Surrogate recovery in sample PAI-03-SS-009-01 was below the lower quality control limits for all six surrogates. Nondetected results were qualified as estimated, UJ.

Surrogate recoveries in sample PAI-03-SS-006-01 were below 10% for four of the six surrogates. The sample was re-extracted and re-analyzed and the surrogates were compliant. However, the re-extraction took place 36 days after sample collection. Therefore, results from the original analysis only were used for validation purposes. Nondetected compounds were qualified as rejected, UR.

Surrogate recoveries in sample PAI-03-SS-014-01 were below 10% for all of the six surrogates. The sample was re-extracted and re-analyzed and the surrogates were compliant. However, the re-extraction took place 36 days after sample collection. Therefore, results from the original analysis only were used for validation purposes. Nondetected compounds were qualified as rejected, UR.

Several tentatively identified compounds were detected in the method blank. Positive results for these compounds reported in the samples should be considered false positives.

Positive results below the CRQL were qualified as estimated, J, due to uncertainty near the detection limit.

Polynuclear Aromatic Hydrocarbons

The samples were analyzed at dilutions ranging from 2X to 50X dilution due to the presence of target compounds above the instrument's linear range. This accounts for the elevated reporting limits.

Fluorene was detected in the rinsate blank at 0.46 µg/L. Fluorene was not detected in any of the water or soil samples. No validation action was required on this basis.

Positive results below the CRQL were qualified as estimated, J, due to uncertainty near the detection limit.

Numerous transcription errors were noted between the Form 1s and the electronic data. The electronic data was amended by the reviewer to reflect the values reported on the Form 1s.

Pesticides

The samples were analyzed at dilutions ranging from 2.5X to 50X due to matrix interferences. This accounts for the elevated reporting limits.

PCBs

All quality control parameters were met for this fraction.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone and 2-butanone failed to meet the 0.05 RRF quality control limit. Several compounds were in the laboratory method and field quality control blanks. Surrogate recoveries below 10% were reported for samples in the semivolatile fraction.

Other Factors Affecting Data Quality: The chlorinated compounds, 1,2-dichloroethene (total), tetrachloroethene, and trichloroethene were present in the rinsate blank..

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94). The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS

Linda Karsonovich
Chemist/Data Validator

Tetra Tech NUS

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

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's r < 0.995
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning r < 0.995 (correlation coefficient)

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-08-8-066

TO: [redacted] DATE: AUGUST 20, 1998

FROM: GRETCHEN PHIPPS COPIES: DV FILE

SUBJECT: INORGANIC DATA VALIDATION - APPENDIX IX METALS
CTO 020 - MCRD PARRIS, ISLAND
SDG - TTP03

SAMPLES: 1/ Aqueous /

PAI-01-GW-010-01

Overview

The sample set for CTO 020, MCRD Parris, Island, SDG TTP03, consists of one (1) aqueous environmental sample.

The sample was analyzed for Target Analyte List (TAL) metals. The sample was collected by Tetra Tech NUS on June 17, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A.

All analyses with the exception of arsenic, mercury, and selenium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic and selenium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentaion

MCRD Parris, Island
SDG TTP03

Table 1 - RECOMMENDATION SUMMARY

Cyanide	
Sulfide	

If the field is left blank, the qualifier is A - Accept data.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-08-8-066

TO:	D. BRAYACK	DATE:	AUGUST 20, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION - APPENDIX IX METALS
CTO 020 - MCRD PARRIS, ISLAND
SDG - TTP03

SAMPLES: 1/ Aqueous /

PAI-01-GW-010-01

Overview

The sample set for CTO 020, MCRD Parris, Island, SDG TTP03, consists of one (1) aqueous environmental sample.

The sample was analyzed for Target Analyte List (TAL) metals. The sample was collected by Tetra Tech NUS on June 17, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A.

All analyses with the exception of arsenic, mercury, and selenium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic and selenium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Aqueous)
beryllium	0.3µg/L	1.5µg/L
barium	2.9µg/L	14.5µg/L
cobalt	3.2µg/L	16µg/L
copper	2.5µg/L	12.5µg/L
thallium	1.8µg/L	9µg/L
vanadium	2.0µg/L	10µg/L
tin[1]	2.800µg/L	14µg/L

[1] Maximum concentration present in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Positive results < the action level for beryllium, copper, thallium, vanadium, and tin have been qualified , "U", as a result of blank contamination. No action was taken for the remaining analtyes since either the results were greater than the action level or were nondetects.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris, Island
SDG TTP03

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Mercury	
Antimony		Nickel	
Arsenic		Selenium	
Barium	A'	Silver	
Beryllium		Thallium	A'
Cadmium		Vanadium	A'
Chromium		Zinc	
Cobalt		Tin	A'
Copper	A'		
Lead			

If the field is left blank, the qualifier is A - Accept data.

A' - Accept data, but qualify results less than the blank action level as nondetected, "U".

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-08-8-079

TO: D. BRAYA

DATE: AUGUST 20, 1998

FROM: GRETCHEN PHIPPS

COPIES: DV FILE

SUBJECT: MISCELLANEOUS DATA VALIDATION - ANIONS, CYANIDE, HARDNESS, HEXAVELENT CHROMIUM, NITRATE/NITRITE,TOTAL DISSOLVED SOLIDS, TOTAL ORGANIC CARBON,AND TOTAL SUPSPENDED SOLIDS
CTO 020 - MCRD PARRIS, ISLAND
SDG - TTP04

SAMPLES: 9/ Aqueous /

PAI-01-GW-004-01	PAI-01-GW-005-01	PAI-01-GW-006-01
PAI-01-GW-011-01	PAI-01-GW-011-01D	PAI-01-GW-012-01
PAI-01-GW-013-01	PAI-01-GW-014-01	PAI-01-GW-09-01

Overview

The sample set for CTO 020, MCRD Parris, Island, SDG TTP04, consists of four (4) aqueous environmental sample. One (1) field duplicate pair, PAI-GW-011-01 / PAI-GW-011-01D, was included within this SDG.

The samples were analyzed for Anions, Cyanide, Hardness, Nitrate/Nitrite, Total Dissolved Solids, Total Organic Carbon and Total Suspended Solids . Two samples, PAI-01-GW-011-01 and PAI-01-GW-011-01D, were also analyzed to Hexavalent Chromium. The samples were collected by Tetra Tech NUS between June 25 and June 29, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Anions analyses were conducted using EPA 300.0 Method. Cyanide analyses were conducted using SW 9012 Method. Hardness analyses were conducted using EPA 130.2. Nitrate/Nitrite analyses were conducted using EPA 353.2 Method. Total Dissolved Solids (TDS) analyses were conducted using EPA 160.1 Method. Total Organic Carbon (TOC) analyses were conducted using SW 9060 Method. Total Suspended Solids (TSS) analyses were conducted using EPA 160.2 Method. Hexavalent Chromium analyses were conducted using SW 7196 Method.

The data was evaluated based on the following parameters:

* • Data Completeness
• Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Holding Times

The holding time until analyses (7days) was exceeded for both TDS and TSS analyses. TDS holding time was exceeded by 12 days. TSS holding time was exceeded by 3 days.

Executive Summary

Laboratory Performance: Holding Time was exceeded for TDS and TSS analyses.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris, Island
SDG TTP04

Table 1 - RECOMMENDATION SUMMARY

Chloride		Sulfate	
Cyanide	A[1]	Total Dissolved Solids	J[1]
Fluoride	A[1]	Total Organic Carbon	
Hardness		Total Suspended Solids	J[1]
Nitrate/Nitrite		Hexavalent Chromium	

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

J[1] - Accept data, but qualify positive results as estimated, "J", as a result of holding time exceedance.

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-07-8-001

TO: D. BRAYACK

DATE: AUGUST 21, 1998

FROM: DANA PIETO

CC: DV FILE

SUBJECT: INORGANIC DATA VALIDATION - HEXAVALENT CHROMIUM, HARDNESS, TOTAL ORGANIC CARBON, pH, & SALINITY
CTO 020, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG U05737

SAMPLES: 2 Solids:

PAI-03-SS-007-01 PAI-03-SS-010-01

4 Aqueous:

- PAI-01-SW-03 PAI-01-SW-04 PAI-01-SW-09
PAI-03-RB-02

The sample set for the CTO 020, MCRD Parris Island, South Carolina, SDG U05737, consists of two solid and three aqueous environmental samples and one rinsate blank (designated RB). Samples PAI-01-SW-03, PAI-01-SW-04, and PAI-01-SW-09 were analyzed for hardness, total organic carbon (TOC), pH, and salinity. Samples PAI-03-RB-02, PAI-03-SS-007-01, and PAI-03-SS-010-01 were analyzed for hexavalent chromium.

The samples were collected by Tetra Tech NUS on May 17 and 19, 1998, and analyzed by RECRA LabNet under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Hexavalent chromium analyses were conducted using SW-846 7196. TOC analyses were conducted using SW-846 9060. The pH analyses were conducted using EPA method 150.1 The salinity analyses were conducted using standard methods 2520B.

The data were evaluated according to the following parameters:

* • Data Completeness
• Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses
* • Detection Limits

The symbol (*) indicates that quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

MEMO TO: D. BRAYACK
DATE: AUGUST 21, 1998 - PAGE 2

Holding Time Results

The holding time until extraction for TOC exceeded the 28-day limit by four days in samples PAI-01-SW-03, PAI-01-SW-04, and PAI-01-SW-09. Positive results were qualified as estimated, (J).

Executive Summary

Laboratory Performance: The holding time until extraction for TOC was exceeded.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Inorganic Data Evaluation" (2/94) 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

Tetra Tech NUS
Data Validator

Joseph A. Samchuck

Tetra Tech NUS
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

PARRIS ISLAND
SDG NO. U05737

TABLE 1 - RECOMMENDATION SUMMARY

Hexavalent Chromium	
Hardness	
Total Organic Carbon	J[1]
pH	
Salinity	

If field is left blank, the qualifier is A - accept all data.

J[1] - Accept data, but qualify positive results as estimated, (J), as a result of holding time exceedance.

Data Qualifier Key:

U - Value is a nondetect as reported by the laboratory and should not be considered present.

J - Positive result is estimated as result of a technical noncompliance.

D-62

September 19, 1997

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's r < 0.995
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning r < 0.995 (correlation coefficient)

Brown & Root Environmental

INTERNAL CORRESPONDENCE

C-49-08-8-075

TO:	[redacted]	DATE:	AUGUST 24, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS
CTO 020 - MCRD PARRIS, ISLAND
SDG - TTP04

SAMPLES: 18/ Aqueous /

PAI-01-GW-004-01	PAI-01-GW-004-01-F	PAI-01-GW-005-01
PAI-01-GW-005-01-F	PAI-01-GW-006-01	PAI-01-GW-006-01-F
PAI-01-GW-011-01	PAI-01-GW-011-01-F	PAI-01-GW-011-01D
PAI-01-GW-011-01D-F	PAI-01-GW-012-01	PAI-01-GW-012-01-F
PAI-01-GW-013-01	PAI-01-GW-013-01-F	PAI-01-GW-014-01
PAI-01-GW-014-01-F	PAI-01-GW-09-01	PAI-01-GW-09-01-F

Merry JDL
~~0.01~~ ~~0.02~~
~~0.051~~
0.031 to ~~0.13~~ 10.13

Overview

The sample set for CTO 020, MCRD Parris, Island, SDG TTP04, consists of eighteen (18) aqueous environmental samples.

The samples were analyzed for Target Analyte List (TAL) metals. The samples were collected by Tetra Tech NUS on June 25 - 29, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A.

All analyses with the exception of arsenic, mercury, lead, selenium and thallium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Aqueous)
antimony	23.4µg/L	117µg/L
barium	1.3µg/L	6.5µg/L
calcium	55.0µg/L	275µg/L
iron[1]	30.700µg/L	153.5µg/L
magnesium[1]	43.500µg/L	217.5µg/L
manganese[1]	19.700µg/L	98.5µg/L
sodium[1]	339.500µg/L	1697.5µg/L
selenium	1.8µg/L	9µg/L
thallium	3.5µg/L	17.5µg/L

[1] Maximum concentration present in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Dilution factors were taken into account were determining blank contamination. Positive results < the action level for iron, manganese, and thallium have been qualified , "U", as a result of blank contamination. No action was taken for the remaining analtyes since either the results were greater than the action level or were nondetects.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris, IS RFI/FS
SDG TTP04

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Magnesium	
Antimony		Manganese	A[1]
Arsenic		Mercury	
Barium		Nickel	
Beryllium		Potassium	
Cadmium		Selenium	
Calcium		Silver	
Chromium		Sodium	
Cobalt		Thallium	A[1]
Copper		Vanadium	
Cyanide		Zinc	
Iron	A[1]		
Lead			

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e.. % RSDs. %Ds. ICVs. CCVs. RPDs. RRFs. etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's $r < 0.995$
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e.. base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations. tuning $r < 0.995$ (correlation coefficient)

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT09-8-059

TO: [redacted] **DATE:** **SEPTEMBER 10, 1998**

FROM: **GRETCHEN PHIPPS** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS, DISSOLVED TAL METALS, LEAD AND CYANIDE**
CTO 020 - MCRD PARRIS ISLAND
SDG – U06151

SAMPLES: 8/ Aqueous /

PAI-01-SW-001	PAI-01-SW-001-F	PAI-01-SW-001D
PAI-01-SW-001D-F	PAI-01-SW-A01	PAI-01-SW-A01-F
PAI-15-RB-01	PAI-15-RB-02	

10/ Soil /

PAI-15-SD-001-01	PAI-15-SD-002-01	PAI-15-SD-003-01
PAI-15-SS-001-01	PAI-15-SS-002-01	PAI-15-SS-003-01
PAI-15-SS-004-01	PAI-15-SS-005-01	PAI-15-SS-006-01
PAI-15-SS-007-01		

Overview

The sample set for CTO 020, MCRD Parris Island, SDG U06151, consists of six (6) aqueous environmental samples and ten (10) soil environmental samples. Two (2) rinsate blanks (PAI-15-RB-01 and PAI-15-RB-02) and two (2) field duplicate pairs (PAI-01-SW-001 / PSI-01-SW-001 and PAI-01-SW-001-F / PAI-01-SW-001D-F)

All aqueous samples, with the exception to those designate –F, were analyzed for Target Analyte List (TAL) metals and Cyanide. The aqueous sample designated –F were analyzed for dissolved TAL metals. Samples PAI-15-SD-001-01 and PAI-15-SD-002-01 were analyzed for TAL metals and Cyanide. Sample PAI-15-SD-003-01 was analyzed for TAL metals. The remaining samples were analyzed for Lead. The samples were collected by Tetra Tech NUS on June 14-16, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of arsenic, mercury and lead in the soil matrix and lead and mercury in the aqueous matrix, were conducted according to SW 846 method 6010A. Arsenic and lead analyses in the soil matrix and lead in the aqueous matrix were conducted according to SW 846 method 7060A. Mercury analyses were conducted according to SW 846 methods 7470A and 7471A. Cyanide analyses were conducted according to SW 846 method 9012.

All analyses, with the exception of arsenic, mercury and lead in the soil matrix and lead and mercury in the aqueous matrix, were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic and lead in the soil matrix and lead in the aqueous matrix were analyzed

by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
• Holding Times
* • Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Holding Time

The holding time for Cyanide analyses affecting the soil matrix and sample PAI-15-RB-02 was exceeded by one (1) day. The nondetected results reported for Cyanide in the affected samples were qualified as estimated, "UJ".

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation / rinsate blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Soil)	Action Level (Aqueous)
Aluminum	45.7µg/L	22.85 mg/kg	229µg/L
Arsenic(4)	4.3µg/L	NA	21.5µg/L
Barium(2)	0.480µg/L	NA	2.4µg/L
Barium(3)	0.76 mg/kg	0.38 mg/kg	NA
Beryllium	0.3µg/L	0.15 mg/kg	1.5µg/L
Calcium	65.9µg/L	NA	330µg/L
Calcium(3)	8.752 mg/kg	43.76 mg/kg	NA
Chromium(3)	0.078 mg/kg	0.39 mg/kg	NA
Copper	2.7µg/L	1.35 mg/kg	13.5µg/L
Iron	21.0µg/L	NA	105µg/L
Iron(3)	6.144 mg/kg	30.72 mg/kg	NA
Lead	2.8µg/L	1.4 mg/kg	14.0µg/L
Lead(2,4)	5.560µg/L	NA	27.0µg/L
Magnesium	48.1µg/L	NA	241µg/L
Magnesium(3)	4.891µg/L	24.46 mg/kg	NA
Manganese	1.7µg/L	0.85 mg/kg	8.5µg/L
Potassium	120.3µg/L	NA	602µg/L
Potassium(1)	231.0µg/L	115.5 mg/kg	NA
Selenium	2.6µg/L	1.3 mg/kg	13.0µg/L
Sodium(3)	75.333 mg/kg	377 mg/kg	NA
Thallium	2.1µg/L	1.05 mg/kg	10.5µg/L
Vanadium	1.9µg/L	0.45 mg/kg	4.5µg/L
Zinc(2)	11.220µg/L	NA	56.1µg/L
Zinc(3)	0.631 mg/kg	3.15 mg/kg	NA

(1) Maximum concentration present in rinsate blank.
(2) Maximum concentration present in aqueous preparation blank.
(3) Maximum concentration present in soil preparation blank.
(4) Maximum concentration affecting ICP analyses.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into account when determining blank contamination. Positive results < the action level for aluminum, arsenick, beryllium, calcium, copper, lead, magnesium, manganese, selenium, vanadium and zinc have been qualified , "U", 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 blank contamination.

Notes

The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for iron, lead and selenium were outside the 80-120% quality control limit. However, no validation action is required per regional guidance.

Executive Summary

Laboratory Performance: The holding time for Cyanide analyses was exceeded by one (1) day. Several analytes were present in the laboratory method / preparation / rinsate blanks.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris Island
SDG U06151

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A[1]		Magnesium	A[1]
Antimony			Manganese	A[1]
Arsenic	A[1]		Mercury	
Barium			Nickel	
Beryllium	A[1]		Potassium	
Cadmium			Selenium	A[1]
Calcium	A[1]		Silver	
Chromium			Sodium	
Cobalt			Thallium	
Copper	A[1]		Vanadium	A[1]
Cyanide		J[1]	Zinc	A[1]
Iron				
Lead	A[1]			

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

J[1] - Accept data, but qualify nondetected results as estimated, "UJ", as a result of holding time exceedance.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-09-8-063

TO: ~~D. BRATAGK~~ **DATE:** **SEPTEMBER 10, 1998**

FROM: **GRETCHEN PHIPPS** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – MISCELLANEOUS PARAMETERS**
CTO 020 - MCRD PARRIS ISLAND
SDG – U06151

SAMPLES: 3/ Aqueous /

PAI-01-SW-001 PAI-01-SW-001D PAI-01-SW-A01

Overview

The sample set for CTO 020, MCRD Parris Island, SDG U06151, consists of there (3) aqueous environmental samples. One (1) field duplicate pair (PAI-01-SW-001/ PAI-01-SW-001D) was included within this SDG.

All samples were analyzed for pH, Salinity, Total Organic Carbon (TOC), Hexavalent Chromium and Hardness. The samples were collected by Tetra Tech NUS on June 16, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. TOC analyses were conducted using SW 846 method 9060. Salinity analyses were conducted using standard method 2520B. Hexavalent Chromium analyses were conducted using SW 846 method 7196. Hardness analyses were conducted using EPA method 130.2.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris Island
SDG U06151

Table 1 - RECOMMENDATION SUMMARY

pH
Salinity
Hardness
TOC
Hexavalent Chromium

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-09-8-098

TO:	**D. BRAYACK**	**DATE:**	**SEPTEMBER 15, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **MISCELLANEOUS DATA VALIDATION - PH AND TOC**
CTO 020 - MCRD PARRIS ISLAND
SDG - U06089

SAMPLES: 9/ Soil /

PAI-02-SD-A-01	PAI-01-SD-002-01	PAI-01-SD-003-01
PAI-01-SD-003-01D	PAI-01-SD-004-01	PAI-10-SD-009-01
PAI-01-SD-010-01	PAI-01-SD-011-01	PAI-10-SD-012-01

Overview

The sample set for CTO 020, MCRD Parris Island, SDG U06089, consists of nine (9) soil environmental sample. One (1) field duplicate pair (PAI-01-SD-003-01 / PAI-01-SD-003-01D) were included within this SDG.

The samples were analyzed for pH and Total Organic Carbon (TOC) . The samples were collected by Tetra Tech NUS on June 10, 1998 and analyzed by RECRA Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The pH analyses were conducting using SW 846 method 9045C. The TOC analyses were conducted using the Walkley-Black method.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Notes

Sample PAI-01-SD-A-01 was incorrectly labeled PAI-01-001-01 on all laboratory data.

A comparison of the field duplicate pair (PAI-01-SD-003-01 / PAI-01-SD-003-01D) is included in Appendix C. However, no validation action is required per regional guidance.

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Tetra Tech, NUS
Gretchen A. Phipps

Tetra Tech, NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris, Island
SDG U06089

Table 1 - RECOMMENDATION SUMMARY

pH
TOC

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

C-49-06-8-041

TO: [redacted] DATE: SEPTEMBER 17, 1998
FROM: L.W. SUMANSKY COPIES: DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS, CYANIDE, pH, TOC, HEXAVALENT CHROMIUM
CTO 020 MCRD PARRIS ISLAND
SDG - UO6971

SAMPLES: 13 Soils

PAI - 01 - SS - 005 - 01	PAI - 01 - SS - 006 - 01
PAI - 01 - SS - 007 - 01	PAI - 01 - SS - 008 - 01
PAI - 01 - SS - 009 - 01	PAI - 01 - SS - 010 - 01
PAI - 01 - SS - 011 - 01	PAI - 01 - SS - 012 - 01
PAI - 01 - SS - 013- -01	PAI - 01 - SS - 014 - 01
PAI - 01 - SS - 014 - 01 - D	PAI - 01 - SS - A - 01
PAI - 41 - SS - 002 - 01	

2 Aqueous - Rinsate Blanks

PAI - 01 - RB- -01
PAI - 01 - RB - 02

Overview

The sample set for CTO 020, MCRD Parris Island, SDG UO6971 consists of thirteen (13) environmental soil and two (2) aqueous rinsate samples. One field duplicate pair (PAI - 01 - SS - 014 - 01 / PAI - 01 - SS - 014 - 01 - D) was included in this SDG.

All soil samples and the two rinsate samples were analyzed for Target Analyte List (TAL) metals. Selected samples, as shown below, were also analyzed for the indicated analytes:

PAI - 01 - RB - 01	CN	Cr^{+6}		
PAI - 01 - RB - 02	CN			
PAI - 01 - SS - 001 - 01	CN			
PAI - 01 - SS - 005 - 01	CN			
PAI - 01 - SS - 006 - 01	CN			
PAI - 01 - SS - 007 - 01	CN		TOC	pH
PAI - 01 - SS - 009 - 01	CN	Cr^{+6}		
PAI - 01 - SS - 010 - 01			TOC	pH
PAI - 01 - SS - 008 - 01		Cr^{+6}		
PAI - 01 - SS - 014 - 01		Cr^{+6}		
PAI - 01 - SS - 014 - 01 - D		Cr^{+6}		
PAI - 01 0 SS - A - 01		Cr^{+6}		

The samples were collected on June 6, 1998 by Tetra Tech NUS and the analyses were performed by RECRA - LABNET - Chicago Environmental Services under Naval Facilities Engineering Services Center (NFECS) Quality Assurance / QualityControl (QA/QC) criteria. Metals analyses , with the exception of mercury, were conducted using SW -

846, method 6010A. Mercury determination was performed using SW - 846, method 7471. Cyanide determination was performed using SW - 846, method 9010. pH determinations were conducted using SW - 846, method 9045CThe determination of hexavalent chromium (Cr^{+6}) was performed using SW - 846, Method 3060A / 7196. Total Organic Car (TOC) determinations were performed using the Walkley - Black method. These data were evaluated based on following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verification
  • Laboratory Blank Analysis
* • Detection Limits

* - All quality control criteria were met for this parameter.

Summary

The findings offered in this report are based upon a general review of holding time, calibration data , laboratory method/ preparation blanks, and detection limits.

All metals analyses, with the exception of mercury, were conducted using Inductively Coupled Plasma (ICP) methodologies. Mercury analyses were conducted using cold vapor AA. Other inorganic analyses were performed by methods specified in the "Overview".

Areas of concern with respect to data quality are listed below.

Minor Problems

- The following contaminants were detected in the laboratory method/ preparation blanks and rinsate blanks at following maximum concentrations:

Samples Affected: Soil

	Maximum Concentration		Action Level Aqueous		Action Level Soil	
aluminum	96.7	ug/L	483.5	ug/L	48.35	mg/kg
barium(1)	0.23	mg/kg	na		1.15	mg/kg
beryllium	0.90	ug/L	4.5	ug/L	0.45	mg/kg
calcium(2)	77.7	ug/L	na		38.85	mg/kg
cobalt	0.6	ug/L	3.0	ug/L	0.30	mg/kg
iron(3)	4.666	mg/kg	na		23.33	mg/kg
lead(3)	2.86	ug/L	14.3	ug/L	na	
lead	1.1	ug/L	na		0.55	mg/kg
magnesium	33.4	ug/L	167.	ug/L	83.5	mg/kg
manganese(2)	1.2	ug/L	na		0.6	mg/kg
nickel	114.3	ug/L	571.5	ug/L	na	
potassium(2)	194.	ug/L	na		97.0	mg/kg
silver	0.7	ug/L	3.5	ug/L	0.35	mg/kg

thallium	3.2	ug/L	16. ug/L	1.6 mg/kg
vanadium [3]	2.69	ug/L	13.45 ug/l	na
vanadium	1.3	ug/L	na	0.65 mg/kg
zinc [2]	5.1	ug/L	na	2.55 mg/kg

(1) Maximum concentration present in a soil preparation blank.
(2) Maximum found in a rinsate blank.
(3) Maximum 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 size, percent solids and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action level for aluminum, beryllium, lead, magnesium, silver and thallium have been qualified "U", nondetected, as a result of blank contamination. No validation action was taken for the remaining analytes since the results were either greater than the action level or were nondetects.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks and rinsate blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", February,1994 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)."

Tetra Tech NUS
L.W. Sumansky
Chemist

Tetra Tech NUS
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.

TO:	**MR. DAVID BRAYACK**	**DATE:**	**OCTOBER 6, 1998**
FROM:	**L.W.SUMANSKY**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PAH/PEST/PCB**
PARRIS ISLAND
SDG UO6363

SAMPLES:	3/ Soil	3/ Aqueous
	PAI – 02 – SS – 001 – 01	PAI – 01 – SW – 002 – 01
	PAI – 02 – SS – 006 – 01	PAI – 01 – SW – 002 – 01D
	PAI – 02 – SS – 006 – 01	PAI – SW – 011 – 01
	1/ Aqueous Rinse Blank	2/ Aqueous Trip Blanks
	PAI – 02 – RB – 01	TB – 062698
		TB – 063098

OVERVIEW

The sample set for Parris Island, SDG U06363 consists of three (3) aqueous and three (3) soil environmental samples plus one (1) aqueous rinse blank and two (2) aqueous trip blanks. All samples were analyzed for Target Compound List (TCL) volatile organic compounds. The samples were also analyzed for semivolatile organic compounds, polynuclear aromatic hydrocarbons (PAHs), organochlorine pesticides, and polychlorinated biphenyls (PCBs).

The samples were collected by Tetra Tech NUS on June 29 and 30, 1998. Analyses were performed by RECRA LABNET – Chicago. All analyses were conducted using SW-846 Methods 8260B, 8270C, 8310, 8081A, and 8082 analytical and reporting protocols.. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
• Initial/continuing calibrations
* • Detection Limits
• Laboratory Method and Field Quality Control Blanks

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting quality are discussed below; documentation supporting these findings are presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Volatile

Initial calibration Relative Response Factors (RRFs) fell below the 0.05 quality control limit for acetone, and 2-butanone in the aqueous samples. Nondetected results for acetone and 2-butanone were qualified as rejected, "UR" in all aqueous samples.

Continuing calibration Relative Response Factor (RRF) fell bellow the 0.05 quality control limit for acetone in the soil samples. Nondetected results for acetone were qualified as rejected, "UR", in all soil samples.

Semivolatile

All data quality parameters were met in this fraction.

Polynuclear Aromatic Hydrocarbons
Transcription errors were noted between Form 1s and the electronic data. The electronic data was amended by the reviewer to match the Form 1s.

Pesticides/PCBs

All data quality parameters were met for this fraction.

Notes

Methylene chloride was detected in the Trip Blank. All samples contained nondetect levels of methylene chloride.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone and 2-butanone failed to meet the 0.05 RRF quality control limit in all water samples and acetone failed to meet the 0.05 RRF quality control limit in the soil samples.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94). 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 National Functional guidelines and Method SW-846 8000B

Tetra Tech NUS

L.W.Sumansky
Chemist

Tetra Tech NUS

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

PARRIS ISLAND

SDG UO6363

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PAH	PEST	PCB
Aqueous					
PAI – 01 – SW – 002 – 01	R [1]				
PAI – 01 – SW – 002 – 01D	R [1]				
PAI – SW – 011 – 01	R [1]				
PAI – 02 – RB – 01	R [1]				
Soil					
PAI – 02 – SS – 001 – 01	R [2]				
PAI – 02 – SS – 006 – 01	R [2]	J [1]			
PAI – 02 – SS – 006 – 01	R [2]	J [1]			

If the field is left blank, the qualifier is A - Accept all data.

R[1] – Reject data, qualify nondetected results for acetone and 2-butanone as rejected, "UR", due to initial calibration RRFs less than 0.05.

R[2] – Reject data, qualify nondetected results for acetone as rejected,"UR", due to initial calibration RRFs less than 0.05.

J[1] – Accept data but qualify positive results for acetone as estimated "J", due to initial calibration RRFs less than 0.05.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO: D. BRAYACK **DATE:** OCTOBER 12, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA/SVOA ORGANICS, PESTICIDES/PCB'S AND PAH
CTO 020, MCRD PARRIS ISLAND
SDG U06151

SAMPLES: 6/Aqueous/

~~PAI-01-SW-001~~	~~PAI-01-SW-001D~~	~~PAI-01-SW-A01~~
TB-061698	PAI-15-RB-02	PAI-15-RB-01

10/Soils/

PAI-15-SD-001-01	PAI-15-SD-002-01	PAI-15-SD-003-01
PAI-15-SS-001-01	PAI-15-SS-002-01	PAI-15-SS-003-01
PAI-15-SS-004-01	PAI-15-SS-005-01	PAI-15-SS-006-01
PAI-15-SS-007-01		

OVERVIEW

The sample set for CTO 020, MCRD Parris Island, SDG U06151 consists of three (3) aqueous environmental samples ten (10) soil environmental samples. Two (2) rinsate blanks (PAI-15-RB-02 and PAI-15-RB-02) and one (1) trip blank (TB-061698) were included within this SDG. One (1) field duplicate pair (PAI-01-SW-001 / PAI-01-SW-001D) was included within this SDG. The following samples were analyzed for Target Compound List (TCL) volatile organic compounds: PAI-01-SW-001, PAI-01-SW-001D, PAI-01-SW-A01 and PAI-061698. The following samples were analyzed for Target Compound List (TLC) semivolatile organic compounds: PAI-01-SW-001, PAI-01-SW-001D, PAI-01-SW-A01, PAI-15-RB-02, PAI-15-SD-001-01, PAI-15-SD-002-01 and PAI-15-SD-00301. The following samples were analyzed for Pesticides/PCB's: PAI-15-SD-001-01, PAI-15-SD-002-01, PAI-15-SD-003-01, PAI-01-SW-001, PAI-01-SW-001D, PAI-01-SW-A01 and PAI-15-RB-02. The following samples were analyzed for PCB's: PAI-15-SS-001-01, PAI-15-SS-002-01, PAI-15-SS-003-01, PAI-15-SS-004-01, PAI-15-SS-005-01, PAI-15-SS-006-01, PAI-15-SS-007-01 and PAI-15-RB-01. The following samples were analyzed for Polynuclear Aromatic Hydrocarbons (PAH): PAI-01-SW-001, PAI-01-SW-001D, PAI-01-SW-A01, PAI-15-RB-02, PAI-15-SD-001-01, PAI-15-SD-002-01 and PAI-15-SD-003-01.

The samples were collected by Tetra Tech NUS on June 14, 15 and 16, 1998 and analyzed Recra Labnet - Chicago. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Volatiles analyses were conducted using SW846 method 8260B. Semivolatiles analyses were conducted using SW846 method 8270C. Pesticide analyses were conducted using SW846 method 8081A. PCB analyses were conducted using SW846 method 8082. PAH analyses were conducted using SW 846 method 8310. The data contained in this SDG were validated with regard to the following parameters:

* Holding times
* Laboratory method and field quality control blank results
* Calibration Verifications (gross exceedances)
* Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings are presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Volatiles

None.

Semivolatiles

None.

Pesticides/PCB's

None.

Polynuclear Aromatic Hydrocarbons

The following compound was present in the laboratory method blank:

Compound	Maximum Concentration	Action Level
Phenanthrene	0.059µg/L	0.295µg/L

An action level of 5X the maximum concentration was used to evaluate sample data for blank contamination. Dilution factors were taken into consideration when evaluating for blank contamination. Positive results < the action level for phenanthrene were qualified as "U", as a result of blank contamination.

Notes

Methylene Choride was present in the Volatile Laboratory Method Blank. However, no validation action was required as all results reported for Methylene Chloride were nondetects.

Anthracene was present in the PAH Laboratory Method Blank. However, no validation action was required as all results reported for Anthracene were nondetects.

Fluorene was present in the rinsate blank (PAI-15-RB-020) for PAH analyses. However, no validation action was required as all results reported for Fluorene were either nondetects or greater than the action level.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Methylene Choride was present in the Volatile Laboratory Method Blank. Anthracene was present in the PAH Laboratory Method Blank. Fluorene was present in the rinsate blank (PAI-15-RB-020) for PAH analyses.

Other Factors Affecting Data Quality: None.

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)."

Gretchen A Phipps

Tetra Tech NUS

Gretchen Phipps
Chemist/Data Validator

Tetra Tech NUS

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

PARRIS ISLAND

SDG U06151

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	Pesticide	PCB	PAH	
PAI-01-SW-001						
PAI-01-SW-001D						
PAI-01-SW-A01					A[1]	J[1]
TB-061698						
PAI-15-RB-02						
PAI-15-RB-01						J[1]
PAI-15-SD-001-01						J[1]
PAI-15-SD-002-01						
PAI-15-SD-003-01						
PAI-15-SS-001-01						
PAI-15-SS-002-01						
PAI-15-SS-003-01						
PAI-15-SS-004-01						
PAI-15-SS-005-01						
PAI-15-SS-006-01						
PAI-15-SS-007-01						

If the field is left blank, the qualifier is A - Accept all data.

A[1] - Accept data, but qualify positive results less than the blank action level for phenanthrene as "U".

J[1] - Accept data, but qualify positive results below the CRQL as estimated, "J".

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-069

TO:	D. BRAYACK	DATE:	OCTOBER 13, 1998
FROM:	TERRI L. SOLOMON	COPIES:	DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA / SVOA / PESTICIDE / PCB / PAH ORGANICS
CTO 020 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG- U06089

SAMPLES: 2/Aqueous/

PAI-01-RB-03 TB-061098

9/Solid/

PAI-01-SD-001-01	PAI-01-SD-002-01	PAI-01-SD-003-01
PAI-01-SD-003-01D	PAI-01-SD-004-01	PAI-01-SD-009-01
PAI-01-SD-010-01	PAI-01-SD-011-01	PAI-01-SD-012-01

OVERVIEW

The sample set for CTO 020 Dallas, SDG U06089 consists of two (2) aqueous field quality control blanks and nine (9) solid environmental samples. All samples with the exception of TB-061098 were analyzed for volatile organic compounds, semivolatile organic compounds, pesticides, PCBs, and polynuclear aromatic hydrocarbons. Sample TB-061098 was analyzed for volatile organic compounds only. One (1) field duplicate pair (PAI-01-SD-003-01 / PAI-01-SD-003-01D) was included within this SDG.

The samples were collected by Tetra Tech NUS on June 10, 1998 and analyzed by Recra Labnet - Chicago. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using SW-846 Methods 8260B, 8000B, 8270C, 8010, 8082 and 8081A analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
  • Initial/continuing calibrations
  • Laboratory method and field quality control blank results
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings are presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Volatile

Initial and continuing calibration relative response factors (RRFs) less than 0.05 were reported for acetone and 2-butanone affecting samples PAI-01-RB-03 and TB-061098. The nondetected results reported for the aforementioned compounds in the affected samples were qualified as rejected "UR".

Initial and continuing calibration RRFs less than 0.05 were reported for acetone affecting the soil samples. The nondetected results reported for the aforementioned compound in the affected samples were qualified as rejected "UR".

Semivolatile

The following table summarizes the maximum concentration of semivolatile compounds detected in the laboratory / field quality control blanks.

Compound	Maximum Concentration	Action Level(aqueous)	Action Level (soil)
bis(2-ethylhexyl)phthalate	8 ug/L	80 ug/L	NA
di-n-butyl phthalate[1]	2 ug/L	NA	666 ug/kg

[1] Maximum concentration present in a field quality control blank.

Dilution factors, sample aliquot, and percent solids were taken into consideration when applying blank action levels. Bis(2-ethylhexyl)phthalate results below the action level were reported as nondetected, U. It should be noted that field quality control blanks are not qualified for field blank contamination.

Polynuclear Aromatic Hydrocarbons

Sample PAI-01-SD-003-01 had the following compounds reported at a 20X dilution: benzo(b)fluoranthene and fluoranthene. The diluted results for the aforementioned compounds were transposed over to the undiluted results and used in validation.

Additional Comments

Positive results reported below the Contract Required Quantitation Limit (CRQL) are qualified as estimated, (J).

EXECUTIVE SUMMARY

Laboratory Performance Issues: The initial and / or continuing calibration RRFs were less than the 0.05 quality control limit for acetone and 2-butanone. Bis(2-ethylhexyl)phthalate was present in the laboratory method blank .

Other Factors Affecting Data Quality: None.

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)."

Tetra Tech NUS
Terri L. Solomon
Chemist/Data Validator

Tetra Tech NUS
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

PARRIS ISLAND

SDG U06089

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	Pesticides / PCB	PAH
PAI-01-RB-03	R^1	A^1 ,J^1		J^1
TB-061098	R^1			
PAI-01-SD-001-01	R^2 ,J^1			J^1
PAI-01-SD-002-01	R^2 ,J^1		J^1	J^1
PAI-01-SD-003-01	J^1	J^1		J^1
PAI-01-SD-003-01D	R^2 ,J^1		J^1	J^1
PAI-01-SD-004-01	J^1			J^1
PAI-01-SD-009-01	J^1			J^1
PAI-01-SD-010-01	R^2			J^1
PAI-01-SD-011-01	R^2 ,J^1	J^1	J^1	J^1
PAI-01-SD-012-01	R^2 ,J^1			J^1

If the field is left blank, the qualifier is A - Accept all data.

A^1 - Accept data, but qualify as nondetected, U, positive results for bis(2-ethylhexyl)phthalate below the blank action level.

J^1 - Accept data, but qualify positive results below the CRQL as estimated, J, due to uncertainty near the detection limit.

R^1 - Reject nondetected results for acetone and 2-butanone, UR", as a result of initial and continuing calibration RRFs less than 0.05.

R^2 - Reject nondetected results for acetone, UR", as a result of initial and continuing calibration RRFs less than 0.05.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-09-8-084

TO:	D. BRAYACK	DATE:	OCTOBER 13, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS, DISSOLVED TAL METALS**
CTO 020 - MCRD PARRIS ISLAND
SDG - U06330

SAMPLES: 4/Aqueous/

PAI-01-SW-010 PAI-01-SW-012 PAI-01-SW-012-F
PAI-01-SW-010-F

Overview

The sample set for CTO 020 MCRD Parris Island, SDG U06330, consists of four (4) aqueous environmental samples

All samples, with the exception of those designated -F, were analyzed for Target Analyte List (TAL) metals and Cyanide. The samples designated -F were analyzed for dissolved TAL metals. The samples were collected by Tetra Tech NUS on June 24, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of arsenic and mercury, were conducted according to SW-846 Method 6010A. Arsenic analyses were conducted using SW846 Method 7060A. Mercury analyses were conducted according to SW-846 Method 7470A and 7471A. Cyanide analyses were conducted using SW846 Method 9012.

All TAL metals analyses with the exception of arsenic and mercury were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic analyses were conducted by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

*	•	Data Completeness
*	•	Holding Times
*	•	Calibration Verifications
	•	Laboratory Blank Analyses
	•	ICP Interference Check Sample Results
*	•	Laboratory Control Sample Results
*	•	Matrix Spike Results
*	•	Laboratory Duplicate Precision
	•	ICP Serial Dilution Results
*	•	GFAA Percent Recovery Results
*	•	GFAA Relative Percent Differences
*	•	Sample Quantitation
*	•	Detection Limits

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Samples affected: All

Analyte	Maximum Concentration	Action Level (Aqueous)
aluminum	34.2µg/L	171µg/L
calcium	64.5µg/L	322.5µg/L
cobalt	0.4µg/L	2.0µg/L
copper	2.0µg/L	10.0µg/L
iron	19.0µg/L	95µg/L
lead	2.4µg/L	12.0µg/L
magnesium	40.2µg/L	201µg/L
manganese	1.2µg/L	6.0µg/L
nickel	0.8µg/L	4.0µg/L
potassium (1)	141.080µg/L	705.4µg/L
vanadium	1.5µg/L	7.5µg/L

(1) Maximum concentration present in aqueous preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Dilution factors were taken into account were determining blank contamination. Positive results < the action level for aluminum, copper, lead and vanadium were qualified , "U", as a result of blank contamination. No action was taken for the remaining analtyes since either the results were greater than the action level or were nondetects.

ICP Interference Check Sample Results

The interfering analyte calcium was present in sample PAI-01-SW-010 at a concentration which was comparable to the level of calcium in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (ICL). Interference affects exist for beryllium, cadmium, cobalt, copper, nickel and thallium in the affected sample. The positive results reported for cobalt, copper and nickel in the affected sample were qualified as estimated, "J". The nondetect results reported for beryllium, cadmium and thallium in the affected sample were qualified as estimated, "UJ".

The interfering analyte magnesium was present in sample PAI-01-SW-010 at a concentration which was comparable to the level of magnesium in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (ICL). Interference affects exist for barium, beryllium, cadmium, cobalt, copper, nickel, vanadium and

thallium in the affected sample. The positive results reported for barium, cobalt, copper, nickel and vanadium in the affected sample were qualified as estimated, "J". The nondetect results reported for beryllium, cadmium and thallium in the affected sample were qualified as estimated, "UJ".

The interfering analyte calcium was present in sample PAI-01-SW-012 at a concentration which was comparable to the level of calcium in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (ICL). Interference affects exist for barium, beryllium, cadmium, chromium, lead and thallium in the affected sample. The positive result reported for barium in the affected sample was qualified as estimated, "J". The nondetect results reported for beryllium, cadmium, chromium, lead and thallium in the affected sample were qualified as estimated, "UJ".

The interfering analyte magnesium was present in sample PAI-01-SW-012 at a concentration which was comparable to the level of magnesium in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (ICL). Interference affects exist for barium,beryllium, cadmium, chromium, lead, thallium and zinc in the affected sample. The positive results reported for barium and zinc in the affected sample were qualified as estimated, "J". The nondetect results reported for beryllium, cadmium, chromium, lead and thallium in the affected sample were qualified as estimated, "UJ".

The interfering analytes calcium and magnesium were present in sample PAI-01-SW-012-F at concentrations which were comparable to the level of calcium and magnesium in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (ICL). Interference affects exist for beryllium, cadmium, chromium, lead, thallium and vanadium in the affected sample. The nondetect results reported for beryllium, cadmium, chromium, lead, thallium and vanadium in the affected sample were qualified as estimated, "UJ".

The interfering analyte calcium was present in sample PAI-01-SW-010-F at a concentration which was comparable to the level of calcium in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (ICL). Interference affects exist for beryllium, cadmium, chromium, manganese, thallium and vanadium in the affected sample. The positive results reported for manganese were qualified as estimated, "J". The nondetect results reported for beryllium, cadmium, chromium, thallium and vanadium in the affected sample were qualified as estimated, "UJ".

The interfering analyte magnesium was present in sample PAI-01-SW-010-F at a concentration which was comparable to the level of magnesium in the Interference Check Sample (ICS) solution. Several analytes namely antimony, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, potassium, sodium, thallium, vanadium and zinc were present in the ICS solution at concentrations which exceeded the Instrument Detection Limit (ICL). Interference affects exist for beryllium, cadmium, chromium, lead, thallium and vanadium in the affected sample. The nondetect results reported for beryllium, cadmium, chromium, lead, thallium and vanadium in the affected sample were qualified as estimated, "UJ".

ICP Serial Dilution Results

The ICP Serial Dilution Percent Differences (%D's) for potassium and vanadium were >10% quality control limit. The positive and nondetect results reported for potassium and vanadium were qualified as estimated, "J" and "UJ", respectively.

Notes

The Contract Required Detection Limits (CRDL) Percent Recovery (%R) for iron, lead and mercury were outside the 90-110% quality control limit. However, no validation actions were required.

Results were transferred incorrectly from the Form 1's to the Data Validation tables.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for several analytes were outside the 90-110% quality control limits.

Other Factors Affecting Data Quality: The interfering analytes calcium and magnesium were present in all samples. The ICP Serial Dilution %D's for potassium and vanadium were >10% quality control limit.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG U06330

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A[1]			Magnesium	A[1]		
Antimony				Manganese		J[2]	
Arsenic				Mercury			
Barium	J[2]			Nickel	J[2]		
Beryllium	J[2]			Potassium	J[1]		
Cadmium	J[2]			Selenium			
Calcium				Silver			
Chromium	J[2]			Sodium			
Cobalt	J[2]			Thallium	J[2]		
Copper	A[1]	J[2]		Vanadium	A[1]	J[1]	J[2]
Iron				Zinc	J[2]		
Lead	A[1]	J[2]		Cyanide			

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

J[1] - Accept data, but qualify results as estimated, "J", due to ICP Serial Dilution %D noncompliance.

J[2] - Accept data, but qualify positive and nondetected results as estimated, "J" and "UJ", respectively, due to ICP Interference.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-70

TO: [redacted] DATE: OCTOBER 13, 1998

FROM: JUSTIN ORBICH COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - VOA/SVOA/PEST/PCB/PAH ORGANICS
CTO 020 – MCRD PARRIS ISLAND
SDG U05900

SAMPLES 5/Aqueous

PAI-01-SW-05	PAI-01-SW-06	PAI-01-SW-07
TB-052798	TB-060198	

3/Sediment

PAI-01-SD-05	PAI-01-SD-06	PAI-01-SD-07

6/Soil

PAI-01-SS-001-01	PAI-01-SS-002-01	PAI-01-SS-003-01
PAI-41-SS-001-01	PAI-41-SS-003-01	PAI-41-SS-004-01

1/Rinse Blank

PAI-41-RB-01

OVERVIEW

The sample set for CTO 020, SDG U05900, MCRD Parris Island consists of one (1) rinse blank, three (3) sediment, six (6) soil, and five (5) aqueous environmental samples including two (2) trip blanks (TB). The environmental samples were analyzed for Target Compound List (TCL) volatiles, semivolatiles, pesticides/PCBs, and PAHs. The trip blanks were analyzed for TCL volatile compounds only.

The samples were collected by Tetra Tech, NUS on May 27 and June 1, 1998, and analyzed by Recra LabNet, Chicago. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatiles, semivolatiles, pesticide/PCB, and PAHs were analyzed according to SW846 Methods 8260B, 8270C, 8081, and 8310. The data in this SDG were validated with regard to the following parameters:

- * Data Completeness
- * Holding Times
- Initial/continuing calibrations
- * Laboratory method/field quality control blank results
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

MEMO TO: DAVE BRAYACK
DATE: OCTOBER 13, 1998 – PAGE 2

VOLATILE FRACTION

The aqueous initial calibration contained RRFs below the minimum quality control limit for acetone and 2-butanone. Nondetected results were qualified as rejected (UR), in the affected samples. Positive results were qualified as estimated (J), in the affected samples.

The soil initial calibration contained RRFs below the minimum quality control limit for acetone. Nondetected results were qualified as rejected (UR), in the affected samples. Positive results were qualified as estimated (J), in the affected samples.

Several volatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

SEMIVOLATILE FRACTION

Several semivolatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

PESTICIDE FRACTION

All data quality parameters were met for this fraction.

POLYNUCLEAR AROMATIC HYDROCARBONS

Several polynuclear aromatic hydrocarbon samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

EXECUTIVE SUMMARY

Laboratory Performance Issues: Initial calibration RRFs for acetone and 2-butanone were below the 0.05 minimum quality control limit. Nondetected results were rejected in associated samples.

Other Issues Affecting Data Quality: None

MEMO TO: **DAVE BRAYACK**
DATE: **OCTOBER 13, 1998 – PAGE 4**

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 problems 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)."

Justin Orbich

Justin Orbich

Chemist/Data Validator
Tetra Tech, NUS

Joseph A. Samchuck

Data Validation Quality Assurance Officer
Tetra Tech, NUS

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS

INTERNAL CORRESPONDENCE

TO: MR. DAVID BRAYACK

DATE: OCTOBER 13, 1998

FROM: L.W.SUMANSKY

COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA/SVOA/PAH/PEST/PCB
PARRIS ISLAND
SDG U06330

SAMPLES: 2/Aqueous/

PAI – 01 – SW010
PAI – 01 – SW012

1/Aqueous Trip Blank

TB062498

OVERVIEW

The sample set for Parris Island, SDG U06330 ,consists of two (2) aqueous environmental samples and one (1) aqueous trip blank. The samples were analyzed for Target Compound List (TCL) volatile organic compounds. The samples, except for the trip blank, were also analyzed for semivolatile organic compounds, polynuclear aromatic hydrocarbons (PAHs), organochlorine pesticides, and polychlorinated biphenyls (PCBs).

The samples were collected by Tetra Tech NUS on June 24, 1998 to and analyzed by RECRA LABNET – Chicago. All analyses were conducted using SW-846 Methods 8260B, 8270C, 8310, 8081A, and 8082 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

- * Data completeness
- * Holding times
- Initial/continuing calibrations
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting quality are discussed below; documentation supporting these findings are presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Volatile

Initial calibration relative response factors (RRFs) fell below the 0.05 quality control limit for acetone, and 2-butanone. Nondetected results for acetone and 2-butanone were qualified as rejected, "UR" in all samples.

Semivolatile

All data quality parameters were met in this fraction.

Polynuclear Aromatic Hydrocarbons

All data quality parameters were met in this fraction.

Pesticides/PCBs

All data quality parameters were met for this fraction.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone and 2-butanone failed to meet the 0.05 RRF quality control limit. Chrysene, in the PAH fraction, was qualified as estimated "J" because the positive result reported was below the CRQL.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94). 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 National Functional guidelines and Method SW-846 8000B."

Tetra Tech NUS

L.W.Sumansky
Chemist

Tetra Tech NUS

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

PARRIS ISLAND

SDG UO6330

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PAH	PEST	PCB
PAI-01-SW-010	R[1]		J[1]		
PAI-01-SW-012	R[1]				
TB062498	R[1]				

If the field is left blank, the qualifier is A - Accept all data.

R[1] - Reject data, qualify nondetected results for acetone and 2-butanone as rejected, "UR", due to initial calibration RRFs less than 0.05.

J[1] Accept data ,except qualify chrysene as estimated "J", because the positive result was reported below CRQL.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-09-8-085

TO: D. BRAYACK **DATE:** OCTOBER 13, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: MISCELLANEOUS DATA VALIDATION - PH, SALINITY, TOC, AND HARDNESS
CTO 020 - MCRD PARRIS ISLAND
SDG - U06330

SAMPLES: 2Aqueous/

PAI-01-SW-010 PAI-01-SW-012

Overview

The sample set for CTO 020 MCRD Parris Island, SDG U06330, consists of two (2) aqueous environmental samples.

All samples were analyzed for pH, Salinity, Total Organic Carbon (TOC), and Hardness. The samples were collected by Tetra Tech NUS on June 24, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. TOC analyses were conducted using SW846 9060 method. Salinity analyses were conducted using standard method 2520B. Hardness analyses were conducted using EAP 130.2 method.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG U06330

Table 1 - RECOMMENDATION SUMMARY

pH	TOC
Salinity	Hardness

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

C-49-08-8-021

TO: [redacted]

DATE: OCTOBER 18, 1998

FROM: GRETCHEN PHIPPS

COPIES: DV FILE

SUBJECT: MISCELLANEOUS DATA VALIDATION - TOC, HARDNESS AND SALINITY
CTO 020 - MCRD PARRIS ISLAND
SDG - U05900

SAMPLES: 3/Soil/

PAI-01-SD-05	PAI-01-SD-06	PAI-01-SD-07

3/Aqueous/

PAI-01-SW-05	PAI-01-SW-06	PAI-01-SW-07

Overview

The sample set for CTO 020 MCRD Parris Island, SDG U05900, three (3) soil environmental samples and three (3) aqueous environmental samples.

All samples were analyzed for pH. All aqueous samples were analyzed for Total Organic Carbon (TOC) and salinity. The samples were collected by Tetra Tech NUS on May 27, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The TOC analyses on soil matrix were conducted using the Walkley-Black Method. The TOC analyses on aqueous matrix were conducted using SW846 9060 Method. The salinity analyses were conducted using Standard Methods 2520B.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verification
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Holding Times

The holding time for salinity analyses was exceeded by sixty-one (61) days (see comment in Case Narrative in Appendix C). The positive results reported for salinity were qualified as estimated, "J".

Executive Summary

Laboratory Performance: The holding time for salinity analyses was exceeded.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG U05900

Table 1 - RECOMMENDATION SUMMARY

TOC	
Hardness	
Salinity	J[1]

If the field is left blank, the qualifier is A - Accept data.

J[1] - Accept data, but qualify positive results as estimated, "J", as a result of holding time exceedance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

C-49-08-8-021

TO: [redacted] **DATE:** OCTOBER 18, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS, DISSOLVED TAL METALS AND CYANIDE
CTO 020 - MCRD PARRIS ISLAND
SDG - U05900

SAMPLES: 3/Sediment/

PAI-01-SD-05	PAI-01-SD-06	PAI-01-SD-07

6/Soil/

PAI-01-SS-001-01	PAI-01-SS-002-01	PAI-01-SS-003-01
PAI-41-SS-001-01	PAI-41-SS-003-01	PAI-41-SS-004-01

7/Aqueous/

PAI-01-SW-05	PAI-01-SW-05-F	PAI-01-SW-06
PAI-01-SW-06-F	PAI-01-SW-07	PAI-01-SW-07-F
PAI-41-RB-01		

Overview

The sample set for CTO 020 MCRD Parris Island, SDG U05900, nine (9) soil environmental samples and three (3) aqueous environmental samples. One (1) rinsate blank (PAI-41-RB-01) was included within this SDG.

All samples, with the exception of those designated -F, were analyzed for Target Analyte List (TAL) metals and Cyanide. The samples designated -F were analyzed for dissolved TAL metals. The samples were collected by Tetra Tech NUS on May 27 and June 1, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of arsenic in the soil matrix and mercury, were conducted according to SW-846 Method 6010A. Arsenic in the soil matrix analyses were conducted using SW846 Method 7060A. Mercury analyses were conducted according to SW-846 Method 7470A and 7471A. Cyanide analyses were conducted using SW846 Method 9012.

All TAL metals analyses with the exception of arsenic and mercury were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic analyses were conducted by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
  • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation / rinsate blanks at the following maximum concentrations:

Samples affected: All

Analyte	Maximum Concentration	Action Level (Soil)	Action Level (Aqueous)
Aluminum	97.9µg/L	48.95 mg/kg	489.5µg/L
Antimony	2.0µg/L	1.0 mg/kg	10µg/L
Barium(2)	0.700µg/L	NA	3.5µg/L
Barium(3)	0.87µg/L	.435 mg/kg	NA
Cadmium	0.4µg/L	0.2 mg/kg	1µg/L
Calcium(2)	85.180µg/L	NA	425.9µg/L
Calcium(3)	190µg/L	95 mg/kg	NA
Copper	2.5µg/L	1.25 mg/kg	12.5µg/L
Iron	42.4µg/L	21.2 mg/kg	212µg/L
Lead	2.0µg/L	NA	10.0µg/L
Lead(1)	0.251 mg/kg	.1255 mg/kg	NA
Magnesium	87.6µg/L	NA	438µg/L
Magnesium(3)	172µg/L	86 mg/kg	NA
Manganese	2.1µg/L	1.05 mg/kg	10.5µg/L
Potassium(2)	132.870µg/L	NA	664.35µg/L
Potassium(3)	209µg/L	104.5 mg/kg	NA
Sodium(3)	1370µg/L	68.5 mg/kg	NA
Thallium	1.9µg/L	0.45 mg/kg	9.5µg/L
Vanadium	2.3µg/L	1.15 mg/kg	11.5µg/L
Zinc(2)	4.070µg/L	NA	20.35µg/L
Zinc(3)	3.6µg/L	1.8 mg/kg	NA

(1) Maximum concentration present in soil preparation blank.
(2) Maximum concentration present in aqueous preparation blank.
(3) Maximum concentration present in rinsate blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot, percent solids, and dilution factors were taken into account were determining blank contamination. Positive results < the action level for aluminum, antimony, barium, cadmium, copper, iron, manganese, vanadium and zinc were qualified , "U", as a result of blank contamination. No action was taken for the remaining analtyes since either the results were greater than the action level or were nondetects.

Notes

The Contract Required Detection Limits (CRDL) Percent Recovery (%R) for beryllium, iron, lead, mercury, selenium and thallium were outside the 90-110% quality control limit. However, no validation actions were required.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation / rinsate blanks. The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for several analytes were outside the 90-110% quality control limits.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG U05900

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A[1]	Magnesium	
Antimony	A[1]	Manganese	A[1]
Arsenic		Mercury	
Barium	A[1]	Nickel	
Beryllium		Potassium	
Cadmium	A[1]	Selenium	
Calcium		Silver	
Chromium		Sodium	
Cobalt		Thallium	
Copper	A[1]	Vanadium	A[1]
Iron	A[1]	Zinc	A[1]
Lead			

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-10-8-230

TO:	D. BRAYACK	DATE:	OCTOBER 29, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS, DISSOLVED TAL METALS
CTO 020/053 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – TTP10

SAMPLES: 16/ Aqueous /

PAI-10-GW-014-01	PAI-10-GW-014-01-F
PAI-10-SW-008-00	PAI-10-SW-008-00-F
PAI-10-SW-008-00D	PAI-10-SW-008-00D-F
PAI-10-SW-009-00	PAI-10-SW-009-00-F
PAI-10-SW-012-00	PAI-10-SW-012-00-F
PAI-10-SW-013-00	PAI-10-SW-013-00-F
SOURCE WATER SWMU 10	SOURCE WATER SWMU 01,02,03

Overview

The sample set for CTO 020/053, MCRD Parris Island, SDG TTP10, consists of sixteen (16) aqueous environmental samples. Two (2) field duplicate pair (PAI-10-SW-008-00 / PAI-10-SW-008-00D and PAI-10-SW-008-00-F/ PAI-10-SW-008-00D-F) were included within this SDG.

The samples, with exception to those designated –F, were analyzed for Target Analyte List (TAL) metals. The samples designated –F were analyzed for dissolved TAL metals. The samples were collected by Tetra Tech NUS on August 11 and 12, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW 846 method 6010B. Mercury analyses were conducted according to SW 846 method 7470A.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

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Calibration Verifications

The Continuing Calibration Verification (CCV) Percent Recovery (%R) for thallium affecting samples SOURCE WATER SWMU 10 and SOURCE WATER SWMU 01,02,03 in CCV 33 was <90% quality control limit. The nondetected results reported for thallium in the affected samples were qualified as estimated, "UJ".

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Aqueous)
Aluminum	46.4µg/L	232µg/L
Barium	1.9µg/L	9.5µg/L
Beryllium	0.2µg/L	1.0µg/L
Calcium	74.0µg/L	370µg/L
Iron [1]	34.2µg/L	171µg/L
Lead	1.6µg/L	8.0µg/L
Magnesium	35.6µg/L	178µg/L
Potassium	156.5µg/L	783µg/L
Selenium	1.3µg/L	6.5µg/L
Silver	8.7µg/L	43.5µg/L
Sodium	281.5µg/L	1408µg/L
Thallium	2.4µg/L	12.0µg/L
Zinc [1]	5.300µg/L	26.5µg/L

[1] Maximum concentration present in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into account when determining blank contamination. Positive results < the action level for aluminum, beryllium, iron, lead, selenium, silver and zinc were qualified, "U", 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.

Notes

The CRDL %R for silver and thallium were outside the 80-120% quality control limit. However, no validation action was required per regional guidance.

The CCV %R for lead was > 110% quality control limit in CCV 6, 7 and 8. However, no validation action was required as all results reported for lead were either nondetected or qualified as a result of blank contamination.

The CCV %R for thallium was <90% quality control limit in CCV 6. However, no validation action was required as no samples were bracketed by CCV 6.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. The CCV %R for thallium 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 Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris Island
SDG TTP10

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A'	
Antimony		
Arsenic		
Barium		
Beryllium	A'	
Cadmium		
Calcium		
Chromium		
Cobalt		
Copper		
Iron	A'	
Lead	A'	
Magnesium		
Manganese		
Mercury		
Nickel		
Potassium		
Selenium	A'	
Silver	A'	
Sodium		
Thallium		J'
Vanadium		
Zinc	A'	

If the field is left blank, the qualifier is A - Accept data.

A' - Accept data, but qualify results less than the blank action level as nondetected, "U".

J' - Accept data, but nondetected results as estimated, "UJ", as a result of calibration noncompliance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-232

TO:	**D. BRAYACK**	**DATE:**	**OCTOBER 29, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – MISCELLANEOUS PARAMETERS**
CTO 020/053 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – TTP10

SAMPLES: 9/ Aqueous /

PAI-10-GW-014-01	PAI-10-SW-008-00
PAI-10-SW-008-00D	PAI-10-SW-009-00
PAI-10-SW-010-00	PAI-10-SW-012-00
PAI-10-SW-013-00	SOURCE WATER SMU 10
SOURCE WATER SMU 01,02,03	

Overview

The sample set for CTO 020/053, MCRD Parris Island, SDG TTP10, consists of nine (9) aqueous environmental samples. One (1) field duplicate pair (PAI-10-SW-008-00 / PAI-10-SW-008-00D) was included within this SDG.

All samples were analyzed for Cyanide, Hardness and Total Organic Carbon (TOC). All samples with the exception of PAI-10-GW-014-01 and PAI-10-SW-012-00 were analyzed for Hexavalent Chromium. Sample PAI-10-GW-14-01, SOURCE WATER SWMU and SOURCE WATER SWMU 01,02,03 were also analyzed for Choride, Fluoride, Nitrate/Nitrite, Sulfate, Total Dissolved Solids (TDS) and Total Suspended Solids (TSS). The samples were collected by Tetra Tech NUS on August 11 and 12, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Anion analyses were conducted using EPA method 300.0. Cyanide analyses were conducted using SW 846 method 9012. Hardness analyses were conducted using EPA method 130.2. Nitrate/Nitrite analyses were conducted using EPA method 353.2. TDS analyses were conducted using EPA method 160.1. TOC analyses were conducted using SW 846 method 9060. TSS analyses were conducted using EPA method 160.2. Hexavalent Chromium analyses were conducted using SW 846 method 7196.

The data was evaluated based on the following parameters:

*
- Data Completeness
- Holding Times
- Calibration Verifications
- Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Holding Times

The holding time for Hexavalent Chromium analyses was exceeded by eight (8) hours for samples SOURCE WATER SWMU 10 and SOURCE WATER SWMU 01,02,03. The nondetected results reported for Hexavalent Chromium in the affected samples were qualified as estimated, "UJ".

Calibration Verifications

The Initial Calibration Verification (ICV) Percent Recovery (%R) for Hexavalent Chromium was <90% quality control limit. The nondetected results reported for Hexavalent Chromium were qualified as estimated, "UJ".

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Aqueous)
Nitrate/Nitrite	0.02µg/L	0.10µg/L

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into account were determining blank contamination. Positive results < the action level for Nitrate/Nitrite were qualified, "U", as a result of blank contamination.

Notes

The holding time exceedance for Hexavalent Chromium was due to delivery time.

Executive Summary

Laboratory Performance: Nitrate/Nitrite was present in the laboratory method blanks. The ICV %R for Hexavalent Chromium was <90% quality control limit

Other Factors Affecting Data Quality: The holding time for Hexavalent Chromium was exceeded.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris Island
SDG TTP10

Table 1 - RECOMMENDATION SUMMARY

Chloride		
Cyanide		
Fluoride		
Hardness		
Nitrate/Nitrite	A[1]	
Sulfate		
TDS		
TOC		
TSS		
Hexavalent Chromium		J[1,2]

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

J[1] - Accept data, but qualify positive and nondetected results as estimated, "J" and "UJ", respectively, as a result of holding time exceedance.

J[2] - Accept data, but qualify nondetected results as estimated, "UJ", as a result of calibration noncompliance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-08-039

TO:	D. BRAYACK	DATE:	NOVEMBER 5, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: **INORGANIC DATA VALIDATION – SEM METALS AND AVS**
CTO 020/ 053 - MCRD PARRIS
SDG – TTP16

SAMPLES: 4 / Sediments /

PAI-01-SD-002-02	PAI-10-SD-016-01
PAI-10-SD-017-01	PAI-10-SD-018-01

Overview

The sample set for CTO 020 / 053, MCRD Parris, SDG TTP16, consists of four (4) sediment environmental samples.

All samples were analyzed for Simultaneously Extracted Metals (SEM) and Acid Volatile Sulfide. The samples were collected by Tetra Tech NUS on September 9 and 14, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering
The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

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The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG TTP16

Table 1 - RECOMMENDATION SUMMARY

SEM
~~SAVS~~
AVS

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

TO: MR. DAVID BRAYACK DATE: NOVEMBER 6, 1998

FROM: LINDA KARSONOVICH COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA/SVOA/PAH/PEST/PCB
PARRIS ISLAND
SDG TTP16

SAMPLES: 1/Aqueous/

TB-091498

11/Solid/

PAI-01-IDW-S	PAI-10-SD-002-02
PAI-02-IDW-S	PAI-03-IDW-S
PAI-10-IDW-S	PAI-10-SD-016-01
PAI-10-SD-017-01	PAI-10-SD-018-01
PAI-10-SS-015-01	PAI-10-SS-016-01
PAI-10-SS-017-01	

OVERVIEW

The sample set for Parris Island, SDG TTP16 consists of one (1) aqueous field quality control blank and eleven (11) solid environmental samples. All samples were analyzed for Target Compound List (TCL) volatile organic compounds. The environmental samples were also analyzed for semivolatile organic compounds, organochlorine pesticides, and polychlorinated biphenyls (PCBs).

The samples were collected by Tetra Tech NUS on August 9-14th, 1998 and analyzed by Laucks Laboratory. All analyses were conducted using SW-846 Methods 8260B, 8270C, 8081A, and 8082 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

- * Data completeness
- * Holding times
- Initial/continuing calibrations
- Laboratory method and field quality control blank results
- Surrogate recovery
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Volatile

Initial and/or continuing calibration relative response factors (RRFs) fell below the 0.05 quality control limit for acetone, 2-hexanone, 2-methyl-2-pentanone, and 2-butanone. Nondetected results were qualified as rejected, UR, in the aqueous samples. Positive results for acetone and 2-butanone were qualified as estimated, J.

Continuing calibration RRFs fell below the 0.05 quality control limit for acetone. Nondetected results were qualified as rejected, UR, in samples PAI-10-SD-002-02 and PAI-02-IDW-S.

The following table summarizes the maximum concentration of volatile compounds detected in the laboratory method and field quality control blanks (*) in this SDG.

Compound	Maximum Concentration	Action Level
Acetone*	2 µg/L	20 µg/Kg
2-Butanone*	1 µg/L	5 µg/Kg
Chloromethane*	1 µg/L	5 µg/Kg
Methylene chloride	4 µg/Kg	40 µg/Kg
Methylene chloride**	180 µg/Kg	1800 µg/Kg

* concentration detected in trip blank
** applied to medium level soils only

Dilution factors, percent solids, and sample aliquot were taken into consideration when applying blank action levels. Positive results for acetone and methylene chloride below the action level were qualified as nondetected, U. It should be noted that field blank results are not qualified based on field blank contamination.

Surrogate recovery fell below the lower quality control limit for 1,2-dichloroethane-d4 in samples PAI-01-IDW-S and PAI-03-IDW-S. The samples were reanalyzed as medium level soils and the surrogates were compliant. The reviewer elected to report the low level analyses and quality the data as estimated, J and UJ, in order to achieve the lowest possible reporting limits.

Semivolatile

No data were rejected for this parameter.

Pesticides/PCBs

No data were rejected for this parameter.

Additional Comments

Positive results below the CRQL were qualified as estimated, J, due to uncertainty near the detection limit.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-hexanone, 2-butanone, and 4-methyl-2-pentanone failed to meet the 0.05 RRF quality control limit. Surrogate recovery was below the quality control limit for several samples in the VOA fraction. Methylene chloride, 2-butanone, chloromethane, and acetone were detected in the field and laboratory method blanks.

Other Factors Affecting Data Quality: None.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-8-032

TO: [redacted] **DATE:** NOVEMBER 19, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS, TCLP METALS AND MISCELLANOUS
CTO 053 - MCRD PARRIS
SDG – TTP16

SAMPLES: 4 / Sediments /

PAI-01-SD-002-02 PAI-01-SD-016-01
PAI-01-SD-017-01 PAI-01-SD-018-01

3 / Soils /

PAI-10-SS-015-01 PAI-10-SS-016-01
PAI-10-SS-017-01

4 / Leachates /

PAI-01-IDW-S PAI-02-IDW-S
PAI-03-IDW-S PAI-10-IDW-S

Overview

The sample set for CTO 053, MCRD Parris, SDG TTP16, consists of four (4) sediment environmental samples and seven (7) soil environmental samples.

All samples were analyzed for Target Analyte List (TAL) metals and pH. Samples PAI-01-IDW-S, PAI-02-IDW-S, PAI-03-IDW-S and PAI-10-IDW-S were also analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals. Samples PAI-01-SD-002-02, PAI-01-SD-016-01, PAI-01-SD-017-01, PAI-01-SD-018-01, PAI-10-SS-015-01, PAI-10-SS-016-01 and PAI-10-SS-017-01 were also analyzed for Cyanide and Total Organic Carbon (TOC). The samples were collected by Tetra Tech NUS on September 9, 10, 11 and 14, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A. pH analyses were conducted using SW 846 method 9045. Cyanide analyses were conducted using SW 846 method 9012. TOC analyses were conducted using SW 846 method 9060.

All metals analyses with the exception of arsenic, mercury, lead, selenium and thallium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
  • Calibration Verifications
  • Laboratory Blank Analyses

  * - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Calibration Verifications

Continuing Calibration Verification (CCV) Percent Recoveries (%R's) for lead in CCV 4 and CCV 5 affecting TAL metals were >110% quality control limit. The following samples were affected: PAI-10-SD-016-01, PAI-10-SD-017-01, PAI-10-SD-018-01, PAI-10-SD-003-02, PAI-10-SS-015-01, PAI-10-SS-016-01 and PAI-10-SS-017-01. The positive results reported in the affected samples were qualified as estimated, "J".

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Samples affected: TAL

Analyte	Maximum Concentration	Action Level (soil)
Aluminum(1)	12.670 mg/kg	63.35 mg/kg
Antimony(1)	2.660 mg/kg	13.3 mg/kg
Barium	3.8µg/L	1.9 mg/kg
Beryllium	0.4µg/L	0.2 mg/kg
Calcium	227.00	113.5 mg/kg
Cobalt	4.7µg/L	2.35 mg/kg
Copper	4.4µg/L	2.2 mg/kg
Iron(1)	5.340 mg/kg	26.7 mg/kg
Lead	1.4µg/L	0.7 mg/kg
Magnesium	66.5µg/L	33.25 mg/kg
Manganese(1)	0.19 mg/kg	0.95 mg/kg
Nickel	8.9µg/L	4.45 mg/kg
Potassium(1)	21.680 mg/kg	108.4 mg/kg
Selenium	0.7µg/L	0.35 mg/kg
Silver(1)	0.960 mg/kg	4.8 mg/kg
Sodium (1)	26.610 mg/kg	134.55 mg/kg

(1) Maximum concentration found in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into account

were determining blank contamination. Positive results < the action level for antimony, beryllium, cobalt, copper, nickel, selenium, silver and sodium were qualified, "U", 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.

Samples affected: TCLP

Analyte	Maximum Concentration	Action Level (aqueous)
Arsenic	29.3µg/L	146.5µg/L
Barium	3.8µg/L	19.0 µg/L
Selenium	41.2µg/L	206 µg/L

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Dilution factors were taken into account were determining blank contamination. Positive results < the action level for arsenic and selenium were qualified, "U", as a result of blank contamination. No action was taken for barium since the results were greater than the action level.

Notes

The Contract Required Detection Limit (CRDL) Percent Recoveries (%R's) for mercury and selenium affected TAL analyses were outside the 80-120% quality control limit. However, no validation actions were required per Regional guidance.

The CRDL %R for selenium affecting TCLP analyses was outside the 80-120% quality control limit. However, no validation actions were required per Regional guidance.

A CCV %R for thallium in CCV 24 affecting TAL metals was >110% quality control limit. Sample PAI-02-IDW-S was affected, However, no validation action was required as the result reported for thallium in the affected sample was nondetected.

TOC analyses contained an insignificant amount of blank contamination.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks affecting TAL analyses. CCV %R's for lead in CCV 4 and CCV 5 affecting TAL metals were >110% 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 Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG TTP16

Table 1 - RECOMMENDATION SUMMARY

Aluminum			Magnesium	
Antimony	A[1]		Manganese	
Arsenic	A[1]		Mercury	
Barium			Nickel	A[1]
Beryllium	A[1]		Potassium	
Cadmium			Selenium	A[1]
Calcium			Silver	A[1]
Chromium			Sodium	A[1]
Cobalt	A[1]		Thallium	
Copper	A[1]		Vanadium	
Cyanide			Zinc	
Iron				
Lead		J[1]		

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

J[1] - Accept data, but qualify positive results as estimated, "J", as a result of calibration noncompliance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-08-006

TO:	D. BRAYACK	DATE:	NOVEMBER 20, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS, DISSOLVED TAL METALS AND MISCELLANOUS PARAMETERS
CTO 053 - MCRD PARRIS ISLAND
SDG – TTP17

SAMPLES: 10/ Aqueous /

PAI-10-GW-012-01	PAI-10-GW-012-01-F
PAI-10-IDW-W	PAI-10-SW-016-01
PAI-10-SW-016-01-F	PAI-10-SW-017-01
PAI-10-SW-017-01-F	PAI-10-SW-018-01
PAI-10-SW-018-01-F	~~PAI-123-IDW-W~~

Overview

The sample set for CTO 053, MCRD Parris Island, SDG TTP17, consists of ten (10) aqueous environmental samples.

All samples, with exception to those designated –F, were analyzed for Target Analyte List (TAL) metals. Samples designated –F were analyzed for dissolved TAL metals. Sample PAI-10-GW-012-01 was analyzed for Chloride, Cyanide, Fluoride, Hardness, Nitrate/Nitrite, Sulfate, Total Dissolved Solids (TDS), Total Organic Carbon (TOC) and Total Suspended Solids (TSS). Samples PAI-10-IDW-W and PAI-123-IDW-W were analyzed for Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total oil and grease, TDS, TSS and pH. Samples PAI-10-SW-016-01, PAI-10-SW-017-01 and PAI-10-SW-018-01 were analyzed for Cyanide, Hardness and TOC. The samples were collected by Tetra Tech NUS on September 11, 12 and 13, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A. Chloride, Fluoride and Sulfate analyses were conducted using EPA method 300.0. Cyanide analyses were conducted using SW 846 method 9012. Hardness analyses were conducted using EPA method 130.2. Nitrate/Nitrite analyses were conducted using EPA method 353.2. TDS analyses were conducted using EPA method 160.1. TOC analyses were conducted using SW 846 method 9060(modified). TSS analyses were conducted using EPA method 160.2. BOD analyses were conducted using EPA method 405.1. COD analyses were conducted using EPA method 410.4. Total oil and grease analyses were conducted using EPA method 413.1. pH analyses were conducted using EPA method 150.1.

All metals analyses with the exception of arsenic, mercury, lead, selenium and thallium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
• Holding Times
* • Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Holding Time

The holding time for pH analyses on sample PAI-123-IDW-W was marginally exceeded. The positive result reported for pH in the affected sample was qualified as estimated, "J".

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Aqueous)
Barium	3.8µg/L	19.0µg/L
Beryllium	0.2µg/L	1.0µg/L
Calcium	45.4µg/L	227µg/L
Cobalt	4.4µg/L	22.0µg/L
Lead	1.4µg/L	7.0µg/L
Magnesium	42.9µg/L	214.5µg/L
Manganese(1)	1.400µg/L	7.0µg/L
Sodium	271.1µg/L	1356µg/L
Thallium	2.0µg/L	10.0µg/L
Nitrate/Nitrite	0.018µg/L	0.09µg/L

(1) Maximum concentration found in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into account when determining blank contamination. Positive results < the action level for beryllium and cobalt were qualified, "U", 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.

Executive Summary

Laboratory Performance: The holding time for pH analyses on sample PAI-123-IDW-W was marginally exceeded. Several analytes were present in the laboratory method / preparation blanks.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG TTP17

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Magnesium	
Antimony		Selenium	
Arsenic		Silver	
Barium		Sodium	
Beryllium	A[1]	Thallium	
Cadmium		Vanadium	
Calcium		Zinc	
Chromium		Chloride	
Cobalt	A[1]	Fluoride	
Copper		Hardness	
Cyanide		Nitrate/Nitrite	
Iron		Sulfate	
Lead		TDS	
Magnesium		TOC	
Manganese		TSS	
Mercury		BOD	
Nickel		COD	
Total oil and grease		pH	J[1]

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

J[1] - Accept data, but qualify positive results as estimated, "J", as a result of holding time exceedance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-8-048

TO: DAVID BRAYACK

DATE: NOVEMBER 23, 1998

FROM: DANA PIETO

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION – TCL VOAs, SVOAs, & PEST/PCBs
CTO 053, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG TTP17

SAMPLES: Waters\VOC:

PAI-10-GW-012-01	PAI-10-IDW-W	PAI-10-SW-016-01
PAI-10-SW-017-01	PAI-10-SW-018-01	~~PAI-123-IDW-W~~
TB980911	TB980912	

Waters\SVOC\PEST\PCB:

PAI-10-GW-012-01	PAI-10-IDW-W	PAI-10-SW-016-01
PAI-10-SW-017-01	PAI-10-SW-018-01	~~PAI-123-IDW-W~~

The sample set for the CTO 053, MCRD Parris Island, South Carolina, SDG TTP17, consists of six aqueous environmental samples and two trip blanks (designated TB). All samples were analyzed for target compound list (TCL) volatile, semivolatile, and pesticide/PCB organic compounds.

The samples were collected by Tetra Tech NUS on September 10th and 11th, 1998, and analyzed by Laucks Testing Laboratories. The volatile, semivolatile, and pesticide/PCB compounds were analyzed under Naval Facilities Engineering Service Center (NFESC) Quality Control/Quality Assurance criteria using the U.S. EPA SW-846 Methods 8260B, 8270C, and 8081A, respectively.

The data were evaluated according to the following parameters:

* • Holding times
• Initial and continuing calibrations
• Laboratory and field blank analyses

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below and the attached Table 1 summarizes the validation qualifications.

Volatiles

All positive results reported at concentrations less than the Contract Required Quantitation Limit (CRQL) were qualified as estimated, (J).

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 23, 1998 - PAGE 2

The following compounds were detected in the field quality control blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level
Acetone	4.2 µg/L	42 µg/L
Methylene chloride	0.3 µg/L	3.0 µg/L

Samples Affected: All.

Sample aliquot and dilution factors were taken into consideration during the application of the action level. Positive results for acetone and methylene chloride reported at concentrations below the detection limit were replaced with revised detection limits and qualified as nondetects, (U). It should be noted that field quality control blanks are not qualified for field quality control blank contamination.

The initial calibration Relative Response Factors (RRFs) for acetone, 2-butanone, and 2-hexanone were below the 0.05 quality control limit. This calibration noncompliance indicates a lack of consistency in instrumental responses which could lead to compromised quantitation of positive and nondetected results for the affected compounds. Positive results were qualified as estimated, (J), and nondetected results were considered to be unusable and were rejected, (UR).

The continuing calibration RRFs for acetone, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone were below the 0.05 quality control limit. This calibration noncompliance indicates a lack of consistency in instrumental responses which could lead to compromised quantitation of positive and nondetected results for the affected compounds. Positive results were qualified as estimated, (J), and nondetected results were considered to be unusable and were rejected, (UR).

Acetone and toluene exceeded the instrument's linear calibration range in sample PAI-10-IDW-W. The sample was diluted 10x. The results for only these compounds were transposed over to the original sample results and used in validation of this SDG.

Acetone exceeded the instrument's linear calibration range in sample PAI-123-IDW-W. The sample was diluted 5x. The result for only this compound was transposed over to the original sample result and used in validation of this SDG.

It should be noted that the trip blanks were labeled incorrectly on the database sheets and the appropriate corrections were made.

Semivolatiles

All positive results reported at concentrations less than the CRQL were qualified as estimated, (J).

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 5, 1998 - PAGE 3

The following semivolatile compound was detected in the laboratory method blank at the maximum concentration indicated below:

Compound	Maximum Concentration	Aqueous Action Level
Bis(2-ethylhexyl)phthalate	1.0 µg/L	10 µg/L

Samples Affected: All

Sample aliquot and dilution factors were taken into consideration during the application of the action level. Positive results for bis(2-ethylhexyl)phthalate reported at concentrations below the detection limit were replaced with the revised detection limits and qualified as nondetects, (U).

It should be noted that aniline, benzyl alcohol, benzoic acid, and 1,2-diphenylhydrazine were removed from the data sheets because they were not on the target compound list referenced in the laboratory specifications.

Pesticides

No problems were noted.

Executive Summary

Laboratory Performance: The volatile initial and continuing calibration RRFs less than the 0.05 quality control limit were reported for acetone, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone. Bis(2-ethylhexyl)phthalate was detected in the semivolatile laboratory method blanks

Other Factors Affecting Data Quality: Acetone and methylene chloride were detected in the volatile field quality control blanks.

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 5, 1998 - PAGE 4

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation" 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

Tetra Tech NUS
Data Validator

Joseph A. Samchuck

Tetra Tech NUS
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

PARRIS ISLAND
SDG NO. TTP17

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA			SVOA		PEST/PCB
PAI-10-GW-012-01	A^1	J^3	$R^{2,3}$	A^3		
PAI-10-IDW-W	A^1	$J^{2,3}$	R^3	A^3	J^3	
PAI-10-SW-016-01	A^1		$R^{2,3}$	A^3		
PAI-10-SW-017-01	A^1		$R^{2,3}$	A^3		
PAI-10-SW-018-01		J^3	$R^{1,2,3}$	A^3		
PAI-123-IDW-W	$A^{1,2}$	$J^{2,3}$	R^3	A^3	J^3	
TB980911		$J^{1,3}$	$R^{2,3}$			
TB980912		$J^{1,3}$	$R^{2,3}$			

If field is left blank, the qualifier is A - accept all data.

A^1 - Accept data, but change positive results for acetone to revised detection limits and qualify as nondetected, (U), as a result of field quality control blank contamination.

A^2 - Accept data, but change positive results for methylene chloride to revised detection limits and qualify as nondetected, (U), as a result of field quality control blank contamination.

A^3 - Accept data, but change positive results for bis(2-ethylhexyl)phthalate to revised detection limits and qualify as nondetected, (U), as a result of laboratory method blank contamination.

J^1 - Accept data, but qualify positive results for acetone as estimated (J), as a result of initial and/or continuing calibration RRFs below 0.05.

J^2 - Accept data, but qualify positive results for 2-butanone as estimated (J), as a result of initial and/or continuing calibration RRFs below 0.05.

J^3 - Accept data, but qualify positive results less than the CRQL as estimated (J).

R^1 - Reject nondetected results (UR) for acetone as a result of initial and/or continuing calibration RRFs less than 0.05.

R^2 - Reject nondetected results (UR) for 2-butanone as a result of initial and/or continuing calibration RRFs less than 0.05.

R^3 - Reject nondetected results (UR) for 4-methyl-2-pentanone and 2-hexanone as a result of initial and/or continuing calibration RRFs less than 0.05.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory and should not be considered present.
J	-	Positive result is estimated as result of a value below the CRQL or a technical noncompliance.
UR	-	Rejected as a result of a technical noncompliance.

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's $r < 0.995$
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-09-8-097

TO: D. GRAYACK **DATE:** DECEMBER 7, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE
CTO 020 - MCRD PARRIS ISLAND
SDG - U06089

SAMPLES: 1/Aqueous/

PAI-01-RB-03

9/Soil/

PAI-01-SD-A-01	PAI-01-SD-002-01	PAI-01-SD-003-01
PAI-01-SD-003-01D	PAI-01-SD-004-01	PAI-01-SD-009-01
PAI-01-SD-010-01	PAI-01-SD-011-01	PAI-01-SD-012-01

Overview

The sample set for CTO 020 MCRD Parris Island, SDG U06089, consists of nine (9) soil environmental samples. One (1) rinsate blank (PAI-01-RB-03) and one (1) field duplicate pair (PAI-01-SD-003-01 / PAI-01-SD-003-01D) was included within this SDG.

All samples were analyzed for Target Analyte List (TAL) metals and Cyanide. The samples were collected by Tetra Tech NUS on June 10, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception arsenic in the aqueous matrix and mercury, were conducted according to SW-846 Method 6010A. Arsenic analyses in the aqueous matrix were conducted using SW846 Method 7060A. Mercury analyses were conducted according to SW-846 Method 7470A and 7471A. Cyanide analyses were conducted using SW846 Method 9012.

All TAL metals analyses with the exception of arsenic in the aqueous matrix and mercury were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic analyses in the aqueous matrix were conducted by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
  • Laboratory Blank Analyses

Notes

The Contract Required Detection Limits (CRDL) Percent Recovery (%R) for iron and mercury were outside the 80-120% quality control limit. However, no validation actions were required.

Sample PAI-01-SD-A-01 was incorrectly labeled PAI-01-001-01 on all laboratory data.

A comparison of the field duplicate pair (PAI-01-SD-003-01 / PAI-01-SD-003-01D) is included in Appendix C. However, no validation action in required.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation / rinsate blanks.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG U06089

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A'	Magnesium	A'
Antimony	A'	Manganese	
Arsenic		Mercury	A'
Barium	A'	Nickel	A'
Beryllium	A'	Potassium	
Cadmium		Selenium	A'
Calcium	A'	Silver	
Chromium		Sodium	
Cobalt		Thallium	
Copper		Vanadium	
Iron		Zinc	A'
Lead	A'	Cyanide	

If the field is left blank, the qualifier is A - Accept data.

A' - Accept data, but qualify results less than the blank action level as nondetected, "U".

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-09-8-101

TO: [redacted] **DATE:** DECEMBER 7, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS, DISSOLVED TAL METALS AND CYANIDE
CTO 020 - MCRD PARRIS ISLAND
SDG - U06363

SAMPLES: 7/Aqueous/

PAI-01-SW-002-01	PAI-01-SW-002-01-F	PAI-01-SW-002-01D
PAI-01-SW-002-01D-F	PAI-01-SW-011-01	PAI-01-SW-011-01-F
PAI-02-RB-01		

3/Soil/

PAI-02-SS-001-01	PAI-02-SS-006-01	PAI-02-SS-008-01

Overview

The sample set for CTO 020 MCRD Parris Island, SDG U06363, consists of six (6) aqueous environmental samples and three (3) soil environmental samples One (1) rinsate blank (PAI-02-RB-01) and two (2) field duplicate pairs (PAI-01-SD-003-01 / PAI-01-SD-003-01D and PAI-01-SD-003-01-F / PAI-01-SD-003-01D-F) were included within this SDG.

All samples, excluding those designated by -F, were analyzed for Target Analyte List (TAL) metals and Cyanide. The samples designated by -F were analyzed for dissolved TAL metals. The samples were collected by Tetra Tech NUS on June 26 and 30, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception lead in samples PAI-01-SW-011-01, PAI-02-RB-01, PAI-02-SS-001-01, PAI-02-SS-006-01 and PAI-02-SS-008-01 and mercury, were conducted according to SW-846 Method 6010A. Lead analyses in samples PAI-01-SW-011-01, PAI-02-RB-01, PAI-02-SS-001-01, PAI-02-SS-006-01 and PAI-02-SS-008-01 were conducted using SW846 Method 7060A. Mercury analyses were conducted according to SW-846 Method 7470A and 7471A. Cyanide analyses were conducted using SW846 Method 9012.

All TAL and dissolved TAL metals analyses with the exception of lead in samples PAI-01-SW-011-01, PAI-02-RB-01, PAI-02-SS-001-01, PAI-02-SS-006-01 and PAI-02-SS-008-01 and mercury were conducted using the Inductively Coupled Plasma (ICP) methodologies. Lead in samples PAI-01-SW-011-01, PAI-02-RB-01, PAI-02-SS-001-01, PAI-02-SS-006-01 and PAI-02-SS-008-01 were conducted by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

calcium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, vanadium and zinc were qualified, "U", 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 blank contamination.

Notes

Continuing Calibration Verification (CCV) Percent Recoveries (%R's) for cadmium and calcium were outside the 90-110% quality control limit for CCV-5. However, this noncompliance did not affect any samples in this SDG.

The Contract Required Detection Limits (CRDL) Percent Recoveries (%R's) for arsenic, iron, lead, mercury and selenium were outside the 80-120% quality control limit. However, no validation actions were required.

A comparison of the field duplicate pairs (PAI-01-SD-003-01 / PAI-01-SD-003-01D and PAI-01-SD-003-01-F / PAI-01-SD-003-01D-F) are included in Appendix C. However, no validation action in required.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation / rinsate blanks.
Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG U06363

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A'	Magnesium	A'
Antimony		Manganese	A'
Arsenic		Mercury	
Barium		Nickel	A'
Beryllium	A'	Potassium	A'
Cadmium		Selenium	
Calcium	A'	Silver	
Chromium		Sodium	
Cobalt	A'	Thallium	
Copper	A'	Vanadium	A'
Iron		Zinc	A'
Lead	A'	Cyanide	

If the field is left blank, the qualifier is A - Accept data.

A' - Accept data, but qualify results less than the blank action level as nondetected, "U".

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-09-8-106

TO: [redacted] **DATE:** **DECEMBER 7, 1998**

FROM: **GRETCHEN PHIPPS** **COPIES:** **DV FILE**

SUBJECT: **MISCELLANEOUS DATA VALIDATION - PH, SALINITY, HARDNESS, HEXAVALENT CHROMIUM, AND TOC**
CTO 020 - MCRD PARRIS ISLAND
SDG - U06363

SAMPLES: 4/Aqueous/

PAI-01-SW-002-01 PAI-01-SW-002-01D PAI-01-SW-011-01
PAI-02-RB-01

3/Soil/

PAI-02-SS-001-01 PAI-02-SS-006-01 PAI-02-SS-008-01

Overview

The sample set for CTO 020 MCRD Parris Island, SDG U06363, consists of three (3) aqueous environmental samples and three (3) soil environmental samples One (1) rinsate blank (PAI-02-RB-01) and one (1) field duplicate pair (PAI-01-SD-003-01 / PAI-01-SD-003-01D) was included within this SDG.

All aqueous samples were analyzed for pH, salinity, hardness and Total Organic Carbon (TOC). All soil samples and samples PAI-01-SW-011-01 and PAI-02-RB-01 were analyzed for Hexavalent Chromium. The samples were collected by Tetra Tech NUS on June 26 and 30, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Salinity analyses were conducted using Standard Methods 2520B and pH analyses were conducted using EPA 150.1 method. Hexavalent Chromium analyses were conducted using SW846 Method 3060A/7196. TOC analyses were conducted using SW846 9060 method.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Laboratory Blanks

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG U06363

Table 1 - RECOMMENDATION SUMMARY

pH
Salinity
Hardness
Hexavalent Chromium
TOC

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

C-49-08-8-018

TO: [redacted]ACK **DATE:** **DECEMBER 8, 1998**

FROM: **GRETCHEN PHIPPS** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - PH AND TOC**
CTO 020/053- MCRD PARRIS ISLAND
SDG - U07632

SAMPLES: 7/Aqueous/

PAI-01-SB-002-04	PAI-01-SB-003-04	PAI-01-SB-005-04
PAI-10-SB-001-22	PAI-10-SB-002-10	PAI-10-SB-006-06
PAI-10-SB-007-24		

Overview

The sample set for CTO 020/053, MCRD Parris Island, SDG U07632, consists of seven (7) soil environmental samples.

The samples were analyzed for pH and Total Organic Carbon (TOC). The samples were collected by Tetra Tech NUS on July 22 - 24, 1998 and analyzed Recra Labnet – Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA /QC) criteria. TOC analyses were conducted using the Walkley-Black method. pH analyses were conducted using SW 846 method 9045C.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

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Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris, Island
SDG U07632

Table 1 - RECOMMENDATION SUMMARY

pH
TOC

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-11-8-002

TO:	**DAVE BRAYACK**	**DATE:**	**DECEMBER 10, 1998**
FROM:	**JUSTIN ORBICH**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB**
CTO 020/053, PARRIS ISLAND
SDG TTP10

SAMPLES: 11/Aqueous

PAI-10-GW-014-01	PAI-10-SW-008-00
PAI-10-SW-008-00D	PAI-10-SW-009-00
PAI-10-SW-010-00	PAI-10-SW-012-00
PAI-10-SW-013-00	SOURCE WATER SWMU 10
SOURCE WATER SWMU 01,02,03	TB-081298
TB-083198	

OVERVIEW

The sample set for CTO 020/053, SDG TTP10, Parris Island consists of eleven (11) aqueous environmental samples, which includes two (2) trip blanks (designated TB) and two (2) source water field blanks (designated SOURCE WATER). The samples were analyzed for Target Compound List (TCL) volatile, semivolatile, and pesticide PCB organic compounds. The trip blanks were analyzed for TCL volatile organic compounds only. One field duplicate pair (PAI-10-SW-008-00/PAI-10-SW-008-00D) was included in this SDG.

The samples were collected on August 11th, 1998 and analyzed by Laucks Testing Laboratories. All volatile, semivolatile, and pesticide/PCB samples were analyzed in accordance with SW846 Methods 8260B, 8270C, and 8081A/8082, respectively. The data in this SDG were validated with regard to the following parameters:

- * Data Completeness
- * Holding Times
- Initial/continuing calibrations
- Laboratory method/field quality control blank results
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 10, 1998 – PAGE 2

VOLATILE FRACTION

The initial calibration analysis of acetone, 2-butanone, and 2-hexanone contained Relative Response Factors (RRFs) below the 0.05 quality control limit. The positive results were qualified as estimated, (J), and the nondetected results were qualified as rejected, (UR).

The continuous calibration of acetone, 2-butanone, 2-hexanone, and 4-methyl-2-pentanone contained Relative Response Factors (RRFs) below the 0.05 quality control limit. The positive results were qualified as estimated, (J), and the nondetected results were qualified as rejected, (UR).

The following contaminants were detected in the quality control blanks at the following maximum concentration:

Analyte	Concentration	Aqueous Action Level
Methylene chloride[1]	2.7µg/L	27.0µg/L

[1] Trip Blank

Blank Actions

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < Action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Dilution factors and sample aliquots were taken into consideration during the application of all action levels. Positive results reported for methylene chloride in the affected samples were qualified in the manner indicated by the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination.

Several volatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

SEMI-VOLATILE FRACTION

The following contaminants were detected in the quality control blanks at the following maximum concentration:

Analyte	Concentration	Aqueous Action Level
Bis(2-ethylhexyl)phthalate	1.0µg/L	10.0µg/L

Blank Actions

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < Action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 10, 1998 – PAGE 3

Dilution factors and sample aliquots were taken into consideration during the application of all action levels. Positive results reported for bis(2-ethylhexyl)phthalate in the affected samples were qualified in the manner indicated by the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination. It should be noted that the source water samples were from a potable water source and were not qualified as blank contamination.

Several volatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

PESTICIDE FRACTION

All quality control parameters were met for this fraction.

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 10, 1998 – PAGE 4

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several volatile initial and continuous calibrations RRFs noncompliances were noted. Positive results were qualified as estimated, (J), while nondetected results were rejected, (UR).. In the semivolatile fraction, bis(2-ethylhexyl)phthalate was detected as blank contamination.

Other Issues Affecting Data Quality: Methylene chloride was detected as blank contamination in the field quality control blank. Potable water source contaminants were detected in the field quality control blank.

MEMO TO: **DAVE BRAYACK**
DATE: **DECEMBER 10, 1998 – PAGE 5**

The data for these analysis were reviewed with reference to the "National Functional Guidelines for Organic Data Validation", February, 1994.

"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).

Tetra Tech NUS

Justin Orbich
Chemist/Data Validator

Tetra Tech NUS

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

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 10, 1998 – PAGE 6

MCRD PARRIS ISLAND
SDG TTP10

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PEST/PCB
PAI-10-GW-014-01	$R^{1,2}$		
PAI-10-SW-008-00	$R^{1,2}$		
PAI-10-SW-008-00D	$R^{1,2}$		
PAI-10-SW-009-00	$R^{1,2}$		
PAI-10-SW-010-00	$R^{1,2}$	A^1	
PAI-10-SW-012-00	$R^{1,2}$	A^1	
PAI-10-SW-013-00	J^2 $R^{1,2}$	A^1	
SWMU 10	$J^{1,2}$ $R^{1,2}$	A^1 J^1	
SWMU 01,02,03	J^1 $R^{1,2}$	J^1	
TB-081298	J^1 $R^{1,2}$		
TB-083198	$R^{1,2}$		

If the field is blank, the qualifier is A, accept all data.

R^1 - Reject, (UR), nondetected results or qualify positive results as estimated, (J), in the affected samples for initial and continuing calibration RRFs less than 0.05 for acetone, 2-butanone, and 2-hexanone.

R^2 - Reject, (UR), nondetected results for continuing calibration RRFs less than 0.05 for 4-methyl-2-pentanone.

A^1 - Accept data, but qualify positive result for bis(2-ethylhexyl)phthalate as nondetected, (U), as a result of blank contamination.

J^1 - Accept data, but qualify those compounds with positive results less than the CRQL as estimated (J).

J^2 - Accept data, but qualify positive results as estimated, (J), for initial and continuing calibration RRFs less than 0.05 for acetone.

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 10, 1998 – PAGE 7

Data Qualifier Definitions:

U - Compound is considered nondetected as reported by the laboratory or was occupied as a blank contamination.

UR - Compound was rejected due to various technical noncompliances.

UJ - Nondetected results is qualified as estimated due to various technical noncompliances.

J - Compound is considered to be present, but reported at an estimated value.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-10-8-080

TO:	~~DAVE BRAYACK~~	**DATE:**	**DECEMBER 10, 1998**
FROM:	**JUSTIN ORBICH**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION - VOA/SVOA/PEST/PCB/PAH ORGANICS**
CTO 020 – MCRD PARRIS ISLAND
SDG U06971

SAMPLES 4/Aqueous

PAI-01-RB-01	PAI-01-RB-02	TB-060298
TB-060398		

13/Soil

PAI-01-SS-005-01	PAI-01-SS-006-01	PAI-01-SS-007-01
PAI-01-SS-008-01	PAI-01-SS-009-01	PAI-01-SS-010-01
PAI-01-SS-011-01	PAI-01-SS-012-01	PAI-01-SS-013-01
PAI-01-SS-014-01	PAI-01-SS-014-01-D	PAI-01-SS-A-01
PAI-41-SS-002-01		

OVERVIEW

The sample set for CTO 020, SDG U06971, MCRD Parris Island consists of thirteen (13) soil, and four (4) aqueous environmental samples including two (2) trip blanks (TB) and two (2) rinse blanks (RB). All samples were analyzed for Target Compound List (TCL) volatiles, semivolatiles, pesticides/PCBs, and PAHs. There was one field duplicate pair (PAI-01-SS-014-01/ PAI-01-SS-014-01-D) in this SDG.

The samples were collected by Tetra Tech, NUS on June 2 and 3, 1998, and analyzed by Recra LabNet, Chicago. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The volatiles, semivolatiles, pesticide/PCB, and PAHs were analyzed according to SW-846 Methods 8260B, 8270C, 8081, and 8310. The data in this SDG were validated with regard to the following parameters:

* • Data Completeness
• Holding Times
• Initial/continuing calibrations
• Laboratory method/field quality control blank results
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

VOLATILE FRACTION

Initial and continuing calibrations contained Relative Response Factors (RRFs) below the 0.05 quality control limit for acetone and 2- butanone. The nondetected results for acetone and 2-butanone were rejected, (UR), and the positive results for acetone was qualified as estimated, (J), in the affected samples.

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MEMO TO: DAVE BRAYACK
DATE: DECEMBER 10, 1998 – PAGE 2

The following contaminants were detected in the quality control blanks at the following maximum concentration:

Analyte	Concentration	Aqueous Action Level	Soil Action Level
Methylene chloride[1]	1.0µg/L	NA	10.0µg/kg
Acetone[2]	2.0µg/L	NA	30.0µg/kg
Toluene[2]	0.6µg/L	3.0µg/L	3.0µg/kg

[1]Trip Blank
[2]Rinsate Blank

Blank Actions

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < Action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Sample aliquots, dilution factors, and percent moisture were taken into consideration during the application of all action levels. Qualify positive results for methylene chloride, acetone, and toluene according to the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination.

SEMIVOLATILE FRACTION

A continuing calibration contained Relative Response Factors (RRFs) below the 0.05 quality control limit for 3-nitroaniline. The nondetected results for 3-nitroaniline were rejected (UR), in the affected samples.

Several semivolatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

PESTICIDE/PCB FRACTION

Several pesticide/PCB samples, PAI-01-SS-005-10, PAI-01-SS-006-01, and PAI-01-SS-007-01, exceeded the forty (40) day holding time until analysis. In the affected samples, positive results were qualified as estimated (J).

Several pesticide/PCB samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

POLYNUCLEAR AROMATIC HYDROCARBONS

Several polynuclear aromatic hydrocarbon samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

MEMO TO: **DAVE BRAYACK**
DATE: **DECEMBER 10, 1998 – PAGE 3**

EXECUTIVE SUMMARY

Laboratory Performance Issues: Nondetected results for acetone and 2-butanone were rejected for initial and continuing calibration RRFs below the quality control limit. Nondetected results for 3-nitroaniline were rejected for continuing calibration RRFs below the quality control limit. Holding time exceedances were noted for pesticide/PCBs. Blank contamination was detected in the quality control blanks for methylene chloride, acetone, and toluene.

Other Issues Affecting Data Quality: None

MEMO TO: **DAVE BRAYACK**
DATE: **DECEMBER 10, 1998 – PAGE 4**

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (February, 1994), 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 problems 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)."

Justin Orbich

Chemist/Data Validator
Tetra Tech, NUS

Joseph A. Samchuck

Data Validation Quality Assurance Officer
Tetra Tech, NUS

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 10, 1998 – PAGE 5

MCRD PARRIS ISLAND
SDG U06971
TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PEST/PCB	PAH
PAI-01-RB-01	R^1	J^1		
PAI-01-RB-02	R^1	J^1		
TB-060298	R^1			
TB-060398	R^1			
PAI-01-SS-005-01	J^1 R^2		J^2	J^1
PAI-01-SS-006-01	R^2		J^2	J^1
PAI-01-SS-007-01	R^2	J^1	J^2	J^1
PAI-01-SS-008-01	$A^{1,2}$	J^1 R^3	J^1	J^1
PAI-01-SS-009-01	R^2	J^1		
PAI-01-SS-010-01	A^1	J^1		J^1
PAI-01-SS-011-01	R^2		J^1	J^1
PAI-01-SS-012-01	A^2 R^2	J^1 R^3	J^1	J^1
PAI-01-SS-013-01	$A^{1,2}$			
PAI-01-SS-014-01	A^1			
PAI-01-SS-014-01-D	$A^{1,2}$	J^1		J^1
PAI-01-SS-A-01	A^1			J^1
PAI-41-SS-002-01	R^2			

If the field is blank, the qualifier is A, accept all data.

R^1 - Reject, (UR), nondetected results for acetone and 2-butanone for initial and continuing calibration RRF less than 0.05, and qualify positive results as estimated, (J).

R^2 - Reject, (UR), nondetected results for acetone for continuing calibration RRF less than 0.05, and qualify positive results as estimated, (J).

R^3 - Reject, (UR), nondetected results for 3-nitroaniline for continuing calibration RRFs less than 0.05.

A^1 - Accept data, but qualify positive result for acetone as nondetected, (U), as a result of blank contamination.

A^2 - Accept data, but qualify positive result for toluene as nondetected, (U), as a result of blank contamination.

J^1 - Accept data, but qualify those compounds with positive results less than the CRQL as estimated (J).

J^2 - Accept data, but qualify positive results for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT as estimated, (J), as a result of holding time exceedence.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**MR. DAVID BRAYACK**	**DATE:**	**JUNE 18, 1999**
FROM:	**LINDA KARSONOVICH**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PAH/PEST/PCB**
PARRIS ISLAND
SDG U04097

SAMPLES: 1/Aqueous/

TB041599

9/Solid/Sediment

PAI-01-SD-001	PAI-01-SD-013	PAI-01-SD-013-D
PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016
PAI-01-SD-017	PAI-01-SS-015	PAI-01-SS-016

Rock

OVERVIEW

The sample set for Parris Island, SDG U04097 consists of one (1) aqueous field quality control blank and nine (9) solid environmental samples. Samples TB041599 and PAI-01-SD-001 were analyzed for Target Compound List (TCL) volatile and semivolatile organic compounds. All the solid environmental samples were also analyzed for polynuclear aromatic hydrocarbons (PAH), organochlorine pesticides, and polychlorinated biphenyls (PCBs). One pair of field duplicates was included in the SDG: PAI-01-SD-013 and PAI-01-SD-013-D.

The samples were collected by Tetra Tech NUS on April 21, 1999 and analyzed by RECRA Labnet. All analyses were conducted using SW-846 Methods 8260B, 8270C, 8310, 8081A, and 8082 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
• Initial/continuing calibrations
• Laboratory method and field quality control blank results
• Surrogates
* • Field Duplicate Results
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings are presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Volatile

Initial and/or continuing calibration relative response factors (RRFs) fell below the 0.05 quality control limit for acetone, 2-hexanone, and 2-butanone. Nondetected results were qualified as rejected, UR, in sample TB041599.

Initial and/or continuing calibration RRFs fell below the 0.05 quality control limit for acetone. Nondetected results for were qualified as rejected, UR, in sample PAI-01-SD-001.

Continuing calibration percent differences (%Ds) exceeded the 25% quality control limit for carbon tetrachloride and tetrachloroethene. Nondetected results were qualified as estimated, UJ, in sample TB041599.

Internal standard recovery of 1,4-dichlorobenzene-d4 fell below the lower quality control limit in sample PAI-01-SD-001. The sample was re-analyzed with similar results. Only the original analysis was used as the basis for data validation. No action was taken since this internal standard is not associated with TCL volatiles.

Semivolatile

Several tentatively identified compounds were detected in the method blank. Positive results for these compounds reported in the samples should be considered false positives. All other data quality parameters were met for this fraction.

Polynuclear Aromatic Hydrocarbons

Samples PAI-01-SD-001, PAI-01-SD-017 and PAI-01-SS-016 were analyzed and reported at a 20X, 50X, and 5X dilution factor, respectively, due to the presence of target compounds above the instrument's linear calibration range. This accounts for the elevated reporting limits for these samples.

Sample PAI-01-SS-015 was analyzed and reported at a 2X dilution factor. Phenanthrene and acenaphthene exceeded the instrument's linear calibration range; therefore, the sample was re-analyzed at a 25X dilution factor. Acenapthene again exceeded the instrument's linear calibration range; therefore, the sample was analyzed a third time at a 100X dilution factor.

Surrogates were not recovered in samples which required dilution of the sample extract. Therefore, extraction efficiency was not evaluated for those samples and no qualifiers were applied on this basis.

Both surrogates fell below the lower quality control limit in sample PAI-01-SD-013-D. Nondetected results were qualified as estimated, UJ.

Pesticides

Samples PAI-01-SD-001, -013, and -013-D were analyzed at a 2.5X dilution factor due to matrix interferences. This accounts for the elevated reporting limits.

Degradation of 4,4'-DDT exceeded the 20% quality control limit. Degradation also exceeded the 30% quality control limit for combined Endrin and 4,4'-DDT degradation; however, since the reason for the exceedance of the combined degradation quality control limit was due 4,4'-DDT degradation, no qualifiers were assigned to Endrin or its breakdown products. The nondetected result for 4,4'-DDT in sample PAI-01-SD-001 was rejected, UR, due to the presence of 4,4'-DDE which was qualified as estimated, J. Positive results for 4,4'-DDE and 4,4'-DDT in samples PAI-01-SS-015 and PAI-01-SS-016 were qualified as estimated, J.

Relative percent differences (RPDs) between columns exceeded the 100% quality control limit for Heptachlor epoxide in sample PAI-01-SD-017 and b-BHC in sample PAI-01-SS-015. The positive results were rejected, R.

PCBs

All quality control parameters were met for this fraction.

Additional Comments

Positive results below the CRQL were qualified as estimated, J, due to uncertainty near the detection limit.

Samples PAI-01-SD-001, PAI-01-SD-013, and PAI-01-SD-013-D contained less than 30% solids. This accounts for the elevated reporting limits for these samples.

Following is a comparison of the PAH results for sample PAI-01-SD-001 obtained during the 8270C and 8310 analyses (all units are in µg/Kg):

Compound	Method 8270C	Method 8310
benzo(a)anthracene	130 J	1200
benzo(a)pyrene	120 J	980
benzo(b)fluoranthene	170 J	940
chrysene	130 J	1100
fluoranthene	230 J	3200
phenanthrene	210 J	2600
pyrene	280 J	3200
anthracene	1200 U	770
benzo(g,h,i)perylene	1200 U	550
benzo(k)fluoranthene	1200 U	410
indeno(1,2,3-c,d)pyrene	1200 U	620

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-hexanone, and 2-butanone failed to meet the 0.05 RRF quality control limit. Degradation of 4,4'-DDT exceeded the quality control limit in the pesticide fraction. Several pesticide compounds failed to meet the RPD quality control limit between columns.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94). The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS

Linda Karsonovich
Chemist/Data Validator

Tetra Tech NUS

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

FIELD DUPLICATES

Parameter	Compound(µg/Kg)	PAI-01-SD-013	PAI-01-SD-013-D	%D
PAH		ND	ND	
Pesticide		ND	ND	

ND – Not Detected.

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-06-9-054

TO: **D. BRAYACK** **DATE:** **JUNE 18, 1999**

FROM: **TERRI L. SOLOMON** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS, TOTAL ORGANIC CARBON, CYANIDE, pH**
CTO 020 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – U04097

SAMPLES: 7/Sediment/

PAI-01-SD-001	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014
PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	

Overview

The sample set for MCRD Parris Island, SDG U04097, consists of seven (7) sediment environmental samples. One (1) field duplicate pair (PAI-01-SD-013 / PAI-01-SD-013-D) was included within this SDG.

All samples were analyzed for Target Analyte List (TAL) metals. Sample PAI-01-SD-001 was also analyzed for cyanide, pH and total organic carbon. The samples were collected by Tetra Tech NUS on April 21, 1999 and analyzed by Severn Trent Laboratories - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals (with the exception of mercury), cyanide and pH were analyzed using SW-846 methodologies. Total organic carbon analyses were conducted using the Lloyd Kahn method. Mercury analyses we digested as per CLP ILMO4.0. A CLP-like deliverable was provided.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
• Laboratory Blank Analyses
* • Field Duplicate Results
* • Detection Limits

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

D-190

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (soil)
aluminum	42.1 ug/L	21.05 mg/kg
barium	3.1 ug/L	1.55 mg/kg
beryllium	0.6 ug/L	0.3 mg/kg
cadmium	0.6 ug/L	0.3 mg/kg
calcium	55.1 ug/L	27.55 mg/kg
cobalt	0.9 ug/L	0.45 mg/kg
copper	4.6 ug/L	2.3 mg/kg
iron(1)	20.579 mg/kg	102.895 mg/kg
magnesium	41.1 ug/L	20.55 mg/kg
manganese	1.3 ug/L	0.65 mg/kg
potassium	49.6 ug/L	24.8 mg/kg
selenium(1)	0.341 mg/kg	1.705 mg/kg
silver	0.4 ug/L	0.2 mg/kg
sodium	496.3 ug/L	248.15 mg/kg
vanadium	1.9 ug/L	0.95 mg/kg
zinc	7.8 ug/L	3.9 mg/kg

Samples affected: All

(1) Maximum concentration present in a solid preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action level for beryllium, copper, selenium and silver have been qualified as nondetected "U". No actions were required for the remaining analytes as all results were either greater than the action levels or were nondetects.

Notes

It should be noted that the percent solids for samples PAI-01-SD-001, PAI-01-SD-013 and PAI-01-SD-013-D were < 30%. The sample results may be biased high.

Several negative blank results for sodium were > 2X CRDL. However, no samples included within this SDG were bracketed by these blanks. Therefore, no validation actions were warranted.

A comparison of field duplicate pair, PAI-01-SD-013 / PAI-01-SD-013-D, is contained in Appendix C.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory / preparation blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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

Tetra Tech NUS
Terri L. Solomon
Chemist

Tetra Tech NUS
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.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-06-9-054

TO: **D. BRAYACK** **DATE:** **JUNE 18, 1999**

FROM: **TERRI L. SOLOMON** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS, TOTAL ORGANIC CARBON, CYANIDE, pH**
CTO 020 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – U04097

SAMPLES: 7/Sediment/

PAI-01-SD-001	PAI-01-SD-013	PAI-01-SD-013-D	PAI-01-SD-014
PAI-01-SD-015	PAI-01-SD-016	PAI-01-SD-017	

Overview

The sample set for MCRD Parris Island, SDG U04097, consists of seven (7) sediment environmental samples. One (1) field duplicate pair (PAI-01-SD-013 / PAI-01-SD-013-D) was included within this SDG.

All samples were analyzed for Target Analyte List (TAL) metals. Sample PAI-01-SD-001 was also analyzed for cyanide, pH and total organic carbon. The samples were collected by Tetra Tech NUS on April 21, 1999 and analyzed by Severn Trent Laboratories - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals (with the exception of mercury), cyanide and pH were analyzed using SW-846 methodologies. Total organic carbon analyses were conducted using the Lloyd Kahn method. Mercury analyses were digested as per CLP ILMO4.0. A CLP-like deliverable was provided.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
• Laboratory Blank Analyses
* • Field Duplicate Results
* • Detection Limits

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (soil)
aluminum	42.1 ug/L	21.05 mg/kg
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cadmium	0.6 ug/L	0.3 mg/kg
calcium	55.1 ug/L	27.55 mg/kg
cobalt	0.9 ug/L	0.45 mg/kg
copper	4.6 ug/L	2.3 mg/kg
iron(1)	20.579 mg/kg	102.895 mg/kg
magnesium	41.1 ug/L	20.55 mg/kg
manganese	1.3 ug/L	0.65 mg/kg
potassium	49.6 ug/L	24.8 mg/kg
selenium(1)	0.341 mg/kg	1.705 mg/kg
silver	0.4 ug/L	0.2 mg/kg
sodium	496.3 ug/L	248.15 mg/kg
vanadium	1.9 ug/L	0.95 mg/kg
zinc	7.8 ug/L	3.9 mg/kg

Samples affected: All

(1) Maximum concentration present in a solid preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action level for beryllium, copper, selenium and silver have been qualified as nondetected "U". No actions were required for the remaining analytes as all results were either greater than the action levels or were nondetects.

Notes

It should be noted that the percent solids for samples PAI-01-SD-001, PAI-01-SD-013 and PAI-01-SD-013-D were < 30%. The sample results may be biased high.

Several negative blank results for sodium were > 2X CRDL. However, no samples included within this SDG were bracketed by these blanks. Therefore, no validation actions were warranted.

A comparison of field duplicate pair, PAI-01-SD-013 / PAI-01-SD-013-D, is contained in Appendix C.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory / preparation blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 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

Tetra Tech NUS
Terri L. Solomon
Chemist

Tetra Tech NUS
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.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**MR. DAVID BRAYACK**	**DATE:**	**JUNE 18, 1999**
FROM:	**LINDA KARSONOVICH**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION- VOA/SVOA/PAH/PEST/PCB**
PARRIS ISLAND
SDG U04097

SAMPLES: 1/Aqueous/

TB041599

9/Solid/Sediment

PAI-01-SD-001	PAI-01-SD-013	PAI-01-SD-013-D
PAI-01-SD-014	PAI-01-SD-015	PAI-01-SD-016
PAI-01-SD-017	PAI-01-SS-015	PAI-01-SS-016

Rebb

OVERVIEW

The sample set for Parris Island, SDG U04097 consists of one (1) aqueous field quality control blank and nine (9) solid environmental samples. Samples TB041599 and PAI-01-SD-001 were analyzed for Target Compound List (TCL) volatile and semivolatile organic compounds. All the solid environmental samples were also analyzed for polynuclear aromatic hydrocarbons (PAH), organochlorine pesticides, and polychlorinated biphenyls (PCBs). One pair of field duplicates was included in the SDG: PAI-01-SD-013 and PAI-01-SD-013-D.

The samples were collected by Tetra Tech NUS on April 21, 1999 and analyzed by RECRA Labnet. All analyses were conducted using SW-846 Methods 8260B, 8270C, 8310, 8081A, and 8082 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

- * Data completeness
- * Holding times
- Initial/continuing calibrations
- Laboratory method and field quality control blank results
- Surrogates
- * Field Duplicate Results
- * Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings are presented in Appendix C. Qualified Analytical results are presented in Appendix A.

Volatile

Initial and/or continuing calibration relative response factors (RRFs) fell below the 0.05 quality control limit for acetone, 2-hexanone, and 2-butanone. Nondetected results were qualified as rejected, UR, in sample TB041599.

Initial and/or continuing calibration RRFs fell below the 0.05 quality control limit for acetone. Nondetected results for were qualified as rejected, UR, in sample PAI-01-SD-001.

Continuing calibration percent differences (%Ds) exceeded the 25% quality control limit for carbon tetrachloride and tetrachloroethene. Nondetected results were qualified as estimated, UJ, in sample TB041599.

Internal standard recovery of 1,4-dichlorobenzene-d4 fell below the lower quality control limit in sample PAI-01-SD-001. The sample was re-analyzed with similar results. Only the original analysis was used as the basis for data validation. No action was taken since this internal standard is not associated with TCL volatiles.

Semivolatile

Several tentatively identified compounds were detected in the method blank. Positive results for these compounds reported in the samples should be considered false positives. All other data quality parameters were met for this fraction.

Polynuclear Aromatic Hydrocarbons

Samples PAI-01-SD-001, PAI-01-SD-017 and PAI-01-SS-016 were analyzed and reported at a 20X, 50X, and 5X dilution factor, respectively, due to the presence of target compounds above the instrument's linear calibration range. This accounts for the elevated reporting limits for these samples.

Sample PAI-01-SS-015 was analyzed and reported at a 2X dilution factor. Phenanthrene and acenaphthene exceeded the instrument's linear calibration range; therefore, the sample was re-analyzed at a 25X dilution factor. Acenapthene again exceeded the instrument's linear calibration range; therefore, the sample was analyzed a third time at a 100X dilution factor.

Surrogates were not recovered in samples which required dilution of the sample extract. Therefore, extraction efficiency was not evaluated for those samples and no qualifiers were applied on this basis.

Both surrogates fell below the lower quality control limit in sample PAI-01-SD-013-D. Nondetected results were qualified as estimated, UJ.

Pesticides

Samples PAI-01-SD-001, -013, and -013-D were analyzed at a 2.5X dilution factor due to matrix interferences. This accounts for the elevated reporting limits.

Degradation of 4,4'-DDT exceeded the 20% quality control limit. Degradation also exceeded the 30% quality control limit for combined Endrin and 4,4'-DDT degradation; however, since the reason for the exceedance of the combined degradation quality control limit was due 4,4'-DDT degradation, no qualifiers were assigned to Endrin or its breakdown products. The nondetected result for 4,4'-DDT in sample PAI-01-SD-001 was rejected, UR, due to the presence of 4,4'-DDE which was qualified as estimated, J. Positive results for 4,4'-DDE and 4,4'-DDT in samples PAI-01-SS-015 and PAI-01-SS-016 were qualified as estimated, J.

Relative percent differences (RPDs) between columns exceeded the 100% quality control limit for Heptachlor epoxide in sample PAI-01-SD-017 and b-BHC in sample PAI-01-SS-015. The positive results were rejected, R.

PCBs

All quality control parameters were met for this fraction.

Additional Comments

Positive results below the CRQL were qualified as estimated, J, due to uncertainty near the detection limit.

Samples PAI-01-SD-001, PAI-01-SD-013, and PAI-01-SD-013-D contained less than 30% solids. This accounts for the elevated reporting limits for these samples.

Following is a comparison of the PAH results for sample PAI-01-SD-001 obtained during the 8270C and 8310 analyses (all units are in µg/Kg):

Compound	Method 8270C	Method 8310
benzo(a)anthracene	130 J	1200
benzo(a)pyrene	120 J	980
benzo(b)fluoranthene	170 J	940
chrysene	130 J	1100
fluoranthene	230 J	3200
phenanthrene	210 J	2600
pyrene	280 J	3200
anthracene	1200 U	770
benzo(g,h,i)perylene	1200 U	550
benzo(k)fluoranthene	1200 U	410
indeno(1,2,3-c,d)pyrene	1200 U	620

EXECUTIVE SUMMARY

Laboratory Performance Issues: Acetone, 2-hexanone, and 2-butanone failed to meet the 0.05 RRF quality control limit. Degradation of 4,4'-DDT exceeded the quality control limit in the pesticide fraction. Several pesticide compounds failed to meet the RPD quality control limit between columns.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (2/94). The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS

Linda Karsonovich
Chemist/Data Validator

Tetra Tech NUS

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

FIELD DUPLICATES

Parameter	Compound(µg/Kg)	PAI-01-SD-013	PAI-01-SD-013-D	%D
PAH		ND	ND	
Pesticide		ND	ND	

ND – Not Detected.

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCD% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop

APPENDIX E

SUPPORTING INFORMATION FOR HUMAN HEALTH RISK ASSESSMENT

E.1 Sample Calculations
E.2 RAGS Part D Tables
E.3 Lead Modeling Results
E.4 Supporting Information
E.5 Toxicological Profiles for Chemicals of Concern

APPENDIX E.1

SAMPLE CALCULATIONS

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF SOIL CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jacobson		DATE: September 21, 1999

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from ingestion of surface soil by a construction worker.

EQUATION:

IEX(mg/kg-day) = (Cs x IR x EF x ED x Fi x CF)/(BW x AT)

Where:

IEX	=	estimated exposure intake (mg/kg-day)
Cs	=	exposure point concentration in soil/sediment (mg/kg)
IR	=	soil ingestion rate (mg/day
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
Fi	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor $(mg/kg\text{-}day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg-day)

RISKS:

ILCR (Carcinogens) = Intake (mg-kg/day) x CSFo $(mg/kg\text{-}day)^{-1}$
HQ (Noncarcinogens) = Intake (mg-kg/day) / RFDo (mg/kg-day)

ASSUMPTIONS:

Cs	=	11.5 mg/kg (Arsenic in surface soil)
IR	=	480 mg/day
EF	=	125 days/year
ED	=	1 year
Fi	=	1.0
CF	=	1.0E-6 kg/mg
BW	=	70 kg
ATc	=	25,550 days (70 x 365 days) - carcinogenic
ATnc	=	365 days (ED x 365 days) - noncarcinogenic
CSFo	=	1.5 $(mg/kg\text{-}day)^{-1}$
RfDo	=	3.0E-4 mg/kg-day

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF SOIL Construction Worker			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jacobson		DATE: September 21, 1999

EXAMPLE CARCINOGENIC CALCULATION:

$$IEXc = \frac{11.5\ mg/kg \times 480\ (mg/day) \times 125\ days/year \times 1\ year \times 1.0 \times 1.0E\text{-}06\ kg/mg}{70\ kg \times 25{,}550\ days}$$

IEXc = 3.9E-07 mg/kg-day

ILCR = 3.9E-07 mg/kg-day x 1.5E+00 $(mg/kg\text{-}day)^{-1}$ = Incremental Lifetime Cancer Risk

ILCR = 5.8E-07

EXAMPLE NONCARCINOGENIC CALCULATION:

$$IEXnc = \frac{11.5\ mg/kg \times 480\ (mg/day) \times 125\ days/year \times 1\ years \times 1.0 \times 1.0E\text{-}06\ kg/mg}{70\ kg \times 365\ days}$$

IEXnc = 2.7E-05 mg/kg-day

HQ = 2.7E-05 mg/kg-day / 3.0E-04 (mg/kg-day) = Hazard Quotient

HQ = 9.0E-02

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jackson		DATE: September 21, 1999

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with surface soil by a construction worker.

EQUATION:

DEX (mg/kg-day) = (Cs x CF x SA x AF x ABS x EF x ED/(BW x AT)

Where:

DEX	=	dermally absorbed dose(mg/kg-day)
Cs	=	exposure point concentration in soil (mg/kg)
CF	=	conversion factor (1E-6 kg/mg)
SA	=	skin surface area available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
ED	=	adult exposure duration (years)
BW	=	body weight (kg)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
AT	=	averaging time (days)

RISKS:

Carcinogens = Intake (mg-kg/day) x CSFd $(mg/kg\text{-}day)^{-1}$
Noncarcinogens = Intake (mg-kg/day) / RFDd (mg/kg-day)

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: J. Jackson		DATE: September 21, 1999

ASSUMPTIONS (for construction construction worker):

Cs	=	11.5 mg/kg (arsenic – surface soil)
CF	=	1.0E-6 kg/mg
SA	=	4,100 cm^2/day
AF	=	0.5 mg/cm^2
ABS	=	0.03
EF	=	125 days/year
ED	=	1 year
BW	=	70 kg
ATc	=	25,550 days (70 x 365 days) - carcinogenic
ATnc	=	365 days (ED x 365 days) - noncarcinogenic
CSFd	=	3.7E+00 $(mg/kg\text{-}day)^{-1}$
RfDd	=	1.2E-04 mg/kg-day

EXAMPLE CARCINOGENIC CALCULATION:

$$DEXc = \frac{11.5\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 4{,}100\ cm^2/day \times 0.5\ mg/cm^2 \times 0.03 \times 125\ days/year \times 1\ year}{70\ kg \times 25{,}550\ days}$$

DEXc = 5.0E-8 mg/kg-day

ILCR = 5.0E-8 mg/kg-day x 3.7E+00 $(mg/kg\text{-}day)^{-1}$ = Incremental Lifetime Cancer Risk

ILCR = 1.8E-7

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY:		DATE: September 21, 1999

EXAMPLE NONCARCINOGENIC CALCULATION:

$$DEXnc = \frac{11.5\ mg/kg \times 1.0E\text{-}06\ kg/mg \times 4{,}100\ cm^2/\ day \times 0.5\ mg/cm^2 \times 0.03 \times 125\ days/year \times 1\ year}{70kg \times 365\ days}$$

DEXnc = 3.5E-6 mg/kg-day

Risknc = 3.5E-6 mg/kg-day / 1.2E-04 (mg/kg-day) = Hazard Quotient

HQ = 2.9E-2

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jackson		DATE: September 21, 1999

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with groundwater by a construction worker.

EQUATION:

DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed dose per event (mg/cm^2/event)
A	=	skin surface area available for contact (cm^2)
EV	=	event frequency (events/day)
ED	=	exposure duration (years)
EF	=	exposure frequency (days/year)
BW	=	body weight (kg)
ATc	=	averaging time for carcinogens (days)
ATnc	=	averaging time for noncarcinogens (days)

EQUATION:

For Inorganics:

$$DA_{event} = (K_p)(C_{sw})(t_{event})$$

For Organics:

$$\text{If } t_{event} < t^*, \text{ then: } DA_{event} = (2K_p)(C_{sw})(CF)\left(\sqrt{\frac{6\tau t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then: } DA_{event} = (K_p)(C_{sw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

Where:

Kp	=	permeability coefficient from water (cm/hr)
Cw	=	concentration of chemical in water (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
t*	=	time it takes to reach steady-state (hour/event)
T	=	lag time (hour/event)
B	=	Bunge Model Constant (dimensionless)

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jackson		DATE: September 21, 1999

EXAMPLE CALCULATION OF DAevent for Chloroform

ASSUMPTIONS:

Kp = 0.0069 cm/hr
Cw = 0.0009 mg/L
tevent = 8 hr/event
CF = 0.001 L/cm^3
τ = 0.49 hour/event
t* = 1.18 hour/event
B = 0.029

$$\text{If } t_{event} < t^*, \text{ then: } DA_{event} = (2K_p)(C_{sw})(CF)\left(\sqrt{\frac{6\tau t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then: } DA_{event} = (K_p)(C_{sw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

tevent > t*, therefore,

DAevent = (0.0069 cm/hr)(0.0009 mg/L)(0.001 L/cm^3) x
8 hours/(1 + 0.029) + 2(0.49)(1 + 3 x 0.029 + 3 x (0.029)^2)/(1 + 0.029)^2

DAevent = 5.45E-8 mg/cm^2-event

RISK CALCULATIONS

ASSUMPTIONS:

A = 2,490 cm^2/day
EV = 1 event/day
ED = 1 years
EF = 21 days/year
BW = 70 kg
ATc = 25,550 days
ATnc = 365 days
CSFd = 3.1E-02 (mg/kg-day)$^{-1}$ (dermal cancer slope factor)
RfDd = 2.0E-03 mg/kg-day (dermal reference dose)

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY:		DATE: September 21, 1999

EXAMPLE CALCULATION OF CARCINOGENIC RISKS for Chloroform

DADc = (DAevent x Ax EV x ED x EF)/(BW x ATc) = carcinogenic dermally absorbed dose
Carcinogenic Risk (ILCR) = DADc (mg-kg/day) x CSFd $(mg/kg\text{-}day)^{-1}$

$$DADc = \frac{5.45E\text{-}08\ mg/cm^2\text{-event} \times 2{,}490\ cm^2 \times 1\ event/day \times 21\ days/year \times 1\ years}{70\ kg \times 25{,}550\ days}$$

DADc = 1.59E-9 mg/kg-day

Cancer Risk (ILCR) = 1.59E-9 mg/kg-day x 3.1E-02 $(mg/kg\text{-}day)^{-1}$

ILCR = 4.9E-11

EXAMPLE CALCULATION NONCARCINOGENIC HAZARD QUOTIENT for Chloroform

DADnc = (DAevent x Ax EV x ED x EF)/(BW x ATnc) = noncarcinogenic dermally absorbed dose
Hazard Quotient (HQ) = DADnc (mg-kg/day) / RfDd (mg/kg-day)

$$DADnc = \frac{5.45E\text{-}08\ mg/cm^2\text{-event} \times 2{,}490\ cm^2 \times 1\ event/day \times 21\ days/year \times 1 years}{70\ kg \times 365\ days}$$

DADnc = 1.12E-07 mg/kg-day

Hazard Quotient (HQ) = 1.12E-07 mg/kg-day / 2.0E-03 mg/kg-day

HQ = 5.6E-05

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER CHILD RESIDENT			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jackson		DATE: September 21, 1999

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface water by a child resident.

EQUATION:

IEX(mg/kg-day) = (Csw x CF x CRsw x ET x EF x ED)/(BW x AT)

Where:

IEX	=	estimated exposure intake (mg/kg-day)
Csw	=	exposure point concentration in surface water (ug/L)
CF	=	conversion factor (mg/ug)
CRsw	=	contact rate (L/hour)
ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor $(mg/kg\text{-}day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg-day)

RISKS:

Carcinogens = Intake (mg-kg/day) x CSFo $(mg/kg\text{-}day)^{-1}$
Noncarcinogens = Intake (mg-kg/day) / RFDo (mg/kg-day)

ASSUMPTIONS:

Cw	=	110 ug/L (pentachlorophenol)
CRsw	=	0.01 L/day
CF	=	0.001 mg/ug
ET	=	2.6
EF	=	45 days/year
ED	=	6 years
BW	=	15 kg
ATc	=	25,550 days (70 x 365 days) - carcinogenic
ATnc	=	2,190 days (ED x 365 days) - noncarcinogenic
CSFo	=	1.2E-01 $(mg/kg\text{-}day)^{-1}$
RfDo	=	3.0E-02 mg/kg-day

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER CHILD RESIDENT			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jackson		DATE: September 21, 1999

EXAMPLE CARCINOGENIC CALCULATION:

$$IEXc = \frac{110\ ug/L \times 0.001\ mg/ug \times 0.01\ L/hour \times 2.6\ hours/day\ 45\ days/year \times 6\ year}{15\ kg \times 25{,}550\ days}$$

IEXc = 2.01E-6 mg/kg-day

ILCR = 2.01E-6 mg/kg-day x 1.2E-01 $(mg/kg\text{-}day)^{-1}$ = Incremental Lifetime Cancer Risk

ILCR = 2.42E-7

EXAMPLE NONCARCINOGENIC CALCULATION:

$$IEXnc = \frac{110\ ug/L \times 0.001\ mg/ug \times 0.01\ L/hour \times 2.6\ hours/day\ 45\ days/year \times 6\ year}{15\ kg \times 2{,}190\ days}$$

IEXnc = 2.35E-5 mg/kg-day

HQ = 2.35 E-5 mg/kg-day / 3.0E-02 (mg/kg-day) = Hazard Quotient

HQ = 7.83-04

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CHILD RESIDENT			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jupin		DATE: September 21, 1999

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with groundwater by a child resident.

EQUATION:

DAD = (DAevent x EV x ED x EF x A)/(BW x AT)

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed dose per event (mg/cm^2/event)
A	=	skin surface area available for contact (cm^2)
EV	=	event frequency (events/day)
ED	=	exposure duration (years)
EF	=	exposure frequency (days/year)
BW	=	body weight (kg)
ATc	=	averaging time for carcinogens (days)
ATnc	=	averaging time for noncarcinogens (days)

EQUATION:

For Inorganics:

$$DA_{event} = (K_p)(C_{sw})(t_{event})$$

For Organics:

$$\text{If } t_{event} < t^*, \text{ then: } DA_{event} = (2K_p)(C_{sw})(CF)\left(\sqrt{\frac{6\tau t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then: } DA_{event} = (K_p)(C_{sw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

Where:

Kp	=	permeability coefficient from water (cm/hr)
Cw	=	concentration of chemical in water (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
t*	=	time it takes to reach steady-state (hour/event)
T	=	lag time (hour/event)
B	=	Bunge Model Constant (dimensionless)

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CHILD RESIDENT			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T Jackson		DATE: September 21, 1999

EXAMPLE CALCULATION OF DAevent

ASSUMPTIONS:

Kp	=	0.46 cm/hr
Cw	=	0.11 mg/L
tevent	=	2.6 hr/event
CF	=	0.001 L/cm^3
τ	=	3.26 hour/event
t*	=	13.7 hour/event
B	=	2.89

$$\text{If } t_{event} < t^*, \text{ then: } DA_{event} = (2K_p)(C_{sw})(CF)\left(\sqrt{\frac{6\,\tau\, t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then: } DA_{event} = (K_p)(C_{sw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

tevent < t*, therefore,

DAevent = (2 x 0.46 cm/hr)(0.11 mg/L)(0.001 L/cm^3) x SQRT[(6 x 3.26 hr x 2.6 hr)/(3.1416)]

DAevent = 4.07E-4 mg/cm^2-event

RISK CALCULATIONS

ASSUMPTIONS:

A	=	2,000 cm^2/day
EV	=	1 event/day
ED	=	6 years
EF	=	15 days/year
BW	=	15 kg
ATc	=	25,550 days
ATnc	=	2,190 days
CSFd	=	1.2E-01 (mg/kg-day)$^{-1}$ (dermal cancer slope factor)
RfDd	=	3.0E-02 mg/kg-day (dermal reference dose)

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CHILD RESIDENT			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jacobson		DATE: September 21, 1999

EXAMPLE CALCULATION OF CARCINOGENIC RISKS

DADc = (DAevent x Ax EV x ED x EF)/(BW x ATc) = carcinogenic dermally absorbed dose
Carcinogenic Risk (ILCR) = DADc (mg-kg/day) x CSFd $(mg/kg\text{-}day)^{-1}$

$$DADc = \frac{4.07E\text{-}04\ mg/cm^2\text{-event} \times 2{,}000\ cm^2 \times 1\ event/day \times 45\ days/year \times 6\ years}{15\ kg \times 25{,}550\ days}$$

DADc = 5.73E-4 mg/kg-day

Cancer Risk (ILCR) = 5.73E-4 mg/kg-day x 1.2E-01 $(mg/kg\text{-}day)^{-1}$

ILCR = 6.88E-5

EXAMPLE CALCULATION NONCARCINOGENIC HAZARD QUOTIENT

DADnc = (DAevent x Ax EV x ED x EF)/(BW x ATnc) = noncarcinogenic dermally absorbed dose
Hazard Quotient (HQ) = DADnc (mg-kg/day) / RfDd (mg/kg-day)

$$DADnc = \frac{4.07E\text{-}04\ mg/cm^2\text{-event} \times 2{,}000\ cm^2 \times 1\ event/day \times 45\ days/year \times 6\ years}{15\ kg \times 2190\ days}$$

DADnc = 6.69E-03 mg/kg-day

Hazard Quotient (HQ) = 6.69E-03 mg/kg-day / 3.0E-02 mg/kg-day

HQ = 2.2E-01

CALCULATION WORKSHEET

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7934
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF FISH		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MAY 25, 2001

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from ingestion of fish using EPA default exposure assumptions and maximum detected concentrations.

EQUATION:

$$IEX = \frac{Cf \times IR \times EF \times ED \times FI}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cf	=	exposure point concentration in fish (mg/kg)
IR	=	ingestion rate (kg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFo $(mg/kg/day)^{-1}$
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	0.612	mg/kg	Arsenic
IR	=	0.054	kg/day	
EF	=	350	days/year	
ED	=	30	years	
FI	=	1		
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	10950	days	
CSFo	=	1.5	$(mg/kg/day)^{-1}$	
RfDo	=	3.0E-04	(mg/kg/day)	

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7934
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF FISH		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	CHECKED BY: T. Jackson	DATE: MAY 25, 2001

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{0.612 \text{ mg/kg} \times 0.054 \text{ kg/day} \times 350 \text{ days/year} \times 30 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 1.94E-04 mg/kg/day

ICLR = 1.94E-04 mg/kg/day x 1.5 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 2.9E-04

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{0.612 \text{ mg/kg} \times 0.054 \text{ kg/day} \times 350 \text{ days/year} \times 30 \text{ years}}{70 \text{ kg} \times 10950 \text{ days}}$$

IEXnc = 4.53E-04 mg/kg/day

HQ = 4.53E-04 mg/kg/day / 0.0003 (mg/kg/day) = Hazard Quotient

HQ = 1.5

CALCULATION OF BENZO(A)PYRENE EQUIVALENT CONCENTRATIONS
SURFACE SOIL -SITE 1/SWMU 41
MCRD PARRIS, SOUTH CAROLINA

Sample	Parameter	Result	BaP TEF	BaP Equivalent Concentration
PAI-01-SS-08-01	BENZO(A)ANTHRACENE	62	0.1	6.2
	CHRYSENE	74	0.001	0.074
	BENZO(B)FLUORANTHENE	110	0.1	11
	BENZO(K)FLUORANTHENE	39	0.01	0.39
	BENZO(A)PYRENE	110	1	110
	DIBENZO(A,H)ANTHRACENE	190 U	1	0
	INDENO(1,2,3-CD)PYRENE	130	0.1	13
	BAP EQUIVALENT			**140.664**
PAI-01-SS-09-01	BENZO(A)ANTHRACENE	200	0.1	20
	CHRYSENE	210	0.001	0.21
	BENZO(B)FLUORANTHENE	220	0.1	22
	BENZO(K)FLUORANTHENE	92	0.01	0.92
	BENZO(A)PYRENE	220	1	220
	DIBENZO(A,H)ANTHRACENE	180 U	1	0
	INDENO(1,2,3-CD)PYRENE	160	0.1	16
	BAP EQUIVALENT			**279.13**
PAI-01-SS-10-01	BENZO(A)ANTHRACENE	29	0.1	2.9
	CHRYSENE	32	0.001	0.032
	BENZO(B)FLUORANTHENE	34	0.1	3.4
	BENZO(K)FLUORANTHENE	16	0.01	0.16
	BENZO(A)PYRENE	33	1	33
	DIBENZO(A,H)ANTHRACENE	85 U	1	0
	INDENO(1,2,3-CD)PYRENE	19 J	0.1	1.9
	BAP EQUIVALENT			**41.392**
PAI-01-SS-07-01	BENZO(A)ANTHRACENE	280	0.1	28
	CHRYSENE	330	0.001	0.33
	BENZO(B)FLUORANTHENE	510	0.1	51
	BENZO(K)FLUORANTHENE	160	0.01	1.6
	BENZO(A)PYRENE	310	1	310
	DIBENZO(A,H)ANTHRACENE	880 U	1	0
	INDENO(1,2,3-CD)PYRENE	230	0.1	23
	BAP EQUIVALENT			**413.93**
PAI-01-SS-12-01	BENZO(A)ANTHRACENE	18 J	0.1	1.8
	CHRYSENE	19 J	0.001	0.019
	BENZO(B)FLUORANTHENE	20	0.1	2
	BENZO(K)FLUORANTHENE	11	0.01	0.11
	BENZO(A)PYRENE	20 J	1	20
	DIBENZO(A,H)ANTHRACENE	100 U	1	0
	INDENO(1,2,3-CD)PYRENE	25 U	0.1	0
	BAP EQUIVALENT			**23.929**
PAI-01-SS-13-01	BENZO(A)ANTHRACENE	120	0.1	12
	CHRYSENE	120	0.001	0.12
	BENZO(B)FLUORANTHENE	130	0.1	13
	BENZO(K)FLUORANTHENE	49	0.01	0.49
	BENZO(A)PYRENE	130	1	130
	DIBENZO(A,H)ANTHRACENE	100 U	1	0
	INDENO(1,2,3-CD)PYRENE	84	0.1	8.4
	BAP EQUIVALENT			**164.01**

5/18/01

E-13c

CALCULATION OF BENZO(A)PYRENE EQUIVALENT CONCENTRATIONS
SURFACE SOIL -SITE 1/SWMU 41
MCRD PARRIS, SOUTH CAROLINA

Sample	Parameter	Result	BaP TEF	BaP Equivalent Concentration
PAI-01-SS-11-01	BENZO(A)ANTHRACENE	76	0.1	7.6
	CHRYSENE	80	0.001	0.08
	BENZO(B)FLUORANTHENE	81	0.1	8.1
	BENZO(K)FLUORANTHENE	27	0.01	0.27
	BENZO(A)PYRENE	90	1	90
	DIBENZO(A,H)ANTHRACENE	200 U	1	0
	INDENO(1,2,3-CD)PYRENE	41 J	0.1	4.1
	BAP EQUIVALENT			**110.15**
PAI-01-SS-05-01	BENZO(A)ANTHRACENE	29 J	0.1	2.9
	CHRYSENE	56	0.001	0.056
	BENZO(B)FLUORANTHENE	53	0.1	5.3
	BENZO(K)FLUORANTHENE	15 J	0.01	0.15
	BENZO(A)PYRENE	40 J	1	40
	DIBENZO(A,H)ANTHRACENE	190 U	1	0
	INDENO(1,2,3-CD)PYRENE	47 U	0.1	0
	BAP EQUIVALENT			**48.406**
PAI-01-SS-06-01	BENZO(A)ANTHRACENE	160	0.1	16
	CHRYSENE	230	0.001	0.23
	BENZO(B)FLUORANTHENE	300	0.1	30
	BENZO(K)FLUORANTHENE	96	0.01	0.96
	BENZO(A)PYRENE	220	1	220
	DIBENZO(A,H)ANTHRACENE	260 U	1	0
	INDENO(1,2,3-CD)PYRENE	180	0.1	18
	BAP EQUIVALENT			**285.19**
PAI-01-SS-14-01-AVG	BENZO(A)ANTHRACENE	103.5	0.1	10.35
	BENZO(A)PYRENE	106.5	0.001	106.5
	BENZO(B)FLUORANTHENE	97	0.1	9.7
	BENZO(K)FLUORANTHENE	39.5	0.01	0.395
	CHRYSENE	147	1	0.147
	DIBENZO(A,H)ANTHRACENE	100 U	1	0
	INDENO(1,2,3-CD)PYRENE	56	0.1	5.6
	BAP EQUIVALENT			**132.692**
PAI-41-SS-01-01	BENZO(A)ANTHRACENE	24 J	0.1	2.4
	CHRYSENE	44 U	0.001	0
	BENZO(B)FLUORANTHENE	43	0.1	4.3
	BENZO(K)FLUORANTHENE	19	0.01	0.19
	BENZO(A)PYRENE	32 J	1	32
	DIBENZO(A,H)ANTHRACENE	170 U	1	0
	INDENO(1,2,3-CD)PYRENE	26 J	0.1	2.6
	BAP EQUIVALENT			**41.49**
PAI-41-SS-03-01	BENZO(A)ANTHRACENE	63	0.1	6.3
	CHRYSENE	44 U	0.001	0
	BENZO(B)FLUORANTHENE	68	0.1	6.8
	BENZO(K)FLUORANTHENE	18 U	0.01	0
	BENZO(A)PYRENE	37 J	1	37
	DIBENZO(A,H)ANTHRACENE	180 U	1	0
	INDENO(1,2,3-CD)PYRENE	44 U	0.1	0
	BAP EQUIVALENT			**50.1**

CALCULATION OF BENZO(A)PYRENE EQUIVALENT CONCENTRATIONS
SURFACE SOIL -SITE 1/SWMU 41
MCRD PARRIS, SOUTH CAROLINA

Sample	Parameter	Result	BaP TEF	BaP Equivalent Concentration
PAI-41-SS-04-01	BENZO(A)ANTHRACENE	21 U	0.1	0
	CHRYSENE	12 J	0.001	0.012
	BENZO(B)FLUORANTHENE	10	0.1	1
	BENZO(K)FLUORANTHENE	8.6 U	0.01	0
	BENZO(A)PYRENE	21 U	1	0
	DIBENZO(A,H)ANTHRACENE	86 U	1	0
	INDENO(1,2,3-CD)PYRENE	21 U	0.1	0
	BAP EQUIVALENT			**1.012**
PAI-41-SS-02-01	BENZO(A)ANTHRACENE	22 U	0.1	0
	CHRYSENE	22 U	0.001	0
	BENZO(B)FLUORANTHENE	13	0.1	1.3
	BENZO(K)FLUORANTHENE	8.9 U	0.01	0
	BENZO(A)PYRENE	22 U	1	0
	DIBENZO(A,H)ANTHRACENE	89 U	1	0
	INDENO(1,2,3-CD)PYRENE	22 U	0.1	0
	BAP EQUIVALENT			**1.3**

Notes:
BaP Equivalent concentration = Result x TEF.

APPENDIX E.2

RAGS PART D TABLES

TABLE 1
SELECTION OF EXPOSURE PATHWAYS
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 3

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	Surface Soil	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Construction workers may have contact with soil during excavation activities.
				Full-time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	No full-time employees at site.
				Maintenance Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Maintenance workers may have contact with soil during normal work activities.
				Military Personnel	Adult	Ingestion Dermal	On-Site On-Site	None None	No military personnel at site.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Access to site is restricted
				Recreational Users	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to soil while at site.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to soil while at site.
				Residents	Child	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
	Surface Soil	Air	Surface Soil	Construction Workers	Adult	Inhalation	On-site	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Full-time Employees	Adult	Inhalation	On-site	None	No full-time employees at site.
				Maintenance Workers	Adult	Inhalation	On-site	Quant	Maintenance workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Military Personnel	Adult	Inhalation	On-site	None	No full-time military personnel at site.
				Trespassers	Adolescents	Inhalation	On-site	None	Access to site is restricted
				Recreational Users	Adolescents	Inhalation	On-Site	Quant	Recreational users may be exposed to fugitive dust and volatile emissions from soil.
					Adult	Inhalation	On-Site	Quant	Recreational users may be exposed to fugitive dust and volatile emissions from soil.
				Residents	Child	Inhalation	On-Site	Quant	Future child residents may be exposed to fugitive dust and volatile emissions from soil.
					Adult	Inhalation	On-Site	Quant	Future adult residents may be exposed to fugitive dust and volatile emissions from soil.

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TABLE 1
SELECTION OF EXPOSURE PATHWAYS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
	Groundwater	Groundwater	Shallow Aquifer	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	None Quant	Groundwater is not used as a potable water supply at the site. Construction workers may contact groundwater during excavation activities.
				Full-time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	Groundwater is not suitable for use as potable water.
				Maintenance Workers	Adult	Ingestion Dermal	On-Site On-Site	None None	Groundwater is not suitable for use as potable water.
				Military Personnel	Adult	Ingestion Dermal	On-Site On-Site	None None	Site is not used by military personnel.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Access to site is restricted
				Recreational Users	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Groundwater is not suitable for use as potable water.
					Adult	Ingestion Dermal	On-Site On-Site	None None	Groundwater is not suitable for use as potable water.
				Residents	Child	Ingestion Dermal	On-Site On-Site	None None	Groundwater is not suitable for use as potable water.
					Adult	Ingestion Dermal	On-Site On-Site	None None	Groundwater is not suitable for use as potable water.
	Groundwater	Air	Shallow Aquifer	Construction Workers	Adult	Inhalation	On-site	None	Groundwater is not suitable for use as potable water.
				Full-time Employees	Adult	Inhalation	On-site	None	Groundwater is not suitable for use as potable water.
				Maintenance Workers	Adult	Inhalation	On-site	None	Groundwater is not suitable for use as potable water.
				Military Personnel	Adult	Inhalation	On-Site	None	Site is not used by military personnel.
				Trespassers	Adolescents	Inhalation	On-Site	None	Access to site is restricted
				Recreational Users	Adolescents	Inhalation	On-Site	None	Groundwater is not suitable for use as potable water.
					Adult	Inhalation	On-Site	None	Groundwater is not suitable for use as potable water.
				Residents	Child	Inhalation	On-Site	None	Groundwater is not suitable for use as potable water.
					Adult	Inhalation	On-Site	None	Groundwater is not suitable for use as potable water.

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TABLE 1
SELECTION OF EXPOSURE PATHWAYS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
	Sediment	Sediment	Sediment	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Construction workers may contact sediment during construction activities.
				Full-time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	No full-time employees at site.
				Maintenance Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Maintenance workers may contact sediment during normal work activities.
				Military Personnel	Adult	Ingestion Dermal	On-Site On-Site	None None	Site is not used by military personnel.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Access to site is restricted
				Recreational Users	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to sediment while at site.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to sediment while at site.
				Residents	Child	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
	Surface Water	Surface Water	Surface Water	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Construction workers may contact surface water during construction activities.
				Full-time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	No full-time employees at site.
				Maintenance Workers	Adult	Ingestion Dermal	On-Site On-Site	None None	Maintenance workers do not contact surface water.
				Military Personnel	Adult	Ingestion Dermal	On-Site On-Site	None None	Site is not used by military personnel.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Access to site is restricted
				Recreational Users	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to surface water while at site.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to surface water while at site.
				Residents	Child	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
		Fish	Surface Water	Recreational Users	Adult	Ingestion	On-Site	Quant	Recreational users may eat fish caught in surface water bodies located adjacent to the site.

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics																
108-88-3	Toluene	0.003	J	0.003	J	mg/kg	PAI-01-SS-05-01	1/10	0.006 - 0.009	0.003	NA	1600	N	NA	NA	No	BSL
	Semivolatile Organics																
120-82-1	1,2,4-Trichlorobenzene	0.14	J	0.14	J	mg/kg	PAI-01-SS-07-01	1/10	0.34 - 0.53	0.14	NA	78	N	NA	NA	No	BSL
91-57-6	2-Methylnaphthalene	0.13	J	0.13	J	mg/kg	PAI-01-SS-07-01	1/10	0.34 - 0.53	0.13	NA	160	N	NA	NA	No	BSL
120-12-7	Anthracene	0.012	J	0.035		mg/kg	PAI-01-SS-09-01	5/10	0.0085 - 0.088	0.035	NA	2300	N	NA	NA	No	BSL
205-99-2	Benzo(a)anthracene	0.018	J	0.28		mg/kg	PAI-01-SS-07-01	10/10	NA	0.28	NA	0.87	C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	0.02	J	0.31		mg/kg	PAI-01-SS-07-01	10/10	NA	0.31	NA	0.087	C	NA	NA	Yes	ASL
205-99-2	Benzo(b)fluoranthene	0.02		0.51		mg/kg	PAI-01-SS-07-01	10/10	NA	0.51	NA	0.87	C	NA	NA	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.038	J	0.21	J	mg/kg	PAI-01-SS-07-01	7/10	0.034 - 0.081	0.21	NA	160 (5)	N	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	0.011		0.16		mg/kg	PAI-01-SS-07-01	10/10	NA	0.16	NA	8.7	C	NA	NA	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	0.06	J	5.6		mg/kg	PAI-01-SS-12-01	4/10	0.36 - 0.53	5.6	NA	46	C	NA	NA	No	BSL
85-68-7	Butylbenzyl Phthalate	2		2		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	2	NA	1600	N	NA	NA	No	BSL
86-74-8	Carbazole	0.26	J	0.49		mg/kg	PAI-01-SS-14-01-AVG	5/10	0.36 - 0.4	0.49	NA	32	C	NA	NA	No	BSL
218-01-9	Chrysene	0.019	J	0.33		mg/kg	PAI-01-SS-07-01	10/10	NA	0.33	NA	87	C	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	0.072	J	0.072		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	0.072	NA	780	N	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	6.4		6.4		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	6.4	NA	160	N	NA	NA	No	BSL
132-64-9	Dibenzofuran	0.17	J	0.2	J	mg/kg	PAI-01-SS-14-01-AVG	3/10	0.34 - 0.53	0.2	NA	31	N	NA	NA	No	BSL
206-44-0	Fluoranthene	0.033		0.63		mg/kg	PAI-01-SS-07-01	10/10	NA	0.63	NA	310	N	NA	NA	No	BSL
86-73-7	Fluorene	0.095		0.095		mg/kg	PAI-01-SS-05-01	1/10	0.042 - 0.44	0.095	NA	310	N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.019	J	0.23		mg/kg	PAI-01-SS-07-01	8/10	0.025 - 0.047	0.23	NA	0.87	C	NA	NA	No	BSL
85-01-8	Phenanthrene	0.021		0.18		mg/kg	PAI-01-SS-06-01	9/10	0.037	0.18	NA	160 (5)	N	NA	NA	No	BSL
129-00-0	Pyrene	0.03	J	0.51		mg/kg	PAI-01-SS-07-01	9/10	0.094	0.51	NA	230	N	NA	NA	No	BSL
	Pesticides/PCBs																
72-54-8	4,4'-DDD	0.0021		0.18	J	mg/kg	PAI-01-SS-07-01	8/10	0.0094 - 0.01	0.18	NA	2.7	C	NA	NA	No	BSL
72-55-9	4,4'-DDE	0.0056		4.2	J	mg/kg	PAI-01-SS-07-01	10/10	NA	4.2	NA	1.9	C	NA	NA	Yes	ASL
50-29-3	4,4'-DDT	0.0021		4.4	J	mg/kg	PAI-01-SS-07-01	10/10	NA	4.4	NA	1.9	C	NA	NA	Yes	ASL
5103-71-9	Alpha-Chlordane	0.0095		0.018		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.018	NA	1.8 (6)	C	NA	NA	No	BSL
11096-82-5	Aroclor-1260	0.021		0.08		mg/kg	PAI-01-SS-09-01	3/10	0.0094 - 0.088	0.08	NA	0.32	C	NA	NA	No	BSL
	Endrin Ketone	0.012		0.012		mg/kg	PAI-01-SS-07-01	1/10	0.0017 - 0.01	0.012	NA	2.3 (7)	N	NA	NA	No	BSL
	Gamma-Chlordane	0.006		0.0081		mg/kg	PAI-01-SS-09-01	2/10	0.0009 - 0.005	0.0081	NA	1.8 (6)	C	NA	NA	No	BSL
319-84-6	alpha-BHC	0.0037		0.042		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.042	NA	0.1	C	NA	NA	No	BSL
319-85-7	beta-BHC	0.0089		0.033		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.033	NA	0.35	C	NA	NA	No	BSL
319-86-8	delta-BHC	0.045		0.045		mg/kg	PAI-01-SS-07-01	1/10	0.0009 - 0.005	0.045	NA	0.1 (8)	C	NA	NA	No	BSL
58-89-9	gamma-BHC (Lindane)	0.075		0.075		mg/kg	PAI-01-SS-07-01	1/10	0.0009 - 0.005	0.075	NA	0.49	C	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	3880		8610		mg/kg	PAI-01-SS-08-01	10/10	NA	8610	7270	7800	N	NA	NA	Yes	ASL
7440-36-0	Antimony	0.1875		90.6		mg/kg	PAI-01-SS-09-01	9/10	0.15	90.6	NA	3.1	N	NA	NA	Yes	ASL

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
7440-38-2	Arsenic	0.58		24.9		mg/kg	PAI-01-SS-09-01	10/10	NA	24.9	1.44	0.43	C	NA	NA	Yes	ASL
7440-39-3	Barium	15.2		178		mg/kg	PAI-01-SS-08-01	10/10	NA	178	23.6	550	N	NA	NA	No	BSL
7440-43-9	Cadmium	0.1		5.4		mg/kg	PAI-01-SS-08-01	10/10	NA	5.4	NA	3.9	N	NA	NA	Yes	ASL
7440-70-2	Calcium	420		13100		mg/kg	PAI-01-SS-05-01	10/10	NA	13100	766	NA		NA	NA	No	NUT
7440-47-3	Chromium	7		53.2		mg/kg	PAI-01-SS-08-01	10/10	NA	53.2	6.23	12000 (9)	N	NA	NA	No	BSL
7440-48-4	Cobalt	0.33		13.7		mg/kg	PAI-01-SS-08-01	10/10	NA	13.7	0.363	470	N	NA	NA	No	BSL
7440-50-8	Copper	6.5		131		mg/kg	PAI-01-SS-08-01	10/10	NA	131	1.52	310	N	NA	NA	No	BSL
57-12-5	Cyanide	0.73		0.86		mg/kg	PAI-01-SS-08-01	2/10	0.42 - 0.61	0.86	NA	160	N	NA	NA	No	BSL
7439-89-6	Iron	2560		147000		mg/kg	PAI-01-SS-08-01	10/10	NA	147000	3920	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	58.4		8380		mg/kg	PAI-01-SS-09-01	10/10	NA	8380	12.5	400 (10)	C	NA	NA	Yes	ASL
7439-96-5	Magnesium	233		1280		mg/kg	PAI-01-SS-06-01	10/10	NA	1280	515	NA		NA	NA	No	NUT
7439-96-5	Manganese	17.4		752		mg/kg	PAI-01-SS-08-01	10/10	NA	752	129	160	N	NA	NA	Yes	ASL
7487-94-7	Mercury	0.04		1.1		mg/kg	PAI-01-SS-07-01	10/10	NA	1.1	0.11	2.3	N	NA	NA	No	BSL
7440-02-0	Nickel	1.8		47.8		mg/kg	PAI-01-SS-08-01	10/10	NA	47.8	1.8	160	N	NA	NA	No	BSL
7440-09-7	Potassium	190		692		mg/kg	PAI-01-SS-05-01	10/10	NA	692	313	NA		NA	NA	No	NUT
7782-49-2	Selenium	0.18		0.73		mg/kg	PAI-01-SS-05-01	5/10	0.17 - 0.2	0.73	0.285	39	N	NA	NA	No	BSL
7440-22-4	Silver	0.48		2.4		mg/kg	PAI-01-SS-09-01	5/10	0.06 - 0.44	2.4	NA	39	N	NA	NA	No	BSL
7440-23-5	Sodium	68		3530		mg/kg	PAI-01-SS-06-01	10/10	NA	3530	241	NA		NA	NA	No	NUT
7440-62-2	Vanadium	5.7		47.4		mg/kg	PAI-01-SS-09-01	10/10	NA	47.4	9.5	55	N	NA	NA	No	BSL
7440-66-6	Zinc	45.65		497		mg/kg	PAI-01-SS-08-01	10/10	NA	497	9.7	2300	N	NA	NA	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) Refer to supporting information for background discussion.

(3) USEPA Region III Risk-Based Concentration Table, April 12, 1999. (Cancer benchmark value = 1E-06, HI = 0.1)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No value available, therefore value for naphthalene used based on similar chemical/toxicological characteristics.

(6) No value available, therefore value for chlordane used based on similar chemical/toxicological characteristics.

(7) No value available, therefore value for endrin used based on similar chemical/toxicological characteristics.

(8) No value available, therefore value for alpha-BHC used based on similar chemical/toxicological characteristics.

(9) Hexavalent chromium was not detected in soil samples, therefore value is for trivalent chromium.

(10) OSWER Screening Level.

Shading indicates chemical exceeded screening criteria and is retained as a COPC.

Definitions:
N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

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TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics															
108-88-3	Toluene	0.003	J	0.003	J	mg/kg	PAI-01-SS-05-01	1/10	0.006 - 0.009	0.003	NA	650 sat	NA	NA	No	BSL
	Semivolatile Organics															
120-82-1	1,2,4-Trichlorobenzene	0.14	J	0.14	J	mg/kg	PAI-01-SS-07-01	1/10	0.34 - 0.53	0.14	NA	3200 sat	NA	NA	No	BSL
91-57-6	2-Methylnaphthalene	0.13	J	0.13	J	mg/kg	PAI-01-SS-07-01	1/10	0.34 - 0.53	0.13	NA	NA	NA	NA	No	NTX
120-12-7	Anthracene	0.012	J	0.035		mg/kg	PAI-01-SS-09-01	5/10	0.0085 - 0.088	0.035	NA	NA	NA	NA	No	NTX
205-99-2	Benzo(a)anthracene	0.018	J	0.28		mg/kg	PAI-01-SS-07-01	10/10	NA	0.28	NA	NA	NA	NA	No	NTX
50-32-8	Benzo(a)pyrene	0.02	J	0.31		mg/kg	PAI-01-SS-07-01	10/10	NA	0.31	NA	NA	NA	NA	No	NTX
205-99-2	Benzo(b)fluoranthene	0.02		0.51		mg/kg	PAI-01-SS-07-01	10/10	NA	0.51	NA	NA	NA	NA	No	NTX
191-24-2	Benzo(g,h,i)perylene	0.038	J	0.21	J	mg/kg	PAI-01-SS-07-01	7/10	0.034 - 0.081	0.21	NA	NA	NA	NA	No	NTX
207-08-9	Benzo(k)fluoranthene	0.011		0.16		mg/kg	PAI-01-SS-07-01	10/10	NA	0.16	NA	NA	NA	NA	No	NTX
117-81-7	Bis(2-Ethylhexyl)phthalate	0.06	J	5.6		mg/kg	PAI-01-SS-12-01	4/10	0.36 - 0.53	5.6	NA	31000 sat	NA	NA	No	BSL
85-68-7	Butylbenzyl Phthalate	2		2		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	2	NA	930 sat	NA	NA	No	BSL
86-74-8	Carbazole	0.26	J	0.49		mg/kg	PAI-01-SS-14-01-AVG	5/10	0.36 - 0.4	0.49	NA	NA	NA	NA	No	NTX
218-01-9	Chrysene	0.019	J	0.33		mg/kg	PAI-01-SS-07-01	10/10	NA	0.33	NA	NA	NA	NA	No	NTX
84-74-2	Di-n-butyl phthalate	0.072	J	0.072		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	0.072	NA	2300 sat	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	6.4		6.4		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	6.4	NA	10000 sat	NA	NA	No	BSL
132-64-9	Dibenzofuran	0.17	J	0.2	J	mg/kg	PAI-01-SS-14-01-AVG	3/10	0.34 - 0.53	0.2	NA	NA	NA	NA	No	NTX
206-44-0	Fluoranthene	0.033		0.63		mg/kg	PAI-01-SS-07-01	10/10	NA	0.63	NA	NA	NA	NA	No	NTX
86-73-7	Fluorene	0.095		0.095		mg/kg	PAI-01-SS-05-01	1/10	0.042 - 0.44	0.095	NA	NA	NA	NA	No	NTX
193-39-5	Indeno(1,2,3-cd)pyrene	0.019	J	0.23		mg/kg	PAI-01-SS-07-01	8/10	0.025 - 0.047	0.23	NA	NA	NA	NA	No	NTX
85-01-8	Phenanthrene	0.021		0.18		mg/kg	PAI-01-SS-06-01	9/10	0.037	0.18	NA	NA	NA	NA	No	NTX
129-00-0	Pyrene	0.03	J	0.51		mg/kg	PAI-01-SS-07-01	9/10	0.094	0.51	NA	NA	NA	NA	No	NTX
	Pesticides/PCBs															
72-54-8	4,4'-DDD	0.0021		0.18	J	mg/kg	PAI-01-SS-07-01	8/10	0.0094 - 0.01	0.18	NA	NA	NA	NA	No	NTX
72-55-9	4,4'-DDE	0.0056		4.2	J	mg/kg	PAI-01-SS-07-01	10/10	NA	4.2	NA	NA	NA	NA	No	NTX
50-29-3	4,4'-DDT	0.0021		4.4	J	mg/kg	PAI-01-SS-07-01	10/10	NA	4.4	NA	NA	NA	NA	No	NTX
5103-71-9	Alpha-Chlordane	0.0095		0.018		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.018	NA	20 C	NA	NA	No	BSL
11096-82-5	Aroclor-1260	0.021		0.08		mg/kg	PAI-01-SS-09-01	3/10	0.0094 - 0.088	0.08	NA	NA	NA	NA	No	NTX
	Endrin Ketone	0.012		0.012		mg/kg	PAI-01-SS-07-01	1/10	0.0017 - 0.01	0.012	NA	NA	NA	NA	No	NTX
	Gamma-Chlordane	0.006		0.0081		mg/kg	PAI-01-SS-09-01	2/10	0.0009 - 0.005	0.0081	NA	20 C	NA	NA	No	BSL
319-84-6	alpha-BHC	0.0037		0.042		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.042	NA	0.8 C	NA	NA	No	BSL
319-85-7	beta-BHC	0.0089		0.033		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.033	NA	NA	NA	NA	No	NTX
319-86-8	delta-BHC	0.045		0.045		mg/kg	PAI-01-SS-07-01	1/10	0.0009 - 0.005	0.045	NA	NA	NA	NA	No	NTX
58-89-9	gamma-BHC (Lindane)	0.075		0.075		mg/kg	PAI-01-SS-07-01	1/10	0.0009 - 0.005	0.075	NA	NA	NA	NA	No	NTX

TABLE 2.2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Inorganics															
7429-90-5	Aluminum	3880		8610		mg/kg	PAI-01-SS-08-01	10/10	NA	8610	7270	NA	NA	NA	No	NTX
7440-36-0	Antimony	0.1875		90.6		mg/kg	PAI-01-SS-09-01	9/10	0.15	90.6	NA	NA	NA	NA	No	NTX
7440-38-2	Arsenic	0.58		24.9		mg/kg	PAI-01-SS-09-01	10/10	NA	24.9	1.44	750	NA	NA	No	BSL
7440-39-3	Barium	15.2		178		mg/kg	PAI-01-SS-08-01	10/10	NA	178	23.6	690000	NA	NA	No	BSL
7440-43-9	Cadmium	0.1		5.4		mg/kg	PAI-01-SS-08-01	10/10	NA	5.4	NA	1800	NA	NA	No	BSL
7440-70-2	Calcium	420		13100		mg/kg	PAI-01-SS-05-01	10/10	NA	13100	766	NA	NA	NA	No	NUT
7440-47-3	Chromium	7		53.2		mg/kg	PAI-01-SS-08-01	10/10	NA	53.2	6.23	270	NA	NA	No	BSL
7440-48-4	Cobalt	0.33		13.7		mg/kg	PAI-01-SS-08-01	10/10	NA	13.7	0.363	NA	NA	NA	No	NTX
7440-50-8	Copper	6.5		131		mg/kg	PAI-01-SS-08-01	10/10	NA	131	1.52	NA	NA	NA	No	NTX
57-12-5	Cyanide	0.73		0.86		mg/kg	PAI-01-SS-08-01	2/10	0.42 - 0.61	0.86	NA	NA	NA	NA	No	NTX
7439-89-6	Iron	2560		147000		mg/kg	PAI-01-SS-08-01	10/10	NA	147000	3920	NA	NA	NA	No	NTX
7439-92-1	Lead	58.4		8380		mg/kg	PAI-01-SS-09-01	10/10	NA	8380	12.5	NA	NA	NA	No	NTX
7439-98-5	Magnesium	233		1280		mg/kg	PAI-01-SS-06-01	10/10	NA	1280	515	NA	NA	NA	No	NUT
7439-96-5	Manganese	17.4		752		mg/kg	PAI-01-SS-08-01	10/10	NA	752	129	NA	NA	NA	No	NTX
7487-94-7	Mercury	0.04		1.1		mg/kg	PAI-01-SS-07-01	10/10	NA	1.1	0.11	10	NA	NA	No	BSL
7440-02-0	Nickel	1.8		47.8		mg/kg	PAI-01-SS-08-01	10/10	NA	47.8	1.8	13000	NA	NA	No	BSL
7440-09-7	Potassium	190		692		mg/kg	PAI-01-SS-05-01	10/10	NA	692	313	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.18		0.73		mg/kg	PAI-01-SS-05-01	5/10	0.17 - 0.2	0.73	0.285	NA	NA	NA	No	NTX
7440-22-4	Silver	0.48		2.4		mg/kg	PAI-01-SS-09-01	5/10	0.06 - 0.44	2.4	NA	NA	NA	NA	No	NTX
7440-23-5	Sodium	68		3530		mg/kg	PAI-01-SS-06-01	10/10	NA	3530	241	NA	NA	NA	No	NTX
7440-62-2	Vanadium	5.7		47.4		mg/kg	PAI-01-SS-09-01	10/10	NA	47.4	9.5	NA	NA	NA	No	NTX
7440-66-6	Zinc	45.65		497		mg/kg	PAI-01-SS-08-01	10/10	NA	497	9.7	NA	NA	NA	No	NTX

Notes:

(1) Minimum/maximum detected concentration.

(2) Refer to supporting information for background discussion.

(3) USEPA Soil Screening Level Guidance: Technical Background Document. May 1996.

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Shading indicates chemical exceeded screening criteria and is retained as a COPC.

Definitions:
N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

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TABLE 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics															
108-88-3	Toluene	0.003	J	0.003	J	mg/kg	PAI-01-SS-05-01	1/10	0.006 - 0.009	0.003	NA	12	NA	NA	No	BSL
	Semivolatile Organics															
120-82-1	1,2,4-Trichlorobenzene	0.14	J	0.14	J	mg/kg	PAI-01-SS-07-01	1/10	0.34 - 0.53	0.14	NA	5	NA	NA	No	BSL
91-57-6	2-Methylnaphthalene	0.13	J	0.13	J	mg/kg	PAI-01-SS-07-01	1/10	0.34 - 0.53	0.13	NA	NA	NA	NA	No	NTX
120-12-7	Anthracene	0.012	J	0.035		mg/kg	PAI-01-SS-09-01	5/10	0.0085 - 0.088	0.035	NA	12000 N	NA	NA	No	BSL
205-99-2	Benzo(a)anthracene	0.018	J	0.28		mg/kg	PAI-01-SS-07-01	10/10	NA	0.28	NA	2 C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	0.02	J	0.31		mg/kg	PAI-01-SS-07-01	10/10	NA	0.31	NA	8 C	NA	NA	No	BSL
205-99-2	Benzo(b)fluoranthene	0.02		0.51		mg/kg	PAI-01-SS-07-01	10/10	NA	0.51	NA	5 C	NA	NA	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.038	J	0.21	J	mg/kg	PAI-01-SS-07-01	7/10	0.034 - 0.081	0.21	NA	NA	NA	NA	No	NTX
207-08-9	Benzo(k)fluoranthene	0.011		0.16		mg/kg	PAI-01-SS-07-01	10/10	NA	0.16	NA	49 C	NA	NA	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	0.06	J	5.6		mg/kg	PAI-01-SS-12-01	4/10	0.36 - 0.53	5.6	NA	3600	NA	NA	No	BSL
85-68-7	Butylbenzyl Phthalate	2		2		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	2	NA	930 sat	NA	NA	No	BSL
86-74-8	Carbazole	0.26	J	0.49		mg/kg	PAI-01-SS-14-01-AVG	5/10	0.36 - 0.4	0.49	NA	0.6 C	NA	NA	No	BSL
218-01-9	Chrysene	0.019	J	0.33		mg/kg	PAI-01-SS-07-01	10/10	NA	0.33	NA	160 C	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	0.072	J	0.072		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	0.072	NA	2300 sat	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	6.4		6.4		mg/kg	PAI-01-SS-12-01	1/10	0.34 - 0.53	6.4	NA	10000 sat	NA	NA	No	BSL
132-64-9	Dibenzofuran	0.17	J	0.2	J	mg/kg	PAI-01-SS-14-01-AVG	3/10	0.34 - 0.53	0.2	NA	NA	NA	NA	No	NTX
206-44-0	Fluoranthene	0.033		0.63		mg/kg	PAI-01-SS-07-01	10/10	NA	0.63	NA	4300 N	NA	NA	No	BSL
86-73-7	Fluorene	0.095		0.095		mg/kg	PAI-01-SS-05-01	1/10	0.042 - 0.44	0.095	NA	560 N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.019	J	0.23		mg/kg	PAI-01-SS-07-01	8/10	0.025 - 0.047	0.23	NA	14 C	NA	NA	No	BSL
85-01-8	Phenanthrene	0.021		0.18		mg/kg	PAI-01-SS-06-01	9/10	0.037	0.18	NA	NA	NA	NA	No	NTX
129-00-0	Pyrene	0.03	J	0.51		mg/kg	PAI-01-SS-07-01	9/10	0.094	0.51	NA	4200 N	NA	NA	No	BSL
	Pesticides/PCBs															
72-54-8	4,4'-DDD	0.0021		0.18	J	mg/kg	PAI-01-SS-07-01	8/10	0.0094 - 0.01	0.18	NA	16 C	NA	NA	No	BSL
72-55-9	4,4'-DDE	0.0056		4.2	J	mg/kg	PAI-01-SS-07-01	10/10	NA	4.2	NA	54 C	NA	NA	No	BSL
50-29-3	4,4'-DDT	0.0021		4.4	J	mg/kg	PAI-01-SS-07-01	10/10	NA	4.4	NA	32 C	NA	NA	No	BSL
5103-71-9	Alpha-Chlordane	0.0095		0.018		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.018	NA	10	NA	NA	No	BSL
11096-82-5	Aroclor-1260	0.021		0.08		mg/kg	PAI-01-SS-09-01	3/10	0.0094 - 0.088	0.08	NA	NA	NA	NA	No	NTX
	Endrin Ketone	0.012		0.012		mg/kg	PAI-01-SS-07-01	1/10	0.0017 - 0.01	0.012	NA	1 (5)	NA	NA	No	BSL
	Gamma-Chlordane	0.006		0.0081		mg/kg	PAI-01-SS-09-01	2/10	0.0009 - 0.005	0.0081	NA	10	NA	NA	No	BSL
319-84-6	alpha-BHC	0.0037		0.042		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.042	NA	0.0005 C	NA	NA	Yes	ASL
319-85-7	beta-BHC	0.0089		0.033		mg/kg	PAI-01-SS-07-01	2/10	0.0009 - 0.005	0.033	NA	0.003 C	NA	NA	Yes	ASL
319-86-8	delta-BHC	0.045		0.045		mg/kg	PAI-01-SS-07-01	1/10	0.0009 - 0.005	0.045	NA	NA	NA	NA	No	NTX
58-89-9	gamma-BHC (Lindane)	0.075		0.075		mg/kg	PAI-01-SS-07-01	1/10	0.0009 - 0.005	0.075	NA	0.009	NA	NA	Yes	ASL

TABLE 2.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Inorganics															
7429-90-5	Aluminum	3880		8610		mg/kg	PAI-01-SS-08-01	10/10	NA	8610	7270	NA	NA	NA	No	NTX
7440-36-0	Antimony	0.1875		90.6		mg/kg	PAI-01-SS-09-01	9/10	0.15	90.6	NA	5	NA	NA	Yes	ASL
7440-38-2	Arsenic	0.58		24.9		mg/kg	PAI-01-SS-09-01	10/10	NA	24.9	1.44	29	NA	NA	No	BSL
7440-39-3	Barium	15.2		178		mg/kg	PAI-01-SS-08-01	10/10	NA	178	23.6	1600	NA	NA	No	BSL
7440-43-9	Cadmium	0.1		5.4		mg/kg	PAI-01-SS-08-01	10/10	NA	5.4	NA	8	NA	NA	No	BSL
7440-70-2	Calcium	420		13100		mg/kg	PAI-01-SS-05-01	10/10	NA	13100	766	NA	NA	NA	No	NUT
7440-47-3	Chromium	7		53.2		mg/kg	PAI-01-SS-08-01	10/10	NA	53.2	6.23	38	NA	NA	Yes	ASL
7440-48-4	Cobalt	0.33		13.7		mg/kg	PAI-01-SS-08-01	10/10	NA	13.7	0.363	NA	NA	NA	No	NTX
7440-50-8	Copper	6.5		131		mg/kg	PAI-01-SS-08-01	10/10	NA	131	1.52	NA	NA	NA	No	NTX
57-12-5	Cyanide	0.73		0.86		mg/kg	PAI-01-SS-08-01	2/10	0.42 - 0.61	0.86	NA	NA	NA	NA	No	NTX
7439-89-6	Iron	2560		147000		mg/kg	PAI-01-SS-08-01	10/10	NA	147000	3920	NA	NA	NA	No	NTX
7439-92-1	Lead	56.4		8380		mg/kg	PAI-01-SS-09-01	10/10	NA	8380	12.5	NA	NA	NA	No	NTX
7439-96-5	Magnesium	233		1280		mg/kg	PAI-01-SS-06-01	10/10	NA	1280	515	NA	NA	NA	No	NUT
7439-96-5	Manganese	17.4		752		mg/kg	PAI-01-SS-08-01	10/10	NA	752	129	NA	NA	NA	No	NTX
7487-94-7	Mercury	0.04		1.1		mg/kg	PAI-01-SS-07-01	10/10	NA	1.1	0.11	2	NA	NA	No	BSL
7440-02-0	Nickel	1.8		47.8		mg/kg	PAI-01-SS-08-01	10/10	NA	47.8	1.8	130	NA	NA	No	BSL
7440-09-7	Potassium	190		692		mg/kg	PAI-01-SS-05-01	10/10	NA	692	313	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.18		0.73		mg/kg	PAI-01-SS-05-01	5/10	0.17 - 0.2	0.73	0.285	5	NA	NA	No	BSL
7440-22-4	Silver	0.48		2.4		mg/kg	PAI-01-SS-09-01	5/10	0.06 - 0.44	2.4	NA	34 N	NA	NA	No	BSL
7440-23-5	Sodium	68		3530		mg/kg	PAI-01-SS-06-01	10/10	NA	3530	241	NA	NA	NA	No	NUT
7440-62-2	Vanadium	5.7		47.4		mg/kg	PAI-01-SS-09-01	10/10	NA	47.4	9.5	6000	NA	NA	No	BSL
7440-66-6	Zinc	45.65		497		mg/kg	PAI-01-SS-08-01	10/10	NA	497	9.7	12000 N	NA	NA	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) Refer to supporting information for background discussion.

(3) USEPA Soil Screening Level Guidance: Technical Background Document. May 1996. (Based on a DAF [Dilutional Attenuation Factor] of 20)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No value available, therefore value for endrin used based on similar chemical/toxicological characteristics.

Shading indicates chemical exceeded screening criteria and is retained as a COPC.

Definitions:
N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

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TABLE 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 41

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics (mg/kg)																
67-64-1	Acetone	0.73	J	0.73	J	mg/kg	PAI-41-SS-02-01	1/1	NA	0.73	0.266	780	N	NA	NA	No	BSL
	Semivolatile Organics (mg/kg)																
205-99-2	Benzo(a)anthracene	0.024		0.063		mg/kg	PAI-41-SS-03-01	2/4	0.021 - 0.022	0.063	NA	0.87	C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	0.032	J	0.037	J	mg/kg	PAI-41-SS-03-01	2/4	0.021 - 0.022	0.037	NA	0.087	C	NA	NA	No	BSL
205-99-2	Benzo(b)fluoranthene	0.01		0.068		mg/kg	PAI-41-SS-03-01	4/4	NA	0.068	NA	0.87	C	NA	NA	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.07		0.07		mg/kg	PAI-41-SS-03-01	1/4	0.034 - 0.07	0.07	NA	160 (5)	N	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	0.019		0.019		mg/kg	PAI-41-SS-01-01	1/4	0.0086 - 0.018	0.019	NA	8.7	C	NA	NA	No	BSL
218-01-9	Chrysene	0.012	J	0.012	J	mg/kg	PAI-41-SS-04-01	1/4	0.022 - 0.044	0.012	NA	87	C	NA	NA	No	BSL
206-44-0	Fluoranthene	0.026		0.2		mg/kg	PAI-41-SS-03-01	4/4	NA	0.2	NA	310	N	NA	NA	No	BSL
86-73-7	Fluorene	0.028		0.028		mg/kg	PAI-41-SS-03-01	1/4	0.043 - 0.087	0.028	0.646	310	N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.026	J	0.026	J	mg/kg	PAI-41-SS-01-01	1/4	0.021 - 0.044	0.026	NA	0.87	C	NA	NA	No	BSL
85-01-8	Phenanthrene	0.03	J	0.19		mg/kg	PAI-41-SS-03-01	4/4	NA	0.19	NA	160 (5)		NA	NA	No	BSL
129-00-0	Pyrene	0.12		0.12		mg/kg	PAI-41-SS-03-01	1/4	0.043 - 0.087	0.12	NA	230	N	NA	NA	No	BSL
	Pesticides/PCBs (mg/kg)																
72-55-9	4,4'-DDE	0.034		0.043		mg/kg	PAI-41-SS-01-01	2/4	0.085 - 0.18	0.043	NA	1.9	C	NA	NA	No	BSL
50-29-3	4,4'-DDT	0.012		0.065		mg/kg	PAI-41-SS-01-01	2/4	0.085 - 0.18	0.065	NA	1.9	C	NA	NA	No	BSL
	Inorganics (mg/kg)																
7429-90-5	Aluminum	3130		6290		mg/kg	PAI-41-SS-04-01	4/4	NA	6290	7270	7800	N	NA	NA	No	BSL, BKG
7440-38-2	Arsenic	0.48		6.3		mg/kg	PAI-41-SS-03-01	4/4	NA	6.3	1.44	0.43	C	NA	NA	Yes	ASL
7440-39-3	Barium	20.7		151		mg/kg	PAI-41-SS-03-01	4/4	NA	151	23.6	550	N	NA	NA	No	BSL
7440-41-7	Beryllium	0.05		0.51		mg/kg	PAI-41-SS-03-01	3/4	0.14	0.51	0.095	16	N	NA	NA	No	BSL
7440-43-9	Cadmium	0.11		1.1		mg/kg	PAI-41-SS-03-01	3/4	0.13	1.1	NA	3.9	N	NA	NA	No	BSL
7440-70-2	Calcium	384		1830		mg/kg	PAI-41-SS-03-01	4/4	NA	1830	766	NA		NA	NA	No	NUT
7440-47-3	Chromium	4.8		13.4		mg/kg	PAI-41-SS-03-01	4/4	NA	13.4	6.23	12000 (6)	N	NA	NA	No	BSL
7440-48-4	Cobalt	0.36		4.3		mg/kg	PAI-41-SS-03-01	4/4	NA	4.3	0.363	470	N	NA	NA	No	BSL
7440-50-8	Copper	4.8		114		mg/kg	PAI-41-SS-03-01	4/4	NA	114	1.52	310	N	NA	NA	No	BSL
7439-89-6	Iron	2150		15500		mg/kg	PAI-41-SS-03-01	4/4	NA	15500	3920	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	26.4		161		mg/kg	PAI-41-SS-01-01	4/4	NA	161	12.5	400 (7)		NA	NA	No	BSL
7439-96-5	Magnesium	187		604		mg/kg	PAI-41-SS-03-01	4/4	NA	604	515	NA		NA	NA	No	NUT
7439-96-5	Manganese	28.3		95.7		mg/kg	PAI-41-SS-03-01	4/4	NA	95.7	129	160	N	NA	NA	No	BSL, BKG
7487-94-7	Mercury	0.04		0.18		mg/kg	PAI-41-SS-03-01	4/4	NA	0.18	0.11	2.3 (8)	N	NA	NA	No	BSL
7440-02-0	Nickel	1.1		13.9		mg/kg	PAI-41-SS-03-01	4/4	NA	13.9	1.8	160	N	NA	NA	No	BSL
7440-09-7	Potassium	148		1170		mg/kg	PAI-41-SS-03-01	4/4	NA	1170	313	NA		NA	NA	No	NUT
7782-49-2	Selenium	0.22		1.1		mg/kg	PAI-41-SS-03-01	4/4	NA	1.1	0.285	39	N	NA	NA	No	BSL
7440-22-4	Silver	0.18		0.89		mg/kg	PAI-41-SS-03-01	2/4	0.05 - 0.25	0.89	NA	39	N	NA	NA	No	BSL
7440-23-5	Sodium	263		425		mg/kg	PAI-41-SS-03-01	4/4	NA	425	241	NA		NA	NA	No	NUT
7440-62-2	Vanadium	4.8		11		mg/kg	PAI-41-SS-03-01	4/4	NA	11	9.5	55	N	NA	NA	No	BSL
7440-66-6	Zinc	27.6		158		mg/kg	PAI-41-SS-03-01	4/4	NA	158	9.7	2300	N	NA	NA	No	BSL

TABLE 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 41

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)

Notes:

(1) Minimum/maximum detected concentration.

(2) Refer to supporting information for background discussion.

(3) USEPA Region III Risk-Based Concentration Table, April 12, 1999. (Cancer benchmark value = 1E-06, HI = 0.1)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No value available, therefore value for naphthalene used based on similar chemical/toxicological characteristics.

(6) Hexavalent chromium was not detected in soil samples, therefore value is for trivalent chromium.

(7) OSWER Screening Level.

(8) Value is for mercuric chloride.

Shading indicates chemical exceeded screening criteria and is retained as a COPC.

Definitions:

N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

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TABLE 2.5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 41

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics (mg/kg)															
67-64-1	Acetone	0.73	J	0.73	J	mg/kg	PAI-41-SS-02-01	1/1	NA	0.73	0.266	100000 sat	NA	NA	No	BSL
	Semivolatile Organics (mg/kg)															
205-99-2	Benzo(a)anthracene	0.024		0.063		mg/kg	PAI-41-SS-03-01	2/4	0.021 - 0.022	0.063	NA	NA	NA	NA	No	NTX
50-32-8	Benzo(a)pyrene	0.032	J	0.037	J	mg/kg	PAI-41-SS-03-01	2/4	0.021 - 0.022	0.037	NA	NA	NA	NA	No	NTX
205-99-2	Benzo(b)fluoranthene	0.01		0.068		mg/kg	PAI-41-SS-03-01	4/4	NA	0.068	NA	NA	NA	NA	No	NTX
191-24-2	Benzo(g,h,i)perylene	0.07		0.07		mg/kg	PAI-41-SS-03-01	1/4	0.034 - 0.07	0.07	NA	NA	NA	NA	No	NTX
207-08-9	Benzo(k)fluoranthene	0.019		0.019		mg/kg	PAI-41-SS-01-01	1/4	0.0088 - 0.018	0.019	NA	NA	NA	NA	No	NTX
218-01-9	Chrysene	0.012	J	0.012	J	mg/kg	PAI-41-SS-04-01	1/4	0.022 - 0.044	0.012	NA	NA	NA	NA	No	NTX
206-44-0	Fluoranthene	0.026		0.2		mg/kg	PAI-41-SS-03-01	4/4	NA	0.2	NA	NA	NA	NA	No	NTX
86-73-7	Fluorene	0.028		0.028		mg/kg	PAI-41-SS-03-01	1/4	0.043 - 0.087	0.028	0.646	NA	NA	NA	No	NTX
193-39-5	Indeno(1,2,3-cd)pyrene	0.026	J	0.026	J	mg/kg	PAI-41-SS-01-01	1/4	0.021 - 0.044	0.026	NA	NA	NA	NA	No	NTX
85-01-8	Phenanthrene	0.03	J	0.19		mg/kg	PAI-41-SS-03-01	4/4	NA	0.19	NA	NA	NA	NA	No	NTX
129-00-0	Pyrene	0.12		0.12		mg/kg	PAI-41-SS-03-01	1/4	0.043 - 0.087	0.12	NA	NA	NA	NA	No	NTX
	Pesticides/PCBs (mg/kg)															
72-55-9	4,4'-DDE	0.034		0.043		mg/kg	PAI-41-SS-01-01	2/4	0.085 - 0.18	0.043	NA	NA	NA	NA	No	NTX
50-29-3	4,4'-DDT	0.012		0.065		mg/kg	PAI-41-SS-01-01	2/4	0.085 - 0.18	0.065	NA	NA	NA	NA	No	NTX
	Inorganics (mg/kg)															
7429-90-5	Aluminum	3130		6290		mg/kg	PAI-41-SS-04-01	4/4	NA	6290	7270	NA	NA	NA	No	NTX, BKG
7440-38-2	Arsenic	0.48		6.3		mg/kg	PAI-41-SS-03-01	4/4	NA	6.3	1.44	750 C	NA	NA	No	BSL
7440-39-3	Barium	20.7		151		mg/kg	PAI-41-SS-03-01	4/4	NA	151	23.6	690000 N	NA	NA	No	BSL
7440-41-7	Beryllium	0.05		0.51		mg/kg	PAI-41-SS-03-01	3/4	0.14	0.51	0.095	1300 C	NA	NA	No	BSL
7440-43-9	Cadmium	0.11		1.1		mg/kg	PAI-41-SS-03-01	3/4	0.13	1.1	NA	1800 C	NA	NA	No	BSL
7440-70-2	Calcium	384		1830		mg/kg	PAI-41-SS-03-01	4/4	NA	1830	766	NA	NA	NA	No	NUT
7440-47-3	Chromium	4.8		13.4		mg/kg	PAI-41-SS-03-01	4/4	NA	13.4	6.23	270	NA	NA	No	BSL
7440-48-4	Cobalt	0.36		4.3		mg/kg	PAI-41-SS-03-01	4/4	NA	4.3	0.363	NA	NA	NA	No	NTX
7440-50-8	Copper	4.8		114		mg/kg	PAI-41-SS-03-01	4/4	NA	114	1.52	NA	NA	NA	No	NTX
7439-89-6	Iron	2150		15500		mg/kg	PAI-41-SS-03-01	4/4	NA	15500	3920	NA	NA	NA	No	NTX
7439-92-1	Lead	20.4		161		mg/kg	PAI-41-SS-01-01	4/4	NA	161	12.5	NA	NA	NA	No	NTX
7439-96-5	Magnesium	187		604		mg/kg	PAI-41-SS-03-01	4/4	NA	604	515	NA	NA	NA	No	NUT
7439-96-5	Manganese	28.3		95.7		mg/kg	PAI-41-SS-03-01	4/4	NA	95.7	129	NA	NA	NA	No	NTX, BKG
7487-94-7	Mercury	0.04		0.18		mg/kg	PAI-41-SS-03-01	4/4	NA	0.18	0.11	10	NA	NA	No	BSL
7440-02-0	Nickel	1.1		13.9		mg/kg	PAI-41-SS-03-01	4/4	NA	13.9	1.8	13000	NA	NA	No	BSL
7440-09-7	Potassium	148		1170		mg/kg	PAI-41-SS-03-01	4/4	NA	1170	313	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.22		1.1		mg/kg	PAI-41-SS-03-01	4/4	NA	1.1	0.285	NA	NA	NA	No	NTX
7440-22-4	Silver	0.18		0.89		mg/kg	PAI-41-SS-03-01	2/4	0.05 - 0.25	0.89	NA	NA	NA	NA	No	NTX
7440-23-5	Sodium	263		425		mg/kg	PAI-41-SS-03-01	4/4	NA	425	241	NA	NA	NA	No	NUT
7440-62-2	Vanadium	4.8		11		mg/kg	PAI-41-SS-03-01	4/4	NA	11	9.5	NA	NA	NA	No	NTX
7440-66-6	Zinc	27.8		158		mg/kg	PAI-41-SS-03-01	4/4	NA	158	9.7	NA	NA	NA	No	NTX

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TABLE 2.5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 41

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)

Notes:

(1) Minimum/maximum detected concentration.

(2) Refer to supporting information for background discussion.

(3) USEPA Soil Screening Level Guidance: Technical Background Document. May 1996.

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions:

N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

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TABLE 2.6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 41

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics (mg/kg)															
67-64-1	Acetone	0.73	J	0.73	J	mg/kg	PAI-41-SS-02-01	1/1	NA	0.73	0.266	16 N	NA	NA	No	BSL
	Semivolatile Organics (mg/kg)															
205-99-2	Benzo(a)anthracene	0.024		0.063		mg/kg	PAI-41-SS-03-01	2/4	0.021 - 0.022	0.063	NA	2 C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	0.032	J	0.037	J	mg/kg	PAI-41-SS-03-01	2/4	0.021 - 0.022	0.037	NA	8	NA	NA	No	BSL
205-99-2	Benzo(b)fluoranthene	0.01		0.068		mg/kg	PAI-41-SS-03-01	4/4	NA	0.068	NA	5 C	NA	NA	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.07		0.07		mg/kg	PAI-41-SS-03-01	1/4	0.034 - 0.07	0.07	NA	NA	NA	NA	No	NTX
207-08-9	Benzo(k)fluoranthene	0.019		0.019		mg/kg	PAI-41-SS-01-01	1/4	0.0086 - 0.018	0.019	NA	49 C	NA	NA	No	BSL
218-01-9	Chrysene	0.012	J	0.012	J	mg/kg	PAI-41-SS-04-01	1/4	0.022 - 0.044	0.012	NA	160 C	NA	NA	No	BSL
206-44-0	Fluoranthene	0.026		0.2		mg/kg	PAI-41-SS-03-01	4/4	NA	0.2	NA	4300 N	NA	NA	No	BSL
86-73-7	Fluorene	0.028		0.028		mg/kg	PAI-41-SS-03-01	1/4	0.043 - 0.087	0.028	0.646	560 N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.026	J	0.026	J	mg/kg	PAI-41-SS-01-01	1/4	0.021 - 0.044	0.026	NA	14 C	NA	NA	No	BSL
85-01-8	Phenanthrene	0.03	J	0.19		mg/kg	PAI-41-SS-03-01	4/4	NA	0.19	NA	NA	NA	NA	No	NTX
129-00-0	Pyrene	0.12		0.12		mg/kg	PAI-41-SS-03-01	1/4	0.043 - 0.087	0.12	NA	4200 N	NA	NA	No	BSL
	Pesticides/PCBs (mg/kg)															
72-55-9	4,4'-DDE	0.034		0.043		mg/kg	PAI-41-SS-01-01	2/4	0.085 - 0.18	0.043	NA	54 C	NA	NA	No	BSL
50-29-3	4,4'-DDT	0.012		0.065		mg/kg	PAI-41-SS-01-01	2/4	0.085 - 0.18	0.065	NA	32 C	NA	NA	No	BSL
	Inorganics (mg/kg)															
7429-90-5	Aluminum	3130		6290		mg/kg	PAI-41-SS-04-01	4/4	NA	6290	7270	NA	NA	NA	No	NUT, BKG
7440-38-2	Arsenic	0.48		6.3		mg/kg	PAI-41-SS-03-01	4/4	NA	6.3	1.44	29	NA	NA	No	BSL
7440-39-3	Barium	20.7		151		mg/kg	PAI-41-SS-03-01	4/4	NA	151	23.8	1600	NA	NA	No	BSL
7440-41-7	Beryllium	0.05		0.51		mg/kg	PAI-41-SS-03-01	3/4	0.14	0.51	0.095	63	NA	NA	No	BSL
7440-43-9	Cadmium	0.11		1.1		mg/kg	PAI-41-SS-03-01	3/4	0.13	1.1	NA	8	NA	NA	No	BSL
7440-70-2	Calcium	384		1830		mg/kg	PAI-41-SS-03-01	4/4	NA	1830	766	NA	NA	NA	No	NUT
7440-47-3	Chromium	4.8		13.4		mg/kg	PAI-41-SS-03-01	4/4	NA	13.4	6.23	38	NA	NA	No	BSL
7440-48-4	Cobalt	0.36		4.3		mg/kg	PAI-41-SS-03-01	4/4	NA	4.3	0.363	NA	NA	NA	No	NTX
7440-50-8	Copper	4.8		114		mg/kg	PAI-41-SS-03-01	4/4	NA	114	1.52	NA	NA	NA	No	NTX
7439-89-6	Iron	2150		15500		mg/kg	PAI-41-SS-03-01	4/4	NA	15500	3920	NA	NA	NA	No	NTX
7439-92-1	Lead	26.4		161		mg/kg	PAI-41-SS-01-01	4/4	NA	161	12.5	NA	NA	NA	No	NTX
7439-96-5	Magnesium	187		604		mg/kg	PAI-41-SS-03-01	4/4	NA	604	515	NA	NA	NA	No	NUT
7439-96-5	Manganese	28.3		95.7		mg/kg	PAI-41-SS-03-01	4/4	NA	95.7	129	NA	NA	NA	No	NUT, BKG
7487-94-7	Mercury	0.04		0.18		mg/kg	PAI-41-SS-03-01	4/4	NA	0.18	0.11	2	NA	NA	No	BSL
7440-02-0	Nickel	1.1		13.9		mg/kg	PAI-41-SS-03-01	4/4	NA	13.9	1.8	130	NA	NA	No	BSL
7440-09-7	Potassium	148		1170		mg/kg	PAI-41-SS-03-01	4/4	NA	1170	313	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.22		1.1		mg/kg	PAI-41-SS-03-01	4/4	NA	1.1	0.285	5	NA	NA	No	BSL
7440-22-4	Silver	0.18		0.89		mg/kg	PAI-41-SS-03-01	2/4	0.05 - 0.25	0.89	NA	34 N	NA	NA	No	BSL
7440-23-5	Sodium	263		425		mg/kg	PAI-41-SS-03-01	4/4	NA	425	241	NA	NA	NA	No	NUT
7440-62-2	Vanadium	4.8		11		mg/kg	PAI-41-SS-03-01	4/4	NA	11	9.5	6000 N	NA	NA	No	BSL
7440-66-6	Zinc	27.8		158		mg/kg	PAI-41-SS-03-01	4/4	NA	158	9.7	12000 N	NA	NA	No	BSL

TABLE 2.6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 41

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)

Notes:

(1) Minimum/maximum detected concentration.

(2) Refer to supporting information for background discussion.

(3) USEPA Soil Screening Level Guidance: Technical Background Document. May 1998. (Based on a DAF [Dilutional Attenuation Factor] of 20)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions:

N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

TABLE 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics																
78-93-3	2-Butanone	3.4	J	3.4	J	ug/L	PAI-01-GW-10-01	1/1	NA	3.4	NA	190	N	NA	NA	No	BSL
67-64-1	Acetone	1.4	J	13	J	ug/L	PAI-01-GW-14-01	4/4	NA	13	NA	61	N	NA	NA	No	BSL
75-15-0	Carbon Disulfide	0.7	J	16		ug/L	PAI-01-GW-14-01	6/11	1	16	NA	100	N	NA	NA	No	BSL
67-66-3	Chloroform	0.3	J	0.9	J	ug/L	PAI-01-GW-14-01	3/11	1	0.9	NA	0.15	C	100	MCL	Yes	ASL
100-41-4	Ethylbenzene	0.2	J	0.2	J	ug/L	PAI-01-GW-10-01	1/11	1	0.2	NA	130	N	700	MCL	No	BSL
108-88-3	Toluene	0.5	J	2		ug/L	PAI-01-GW-07-01	3/11	1	2	NA	75	N	1000	MCL	No	BSL
1330-20-7	Xylenes, Total	1.4		2		ug/L	PAI-01-GW-09-01	2/11	1	2	NA	1200	N	10000	MCL	No	BSL
	Semivolatile Organics																
95-50-1	1,2-Dichlorobenzene	3	J	3	J	ug/L	PAI-01-GW-05-01	1/11	5 - 6	3	NA	6.4	N	600	MCL	No	BSL
105-67-9	2,4-Dimethylphenol	2	J	5	J	ug/L	PAI-01-GW-09-01	2/11	5 - 6	5	NA	73	N	NA	NA	No	BSL
91-57-6	2-Methylnaphthalene	7		7		ug/L	PAI-01-GW-10-01	1/11	5 - 6	7	NA	12	N	NA	NA	No	BSL
95-48-7	2-Methylphenol	1	J	1	J	ug/L	PAI-01-GW-10-01	1/11	5 - 6	1	NA	180	N	NA	NA	No	BSL
83-32-9	Acenaphthene	1	J	7		ug/L	PAI-01-GW-10-01	2/11	5 - 6	7	NA	37	N	NA	NA	No	BSL
120-12-7	Anthracene	1	J	1	J	ug/L	PAI-01-GW-10-01, PAI-01-GW-13-01	2/11	5 - 6	1	NA	180	N	NA	NA	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	1	J	1	J	ug/L	PAI-01-GW-08-01, PAI-01-GW-10-01, GW-07-01	3/11	5 - 10	1	NA	4.8	C	6	MCL	No	BSL
86-74-8	Carbazole	2	J	2	J	ug/L	PAI-01-GW-13-01	1/10	5 - 6	2	NA	3.3	C	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	1	J	1	J	ug/L	PAI-01-GW-12-01, PAI-01-GW-08-01, PAI-01-GW-10-01, PAI-01-GW-09-01, PAI-01-GW-06-01, PAI-01-GW-11-01-AVG, PAI-01-GW-07-01	7/11	5 - 6	1	NA	370	N	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	7		7		ug/L	PAI1-GW4-01	1/11	5 - 6	7	NA	73	N	NA	NA	No	BSL
132-64-9	Dibenzofuran	1	J	3	J	ug/L	PAI-01-GW-10-01	2/11	5 - 6	3	NA	2.4	N	NA	NA	Yes	ASL
84-66-2	Diethyl Phthalate	1	J	1	J	ug/L	PAI-01-GW-10-01, PAI-01-GW-06-01, PAI-01-GW-08-01, PAI-01-GW-09-01	4/11	5 - 6	1	NA	2900	N	NA	NA	No	BSL
206-44-0	Fluoranthene	1	J	1	J	ug/L	PAI-01-GW-13-01, PAI-01-GW-10-01	2/11	5 - 6	1	NA	150	N	NA	NA	No	BSL
86-73-7	Fluorene	1	J	6		ug/L	PAI-01-GW-10-01	2/11	5 - 6	6	NA	24	N	NA	NA	No	BSL
91-20-3	Naphthalene	1	J	57		ug/L	PAI-01-GW-10-01	4/11	5 - 6	57	NA	0.65	N	NA	NA	Yes	ASL
85-01-8	Phenanthrene	1	J	8		ug/L	PAI-01-GW-10-01	4/11	5 - 6	8	NA	0.65 (5)	N	NA	NA	Yes	ASL
129-00-0	Pyrene	1	J	1	J	ug/L	PAI-01-GW-10-01, PAI-01-GW-13-01	2/11	5 - 6	1	NA	18	N	NA	NA	No	BSL

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TABLE 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Inorganics																
7429-90-5	Aluminum	23.3		3970		ug/L	PAI1-GW4-01	5/10	22 - 27	3970	NA	3700	N	50 To 200	SMCL	Yes	ASL
7440-38-2	Arsenic	1.15		4.4		ug/L	PAI-01-GW-09-01	6/11	1.1 - 2.2	4.4	NA	0.045	C	50	MCL	Yes	ASL
7440-39-3	Barium	16.2		1030		ug/L	PAI-01-GW-07-01	11/11	NA	1030	NA	260	N	2000	MCL	Yes	ASL
7440-41-7	Beryllium	0.2		0.7		ug/L	PAI-01-GW-09-01	5/11	0.2 - 0.7	0.7	NA	7.3	N	4	MCL	No	BSL
7440-70-2	Calcium	67200		494000		ug/L	PAI-01-GW-09-01	10/10	NA	494000	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	6.4		18.4		ug/L	PAI-01-GW-09-01	9/11	6.4	18.4	NA	5500 (6)	N	100	MCL	No	BSL
7440-50-8	Copper	2.55		7.8		ug/L	PAI-01-GW-05-01	4/11	2.1 - 3.7	7.8	NA	150	N	1300	TT	No	BSL
7439-89-6	Iron	259		12700		ug/L	PAI-01-GW-06-01	7/10	8.6 - 84.6	12700	NA	1100	N	300	SMCL	Yes	ASL
7439-92-1	Lead	0.5		34.7		ug/L	PAI-01-GW-09-01	10/11	0.9	34.7	NA	15 (7)		15	TT	Yes	ASL
7439-96-5	Magnesium	9650		1180000		ug/L	PAI-01-GW-09-01	10/10	NA	1180000	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	40.3	J	1320		ug/L	PAI-01-GW-05-01	7/10	13.7 - 96.6	1320	NA	73	N	50	SMCL	Yes	ASL
7440-09-7	Potassium	6980		477000		ug/L	PAI-01-GW-09-01	10/10	NA	477000	NA	NA		NA	NA	No	NUT
7440-23-5	Sodium	19400		10100000		ug/L	PAI-01-GW-09-01	10/10	NA	10100000	NA	NA		NA	NA	No	NUT
7440-62-2	Vanadium	3.1		32.6		ug/L	PAI-01-GW-09-01	8/11	6.3 - 8.8	32.6	NA	26	N	NA	NA	Yes	ASL
7440-66-6	Zinc	4.6		16.9		ug/L	PAI-01-GW-05-01	10/11	4.3	16.9	NA	1100	N	5000	SMCL	No	BSL
	Misc																
	TEQ Human	0.004		0.017		pg/L	PAI-01-GW-DU09(s)-02	1/1	NA	0.017	NA	0.45	C	30	MCL	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) Refer to supporting information for background discussion.

(3) USEPA Region III Risk-Based Concentration Table, April 12, 1999. (Cancer benchmark value = 1E-06, HI = 0.1)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) No value available, therefore value for naphthalene used based on similar chemical/toxicological characteristics.

(6) Hexavalent chromium was not detected in groundwater samples, therefore value is for trivalent chromium.

(7) OSWER Screening Level.

Shading indicates chemical exceeded screening criteria and is retained as a COPC.

Definitions:

N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
MCL = Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
TT = Treatment Technique
TEQ = Toxicity equivalent concentration.

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TABLE 2.8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics																
67-64-1	Acetone	7	J	7	J	ug/L	PAI-01-SW-09-00	1/2	2	7	NA	61 (5)	N	NA	NA	No	BSL
	Semivolatile Organics																
91-57-6	2-Methylnaphthalene	10		10		ug/L	PAI-01-SW-03-00	1/8	10 - 11.5	10	NA	12 (5)	N	NA	NA	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	14		56		ug/L	PAI-01-SW-03-00	3/8	10 - 11.5	56	44.8	1.8		1.8	NRWQC	Yes	ASL
218-01-9	Chrysene	0.1	J	0.1	J	ug/L	PAI-01-SW-10-00	1/8	0.12 - 0.24	0.1	NA	0.0044		0.0044	NRWQC	Yes	ASL
132-64-9	Dibenzofuran	10		10		ug/L	PAI-01-SW-03-00	1/8	10 - 11.5	10	NA	2.4 (5)	N	NA	NA	Yes	ASL
206-44-0	Fluoranthene	0.082		0.082		ug/L	PAI-01-SW-04-00	1/8	0.12 - 0.27	0.082	NA	300		300	NRWQC	No	BSL
87-86-5	Pentachlorophenol	110		110		ug/L	PAI-01-SW-03-00	1/8	48 - 57	110	NA	0.28		0.28	NRWQC	Yes	ASL
108-95-2	Phenol	3	J	3	J	ug/L	PAI-01-SW-11-00	1/8	10 - 11.5	3	NA	21000		21000	NRWQC	No	BSL
	Inorganics																
7429-90-5	Aluminum	434		13435		ug/L	PAI-01-SW-01-00-AVG	8/8	262 - 309	13435	3113	3700 (5)	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	13.9		13.9		ug/L	PAI-01-SW-10-00	1/8	2 - 8.3	13.9	5.13	0.018		0.018	NRWQC	Yes	ASL
7440-39-3	Barium	12.6		37.15		ug/L	PAI-01-SW-01-00-AVG	8/8	NA	37.15	38.4	1000	N	NA	NA	No	BSL, BKG
7440-43-9	Cadmium	0.305		0.42		ug/L	PAI-01-SW-01-00-AVG	2/8	0.3	0.42	NA	10		10	NRWQC	No	BSL
7440-70-2	Calcium	228000		290000		ug/L	PAI-01-SW-12-00	8/8	NA	290000	637000	NA		NA	NA	No	NUT
7440-47-3	Chromium	14.1		19.2		ug/L	PAI-01-SW-10-00	2/8	0.7 - 0.8	19.2	22.5	5500 (5,6)	N	NA	NA	No	BSL, BKG
7440-48-4	Cobalt	1.755		2.9		ug/L	PAI-01-SW-10-00	2/8	0.4 - 0.6	2.9	NA	220 (5)	N	NA	NA	No	BSL
7440-50-8	Copper	13.6		62.95		ug/L	PAI-01-SW-01-00-AVG	2/8	1.4 - 9	62.95	6.97	1300		1300	NRWQC	No	BSL
7439-89-6	Iron	175		15600		ug/L	PAI-01-SW-10-00	8/8	NA	15600	2091	300		300	NRWQC	Yes	ASL
7439-92-1	Lead	20.9		77.5		ug/L	PAI-01-SW-01-00-AVG	2/8	1 - 17	77.5	NA	15 (7)		15	TT	Yes	ASL
7439-96-5	Magnesium	693000		883000		ug/L	PAI-01-SW-12-00	8/8	NA	883000	1918667	NA		NA	NA	No	NUT
7439-96-5	Manganese	21.65		124		ug/L	PAI-01-SW-10-00	8/8	NA	124	53.1	50		50	NRWQC	Yes	ASL
7487-94-7	Mercury	0.09		0.12		ug/L	PAI-01-SW-10-00	2/8	0.1 - 0.12	0.12	NA	0.05		0.05	NRWQC	Yes	ASL
7440-02-0	Nickel	3.85		5	J	ug/L	PAI-01-SW-10-00	2/8	0.6 - 1	5	NA	610		610	NRWQC	No	BSL
7440-09-7	Potassium	342500		492000		ug/L	PAI-01-SW-12-00	8/8	NA	492000	831333	NA		NA	NA	No	NUT
7440-22-4	Silver	0.89		0.89		ug/L	PAI-01-SW-11-00	1/8	0.6 - 0.7	0.89	NA	18 (5)	N	NA	NA	No	BSL
7440-23-5	Sodium	5710000		7440000		ug/L	PAI-01-SW-01-00-AVG	8/8	NA	7440000	16226667	NA		NA	NA	No	NUT
7440-62-2	Vanadium	24.2		36.1		ug/L	PAI-01-SW-10-00	2/8	0.5 - 4.1	36.1	18.2	26 (5)	N	NA	NA	Yes	ASL
7440-66-6	Zinc	7.3	J	51.025		ug/L	PAI-01-SW-01-00-AVG	4/8	5 - 28.25	51.025	10.6	9100	N	9100	NRWQC	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) Refer to supporting information for background discussion.

(3) USEPA National Recommended Water Quality Criteria (NRWQC), April 1999.

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions:
N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
MCL = Maximum Contaminant Level

TABLE 2.8

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)

(5) Water quality criteria not available EPA Region III RBC for tap water ingestion used (Cancer benchmark value = 1E-6, HI = 0.1).

(6) Hexavalent chromium was not detected in groundwater samples, therefore value is for trivalent chromium.

(7) OSWER action level for drinking water.

Shading indicates chemical exceeded screening criteria and is retained as a COPC.

SMCL = Secondary Maximum Contaminant Level

TT = Treatment Technique

TABLE 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organics																
67-64-1	Acetone	0.016		0.063		mg/kg	PAI-01-SD-09-01	3/3	NA	0.063	NA	780	N	NA	NA	No	BSL
75-15-0	Carbon Disulfide	0.002	J	0.024	J	mg/kg	PAI-01-SD-001	6/9	0.008 - 1.2	0.024	NA	780	N	NA	NA	No	BSL
108-88-3	Toluene	0.003	J	0.007	J	mg/kg	PAI-01-SD-09-01	6/9	0.019 - 1.2	0.007	NA	1600	N	NA	NA	No	BSL
	Semivolatile Organics																
208-96-8	Acenaphthylene	0.38	J	0.38	J	mg/kg	PAI-01-SD-02-01	1/14	0.071 - 3.6	0.38	NA	160 (5)	N	NA	NA	No	BSL
120-12-7	Anthracene	0.011	J	0.77		mg/kg	PAI-01-SD-001	6/14	0.0028 - 0.85	0.77	NA	2300	N	NA	NA	No	BSL
205-99-2	Benzo(a)anthracene	0.03	J	2.2		mg/kg	PAI-01-SD-017	8/14	0.0071 - 0.85	2.2	NA	0.87	C	NA	NA	Yes	ASL
50-32-8	Benzo(a)pyrene	0.0078	J	1.7		mg/kg	PAI-01-SD-017	9/14	0.0071 - 0.85	1.7	NA	0.087	C	NA	NA	Yes	ASL
205-99-2	Benzo(b)fluoranthene	0.0081	J	1.8		mg/kg	PAI-01-SD-017	10/14	0.0028 - 0.85	1.8	NA	0.87	C	NA	NA	Yes	ASL
191-24-2	Benzo(g,h,i)perylene	0.03	J	0.99		mg/kg	PAI-01-SD-017	7/14	0.011 - 0.85	0.99	NA	160 (5)	N	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	0.0031	J	0.85		mg/kg	PAI-01-SD-017	9/14	0.0028 - 0.85	0.85	NA	8.7	C	NA	NA	No	BSL
86-74-8	Carbazole	0.086	J	0.58		mg/kg	PAI-01-SD-02-01	3/9	0.47 - 1.2	0.58	NA	32	C	NA	NA	No	BSL
218-01-9	Chrysene	0.013	J	2.3		mg/kg	PAI-01-SD-017	9/14	0.0071 - 0.85	2.3	NA	87	C	NA	NA	No	BSL
53-70-3	Dibenzo(a,h)anthracene	1.6		1.6		mg/kg	PAI-01-SD-017	1/14	0.011 - 0.85	1.6	NA	0.087	C	NA	NA	Yes	ASL
206-44-0	Fluoranthene	0.025		6.6		mg/kg	PAI-01-SD-017	9/14	0.0071 - 0.85	6.6	NA	310	N	NA	NA	No	BSL
86-73-7	Fluorene	0.16	J	0.16	J	mg/kg	PAI-01-SD-03-01-AVG	1/14	0.014 - 0.85	0.16	NA	310	N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.03	J	1.1		mg/kg	PAI-01-SD-017	8/14	0.0071 - 0.85	1.1	NA	0.87	C	NA	NA	Yes	ASL
85-01-8	Phenanthrene	0.025	J	2.6		mg/kg	PAI-01-SD-001	8/14	0.0057 - 0.85	2.6	NA	160 (5)	N	NA	NA	No	BSL
129-00-0	Pyrene	0.064	J	5.4		mg/kg	PAI-01-SD-017	7/14	0.014 - 0.85	5.4	NA	230	N	NA	NA	No	BSL
	Pesticides/PCBs																
72-54-8	4,4'-DDD	0.0036	J	0.26		mg/kg	PAI-01-SD-09-01	4/14	0.0057 - 0.032	0.26	NA	2.7	C	NA	NA	No	BSL
72-55-9	4,4'-DDE	0.0055	J	0.12		mg/kg	PAI-01-SD-09-01	6/14	0.0057 - 0.032	0.12	NA	1.9	C	NA	NA	No	BSL
50-29-3	4,4'-DDT	0.0032	J	0.27		mg/kg	PAI-01-SD-09-01	4/13	0.0046 - 0.032	0.27	NA	1.9	C	NA	NA	No	BSL
5103-71-9	Alpha-Chlordane	0.052		0.052		mg/kg	PAI-01-SD-09-01	1/8	0.0023 - 0.0074	0.052	NA	1.8	C	NA	NA	No	BSL
57-74-9	Gamma-Chlordane	0.13		0.13		mg/kg	PAI-01-SD-09-01	1/14	0.0023 - 0.0155	0.13	NA	1.8	C	NA	NA	No	BSL
319-84-6	alpha-BHC	0.0027		0.0027		mg/kg	PAI-01-SD-02-01	1/14	0.0023 - 0.0155	0.0027	NA	0.1	C	NA	NA	No	BSL
319-85-7	beta-BHC	0.0054		0.0054		mg/kg	PAI-01-SD-02-01	1/14	0.0023 - 0.0155	0.0054	NA	0.35	C	NA	NA	No	BSL
319-86-8	delta-BHC	0.0027		0.0027		mg/kg	PAI-01-SD-02-01	1/14	0.0023 - 0.0155	0.0027	NA	0.1 (6)	C	NA	NA	No	BSL
58-89-9	gamma-BHC (Lindane)	0.0021	J	0.0021	J	mg/kg	PAI-01-SD-02-01	1/14	0.0023 - 0.0155	0.0021	NA	0.49	C	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	2110		23400		mg/kg	PAI-01-SD-02-02	14/14	NA	23400	24284	7800	N	NA	NA	No	BKG
7440-36-0	Antimony	0.55		1.3		mg/kg	PAI-01-SD-001	4/14	0.39 - 6	1.3	NA	3.1	N	NA	NA	No	BSL
7440-38-2	Arsenic	1.2		15.6		mg/kg	PAI-01-SD-10-01	13/14	0.27	15.6	12.2	0.43	C	NA	NA	Yes	ASL
7440-39-3	Barium	5.7		88.5		mg/kg	PAI-01-SD-09-01	14/14	NA	88.5	28.0	550	N	NA	NA	No	BSL
7440-41-7	Beryllium	0.7075		1.2		mg/kg	PAI-01-SD-10-01	3/14	0.17 - 0.95	1.2	0.977	16	N	NA	NA	No	BSL
7440-43-9	Cadmium	0.79		0.79		mg/kg	PAI-01-SD-02-02	1/14	0.04 - 0.09	0.79	0.278	7.8	N	NA	NA	No	BSL
7440-70-2	Calcium	387		14500		mg/kg	PAI-01-SD-09-01	14/14	NA	14500	4002	NA		NA	NA	No	NUT
7440-47-3	Chromium	7.1		34.4		mg/kg	PAI-01-SD-10-01	14/14	NA	34.4	35.2	12000 (8)	N	NA	NA	No	BKG
7440-48-4	Cobalt	0.19		3.9		mg/kg	PAI-01-SD-10-01	13/14	5.7	3.9	2.63	470	N	NA	NA	No	BSL

TABLE 2.9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
7440-50-8	Copper	5.5		95.3		mg/kg	PAI-01-SD-001	13/14	3.3	95.3	10.1	310	N	NA	NA	No	BSL
7439-89-6	Iron	1930		24000		mg/kg	PAI-01-SD-02-02	14/14	NA	24000	21450	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	6.6		194		mg/kg	PAI-01-SD-09-01	14/14	NA	194	20.6	400 (9)		NA	NA	No	BSL
7439-96-5	Magnesium	597		7355		mg/kg	PAI-01-SD-013-AVG	14/14	NA	7355	6437	NA		NA	NA	No	NUT
7439-96-5	Manganese	12.3		190		mg/kg	PAI-01-SD-013-AVG	14/14	NA	190	186	160	N	NA	NA	Yes	ASL
7487-94-7	Mercury	0.16		0.67		mg/kg	PAI-01-SD-09-01	2/14	0.07 - 0.28	0.67	0.09	2.3 (10)	N	NA	NA	No	BSL
7440-02-0	Nickel	1.4		7.9		mg/kg	PAI-01-SD-10-01	12/14	0.75 - 11.3	7.9	5.95	160	N	NA	NA	No	BSL
7440-09-7	Potassium	331		4475		mg/kg	PAI-01-SD-013-AVG	14/14	NA	4475	3190	NA		NA	NA	No	NUT
7440-22-4	Silver	0.36		2.4		mg/kg	PAI-01-SD-09-01	2/14	0.06 - 1.1	2.4	NA	39	N	NA	NA	No	BSL
7440-23-5	Sodium	2620		25550		mg/kg	PAI-01-SD-013-AVG	14/14	NA	25550	19110	NA		NA	NA	No	NUT
7440-28-0	Thallium	0.925		0.925		mg/kg	PAI-01-SD-013-AVG	1/14	0.38 - 1.1	0.925	0.405	0.55	N	NA	NA	Yes	ASL
7440-62-2	Vanadium	4.3		50.65		mg/kg	PAI-01-SD-013-AVG	14/14	NA	50.65	49.6	55	N	NA	NA	No	BSL
7440-66-6	Zinc	10.5		124		mg/kg	PAI-01-SD-09-01	14/14	NA	124	45.0	2300	N	NA	NA	No	BSL
	Misc																
	TEQ Human	0.06		3.3		ng/kg	PAI-01-SD-11	3/3	NA	3.3	1.1	4.3	C	1000	(7)	No	BSL

Notes:

1 Minimum/maximum detected concentration

2 Refer to supporting information for background discussion.

3 U.S. EPA Region 3 Risk-Based Concentration Table, April 12, 1999. (Cancer benchmark value = 1E-06, HI = 0.1)

4 Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

5 No value available; therefore, value for naphthalene was used based on similar chemical/toxicological characteristics.

6 No value available; therefore, value for alpha-BHC was used based on similar chemical/toxicological characteristics.

7 U.S. EPA Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites. OSWER Directive 9200.4-26.

8 Hexavalent chromium was not detected in sediment samples; therefore, value is for trivalent chromium.

9 OSWER Screening Level

10 No value available; therefore, value for mercuric chloride used based on similar chemical/toxicological characteristics..

Shading indicates chemical exceeded screening criteria and is retained as a COPC.

Definitions:
N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic
TEQ - Toxicity equivalent concentration.

E-35

TABLE 3.1

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil
Exposure Point: Site 1

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)pyrene equivalents	mg/kg	0.124	0.183	0.414		mg/kg	0.414	Max	W - Test (4)	NA	NA	NA
4,4'-DDE	mg/kg	0.395	0.923	4.2	J	mg/kg	2.38	95% UCL-L	W - Test (1)	NA	NA	NA
4,4'-DDT	mg/kg	0.389	0.940	4.4	J	mg/kg	4.4	Max	W - Test (2)	NA	NA	NA
Aluminum	mg/kg	5668	6474	8610		mg/kg	6474	95% UCL-N	W - Test (3)	NA	NA	NA
Antimony	mg/kg	7.03	18.4	90.6		mg/kg	90.6	Max	W - Test (4)	NA	NA	NA
Arsenic	mg/kg	4.34	7.58	24.9		mg/kg	11.5	95% UCL-L	W - Test (1)	NA	NA	NA
Cadmium	mg/kg	0.924	1.65	5.4		mg/kg	3.39	95% UCL-L	W - Test (1)	NA	NA	NA
Iron	mg/kg	19558	37876	147000		mg/kg	147000	Max	W - Test (4)	NA	NA	NA
Lead	mg/kg	834	1872	8380		mg/kg	2805	95% UCL-L	W - Test (1)	NA	NA	NA
Manganese	mg/kg	123	215	752		mg/kg	264	95% UCL-L	W - Test (1)	NA	NA	NA

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Shapiro-Wilk W Test indicates that data is lognormally distributed.

(2) - Shapiro-Wilk W Test indicates that data is lognormally distributed, UCL exceeds maximum detected concentration, therefore maximum detected concentration is used as EPC.

(3) - Shapiro-Wilk W Test indicates that data is normally distributed.

(4) - Shapiro-Wilk W Test was inconclusive.

TABLE 3.2

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 1

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Chloroform	ug/L	0.509	0.588	0.9	J	ug/L	0.9	Max	W - Test (1)	NA	NA	NA
Dibenzofuran	ug/L	2.55	2.86	3	J	ug/L	3	Max	W - Test (1)	NA	NA	NA
Naphthalene	ug/L	7.59	16.6	57		ug/L	57	Max	W - Test (1)	NA	NA	NA
Phenanthrene	ug/L	2.73	3.78	8		ug/L	8	Max	W - Test (1)	NA	NA	NA
Aluminum	ug/L	431	1152	3970		ug/L	3970	Max	W - Test (1)	NA	NA	NA
Arsenic	ug/L	1.66	2.28	4.4		ug/L	2.72	95% UCL-L	W - Test (2)	NA	NA	NA
Barium	ug/L	424	621	1030		ug/L	1030	Max	W - Test (3)	NA	NA	NA
Cadmium	ug/L	1.37	1.75	2.7		ug/L	1.90	95% UCL-L	W - Test (2)	NA	NA	NA
Iron	ug/L	3023	5426	12700		ug/L	12700	Max	W - Test (3)	NA	NA	NA
Lead	ug/L	11.4	17.7	34.7		ug/L	34.7	Max	W - Test (3)	NA	NA	NA
Manganese	ug/L	224	451	1320		ug/L	1320	Max	W - Test (3)	NA	NA	NA
Thallium	ug/L	4.55	5.88	3.1		ug/L	3.1	Max	W - Test (1)	NA	NA	NA
Vanadium	ug/L	7.98	12.6	32.6		ug/L	13.4	95% UCL-L	W - Test (2)	NA	NA	NA

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Shapiro-Wilk W Test was inconclusive.

(2) - Shapiro-Wilk W Test indicates that data is lognormally distributed.

(3) - Shapiro-Wilk W Test indicates that data is lognormally distributed, UCL exceeds maximum detected concentration, therefore maximum detected concentration is used as EPC.

TABLE 3.3

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)pyrene equivalents	ug/L	0.0004	(4)	0.0007		ug/L	0.0007	Max	W - Test (1)	NA	NA	NA
Bis(2-ethylhexyl)phthalate	ug/L	13.8	24.3	56		ug/L	56	Max	W - Test (1)	NA	NA	NA
Dibenzofuran	ug/L	5.75	6.75	10		ug/L	10	Max	W - Test (1)	NA	NA	NA
Pentachlorophenol	ug/L	35.1	52.5	110		ug/L	110	Max	W - Test (1)	NA	NA	NA
Aluminum	ug/L	4356	7922	13435		ug/L	13435	Max	W - Test (2)	NA	NA	NA
Arsenic	ug/L	2.95	5.68	13.9		ug/L	14	Max	W - Test (1)	NA	NA	NA
Iron	ug/L	3597	6921	15600		ug/L	15600	Max	W - Test (2)	NA	NA	NA
Lead	ug/L	18.2	34.8	77.5		ug/L	78	Max	W - Test (2)	NA	NA	NA
Manganese	ug/L	61.4	83.5	124		ug/L	101	Max	W - Test (3)	NA	NA	NA
Vanadium	ug/L	8.86	17.1	36.1		ug/L	36	Max	W - Test (2)	NA	NA	NA

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Shapiro-Wilk W Test was inconclusive.

(2) - Shapiro-Wilk W Test indicates that data is lognormally distributed, UCL exceeds maximum detected concentration, therefore maximum detected concentration is used as EPC.

(3) - Shapiro-Wilk W Test indicates that data is lognormally distributed.

TABLE 3.4

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)pyrene equivalents	mg/kg	0.675	1.36	3.82		mg/kg	3.82	95% UCL-L	W - Test (4)	NA	NA	NA
Arsenic	mg/kg	6.25	8.54	15.6		mg/kg	8.54	95% UCL-N	W - Test (1)	NA	NA	NA
Iron	mg/kg	13221	17027	24000		mg/kg	24000	Max	W - Test (2)	NA	NA	NA
Manganese	mg/kg	92.5	121	190		mg/kg	171	95% UCL-L	W - Test (3)	NA	NA	NA
Thallium	mg/kg	0.348	0.444	0.925		mg/kg	0.454	95% UCL-L	W - Test (3)	NA	NA	NA

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Shapiro-Wilk W Test indicates that data is normally distributed.

(2) - Shapiro-Wilk W Test was inconclusive.

(3) - Shapiro-Wilk W Test indicates that data is lognormally distributed.

(4) - Shapiro-Wilk W Test indicates that data is lognormally distributed, UCL exceeds maximum detected concentration, therefore maximum detected concentration is used as EPC.

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	N/A	N/A	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	480	EPA, 1993	N/A	N/A	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	N/A	N/A	
	FI	Fraction Ingested	unitless	1	EPA, 1993	N/A	N/A	
	EF	Exposure Frequency	days/year	125	EPA, 1993	N/A	N/A	
	ED	Exposure Duration	years	1	(1)	N/A	N/A	
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	N/A	N/A	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	N/A	N/A	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	N/A	N/A	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	4100	(2)	N/A	N/A	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.5	EPA, 1998	N/A	N/A	
	DABS	Absorption Factor	unitless	See Text	See Text	N/A	N/A	
	EF	Exposure Frequency	days/year	125	EPA, 1993	N/A	N/A	
	ED	Exposure Duration	years	1	(1)	N/A	N/A	
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	N/A	N/A	

Notes:

(1) - Professinal judgement.

(2) - Assume hands, forearms, and head are exposed (EPA, 1992).

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

EPA, 1992: Dermal Exposure Assessment: Principles and Applications.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

TABLE 4.2

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	2490	(1)	NA	NA	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(2)	NA	NA	
	ET	Exposure Time	hours/event	8	(2)	NA	NA	
	EF	Exposure Frequency	days/year	21	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	1	(2)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	

Notes:

(1) - Assumes forearms and hands are exposed (EPA, 1992).

(2) - Professional judgement.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

TABLE 4.3

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text.	See Text.	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	480	EPA, 1993	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	21	(1)	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text.	See Text.	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	4100	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.5	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	See Text.	- -	NA	NA	
	EF	Exposure Frequency	days/year	21	(1)	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(1) - Assume hands, forearms, and head are exposed (EPA, 1992).

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1992: Dermal Exposure Assessment: Principles and Applications.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

TABLE 4.4

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1995	NA	NA	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	ug/mg	0.001	- -	NA	NA	
	ET	Exposure Time	hours/event	8	(1)	NA	NA	
	EF	Exposure Frequency	events/year	21	EPA, 1995	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	2490	(1)	NA	NA	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	8	EPA, 1989	NA	NA	
	EF	Exposure Frequency	days/year	21	EPA, 1995	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

EPA Region 4, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletiin No. 3.

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Maintenance Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	N/A	N/A	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA, 1993	N/A	N/A	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	N/A	N/A	
	FI	Fraction Ingested	unitless	1	EPA, 1993	N/A	N/A	
	EF	Exposure Frequency	days/year	50	(1)	N/A	N/A	
	ED	Exposure Duration	years	25	EPA, 1993	N/A	N/A	
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	9125	EPA, 1989	N/A	N/A	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	N/A	N/A	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	N/A	N/A	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	4100	(2)	N/A	N/A	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	N/A	N/A	
	DABS	Absorption Factor	unitless	See Text	See Text	N/A	N/A	
	EF	Exposure Frequency	days/year	50	(1)	N/A	N/A	
	ED	Exposure Duration	years	25	EPA, 1993	N/A	N/A	
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	9125	EPA, 1989	N/A	N/A	

Notes:

(1) - Profesional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Maintenance Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA, 1993	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	25	(1)	NA	NA	
	ED	Exposure Duration	years	25	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	9125	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	4100	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	25	(1)	NA	NA	
	ED	Exposure Duration	years	25	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	EPA, 1989	NA	NA	

Notes:

(1) - Professional Judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	(1)	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	(1)	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.9

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1988	NA	NA	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	ug/mg	0.001	- -	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1988: Superfund Exposure Assessment Manual.

TABLE 4.10

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	(1)	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.11

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	(1)	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.12

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1988	NA	NA	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	ug/mg	0.001	--	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1988: Superfund Exposure Assessment Manual.

TABLE 4.13

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	Default Value	RME Rationale/ Reference	Site-Specific Value	Site-Specific Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Cfish	Chemical Concentration in fish	mg/kg	See Text	See Text	See Text	See Text	Intake (mg/kg/day) =
	IR	Fish/shellfish ingestion rate	kg/day	0.054	EPA, 1995	0.145	EPA, 1995	$\frac{Cfish \times IR \times FI \times EF \times ED}{BW \times AT}$
	FI	Fraction ingested from source	unitless	1	EPA, 1995	1	EPA, 1995	
	EF	Exposure Frequency	day/year	350	EPA, 1995	45	(1)	
	ED	Exposure Duration	years	30	EPA, 1995	6	(2)	
	BW	Body Weight	kg	70	EPA, 1993	70	EPA, 1993	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	25550	EPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	10950	EPA, 1989	2190	EPA, 1989	

Notes:

(1) - Assumes approximately one day a week.

(2) - Assumes two 3 year tours of duty.

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

EPA 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

TABLE 4.14

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	200	EPA, 1993	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	2000	(1)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.15

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	200	EPA, 1993	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	1743	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.16

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1988	NA	NA	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	ug/mg	0.001	- -	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	2000	(2)	NA	NA	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1988: Superfund Exposure Assessment Manual.

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

TABLE 4.17

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA, 1993	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(1)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.07	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	

Notes:

(1) - Assume 25 percent of total body surface area available for contact.

Sources: .

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.18

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	(1)	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.07	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	See Text	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.19

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Text	See Text	NA	NA	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1988	NA	NA	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	ug/mg	0.001	- -	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1988: Superfund Exposure Assessment Manual.

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)
Volatile Organics										
Chloroform	Chronic	1E-02	(mg/kg/day)	20%	2.0E-03	(mg/kg/day)	Liver	1000/1	IRIS:IRIS	10/01/99:10/01/99
Semivolatile Organics										
Benzo(a)pyrene	Chronic	NA	(mg/kg/day)	31%	NA	(mg/kg/day)	Cancer	NA	NA	NA
Bis(2-ethylhexyl)phthalate	Chronic	2E-02	(mg/kg/day)	19%	3.8E-03	(mg/kg/day)	Liver	1000/1	IRIS:IRIS	10/01/99:10/01/99
Dibenzofuran	Chronic	4E-03	(mg/kg/day)	100%	4.0E-03	(mg/kg/day)	None Specified	NA	EPAIII	04/12/99
Naphthalene	Chronic	2E-02	(mg/kg/day)	31%	6.2E-03	(mg/kg/day)	Body Weight	3000/1	IRIS:IRIS	10/01/99:10/01/99
Pentachlorophenol	Chronic	3E-02	(mg/kg/day)	100%	3.0E-02	(mg/kg/day)	Liver, Kidney	100/1	IRIS:IRIS	10/01/99:10/01/99
Phenanthrene	Chronic	NA	(mg/kg/day)	31%	NA	(mg/kg/day)	NA	NA	NA	NA
Pesticides/PCBs										
DDE	Chronic	NA	(mg/kg/day)	70%	NA	(mg/kg/day)	Cancer	NA	NA	NA
DDT	Chronic	5E-04	(mg/kg/day)	70%	3.5E-04	(mg/kg/day)	Liver	100/1	IRIS:IRIS	10/01/99:10/01/99
alpha-BHC	Chronic	NA	(mg/kg/day)	70%	NA	(mg/kg/day)	NA	NA	NA	NA
beta-BHC	Chronic	NA	(mg/kg/day)	70%	NA	(mg/kg/day)	NA	NA	NA	NA
gamma-chlordane	Chronic	5E-04	(mg/kg/day)	50%	2.5E-04	(mg/kg/day)	Liver	300/1	IRIS:IRIS	10/01/99:10/01/99
Inorganics										
Aluminum	Chronic	1E+00	(mg/kg/day)	10%	1.0E-01	(mg/kg/day)	Body Weight	NA	EPAIII	04/12/99:05/26/99
Antimony	Chronic	4E-04	(mg/kg/day)	2%	8.0E-06	(mg/kg/day)	Blood	1000/1	IRIS:IRIS	10/01/99:10/01/99
Arsenic	Chronic	3E-04	(mg/kg/day)	41%	1.2E-04	(mg/kg/day)	Skin	3/1	IRIS:IRIS	10/01/99:10/01/99
Barium	Chronic	7E-02	(mg/kg/day)	7%	4.9E-03	(mg/kg/day)	CVS	3/1	IRIS:IRIS	10/01/99:10/01/99
Cadmium	Chronic	5E-04	(mg/kg/day)	1%	5.0E-06	(mg/kg/day)	Kidney	10/1	IRIS:IRIS	10/01/99:10/01/99
Iron	Chronic	3E-01	(mg/kg/day)	15%	4.5E-02	(mg/kg/day)	Blood	NA	EPAIII	04/12/99:05/26/99
Lead	Chronic	NA	(mg/kg/day)	15%	NA	(mg/kg/day)	CNS	NA	NA	NA
Manganese	Chronic	2E-02	(mg/kg/day)	4%	8.0E-04	(mg/kg/day)	CNS	1/1	IRIS:IRIS	10/01/99:10/01/99
Methyl Mercury	Chronic	1E-04	(mg/kg/day)	90%	9.0E-05	(mg/kg/day)	CNS	10/1	IRIS:IRIS	10/01/99:10/01/99
Thallium	Chronic	7E-05	(mg/kg/day)	15%	1.1E-05	(mg/kg/day)	None Specified	NA	EPAIII	04/12/99
Vanadium	Chronic	7E-03	(mg/kg/day)	1%	7.0E-05	(mg/kg/day)	None Specified	100	HEAST	07/97

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal RfD (2)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (MM/DD/YY)

Notes:

N/A = Not Applicable

(1) - USEPA Region IV, February 26, 1996.

(2) - RfDdermal = RfDoral x Oral to Dermal Adjustment Factor

(3) For IRIS values date that IRIS was searched.
For HEAST values, provide the date of HEAST.
FOR EPAIII, date of RBC Table.

NA = Not Applicable

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

EPAIII = USEPA Region III Risk-Based Concentration Table, April 12, 1999.

CNS = Central Nervous System

CVS = Cardiovascular System

Gastro = Gastro-Intestinal System

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TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (3) (MM/DD/YY)
Volatile Organics							
Chloroform	6.1E-03	20%	3.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	10/01/99
Semivolatile Organics							
Benzo(a)pyrene	7.3E+00	31%	2.4E+01	$(mg/kg/day)^{-1}$	B2	IRIS	10/01/99
Bis(2-ethylhexyl)phthalate	1.4E-02	19%	7.4E-02	$(mg/kg/day)^{-1}$	B2	IRIS	10/01/99
Dibenzofuran	NA	100%	NA	$(mg/kg/day)^{-1}$	D	NA	NA
Naphthalene	NA	31%	NA	$(mg/kg/day)^{-1}$	C	IRIS	10/01/99
Pentachlorophenol	1.2E-01	100%	1.2E-01	$(mg/kg/day)^{-1}$	B2	IRIS	10/01/99
Phenanthrene	NA	31%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Pesticides/PCBs							
DDE	3.4E-01	70%	4.9E-01	$(mg/kg/day)^{-1}$	B2	IRIS	10/01/99
DDT	3.4E-01	70%	4.9E-01	$(mg/kg/day)^{-1}$	B2	IRIS	10/01/99
alpha-BHC	6.3E+00	70%	9.0E+00	$(mg/kg/day)^{-1}$	B2	IRIS	10/01/99
beta-BHC	1.8E+00	70%	2.6E+00	$(mg/kg/day)^{-1}$	C	IRIS	10/01/99
gamma-chlordane	3.5E-01	50%	7.0E-01	$(mg/kg/day)^{-1}$	B2	IRIS	10/01/99
Inorganics							
Aluminum	NA	10%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Antimony	NA	2%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Arsenic	1.5E+00	41%	3.7E+00	$(mg/kg/day)^{-1}$	A	IRIS	10/01/99
Barium	NA	7%	NA	$(mg/kg/day)^{-1}$	D	IRIS	10/01/99
Cadmium	NA	1%	NA	$(mg/kg/day)^{-1}$	B1	NA	NA
Iron	NA	15%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Lead	NA	15%	NA	$(mg/kg/day)^{-1}$	B2	NA	NA
Manganese	NA	4%	NA	$(mg/kg/day)^{-1}$	D	IRIS	10/01/99
Methyl Mercury	NA	90%	NA	$(mg/kg/day)^{-1}$	C	IRIS	10/01/99
Thallium	NA	15%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Vanadium	NA	1%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA

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TABLE 6.1

CANCER TOXICITY DATA -- ORAL/DERMAL

MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (3) (MM/DD/YY)

Notes:

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

(1) - USEPA Region IV, February 26, 1996.

(2) - CSFdermal = CSForal/Oral to Dermal Adjustment Factor.

(3) - For IRIS values, the date IRIS was searched.
For HEAST values, the date of the latest HEAST.

Weight of Evidence:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

E-6/6

TABLE 7.1
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	9.7E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	5.6E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	1.0E-05	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	2.1E-02
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.5E-02	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	1.5E-02
	Antimony	90.6	mg/kg	90.6	mg/kg	M	2.1E-04	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	5.3E-01
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	2.7E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	9.0E-02
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	8.0E-06	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.6E-02
	Iron	147000	mg/kg	147000	mg/kg	M	3.5E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.2E+00
	Lead	2805	mg/kg	2805	mg/kg	M	6.6E-03	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	6.2E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.1E-02
	(Total)												1.9E+00
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	5.4E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	2.4E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	4.4E-07	mg/kg/day	3.5E-04	mg/kg/day	N/A	N/A	1.3E-03
	Aluminum	6474	mg/kg	6474	mg/kg	M	6.5E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	6.5E-04
	Antimony	90.6	mg/kg	90.6	mg/kg	M	9.1E-07	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	1.1E-01
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	3.5E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.8E-02
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	3.4E-07	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	6.8E-02
	Iron	147000	mg/kg	147000	mg/kg	M	1.5E-03	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	3.3E-02
	Lead	2805	mg/kg	2805	mg/kg	M	2.8E-05	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	2.6E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.3E-03
	(Total)												2.5E-01
												Total Hazard Index Across All Exposure Routes/Pathways	2.1E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.2
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	Chloroform	0.9	ug/L	0.9	ug/L	M	1.1E-07	mg/kg/day	2.0E-03	mg/kg/day	N/A	N/A	5.6E-05
	Dibenzofuran	3	ug/L	3	ug/L	M	5.0E-06	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.3E-03
	Naphthalene	57	ug/L	57	ug/L	M	4.6E-05	mg/kg/day	6.2E-03	mg/kg/day	N/A	N/A	7.4E-03
	Phenanthrene	8	ug/L	8	ug/L	M	2.1E-05	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Aluminum	3970	ug/L	3970	ug/L	M	6.5E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	6.5E-04
	Arsenic	2.72	ug/L	2.72	ug/L	M	4.5E-08	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	3.6E-04
	Barium	1030	ug/L	1030	ug/L	M	1.7E-05	mg/kg/day	4.9E-03	mg/kg/day	N/A	N/A	3.4E-03
	Iron	12700	ug/L	12700	ug/L	M	2.1E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	4.6E-03
	Lead	34.7	ug/L	34.7	ug/L	M	5.7E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	1320	ug/L	1320	ug/L	M	2.2E-05	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	2.7E-02
	Vanadium	13.4	ug/L	13.4	ug/L	M	2.2E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	3.1E-03
	(Total)												4.8E-02
												Total Hazard Index Across All Exposure Routes/Pathways	4.8E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.3
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.5E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	3.4E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.1E-02
	Iron	24000	mg/kg	24000	mg/kg	M	9.5E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	3.2E-02
	Manganese	171	mg/kg	171	mg/kg	M	6.7E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.4E-03
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.8E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	2.6E-03
	(Total)												4.9E-02
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	8.4E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	4.3E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	3.5E-03
	Iron	24000	mg/kg	24000	mg/kg	M	4.0E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	9.0E-04
	Manganese	171	mg/kg	171	mg/kg	M	2.9E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.6E-04
	Thallium	0.454	mg/kg	0.454	mg/kg	M	7.6E-10	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	7.3E-05
	(Total)												4.8E-03
												Total Hazard Index Across All Exposure Routes/Pathways	5.4E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.4
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	4.6E-11	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	3.7E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.8E-04
	Dibenzofuran	10	ug/L	10	ug/L	M	6.6E-07	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.6E-04
	Pentachlorophenol	110	ug/L	110	ug/L	M	7.2E-06	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	2.4E-04
	Aluminum	13435	ug/L	13435	ug/L	M	8.8E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	8.8E-04
	Arsenic	13.9	ug/L	13.9	ug/L	M	9.1E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	3.0E-03
	Iron	15600	ug/L	15600	ug/L	M	1.0E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	3.4E-03
	Lead	77.5	ug/L	77.5	ug/L	M	5.1E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	101	ug/L	101	ug/L	M	6.6E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.3E-04
	Vanadium	36.1	ug/L	36.1	ug/L	M	2.4E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	3.4E-04
	(Total)												8.6E-03
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	1.3E-09	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	1.2E-03	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	3.2E-01
	Dibenzofuran	10	ug/L	10	ug/L	M	1.7E-05	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	4.2E-03
	Pentachlorophenol	110	ug/L	110	ug/L	M	1.5E-03	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	4.9E-02
	Aluminum	13435	ug/L	13435	ug/L	M	2.2E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	2.2E-03
	Arsenic	13.9	ug/L	13.9	ug/L	M	2.3E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.9E-03
	Iron	15600	ug/L	15600	ug/L	M	2.6E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	5.7E-03
	Lead	77.5	ug/L	77.5	ug/L	M	1.3E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	101	ug/L	101	ug/L	M	1.7E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	2.1E-03
	Vanadium	36.1	ug/L	36.1	ug/L	M	5.9E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	8.4E-03
	(Total)												3.9E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.0E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Maintenance Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	8.1E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	4.7E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	8.6E-07	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.7E-03
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.3E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	1.3E-03
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.8E-05	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	4.4E-02
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	2.3E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	7.5E-03
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	6.6E-07	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.3E-03
	Iron	147000	mg/kg	147000	mg/kg	M	2.9E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	9.6E-02
	Lead	2805	mg/kg	2805	mg/kg	M	5.5E-04	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	5.2E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.6E-03
	(Total)												1.5E-01
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	8.6E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	3.8E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	7.1E-08	mg/kg/day	3.5E-04	mg/kg/day	N/A	N/A	2.0E-04
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.0E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.0E-04
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.5E-07	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	1.8E-02
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	5.5E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.5E-03
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	5.4E-08	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	1.1E-02
	Iron	147000	mg/kg	147000	mg/kg	M	2.4E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	5.2E-03
	Lead	2805	mg/kg	2805	mg/kg	M	4.5E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	4.2E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	5.3E-04
	(Total)												4.0E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.9E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

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TABLE 7.6
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Maintenance Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	3.7E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	8.4E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	2.8E-03
	Iron	24000	mg/kg	24000	mg/kg	M	2.3E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	7.8E-03
	Manganese	171	mg/kg	171	mg/kg	M	1.7E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	8.4E-04
	Thallium	0.454	mg/kg	0.454	mg/kg	M	4.4E-08	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	6.3E-04
	(Total)												1.2E-02
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	4.0E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	2.1E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.7E-03
	Iron	24000	mg/kg	24000	mg/kg	M	1.9E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	4.3E-04
	Manganese	171	mg/kg	171	mg/kg	M	1.4E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	1.7E-04
	Thallium	0.454	mg/kg	0.454	mg/kg	M	3.6E-10	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	3.5E-05
	(Total)												2.3E-03
												Total Hazard Index Across All Exposure Routes/Pathways	1.4E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.7
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.1E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	6.5E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	1.2E-06	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	2.4E-03
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.8E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	1.8E-03
	Antimony	90.6	mg/kg	90.6	mg/kg	M	2.5E-05	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	6.2E-02
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	3.2E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.1E-02
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	9.3E-07	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.9E-03
	Iron	147000	mg/kg	147000	mg/kg	M	4.0E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.3E-01
	Lead	2805	mg/kg	2805	mg/kg	M	7.7E-04	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	7.2E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.6E-03
	(Total)												2.2E-01
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.1E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	5.0E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	9.2E-08	mg/kg/day	3.5E-04	mg/kg/day	N/A	N/A	2.6E-04
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.4E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.4E-04
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.9E-07	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.4E-02
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	7.2E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	5.9E-03
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	7.1E-08	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	1.4E-02
	Iron	147000	mg/kg	147000	mg/kg	M	3.1E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	6.8E-03
	Lead	2805	mg/kg	2805	mg/kg	M	5.9E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	5.5E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	6.9E-04
	(Total)												5.2E-02
												Total Hazard Index Across All Exposure Routes/Pathways	2.7E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.8
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.0E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	2.3E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	7.8E-03
	Iron	24000	mg/kg	24000	mg/kg	M	6.6E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	2.2E-02
	Manganese	171	mg/kg	171	mg/kg	M	4.7E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.3E-03
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.2E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.8E-03
	(Total)												3.4E-02
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.0E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	5.4E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.4E-03
	Iron	24000	mg/kg	24000	mg/kg	M	5.0E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.1E-03
	Manganese	171	mg/kg	171	mg/kg	M	3.6E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	4.5E-04
	Thallium	0.454	mg/kg	0.454	mg/kg	M	9.5E-10	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	9.1E-05
	(Total)												6.0E-03
												Total Hazard Index Across All Exposure Routes/Pathways	4.0E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.9
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	5.0E-11	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	4.0E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.0E-04
	Dibenzofuran	10	ug/L	10	ug/L	M	7.1E-07	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.8E-04
	Pentachlorophenol	110	ug/L	110	ug/L	M	7.8E-06	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	2.6E-04
	Aluminum	13435	ug/L	13435	ug/L	M	9.6E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	9.6E-04
	Arsenic	13.9	ug/L	13.9	ug/L	M	9.9E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	3.3E-03
	Iron	15600	ug/L	15600	ug/L	M	1.1E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	3.7E-03
	Lead	77.5	ug/L	77.5	ug/L	M	5.5E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	101	ug/L	101	ug/L	M	7.2E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.6E-04
	Vanadium	36.1	ug/L	36.1	ug/L	M	2.6E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	3.7E-04
	(Total)												9.3E-03
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	3.8E-09	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	3.5E-03	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	9.3E-01
	Dibenzofuran	10	ug/L	10	ug/L	M	4.8E-05	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.2E-02
	Pentachlorophenol	110	ug/L	110	ug/L	M	4.3E-03	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	1.4E-01
	Aluminum	13435	ug/L	13435	ug/L	M	3.7E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	3.7E-03
	Arsenic	13.9	ug/L	13.9	ug/L	M	3.8E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	3.1E-03
	Iron	15600	ug/L	15600	ug/L	M	4.2E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	9.4E-03
	Lead	77.5	ug/L	77.5	ug/L	M	2.1E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	101	ug/L	101	ug/L	M	2.7E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.4E-03
	Vanadium	36.1	ug/L	36.1	ug/L	M	9.8E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.4E-02
	(Total)												1.1E+00
												Total Hazard Index Across All Exposure Routes/Pathways	1.1E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.10
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	7.3E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	4.2E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	7.7E-07	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.5E-03
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.1E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	1.1E-03
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.6E-05	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	4.0E-02
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	2.0E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	6.8E-03
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	6.0E-07	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.2E-03
	Iron	147000	mg/kg	147000	mg/kg	M	2.6E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	8.6E-02
	Lead	2805	mg/kg	2805	mg/kg	M	4.9E-04	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	4.6E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.3E-03
	(Total)												1.4E-01
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.1E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	4.8E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	8.8E-08	mg/kg/day	3.5E-04	mg/kg/day	N/A	N/A	2.5E-04
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.3E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.3E-04
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.8E-07	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.3E-02
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	6.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	5.6E-03
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	6.8E-08	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	1.4E-02
	Iron	147000	mg/kg	147000	mg/kg	M	3.0E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	6.6E-03
	Lead	2805	mg/kg	2805	mg/kg	M	5.6E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	5.3E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	6.6E-04
	(Total)												5.0E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.9E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.11
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	6.7E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	1.5E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	5.0E-03
	Iron	24000	mg/kg	24000	mg/kg	M	4.2E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.4E-02
	Manganese	171	mg/kg	171	mg/kg	M	3.0E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.5E-03
	Thallium	0.454	mg/kg	0.454	mg/kg	M	8.0E-08	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.1E-03
	(Total)												2.2E-02
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.0E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	5.1E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.2E-03
	Iron	24000	mg/kg	24000	mg/kg	M	4.8E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.1E-03
	Manganese	171	mg/kg	171	mg/kg	M	3.4E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	4.3E-04
	Thallium	0.454	mg/kg	0.454	mg/kg	M	9.1E-10	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	8.7E-05
	(Total)												5.8E-03
												Total Hazard Index Across All Exposure Routes/Pathways	2.8E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.12
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	3.2E-11	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	2.6E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.3E-04
	Dibenzofuran	10	ug/L	10	ug/L	M	4.6E-07	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.1E-04
	Pentachlorophenol	110	ug/L	110	ug/L	M	5.0E-06	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	1.7E-04
	Aluminum	13435	ug/L	13435	ug/L	M	6.2E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	6.2E-04
	Arsenic	13.9	ug/L	13.9	ug/L	M	6.4E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	2.1E-03
	Iron	15600	ug/L	15600	ug/L	M	7.1E-04	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	2.4E-03
	Lead	77.5	ug/L	77.5	ug/L	M	3.5E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	101	ug/L	101	ug/L	M	4.6E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.3E-04
	Vanadium	36.1	ug/L	36.1	ug/L	M	1.7E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	2.4E-04
	(Total)												6.0E-03
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	3.7E-09	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	3.4E-03	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	8.9E-01
	Dibenzofuran	10	ug/L	10	ug/L	M	4.6E-05	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.1E-02
	Pentachlorophenol	110	ug/L	110	ug/L	M	4.1E-03	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	1.4E-01
	Aluminum	13435	ug/L	13435	ug/L	M	3.5E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	3.5E-03
	Arsenic	13.9	ug/L	13.9	ug/L	M	3.6E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.9E-03
	#REF!	#REF!	ug/L	#REF!	ug/L	M	#REF!	mg/kg/day	#REF!	mg/kg/day	N/A	N/A	--
	Iron	15600	ug/L	15600	ug/L	M	4.1E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	9.0E-03
	Lead	77.5	ug/L	77.5	ug/L	M	2.0E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	101	ug/L	101	ug/L	M	2.6E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.3E-03
	Vanadium	36.1	ug/L	36.1	ug/L	M	9.4E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.3E-02
	(Total)												1.1E+00
												Total Hazard Index Across All Exposure Routes/Pathways	1.1E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.13
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - MAXIMUM CONCENTRATIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bis(2-Ethylhexyl)phthalate	7.28	mg/kg	7.28	mg/kg	R	5.4E-03	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.7E-01
	Dibenzofuran	6.90	mg/kg	6.90	mg/kg	R	5.1E-03	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.3E+00
	Pentachlorophenol	43.7	mg/kg	43.7	mg/kg	R	3.2E-02	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	1.1E+00
	Aluminum	1276	mg/kg	1276	mg/kg	R	9.4E-01	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	9.4E-01
	Arsenic	0.612	mg/kg	0.612	mg/kg	R	4.5E-04	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.5E+00
	Iron	7020	mg/kg	7020	mg/kg	R	5.2E+00	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.7E+01
	Lead	3.80	mg/kg	3.80	mg/kg	R	2.8E-03	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	46.3	mg/kg	46.3	mg/kg	R	3.4E-02	mg/kg/day	2.4E-02	mg/kg/day	N/A	N/A	1.4E+00
	Mercury	0.451	mg/kg	0.451	mg/kg	R	3.3E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.7E-02
	(Total)												2.4E+01
												Total Hazard Index Across All Exposure Routes/Pathways	2.4E+01

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

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TABLE 7.14
CALCULATION OF NON-CANCER HAZARDS
SITE-SPECIFIC EXPOSURE ASSUMPTIONS - MAXIMUM CONCENTRATIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bis(2-Ethylhexyl)phthalate	7.28	mg/kg	7.28	mg/kg	R	1.9E-03	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	9.3E-02
	Dibenzofuran	6.90	mg/kg	6.90	mg/kg	R	1.8E-03	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	4.4E-01
	Pentachlorophenol	43.7	mg/kg	43.7	mg/kg	R	1.1E-02	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	3.7E-01
	Aluminum	1276	mg/kg	1276	mg/kg	R	3.3E-01	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	3.3E-01
	Arsenic	0.612	mg/kg	0.612	mg/kg	R	1.6E-04	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	5.2E-01
	Iron	7020	mg/kg	7020	mg/kg	R	1.8E+00	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	6.0E+00
	Lead	3.80	mg/kg	3.80	mg/kg	R	9.7E-04	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	46.3	mg/kg	46.3	mg/kg	R	1.2E-02	mg/kg/day	2.4E-02	mg/kg/day	N/A	N/A	4.9E-01
	Mercury	0.451	mg/kg	0.451	mg/kg	R	1.2E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	5.8E-03
	(Total)												8.2E+00
												Total Hazard Index Across All Exposure Routes/Pathways	8.2E+00

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

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TABLE 7.15
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - AVERAGE CONCENTRATIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bis(2-Ethylhexyl)phthalate	1.79	mg/kg	1.79	mg/kg	R	1.3E-03	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	6.6E-02
	Dibenzofuran	3.97	mg/kg	3.97	mg/kg	R	2.9E-03	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	7.3E-01
	Pentachlorophenol	13.9	mg/kg	13.9	mg/kg	R	1.0E-02	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	3.4E-01
	Aluminum	414	mg/kg	414	mg/kg	R	3.1E-01	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	3.1E-01
	Arsenic	0.130	mg/kg	0.130	mg/kg	R	9.6E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	3.2E-01
	Iron	1619	mg/kg	1619	mg/kg	R	1.2E+00	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	4.0E+00
	Lead	0.89	mg/kg	0.89	mg/kg	R	6.6E-04	mg/kg/day	NA	mg/kg/day	N/A	N/A	- -
	Manganese	22.9	mg/kg	22.9	mg/kg	R	1.7E-02	mg/kg/day	2.4E-02	mg/kg/day	N/A	N/A	7.1E-01
	Mercury	0.244	mg/kg	0.244	mg/kg	R	1.8E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	9.0E-03
	(Total)												6.5E+00
												Total Hazard Index Across All Exposure Routes/Pathways	6.5E+00

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

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TABLE 7.16
CALCULATION OF NON-CANCER HAZARDS
SITE-SPECIFIC EXPOSURE ASSUMPTIONS - AVERAGE CONCENTRATIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bis(2-Ethylhexyl)phthalate	1.79	mg/kg	1.79	mg/kg	R	4.6E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.3E-02
	Dibenzofuran	3.97	mg/kg	3.97	mg/kg	R	1.0E-03	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	2.5E-01
	Pentachlorophenol	13.9	mg/kg	13.9	mg/kg	R	3.6E-03	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	1.2E-01
	Aluminum	414	mg/kg	414	mg/kg	R	1.1E-01	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	1.1E-01
	Arsenic	0.130	mg/kg	0.130	mg/kg	R	3.3E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.1E-01
	Iron	1619	mg/kg	1619	mg/kg	R	4.1E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.4E+00
	Lead	0.89	mg/kg	0.89	mg/kg	R	2.3E-04	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	22.9	mg/kg	22.9	mg/kg	R	5.9E-03	mg/kg/day	2.4E-02	mg/kg/day	N/A	N/A	2.4E-01
	Mercury	0.244	mg/kg	0.244	mg/kg	R	6.2E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.1E-03
	(Total)												2.2E+00
												Total Hazard Index Across All Exposure Routes/Pathways	2.2E+00

(1) Medium-Specific (M) EPC selected for hazard calculation.
(2) Chronic.

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TABLE 7.17
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	5.3E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	3.0E-05	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	5.6E-05	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.1E-01
	Aluminum	6474	mg/kg	6474	mg/kg	M	8.3E-02	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	8.3E-02
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.2E-03	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	2.9E+00
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	1.5E-04	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	4.9E-01
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	4.3E-05	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	8.7E-02
	Iron	147000	mg/kg	147000	mg/kg	M	1.9E+00	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	6.3E+00
	Lead	2805	mg/kg	2805	mg/kg	M	3.6E-02	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	3.4E-03	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.7E-01
	(Total)												1.0E+01
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.4E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	6.1E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	1.1E-06	mg/kg/day	3.5E-04	mg/kg/day	N/A	N/A	3.2E-03
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.7E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.7E-03
	Antimony	90.6	mg/kg	90.6	mg/kg	M	2.3E-06	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.9E-01
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	8.8E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	7.2E-02
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	8.7E-07	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	1.7E-01
	Iron	147000	mg/kg	147000	mg/kg	M	3.8E-03	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	8.4E-02
	Lead	2805	mg/kg	2805	mg/kg	M	7.2E-05	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	6.8E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	8.4E-03
	(Total)												6.3E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.1E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.18
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	6.3E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	1.4E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	4.7E-02
	Iron	24000	mg/kg	24000	mg/kg	M	3.9E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.3E-01
	Manganese	171	mg/kg	171	mg/kg	M	2.8E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.4E-02
	Thallium	0.454	mg/kg	0.454	mg/kg	M	7.5E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.1E-02
	(Total)												2.0E-01
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.4E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	7.3E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	6.0E-03
	Iron	24000	mg/kg	24000	mg/kg	M	6.9E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.5E-03
	Manganese	171	mg/kg	171	mg/kg	M	4.9E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	6.1E-04
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.3E-09	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	1.2E-04
	(Total)												8.2E-03
												Total Hazard Index Across All Exposure Routes/Pathways	2.1E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.19
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	1.5E-10	mg/kg/day	NA	mg/kg/day	N/A	N/A	- -
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	1.2E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	6.0E-04
	Dibenzofuran	10	ug/L	10	ug/L	M	2.1E-06	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	5.3E-04
	Pentachlorophenol	110	ug/L	110	ug/L	M	2.4E-05	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	7.8E-04
	Aluminum	13435	ug/L	13435	ug/L	M	2.9E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	2.9E-03
	Arsenic	13.9	ug/L	13.9	ug/L	M	3.0E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	9.9E-03
	Iron	15600	ug/L	15600	ug/L	M	3.3E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.1E-02
	Lead	77.5	ug/L	77.5	ug/L	M	1.7E-05	mg/kg/day	NA	mg/kg/day	N/A	N/A	- -
	Manganese	101	ug/L	101	ug/L	M	2.2E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.1E-03
	Mercury	0.12	ug/L	0.12	ug/L	M	2.6E-08	mg/kg/day	1.0E-04	mg/kg/day	N/A	N/A	2.6E-04
	Vanadium	36.1	ug/L	36.1	ug/L	M	7.7E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	1.1E-03
	(Total)												2.8E-02
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	6.0E-09	mg/kg/day	NA	mg/kg/day	N/A	N/A	- -
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	5.5E-03	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.5E+00
	Dibenzofuran	10	ug/L	10	ug/L	M	7.5E-05	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.9E-02
	Pentachlorophenol	110	ug/L	110	ug/L	M	6.7E-03	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	2.2E-01
	Aluminum	13435	ug/L	13435	ug/L	M	5.7E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	5.7E-03
	Arsenic	13.9	ug/L	13.9	ug/L	M	5.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.8E-03
	Iron	15600	ug/L	15600	ug/L	M	6.7E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.5E-02
	Lead	77.5	ug/L	77.5	ug/L	M	3.3E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	- -
	Manganese	101	ug/L	101	ug/L	M	4.3E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	5.4E-03
	Mercury	0.12	ug/L	0.12	ug/L	M	5.1E-09	mg/kg/day	9.0E-05	mg/kg/day	N/A	N/A	5.7E-05
	Vanadium	36.1	ug/L	36.1	ug/L	M	1.5E-06	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	2.2E-02
	(Total)												1.7E+00
												Total Hazard Index Across All Exposure Routes/Pathways	1.8E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.20
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	5.7E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	3.3E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	6.0E-06	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.2E-02
	Aluminum	6474	mg/kg	6474	mg/kg	M	8.9E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	8.9E-03
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.2E-04	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	3.1E-01
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	1.6E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	5.3E-02
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	4.6E-06	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	9.3E-03
	Iron	147000	mg/kg	147000	mg/kg	M	2.0E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	6.7E-01
	Lead	2805	mg/kg	2805	mg/kg	M	3.8E-03	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	3.6E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.8E-02
	(Total)												1.1E+00
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	2.9E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	1.3E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	2.4E-07	mg/kg/day	3.5E-04	mg/kg/day	N/A	N/A	6.9E-04
	Aluminum	6474	mg/kg	6474	mg/kg	M	3.5E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	3.5E-04
	Antimony	90.6	mg/kg	90.6	mg/kg	M	5.0E-07	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	6.2E-02
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	1.9E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.5E-02
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	1.9E-07	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	3.7E-02
	Iron	147000	mg/kg	147000	mg/kg	M	8.0E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.8E-02
	Lead	2805	mg/kg	2805	mg/kg	M	1.5E-05	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	264	mg/kg	264	mg/kg	M	1.4E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	1.8E-03
	(Total)												1.3E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.2E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.21
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	6.7E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	1.5E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	5.0E-03
	Iron	24000	mg/kg	24000	mg/kg	M	4.2E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.4E-02
	Manganese	171	mg/kg	171	mg/kg	M	3.0E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.5E-03
	Thallium	0.454	mg/kg	0.454	mg/kg	M	8.0E-08	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.1E-03
	(Total)												2.2E-02
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	3.5E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	1.8E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.5E-03
	Iron	24000	mg/kg	24000	mg/kg	M	1.7E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	3.7E-04
	Manganese	171	mg/kg	171	mg/kg	M	1.2E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	1.5E-04
	Thallium	0.454	mg/kg	0.454	mg/kg	M	3.2E-10	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	3.0E-05
	(Total)												2.0E-03
												Total Hazard Index Across All Exposure Routes/Pathways	2.4E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

E-79d

TABLE 7.22
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	3.2E-11	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	2.6E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.3E-04
	Dibenzofuran	10	ug/L	10	ug/L	M	4.6E-07	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.1E-04
	Pentachlorophenol	110	ug/L	110	ug/L	M	5.0E-06	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	1.7E-04
	Aluminum	13435	ug/L	13435	ug/L	M	6.2E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	6.2E-04
	Arsenic	13.9	ug/L	13.9	ug/L	M	6.4E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	2.1E-03
	Iron	15600	ug/L	15600	ug/L	M	7.1E-04	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	2.4E-03
	Lead	77.5	ug/L	77.5	ug/L	M	3.5E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	101	ug/L	101	ug/L	M	4.6E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.3E-04
	Mercury	0.12	ug/L	0.12	ug/L	M	5.5E-09	mg/kg/day	1.0E-04	mg/kg/day	N/A	N/A	5.5E-05
	Vanadium	36.1	ug/L	36.1	ug/L	M	1.7E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	2.4E-04
	(Total)												6.1E-03
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	3.7E-09	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Bis(2-ethylhexyl)phthalate	56.0	ug/L	56.0	ug/L	M	3.4E-03	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	8.9E-01
	Dibenzofuran	10.0	ug/L	10.0	ug/L	M	4.6E-05	mg/kg/day	4.0E-03	mg/kg/day	N/A	N/A	1.1E-02
	Pentachlorophenol	110	ug/L	110	ug/L	M	4.1E-03	mg/kg/day	3.0E-02	mg/kg/day	N/A	N/A	1.4E-01
	Aluminum	13435	ug/L	13435	ug/L	M	3.5E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	3.5E-03
	Arsenic	13.9	ug/L	13.9	ug/L	M	3.6E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.9E-03
	Iron	15600	ug/L	15600	ug/L	M	4.1E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	9.0E-03
	Lead	77.5	ug/L	77.5	ug/L	M	2.0E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Manganese	101	ug/L	101	ug/L	M	2.6E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.3E-03
	Mercury	0.120	ug/L	0.120	ug/L	M	3.1E-09	mg/kg/day	9.0E-05	mg/kg/day	N/A	N/A	3.5E-05
	Vanadium	36.1	ug/L	36.1	ug/L	M	9.4E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.3E-02
	(Total)												1.1E+00
												Total Hazard Index Across All Exposure Routes/Pathways	1.1E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

E-79e

TABLE 8.1
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.4E-08	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.0E-07
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	8.0E-08	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	2.7E-08
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	1.5E-07	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	5.0E-08
	Aluminum	6474	mg/kg	6474	mg/kg	M	2.2E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	3.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	3.9E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	5.8E-07
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	1.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	4.9E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	9.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	8.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										7.6E-07
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	7.7E-09	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	1.8E-07
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	3.4E-09	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	1.7E-09
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	6.3E-09	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	3.1E-09
	Aluminum	6474	mg/kg	6474	mg/kg	M	9.3E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	4.9E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.8E-07
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	4.9E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	2.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	4.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	3.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.7E-07
										Total Risk Across All Exposure Routes/Pathways	1.12E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

E-80

TABLE 8.2
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	Chloroform	0.9	ug/L	0.9	ug/L	M	1.6E-09	mg/kg/day	3.1E-02	(mg/kg/day) $^{-1}$	4.9E-11
	Dibenzofuran	3	ug/L	3	ug/L	M	7.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Naphthalene	57	ug/L	57	ug/L	M	6.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Phenanthrene	8	ug/L	8	ug/L	M	2.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Aluminum	3970	ug/L	3970	ug/L	M	9.3E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	2.72	ug/L	2.72	ug/L	M	6.4E-10	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.3E-09
	Barium	1030	ug/L	1030	ug/L	M	2.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	12700	ug/L	12700	ug/L	M	3.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	34.7	ug/L	34.7	ug/L	M	8.1E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1320	ug/L	1320	ug/L	M	3.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	13.4	ug/L	13.4	ug/L	M	3.1E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.4E-09
										Total Risk Across All Exposure Routes/Pathways	2.4E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.3
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	2.2E-08	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.6E-07
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	4.8E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	7.2E-08
	Iron	24000	mg/kg	24000	mg/kg	M	1.4E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	9.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	2.6E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.3E-07
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.2E-08	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.8E-07
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	6.2E-09	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.3E-08
	Iron	24000	mg/kg	24000	mg/kg	M	5.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	4.1E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.1E-11	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.0E-07
										Total Risk Across All Exposure Routes/Pathways	5.3E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	6.6E-13	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	4.8E-12
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	5.3E-08	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	7.4E-10
	Dibenzofuran	10	ug/L	10	ug/L	M	9.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	1.0E-07	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	1.2E-08
	Aluminum	13435	ug/L	13435	ug/L	M	1.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	1.3E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.0E-08
	Iron	15600	ug/L	15600	ug/L	M	1.5E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	7.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	9.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.3E-08
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	1.9E-11	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	4.4E-10
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	1.7E-05	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	1.3E-06
	Dibenzofuran	10	ug/L	10	ug/L	M	2.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	2.1E-05	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	2.5E-06
	Aluminum	13435	ug/L	13435	ug/L	M	3.1E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	3.3E-09	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.2E-08
	Iron	15600	ug/L	15600	ug/L	M	3.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	1.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	2.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	8.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.8E-06
										Total Risk Across All Exposure Routes/Pathways	3.8E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Maintenance Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	2.9E-08	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	2.1E-07
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	1.7E-07	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	5.7E-08
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	3.1E-07	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	1.0E-07
	Aluminum	6474	mg/kg	6474	mg/kg	M	4.5E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	6.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	8.0E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.2E-06
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	2.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	1.0E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	2.0E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	1.8E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.6E-06
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	3.1E-08	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	7.3E-07
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	1.4E-08	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	6.6E-09
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	2.5E-08	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	1.2E-08
	Aluminum	6474	mg/kg	6474	mg/kg	M	3.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	5.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	2.0E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	7.2E-07
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	1.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	8.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	1.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	1.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.5E-06
										Total Risk Across All Exposure Routes/Pathways	3.05E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Maintenance Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.3E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	9.7E-07
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	3.0E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	4.5E-07
	Iron	24000	mg/kg	24000	mg/kg	M	8.4E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	6.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.4E-06
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.4E-07	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	3.4E-06
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	7.3E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.7E-07
	Iron	24000	mg/kg	24000	mg/kg	M	6.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	4.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.3E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.6E-06
										Total Risk Across All Exposure Routes/Pathways	5.0E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.7
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.6E-08	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.2E-07
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	9.3E-08	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	3.2E-08
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	1.7E-07	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	5.9E-08
	Aluminum	6474	mg/kg	6474	mg/kg	M	2.5E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	3.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	4.5E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	6.8E-07
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	1.3E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	5.8E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	1.1E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	1.0E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										8.8E-07
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.6E-08	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	3.8E-07
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	7.1E-09	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	3.5E-09
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	1.3E-08	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	6.4E-09
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	2.7E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	1.0E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	3.8E-07
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	1.0E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	4.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	8.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	7.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										7.7E-07
										Total Risk Across All Exposure Routes/Pathways	1.65E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.8
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.5E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.1E-06
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	3.3E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	5.0E-07
	Iron	24000	mg/kg	24000	mg/kg	M	9.4E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	6.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.6E-06
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.5E-07	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	3.5E-06
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	7.7E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.8E-07
	Iron	24000	mg/kg	24000	mg/kg	M	7.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	5.1E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.4E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.8E-06
										Total Risk Across All Exposure Routes/Pathways	5.4E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.9
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	7.1E-12	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	5.2E-11
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	5.7E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	8.0E-09
	Dibenzofuran	10	ug/L	10	ug/L	M	1.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	1.1E-06	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	1.3E-07
	Aluminum	13435	ug/L	13435	ug/L	M	1.4E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	1.4E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.1E-07
	Iron	15600	ug/L	15600	ug/L	M	1.6E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	7.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	1.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	3.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.5E-07
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	5.5E-10	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	1.3E-08
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	5.0E-04	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	3.7E-05
	Dibenzofuran	10	ug/L	10	ug/L	M	6.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	6.1E-04	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	7.3E-05
	Aluminum	13435	ug/L	13435	ug/L	M	5.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	5.4E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.0E-07
	Iron	15600	ug/L	15600	ug/L	M	6.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	3.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	3.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	1.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.1E-04
										Total Risk Across All Exposure Routes/Pathways	1.1E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.10
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	6.2E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	4.6E-08
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	3.6E-08	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	1.2E-08
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	6.6E-08	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	2.3E-08
	Aluminum	6474	mg/kg	6474	mg/kg	M	9.8E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	1.7E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.6E-07
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	5.1E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	2.2E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	4.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	4.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.4E-07
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	9.3E-09	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.2E-07
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	4.1E-09	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	2.0E-09
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	7.6E-09	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	3.7E-09
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.1E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	5.9E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.2E-07
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	5.8E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	2.5E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	4.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	4.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										4.4E-07
										Total Risk Across All Exposure Routes/Pathways	7.82E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.11
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	5.8E-08	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	4.2E-07
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	1.3E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.9E-07
	Iron	24000	mg/kg	24000	mg/kg	M	3.6E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	2.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	6.9E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										6.1E-07
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	8.5E-08	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.0E-06
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	4.4E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.6E-07
	Iron	24000	mg/kg	24000	mg/kg	M	4.1E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	2.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	7.8E-11	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.2E-06
										Total Risk Across All Exposure Routes/Pathways	2.8E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.12
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	2.7E-12	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	2.0E-11
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	2.2E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	3.1E-09
	Dibenzofuran	10	ug/L	10	ug/L	M	3.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	4.3E-07	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	5.2E-08
	Aluminum	13435	ug/L	13435	ug/L	M	5.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	5.5E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	8.2E-08
	Iron	15600	ug/L	15600	ug/L	M	6.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	3.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	4.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	1.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.4E-07
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	3.1E-10	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	7.4E-09
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	2.9E-04	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	2.1E-05
	Dibenzofuran	10	ug/L	10	ug/L	M	3.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	3.5E-04	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	4.2E-05
	Aluminum	13435	ug/L	13435	ug/L	M	3.0E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	3.1E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.1E-07
	Iron	15600	ug/L	15600	ug/L	M	3.5E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	1.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	2.3E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	8.1E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										6.3E-05
										Total Risk Across All Exposure Routes/Pathways	6.4E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.13
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE - MAXIMUM CONCENTRATIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bis(2-Ethylhexyl)phthalate	7.28	mg/kg	7.28	mg/kg	R	2.3E-03	mg/kg/day	1.4E-02	(mg/kg/day) -1	3.2E-05
	Dibenzofuran	6.90	mg/kg	6.90	mg/kg	R	2.2E-03	mg/kg/day	NA	(mg/kg/day) -1	- -
	Pentachlorophenol	43.7	mg/kg	43.7	mg/kg	R	1.4E-02	mg/kg/day	1.2E-01	(mg/kg/day) -1	1.7E-03
	Aluminum	1276	mg/kg	1276	mg/kg	R	4.0E-01	mg/kg/day	NA	(mg/kg/day) -1	- -
	Arsenic	0.612	mg/kg	0.612	mg/kg	R	1.9E-04	mg/kg/day	1.5E+00	(mg/kg/day) -1	2.9E-04
	Iron	7020	mg/kg	7020	mg/kg	R	2.2E+00	mg/kg/day	NA	(mg/kg/day) -1	- -
	Lead	3.80	mg/kg	3.80	mg/kg	R	1.2E-03	mg/kg/day	NA	(mg/kg/day) -1	- -
	Manganese	46.3	mg/kg	46.3	mg/kg	R	1.5E-02	mg/kg/day	NA	(mg/kg/day) -1	- -
	Mercury	0.451	mg/kg	0.451	mg/kg	R	1.4E-04	mg/kg/day	NA	(mg/kg/day) -1	- -
	(Total)										2.0E-03
										Total Risk Across All Exposure Routes/Pathways	2.0E-03

(1) Medium-Specific (M) EPC selected for risk calculation.

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TABLE 8.14
CALCULATION OF CANCER RISKS
SITE-SPECIFIC EXPOSURE ASSUMPTIONS - MAXIMUM CONCENTRATIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bis(2-Ethylhexyl)phthalate	7.28	mg/kg	7.28	mg/kg	R	1.6E-04	mg/kg/day	1.4E-02	(mg/kg/day) -1	2.2E-06
	Dibenzofuran	6.90	mg/kg	6.90	mg/kg	R	1.5E-04	mg/kg/day	NA	(mg/kg/day) -1	- -
	Pentachlorophenol	43.7	mg/kg	43.7	mg/kg	R	9.6E-04	mg/kg/day	1.2E-01	(mg/kg/day) -1	1.1E-04
	Aluminum	1276	mg/kg	1276	mg/kg	R	2.8E-02	mg/kg/day	NA	(mg/kg/day) -1	- -
	Arsenic	0.612	mg/kg	0.612	mg/kg	R	1.3E-05	mg/kg/day	1.5E+00	(mg/kg/day) -1	2.0E-05
	Iron	7020	mg/kg	7020	mg/kg	R	1.5E-01	mg/kg/day	NA	(mg/kg/day) -1	- -
	Lead	3.80	mg/kg	3.80	mg/kg	R	8.3E-05	mg/kg/day	NA	(mg/kg/day) -1	- -
	Manganese	46.3	mg/kg	46.3	mg/kg	R	1.0E-03	mg/kg/day	NA	(mg/kg/day) -1	- -
	Mercury	0.451	mg/kg	0.451	mg/kg	R	9.9E-06	mg/kg/day	NA	(mg/kg/day) -1	- -
	(Total)										1.4E-04
										Total Risk Across All Exposure Routes/Pathways	1.4E-04

(1) Medium-Specific (M) EPC selected for risk calculation.

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TABLE 8.15
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE - AVERAGE CONCENTRATIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bis(2-Ethylhexyl)phthalate	1.79	mg/kg	1.79	mg/kg	R	5.7E-04	mg/kg/day	1.4E-02	(mg/kg/day) -1	8.0E-06
	Dibenzofuran	3.97	mg/kg	3.97	mg/kg	R	1.3E-03	mg/kg/day	NA	(mg/kg/day) -1	- -
	Pentachlorophenol	13.9	mg/kg	13.9	mg/kg	R	4.4E-03	mg/kg/day	1.2E-01	(mg/kg/day) -1	5.3E-04
	Aluminum	414	mg/kg	414	mg/kg	R	1.3E-01	mg/kg/day	NA	(mg/kg/day) -1	- -
	Arsenic	0.130	mg/kg	0.130	mg/kg	R	4.1E-05	mg/kg/day	1.5E+00	(mg/kg/day) -1	6.2E-05
	Iron	1619	mg/kg	1619	mg/kg	R	5.1E-01	mg/kg/day	NA	(mg/kg/day) -1	- -
	Lead	0.89	mg/kg	0.89	mg/kg	R	2.8E-04	mg/kg/day	NA	(mg/kg/day) -1	- -
	Manganese	22.9	mg/kg	22.9	mg/kg	R	7.3E-03	mg/kg/day	NA	(mg/kg/day) -1	- -
	Mercury	0.244	mg/kg	0.244	mg/kg	R	7.7E-05	mg/kg/day	NA	(mg/kg/day) -1	- -
	(Total)										6.0E-04
										Total Risk Across All Exposure Routes/Pathways	6.0E-04

(1) Medium-Specific (M) EPC selected for risk calculation.

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TABLE 8.16
CALCULATION OF CANCER RISKS
SITE-SPECIFIC EXPOSURE ASSUMPTIONS - AVERAGE CONCENTRATIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Finfish/Shellfish
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bis(2-Ethylhexyl)phthalate	1.79	mg/kg	1.79	mg/kg	R	3.9E-05	mg/kg/day	1.4E-02	(mg/kg/day) -1	5.5E-07
	Dibenzofuran	3.97	mg/kg	3.97	mg/kg	R	8.7E-05	mg/kg/day	NA	(mg/kg/day) -1	- -
	Pentachlorophenol	13.9	mg/kg	13.9	mg/kg	R	3.1E-04	mg/kg/day	1.2E-01	(mg/kg/day) -1	3.7E-05
	Aluminum	414	mg/kg	414	mg/kg	R	9.1E-03	mg/kg/day	NA	(mg/kg/day) -1	- -
	Arsenic	0.130	mg/kg	0.130	mg/kg	R	2.8E-06	mg/kg/day	1.5E+00	(mg/kg/day) -1	4.3E-06
	Iron	1619	mg/kg	1619	mg/kg	R	3.5E-02	mg/kg/day	NA	(mg/kg/day) -1	- -
	Lead	0.89	mg/kg	0.89	mg/kg	R	2.0E-05	mg/kg/day	NA	(mg/kg/day) -1	- -
	Manganese	22.9	mg/kg	22.9	mg/kg	R	5.0E-04	mg/kg/day	NA	(mg/kg/day) -1	- -
	Mercury	0.244	mg/kg	0.244	mg/kg	R	5.3E-06	mg/kg/day	NA	(mg/kg/day) -1	- -
	(Total)										4.1E-05
										Total Risk Across All Exposure Routes/Pathways	4.1E-05

(1) Medium-Specific (M) EPC selected for risk calculation.

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TABLE 8.17
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	4.5E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	3.3E-06
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	2.6E-06	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	8.9E-07
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	4.8E-06	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	1.6E-06
	Aluminum	6474	mg/kg	6474	mg/kg	M	7.1E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	9.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	1.3E-05	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.9E-05
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	3.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	1.6E-01	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	3.1E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	2.9E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.5E-05
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.2E-07	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.8E-06
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	5.2E-08	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	2.5E-08
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	9.6E-08	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	4.7E-08
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	2.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	7.6E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.8E-06
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	7.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	3.2E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	6.1E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	5.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										5.6E-06
										Total Risk Across All Exposure Routes/Pathways	3.04E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.18
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	5.4E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	3.9E-06
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	1.2E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.8E-06
	Iron	24000	mg/kg	24000	mg/kg	M	3.4E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	2.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	6.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										5.7E-06
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.2E-07	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.9E-06
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	6.3E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.3E-07
	Iron	24000	mg/kg	24000	mg/kg	M	5.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	4.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.1E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.1E-06
										Total Risk Across All Exposure Routes/Pathways	8.8E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.19
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfill
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	1.3E-11	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	9.4E-11
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	1.0E-06	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	1.4E-08
	Dibenzofuran	10	ug/L	10	ug/L	M	1.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	2.0E-06	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	2.4E-07
	Aluminum	13435	ug/L	13435	ug/L	M	2.5E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	2.5E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.8E-07
	Iron	15600	ug/L	15600	ug/L	M	2.9E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	1.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	1.9E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Mercury	0.12	ug/L	0.12	ug/L	M	2.2E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	6.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										6.4E-07
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	5.1E-10	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	1.2E-08
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	4.7E-04	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	3.5E-05
	Dibenzofuran	10	ug/L	10	ug/L	M	6.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	5.7E-04	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	6.9E-05
	Aluminum	13435	ug/L	13435	ug/L	M	4.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	5.1E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.9E-07
	Iron	15600	ug/L	15600	ug/L	M	5.7E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	2.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	3.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Mercury	0.12	ug/L	0.12	ug/L	M	4.4E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	1.3E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.0E-04
										Total Risk Across All Exposure Routes/Pathways	1.0E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.20
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.9E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.4E-06
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	1.1E-06	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	3.8E-07
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	2.1E-06	mg/kg/day	3.4E-01	(mg/kg/day) $^{-1}$	7.0E-07
	Aluminum	6474	mg/kg	6474	mg/kg	M	3.0E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	4.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	5.4E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	8.1E-06
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	1.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	6.9E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	1.3E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	1.2E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.1E-05
Dermal	Benzo(a)pyrene Equivalents	0.414	mg/kg	0.414	mg/kg	M	1.0E-07	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.4E-06
	4,4'-DDE	2.38	mg/kg	2.38	mg/kg	M	4.5E-08	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	2.2E-08
	4,4'-DDT	4.4	mg/kg	4.4	mg/kg	M	8.2E-08	mg/kg/day	4.9E-01	(mg/kg/day) $^{-1}$	4.0E-08
	Aluminum	6474	mg/kg	6474	mg/kg	M	1.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	90.6	mg/kg	90.6	mg/kg	M	1.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	11.5	mg/kg	11.5	mg/kg	M	6.5E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.4E-06
	Cadmium	3.39	mg/kg	3.39	mg/kg	M	6.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	147000	mg/kg	147000	mg/kg	M	2.8E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	2805	mg/kg	2805	mg/kg	M	5.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	264	mg/kg	264	mg/kg	M	4.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										4.8E-06
										Total Risk Across All Exposure Routes/Pathways	1.5E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.21
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	2.3E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.7E-06
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	5.2E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	7.7E-07
	Iron	24000	mg/kg	24000	mg/kg	M	1.4E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	1.0E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	2.7E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.5E-06
Dermal	Benzo(a)pyrene Equivalents	3.82	mg/kg	3.82	mg/kg	M	1.2E-07	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.8E-06
	Arsenic	8.54	mg/kg	8.54	mg/kg	M	6.2E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.3E-07
	Iron	24000	mg/kg	24000	mg/kg	M	5.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	171	mg/kg	171	mg/kg	M	4.1E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	0.454	mg/kg	0.454	mg/kg	M	1.1E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.0E-06
										Total Risk Across All Exposure Routes/Pathways	5.5E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.22
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 1 - Incinerator Landfil
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	1.1E-11	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	8.0E-11
	Bis(2-ethylhexyl)phthalate	56	ug/L	56	ug/L	M	8.8E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	1.2E-08
	Dibenzofuran	10	ug/L	10	ug/L	M	1.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	1.7E-06	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	2.1E-07
	Aluminum	13435	ug/L	13435	ug/L	M	2.1E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	2.2E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.3E-07
	Iron	15600	ug/L	15600	ug/L	M	2.4E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	1.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	1.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Mercury	0.12	ug/L	0.12	ug/L	M	1.9E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	5.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										5.5E-07
Dermal	Benzo(a)pyrene Equivalents	0.0007	ug/L	0.0007	ug/L	M	1.3E-09	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	3.0E-08
	Bis(2-ethylhexyl)phthalate	56.0	ug/L	56.0	ug/L	M	1.2E-03	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	8.5E-05
	Dibenzofuran	10.0	ug/L	10.0	ug/L	M	1.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Pentachlorophenol	110	ug/L	110	ug/L	M	1.4E-03	mg/kg/day	1.2E-01	(mg/kg/day) $^{-1}$	1.7E-04
	Aluminum	13435	ug/L	13435	ug/L	M	1.2E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	13.9	ug/L	13.9	ug/L	M	1.2E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	4.6E-07
	Iron	15600	ug/L	15600	ug/L	M	1.4E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Lead	77.5	ug/L	77.5	ug/L	M	6.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	101	ug/L	101	ug/L	M	9.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Mercury	0.120	ug/L	0.120	ug/L	M	1.1E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	36.1	ug/L	36.1	ug/L	M	3.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.5E-04
										Total Risk Across All Exposure Routes/Pathways	2.5E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 9.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.0E-07	--	1.8E-07	2.8E-07	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	2.7E-08	--	1.7E-09	2.9E-08	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	5.0E-08	--	3.1E-09	5.3E-08	4,4'-DDT	Liver	2.1E-02	--	1.3E-03	2.2E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	1.5E-02	--	6.5E-04	1.6E-02
			Antimony	--	--	--	--	Antimony	Blood	5.3E-01	--	1.1E-01	6.5E-01
			Arsenic	5.8E-07	--	1.8E-07	7.6E-07	Arsenic	Skin	9.0E-02	--	2.8E-02	1.2E-01
			Cadmium	--	--	--	--	Cadmium	Kidney	1.6E-02	--	6.8E-02	8.4E-02
			Iron	--	--	--	--	Iron	Blood	1.2E+00	--	3.3E-02	1.2E+00
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	3.1E-02	--	3.3E-03	3.4E-02
			(Total)	7.6E-07	--	3.7E-07	1.1E-06	(Total)		1.9E+00	--	2.5E-01	2.1E+00
Groundwater	Groundwater	Site 1 - Incinerator Landfill	Chloroform	--	--	4.9E-11	4.9E-11	Chloroform	Liver	--	--	5.6E-05	5.6E-05
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Specified	--	--	1.3E-03	1.3E-03
			Naphthalene	--	--	--	--	Naphthalene	Body Weight	--	--	7.4E-03	7.4E-03
			Phenanthrene	--	--	--	--	Phenanthrene	NA	--	--	--	--
			Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	6.5E-04	6.5E-04
			Arsenic	--	--	2.3E-09	2.3E-09	Arsenic	Skin	--	--	3.6E-04	3.6E-04
			Barium	--	--	--	--	Barium	CVS	--	--	3.4E-03	3.4E-03
			Iron	--	--	--	--	Iron	Blood	--	--	4.6E-03	4.6E-03
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	2.7E-02	2.7E-02
			Vanadium	--	--	--	--	Vanadium	None Specified	--	--	3.1E-03	3.1E-03
			(Total)	--	--	2.4E-09	2.4E-09	(Total)		--	--	4.8E-02	4.8E-02
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	4.8E-12	--	4.4E-10	4.5E-10	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Bis(2-ethylhexyl)phthalate	7.4E-10	--	1.3E-06	1.3E-06	Bis(2-ethylhexyl)phthalate	Liver	1.8E-04	--	3.2E-01	3.2E-01
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Specified	1.6E-04	--	4.2E-03	4.4E-03
			Pentachlorophenol	1.2E-08	--	2.5E-06	2.5E-06	Pentachlorophenol	Liver, Kidney	2.4E-04	--	4.9E-02	4.9E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	8.8E-04	--	2.2E-03	3.1E-03
			Arsenic	2.0E-08	--	1.2E-08	3.1E-08	Arsenic	Skin	3.0E-03	--	1.9E-03	4.9E-03
			Iron	--	--	--	--	Iron	Blood	3.4E-03	--	5.7E-03	9.1E-03
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	3.3E-04	--	2.1E-03	2.4E-03
			Mercury	3.3E-08	--	--	3.3E-08	Mercury	CNS	7.9E-05	--	2.2E-05	1.0E-04
			Vanadium	3.3E-08	--	--	3.3E-08	Vanadium	None Specified	3.4E-04	--	8.4E-03	8.8E-03
			(Total)	9.8E-08	--	3.8E-06	3.9E-06	(Total)		8.7E-03	--	3.9E-01	4.0E-01
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.6E-07	--	2.8E-07	4.4E-07	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	7.2E-08	--	2.3E-08	9.5E-08	Arsenic	Skin	1.1E-02	--	3.5E-03	1.5E-02
			Iron	--	--	--	--	Iron	Blood	3.2E-02	--	9.0E-04	3.2E-02
			Manganese	--	--	--	--	Manganese	CNS	3.4E-03	--	3.6E-04	3.7E-03
			Thallium	--	--	--	--	Thallium	None Specified	2.6E-03	--	7.3E-05	2.6E-03
			(Total)	2.3E-07	--	3.0E-07	5.3E-07	(Total)		4.9E-02	--	4.8E-03	5.4E-02

Total Risk Across Soil	1.1E-06
Total Risk Across Groundwater	2.4E-09
Total Risk Across Surface Water	3.9E-06
Total Risk Across Sediment	5.3E-07
Total Risk Across All Media and All Exposure Routes	5.5E-06

Total Hazard Index Across All Media and All Exposure Routes	2.6E+00
Total CVS HI	3.4E-03
Total Skin HI	1.4E-01
Total Liver HI	7.1E-02
Total CNS HI	7.1E-02
Total Blood HI	1.2E+00
Total Body Weight	2.0E-02

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TABLE 9.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	2.1E-07	--	7.3E-07	9.4E-07	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	5.7E-08	--	6.6E-09	6.3E-08	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	1.0E-07	--	1.2E-08	1.2E-07	4,4'-DDT	Liver	1.7E-03	--	2.0E-04	1.9E-03
			Aluminum	--	--	--	--	Aluminum	Body Weight	1.3E-03	--	1.0E-04	1.4E-03
			Antimony	--	--	--	--	Antimony	Blood	4.4E-02	--	1.8E-02	6.2E-02
			Arsenic	1.2E-06	--	7.2E-07	1.9E-06	Arsenic	Skin	7.5E-03	--	4.5E-03	1.2E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	1.3E-03	--	1.1E-02	1.2E-02
			Iron	--	--	--	--	Iron	Blood	9.6E-02	--	5.2E-03	1.0E-01
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	2.6E-03	--	5.3E-04	3.1E-03
			(Total)	1.6E-06	--	1.5E-06	3.0E-06	(Total)		1.5E-01	--	4.0E-02	1.9E-01
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	9.7E-07	--	3.4E-06	4.3E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	4.5E-07	--	2.7E-07	7.2E-07	Arsenic	Skin	2.8E-03	--	1.7E-03	4.5E-03
			Iron	--	--	--	--	Iron	Blood	7.8E-03	--	4.3E-04	8.3E-03
			Manganese	--	--	--	--	Manganese	CNS	8.4E-04	--	1.7E-04	1.0E-03
			Thallium	--	--	--	--	Thallium	None Specified	6.3E-04	--	3.5E-05	6.7E-04
			(Total)	1.4E-06	--	3.6E-06	5.0E-06	(Total)		1.2E-02	--	2.3E-03	1.4E-02

Total Risk Across Soil	3.0E-06
Total Risk Across Sediment	5.0E-06
Total Risk Across All Media and All Exposure Routes	8.1E-06
Total Hazard Index Across All Media and All Exposure Routes	2.1E-01
Total Skin HI	1.6E-02
Total Liver HI	1.9E-03
Total CNS HI	4.1E-03
Total Blood HI	1.1E-01
Total Body Weight HI	1.4E-03
Total None Reported HI	6.7E-04

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TABLE 9.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Recreational Users
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.2E-07	--	3.8E-07	5.0E-07	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	3.2E-08	--	3.5E-09	3.5E-08	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	5.9E-08	--	6.4E-09	6.5E-08	4,4'-DDT	Liver	2.4E-03	--	2.6E-04	2.7E-03
			Aluminum	--	--	--	--	Aluminum	Body Weight	1.8E-03	--	1.4E-04	1.9E-03
			Antimony	--	--	--	--	Antimony	Blood	6.2E-02	--	2.4E-02	8.6E-02
			Arsenic	6.8E-07	--	3.8E-07	1.1E-06	Arsenic	Skin	1.1E-02	--	5.9E-03	1.6E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	1.9E-03	--	1.4E-02	1.6E-02
			Iron	--	--	--	--	Iron	Blood	1.3E-01	--	6.8E-03	1.4E-01
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	3.6E-03	--	6.9E-04	4.3E-03
			(Total)	8.8E-07	--	7.7E-07	1.6E-06	(Total)		2.2E-01	--	5.2E-02	2.7E-01
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	5.2E-11	--	1.3E-08	1.3E-08	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Bis(2-ethylhexyl)phthalate	8.0E-09	--	3.7E-05	3.7E-05	Bis(2-ethylhexyl)phthalate	Liver	2.0E-04	--	9.3E-01	9.3E-01
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Specified	1.8E-04	--	1.2E-02	1.2E-02
			Pentachlorophenol	1.3E-07	--	7.3E-05	7.3E-05	Pentachlorophenol	Liver, Kidney	2.6E-04	--	1.4E-01	1.4E-01
			Aluminum	--	--	--	--	Aluminum	Body Weight	9.6E-04	--	3.7E-03	4.6E-03
			Arsenic	2.1E-07	--	2.0E-07	4.1E-07	Arsenic	Skin	3.3E-03	--	3.1E-03	6.4E-03
			Iron	--	--	--	--	Iron	Blood	3.7E-03	--	9.4E-03	1.3E-02
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	3.6E-04	--	3.4E-03	3.8E-03
			Vanadium	--	--	--	--	Vanadium	None Specified	3.7E-04	--	1.4E-02	1.4E-02
			(Total)	3.5E-07	--	1.1E-04	1.1E-04	(Total)		9.3E-03	--	1.1E+00	1.1E+00
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.1E-06	--	3.5E-06	4.6E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	5.0E-07	--	2.8E-07	7.8E-07	Arsenic	Skin	7.8E-03	--	4.4E-03	1.2E-02
			Iron	--	--	--	--	Iron	Blood	2.2E-02	--	1.1E-03	2.3E-02
			Manganese	--	--	--	--	Manganese	CNS	2.3E-03	--	4.5E-04	2.8E-03
			Thallium	--	--	--	--	Thallium	None Specified	1.8E-03	--	9.1E-05	1.9E-03
			(Total)	1.6E-06	--	3.8E-06	5.4E-06	(Total)		3.4E-02	--	6.0E-03	4.0E-02

Total Risk Across Surface Soil	1.6E-06
Total Risk Across Surface Water	1.1E-04
Total Risk Across Sediment	5.4E-06
Total Risk Across All Media and All Exposure Routes	1.2E-04

Total Hazard Index Across All Media and All Exposure Routes	1.4E+00
Total Skin HI	3.5E-02
Total Liver HI	1.1E+00
Total CNS HI	1.1E-02
Total Blood HI	2.6E-01
Total Body Weight HI	6.5E-03
Total None Reported HI	2.8E-02

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TABLE 9.4a
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	4.6E-08	--	2.2E-07	2.6E-07	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	1.2E-08	--	2.0E-09	1.4E-08	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	2.3E-08	--	3.7E-09	2.6E-08	4,4'-DDT	Liver	1.5E-03	--	2.5E-04	1.8E-03
			Aluminum	--	--	--	--	Aluminum	Body Weight	1.1E-03	--	1.3E-04	1.3E-03
			Antimony	--	--	--	--	Antimony	Blood	4.0E-02	--	2.3E-02	6.3E-02
			Arsenic	2.6E-07	--	2.2E-07	4.8E-07	Arsenic	Skin	6.6E-03	--	5.6E-03	1.2E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	1.2E-03	--	1.4E-02	1.5E-02
			Iron	--	--	--	--	Iron	Blood	8.6E-02	--	6.6E-03	9.3E-02
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	2.3E-03	--	6.6E-04	3.0E-03
			(Total)	3.4E-07	--	4.4E-07	7.8E-07	(Total)		1.4E-01	--	5.0E-02	1.9E-01
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	2.0E-11	--	7.4E-09	7.4E-09	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Bis(2-ethylhexyl)phthalate	3.1E-09	--	1.8E-06	1.9E-06	Bis(2-ethylhexyl)phthalate	Liver	1.3E-04	--	7.7E-02	7.7E-02
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Specified	1.1E-04	--	1.3E-02	1.3E-02
			Pentachlorophenol	5.2E-08	--	5.9E-06	6.0E-06	Pentachlorophenol	Liver, Kidney	1.7E-04	--	1.9E-02	1.9E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	6.2E-04	--	7.0E-01	7.0E-01
			Arsenic	8.2E-08	--	2.3E-05	2.3E-05	Arsenic	Skin	2.1E-03	--	5.9E-01	5.9E-01
			Iron	--	--	--	--	Iron	Blood	2.4E-03	--	1.8E+00	1.8E+00
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	2.3E-04	--	6.6E-01	6.6E-01
			Mercury	--	--	--	--	Mercury	CNS	5.5E-05	--	7.0E-03	7.0E-03
			Vanadium	--	--	--	--	Vanadium	None Specified	2.4E-04	--	7.0E-03	7.2E-03
			(Total)	1.4E-07	--	3.1E-05	3.1E-05	(Total)		6.1E-03	--	3.9E+00	3.9E+00
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	4.2E-07	--	2.0E-06	2.4E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	1.9E-07	--	1.6E-07	3.5E-07	Arsenic	Skin	5.0E-03	--	4.2E-03	9.2E-03
			Iron	--	--	--	--	Iron	Blood	1.4E-02	--	1.1E-03	1.5E-02
			Manganese	--	--	--	--	Manganese	CNS	1.5E-03	--	4.3E-04	1.9E-03
			Thallium	--	--	--	--	Thallium	None Specified	1.1E-03	--	8.7E-05	1.2E-03
			(Total)	6.1E-07	--	2.2E-06	2.8E-06	(Total)		2.2E-02	--	5.8E-03	2.8E-02

Total Risk Across Surface Soil	7.8E-07
Total Risk Across Surface Water	3.1E-05
Total Risk Across Sediment	2.8E-06
Total Risk Across All Media and All Exposure Routes	3.4E-05

Total Hazard Index Across All Media and All Exposure Routes	4.1E+00

Total Skin HI	6.1E-01
Total Liver HI	9.8E-02
Total CNS HI	6.7E-01
Total Blood HI	2.0E+00
Total Body Weight HI	7.0E-01
Total None Reported HI	2.2E-02

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TABLE 9.4b
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Finfish/Shellfish	Site 1 - Incinerator Landfill Maximum Concentration	Bis(2-Ethylhexyl)phthalate	3.2E-05	--	--	3.2E-05	Bis(2-Ethylhexyl)phthalate	Liver	2.7E-01	--	--	2.7E-01
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Reported	1.3E+00	--	--	1.3E+00
			Pentachlorophenol	1.7E-03	--	--	1.7E-03	Pentachlorophenol	Liver, Kidney	1.1E+00	--	--	1.1E+00
			Aluminum	--	--	--	--	Aluminum	Body Weight	9.4E-01	--	--	9.4E-01
			Arsenic	2.9E-04	--	--	2.9E-04	Arsenic	Skin, CVS	1.5E+00	--	--	1.5E+00
			Iron	--	--	--	--	Iron	Blood, GS	1.7E+01	--	--	1.7E+01
			Lead	--	--	--	--	Lead	NA	NA	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	1.4E+00	--	--	1.4E+00
			Mercury	--	--	--	--	Mercury	Body Weight	1.7E-02	--	--	1.7E-02
			(Total)	2.0E-03	--	--	2.0E-03	(Total)		2.4E+01	--	--	2.4E+01

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TABLE 9.4c
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
SITE-SPECIFIC EXPOSURE ASSUMPTIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Finfish/Shellfish	Site 1 - Incinerator Landfill Maximum Concentration	Bis(2-Ethylhexyl)phthalate	2.2E-06	--	--	2.2E-06	Bis(2-Ethylhexyl)phthalate	Liver	9.3E-02	--	--	9.3E-02
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Reported	4.4E-01	--	--	4.4E-01
			Pentachlorophenol	1.1E-04	--	--	1.1E-04	Pentachlorophenol	Liver, Kidney	3.7E-01	--	--	3.7E-01
			Aluminum	--	--	--	--	Aluminum	Body Weight	3.3E-01	--	--	3.3E-01
			Arsenic	2.0E-05	--	--	2.0E-05	Arsenic	Skin, CVS	5.2E-01	--	--	5.2E-01
			Iron	--	--	--	--	Iron	Blood, GS	6.0E+00	--	--	6.0E+00
			Lead	--	--	--	--	Lead	NA	NA	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	4.9E-01	--	--	4.9E-01
			Mercury	--	--	--	--	Mercury	Body Weight	5.8E-03	--	--	5.8E-03
			(Total)	1.4E-04	--	--	1.4E-04	(Total)		8.2E+00	--	--	8.2E+00

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TABLE 9.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Child Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	3.3E-06	--	2.8E-06	6.1E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	8.9E-07	--	2.5E-08	9.1E-07	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	1.6E-06	--	4.7E-08	1.7E-06	4,4'-DDT	Liver	1.1E-01	--	3.2E-03	1.2E-01
			Aluminum	--	--	--	--	Aluminum	Body Weight	8.3E-02	--	1.7E-03	8.4E-02
			Antimony	--	--	--	--	Antimony	Blood	2.9E+00	--	2.9E-01	3.2E+00
			Arsenic	1.9E-05	--	2.8E-06	2.2E-05	Arsenic	Skin	4.9E-01	--	7.2E-02	5.6E-01
			Cadmium	--	--	--	--	Cadmium	Kidney	8.7E-02	--	1.7E-01	2.6E-01
			Iron	--	--	--	--	Iron	Blood	6.3E+00	--	8.4E-02	6.3E+00
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	1.7E-01	--	8.4E-03	1.8E-01
			(Total)	2.5E-05	--	5.6E-06	3.0E-05	(Total)		1.0E+01	--	6.3E-01	1.1E+01
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	9.4E-11	--	1.2E-08	1.2E-08	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Bis(2-ethylhexyl)phthalate	1.4E-08	--	3.5E-05	3.5E-05	Bis(2-ethylhexyl)phthalate	Liver	6.0E-04	--	1.5E+00	1.5E+00
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Specified	5.3E-04	--	1.9E-02	1.9E-02
			Pentachlorophenol	2.4E-07	--	6.9E-05	6.9E-05	Pentachlorophenol	Liver, Kidney	7.8E-04	--	2.2E-01	2.2E-01
			Aluminum	--	--	--	--	Aluminum	Body Weight	2.9E-03	--	5.7E-03	8.6E-03
			Arsenic	3.8E-07	--	1.9E-07	5.7E-07	Arsenic	Skin	9.9E-03	--	4.8E-03	1.5E-02
			Iron	--	--	--	--	Iron	Blood	1.1E-02	--	1.5E-02	2.6E-02
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	1.1E-03	--	5.4E-03	6.5E-03
			Vanadium	--	--	--	--	Vanadium	None Specified	1.1E-03	--	2.2E-02	2.3E-02
			(Total)	6.4E-07	--	1.0E-04	1.0E-04	(Total)		2.8E-02	--	1.7E+00	1.8E+00
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	3.9E-06	--	2.9E-06	6.8E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	1.8E-06	--	2.3E-07	2.0E-06	Arsenic	Skin	4.7E-02	--	6.0E-03	5.3E-02
			Iron	--	--	--	--	Iron	Blood	1.3E-01	--	1.5E-03	1.3E-01
			Manganese	--	--	--	--	Manganese	CNS	1.4E-02	--	6.1E-04	1.5E-02
			Thallium	--	--	--	--	Thallium	None Specified	1.1E-02	--	1.2E-04	1.1E-02
			(Total)	5.7E-06	--	3.1E-06	8.8E-06	(Total)		2.0E-01	--	8.2E-03	2.1E-01

Total Risk Across Surface Soil	3.0E-05
Total Risk Across Surface Water	1.0E-04
Total Risk Across Sediment	8.8E-06
Total Risk Across All Media and All Exposure Routes	1.4E-04

Total Hazard Index Across All Media and All Exposure Routes	1.3E+01
Total Skin, CVS HI	6.3E-01
Total Liver HI	1.8E+00
Total CNS HI	2.0E-01
Total Blood HI	9.7E+00
Total Body Weight HI	9.3E-02
Total None Reported HI	5.3E-02

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TABLE 9.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Adult Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface/Subsurface Soil	Surface/Subsurface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.4E-06	--	2.4E-06	3.8E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	3.8E-07	--	2.2E-08	4.0E-07	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	7.0E-07	--	4.0E-08	7.4E-07	4,4'-DDT	Liver	1.2E-02	--	6.9E-04	1.3E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	8.9E-03	--	3.5E-04	9.2E-03
			Antimony	--	--	--	--	Antimony	Blood	3.1E-01	--	6.2E-02	3.7E-01
			Arsenic	8.1E-06	--	2.4E-06	1.0E-05	Arsenic	Skin	5.3E-02	--	1.5E-02	6.8E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	9.3E-03	--	3.7E-02	4.6E-02
			Iron	--	--	--	--	Iron	Blood	6.7E-01	--	1.8E-02	6.9E-01
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	1.8E-02	--	1.8E-03	2.0E-02
			(Total)	1.1E-05	--	4.8E-06	1.5E-05	(Total)		1.1E+00	--	1.3E-01	1.2E+00
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	8.0E-11	--	3.0E-08	3.0E-08	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Bis(2-ethylhexyl)phthalate	1.2E-08	--	8.5E-05	8.5E-05	Bis(2-ethylhexyl)phthalate	Liver	1.3E-04	--	8.9E-01	8.9E-01
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Specified	1.1E-04	--	1.1E-02	1.2E-02
			Pentachlorophenol	2.1E-07	--	1.7E-04	1.7E-04	Pentachlorophenol	Liver, Kidney	1.7E-04	--	1.4E-01	1.4E-01
			Aluminum	--	--	--	--	Aluminum	Body Weight	6.2E-04	--	3.5E-03	4.1E-03
			Arsenic	3.3E-07	--	4.6E-07	7.8E-07	Arsenic	Skin	2.1E-03	--	2.9E-03	5.1E-03
			Iron	--	--	--	--	Iron	Blood	2.4E-03	--	9.0E-03	1.1E-02
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	2.3E-04	--	3.3E-03	3.5E-03
			Vanadium	--	--	--	--	Vanadium	None Specified	2.4E-04	--	1.3E-02	1.4E-02
			(Total)	5.5E-07	--	2.5E-04	2.5E-04	(Total)		6.0E-03	--	1.1E+00	1.1E+00
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.7E-06	--	2.8E-06	4.5E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	7.7E-07	--	2.3E-07	1.0E-06	Arsenic	Skin	5.0E-03	--	1.5E-03	6.5E-03
			Iron	--	--	--	--	Iron	Blood	1.4E-02	--	3.7E-04	1.4E-02
			Manganese	--	--	--	--	Manganese	CNS	1.5E-03	--	1.5E-04	1.7E-03
			Thallium	--	--	--	--	Thallium	None Specified	1.1E-03	--	3.0E-05	1.2E-03
			(Total)	2.5E-06	--	3.0E-06	5.5E-06	(Total)		2.2E-02	--	2.0E-03	2.4E-02

Total Risk Across Surface Soil	1.5E-05
Total Risk Across Surface Water	2.5E-04
Total Risk Across Sediment	5.5E-06
Total Risk Across All Media and All Exposure Routes	2.8E-04

Total Hazard Index Across All Media and All Exposure Routes	2.3E+00
Total Skin HI	7.9E-02
Total Liver HI	1.0E+00
Total Blood HI	1.1E+00
Total Body Weight	1.3E-02
Total None Reported	1.3E-02
Total Kidney	1.8E-01

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TABLE 9.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Lifetime Residents
Receptor Age: Children/Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	4.7E-06	--	5.2E-06	9.9E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	1.3E-06	--	4.7E-08	1.3E-06	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	2.3E-06	--	8.7E-08	2.4E-06	4,4'-DDT	Liver	--	--	--	--
			Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	--	--	--	--
			Arsenic	2.7E-05	--	5.1E-06	3.2E-05	Arsenic	Skin	--	--	--	--
			Cadmium	--	--	--	--	Cadmium	Kidney	--	--	--	--
			Iron	--	--	--	--	Iron	Blood	--	--	--	--
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			(Total)	3.5E-05	--	1.0E-05	4.6E-05	(Total)		--	--	--	--
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.7E-10	--	4.2E-08	4.2E-08	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Bis(2-ethylhexyl)phthalate	2.7E-08	--	1.2E-04	1.2E-04	Bis(2-ethylhexyl)phthalate	Liver	--	--	--	--
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Specified	--	--	--	--
			Pentachlorophenol	4.5E-07	--	2.4E-04	2.4E-04	Pentachlorophenol	Liver, Kidney	--	--	--	--
			Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	--	--
			Arsenic	7.1E-07	--	6.4E-07	1.4E-06	Arsenic	Skin	--	--	--	--
			Iron	--	--	--	--	Iron	Blood	--	--	--	--
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			Vanadium	--	--	--	--	Vanadium	None Specified	--	--	--	--
			(Total)	1.2E-06	--	3.6E-04	3.6E-04	(Total)		--	--	--	--
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	5.6E-06	--	5.7E-06	1.1E-05	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	2.6E-06	--	4.6E-07	3.0E-06	Arsenic	Skin	--	--	--	--
			Iron	--	--	--	--	Iron	Blood	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			Thallium	--	--	--	--	Thallium	None Specified	--	--	--	--
			(Total)	8.2E-06	--	6.1E-06	1.4E-05	(Total)		--	--	--	--
						Total Risk Across Surface Soil	4.6E-05					Total Hazard Index Across All Media and All Exposure Routes	--
						Total Risk Across Surface Water	3.6E-04						
						Total Risk Across Sediment	1.4E-05						
						Total Risk Across All Media and All Exposure Routes	4.2E-04						

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TABLE 10.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill Site 41 - Former Incinerator	Benzo(a)pyrene Equivalents	1.0E-07	--	1.8E-07	2.8E-07	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			4,4'-DDE	2.7E-08	--	1.7E-09	2.9E-08	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	5.0E-08	--	3.1E-09	5.3E-08	4,4'-DDT	Liver	2.1E-02	--	1.3E-03	2.2E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	1.5E-02	--	6.5E-04	1.6E-02
			Antimony	--	--	--	--	Antimony	Blood	5.3E-01	--	1.1E-01	6.5E-01
			Arsenic	5.8E-07	--	1.8E-07	7.6E-07	Arsenic	Skin	9.0E-02	--	2.8E-02	1.2E-01
			Cadmium	--	--	--	--	Cadmium	Kidney	1.6E-02	--	6.8E-02	8.4E-02
			Iron	--	--	--	--	Iron	Blood	1.2E+00	--	3.3E-02	1.2E+00
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	3.1E-02	--	3.3E-03	3.4E-02
			(Total)	7.6E-07	--	3.7E-07	1.1E-06	(Total)		1.9E+00	--	2.5E-01	2.1E+00
Groundwater	Groundwater	Site 1 - Incinerator Landfill	Chloroform	--	--	4.9E-11	4.9E-11	Chloroform	Liver	--	--	5.6E-05	5.6E-05
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Specified	--	--	1.3E-03	1.3E-03
			Naphthalene	--	--	--	--	Naphthalene	Body Weight	--	--	7.4E-03	7.4E-03
			Phenanthrene	--	--	--	--	Phenanthrene	NA	--	--	--	--
			Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	6.5E-04	6.5E-04
			Arsenic	--	--	2.3E-09	2.3E-09	Arsenic	Skin	--	--	3.6E-04	3.6E-04
			Barium	--	--	--	--	Barium	CVS	--	--	3.4E-03	3.4E-03
			Iron	--	--	--	--	Iron	Blood	--	--	4.6E-03	4.6E-03
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	2.7E-02	2.7E-02
			Vanadium	--	--	--	--	Vanadium	None Specified	--	--	3.1E-03	3.1E-03
			(Total)	--	--	2.4E-09	2.4E-09	(Total)		--	--	4.8E-02	4.8E-02
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Bis(2-ethylhexyl)phthalate	7.4E-10	--	1.3E-06	1.3E-06	Bis(2-ethylhexyl)phthalate	Liver	1.8E-04	--	3.2E-01	3.2E-01
			Pentachlorophenol	1.2E-08	--	2.5E-06	2.5E-06	Pentachlorophenol	Liver, Kidney	2.4E-04	--	4.9E-02	4.9E-02
			(Total)	1.3E-08	--	3.8E-06	3.8E-06	(Total)		4.3E-04	--	3.7E-01	3.7E-01
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.6E-07	--	2.8E-07	4.4E-07	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	7.2E-08	--	2.3E-08	9.5E-08	Arsenic	Skin	1.1E-02	--	3.5E-03	1.5E-02
			Iron	--	--	--	--	Iron	Blood	3.2E-02	--	9.0E-04	3.2E-02
			Manganese	--	--	--	--	Manganese	CNS	3.4E-03	--	3.6E-04	3.7E-03
			Thallium	--	--	--	--	Thallium	None Specified	2.6E-03	--	7.3E-05	2.6E-03
			(Total)	2.3E-07	--	3.0E-07	5.3E-07	(Total)		4.9E-02	--	4.8E-03	5.4E-02

Total Risk Across Soil	1.1E-06
Total Risk Across Groundwater	2.4E-09
Total Risk Across Surface Water	3.8E-06
Total Risk Across Sediment	5.3E-07
Total Risk Across All Media and All Exposure Routes	5.5E-06

Total Hazard Index Across All Media and All Exposure Routes	2.6E+00

Total CVS HI	3.4E-03
Total Skin HI	1.3E-01
Total Liver HI	7.1E-02
Total CNS HI	6.5E-02
Total Blood HI	1.2E+00
Total Body Weight	1.7E-02

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TABLE 10.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Maintenance Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Arsenic	1.2E-06	--	--	1.2E-06	Arsenic	Skin	--	--	--	--
			(Total)	1.2E-06	--	--	1.2E-06	(Total)		--	--	--	--
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	--	--	3.4E-06	3.4E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			(Total)	--	--	3.4E-06	3.4E-06	(Total)		--	--	--	--
						Total Risk Across Soil	1.2E-06					Total Hazard Index Across All Media and All Exposure Routes	--
						Total Risk Across Sediment	3.4E-06						
						Total Risk Across All Media and All Exposure Routes	4.6E-06						

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TABLE 10.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Recreational Users
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.2E-07	--	3.8E-07	5.0E-07	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	3.2E-08	--	3.5E-09	3.5E-08	4,4'-DDE	Cancer	--	--	--	--
			4,4'-DDT	5.9E-08	--	6.4E-09	6.5E-08	4,4'-DDT	Liver	2.4E-03	--	2.6E-04	2.7E-03
			Aluminum	--	--	--	--	Aluminum	Body Weight	1.8E-03	--	1.4E-04	1.9E-03
			Antimony	--	--	--	--	Antimony	Blood	6.2E-02	--	2.4E-02	8.6E-02
			Arsenic	6.8E-07	--	3.8E-07	1.1E-06	Arsenic	Skin	1.1E-02	--	5.9E-03	1.6E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	1.9E-03	--	1.4E-02	1.6E-02
			Iron	--	--	--	--	Iron	Blood	1.3E-01	--	6.8E-03	1.4E-01
			Lead	--	--	--	--	Lead	CNS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	3.6E-03	--	6.9E-04	4.3E-03
			(Total)	8.8E-07	--	7.7E-07	1.6E-06	(Total)		2.2E-01	--	5.2E-02	2.7E-01
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Bis(2-ethylhexyl)phthalate	8.0E-09	--	3.7E-05	3.7E-05	Bis(2-ethylhexyl)phthalate	Liver	2.0E-04	--	9.3E-01	9.3E-01
			Pentachlorophenol	1.3E-07	--	7.3E-05	7.3E-05	Pentachlorophenol	Liver, Kidney	2.6E-04	--	1.4E-01	1.4E-01
			(Total)	1.4E-07	--	1.1E-04	1.1E-04	(Total)		4.6E-04	--	1.1E+00	1.1E+00
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.1E-06	--	3.5E-06	4.6E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			(Total)	1.1E-06	--	3.5E-06	4.6E-06	(Total)		--	--	--	--

Total Risk Across Surface Soil	1.6E-06
Total Risk Across Surface Water	1.1E-04
Total Risk Across Sediment	4.6E-06
Total Risk Across All Media and All Exposure Routes	1.2E-04

Total Hazard Index Across All Media and All Exposure Routes	1.3E+00

Total Skin HI	1.6E-02
Total Liver HI	1.1E+00
Total CNS HI	4.3E-03
Total Blood HI	2.3E-01
Total Body Weight HI	1.9E-03
Total Kidney HI	1.6E-01

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TABLE 10.4a
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Bis(2-ethylhexyl)phthalate	--	--	1.8E-06	1.8E-06	Bis(2-ethylhexyl)phthalate	Liver	--	--	--	--
			Pentachlorophenol	--	--	5.9E-06	5.9E-06	Pentachlorophenol	Liver, Kidney	--	--	--	--
			(Total)	--	--	7.8E-06	7.8E-06	(Total)		--	--	--	--
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	--	--	2.0E-06	2.0E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			(Total)	--	--	2.0E-06	2.0E-06	(Total)		--	--	--	--
						Total Risk Across Surface Water	7.8E-06					Total Hazard Index Across All Media and All Exposure Routes	--
						Total Risk Across Sediment	2.0E-06						
						Total Risk Across All Media and All Exposure Routes	9.8E-06						

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TABLE 10.4b
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Finfish/Shellfish	Site 1 - Incinerator Landfill Maximum Concentration	Bis(2-Ethylhexyl)phthalate	3.2E-05	--	--	3.2E-05	Bis(2-Ethylhexyl)phthalate	Liver	2.7E-01	--	--	2.7E-01
			Dibenzofuran	--	--	--	--	Dibenzofuran	None Reported	1.3E+00	--	--	1.3E+00
			Pentachlorophenol	1.7E-03	--	--	1.7E-03	Pentachlorophenol	Liver, Kidney	1.1E+00	--	--	1.1E+00
			Arsenic	2.9E-04	--	--	2.9E-04	Arsenic	Skin, CVS	1.5E+00	--	--	1.5E+00
			Iron	--	--	--	--	Iron	Blood, GS	1.7E+01	--	--	1.7E+01
			Manganese	--	--	--	--	Manganese	CNS	1.4E+00	--	--	1.4E+00
			(Total)	2.0E-03	--	--	2.0E-03	(Total)		2.3E+01	--	--	2.3E+01

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TABLE 10.4c
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
SITE-SPECIFIC EXPOSURE ASSUMPTIONS
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Finfish/Shellfish	Site 1 - Incinerator Landfill Maximum Concentration	Bis(2-Ethylhexyl)phthalate	2.2E-06	--	--	2.2E-06	Bis(2-Ethylhexyl)phthalate	Liver	9.3E-02	--	--	9.3E-02
			Pentachlorophenol	1.1E-04	--	--	1.1E-04	Pentachlorophenol	Liver, Kidney	3.7E-01	--	--	3.7E-01
			Arsenic	2.0E-05	--	--	2.0E-05	Arsenic	Skin, CVS	5.2E-01	--	--	5.2E-01
			Iron	--	--	--	--	Iron	Blood, GS	6.0E+00	--	--	6.0E+00
			(Total)	1.4E-04	--	--	1.4E-04	(Total)		8.2E+00	--	--	8.2E+00

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TABLE 10.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Child Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	3.3E-06	--	2.8E-06	6.1E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDT	1.6E-06	--	4.7E-08	1.7E-06	4,4'-DDT	Liver	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	2.9E+00	--	--	2.9E+00
			Arsenic	1.9E-05	--	2.8E-06	2.2E-05	Arsenic	Skin	--	--	--	--
			Iron	--	--	--	--	Iron	Blood	6.3E+00	--	--	6.3E+00
			(Total)	2.4E-05	--	5.6E-06	2.9E-05	(Total)		9.2E+00	--	--	9.2E+00
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Bis(2-ethylhexyl)phthalate	--	--	3.5E-05	3.5E-05	Bis(2-ethylhexyl)phthalate	Liver	6.0E-04	--	1.5E+00	1.5E+00
			Pentachlorophenol	--	--	6.9E-05	6.9E-05	Pentachlorophenol	Liver, Kidney	--	--	--	--
			(Total)	--	--	1.0E-04	1.0E-04	(Total)		6.0E-04	--	1.5E+00	1.5E+00
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	3.9E-06	--	2.9E-06	6.8E-06	Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
			Arsenic	1.8E-06	--	2.3E-07	2.0E-06	Arsenic	Skin	--	--	--	--
			(Total)	5.7E-06	--	3.1E-06	8.8E-06	(Total)		--	--	--	--
						Total Risk Across Surface Soil	2.9E-05					Total Hazard Index Across All Media and All Exposure Routes	1.1E+01
						Total Risk Across Surface Water	1.0E-04						
						Total Risk Across Sediment	8.8E-06						
						Total Risk Across All Media and All Exposure Routes	1.4E-04						

TABLE 10.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Adult Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface/Subsurface Soil	Surface/Subsurface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.4E-06	--	2.4E-06	3.8E-06
		Site 41 - Former Incinerator	Arsenic	8.1E-06	--	2.4E-06	1.0E-05
			(Total)	9.5E-06	--	4.7E-06	1.4E-05
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Bis(2-ethylhexyl)phthalate	--	--	8.5E-05	8.5E-05
			Pentachlorophenol	--	--	1.7E-04	1.7E-04
			(Total)	--	--	2.5E-04	2.5E-04
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	1.7E-06	--	2.8E-06	4.5E-06
			(Total)	1.7E-06	--	2.8E-06	4.5E-06
			Total Risk Across Surface Soil				1.4E-05
			Total Risk Across Surface Water				2.5E-04
			Total Risk Across Sediment				4.5E-06
			Total Risk Across All Media and All Exposure Routes				2.7E-04

Chemical	Non-Carcinogenic Hazard Quotient				
	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
Arsenic	Skin	--	--	--	--
(Total)		--	--	--	--
Bis(2-ethylhexyl)phthalate	Liver	--	--	--	--
Pentachlorophenol	Liver, Kidney	--	--	--	--
(Total)		--	--	--	--
Benzo(a)pyrene Equivalents	Cancer	--	--	--	--
(Total)		--	--	--	--
Total Hazard Index Across All Media and All Exposure Routes					--

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TABLE 10.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Lifetime Residents
Receptor Age: Children/Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	4.7E-06	--	5.2E-06	9.9E-06	Benzo(a)pyrene Equivalents	--	--	--	--	--
		Site 41 - Former Incinerator	4,4'-DDE	1.3E-06	--	--	1.3E-06	4,4'-DDE	--	--	--	--	--
			4,4'-DDT	2.3E-06	--	--	2.3E-06	4,4'-DDT	--	--	--	--	--
			Arsenic	2.7E-05	--	5.1E-06	3.2E-05	Arsenic	--	--	--	--	--
			(Total)	3.5E-05	--	1.0E-05	4.6E-05	(Total)	--	--	--	--	--
Surface Water	Surface Water	Site 1 - Incinerator Landfill	Bis(2-ethylhexyl)phthalate	--	--	1.2E-04	1.2E-04	Bis(2-ethylhexyl)phthalate	--	--	--	--	--
			Pentachlorophenol	--	--	2.4E-04	2.4E-04	Pentachlorophenol	--	--	--	--	--
			Arsenic	--	--	--	--	Arsenic	--	--	--	--	--
			(Total)	--	--	3.6E-04	3.6E-04	(Total)	--	--	--	--	--
Sediment	Sediment	Site 1 - Incinerator Landfill	Benzo(a)pyrene Equivalents	5.6E-06	--	5.7E-06	1.1E-05	Benzo(a)pyrene Equivalents	--	--	--	--	--
			Arsenic	2.6E-06	--	--	2.6E-06	Arsenic	--	--	--	--	--
			(Total)	8.2E-06	--	5.7E-06	1.4E-05	(Total)	--	--	--	--	--
						Total Risk Across Surface Soil	4.6E-05					Total Hazard Index Across All Media and All Exposure Routes	--
						Total Risk Across Surface Water	3.6E-04						
						Total Risk Across Sediment	1.4E-05						
						Total Risk Across All Media and All Exposure Routes	4.2E-04						

APPENDIX E.3

LEAD MODELING RESULTS

IEUBK MODEL - Exposure to Lead (Page 1 of 2)
SITE NAME: Site 1 & SWMU 41
EXPOSURE SCENARIO: On-site Child Resident
LOCATION: MCRD Parris Island, South Carolina
DATE: September 24, 1999

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: 4.00 ug Pb/L DEFAULT
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: constant conc.
Dust: Multiple Source Analysis

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	834.0	593.8
1-2	834.0	593.8
2-3	834.0	593.8
3-4	834.0	593.8
4-5	834.0	593.8
5-6	834.0	593.8
6-7	834.0	593.8

Additional Dust Sources: None DEFAULT
Soil contribution conversion factor: 0.70
Air contribution conversion factor: 100.0

PAINT Intake: 0.00 ug Pb/day DEFAULT

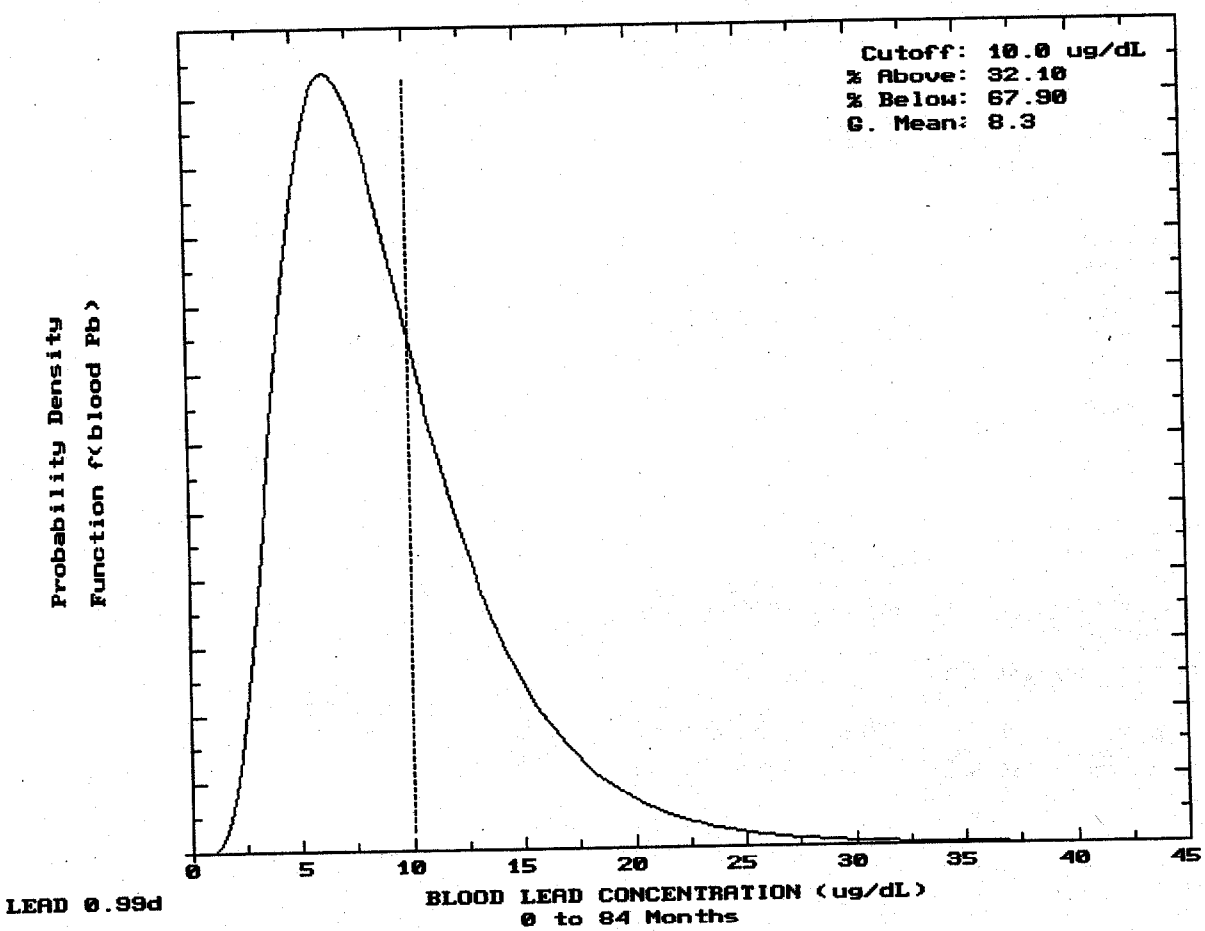
MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	9.1	17.25	14.64
1-2:	10.4	25.67	22.55
2-3:	9.8	26.73	23.18
3-4:	9.4	27.36	23.80
4-5:	7.9	22.30	18.60
5-6:	6.7	21.09	17.09
6-7:	5.9	20.67	16.31

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.26	0.33	0.00	0.02
1-2:	2.29	0.79	0.00	0.03
2-3:	2.65	0.85	0.00	0.06
3-4:	2.61	0.89	0.00	0.07
4-5:	2.66	0.97	0.00	0.07
5-6:	2.86	1.05	0.00	0.09
6-7:	3.19	1.08	0.00	0.09

IEUBK MODEL - Exposure to Lead (Page 2 of 2)
SITE NAME: Site 1 & SWMU 41
EXPOSURE SCENARIO: On-site Child Resident
LOCATION: MCRD Parris Island, South Carolina
DATE: September 24, 1999



Calculations of 95th Percentile Fetal Blood Lead Concentrations for Adult Exposure to Soil

SITE NAME: SITE 1 & SWMU 41
LOCATION: MCRD PARRIS ISLAND, SOUTH CAROLINA
RECEPTOR: CONSTRUCTION WORKER
DATE: SEPTEMBER 24, 1999

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

$PbB_{fetal,\ 0.95} = PbB_{adult,\ central} \times GSD_{i,\ adult} \times R_{fetal/maternal}$

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)	834	834	834	834
BKSF	Biokinetic slope factor (ug/dL per ug/day))	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)	125	125	125	125
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)	3.07	3.07	3.57	3.57
$PbB_{fetal,\ 0.95}$	Calculated 95th percentile blood lead concentrations among fetuses born to women having site exposures (ug/dL)	7.27	9.37	8.45	10.89

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.

E-114

APPENDIX E.4

SUPPORTING INFORMATION

EPA Region III RBC Table
April 12, 1999

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch St
Philadelphia, Pennsylvania 19103

SUBJECT: Risk-Based Concentration Table **DATE:** 4/12/1999

FROM: Jennifer Hubbard, Toxicologist
Superfund Technical Support Section (3HS41)

TO: RBC Table Users

Attached is the EPA Region III Risk-Based Concentration (RBC) Table, which we prepare and post periodically for all interested parties.

IMPORTANT NOTES: To make the RBC Table more accessible and to minimize paper usage, it is now primarily available through the Internet. The address is **http://www.epa.gov/reg3hwmd/risk/riskmenu.htm**. The Table is available in both Lotus and Excel as "self-extracting" files. These files should be downloaded and then processed with your computer's "run" function. The files can then be viewed in Lotus or Excel. If you have technical questions about the toxicological or risk assessment aspects of the RBCs, please contact Jennifer Hubbard at 215-814-3328 or hubbard.jennifer@epamail.epa.gov. Other questions can be addressed to Vanessa Sizer or Terri Fields at 215-814-3041. You can also consult the Frequently Asked Questions, below.

CONTENTS, USES, AND LIMITATIONS OF THE RBC TABLE

The RBC Table contains Reference Doses (RfDs) and Cancer Slope Factors (CSFs) for 400-500 chemicals. These toxicity factors have been combined with "standard" exposure scenarios to calculate RBCs--chemical concentrations corresponding to fixed levels of risk (i.e., a Hazard Quotient (HQ) of 1, or lifetime cancer risk of 1E-6, whichever occurs at a lower concentration) in water, air, fish tissue, and soil.

The Region III toxicologists use RBCs to screen sites not yet on the NPL, respond rapidly to citizen inquiries, and spot-check formal baseline risk assessments. The primary use of RBCs is for chemical screening during baseline risk assessment (see EPA Regional Guidance EPA/903/R-93-001, "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening"). The exposure equations come from EPA's Risk Assessment Guidance for Superfund (RAGS), while the exposure factors are those recommended in RAGS or supplemental guidance from the Superfund program. The attached technical background

document provides specific equations and assumptions. Simply put, RBCs are like risk assessments run in reverse. For a single contaminant in a single medium, under standard default exposure assumptions, the RBC corresponds to the target risk or hazard quotient.

RBCs also have several important limitations. Specifically excluded from consideration are (1) transfers from soil to air and groundwater, 2) cumulative risk from multiple contaminants or media, and (3) dermal risk. Additionally, the risks for inhalation of vapors from water are based on a very simple model, whereas detailed risk assessments may use more detailed showering models. Also, the toxicity information in the Table has been assembled by hand and (despite extensive checking and years of use) may contain errors. It's advisable to cross-check before relying on any RfDs or CSFs in the Table. If you note any errors, please let us know.

It is important to note that this Table uses inhalation RfDs and CSFs rather than RfCs and inhalation unit cancer risks. This is because the latter factors incorporate exposure assumptions and therefore can only be used for one exposure scenario. Because risk assessors need to evaluate risks for many types of scenarios, the factors have been converted to the more traditional RfDs and CSFs. Unless otherwise indicated in the toxicity-factor source, the assumption is that RfCs and unit risks should be adjusted by a 70-kilogram body weight and a 20 m^3/day inhalation rate to generate the RfDs and CSFs.

Many users want to know if the RBCs can be used as valid no-action levels or cleanup levels, especially for soils. The answer is a bit complex. First, it is important to realize that <u>the RBC Table does not constitute regulation or guidance, and should not be viewed as a substitute for a site-specific risk assessment</u>. For sites where:

1. A single medium is contaminated;

2. A single contaminant contributes nearly all the health risk;

3. Volatilization, leaching, dermal contact, and other pathways not included in the RBCs are not expected to be significant;

4. The exposure scenarios and assumptions used in the RBC table are appropriate for the site;

5. The fixed risk levels used in the RBC table are appropriate for the site; and

6. Risk to ecological receptors is not expected to be significant;

the RBCs would probably be protective as no-action levels or cleanup goals. However, to the extent that a site deviates from this description, as most do, the RBCs would not necessarily be appropriate.

<u>To summarize, the Table should generally not be used to set cleanup or no-action levels</u>

at CERCLA sites or RCRA Corrective Action sites, to substitute for EPA guidance for preparing baseline risk assessments, or to determine if a waste is hazardous under RCRA.

SPECIAL NOTES

The RBC Table was originally developed by Roy L. Smith, Ph.D., for use by risk assessors in the Region III Superfund program. Dr. Smith is no longer with Region III, and the Table continues to evolve. You may notice some modifications of formatting and conventions used in the Table.

For instance, besides formatting, the following changes are noteworthy:

- As usual, updated toxicity factors have been used wherever available. However, because IRIS and provisional values are updated more frequently than the RBC Table, RBC Table users are ultimately responsible for obtaining the most up-to-date values. The RBC Table is provided as a convenience, but toxicity factors are compiled from the original sources and it is those original sources that should serve as the definitive reference.

- Certain outdated and withdrawn numbers have been removed from the Table.

- Changes to the table have been marked with asterisks (**). Changes may involve a corrected CAS number or a correction in the VOC status, or they may reflect changes of RfDs and CSFs on IRIS.

- RBCs are no longer rounded to 1E6 ppm. For certain low-toxicity chemicals, the RBCs exceed possible concentrations at the target risks. In such cases, Dr. Smith rounded these numbers to the highest possible concentration, or 1E6 ppm. The rounding has been discontinued so that Table users can adjust the RBCs to a different target risk whenever necessary. For example, when screening chemicals at a target HQ of 0.1, noncarcinogenic RBCs may simply be divided by 10. Such scaling is not possible when RBCs are rounded.

- This Table was originally compiled to assist Superfund risk assessors in screening hazardous waste sites. The large number of chemicals made the Table unwieldy and difficult to keep current. Many of the chemicals did not typically (or even occasionally) appear at Superfund sites. Starting with the April 1998 version of the Table, the 600+ chemicals were reduced to some 400-500 chemicals by eliminating many of those atypical chemicals. Through time, the Table may continue to grow or decrease in size. Comments on this issue are appreciated. During the last six months, only one request was received for restoration of a chemical: NuStar has been restored to the Table. (A list of the deleted chemicals is attached.)

- At Region III Superfund sites, noncancer RBCs are typically adjusted downward to correspond to a target HQ of 0.1 rather than 1. (This is done to ensure that chemicals with

additive effects are not prematurely eliminated during screening.) However, some chemicals have RBCs at HQs of 0.1 that are lower than their RBCs at 1E-6 cancer risk. In other words, the screening RBC would change from carcinogenic to noncarcinogenic. A new feature of this Table is that these chemicals are now flagged with a "!" symbol. Therefore, assessors screening with adjusted RBCs will be alerted to this situation.

- Earlier versions of this Table included a substitution of inhalation toxicity factors for oral factors whenever oral factors were unavailable (this applied only to groundwater and air, but not soil or fish). This practice has been discontinued in order to minimize the uncertainty associated with such a conversion. The discontinuation of this practice does not significantly decrease the number of available RBCs.

- The criterion for "VOC status" has been adjusted in accordance with RAGS Part B: chemicals with Henry's Law constants greater than 1E-5 and molecular weight less than 200 are now marked as VOCs. This increases consistency with the national guidance and with other EPA regions that use risk-based screening numbers. The vast majority of the changes on this RBC table are adjustments to meet this criterion. A change in the VOC status only changes the tap water RBC. (Exceptions to the criterion: certain chemicals that are gases at showering temperature are also marked as VOCs, because the purpose of the VOC column is to indicate whether inhalation should be considered as part of the tap water RBC.)

- Earlier versions of this Table included soil screening levels (SSLs), when those values were available in draft form. Since the finalization of the SSL Guidance, risk assessors are urged to consult the final SSL Guidance directly. The Guidance has detailed recommendations on site-specific sampling and site-specific SSL generation. (Soil Screening Guidance: User's Guide, April 1996, Publication 9355.4-23; and Soil Screening Guidance: Technical Background Document, May 1996; EPA/540/R-95/128)

- One user of the Table pointed out that the CAS numbers do not contain the dashes that are part of their format. CAS numbers have always appeared on the Table without dashes, but may be converted to their dashed form by placing a dash before the last number (farthest to the right), then moving two places to the left and placing another dash. For example, "107131" becomes "107-13-1"; "7440360" becomes "7440-36-0"; "25057890" becomes "25057-89-0." Region III could add the dashes directly to the Table, but we do not wish to make this change without feedback from users on whether this would adversely affect them. Therefore, we are soliciting comments on this issue (see box on first page for address). Over the last six months, no comments have been received on this issue.

FREQUENTLY ASKED QUESTIONS

To help you better understand the RBC Table, here are answers to our most often-asked questions:

1. How can the age-adjusted inhalation factor (11.66) be less than the inhalation rate for either a child (12) or an adult (20)?

   Age-adjusted factors are not intake rates, but rather partial calculations which have different units from intake rates. (Therefore, they are not directly comparable.) The fact that these partial calculations have values similar to intake rates is really coincidental, an artifact of the similar magnitude of years of exposure and time-averaged body weight.

2. For manganese, IRIS shows an oral RfD of 0.14 mg/kg/day, but the RBC Table uses 2E-2 mg/kg/day. Why?

   The IRIS RfD includes manganese from all sources, including diet. The explanatory text in IRIS recommends using a modifying factor of 3 when calculating risks associated with non-food sources, and the Table follows this recommendation. IRIS also recommends subtracting dietary exposure (default assumption in this case 5 mg). Thus, the IRIS RfD has been lowered by a factor of 2 x 3, or 6. The Table now reflects manganese RBCs for both "food" and "non-food" (most environmental) sources.

3. What is the source of the child's inhalation rate of 12 m^3/day?

   The calculation comes from basic physiology. It's a scaling of the mass-specific 20 m^3/day rate for adults from a body mass of 70 kg to 15 kg, using the 2/3 power of mass, as follows:

   Ircm = mass-specific child inhalation rate (m^3/kg/day)
   Irc = child inhalation rate (m^3/day)

   20 m^3/day / 70 kg = 0.286 m^3/kg/day (mass-specific adult inhalation rate)

   $0.286\ m^3/kg/day \times (70^{0.67}) = (Ircm) \times (15^{0.67})$

   Ircm = 0.803 m^3/kg/day

   Irc = Ircm x 15 kg = 0.803 m^3/kg/day x 15 kg = 12.04 m^3/day

4. Can the oral RfDs in the RBC Table be applied to dermal exposure?

   Not directly. Oral RfDs are usually based on administered dose and therefore tacitly include a GI absorption factor. Thus, any use of oral RfDs in dermal risk calculations should involve removing this absorption factor. Consult the Risk Assessment Guidance for Superfund, Part A, Appendix A, for further details on how to do this.

5. The exposure variables table in the RBC background document lists the averaging time

for non-carcinogens as "ED*365." What does that mean?

ED is exposure duration, in years, and * is the computer-ese symbol for multiplication. Multiplying ED by 365 simply converts the duration to days. In fact, the ED term is included in both the numerator and denominator of the RBC algorithms for non-cancer risk, canceling it altogether. See RAGS for more information.

6. Why is inorganic lead not included in the RBC Table?

EPA has no consensus RfD or CSF for inorganic lead, so it is not possible to calculate RBCs as we have done for other chemicals. EPA considers lead to be a special case because of the difficulty in identifying the classic "threshold" needed to develop an RfD.

EPA therefore evaluates lead exposure by using blood-lead modeling, such as the Integrated Exposure-Uptake Biokinetic Model (IEUBK). The EPA Office of Solid Waste has also released a detailed directive on risk assessment and cleanup of residential soil lead. The directive recommends that soil lead levels less than 400 mg/kg are generally safe for residential use. Above that level, the document suggests collecting data and modeling blood-lead levels with the IEUBK model. For the purposes of screening, therefore, 400 mg/kg is recommended for residential soils. For water, we suggest 15 ug/l (the EPA Action Level in water), and for air, the National Ambient Air Quality Standard.

7. Where did the CSFs for carcinogenic PAHs come from?

The PAH CSFs are all calculated relative to benzo[a]pyrene, which has an IRIS slope factor. The relative factors for the other PAHs can be found in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," Final Draft, ECAO-CIN-842 (March, 1993).

8. May I please have a copy of a previous RBC Table?

We do not distribute outdated copies of the RBC Table. Each new version of the Table supersedes all previous versions.

9. Please elaborate on the meaning of the "W" source code in the Table.

The "W" code means that a RfD or CSF is currently not present on either IRIS or HEAST, but that it was once present on either IRIS or HEAST and was removed. Such withdrawal usually indicates that consensus on the number no longer exists among EPA scientists, but not that EPA believes the contaminant to be unimportant.

Withdrawn numbers are shown in the Table because we still need to deal with these contaminants during the long delays before replacement numbers are ready. For the purpose of screening, a "W" value is similar to a provisional value in that neither value

has achieved Agency consensus. The "W" code should serve as a clear warning that before making any serious decision involving that contaminant, you will need to develop an interim value based on current scientific understanding.

If you are assessing risks at a site where a major contaminant is coded "W," consider working with your Region EPA risk assessor to develop a current toxicity constant. If the site is being studied under CERCLA, the EPA-NCEA Regional Technical Support group may be able to assist.

10. Can I get copies of supporting documents for interim toxicity constants which are coded "E" in the RBC Table?

Unfortunately, Region 3 does not have a complete set of supporting documents. The EPA-NCEA Superfund Technical Support Center prepares these interim toxicity constants in response to site-specific requests from Regional risk assessors, and sends the documentation only to the requestor. The RBC Tables contain only the latest interim values that we've either requested or have otherwise received. NCEA maintains the master data base of these chemicals, but will not release documentation of provisional values unless they are recent. Furthermore, since NCEA's Superfund Technical Support Center is mainly for the support of Superfund, it usually cannot develop new criteria unless authorized to do so for a specific Superfund project.

If an "E"-coded contaminant is a chemical of potential concern at your site, we urge you to work with the EPA Regional risk assessor assigned to the project in order to develop or obtain documentation for provisional values. EPA Region 3 furnishes documents only when needed to support Regional risk assessments or recommendations.

11. Why is there no oral RfD for mercury? How should I handle mercury?

IRIS gives oral RfDs for mercuric chloride and for methylmercury, but not for elemental mercury. Therefore, the RBC Table reflects this primary source. Consult your toxicologist to determine which of the available mercury numbers is suitable for the conditions at your site (e.g., whether mercury is likely to be organic or inorganic.)

Attachment

"DISCONTINUED" CHEMICALS

These chemicals may still have toxicity criteria available in IRIS, HEAST, or NCEA provisional values. However, they are not routine chemicals and therefore will not be routinely maintained in the RBC Table, unless our Table users report a significant need for chemicals to be re-added. Some of the chemicals on this Table were deleted because supporting toxicity information has been withdrawn or is unavailable.

acephate
acetone cyanohyrin
acifluorfen
acrylic acid
ally
allyl alcohol
aluminum phosphide
amdro
ametryn
m-aminophenol
amitraz
ammonium sulfamate
antimony potassium tartrate
apollo
aramite
asulam
avermectin B1
barium cyanide
bayleton
benefin
benomyl
benzotrichloride
bidrin
biphenthin
bis(2-chloro-1-methylethyl)ether
bisphenol A
boron trifluoride
4-bromophenyl phenyl ether
bromoxynil
bromoxynil octanoate
butylphthalyl butylglycolate
cacodylic acid
captafol
captan
carboxin
chloramben
chlorimuron-ethyl
chloroacetaldehyde
2-chloroacetophenone
4-chlorobenzotrifluoride
2-chloroethyl vinyl ether
4-chloro-2-methylaniline hydrochloride
chlorothalonil
chlorpropham
chlorsulfuron
chlorthiophos
coal tar creosote
cyclohexlamine
cyromazine
danitol
decabromodiphenyl ether
demeton
diallate
diethylforamide
diflubenzuron
dimethipin
dimethoate
N,N-dimethylformamide
dimethyl terephthalate
diphenamid
direct black 38
direct blue 6
direct brown 95
dodine
1,2-epoxybutane
ethephon
2-ethoxyethanol acetate
ethyl acrylate
EPTC

ethylene cyanohydrin
ethyl p-nitrophenyl phenylphosphorothioate
ethylphthalyl ethyl glycolate
express
fluoridone
flurprimidol
flutolanil
fluvalinate
folpet
fosteyl-al
furium
furmecyclox
glufosinate-ammonium
haloxyfop-methyl
harmony
imazalil
imazaquin
iprodione
isoxaben
kepone
lactofen
linuron
londax
maleic hydrazide
malononitrile
mancozeb
maneb
merphos
merphos oxide
metalaxyl
methamidophos
methomyl
2-methoxyethanol acetate
2-methoxyethanol
2-methoxy-5-nitroaniline
2-methylaniline hydrochloride
methyl chlorocarbonate
4,4-methylene bisbenzeneamine
metribuzin
molinate
2-naphthylamine
napropamide
nickel subsulfide
nitrapyrin
3-nitroaniline
4-nitroaniline
nitroguanidine
norflurazon
octabromodiphenyl ether
octamethylpyrophosphoramide
paclobutrazol
pebulate
pendimethalin
pentabromo-6-chlorocyclohexane
pentabromodiphenyl ether
phenmedipham
phenylmercuric acetate
phorate
phosmet
picloram
pirimiphos-methyl
prochloraz
profluralin
pronamide
propargyl alcohol
propazine
propham
propiconazole
propylene oxide
pydrin
quinalphos
savey
selenourea
sethoxydim
sodium fluoroacetate
sodium metavanadate
systhane
tebuthiuron
temephos
terbacil
terbufos
terbutryn

tetrachlorovinphos
tetraethyldithiopyrophosphate
thallium selenide
2-(thiocyanomethylthio)-benzothiazole
thiofanox
thiophanate-methyl
thiram
tralomethrin
triallate
triasulfuron
2,4,6-trichloroaniline hydrochloride
tridiphane
triethylamine
trifluralin
vernam

EPA REGION III RISK-BASED CONCENTRATION TABLE
TECHNICAL BACKGROUND INFORMATION

(Originally developed by Roy L. Smith, Ph.D.)

Development of Risk-Based Concentrations

General

Separate carcinogenic and non-carcinogenic risk-based concentrations were calculated for each compound for each pathway. The concentration in the table is the lower of the two, rounded to two significant figures. The following terms and values were used in the calculations:

Exposure variables	Value	Symbol
General:		
Carcinogenic potency slope oral (risk per mg/kg/d):	*	CPSo
Carcinogenic potency slope inhaled (risk per mg/kg/d):	*	CPSi
Reference dose oral (mg/kg/d):	*	RfDo
Reference dose inhaled (mg/kg/d):	*	RfDi
Target cancer risk:	1e-06	TR
Target hazard quotient:	1	THQ
Body weight, adult (kg):	70	BWa
Body weight, age 1-6 (kg):	15	BWc
Averaging time carcinogens (d):	25550	ATc
Averaging time non-carcinogens (d):	ED*365	ATn
Inhalation, adult (m3/d):	20	IRAa
Inhalation, child (m3/d):	12	IRAc
Inhalation factor, age-adjusted (m3-y/kg-d):	11.66	IFAadj
Tap water ingestion, adult (L/d):	2	IRWa
Tap water ingestion, age 1-6 (L/d):	1	IRWc
Tap water ingestion factor, age-adjusted (L-y/kg-d):	1.09	IFWadj
Fish ingestion (g/d):	54	IRF
Soil ingestion, adult (mg/d):	100	IRSa
Soil ingestion, age 1-6 (mg/d):	200	IRSc
Soil ingestion factor, age adjusted (mg-y/kg-d):	114.29	IFSadj
Residential:		
Exposure frequency (d/y):	350	EFr
Exposure duration, total (y):	30	EDtot
Exposure duration, age 1-6 (y):	6	EDc
Volatilization factor (L/m3):	0.5	K
Occupational:		
Exposure frequency (d/y):	250	EFo
Exposure duration (y):	25	EDo
Fraction of contaminated soil ingested (unitless)	0.5	FC

*: Contaminant-specific toxicological constants. The priority among sources of toxicological constants was as follows: (1) IRIS, (2) HEAST, (3) HEAST alternative method, (4) EPA-NCEA Superfund Health Risk Technical Support Center, (5) withdrawn from IRIS or HEAST, and (6) other EPA documents. Each source was used only if numbers from higher-priority sources were unavailable. The EPA Superfund Health Risk Technical Support Center, part of the EPA National Center for Environmental Assessment in Cincinnati, develops provisional RfDs and CPSs on request for contaminants not in IRIS or HEAST. These provisional values are labeled "E = EPA-NCEA provisional" in the table. It is possible they may be obsolete. If one of the "E" constants is important to a Superfund risk assessment, consider requesting, through a Regional risk assessor, a new provisional value.

Age-adjusted factors

Because contact rates with tap water, ambient air, and residential soil are different for children and adults, carcinogenic risks during the first 30 years of life were calculated using age-adjusted factors. These factors approximated the integrated exposure from birth until age 30 by combining contact rates, body weights, and exposure durations for two age groups - small children and adults. The age-adjusted factor for soil was obtained from RAGS IB; the others were developed by analogy.

(1) Air inhalation

$$IFAadj \ \frac{m^3 \cdot y}{kg \cdot d} = \frac{EDc \cdot IRAc}{BWc} + \frac{(EDtot - EDc) \cdot IRAa}{BWa}$$

(2) Tap water ingestion

$$IFWadj \ \frac{L \cdot y}{kg \cdot d} = \frac{EDc \cdot IRWc}{BWc} + \frac{(EDtot - EDc) \cdot IRWa}{BWa}$$

(3) Soil ingestion

$$IFSadj \ \frac{mg \cdot y}{kg \cdot d} = \frac{EDc \cdot IRSc}{BWc} + \frac{(EDtot - EDc) \cdot IRSa}{BWa}$$

Residential water

Volatilization terms were calculated only for compounds with a mark in the "VOC" column. Compounds having a Henry's Law constant greater than 10^{-5} were considered volatile. The list may be incomplete, but is unlikely to include false positives. The equations and the volatilization factor (K, above) were obtained from RAGS IB. Oral potency slopes and reference doses were used for both oral and inhaled exposures for volatile compounds lacking inhalation values. RBCs for carcinogens were based on combined childhood and adult exposure; for non-carcinogens RBCs were based on adult exposure.

(4) Carcinogens

$$RBC \ \frac{\mu g}{L} = \frac{TR \cdot ATc \cdot 1000 \frac{\mu g}{mg}}{EFr \cdot ([K \cdot IFAadj \cdot CPSi] + [IFWadj \cdot CPSo])}$$

(5) Non-carcinogens

$$RBC\ \frac{\mu g}{L} = \frac{THQ \cdot BWa \cdot ATn \cdot 1000\frac{\mu g}{mg}}{EFr \cdot EDtot \cdot \left(\frac{K \cdot IRAa}{RfDi} + \frac{IRWa}{RfDo}\right)}$$

Ambient air

Oral potency slopes and references were used where inhalation values were not available. RBCs for carcinogens were based on combined childhood and adult exposure; for non-carcinogens RBCs were based on adult exposure.

(6) Carcinogens

$$RBC\ \frac{\mu g}{m^3} = \frac{TR \cdot ATc \cdot 1000\frac{\mu g}{mg}}{EFr \cdot IFAadj \cdot CPSi}$$

(7) Non-carcinogens

$$RBC\ \frac{\mu g}{m^3} = \frac{THQ \cdot RfDi \cdot BWa \cdot ATn \cdot 1000\frac{\mu g}{mg}}{EFr \cdot EDtot \cdot IRAa}$$

Edible fish

All RBCs were based on adult exposure.

(8) Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot BWa \cdot ATc}{EFr \cdot EDtot \cdot \frac{IRF}{1000\frac{g}{kg}} \cdot CPSo}$$

(9) Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ \cdot RfDo \cdot BWa \cdot ATn}{EFr \cdot EDtot \cdot \frac{IRF}{1000\frac{g}{kg}}}$$

Commercial/industrial soil ingestion

RBCs were based on adult occupational exposure, including an assumption that only 50% of total soil ingestion is work-related.

(10) Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot BWa \cdot ATc}{EFo \cdot EDo \cdot \frac{IRSa}{10^6\ \frac{mg}{kg}} \cdot FC \cdot CPSo}$$

(11) Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ \cdot RfDo \cdot BWa \cdot ATn}{EFo \cdot EDo \cdot \frac{IRSa}{10^6\ \frac{mg}{kg}} \cdot FC}$$

Residential soil ingestion

RBCs for carcinogens were based on combined childhood and adult exposure; RBCs for non-carcinogens were based on childhood exposure only.

(12) Carcinogens

$$RBC\ \frac{mg}{kg} = \frac{TR \cdot ATc}{EFr \cdot \frac{IFSadj}{10^6\ \frac{mg}{kg}} \cdot CPSo}$$

(13) Non-carcinogens

$$RBC\ \frac{mg}{kg} = \frac{THQ \cdot RfDo \cdot BWc \cdot ATn}{EFr \cdot EDc \cdot \frac{IRSc}{10^6\ \frac{mg}{kg}}}$$

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects * = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
**ACETALDEHYDE	75070			2.57E-03 I	7.7E-03 I	y	1.6E+00 C	8.1E-01 C			
ACETOCHLOR	34256821	2E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
**ACETONE	67641	1.00E-01 I				y	6.1E+02 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
**ACETONITRILE	75058			1.7E-02 I		y	1.2E+02 N	6.2E+01 N			
ACETOPHENONE	98862	1.00E-01 I		5.70E-06 W		y	4.2E-02 N	2.1E-02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ACROLEIN	107028	2.00E-02 H		5.70E-06 I		y	4.2E-02 N	2.1E-02 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
ACRYLAMIDE	79061	2.00E-04 I	4.50E+00 I		4.50E+00 I		1.5E-02 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
**ACRYLONITRILE	107131	1.00E-03 H	5.40E-01 I	5.70E-04 I	2.40E-01 I	y	3.7E-02 C	2.6E-02 C	5.8E-03 C	1.1E+01 C	1.2E+00 C
ALACHLOR	15972608	1.00E-02 I	8.00E-02 H				8.4E-01 C	7.8E-02 C	3.9E-02 C	7.2E+01 C	8.0E+00 C
ALAR	1596845	1.50E-01 I					5.5E+03 N	5.5E+02 N	2.0E+02 N	3.1E+05 N	1.2E+04 N
ALDICARB	116063	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
ALDICARB SULFONE	1646884	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
ALDRIN	309002	3.00E-05 I	1.70E+01 I		1.70E+01 I		3.9E-03 C	3.7E-04 C	1.9E-04 C	3.4E-01 C	3.8E-02 C
ALUMINUM	7429905	1.00E+00 E		1.00E-03 E			3.7E+04 N	3.7E+00 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
AMINODINITROTOLUENES		6.00E-05 E					2.2E+00 N	2.2E-01 N	8.1E-02 N	1.2E+02 N	4.7E+00 N
4-AMINOPYRIDINE	504245	2.00E-05 H					7.3E-01 N	7.3E-02 N	2.7E-02 N	4.1E+01 N	1.6E+00 N
AMMONIA	7664417			2.86E-02 I		y	2.1E+02 N	1.0E+02 N			
**ANILINE	62533	7.00E-03 E	5.70E-03 I	2.90E-04 I			1.2E+01 C	1.1E+00 N	5.5E-01 C	1.0E+03 C	1.1E+02 C *
ANTIMONY	7440360	4.00E-04 I					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ANTIMONY PENTOXIDE	1314609	5.00E-04 H					1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
ANTIMONY TETROXIDE	1332816	4.00E-04 H					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ANTIMONY TRIOXIDE	1309644	4.00E-04 H		5.70E-05 I			1.5E+01 N	2.1E-01 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
ARSENIC	7440382	3.00E-04 I	1.50E+00 I		1.51E+01 I		4.5E-02 C	4.1E-04 C	2.1E-03 C	3.8E+00 C	4.3E-01 C
ARSINE	7784421			1.40E-05 I		y	1.0E-01 N	5.1E-02 N			
ASSURE	76578148	9.00E-03 I					3.3E+02 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
ATRAZINE	1912249	3.50E-02 I	2.20E-01 H				3.0E-01 C	2.8E-02 C	1.4E-02 C	2.6E+01 C	2.9E+00 C
AZOBENZENE	103333		1.10E-01 I		1.10E-01 I		6.1E-01 C	5.7E-02 C	2.9E-02 C	5.2E+01 C	5.8E+00 C
BARIUM	7440393	7.00E-02 I		1.40E-04 A			2.6E+03 N	5.1E-01 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
BAYGON	114261	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
BAYTHROID	68359375	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
BENTAZON	25057890	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
BENZALDEHYDE	100527	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
BENZENE	71432	3.00E-03 E	2.90E-02 I	1.70E-03 E	2.90E-02 I	y	3.6E-01 C	2.2E-01 C	1.1E-01 C	2.0E+02 C	2.2E+01 C
BENZENETHIOL	108985	1.00E-05 H				y	6.1E-02 N	3.7E-02 N	1.4E-02 N	2.0E+01 N	7.8E-01 N
BENZIDINE	92875	3.00E-03 I	2.30E+02 I		2.30E+02 I		2.9E-04 C	2.7E-05 C	1.4E-05 C	2.5E-02 C	2.8E-03 C
BENZOIC ACID	65850	4.00E+00 I					1.5E+05 N	1.5E+04 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
BENZYL ALCOHOL	100516	3.00E-01 H					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
BENZYL CHLORIDE	100447		0.17 I			y	6.2E-02 C	3.7E-02 C	1.9E-02 C	3.4E+01 C	3.8E+00 C
BERYLLIUM	7440417	2.00E-03 I		5.7E-06 I	8.40E+00 I		7.3E+01 N	7.5E-04 C	2.7E+00 N	4.1E+03 N	1.6E+02 N
BIPHENYL	92524	5.00E-02 I				y	3.0E+02 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
**BIS(2-CHLOROETHYL)ETHER	111444		1.10E+00 I		1.10E+00 I	y	9.6E-03 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C
BIS(2-CHLOROISOPROPYL)ETHER	108601	4.00E-02 I	7.00E-02 H		3.50E-02 H	y	2.6E-01 C	1.8E-01 C	4.5E-02 C	8.2E+01 C	9.1E+00 C
BIS(CHLOROMETHYL)ETHER	542881		2.20E+02 I		2.20E+02 I	y	4.8E-05 C	2.8E-05 C	1.4E-05 C	2.6E-02 C	2.9E-03 C
BIS(2-ETHYLHEXYL)PHTHALATE	117817	2.00E-02 I	1.40E-02 I		1.40E-02 E		4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C
BORON	7440428	9.00E-02 I		5.70E-03 H			3.3E+03 N	2.1E+01 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
BROMODICHLOROMETHANE	75274	2.00E-02 I	6.20E-02 I			y	1.7E-01 C	1.0E-01 C	5.1E-02 C	9.2E+01 C	1.0E+01 C
BROMOETHENE	593602			8.6E-04 I	1.10E-01 H	y	1.1E-01 C	5.7E-02 C			
**BROMOFORM	75252	2.00E-02 I	7.90E-03 I		3.90E-03 I		8.5E+00 C	1.6E+00 C	4.0E-01 C	7.2E+02 C	8.1E+01 C
BROMOMETHANE	74839	1.40E-03 I		1.40E-03 I		y	8.5E+00 N	5.1E+00 N	1.9E+00 N	2.9E+03 N	1.1E+02 N
**BROMOPHOS	2104963	5.00E-03 H					1.6E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
1,3-BUTADIENE	106990				1.80E+00 H	y	7.0E-03 C	3.5E-03 C			
1-BUTANOL	71363	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
BUTYLBENZYLPHTHALATE	85687	2.00E-01 I					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
BUTYLATE	2008415	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N

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Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
N-BUTYLBENZENE	104518	1.00E-02 E				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
SEC-BUTYLBENZENE	135988	1.00E-02 E				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
TERT-BUTYLBENZENE	98066	1.00E-02 E				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
CADMIUM-WATER	7440439	5.00E-04 I			6.30E+00 I		1.8E+01 N	9.9E-04 C	6.8E-01 N	1.0E+03 N	3.9E+01 N
CADMIUM-FOOD	7440439	1.00E-03 I			6.30E+00 I		3.7E+01 N	9.9E-04 C	1.4E+00 N	2.0E+03 N	7.8E+01 N
CAPROLACTAM	105602	5.00E-01 I					1.8E+04 N	1.8E+03 N	6.8E+02 N	1.0E+06 N	3.9E+04 N
CARBARYL	63252	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CARBON DISULFIDE	75150	1.00E-01 I		2.00E-01 I		y	1.0E+03 N	7.3E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CARBON TETRACHLORIDE	56235	7.00E-04 I	1.30E-01 I	5.71E-04 E	5.30E-02 I	y	1.6E-01 C	1.2E-01 C	2.4E-02 C	4.4E+01 C	4.9E+00 C
CARBOSULFAN	55285148	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
**CHLORAL	75876	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
CHLORANIL	118752		4.00E-01 H				1.7E-01 C	1.6E-02 C	7.9E-03 C	1.4E+01 C	1.6E+00 C
CHLORDANE	57749	5.00E-04 I	3.5E-01 I	2.00E-04 I	3.5E-01 I		1.9E-01 C	1.8E-02 C	9.0E-03 C	1.6E+01 C	1.8E+00 C
CHLORINE	7782505	1.00E-01 I				y	6.1E+02 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CHLORINE DIOXIDE	10049044			5.70E-05 I		y	4.2E-01 N	2.1E-01 N			
CHLOROACETIC ACID	79118	2.00E-03 H					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
4-CHLOROANILINE	106478	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
**CHLOROBENZENE	108907	2.00E-02 I		1.7E-02 E		y	1.1E+02 N	6.2E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CHLOROBENZILATE	510156	2.00E-02 I	2.70E-01 H		2.70E-01 H		2.5E-01 C	2.3E-02 C	1.2E-02 C	2.1E+01 C	2.4E+00 C
P-CHLOROBENZOIC ACID	74113	2.00E-01 H					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
2-CHLORO-1,3-BUTADIENE	126998	2.00E-02 A		2.00E-03 H		y	1.4E+01 N	7.3E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1-CHLOROBUTANE	109693	4.00E-01 H				y	2.4E+03 N	1.5E+03 N	5.4E+02 N	8.2E+05 N	3.1E+04 N
1-CHLORO-1,1-DIFLUOROETHANE	75683			1.40E+01 I		y	1.0E+05 N	5.1E+04 N			
CHLORODIFLUOROMETHANE	75456			1.40E+01 I		y	1.0E+05 N	5.1E+04 N			
CHLOROETHANE	75003	4.00E-01 E	2.90E-03 E	2.90E+00 I		y	3.6E+00 C	2.2E+00 C	1.1E+00 C	2.0E+03 C	2.2E+02 C
CHLOROFORM	67663	1.00E-02 I	6.10E-03 I	8.6E-05 E	8.10E-02 I	y	1.5E-01 C I	7.7E-02 C I	5.2E-01 C	9.4E+02 C	1.0E+02 C I
**CHLOROMETHANE	74873		1.30E-02 H	8.6E-02 E	3.5E-03 E	y	2.1E+00 C	1.8E+00 C	2.4E-01 C	4.4E+02 C	4.9E+01 C
4-CHLORO-2-METHYLANILINE	95692		5.80E-01 H				1.2E-01 C	1.1E-02 C	5.4E-03 C	9.9E+00 C	1.1E+00 C
BETA-CHLORONAPHTHALENE	91587	8.00E-02 I				y	4.9E+02 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
O-CHLORONITROBENZENE	88733		2.50E-02 H			y	4.2E-01 C	2.5E-01 C	1.3E-01 C	2.3E+02 C	2.6E+01 C
P-CHLORONITROBENZENE	100005		1.80E-02 H			y	5.9E-01 C	3.5E-01 C	1.8E-01 C	3.2E+02 C	3.5E+01 C
**2-CHLOROPHENOL	95578	5.00E-03 I				y	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
2-CHLOROPROPANE	75296			2.90E-02 H		y	2.1E+02 N	1.1E+02 N			
O-CHLOROTOLUENE	95498	2.00E-02 I				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CHLORPYRIFOS	2921882	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
CHLORPYRIFOS-METHYL	5598130	1.00E-02 H					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
CHROMIUM III	16065831	1.50E+00 I					5.5E+04 N	5.5E+03 N	2.0E+03 N	3.1E+06 N	1.2E+05 N
CHROMIUM VI	18540299	3.00E-03 I		3.00E-05 I	4.10E+01 H		1.1E+02 N	1.5E-04 C	4.1E+00 N	6.1E+03 N	2.3E+02 N
COBALT	7440484	6.00E-02 E					2.2E+03 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
**COKE OVEN EMISSIONS (COAL TAR)	8007452				2.2 I			2.8E-03 C			
COPPER	7440508	4.00E-02 H					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
**CROTONALDEHYDE	123739		1.90E+00 H			y	5.6E-03 C	3.3E-03 C	1.7E-03 C	3.0E+00 C	3.4E-01 C
CUMENE	98828	1.00E-01 I		1.10E-01 I		y	6.6E+02 N	4.0E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
CYANIDE (FREE)	57125	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
CALCIUM CYANIDE	592018	4E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
COPPER CYANIDE	544923	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
CYANAZINE	21725462	2.00E-03 H	8.40E-01 H				8.0E-02 C	7.5E-03 C	3.8E-03 C	6.6E+00 C	7.8E-01 C
CYANOGEN	460195	4.00E-02 I				y	2.4E+02 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
CYANOGEN BROMIDE	506683	9.00E-02 I					3.3E+03 N	3.3E+02 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
CYANOGEN CHLORIDE	506774	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
HYDROGEN CYANIDE	74908	2.00E-02 I		8.60E-04 I		y	6.2E+00 N	3.1E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
POTASSIUM CYANIDE	151508	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
POTASSIUM SILVER CYANIDE	506616	2.00E-01 I					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
SILVER CYANIDE	506649	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N

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Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
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Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
SODIUM CYANIDE	143339	4.00E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
THIOCYANATE		1.00E-01 E					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ZINC CYANIDE	557211	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
CYCLOHEXANONE	108941	5.00E+00 I					1.8E+05 N	1.8E+04 N	6.8E+03 N	1.0E+07 N	3.9E+05 N
CYHALOTHRIN/KARATE	68085858	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
CYPERMETHRIN	52315078	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DACTHAL	1861321	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DALAPON	75990	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
DDD	72548		2.40E-01 I				2.8E-01 C	2.6E-02 C	1.3E-02 C	2.4E+01 C	2.7E+00 C
DDE	72559		3.40E-01 I				2.0E-01 C	1.8E-02 C	9.3E-03 C	1.7E+01 C	1.9E+00 C
DDT	50293	5.00E-04 I	3.40E-01 I		3.40E-01 I		2.0E-01 C	1.8E-02 C	9.3E-03 C	1.7E+01 C	1.9E+00 C
DIAZINON	333415	9.00E-04 H					3.3E+01 N	3.3E+00 N	1.2E+00 N	1.8E+03 N	7.0E+01 N
DIBENZOFURAN	132649	4.00E-03 E				y	2.4E+01 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
**1,4-DIBROMOBENZENE	106376	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DIBROMOCHLOROMETHANE	124481	2.00E-02 I	8.40E-02 I			y	1.3E-01 C	7.5E-02 C	3.8E-02 C	6.8E+01 C	7.6E+00 C
1,2-DIBROMO-3-CHLOROPROPANE	96128		1.40E+00 H	5.70E-05 I	2.40E-03 H	y	4.7E-02 C I	2.1E-01 N	2.3E-03 C	4.1E+00 C	4.6E-01 C
1,2-DIBROMOETHANE	106934		8.50E+01 I	5.70E-05 H	7.60E-01 I	y	7.5E-04 C	8.2E-03 C	3.7E-05 C	6.7E-02 C	7.5E-03 C
DIBUTYLPHTHALATE	84742	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
DICAMBA	1918009	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
1,2-DICHLOROBENZENE	95501	9.00E-02 I		9.00E-03 E		y	6.4E+01 N	3.3E+01 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
**1,3-DICHLOROBENZENE	541731	9.00E-04 E				y	5.5E+00 N	3.3E+00 N	1.2E+00 N	1.8E+03 N	7.0E+01 N
1,4-DICHLOROBENZENE	106467	3.00E-02 E	2.40E-02 H	2.29E-01 I	2.2E-02 E	y	4.7E-01 C	2.6E-01 C	1.3E-01 C	2.4E+02 C	2.7E+01 C
3,3'-DICHLOROBENZIDINE	91941		4.50E-01 I				1.5E-01 C	1.4E-02 C	7.0E-03 C	1.3E+01 C	1.4E+00 C
1,4-DICHLORO-2-BUTENE	764410				9.30E+00 H	y	1.3E-03 C	6.7E-04 C			
DICHLORODIFLUOROMETHANE	75718	2.00E-01 I		5.00E-02 A		y	3.5E+02 N	1.8E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
1,1-DICHLOROETHANE	75343	1.00E-01 H		1.40E-01 A		y	8.0E+02 N	5.1E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
1,2-DICHLOROETHANE	107062	3.00E-02 E	9.10E-02 I	1.40E-03 E	9.10E-02 I	y	1.2E-01 C	6.9E-02 C	3.5E-02 C	6.3E+01 C	7.0E+00 C
1,1-DICHLOROETHENE	75354	9.00E-03 I	6.00E-01 I		1.75E-01 I	y	4.4E-02 C	3.6E-02 C	5.3E-03 C	9.5E+00 C	1.1E+00 C
CIS-1,2-DICHLOROETHENE	156592	1.00E-02 H				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
TRANS-1,2-DICHLOROETHENE	156605	2.00E-02 I				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
TOTAL 1,2-DICHLOROETHENE	540590	9.00E-03 H				y	5.5E+01 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
2,4-DICHLOROPHENOL	120832	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
**2,4-D	94757	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
4-(2,4-DICHLOROPHENOXY)BUTYRIC ACID	94826	8E-03 I					2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
1,2-DICHLOROPROPANE	78875		6.80E-02 H	1.14E-03 I		y	1.6E-01 C	9.2E-02 C	4.6E-02 C	8.4E+01 C	9.4E+00 C
2,3-DICHLOROPROPANOL	616239	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
1,3-DICHLOROPROPENE	542756	3.00E-04 I	1.80E-01 H	5.71E-03 I	1.30E-01 H	y	7.7E-02 C	4.8E-02 C	1.8E-02 C	3.2E+01 C	3.5E+00 C I
DICHLORVOS	62737	5E-04 I	0.29 I	1.43E-04 I			2.3E-01 C	2.2E-02 C	1.1E-02 C	2.0E+01 C	2.2E+00 C
DICOFOL	115322		4.4E-01 W				1.5E-01 C	1.4E-02 C	7.2E-03 C	1.3E+01 C	1.5E+00 C
DICYCLOPENTADIENE	77736	3E-02 H		6.00E-05 A		y	4.4E-01 N	2.2E-01 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
DIELDRIN	60571	5.00E-05 I	1.60E+01 I		1.60E+01 I		4.2E-03 C	3.9E-04 C	2.0E-04 C	3.6E-01 C	4.0E-02 C
DIESEL EMISSIONS				1.40E-03 I				5.1E+00 N			
DIETHYLPHTHALATE	84662	8.00E-01 I					2.9E+04 N	2.9E+03 N	1.1E+03 N	1.6E+06 N	6.3E+04 N
DIETHYLENE GLYCOL, MONOBUTYL ETHER	112345			5.70E-03 H				2.1E+01 N			
DIETHYLENE GLYCOL, MONOETHYL ETHER	111900	2.00E+00 H					7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
DI(2-ETHYLHEXYL)ADIPATE	103231	6.00E-01 I	1.20E-03 I				5.6E+01 C	5.2E+00 C	2.6E+00 C	4.8E+03 C	5.3E+02 C
DIETHYLSTILBESTROL	56531		4.70E+03 H				1.4E-05 C	1.3E-06 C	6.7E-07 C	1.2E-03 C	1.4E-04 C
DIFENZOQUAT (AVENGE)	43222486	8.00E-02 I					2.9E+03 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
1,1-DIFLUOROETHANE	75376			1.10E+01 I		y	8.0E+04 N	4.0E+04 N			
DIISOPROPYL METHYLPHOSPHONATE (DIMP)	1445756	8.00E-02 I					2.9E+03 N	2.9E+02 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
3,3'-DIMETHOXYBENZIDINE	119904		1.40E-02 H				4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C
**DIMETHYLAMINE	124403			5.70E-06 W		y	4.2E-02 N	2.1E-02 N			
2,4-DIMETHYLANILINE HYDROCHLORIDE	21436964		5.80E-01 H				1.2E-01 C	1.1E-02 C	5.4E-03 C	9.9E+00 C	1.1E+00 C
2,4-DIMETH[illegible]INE	95681		7.50E-01 H				8.9E-02 C	8.3E-03 C	4.2E-03 C	7.6E+00 C	8.5E-01 C

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Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
N,N-DIMETHYLANILINE	121697	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
3,3'-DIMETHYLBENZIDINE	119937		9.20E+00 H				7.3E-03 C	6.8E-04 C	3.4E-04 C	6.2E-01 C	6.9E-02 C
1,1-DIMETHYLHYDRAZINE	57147		2.60E+00 W		3.50E+00 W		2.6E-02 C	1.8E-03 C	1.2E-03 C	2.2E+00 C	2.5E-01 C
1,2-DIMETHYLHYDRAZINE	540738		3.70E+01 W		3.70E+01 W		1.8E-03 C	1.7E-04 C	8.5E-05 C	1.5E-01 C	1.7E-02 C
2,4-DIMETHYLPHENOL	105679	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
2,6-DIMETHYLPHENOL	576261	6.00E-04 I					2.2E+01 N	2.2E+00 N	8.1E-01 N	1.2E+03 N	4.7E+01 N
3,4-DIMETHYLPHENOL	95658	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
DIMETHYLPHTHALATE	131113	1.00E+01 W					3.7E+05 N	3.7E+04 N	1.4E+04 N	2.0E+07 N	7.8E+05 N
1,2-DINITROBENZENE	528290	4.00E-04 H					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
1,3-DINITROBENZENE	99650	1.00E-04 I					3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
1,4-DINITROBENZENE	100254	4.00E-04 H					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
4,6-DINITRO-O-CYCLOHEXYL PHENOL	131895	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
4,6-DINITRO-2-METHYLPHENOL	534521	1.00E-04 E					3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
2,4-DINITROPHENOL	51285	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
DINITROTOLUENE MIX			6.80E-01 I				9.6E-02 C	9.2E-03 C	4.6E-03 C	8.4E+00 C	9.4E-01 C
2,4-DINITROTOLUENE	121142	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
2,6-DINITROTOLUENE	606202	1.00E-03 H					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
**DINOSEB	88857	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
DIOCTYLPHTHALATE	117840	2.00E-02 H					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1,4-DIOXANE	123911		1.10E-02 I				6.1E+00 C	5.7E-01 C	2.9E-01 C	5.2E+02 C	5.8E+01 C
DIPHENYLAMINE	122394	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
1,2-DIPHENYLHYDRAZINE	122667		8.00E-01 I		8.00E-01 I		8.4E-02 C	7.8E-03 C	3.9E-03 C	7.2E+00 C	8.0E-01 C
DIQUAT	85007	2.20E-03 I					8.0E+01 N	8.0E+00 N	3.0E+00 N	4.5E+03 N	1.7E+02 N
**DISULFOTON	298044	4.00E-05 I					1.5E+00 N	1.5E-01 N	5.4E-02 N	8.2E+01 N	3.1E+00 N
1,4-DITHIANE	505293	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
DIURON	330541	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
ENDOSULFAN	115297	6.00E-03 I					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
ENDRIN	72208	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
**EPICHLOROHYDRIN	106898	2.00E-03 H	9.90E-03 I	2.86E-04 I	4.20E-03 I	y	2.0E+00 N	1.0E+00 N	3.2E-01 C I	5.8E+02 C I	6.5E+01 C I
ETHION	563122	5.00E-04 I					1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
2-ETHOXYETHANOL	110805	4.00E-01 H		5.70E-02 I			1.5E+04 N	2.1E+02 N	5.4E+02 N	8.2E+05 N	3.1E+04 N
ETHYL ACETATE	141786	9.00E-01 I				y	5.5E+03 N	3.3E+03 N	1.2E+03 N	1.8E+06 N	7.0E+04 N
ETHYLBENZENE	100414	1.00E-01 I		2.90E-01 I		y	1.3E+03 N	1.1E+03 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
ETHYLENE DIAMINE	107153	2.00E-02 H					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
ETHYLENE GLYCOL	107211	2.00E+00 I					7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
ETHYLENE GLYCOL, MONOBUTYL ETHER	111762			5.70E-03 H				2.1E+01 N			
**ETHYLENE OXIDE	75218		1.00E+00 H		3.50E-01 H	y	2.3E-02 C	1.8E-02 C	3.2E-03 C	5.7E+00 C	6.4E-01 C
ETHYLENE THIOUREA	96457	8.00E-05 I	1.1E-01 H				6.1E-01 C I	5.7E-02 C I	2.9E-02 C I	5.2E+01 C I	5.8E+00 C I
ETHYL ETHER	60297	2.00E-01 I				y	1.2E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
ETHYL METHACRYLATE	97632	9.00E-02 H				y	5.5E+02 N	3.3E+02 N	1.2E+02 N	1.8E+05 N	7.0E+03 N
FENAMIPHOS	22224926	2.50E-04 I					9.1E+00 N	9.1E-01 N	3.4E-01 N	5.1E+02 N	2.0E+01 N
FLUOMETURON	2164172	1.30E-02 I					4.7E+02 N	4.7E+01 N	1.8E+01 N	2.7E+04 N	1.0E+03 N
FLUORINE	7782414	6.00E-02 I					2.2E+03 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
FOMESAFEN	72178020		1.90E-01 I				3.5E-01 C	3.3E-02 C	1.7E-02 C	3.0E+01 C	3.4E+00 C
FONOFOS	944229	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
FORMALDEHYDE	50000	2.00E-01 I			4.50E-02 I		7.3E+03 N	1.4E-01 C	2.7E+02 N	4.1E+05 N	1.6E+04 N
FORMIC ACID	64186	2.00E+00 H					7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
FURAN	110009	1.00E-03 I				y	6.1E+00 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
FURAZOLIDONE	67458		3.80E+00 H				1.8E-02 C	1.6E-03 C	8.3E-04 C	1.5E+00 C	1.7E-01 C
FURFURAL	98011	3.00E-03 I		1.00E-02 A			1.1E+02 N	3.7E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
GLYCIDALDEHYDE	765344	4.00E-04 I		2.90E-04 H			1.5E+01 N	1.1E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N
GLYPHOSATE	1071836	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
**HEPTACHLOR	76448	5.00E-04 I	4.50E+00 I		4.50E+00 I		1.5E-02 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
**HEPTACHLOR EPOXIDE	1024573	1.30E-05 I	9.10E+00 I		9.10E+00 I		7.4E-03 C	6.9E-04 C	3.5E-04 C	6.3E-01 C	7.0E-02 C

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HEXABROMOBENZENE	87821	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
**HEXACHLOROBENZENE	118741	8.00E-04 I	1.60E+00 I		1.60E+00 I		4.2E-02 C	3.9E-03 C	2.0E-03 C	3.6E+00 C	4.0E-01 C
**HEXACHLOROBUTADIENE	87683	2.00E-04 H	7.80E-02 I		7.80E-02 I		8.6E-01 C I	8.0E-02 C I	4.0E-02 C I	7.3E+01 C I	8.2E+00 C I
ALPHA-HCH	319846		6.30E+00 I		6.30E+00 I		1.1E-02 C	9.9E-04 C	5.0E-04 C	9.1E-01 C	1.0E-01 C
BETA-HCH	319857		1.80E+00 I		1.80E+00 I		3.7E-02 C	3.5E-03 C	1.8E-03 C	3.2E+00 C	3.5E-01 C
GAMMA-HCH (LINDANE)	58899	3.00E-04 I	1.30E+00 H				5.2E-02 C	4.8E-03 C	2.4E-03 C	4.4E+00 C	4.9E-01 C
TECHNICAL HCH	608731		1.80E+00 I		1.80E+00 I		3.7E-02 C	3.5E-03 C	1.8E-03 C	3.2E+00 C	3.5E-01 C
**HEXACHLOROCYCLOPENTADIENE	77474	7.00E-03 I		2.00E-05 H			2.6E+02 N	7.3E-02 N	9.5E+00 N	1.4E+04 N	5.5E+02 N
HEXACHLORODIBENZODIOXIN MIX	19408743		6.20E+03 I		4.55E+03 I		1.1E-05 C	1.4E-06 C	5.1E-07 C	9.2E-04 C	1.0E-04 C
**HEXACHLOROETHANE	67721	1.00E-03 I	1.40E-02 I		1.40E-02 I		4.8E+00 C I	4.5E-01 C I	2.3E-01 C I	4.1E+02 C I	4.6E+01 C I
HEXACHLOROPHENE	70304	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
1,6-HEXAMETHYLENE DIISOCYANATE	822060			2.90E-06 I				1.1E-02 N			
HEXANE	110543	6.00E-02 H		5.71E-02 I		y	3.5E+02 N	2.1E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
2-HEXANONE	591786	4.00E-02 E		1.4E-03 E			1.5E+03 N	5.1E+00 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
HEXAZINONE	51235042	3.30E-02 I					1.2E+03 N	1.2E+02 N	4.5E+01 N	6.7E+04 N	2.6E+03 N
HMX	2691410	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
HYDRAZINE	302012		3.00E+00 I		1.70E+01 I		2.2E-02 C	3.7E-04 C	1.1E-03 C	1.9E+00 C	2.1E-01 C
HYDROGEN CHLORIDE	7647010			5.70E-03 I				2.1E+01 N			
HYDROGEN SULFIDE	7783064	3.00E-03 I		2.85E-04 I			1.1E+02 N	1.0E+00 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
HYDROQUINONE	123319	4.00E-02 H					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
IRON	7439896	3.00E-01 E					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ISOBUTANOL	78831	3.00E-01 I				y	1.8E+03 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ISOPHORONE	78591	2.00E-01 I	9.50E-04 I				7.0E+01 C	6.6E+00 C	3.3E+00 C	6.0E+03 C	6.7E+02 C
ISOPROPALIN	33820530	1.50E-02 I					5.5E+02 N	5.5E+01 N	2.0E+01 N	3.1E+04 N	1.2E+03 N
ISOPROPYL METHYL PHOSPHONIC ACID	1832548	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
**TETRAETHYLLEAD	78002	1.00E-07 I					3.7E-03 N	3.7E-04 N	1.4E-04 N	2.0E-01 N	7.8E-03 N
LITHIUM	7439932	2.00E-02 E					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MALATHION	121755	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MALEIC ANHYDRIDE	108316	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
MANGANESE-NONFOOD	7439965	2.00E-02 I		1.43E-05 I			7.3E+02 N	5.2E-02 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
MANGANESE-FOOD	7439965	1.40E-01 I		1.43E-05 I			5.1E+03 N	5.2E-02 N	1.9E+02 N	2.9E+05 N	1.1E+04 N
MEPHOSFOLAN	950107	9.00E-05 H					3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
MEPIQUAT CHLORIDE	24307264	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
MERCURIC CHLORIDE	7487947	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
MERCURY (INORGANIC)	7439976			8.60E-05 I				3.1E-01 N			
METHYLMERCURY	22967926	1.00E-04 I					3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
METHACRYLONITRILE	126987	1.00E-04 I		2.00E-04 A		y	1.0E+00 N	7.3E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N
METHANOL	67561	5.00E-01 I					1.8E+04 N	1.8E+03 N	6.8E+02 N	1.0E+06 N	3.9E+04 N
METHIDATHION	950378	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
METHOXYCHLOR	72435	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
METHYL ACETATE	79209	1.00E+00 H				y	6.1E+03 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
METHYL ACRYLATE	96333	3.00E-02 A				y	1.8E+02 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
2-METHYLANILINE	95534		2.40E-01 H				2.8E-01 C	2.6E-02 C	1.3E-02 C	2.4E+01 C	2.7E+00 C
4-(2-METHYL-4-CHLOROPHENOXY) BUTYRIC ACID	94815	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
2-METHYL-4-CHLOROPHENOXYACETIC ACID (MCPA)	94746	5.00E-04 I					1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
2-(2-METHYL-4-CHLOROPHENOXY)PROPIONIC ACID (M	93652	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
METHYLCYCLOHEXANE	108872			8.60E-01 H		y	6.3E+03 N	3.1E+03 N			
METHYLENE BROMIDE	74953	1.00E-02 A				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
METHYLENE CHLORIDE	75092	6.00E-02 I	7.50E-03 I	8.60E-01 H	1.65E-03 I	y	4.1E+00 C	3.8E+00 C	4.2E-01 C	7.6E+02 C	8.5E+01 C
4,4'-METHYLENE BIS(2-CHLOROANILINE)	101144	7.00E-04 H	1.30E-01 H		1.30E-01 H		5.2E-01 C	4.8E-02 C	2.4E-02 C	4.4E+01 C	4.9E+00 C
4,4'-METHYLENE BIS(N,N'-DIMETHYL)ANILINE	101611		4.60E-02 I				1.5E+00 C	1.4E-01 C	6.9E-02 C	1.2E+02 C	1.4E+01 C
4,4'-METHYLENEDIPHENYL ISOCYANATE	101688			1.7E-04 I				6.2E-01 N			
METHYL ETHYL KETONE (2-BUTANONE)	78933	6.00E-01 I		2.86E-01 I		y	1.9E+03 N	1.0E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
METHYL HY[illegible]E	60344		1.10E+00 W				6.1E-02 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C

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Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
**METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANON	108101	8.00E-02 H		2.00E-02 A		y	1.4E+02 N	7.3E+01 N	1.1E+02 N	1.6E+05 N	6.3E+03 N
METHYL METHACRYLATE	80626	1.40E+00 I		2.00E-01 I		y	1.4E+03 N	7.3E+02 N	1.9E+03 N	2.9E+06 N	1.1E+05 N
2-METHYL-5-NITROANILINE	99558		3.30E-02 H				2.0E+00 C	1.9E-01 C	9.6E-02 C	1.7E+02 C	1.9E+01 C
METHYL PARATHION	298000	2.50E-04 I					9.1E+00 N	9.1E-01 N	3.4E-01 N	5.1E+02 N	2.0E+01 N
2-METHYLPHENOL	95487	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
3-METHYLPHENOL	108394	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
4-METHYLPHENOL	106445	5.00E-03 H					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
METHYLSTYRENE MIX	25013154	6.00E-03 A		1.00E-02 A		y	5.5E+01 N	3.7E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
ALPHA-METHYLSTYRENE	98839	7.00E-02 A				y	4.3E+02 N	2.6E+02 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
METHYL TERT-BUTYL ETHER	1634044			8.57E-01 I		y	6.3E+03 N	3.1E+03 N			
METOLACHLOR (DUAL)	51218452	1.50E-01 I					5.5E+03 N	5.5E+02 N	2.0E+02 N	3.1E+05 N	1.2E+04 N
**MIREX	2385855	2.00E-04 I					7.3E+00 N	7.3E-01 N	2.7E-01 N	4.1E+02 N	1.6E+01 N
MOLYBDENUM	7439987	5E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
**MONOCHLORAMINE	10599903	1E-01 I		1.00E-01 H			3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
NALED	300765	2E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N
NICKEL REFINERY DUST					8.4E-01 I			7.5E-03 C			
NICKEL	7440020	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
NITRATE	14797558	1.60E+00 I					5.8E+04 N	5.8E+03 N	2.2E+03 N	3.3E+06 N	1.3E+05 N
NITRIC OXIDE	10102439	1.00E-01 W				y	6.1E+02 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
NITRITE	14797650	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
2-NITROANILINE	88744			5.70E-05 H				2.1E-01 N			
NITROBENZENE	98953	5.00E-04 I		6.00E-04 A		y	3.5E+00 N	2.2E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N
NITROFURANTOIN	67209	7.00E-02 H					2.6E+03 N	2.6E+02 N	9.5E+01 N	1.4E+05 N	5.5E+03 N
NITROFURAZONE	59870		1.50E+00 H				4.5E-02 C	4.2E-03 C	2.1E-03 C	3.8E+00 C	4.3E-01 C
NITROGEN DIOXIDE	10102440	1.00E+00 W				y	6.1E+03 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
NITROGLYCERIN	55630		1.4E-02 E				4.8E+00 C	4.5E-01 C	2.3E-01 C	4.1E+02 C	4.6E+01 C
4-NITROPHENOL	100027	8.00E-03 E					2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
2-NITROPROPANE	79469			5.70E-03 I	9.40E+00 H	y	1.3E-03 C	6.7E-04 C			
**N-NITROSO-DI-N-BUTYLAMINE	924163		5.40E+00 I		5.60E+00 I	y	1.9E-03 C	1.1E-03 C	5.8E-04 C	1.1E+00 C	1.2E-01 C
N-NITROSODIETHANOLAMINE	1116547		2.80E+00 I				2.4E-02 C	2.2E-03 C	1.1E-03 C	2.0E+00 C	2.3E-01 C
N-NITROSODIETHYLAMINE	55185		1.50E+02 I		1.50E+02 I		4.5E-04 C	4.2E-05 C	2.1E-05 C	3.8E-02 C	4.3E-03 C
N-NITROSODIMETHYLAMINE	62759		5.10E+01 I		5.10E+01 I		1.3E-03 C	1.2E-04 C	6.2E-05 C	1.1E-01 C	1.3E-02 C
N-NITROSODIPHENYLAMINE	86306		4.90E-03 I				1.4E+01 C	1.3E+00 C	6.4E-01 C	1.2E+03 C	1.3E+02 C
N-NITROSODIPROPYLAMINE	621647		7.00E+00 I				9.6E-03 C	8.9E-04 C	4.5E-04 C	8.2E-01 C	9.1E-02 C
N-NITROSO-N-ETHYLUREA	759739		1.40E+02 H				4.8E-04 C	4.5E-05 C	2.3E-05 C	4.1E-02 C	4.6E-03 C
N-NITROSO-N-METHYLETHYLAMINE	10595956		2.20E+01 I				3.0E-03 C	2.8E-04 C	1.4E-04 C	2.6E-01 C	2.9E-02 C
N-NITROSOPYRROLIDINE	930552		2.10E+00 I		2.10E+00 I		3.2E-02 C	3.0E-03 C	1.5E-03 C	2.7E+00 C	3.0E-01 C
M-NITROTOLUENE	99081	2.00E-02 E				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
O-NITROTOLUENE	88722	1.00E-02 H				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
P-NITROTOLUENE	99990	1.00E-02 H				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
NUSTAR	85509199	7.00E-04 I					2.6E+01 N	2.6E+00 N	9.5E-01 N	1.4E+03 N	5.5E+01 N
ORYZALIN	19044883	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
OXADIAZON	19666309	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
OXAMYL	23135220	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
OXYFLUORFEN	42874033	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N
PARAQUAT DICHLORIDE	1910425	4.50E-03 I					1.6E+02 N	1.6E+01 N	6.1E+00 N	9.2E+03 N	3.5E+02 N
PARATHION	56382	6.00E-03 H					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
**PENTACHLOROBENZENE	608935	8.00E-04 I					2.9E+01 N	2.9E+00 N	1.1E+00 N	1.6E+03 N	6.3E+01 N
**PENTACHLORONITROBENZENE	82688	3.00E-03 I	2.60E-01 H				2.6E-01 C	2.4E-02 C	1.2E-02 C	2.2E+01 C	2.5E+00 C
PENTACHLOROPHENOL	87865	3.00E-02 I	1.20E-01 I				5.6E-01 C	5.2E-02 C	2.6E-02 C	4.8E+01 C	5.3E+00 C
PERMETHRIN	52645531	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
PHENOL	108952	6.00E-01 I					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
M-PHENYLENEDIAMINE	108452	6.00E-03 I					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N
O-PHENYLENEDIAMINE	95545		4.70E-02 H				1.4E+00 C	1.3E-01 C	6.7E-02 C	1.2E+02 C	1.4E+01 C

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P-PHENYLENEDIAMINE	106503	1.90E-01 H					6.9E+03 N	6.9E+02 N	2.6E+02 N	3.9E+05 N	1.5E+04 N
2-PHENYLPHENOL	90437		1.90E-03 H				3.5E+01 C	3.3E+00 C	1.7E+00 C	3.0E+03 C	3.4E+02 C
PHOSPHINE	7803512	3.00E-04 I		8.60E-05 I			1.1E+01 N	3.1E-01 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
PHOSPHORIC ACID	7664382			2.90E-03 I				1.1E+01 N			
PHOSPHORUS (WHITE)	7723140	2.00E-05 I					7.3E-01 N	7.3E-02 N	2.7E-02 N	4.1E+01 N	1.6E+00 N
P-PHTHALIC ACID	100210	1.00E+00 H					3.7E+04 N	3.7E+03 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
PHTHALIC ANHYDRIDE	85449	2.00E+00 I		3.43E-02 H			7.3E+04 N	1.3E+02 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
POLYBROMINATED BIPHENYLS		7.00E-06 H	8.90E+00 H				7.5E-03 C	7.0E-04 C	3.5E-04 C	6.4E-01 C	7.2E-02 C I
POLYCHLORINATED BIPHENYLS	1336363		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1016	12674112	7.00E-05 I	7.00E-02 I		7.00E-02 I		9.6E-01 C I	8.9E-02 C I	4.5E-02 C I	8.2E+01 C I	5.5E+00 N
AROCLOR-1221	11104282		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1232	11141165		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1242	53469219		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1248	12672296		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
AROCLOR-1254	11097691	2.00E-05 I	2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C I
AROCLOR-1260	11096825		2.00E+00 I		2.00E+00 I		3.3E-02 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C
POLYCHLORINATED TERPHENYLS	61788338		4.50E+00 E				1.5E-02 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C
POLYNUCLEAR AROMATIC HYDROCARBONS:											
**ACENAPHTHENE	83329	6.00E-02 I				y	3.7E+02 N	2.2E+02 N	8.1E+01 N	1.2E+05 N	4.7E+03 N
**ANTHRACENE	120127	3.00E-01 I				y	1.8E+03 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
BENZ[A]ANTHRACENE	56553		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
BENZO[B]FLUORANTHENE	205992		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
BENZO[K]FLUORANTHENE	207089		7.30E-02 E				9.2E-01 C	8.6E-02 C	4.3E-02 C	7.8E+01 C	8.7E+00 C
BENZO[A]PYRENE	50328		7.30E+00 I		3.10E+00 E		9.2E-03 C	2.0E-03 C	4.3E-04 C	7.8E-01 C	8.7E-02 C
CARBAZOLE	86748		2.00E-02 H				3.3E+00 C	3.1E-01 C	1.6E-01 C	2.9E+02 C	3.2E+01 C
CHRYSENE	218019		7.30E-03 E				9.2E+00 C	8.6E-01 C	4.3E-01 C	7.8E+02 C	8.7E+01 C
DIBENZ[A,H]ANTHRACENE	53703		7.30E+00 E				9.2E-03 C	8.6E-04 C	4.3E-04 C	7.8E-01 C	8.7E-02 C
DIBENZOFURAN	132649	4.00E-03 E				y	2.4E+01 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
FLUORANTHENE	206440	4.00E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
**FLUORENE	86737	4.00E-02 I				y	2.4E+02 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N
INDENO[1,2,3-C,D]PYRENE	193395		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C
2-METHYLNAPHTHALENE	91576	2.00E-02 E				y	1.2E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
**NAPHTHALENE	91203	2.00E-02 I		9.00E-04 I		y	6.5E+00 N	3.3E+00 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
**PYRENE	129000	3.00E-02 I				y	1.8E+02 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
PROMETON	1610180	1.50E-02 I					5.5E+02 N	5.5E+01 N	2.0E+01 N	3.1E+04 N	1.2E+03 N
PROMETRYN	7287196	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
PROPACHLOR	1918167	1.30E-02 I					4.7E+02 N	4.7E+01 N	1.8E+01 N	2.7E+04 N	1.0E+03 N
PROPANIL	709988	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
PROPARGITE	2312358	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
N-PROPYLBENZENE		1.00E-02 E				y	6.1E+01 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
PROPYLENE GLYCOL	57556	2.00E+01 H					7.3E+05 N	7.3E+04 N	2.7E+04 N	4.1E+07 N	1.6E+06 N
PROPYLENE GLYCOL, MONOETHYL ETHER	52125538	7.00E-01 H					2.6E+04 N	2.6E+03 N	9.5E+02 N	1.4E+06 N	5.5E+04 N
PROPYLENE GLYCOL, MONOMETHYL ETHER	107982	7.00E-01 H		5.70E-01 I			2.6E+04 N	2.1E+03 N	9.5E+02 N	1.4E+06 N	5.5E+04 N
PURSUIT	81335775	2.50E-01 I					9.1E+03 N	9.1E+02 N	3.4E+02 N	5.1E+05 N	2.0E+04 N
PYRIDINE	110861	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N
QUINOLINE	91225		1.20E+01 H				5.6E-03 C	5.2E-04 C	2.6E-04 C	4.8E-01 C	5.3E-02 C
RDX	121824	3.00E-03 I	1.10E-01 I				6.1E-01 C	5.7E-02 C	2.9E-02 C	5.2E+01 C	5.8E+00 C
RESMETHRIN	10453868	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
**RONNEL	299843	5.00E-02 H					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
ROTENONE	83794	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
SELENIOUS ACID	7783008	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SELENIUM	7782492	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SILVER	7440224	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
SIMAZINE	122349	5.00E-03 I	1.20E-01 H				5.6E-01 C	5.2E-02 C	2.6E-02 C	4.8E+01 C	5.3E+00 C

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Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects I = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
SODIUM AZIDE	26628228	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N
SODIUM DIETHYLDITHIOCARBAMATE	148185	3.00E-02 I	2.70E-01 H				2.5E-01 C	2.3E-02 C	1.2E-02 C	2.1E+01 C	2.4E+00 C
STRONTIUM, STABLE	7440246	6.00E-01 I					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
STRYCHNINE	57249	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
STYRENE	100425	2.00E-01 I		2.86E-01 I		y	1.6E+03 N	1.0E+03 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
2,3,7,8-TETRACHLORODIBENZODIOXIN	1746016		1.50E+05 H		1.50E+05 H		4.5E-07 C	4.2E-08 C	2.1E-08 C	3.8E-05 C	4.3E-06 C
**1,2,4,5-TETRACHLOROBENZENE	95943	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
1,1,1,2-TETRACHLOROETHANE	630206	3.00E-02 I	2.60E-02 I		2.60E-02 I	y	4.1E-01 C	2.4E-01 C	1.2E-01 C	2.2E+02 C	2.5E+01 C
1,1,2,2-TETRACHLOROETHANE	79345	6.00E-02 E	2.00E-01 I		2.00E-01 I	y	5.3E-02 C	3.1E-02 C	1.6E-02 C	2.9E+01 C	3.2E+00 C
TETRACHLOROETHENE	127184	1.00E-02 I	5.20E-02 E	1.4E-01 E	2.00E-03 E	y	1.1E+00 C	3.1E+00 C	6.1E-02 C	1.1E+02 C	1.2E+01 C
2,3,4,6-TETRACHLOROPHENOL	58902	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
**P,A,A,A-TETRACHLOROTOLUENE	5216251		2.00E+01 H				3.3E-03 C	3.1E-04 C	1.6E-04 C	2.9E-01 C	3.2E-02 C
1,1,1,2-TETRAFLUOROETHANE	811972			2.29E+01 I		y	1.7E+05 N	8.4E+04 N			
**TETRAHYDROFURAN	109999	2.00E-02 E	7.6E-03 E	8.6E-02 E	6.8E-03 E		8.8E+00 C	9.2E-01 C	4.2E-01 C	7.5E+02 C	8.4E+01 C
TETRYL	479458	1.00E-02 H					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
THALLIC OXIDE	1314325	7.00E-05 W					2.6E+00 N	2.6E-01 N	9.5E-02 N	1.4E+02 N	5.5E+00 N
THALLIUM	7440280	7.00E-05 O					2.6E+00 N	2.6E-01 N	9.5E-02 N	1.4E+02 N	5.5E+00 N
THALLIUM ACETATE	563688	9.00E-05 I					3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
THALLIUM CARBONATE	6533739	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THALLIUM CHLORIDE	7791120	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THALLIUM NITRATE	10102451	9.00E-05 I					3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N
THALLIUM SULFATE (2:1)	7446186	8.00E-05 I					2.9E+00 N	2.9E-01 N	1.1E-01 N	1.6E+02 N	6.3E+00 N
THIOBENCARB	28249776	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
TIN	7440315	6.00E-01 H					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
TITANIUM	7440326	4.00E+00 E		8.60E-03 E			1.5E+05 N	3.1E+01 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
TITANIUM DIOXIDE	13463677	4.00E+00 E		8.60E-03 E			1.5E+05 N	3.1E+01 N	5.4E+03 N	8.2E+06 N	3.1E+05 N
TOLUENE	108883	2.00E-01 I		1.14E-01 I		y	7.5E+02 N	4.2E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
TOLUENE-2,4-DIAMINE	95807		3.20E+00 H				2.1E-02 C	2.0E-03 C	9.9E-04 C	1.8E+00 C	2.0E-01 C
TOLUENE-2,5-DIAMINE	95705	6.00E-01 H					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N
TOLUENE-2,6-DIAMINE	823405	2.00E-01 H					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N
P-TOLUIDINE	106490		1.90E-01 H				3.5E-01 C	3.3E-02 C	1.7E-02 C	3.0E+01 C	3.4E+00 C
**TOXAPHENE	8001352		1.10E+00 I		1.10E+00 I		6.1E-02 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C
**1,2,4-TRIBROMOBENZENE	615543	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
TRIBUTYLTIN OXIDE	56359	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
2,4,6-TRICHLOROANILINE	634935		3.40E-02 H				2.0E+00 C	1.8E-01 C	9.3E-02 C	1.7E+02 C	1.9E+01 C
1,2,4-TRICHLOROBENZENE	120821	1.00E-02 I		5.70E-02 H		y	1.9E+02 N	2.1E+02 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
1,1,1-TRICHLOROETHANE	71556	2.00E-02 E		2.86E-01 E		y	5.4E+02 N	1.0E+03 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
1,1,2-TRICHLOROETHANE	79005	4.00E-03 I	5.70E-02 I		5.60E-02 I	y	1.9E-01 C	1.1E-01 C	5.5E-02 C	1.0E+02 C	1.1E+01 C
TRICHLOROETHENE	79016	6.00E-03 E	1.10E-02 E		6.00E-03 E	y	1.6E+00 C	1.0E+00 C	2.9E-01 C	5.2E+02 C	5.8E+01 C I
TRICHLOROFLUOROMETHANE	75694	3.00E-01 I		2.00E-01 A		y	1.3E+03 N	7.3E+02 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
2,4,5-TRICHLOROPHENOL	95954	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N
2,4,6-TRICHLOROPHENOL	88062		1.10E-02 I		1.00E-02 I		6.1E+00 C	6.3E-01 C	2.9E-01 C	5.2E+02 C	5.8E+01 C
2,4,5-T	93765	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N
2-(2,4,5-TRICHLOROPHENOXY)PROPIONIC ACID	93721	8.00E-03 I					2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N
1,1,2-TRICHLOROPROPANE	598776	5.00E-03 I				y	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
1,2,3-TRICHLOROPROPANE	96184	6.00E-03 I	7.00E+00 H			y	1.5E-03 C	8.9E-04 C	4.5E-04 C	8.2E-01 C	9.1E-02 C
1,2,3-TRICHLOROPROPENE	96195	5.00E-03 H				y	3.0E+01 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76131	3.00E+01 I		8.60E+00 H		y	5.9E+04 N	3.1E+04 N	4.1E+04 N	6.1E+07 N	2.3E+06 N
1,2,4-TRIMETHYLBENZENE	95636	5.00E-02 E		1.70E-03 E		y	1.2E+01 N	6.2E+00 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
1,3,5-TRIMETHYLBENZENE	108678	5.00E-02 E		1.70E-03 E		y	1.2E+01 N	6.2E+00 N	6.8E+01 N	1.0E+05 N	3.9E+03 N
TRIMETHYL PHOSPHATE	512561		3.70E-02 H				1.8E+00 C	1.7E-01 C	8.5E-02 C	1.5E+02 C	1.7E+01 C
1,3,5-TRINITROBENZENE	99354	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N
2,4,6-TRINITROTOLUENE	118967	5.00E-04 I	3.00E-02 I				2.2E+00 C I	2.1E-01 C I	1.1E-01 C I	1.9E+02 C I	2.1E+01 C I
URANIUM (SOLUBLE SALTS)		3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects f = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFI 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Residential mg/kg
VANADIUM	7440622	7.00E-03 H					2.6E+02 N	2.6E+01 N	9.5E+00 N	1.4E+04 N	5.5E+02 N
VANADIUM PENTOXIDE	1314621	9.00E-03 I					3.3E+02 N	3.3E+01 N	1.2E+01 N	1.8E+04 N	7.0E+02 N
VANADIUM SULFATE	16785812	2.00E-02 H					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N
VINCLOZOLIN	50471448	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N
VINYL ACETATE	108054	1.00E+00 H		5.71E-02 I		y	4.1E+02 N	2.1E+02 N	1.4E+03 N	2.0E+06 N	7.8E+04 N
VINYL CHLORIDE	75014		1.90E+00 H		3.00E-01 H	y	1.9E-02 C	2.1E-02 C	1.7E-03 C	3.0E+00 C	3.4E-01 C
WARFARIN	81812	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
M-XYLENE	108383	2.00E+00 H				y	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
O-XYLENE	95476	2.00E+00 H				y	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
P-XYLENE	106423					y					
XYLENES	1330207	2.00E+00 I				y	1.2E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N
ZINC	7440666	3.00E-01 I					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N
ZINC PHOSPHIDE	1314847	3E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N
ZINEB	12122677	5E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N

Drinking Water Regulations and Health Advisories
October 1996

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AND HEALTH ADVISORIES

by

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LEGEND

Abbreviations column descriptions are:

MCLG: Maximum Contaminant Level Goal. A non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.

MCL: Maximum Contaminant Level. Maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

RfD: Reference Dose. An estimate of a daily exposure to the human population that is likely to be without appreciable risk of deleterious effects over a lifetime.

DWEL: Drinking Water Equivalent Level. A lifetime exposure concentration protective of adverse, non-cancer health effects, that assumes all of the exposure to a contaminant is from a drinking water source.

The codes for the **Status Reg** and **Status HA** columns are as follows:

F	final
D	draft
L	listed for regulation
P	proposed
T	tentative (not officially proposed)

Other codes found in the table include the following:

NA	not applicable
PS	performance standard 0.5 NTU-1.0 NTU
TT	treatment technique

Large discrepancies between Lifetime and Longer-term HA values may occur because of the Agency's conservative policies, especially with regard to carcinogenicity, relative source contribution, and less-than-lifetime exposures in chronic toxicity testing. These factors can result in a cumulative UF (uncertainty factor) of up to 5 to 5000 when calculating a Lifetime HA.

The scheme for categorizing chemicals according to their carcinogenic potential is as follows:*

Group A: **Human carcinogen**	Sufficient evidence in epidemiologic studies to support causal association between exposure and cancer
Group B: **Probable human carcinogen**	Limited evidence in epidemiologic studies (Group B1) and/or sufficient evidence from animal studies (Group B2)
Group C: **Possible human carcinogen**	Limited evidence from animal studies and inadequate or no data in humans
Group D: **Not classifiable**	Inadequate or no human and animal evidence of carcinogenicity
Group E: **No evidence of carcinogenicity for humans**	No evidence of carcinogenicity in at least two adequate animal tests in different species *or* in adequate epidemiologic and animal studies

Drinking Water Health Advisories (HAs) are defined as follows:

One-day HA:	The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for up to 5 consecutive days of exposure, with a margin of safety.
Ten-day HA:	The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects up to 14 consecutive days of exposure, with a margin of safety.
Long-term HA:	The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects up to approximately 7 years (10% of an individual's lifetime) of exposure, with a margin of safety.
Lifetime HA:	The concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects over a lifetime of exposure, with a margin of safety.

*EPA is in the process of revising the Cancer Guidelines.

Drinking Water Standards and Health Advisories

October 1996

Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
ORGANICS													
Acenaphthene	-	-	-	-	-	-	-	-	0.06	-	-	-	-
Acifluorfen	T	zero	-	F	2	2	0.1	0.4	0.013	0.4	-	0.1	B2
Acrylamide	F	zero	TT	F	1.5	0.3	0.02	0.07	0.0002	0.007	-	0.001	B2
Acrylonitrile	T	zero	-	D	-	-	-	-	-	-	-	0.006	B1*
Adipate (diethylhexyl)	F	0.4	0.4	-	20	20	20	60	0.6	20	0.4	3	C
Alachlor	F	zero	0.002	F	0.1	0.1	-	-	0.01	0.4	-	0.04	B2
Aldicarb**	D	0.007	0.007	D	-	-	-	-	0.001	0.035	0.007	-	D
Aldicarb sulfone**	D	0.007	0.007	D	-	-	-	-	0.001	0.035	0.007	-	D
Aldicarb sulfoxide**	D	0.007	0.007	D	-	-	-	-	0.001	0.035	0.007	-	D
Aldrin	-	-	-	D	0.0003	0.0003	0.0003	0.0003	0.00003	0.001	-	0.0002	B2
Ametryn	-	-	-	F	9	9	0.9	3	0.009	0.3	0.06	-	D
Ammonium sulfamate	-	-	-	F	20	20	20	80	0.28	8	2	-	D
Anthracene (PAH)***	-	-	-	-	-	-	-	-	0.3	-	-	-	D
Atrazine	F	0.003	0.003	F	0.1	0.1	0.05	0.2	0.035	0.2*	0.003*	-	C
Baygon	-	-	-	F	0.04	0.04	0.04	0.1	0.004	0.1	0.003	-	C
Bentazon	T	0.02	-	F	0.3	0.3	0.3	1.0	0.032	1.0	0.2**	-	D
Benz(a)anthracene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-	B2
Benzene	F	zero	0.005	F	0.2	0.2	-	-	-	-	-	0.1	A
Benzo(a)pyrene (PAH)	F	zero	0.0002	-	-	-	-	-	-	-	-	0.0002*	B2*
Benzo(b)fluoranthene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-	B2
Benzo(g,h,i)perylene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-	D
Benzo(k)fluoranthene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-	B2
bis-2-Chloroisopropyl ether	-	-	-	F	4	4	4	13	0.04	1	0.3	-	D
Bromacil	L	-	-	F	6	6	3	9	0.13	5	0.09	-	C
Bromobenzene	L	-	-	D	-	-	-	-	-	-	-	-	-

* Under review.

**NOTE: The HA value or the MCLG/MCL value for any two or more of these three chemicals should remain at 0.007 mg/L because of similar mode of action.

***PAH = Polyaromatic hydrocarbon

†See 40CFR Parts 141 and 142

Revised value based on change in RfD

NOTE: Anthracene and Benzo(g,h,i)perylene — not proposed in Phase V.

NOTE: Changes from the last version are noted in italic and Bold Face print.

Drinking Water Standards and Health Advisories

Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
Bromochloroacetonitrile	T	-	-	D	-	-	-	-	-	-	-	-	-
Bromochloromethane	-	-	-	F	0.1	1	0.1	0.5	0.013	0.05	0.01	-	-
Bromodichloromethane (THM)	P	zero	0.1*/0.08'	D	6	6	4	13	0.02	0.7	-	0.06	B2
Bromoform (THM)	P	zero	0.1*/0.08'	D	5	2	2	6	0.02	0.7	-	0.4	B2
Bromomethane	T	-	-	D	0.1	0.1	0.1	0.5	0.001	0.05	0.01	-	D
Butyl benzyl phthalate (PAE)***	-	-	-	-	-	-	-	-	0.2	7	-	-	C
Butylate	-	-	-	F	2	2	1	4	0.05	2	0.35	-	D
Butylbenzene n-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butylbenzene sec-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butylbenzene tert-	-	-	-	D	-	-	-	-	-	-	-	-	-
Carbaryl	-	-	-	F	1	1	1	1	0.1	4	0.7	-	D
Carbofuran	F	0.04	0.04	F	0.05	0.05	0.05	0.2	0.005	0.2	0.04	-	E
Carbon tetrachloride	F	zero	0.005	F	4	0.2	0.07	0.3	0.0007	0.03	-	0.03	B2
Carboxin	-	-	-	F	1	1	1	4	0.1	4	0.7	-	D
Chloral hydrate	P	0.04	0.06**	D	7	0.2	0.2	0.6	0.0002	0.06	0.06	-	C
Chloramben	-	-	-	F	3	3	0.2	0.5	0.015	0.5	0.1	-	D
Chlordane	F	zero	0.002	F	0.06	0.06	-	-	0.00006	0.002	-	0.003	B2
Chlorodibromomethane (THM)	P	0.06	0.1*/0.08'	D	6	6	2	8	0.02	0.7	0.06	-	C
Chloroethane	L	-	-	D	-	-	-	-	-	-	-	-	B
Chloroform (THM)	P	zero	0.1*/0.08'	D	4	4	0.1	0.4	0.01	0.4	-	0.6	B2
Chloromethane	L	-	-	F	9	0.4	0.4	1	0.004	0.1	0.003	-	C
Chlorophenol (2-)	-	-	-	D	0.5	0.5	0.5	2.0	0.005	0.2	0.04	-	D
p-Chlorophenyl methyl sulfide/sulfone/sulfoxide	-	-	-	**	-	-	-	-	-	-	-	-	D
Chloropicrin	L	-	-	-	-	-	-	-	-	-	-	-	-
Chlorothalonil	-	-	-	F	0.2	0.2	0.2	0.5	0.015	0.5	-	0.15	B2
Chlorotoluene o-	L	-	-	F	2	2	2	7	0.02	0.7	0.1	-	D
Chlorotoluene p-	L	-	-	F	2	2	2	7	0.02	0.7	0.1	-	D
Chlorpyrifos	-	-	-	F	0.03	0.03	0.03	0.1	0.003	0.1	0.02	-	D
Chrysene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-***	B2
Cyanazine****	T	0.001	-	D	0.1	0.1	0.02	0.07	0.002	0.07	0.001****	-	C

* Current MCL "A HA will not be developed due to insufficient data" ; a "Database Deficiency Report has been published.

' 1994 Proposed rule for Disinfectants and Disinfection By-products : Total for all THMs combined cannot exceed the 0.08 level.

**Total for all haloacetic acids cannot exceed 0.06 level. ***PAE = phthalate acid ester ****Draft HA updated for the Phase VIB regulation, which has been postponed. It includes the change of the cancer classifi[illegible] from D to C, thus justifying the use of an additional 10-fold safety factor for th[illegible]me HA.

Drinking Water Standards and Health Advisories

Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
Cyanogen chloride	T	-	-	-	-	-	-	-	-	-	-	-	-
Cymene p-	-	-	-	D	-	-	-	-	-	-	-	-	-
2,4-D	F	0.07	0.07	F	1	0.3	0.1	0.4	0.01	0.4	0.07	-	D
DCPA (Dacthal)	L	-	-	F	80	80	5	20	0.01	-	-	-	D
Dalapon	F	0.2	0.2	F	3	3	0.3	0.9	0.026	0.9	0.2	-	D
Di(2-ethylhexyl)adipate	F	0.4	0.4	-	20	20	20	60	0.6	20	0.4	3	C
Diazinon	-	-	-	F	0.02	0.02	0.005	0.02	0.00009	0.003	0.0006	-	E
Dibromoacetonitrile	L	-	-	D	2	2	2	8	0.02	0.8	0.02	-	C
Dibromochloropropane (DBCP)	F	zero	0.0002	F	0.2	0.05	-	-	-	-	-	0.003	B2
Dibromomethane	L	-	-	-	-	-	-	-	-	-	-	-	D
Dibutyl phthalate (PAE)	-	-	-	-	-	-	-	-	0.1	4	-	-	D
Dicamba	L	-	-	F	0.3	0.3	0.3	1	0.03	1	0.2	-	D
Dichloroacetaldehyde	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloroacetic acid	P	zero	0.06**	D	1	1	1	4	0.004	0.1	-	-**	B2
Dichloroacetonitrile	L	-	-	D	1	1	0.8	3	0.008	0.3	0.006	-	C
Dichlorobenzene o-	F	0.6	0.6	F	9	9	9	30	0.09	3	0.6	-	D
Dichlorobenzene m- *	-	-	-	F	9	9	9	30	0.09	3	0.6	-	D
Dichlorobenzene p-	F	0.075	0.075	F	10	10	10	40	0.1	4	0.075	-	C
Dichlorodifluoromethane	L	-	-	F	40	40	9	30	0.2	5	1	-	D
Dichloroethane (1,2-)	F	zero	0.005	F	0.7	0.7	0.7	2.8	-	-	-	0.04	B2
Dichloroethylene (1,1-)	F	0.007	0.007	F	2	1	1	4	0.009	0.4	0.007	-	C
Dichloroethylene (cis-1,2-)	F	0.07	0.07	F	4	3	3	11	0.01	0.4	0.07	-	D
Dichloroethylene (trans-1,2-)	F	0.1	0.1	F	20	2	2	6	0.02	0.6	0.1	-	D
Dichloromethane	F	zero	0.005	F	10	2	-	-	0.06	2	-	0.5	B2
Dichlorophenol (2,4-)	-	-	-	D	0.03	0.03	0.03	0.1	0.003	0.1	0.02	-	D
Dichloropropane (1,1-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropane (1,2-)	F	zero	0.005	F	-	0.09	-	-	-	-	-	0.06	B2
Dichloropropane (1,3-)	L	-	-	D	-	-	-	-	-	-	-	-	-

* The values for m-dichlorobenzene are based on data for o-dichlorobenzene.
** A quantitative risk estimate has not been determined.
** Total for all haloacetic acids cannot exceed 0.06 level.

Drinking Water Standards and Health Advisories

Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
Dichloropropane (2,2-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropene (1,1-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropene (1,3-)	T	zero	-	F	0.03	0.03	0.03	0.09	0.0003	0.01	-	0.02	B2
Dieldrin	-	-	-	F	0.0005	0.0005	0.0005	0.002	0.00005	0.002	-	0.0002	B2
Diethyl phthalate (PAE)	-	-	-	D	-	-	-	-	0.8	30	5	-	D
Diethylene glycol dinitrate	-	-	-	*	-	-	-	-	-	-	-	-	-
Di(2-ethylhexyl)phthalate (PAE)	F	zero	0.006	D	-	-	-	-	0.02	0.7	-	0.3	B2
Diisopropyl methylphosphonate	-	-	-	F	6	6	6	30	0.06	3	0.6	-	D
Dimethrin	-	-	-	F	10	10	10	40	0.3	10	2	-	D
Dimethyl methylphosphonate	-	-	-	F	2	2	2	6	0.2	7	0.1	0.7	C
Dimethyl phthalate (PAE)	-	-	-	-	-	-	-	-	-	-	-	-	D
1,3-Dinitrobenzene	-	-	-	F	0.04	0.04	0.04	0.14	0.0001	0.005	0.001	-	D
Dinitrotoluene (2,4-)	L	-	-	F	0.50	0.50	0.30	1	0.002	0.1	-	0.005	B2
Dinitrotoluene (2,6-)	L	-	-	F	0.40	0.40	0.40	1	0.001	0.04	-	0.005	B2
tg 2,6 & 2,4 dinitrotoluene **	-	-	-	-	-	-	-	-	-	-	-	0.005	B2
Dinoseb	F	0.007	0.007	F	0.3	0.3	0.01	0.04	0.001	0.04	0.007	-	D
Dioxane p-	-	-	-	F	4	0.4	-	-	-	-	-	0.7	B2
Diphenamid	-	-	-	F	0.3	0.3	0.3	1	0.03	1	0.2	-	D
Diphenylamine	-	-	-	F	1	1	0.3	1	0.03	1	0.2	-	D
Diquat	F	0.02	0.02	-	-	-	-	-	0.0022	0.08	0.02	-	D
Disulfoton	-	-	-	F	0.01	0.01	0.003	0.009	0.00004	0.001	0.0003	-	E
Dithiane (1,4-)	-	-	-	F	0.4	0.4	0.4	1	0.01	0.4	0.08	-	D
Diuron	-	-	-	F	1	1	0.3	0.9	0.002	0.07	0.01	-	D
Endothal	F	0.1	0.1	F	0.8	0.8	0.2	0.2	0.02	0.7	0.1	-	D
Endrin	F	0.002	0.002	F	0.02	0.02	0.003	0.01	0.0003	0.01	0.002	-	D
Epichlorohydrin	F	zero	TT	F	0.1	0.1	0.07	0.07	0.002	0.07	-	0.4	B2
Ethylbenzene	F	0.7	0.7	F	30	3	1	3	0.1	3	0.7	-	D
Ethylene dibromide (EDB)	F	zero	0.00005	F	0.008	0.008	-	-	-	-	-	0.00004	B2
Ethylene glycol	-	-	-	F	20	6	6	20	2	40	7	-	D
ETU	L	-	-	F	0.3	0.3	0.1	0.4	0.00008	0.003	-	0.03	B2
Fenamiphos	-	-	-	F	0.009	0.009	0.005	0.02	0.00025	0.009	0.002	-	D

* An HA will not be developed due to insufficient data; a "Database Deficiency Report" has been published.

** tg = technical grade

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Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
Fluometron	-	-	-	F	2	2	2	5	0.013	0.4	0.09	-	D
Fluorene (PAH)	-	-	-	-	-	-	-	-	0.04	-	-	-	D
Fluorotrichloromethane	L	-	-	F	7	7	3	10	0.3	10	2	-	D
Fog Oil	-	-	-	D	-	-	-	-	-	-	-	-	-
Fonofos	-	-	-	F	0.02	0.02	0.02	0.07	0.002	0.07	0.01	-	D
Formaldehyde	D	-	-	D	10	5	5	20	0.15	5	1	-	B1**
Gasoline, unleaded (benzene)	-	-	-	D	-	-	-	-	-	-	0.005	-	-
Glyphosate	F	0.7	0.7	F	20	20	1	1	0.1	4	0.7	-	E
Heptachlor	F	zero	0.0004	F	0.01	0.01	0.005	0.005	0.0005	0.02	-	0.0008	B2
Heptachlor epoxide	F	zero	0.0002	F	0.01	-	0.0001	0.0001	1E-5	0.0004	-	0.0004	B2
Hexachlorobenzene	F	zero	0.001	F	0.05	0.05	0.05	0.2	0.0008	0.03	-	0.002	B2
Hexachlorobutadiene	T	0.001	-	F	0.3	0.3	0.1	0.4	0.002	0.07	0.001	-	C
Hexachlorocyclopentadiene	F	0.05	0.05	-	-	-	-	-	0.007	0.2	-	-	D
Hexachloroethane	L	-	-	F	5	5	0.1	0.5	0.001	0.04	0.001	-	C
Hexane (n-)	-	-	-	F	10	4	4	10	-	-	-	-	D
Hexazinone	-	-	-	F	3	3	3	9	0.033*	1*	0.2*	-	D
HMX	-	-	-	F	5	5	5	20	0.05	2	0.4	-	D
Indeno(1,2,3,-c,d)pyrene (PAH)	-	-	-	D	-	-	-	-	-	-	-	-***	B2
Isophorone	L	-	-	F	15	15	15	15	0.2	7	0.1	4	C
Isopropyl methylphosphonate	-	-	-	D	30	30	30	100	0.1	4.0	0.7	-	D
Isopropylbenzene	-	-	-	D	-	-	-	-	-	-	-	-	-
Lindane	F	0.0002	0.0002	F	1	1	0.03	0.1	0.0003	0.01	0.0002	-	C
Malathion	-	-	-	F	0.2	0.2	0.2	0.8	0.02	0.8	0.2	-	D
Maleic hydrazide	-	-	-	F	10	10	5	20	0.5	20	4	-	D
MCPA	-	-	-	F	0.1	0.1	0.1	0.4	0.0015	0.05	0.01	-	E
Methomyl	L	-	-	F	0.3	0.3	0.3	0.3	0.025	0.9	0.2	-	D
Methoxychlor	F	0.04	0.04	F	0.05	0.05	0.05	0.2	0.005	0.2	0.04	-	D
Methyl ethyl ketone*	-	-	-	F	-	-	-	-	-	-	-	-	D
Methyl parathion	-	-	-	F	0.3	0.3	0.03	0.1	0.00025	0.009	0.002	-	D

* Under review.

** Carcinogenicity based on inhalation exposure.

***See 40CFR Parts 141 and 142

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Drinking Water Standards and Health Advisories

Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
Methyl tert butyl ether	L	-	-	D	24	24	3	12	0.03	1.0	0.02-0.2*		C***
Metolachlor	L	-	-	F	2	2	2	5.0	0.1	3.5	0.07	-	C
Metribuzin	L	-	-	F	5	5	0.3	0.5	0.013**	0.5	0.1	-	D
Monochloroacetic acid	L	-	-	D	-	-	-	-	-	-	-	-	-
Monochlorobenzene	F	0.1	0.1	F	2	2	2	7	0.02	0.7	0.1	-	D
Naphthalene	-	-	-	F	0.5	0.5	0.4	1	0.004	0.1	0.02	-	D
Nitrocellulose (non-toxic)	-	-	-	F	-	-	-	-	-	-	-	-	-
Nitroguanidine	-	-	-	F	10	10	10	40	0.1	4	0.7	-	D
Nitrophenol p-	-	-	-	F	0.8	0.8	0.8	3	0.008	0.3	0.06	-	D
Oxamyl (Vydate)	F	0.2	0.2	F	0.2	0.2	0.2	0.9	0.025	0.9	0.2	-	E
Paraquat	-	-	-	F	0.1	0.1	0.05	0.2	0.0045	0.2	0.03	-	E
Pentachloroethane	-	-	-	D	-	-	-	-	-	-	-	-	-
Pentachlorophenol	F	zero	0.001	F	1	0.3	0.3	1	0.03	1	-	0.03	B2
Phenanthrene (PAH)	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	-	-	-	D	6	6	6	20	0.6	20	4	-	D
Picloram	F	0.5	0.5	F	20	20	0.7	2	0.07	2	0.5	-	D
Polychlorinated biphenyls (PCBs)	F	zero	0.0005	P	-	-	-	-	-	-	-	0.0005	B2
Prometon	L	-	-	F	0.2	0.2	0.2	0.5	0.015*	0.5*	0.1*	-	D
Pronamide	-	-	-	F	0.8	0.8	0.8	3	0.075	3	0.05	-	C
Propachlor	-	-	-	F	0.5	0.5	0.1	0.5	0.013	0.5	0.09	-	D
Propazine	-	-	-	F	1	1	0.5	2	0.02	0.7	0.01	-	C
Propham	-	-	-	F	5	5	5	20	0.02	0.6	0.1	-	D
Propylbenzene n-	-	-	-	D	-	-	-	-	-	-	-	-	-
Pyrene (PAH)	-	-	-	-	-	-	-	-	0.03	-	-	-	D
RDX	-	-	-	F	0.1	0.1	0.1	0.4	0.003	0.1	0.002	0.03	C
Simazine	F	0.004	0.004	F	0.07	0.07	0.07	0.07	0.005	0.2	0.004	-	C
Styrene	F	0.1	0.1	F	20	2	2	7	0.2	7	0.1	-	D
2,4,5-T	L	-	-	F	0.8	0.8	0.8	1	0.01	0.35	0.07	-	B2
2,3,7,8-TCDD (Dioxin)	F	zero	3E-08	F	1E-06	1E-07	1E-08	4E-08	1E-09	4E-08	-	2E-08	B2

* Under review. NOTE: Phenanthrene — not proposed.

** The RfD for metribuzin was revised Dec. 1994 to 0.013 mg/kg/day. Based on this revised RfD the Lifetime HA would be 0.1 mg/l assuming a 20% relative source contribution for drinking water. This information has not been incorporated in the Health Advisory document.

*** Tentative.

* If the cancer classification C is accepted, the Lifetime HA is *0.02*; otherwise it is 0.200 mg/L.

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Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg /day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
Tebuthiuron	-	-	-	F	3	3	0.7	2	0.07	2	0.5	-	D
Terbacil	-	-	-	F	0.3	0.3	0.3	0.9	0.013	0.4	0.09	-	E
Terbufos	-	-	-	F	0.005	0.005	0.001	0.005	0.00013	0.005	0.0009	-	D
Tetrachloroethane (1,1,1,2-)	L	-	-	F	2	2	0.9	3	0.03	1	0.07	0.1	C
Tetrachloroethane (1,1,2,2-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Tetrachloroethylene	F	zero	0.005	F	2	2	1	5	0.01	0.5	-	0.07	-
Tetranitromethane	-	-	-	**	-	-	-	-	-	-	-	-	-
Toluene	F	1	1	F	20	2	2	7	0.2	7	1	-	D
Toxaphene	F	zero	0.003	F	-	-	-	-	0.1*	-	-	0.003	B2
2,4,5-TP	F	0.05	0.05	F	0.2	0.2	0.07	0.3	0.0075	0.3	0.05	-	D
1,1,2-Trichloro-1,2,2-trifluoroethane	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroacetic acid	P	0.3	0.06**	D	4	4	4	13	0.1	4.0	0.3	-	C
Trichloroacetonitrile	L	-	-	D	0.05	0.05	-	-	-	-	-	-	-
Trichlorobenzene (1,2,4-)	F	0.07	0.07	F	0.1	0.1	0.1	0.5	0.01	0.04	0.07	-	D
Trichlorobenzene (1,3,5-)	-	-	-	F	0.6	0.6	0.6	2	0.006	0.2	0.04	-	D
Trichloroethane (1,1,1-)	F	0.2	0.2	F	100	40	40	100	0.035	1	0.2	-	D
Trichloroethane (1,1,2-)	F	0.003	0.005	F	0.6	0.4	0.4	1	0.004	0.1	0.003	-	C
Trichloroethanol (2,2,2-)	L	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethylene	F	zero	0.005	F	-	-	-	-	-	0.3	-	0.3	B2
Trichlorophenol (2,4,6-)	L	-	-	D	-	-	-	-	-	-	-	0.3	B2
Trichloropropane (1,1,1-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trichloropropane (1,2,3-)	L	-	-	F	0.6	0.6	0.6	2	0.006	0.2	0.04	0.5	B2
Trifluralin	L	-	-	F	0.08	0.08	0.08	0.3	0.0075	0.3	0.005	0.5	C
Trimethylbenzene (1,2,4-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trimethylbenzene (1,3,5-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trinitroglycerol	-	-	-	F	0.005	0.005	0.005	0.005	-	-	0.005	-	-
Trinitrotoluene	-	-	-	F	0.02	0.02	0.02	0.02	0.0005	0.02	0.002	0.1	C
Vinyl chloride	F	zero	0.002	F	3	3	0.01	0.05	-	-	-	0.0015	A
Xylenes	F	10	10	F	40	40	40	100	2	60	10	-	D

* Under review.

** A HA will not be developed due to insufficient data; a "Database Deficiency Report" has been published.

** Total for all haloacetic acids cannot exceed 0.06 mg/l level.

Drinking Water Standards and Health Advisories

Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg /day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
INORGANICS													
Aluminum	L	-	-	D	-	-	-	-	-	-	-	-	-
Ammonia	-	-	-	D	-	-	-	-	-	-	30	-	D
Antimony	F	0.006	0.006	F	0.01	0.01	0.01	0.015	0.0004	0.01	0.003	-	D
Arsenic	*	-	0.05	D	-	-	-	-	-	-	-	0.002	A
Asbestos (fibers/l >10μm length)	F	7 MFL	7 MFL	-	-	-	-	-	-	-	-	700 MFL	A
Barium	F	2	2	F	-	-	-	-	0.07	2	2	-	D
Beryllium	F	0.004	0.004	D	30	30	4	20	0.005	0.2	-	0.0008	B2
Boron	L	-	-	D	4	0.9	0.9	3	0.09	3	0.6	-	D
Bromate	L	zero	0.01	-	-	-	-	-	-	-	-	-	-
Cadmium	F	0.005	0.005	F	0.04	0.04	0.005	0.02	0.0005	0.02	0.005	-	D
Chloramine	P	4***	4	D	1	1	1	1	0.1	3.3	3/4***	-	-
Chlorate	L	-	-	D	-	-	-	-	-	-	-	-	-
Chlorine	P	4	4	D	-	-	-	-	0.1	-	-	-	D
Chlorine dioxide	T	0.3	0.8	D	-	-	-	-	0.01	0.35	0.3	-	D
Chlorite	L	0.08	1	D	-	-	-	-	0.003	0.1	0.08	-	D
Chromium (total)	F	0.1	0.1	F	1	1	0.2	0.8	0.005	0.2	0.1	-	D
Copper (at tap)	F	1.3	TT**	-	-	-	-	-	-	-	-	-	D
Cyanide	F	0.2	0.2	F	0.2	0.2	0.2	0.8	0.022	0.8	0.2	-	D
Fluoride*	F	4	4	-	-	-	-	-	0.12	-	-	-	-
Hypochlorite	P	4[1]	-	-	-	-	-	-	-	-	-	-	-
Hypochlorous acid	P	4[1]	-	-	-	-	-	-	-	-	-	-	-
Lead (at tap)	F	zero	TT**	-	-	-	-	-	-	-	-	-	B2
Manganese	L	-	-	-	-	-	-	-	0.14[2]	-	-	-	-
Mercury (inorganic)	F	0.002	0.002	F	-	-	-	0.002	0.0003	0.01	0.002	-	D
Molybdenum	L	-	-	D	*0.02*	*0.02*	*0.01*	0.05	0.005	0.2	0.04	-	D
Nickel	F	0.1[4]	0.1[4]	F	1	1	0.5	1.7	0.02	0.8	0.1	-	D
Nitrate (as N)	F	10	10	F	-	10*	-	-	1.6	-	-	-	*

* Under review.
** Copper — action level 1.3 mg/L, Lead — action level 0.015 mg/L
*** Measured as free chlorine.
[1] Regulated as chlorine.
[2] In food.
[3] In water.
[4] Being rem

Chemicals	Standards			Status HA	Health Advisories								Cancer Group
					10-kg Child			70-kg Adult					
	Status Reg.	MCLG (mg/l)	MCL (mg/l)		One-day (mg/l)	Ten-day (mg/l)	Longer-term (mg/l)	Longer-term (mg/l)	RfD (mg/kg/day)	DWEL (mg/l)	Lifetime (mg/l)	mg/l at 10^{-4} Cancer Risk	
Nitrite (as N)	F	1	1	F	-	1*	-	-	0.16*	-	-	-	*
Nitrate + Nitrite (both as N)	F	10	10	F	-	-	-	-	-	-	-	-	*
Selenium	F	0.05	0.05	-	-	-	-	-	0.005	-	-	-	-
Silver	-	-	-	D	0.2	0.2	0.2	0.2	0.005	0.2	0.1	-	D
Sodium	-	-	-	D	-	-	-	-	-	20**	-	-	-
Strontium	L	-	-	D	25	25	25	90	0.6	90	17	-	D
Sulfate	P	500	500	D	-	-	-	-	-	-	-	-	-
Thallium	F	0.0005	0.002	F	0.007	0.007	0.007	0.02	0.00007	0.0023	0.0006	-	-
Vanadium	T	-	-	D	-	-	-	-	-	-	-	-	D
White phosphorous	-	-	-	F	-	-	-	-	0.00002	0.0005	0.0001	-	D
Zinc	L	-	-	D	6	6	3	10	0.3	10	2	-	D
Zinc chloride (measured as Zinc)	L	-	-	F	6	6	3	10	0.3	10	2	-	D
RADIONUCLIDES													
Beta particle and photon activity (formerly man-made radionuclides)	F	++	4 mrem	-	-	-	-	-	-	-	-	4 mrem/y	A
Gross alpha particle activity	F	++	15 pCi/L	-	-	-	-	-	-	-	-	15 pCi/L	A
Combined Radium 226 & 228	F	++	5 pCi/L	-	-	-	-	-	-	-	-	20 pCi/L	A
Radon+	P	zero	300 pCi/L	-	-	-	-	-	-	-	-	150 pCi/L	A
Uranium+	P	zero	20 µg/L	-	-	-	-	-	0.003	-	-	-	A

* Under review. ** Guidance.
+ 1991 Proposed National Primary Drinking Water Rule for Radionuclides
++No final MCLG, but zero proposed in 1991.

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Secondary Maximum Contaminant Levels

Chemicals	Status	SMCLs (mg/L)
Aluminum	F	0.05 to 0.2
Chloride	F	250
Color	F	15 color units
Copper	F	1.0
Corrosivity	F	non-corrosive
Fluoride*	F	2.0
Foaming agents	F	0.5
Iron	F	0.3
Manganese	F	0.05
Odor	F	3 threshold odor numbers
pH	F	6.5 — 8.5
Silver	F	0.1
Sulfate	F	250
Total dissolved solids (TDS)	F	500
Zinc	F	5

Status Codes: P — proposed, F — final

* Under review.

Secondary Drinking Water Standards are unenforceable federal guidelines regarding taste, odor, color and certain other non-aesthetic effects of drinking water. EPA recommends them to the States as reasonable goals, but federal law does not require water systems to comply with them. States may, however, adopt their own e[illegible]ceable regulations governing these concerns. To [illegible] safe, check your State's drinking water rules.

Microbiology

	Status	MCLG	MCL
Cryptosporidium	L	-	-
Giardia lamblia	F	zero	TT
Legionella	F#	zero	TT
Standard Plate Count	F#	NA	TT
Total Coliforms	F	zero	**
Turbidity	F	NA	PS
Viruses	F#	zero	TT

Key: PS, TT, F, defined as previously stated.

\# Final for systems using surface water; also being considered for regulation under groundwater disinfection rule.

Federal Ambient Water Quality Criteria
April 1999

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NATIONAL RECOMMENDED WATER QUALITY CRITERIA FOR PRIORITY TOXIC POLLUTANTS

	Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/ Source
1	Antimony	7440360					14 B,Z	4300 B	57FR60848
2	Arsenic	7440382	340 A,D,K	150 A,D,K	69 A,D,bb	36 A,D,bb	0.018 C,M,S	0.14 C,M,S	62FR42160 57FR60848
3	Beryllium	7440417					J,Z	J	62FR42160
4	Cadmium	7440439	4.3 D,E,K	2.2 D,E,K	42 D,bb	9.3 D,bb	J,Z	J	62FR42160
5a	Chromium III	16065831	570 D,E,K	74 D,E,K			J,Z Total	J	EPA820/B-96-001 62FR42160
5b	Chromium VI	18540299	16 D,K	11 D,K	1,100 D,bb	50 D,bb	J, Z Total	J	62FR42160
6	Copper	7440508	13 D,E,K,cc	9.0 D,E,K,cc	4.8 D,cc,ff	3.1 D,cc,ff	1,300 U		62FR42160
7	Lead	7439921	65 D,E,bb,gg	2.5 D,E,bb,gg	210 D,bb	8.1 D,bb	J	J	62FR42160
8	Mercury	7439976	1.4 D,K,hh	0.77 D,K,hh	1.8 D,ee,hh	0.94 D,ee,hh	0.050 B	0.051 B	62FR42160
9	Nickel	7440020	470 D,E,K	52 D,E,K	74 D,bb	8.2 D,bb	610 B	4,600 B	62FR42160
10	Selenium	7782492	L,R,T	5.0 T	290 D,bb,dd	71 D,bb,dd	170 Z	11,000	62FR42160 IRIS 09/01/91
11	Silver	7440224	3.4 D,E,G		1.9 D,G				62FR42160
12	Thallium	7440280					1.7 B	6.3 B	57FR60848
13	Zinc	7440666	120 D,E,K	120 D,E,K	90 D,bb	81 D,bb	9,100 U	69,000 U	62FR42160 IRIS 10/01/92

	Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/ Source
14	Cyanide	57125	22 K,Q	5.2 K,Q	1 Q,bb	1 Q,bb	700 B,Z	220,000 B,H	EPA820/B-96-001 57FR60848
15	Asbestos	1332214					7 million fibers/L I		57FR60848
16	2,3,7,8-TCDD Dioxin	1746016					1.3E-8 C	1.4E-8 C	62FR42160
17	Acrolein	107028					320	780	57FR60848
18	Acrylonitrile	107131					0.059 B,C	0.66 B,C	57FR60848
19	Benzene	71432					1.2 B,C	71 B,C	62FR42160
20	Bromoform	75252					4.3 B,C	360 B,C	62FR42160
21	Carbon Tetrachloride	56235					0.25 B,C	4.4 B,C	57FR60848
22	Chlorobenzene	108907					680 B,Z	21,000 B,H	57FR60848
23	Chlorodibromomethane	124481					0.41 B,C	34 B,C	62FR42160
24	Chloroethane	75003							
25	2-Chloroethylvinyl Ether	110758							
26	Chloroform	67663					5.7 B,C	470 B,C	62FR42160
27	Dichlorobromomethane	75274					0.56 B,C	46 B,C	62FR42160
28	1,1-Dichloroethane	75343							
29	1,2-Dichloroethane	107062					0.38 B,C	99 B,C	57FR60848
30	1,1-Dichloroethylene	75354					0.057 B,C	3.2 B,C	57FR60848

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	Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/ Source
31	1,2-Dichloropropane	78875					0.52 B,C	39 B,C	62FR42160
32	1,3-Dichloropropene	542756					10 B	1,700 B	57FR60848
33	Ethylbenzene	100414					3,100 B,Z	29,000 B	62FR42160
34	Methyl Bromide	74839					48 B	4000 B	62FR42160
35	Methyl Chloride	74873					J	J	62FR42160
36	Methylene Chloride	75092					4.7 B,C	1600 B,C	62FR42160
37	1,1,2,2-Tetrachloroethane	79345					0.17 B,C	11 B,C	57FR60848
38	Tetrachloroethylene	127184					0.8 C	8.85 C	57FR60848
39	Toluene	108883					6,800 B,Z	200,000 B	62FR42160
40	1,2-Trans-Dichloroethylene	156605					700 B,Z	140,000 B	62FR42160
41	1,1,1-Trichloroethane	71556					J,Z	J	62FR42160
42	1,1,2-Trichloroethane	79005					0.60 B,C	42 B,C	57FR60848
43	Trichloroethylene	79016					2.7 C	81 C	57FR60848
44	Vinyl Chloride	75014					2.0 C	525 C	57FR60848
45	2-Chlorophenol	95578					120 B,U	400 B,U	62FR42160
46	2,4-Dichlorophenol	120832					93 B,U	790 B,U	57FR60848
47	2,4-Dimethylphenol	105679					540 B,U	2,300 B,U	62FR42160
48	2-Methyl-4,6-Dinitrophenol	534521					13.4	765	57FR60848
49	2,4-Dinitrophenol	51285					70 B	14,000 B	57FR60848
50	2-Nitrophenol	88755							
51	4-Nitrophenol	100027							
52	3-Methyl-4-Chlorophenol	59507					U	U	

	Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/ Source
53	Pentachlorophenol	87865	19 F,K	15 F,K	13 bb	7.9 bb	0.28 B,C	8.2 B,C,H	62FR42160
54	Phenol	108952					21,000 B,U	4,600,000 B,H,U	62FR42160 57FR60848
55	2,4,6-Trichlorophenol	88062					2.1 B,C,U	6.5 B,C	62FR42160
56	Acenaphthene	83329					1,200 B,U	2,700 B,U	62FR42160
57	Acenaphthylene	208968							
58	Anthracene	120127					9,600 B	110,000 B	62FR42160
59	Benzidine	92875					0.00012 B,C	0.00054 B,C	57FR60848
60	BenzoaAnthracene	56553					0.0044 B,C	0.049 B,C	62FR42160
61	BenzoaPyrene	50328					0.0044 B,C	0.049 B,C	62FR42160
62	BenzobFluoranthene	205992					0.0044 B,C	0.049 B,C	62FR42160
63	BenzoghiPerylene	191242							
64	BenzokFluoranthene	207089					0.0044 B,C	0.049 B,C	62FR42160
65	Bis2-ChloroethoxyMethane	111911							
66	Bis2-ChloroethylEther	111444					0.031 B,C	1.4 B,C	57FR60848
67	Bis2-ChloroisopropylEther	39638329					1,400 B	170,000 B	62FR42160 57FR60848
68	Bis2-EthylhexylPhthalate[x]	117817					1.8 B,C	5.9 B,C	57FR60848
69	4-Bromophenyl Phenyl Ether	101553							
70	Butylbenzyl Phthalate[w]	85687					3,000 B	5,200 B	62FR42160
71	2-Chloronaphthalene	91587					1,700 B	4,300 B	62FR42160

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	Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/ Source
72	4-Chlorophenyl Phenyl Ether	7005723							
73	Chrysene	218019					0.0044 B,C	0.049 B,C	62FR42160
74	Dibenzoa,hAnthracene	53703					0.0044 B,C	0.049 B,C	62FR42160
75	1,2-Dichlorobenzene	95501					2,700 B,Z	17,000 B	62FR42160
76	1,3-Dichlorobenzene	541731					400	2,600	62FR42160
77	1,4-Dichlorobenzene	106467					400 Z	2600	62FR42160
78	3,3'-Dichlorobenzidine	91941					0.04 B,C	0.077 B,C	57FR60848
79	Diethyl Phthalate[W]	84662					23,000 B	120,000 B	57FR60848
80	Dimethyl Phthalate[W]	131113					313,000	2,900,000	57FR60848
81	Di-n-Butyl Phthalate[W]	84742					2,700 B	12,000 B	57FR60848
82	2,4-Dinitrotoluene	121142					0.11 C	9.1 C	57FR60848
83	2,6-Dinitrotoluene	606202							
84	Di-n-Octyl Phthalate	117840							
85	1,2-Diphenylhydrazine	122667					0.040 B,C	0.54 B,C	57FR60848
86	Fluoranthene	206440					300 B	370 B	62FR42160
87	Fluorene	86737					1,300 B	14,000 B	62FR42160
88	Hexachlorobenzene	118741					0.00075 B,C	0.00077 B,C	62FR42160
89	Hexachlorobutadiene	87683					0.44 B,C	50 B,C	57FR60848
90	Hexachlorocyclopentadiene	77474					240 B,U,Z	17,000 B,H,U	57FR60848
91	Hexachloroethane	67721					1.9 B,C	8.9 B,C	57FR60848

	Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/ Source
92	Ideno1,2,3-cdPyrene	193395					0.0044 B,C	0.049 B,C	62FR42160
93	Isophorone	78591					36 B,C	2,600 B,C	IRIS 11/01/97
94	Naphthalene	91203							
95	Nitrobenzene	98953					17 B	1,900 B,H,U	57FR60848
96	N-Nitrosodimethylamine	62759					0.00069 B,C	8.1 B,C	57FR60848
97	N-Nitrosodi-n-Propylamine	621647					0.005 B,C	1.4 B,C	62FR42160
98	N-Nitrosodiphenylamine	86306					5.0 B,C	16 B,C	57FR60848
99	Phenanthrene	85018							
100	Pyrene	129000					960 B	11,000 B	62FR42160
101	1,2,4-Trichlorobenzene	120821					260 Z	940	IRIS 11/01/96
102	Aldrin	309002	3.0 G		1.3 G		0.00013 B,C	0.00014 B,C	62FR42160
103	alpha-BHC	319846					0.0039 B,C	0.013 B,C	62FR42160
104	beta-BHC	319857					0.014 B,C	0.046 B,C	62FR42160
105	gamma-BHC (Lindane)	58899	0.95 K		0.16 G		0.019 C	0.063 C	62FR42160
106	delta-BHC	319868							
107	Chlordane	57749	2.4 G	0.0043 G,aa	0.09 G	0.004 G,aa	0.0021 B,C	0.0022 B,C	62FR42160 IRIS02/07/98
108	4,4'-DDT	50293	1.1 G	0.001 G,aa	0.13 G	0.001 G,aa	0.00059 B,C	0.00059 B,C	62FR42160
109	4,4'-DDE	72559					0.00059 B,C	0.00059 B,C	62FR42160
110	4,4'-DDD	72548					0.00083 B,C	0.00084 B,C	62FR42160

	Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/ Source
111	Dieldrin	60571	0.24 K	0.056 K,O	0.71 G	0.0019 G,aa	0.00014 B,C	0.00014 B,C	62FR42160
112	alpha-Endosulfan	959988	0.22 G,Y	0.056 G,Y	0.034 G,Y	0.0087 G,Y	110 B	240 B	62FR42160
113	beta-Endosulfan	33213659	0.22 G,Y	0.056 G,Y	0.034 G,Y	0.0087 G,Y	110 B	240 B	62FR42160
114	Endosulfan Sulfate	1031078					110 B	240 B	62FR42160
115	Endrin	72208	0.086 K	0.036 K,O	0.037 G	0.0023 G,aa	0.76 B	0.81 B,H	62FR42160
116	Endrin Aldehyde	7421934					0.76 B	0.81 B,H	62FR42160
117	Heptachlor	76448	0.52 G	0.0038 G,aa	0.053 G	0.0036 G,aa	0.00021 B,C	0.00021 B,C	62FR42160
118	Heptachlor Epoxide	1024573	0.52 G,V	0.0038 G,V,aa	0.053 G,V	0.0036 G,V,aa	0.00010 B,C	0.00011 B,C	62FR42160
119	Polychlorinated Biphenyls PCBs:			0.014 N,aa		0.03 N,aa	0.00017 B,C,P	0.00017 B,C,P	62FR42160 63FR16182
120	Toxaphene	8001352	0.73	0.0002 aa	0.21	0.0002 aa	0.00073 B,C	0.00075 B,C	62FR42160

Footnotes:

A This recommended water quality criterion was derived from data for arsenic (III), but is applied here to total arsenic, which might imply that arsenic (III) and arsenic (V) are equally toxic to aquatic life and that their toxicities are additive. In the arsenic criteria document (EPA 440/5-84-033, January 1985), Species Mean Acute Values are given for both arsenic (III) and arsenic (V) for five species and the ratios of the SMAVs for each species range from 0.6 to 1.7. Chronic values are available for both arsenic (III) and arsenic (V) for one species; for the fathead minnow, the chronic value for arsenic (V) is 0.29 times the chronic value for arsenic (III). No data are known to be available concerning whether the toxicities of the forms of arsenic to aquatic organisms are additive.

B This criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of April 8, 1998. The fish tissue bioconcentration factor (BCF) from the 1980 Ambient Water Quality Criteria document was retained in each case.

C This criterion is based on carcinogenicity of 10^{-6} risk. Alternate risk levels may be obtained by moving the decimal point (e.g., for a risk level of 10^{-5}, move the decimal point in the recommended criterion one place to the right).

D Freshwater and saltwater criteria for metals are expressed in terms of the dissolved metal in the water column. The recommended water quality criteria value was calculated by using the previous 304(a) aquatic life criteria expressed in terms of total recoverable metal, and multiplying it by a conversion factor (CF). The term "Conversion Factor" (CF) represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. (Conversion Factors for saltwater CCCs are not currently available. Conversion factors derived for saltwater CMCs have been used for both saltwater CMCs and CCCs). See "Office of Water Policy and Technical

Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria," October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water, available from the Water Resource center, USEPA, 401 M St., SW, mail code RC4100, Washington, DC 20460; and 40CFR§131.36(b)(1). Conversion Factors applied in the table can be found in Appendix A to the Preamble- Conversion Factors for Dissolved Metals.

E The freshwater criterion for this metal is expressed as a function of hardness (mg/L) in the water column. The value given here corresponds to a hardness of 100 mg/L. Criteria values for other hardness may be calculated from the following: CMC (dissolved) = $\exp\{m_A [\ln(\text{hardness})] + b_A\}$ (CF), or CCC (dissolved) = $\exp\{m_C [\ln(\text{hardness})] + b_C\}$ (CF) and the parameters specified in Appendix B to the Preamble- Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent.

F Freshwater aquatic life values for pentachlorophenol are expressed as a function of pH, and are calculated as follows: CMC = exp(1.005(pH)-4.869); CCC = exp(1.005(pH)-5.134). Values displayed in table correspond to a pH of 7.8.

G This Criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptachlor (440/5-80-052), Hexachlorocyclohexane (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a "CMC" derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

H No criterion for protection of human health from consumption of aquatic organisms excluding water was presented in the 1980 criteria document or in the *1986 Quality Criteria for Water*. Nevertheless, sufficient information was presented in the 1980 document to allow the calculation of a criterion, even though the results of such a calculation were not shown in the document.

I This criterion for asbestos is the Maximum Contaminant Level (MCL) developed under the Safe Drinking Water Act (SDWA).

J EPA has not calculated human health criterion for this contaminant. However, permit authorities should address this contaminant in NPDES permit actions using the State's existing narrative criteria for toxics.

K This recommended criterion is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*, (EPA-820-B-96-001, September 1996). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the difference between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. None of the decisions concerning the derivation of this criterion were affected by any considerations that are specific to the Great Lakes.

L The CMC = 1/[(f1/CMC1) + (f2/CMC2)] where f1 and f2 are the fractions of total selenium that are treated as selenite and selenate, respectively, and CMC1 and CMC2 are 185.9 μg/l and 12.83 μg/l, respectively.

M EPA is currently reassessing the criteria for arsenic. Upon completion of the reassessment the Agency will publish revised criteria as appropriate.

N PCBs are a class of chemicals which include aroclors, 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825 and 12674112 respectively. The aquatic life criteria apply to this set of PCBs.

O The derivation of the CCC for this pollutant did not consider exposure through the diet, which is probably important for aquatic life occupying upper trophic levels..

P This criterion applies to total pcbs, i.e., the sum of all congener or all isomer analyses.

Q This recommended water quality criterion is expressed as μg free cyanide (as CN)/L.

R This value was announced (61FR58444-58449, November 14, 1996) as a proposed GLI 303(c) aquatic life criterion. EPA is currently working on this criterion and so this value might change substantially in the near future.

S This recommended water quality criterion refers to the inorganic form only.

T This recommended water quality criterion is expressed in terms of total recoverable metal in the water column. It is scientifically acceptable to use the conversion factor of 0.922 that was used in the GLI to convert this to a value that is expressed in terms of dissolved metal.

U The organoleptic effect criterion is more stringent than the value for priority toxic pollutants.

V This value was derived from data for heptachlor and the criteria document provides insufficient data to estimate the relative toxicities of heptachlor and heptachlor epoxide.

W Although EPA has not published a final criteria document for this compound it is EPA's understanding that sufficient data exist to allow calculation of aquatic criteria. It is anticipated that industry intends to publish in the peer reviewed literature draft aquatic life criteria generated in accordance with EPA Guidelines. EPA will review such criteria for possible issuance as national WQC.

X There is a full set of aquatic life toxicity data that show that DEHP is not toxic to aquatic organisms at or below its solubility limit.

Y This value was derived from data for endosulfan and is most appropriately applied to the sum of alpha-endosulfan and beta-endosulfan.

Z A more stringent MCL has been issued by EPA. Refer to drinking water regulations (40 CFR 141) or Safe Drinking Water Hotline (1-800-426-4791) for values.

aa This CCC is based on the Final Residue Value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the Agency no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.

bb This water quality criterion is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Arsenic (EPA 440/5-84-033), Cadmium (EPA 440/5-84-032), Chromium (EPA 440/5-84-029), Copper (EPA 440/5-84-031), Cyanide (EPA 440/5-84-028), Lead (EPA 440/5-84-027), Nickel (EPA 440/5-86-004), Pentachlorophenol (EPA 440/5-86-009), Toxaphene, (EPA 440/5-86-006), Zinc (EPA 440/5-87- 003).

cc When the concentration of dissolved organic carbon is elevated, copper is substantially less toxic and use of Water-Effect Ratios might be appropriate.

dd The selenium criteria document (EPA 440/5-87-006, September 1987) provides that if selenium is as toxic to saltwater fishes in the field as it is to freshwater fishes in the field, the status of the fish community should be monitored whenever the concentration of selenium exceeds 5.0 μg/L in salt water because the saltwater CCC does not take into account uptake via the food chain.

ee This recommended water quality criterion was derived on page 43 of the mercury criteria document (EPA 440/5-84-026, January 1985). The saltwater CCC of 0.025 ug/L given on page 23 of the criteria document is based on the Final Residue Value procedure in the 1985 Guidelines. Since the publication of the Great Lakes Aquatic Life Criteria Guidelines in 1995 (60FR15393-15399, March 23, 1995), the Agency no longer uses the Final Residue Value procedure for deriving CCCs for new or revised 304(a) aquatic life criteria.

ff This recommended water quality criterion was derived in *Ambient Water Quality Criteria Saltwater Copper Addendum* (Draft, April 14, 1995) and was promulgated in the Interim final National Toxics Rule (60FR22228-222237, May 4, 1995).

gg EPA is actively working on this criterion and so this recommended water quality criterion may change substantially in the near future.

hh This recommended water quality criterion was derived from data for inorganic mercury (II), but is applied here to total mercury. If a substantial portion of the mercury in the water column is methylmercury, this criterion will probably be under protective. In addition, even though inorganic mercury is converted to methylmercury and methylmercury bioaccumulates to a great extent, this criterion does not account for uptake via the food chain because sufficient data were not available when the criterion was derived.

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NATIONAL RECOMMENDED WATER QUALITY CRITERIA FOR NON PRIORITY POLLUTANTS

	Non Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/Source
1	Alkalinity	--		20000 F					Gold Book
2	Aluminum pH 6.5 - 9.0	7429905	750 G,I	87 G,I,L					53FR33178
3	Ammonia	7664417	FRESHWATER CRITERIA ARE pH DEPENDENT -- SEE DOCUMENT D SALTWATER CRITERIA ARE pH AND TEMPERATURE DEPENDENT						EPA822-R-98-008 EPA440/5-88-004
4	Aesthetic Qualities	--	NARRATIVE STATEMENT-- SEE DOCUMENT						Gold Book
5	Bacteria	--	FOR PRIMARY RECREATION AND SHELLFISH USES -- SEE DOCUMENT						Gold Book
6	Barium	7440393					1,000 A		Gold Book
7	Boron	--	NARRATIVE STATEMENT-- SEE DOCUMENT						Gold Book
8	Chloride	16887006	860000 G	230000 G					53FR19028
9	Chlorine	7782505	19	11	13	7.5	C		Gold Book
10	Chlorophenoxy Herbicide 2,4,5,-TP	93721					10 A		Gold Book
11	Chlorophenoxy Herbicide 2,4-D	94757					100 A,C		Gold Book
12	Chloropyrifos	2921882	0.083 G	0.041 G	0.011 G	0.0056 G			Gold Book
13	Color	--	NARRATIVE STATEMENT-- SEE DOCUMENT F						Gold Book
14	Demeton	8065483		0.1 F		0.1 F			Gold Book
15	Ether, Bis Chloromethyl	542881					0.00013 E	0.00078 E	IRIS 01/01/91
16	Gases, Total Dissolved	--	NARRATIVE STATEMENT -- SEE DOCUMENT F						Gold Book
17	Guthion	86500		0.01 F		0.01 F			Gold Book
18	Hardness	--	NARRATIVE STATEMENT-- SEE DOCUMENT						Gold Book

	Non Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/Source
19	Hexachlorocyclo-hexane-Technical	319868					0.0123	0.0414	Gold Book
20	Iron	7439896		1000 F			300 A		Gold Book
21	Malathion	121755		0.1 F		0.1 F			Gold Book
22	Manganese	7439965					50 A	100 A	Gold Book
23	Methoxychlor	72435		0.03 F		0.03 F	100 A,C		Gold Book
24	Mirex	2385855		0.001 F		0.001 F			Gold Book
25	Nitrates	14797558					10,000 A		Gold Book
26	Nitrosamines	--					0.0008	1.24	
27	Dinitrophenols	25550587					70	14,000	Gold Book
28	Nitrosodibutylamine,N	924163					0.0064 A	0.587 A	Gold Book
29	Nitrosodiethylamine,N	55185					0.0008 A	1.24 A	Gold Book
30	Nitrosopyrrolidine,N	930552					0.016	91.9	Gold Book
31	Oil and Grease	--	NARRATIVE STATEMENT -- SEE DOCUMENT F						Gold Book
32	Oxygen, Dissolved	7782447	WARMWATER AND COLDWATER MATRIX -- SEE DOCUMENT O						Gold Book
33	Parathion	56382	0.065 J	0.013 J					Gold Book
34	Pentachlorobenzene	608935					3.5 E	4.1 E	IRIS 03/01/88
35	pH	--		6.5 - 9 F		6.5 - 8.5 F,K	5 - 9		Gold Book
36	Phosphorus Elemental	7723140				0.1 F,K			Gold Book
37	Phosphate Phosphorus	--	NARRATIVE STATEMENT-- SEE DOCUMENT						Gold Book

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	Non Priority Pollutant	CAS Number	Freshwater CMC (µg/L)	Freshwater CCC (µg/L)	Saltwater CMC (µg/L)	Saltwater CCC (µg/L)	Human Health For Consumption of: Water + Organism (µg/L)	Human Health For Consumption of: Organism Only (µg/L)	FR Cite/Source
38	Solids Dissolved and Salinity	--					250,000 A		Gold Book
39	Solids Suspended and Turbidity	--	NARRATIVE STATEMENT -- SEE DOCUMENT F						Gold Book
40	Sulfide-Hydrogen Sulfide	7783064		2.0 F		2.0 F			Gold Book
41	Tainting Substances	--	NARRATIVE STATEMENT-- SEE DOCUMENT						Gold Book
42	Temperature	--	SPECIES DEPENDENT CRITERIA -- SEE DOCUMENT M						Gold Book
43	Tetrachlorobenzene,1,2,4,5-	95943					2.3 E	2.9 E	IRIS03/01/91
44	Tributyltin TBT	--	0.46 N	0.063 N	0.37 N	0.010 N			62FR42554
45	Trichlorophenol,2,4,5-	95954					2,600 B,E	9800 B,E	IRIS 03/01/88

Footnotes:

A This human health criterion is the same as originally published in the Red Book which predates the 1980 methodology and did not utilize the fish ingestion BCF approach. This same criterion value is now published in the Gold Book.

B The organoleptic effect criterion is more stringent than the value presented in the non priority pollutants table.

C A more stringent Maximum Contaminant Level (MCL) has been issued by EPA under the Safe Drinking Water Act. Refer to drinking water regulations 40CFR141 or Safe Drinking Water Hotline (1-800-426-4791) for values.

D According to the procedures described in the *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, except possibly where a very sensitive species is important at a site, freshwater aquatic life should be protected if both conditions specified in Appendix C to the Preamble- Calculation of Freshwater Ammonia Criterion are satisfied.

E This criterion has been revised to reflect The Environmental Protection Agency's q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of April 8, 1998. The fish tissue bioconcentration factor (BCF) used to derive the original criterion was retained in each case.

F The derivation of this value is presented in the Red Book (EPA 440/9-76-023, July, 1976).

G This value is based on a 304(a) aquatic life criterion that was derived using the 1985 Guidelines (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, PB85-227049, January 1985) and was issued in one of the following criteria documents: Aluminum (EPA 440/5-86-008); Chloride (EPA 440/5-88-001); Chloropyrifos (EPA 440/5-86-005).

I This value is expressed in terms of total recoverable metal in the water column.

J This value is based on a 304(a) aquatic life criterion that was issued in the *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water* (EPA-820-B-96-001). This value was derived using the GLI Guidelines (60FR15393-15399, March 23, 1995; 40CFR132 Appendix A); the differences between the 1985 Guidelines and the GLI Guidelines are explained on page iv of the 1995 Updates. No decision concerning this criterion was affected by any considerations that are specific to the Great Lakes.

K According to page 181 of the Red Book:

For open ocean waters where the depth is substantially greater than the euphotic zone, the pH should not be changed more than 0.2 units from the naturally occurring variation or any case outside the range of 6.5 to 8.5. For shallow, highly productive coastal and estuarine areas where naturally occurring pH variations approach the lethal limits of some species, changes in pH should be avoided but in any case should not exceed the limits established for fresh water, i.e., 6.5-9.0.

L There are three major reasons why the use of Water-Effect Ratios might be appropriate. (1) The value of 87 μg/l is based on a toxicity test with the striped bass in water with pH= 6.5-6.6 and hardness <10 mg/L. Data in "Aluminum Water-Effect Ratio for the 3M Plant Effluent Discharge, Middleway, West Virginia" (May 1994) indicate that aluminum is substantially less toxic at higher pH and hardness, but the effects of pH and hardness are not well quantified at this time. (2) In tests with the brook trout at low pH and hardness, effects increased with increasing concentrations of total aluminum even though the concentration of dissolved aluminum was constant, indicating that total recoverable is a more appropriate measurement than dissolved, at least when particulate aluminum is primarily aluminum hydroxide particles. In surface waters, however, the total recoverable procedure might measure aluminum associated with clay particles, which might be less toxic than aluminum associated with aluminum hydroxide. (3) EPA is aware of field data indicating that many high quality waters in the U.S. contain more than 87 μg aluminum/L, when either total recoverable or dissolved is measured.

M U.S. EPA. 1973. Water Quality Criteria 1972. EPA-R3-73-033. National Technical Information Service, Springfield, VA.; U.S. EPA. 1977. Temperature Criteria for Freshwater Fish: Protocol and Procedures. EPA-600/3-77-061. National Technical Information Service, Springfield, VA.

N This value was announced (62FR42554, August 7, 1997) as a proposed 304(a) aquatic life criterion. Although EPA has not responded to public comment, EPA is publishing this as a 304(a) criterion in today's notice as guidance for States and Tribes to consider when adopting water quality criteria.

O U.S. EPA. 1986. Ambient Water Quality Criteria for Dissolved Oxygen. EPA 440/5-86-003. National Technical Information Service, Springfield, VA.

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NATIONAL RECOMMENDED WATER QUALITY CRITERIA FOR ORGANOLEPTIC EFFECTS

	Pollutant	CAS Number	Organoleptic Effect Criteria (μg/L)	FR Cite/Source
1	Acenaphthene	83329	20	Gold Book
2	Monochlorobenzene	108907	20	Gold Book
3	3-Chlorophenol	--	0.1	Gold Book
4	4-Chlorophenol	106489	0.1	Gold Book
5	2,3-Dichlorophenol	--	0.04	Gold Book
6	2,5-Dichlorophenol	--	0.5	Gold Book
7	2,6-Dichlorophenol	--	0.2	Gold Book
8	3,4-Dichlorophenol	--	0.3	Gold Book
9	2,4,5-Trichlorophenol	95954	1	Gold Book
10	2,4,6-Trichloropehnol	88062	2	Gold Book
11	2,3,4,6-Tetrachlorophenol	--	1	Gold Book
12	2-Methyl-4-Chlorophenol	--	1800	Gold Book
13	3-Methyl-4-Chlorophenol	59507	3000	Gold Book
14	3-Methyl-6-Chlorophenol	--	20	Gold Book
15	2-Chlorophenol	95578	0.1	Gold Book
16	Copper	7440508	1000	Gold Book
17	2,4-Dichlorophenol	120832	0.3	Gold Book
18	2,4-Dimethylpehnol	105679	400	Gold Book
19	Hexachlorocyclopentadiene	77474	1	Gold Book
20	Nitrobenzene	98953	30	Gold Book

	Pollutant	CAS Number	Organoleptic Effect Criteria (μg/L)	FR Cite/Source
21	Pentachlorophenol	87865	30	Gold Book
22	Phenol	108952	300	Gold Book
23	Zinc	7440666	5000	45 FR79341

General Notes:

1. These criteria are based on organoleptic (taste and odor) effects. Because of variations in chemical nomenclature systems, this listing of pollutants does not duplicate the listing in Appendix A of 40 CFR Part 423. Also listed are the Chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

NATIONAL RECOMMENDED WATER QUALITY CRITERIA

Additional Notes:

1. Criteria Maximum Concentration and Criterion Continuous Concentration

The Criteria Maximum Concentration (CMC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an unacceptable effect. The Criterion Continuous Concentration (CCC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect. The CMC and CCC are just two of the six parts of a aquatic life criterion; the other four parts are the acute averaging period, chronic averaging period, acute frequency of allowed exceedence, and chronic frequency of allowed exceedence. Because 304(a) aquatic life criteria are national guidance, they are intended to be protective of the vast majority of the aquatic communities in the United States.

2. Criteria Recommendations for Priority Pollutants, Non Priority Pollutants and Organoleptic Effects

This compilation lists all priority toxic pollutants and some non priority toxic pollutants, and both human health effect and organoleptic effect criteria issued pursuant to CWA §304(a). Blank spaces indicate that EPA has no CWA §304(a) criteria recommendations. For a number of non-priority toxic pollutants not listed, CWA §304(a) "water + organism" human health criteria are not available, but, EPA has published MCLs under the SDWA that may be used in establishing water quality standards to protect water supply designated uses. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in Appendix A of 40 CFR Part 423. Also listed are the Chemical Abstracts Service CAS registry numbers, which provide a unique identification for each chemical.

3. Human Health Risk

The human health criteria for the priority and non priority pollutants are based on carcinogenicity of 10^{-6} risk. Alternate risk levels may be obtained by moving the decimal point (e.g., for a risk level of 10^{-5}, move the decimal point in the recommended criterion one place to the right).

4. Water Quality Criteria published pursuant to Section 304(a) or Section 303(c) of the CWA

Many of the values in the compilation were published in the proposed California Toxics Rule (CTR, 62FR42160). Although such values were published pursuant to Section 303(c) of the CWA, they represent the Agency's most recent calculation of water quality criteria and thus are published today as the Agency's 304(a) criteria. Water quality criteria published in the proposed CTR may be revised when EPA takes final action on the CTR.

5. Calculation of Dissolved Metals Criteria

The 304(a) criteria for metals, shown as dissolved metals, are calculated in one of two ways. For freshwater metals criteria that are hardness-dependent, the dissolved metal criteria were calculated using a hardness of 100 mg/l as $CaCO_3$ for illustrative purposes only. Saltwater and freshwater metals' criteria that are not hardness-dependent are calculated by multiplying the total recoverable criteria before rounding by the appropriate conversion factors. The final dissolved metals' criteria in the table are rounded to two significant figures. Information regarding the calculation of hardness dependent conversion factors are included in the footnotes.

6. Correction of Chemical Abstract Services Number

The Chemical Abstract Services number (CAS) for Bis(2-Chloroisoprpyl) Ether, has been corrected in the table. The correct CAS number for this chemical is 39638-32-9. Previous publications listed 108-60-1 as the CAS number for this chemical.

7. Maximum Contaminant Levels

The compilation includes footnotes for pollutants with Maximum Contaminant Levels (MCLs) more stringent than the recommended water quality criteria in the compilation. MCLs for these pollutants are not included in the compilation, but can be found in the appropriate drinking water regulations (40 CFR 141.11-16 and 141.60-63), or can be accessed through the Safe Drinking Water Hotline (800-426-4791) or the Internet (http://www.epa.gov/ost/tools/dwstds-s.html).

8. Organoleptic Effects

The compilation contains 304(a) criteria for pollutants with toxicity-based criteria as well as non-toxicity based criteria. The basis for the non-toxicity based criteria are organoleptic effects (e.g., taste and odor) which would make water and edible aquatic life unpalatable but not toxic to humans. The table includes criteria for organoleptic effects for 23 pollutants. Pollutants with organoleptic effect criteria more stringent than the criteria based on toxicity (e.g., included in both the priority and non-priority pollutant tables) are footnoted as such.

9. Category Criteria

In the 1980 criteria documents, certain recommended water quality criteria were published for categories of pollutants rather than for individual pollutants within that category. Subsequently, in a series of separate actions, the Agency derived criteria for specific pollutants within a category. Therefore, in this compilation EPA is replacing criteria representing categories with individual pollutant criteria (e.g., 1,3-dichlorobenzene, 1,4-dichlorobenzene and 1,2-dichlorobenzene).

10. Specific Chemical Calculations

A. Selenium

(1) Human Health

In the 1980 Selenium document, a criterion for the protection of human health from consumption of water and organisms was calculated based on a BCF of 6.0 L/kg and a maximum water-related contribution of 35 μg Se/day. Subsequently, the EPA Office of Health and Environmental Assessment issued an errata notice (February 23, 1982), revising the BCF for selenium to 4.8 L/kg. In 1988, EPA issued an addendum (ECAO-CIN-668) revising the human health criteria for selenium. Later in the final National Toxic Rule (NTR, 57 FR 60848), EPA withdrew previously published selenium human health criteria, pending Agency review of new epidemiological data.

This compilation includes human health criteria for selenium, calculated using a BCF of 4.8 L/kg along with the current IRIS RfD of 0.005 mg/kg/day. EPA included these recommended water quality criteria in the compilation because the data necessary for calculating a criteria in accordance with EPA's 1980 human health methodology are available.

(2) Aquatic Life

This compilation contains aquatic life criteria for selenium that are the same as those published in the proposed CTR. In the CTR, EPA proposed an acute criterion for selenium based on the criterion proposed for selenium in the Water Quality Guidance for the Great Lakes System (61 FR 58444). The GLI and CTR proposals take into account data showing that selenium's two most prevalent oxidation states, selenite and selenate, present differing potentials for aquatic toxicity, as well as new data indicating that various forms of selenium are additive. The new approach produces a different selenium acute criterion concentration, or CMC, depending upon the relative proportions of selenite, selenate, and other forms of selenium that are present.

EPA notes it is currently undertaking a reassessment of selenium, and expects the 304(a) criteria for selenium will be revised based on the final reassessment (63FR26186). However, until such time as revised water quality criteria for selenium are published by the Agency, the recommended water quality criteria in this compilation are EPA's current 304(a) criteria.

B. 1,2,4-Trichlorobenzene and Zinc

Human health criteria for 1,2,4-trichlorobenzene and zinc have not been previously published. Sufficient information is now available for calculating water quality criteria for the protection of human health from the consumption of aquatic organisms and the consumption of aquatic organisms and water for both these compounds. Therefore, EPA is publishing criteria for these pollutants in this compilation.

C. Chromium (III)

The recommended aquatic life water quality criteria for chromium (III) included in the compilation are based on the values presented in the document titled: *1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water*, however, this document contains criteria based on the total recoverable fraction. The chromium (III) criteria in this compilation were calculated by applying the conversion factors used in the Final Water Quality Guidance for the Great Lakes System (60 FR 15366) to the 1995 Update document values.

D. Ether, Bis (Chloromethyl), Pentachlorobenzene, Tetrachlorobenzene 1,2,4,5-, Trichlorphenol

Human health criteria for these pollutants were last published in EPA's *Quality Criteria for Water 1986* or "Gold Book". Some of these criteria were calculated using Acceptable Daily Intake (ADIs) rather than RfDs. Updated q1*s and RfDs are now available in IRIS for ether, bis (chloromethyl), pentachlorobenzene, tetrachlorobenzene 1,2,4,5-, and trichlorophenol, and were used to revise the water quality criteria for these compounds. The recommended water quality criteria for ether, bis (chloromethyl) were revised using an updated q1*, while criteria for pentachlorobenzene, and tetrachlorobenzene 1,2,4,5-, and trichlorophenol were derived using an updated RfD value.

E. PCBs

In this compilation EPA is publishing aquatic life and human health criteria based on total PCBs rather than individual arochlors. These criteria replace the previous criteria for the seven individual arochlors. Thus, there are criteria for a total of 102 of the 126 priority pollutants.

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Appendix A - Conversion Factors for Dissolved Metals

Metal	Conversion Factor freshwater CMC	Conversion Factor freshwater CCC	Conversion Factor saltwater CMC	Conversion Factor saltwater CCC[1]
Arsenic	1.000	1.000	1.000	1.000
Cadmium	1.136672-[(ln hardness)(0.041838)]	1.101672-[(ln hardness)(0.041838)]	0.994	0.994
Chromium III	0.316	0.860	--	--
Chromium VI	0.982	0.962	0.993	0.993
Copper	0.960	0.960	0.83	0.83
Lead	1.46203-[(ln hardness)(0.145712)]	1.46203-[(ln hardness)(0.145712)]	0.951	0.951
Mercury	0.85	0.85	0.85	0.85
Nickel	0.998	0.997	0.990	0.990
Selenium	--	--	0.998	0.998
Silver	0.85	--	0.85	--
Zinc	0.978	0.986	0.946	0.946

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Appendix B - Parameters for Calculating Freshwater Dissolved Metals Criteria That Are Hardness-Dependent

Chemical	m_A	b_A	m_C	b_C	Freshwater Conversion Factors (CF)	
					Acute	Chronic
Cadmium	1.128	-3.6867	0.7852	-2.715	1.136672-[ln (hardness)(0.041838)]	1.101672-[ln (hardness)(0.041838)]
Chromium III	0.8190	3.7256	0.8190	0.6848	0.316	0.860
Copper	0.9422	-1.700	0.8545	-1.702	0.960	0.960
Lead	1.273	-1.460	1.273	-4.705	1.46203-[ln (hardness)(0.145712)]	1.46203-[ln (hardness)(0.145712)]
Nickel	0.8460	2.255	0.8460	0.0584	0.998	0.997
Silver	1.72	-6.52	--	--	0.85	--
Zinc	0.8473	0.884	0.8473	0.884	0.978	0.986

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Appendix C - Calculation of Freshwater Ammonia Criterion

1. The one-hour average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CMC calculated using the following equation:

$$CMC = \frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$$

In situations where salmonids do not occur, the CMC may be calculated using the following equation:

$$CMC = \frac{0.411}{1 + 10^{7.204-pH}} + \frac{58.4}{1 + 10^{pH-7.204}}$$

2. The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CCC calculated using the following equation:

$$CCC = \frac{0.0858}{1 + 10^{7.688-pH}} + \frac{3.70}{1 + 10^{pH-7.688}}$$

and the highest four-day average within the 30-day period does not exceed twice the CCC.

APPENDIX E.5

TOXICOLOGICAL PROFILES FOR CHEMICALS OF CONCERN

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E.5.1 ALUMINUM

E.5.1.1 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 (USEPA, 1999a).

E.5.1.2 Carcinogenicity

Data were not located regarding the carcinogenicity of aluminum to humans. No oral or inhalation cancer slope factor is available for aluminum.

H.5.2 ANTIMONY

H.5.2.1 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, bones, 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.

H.5.2.2 Noncancer Toxicity

Acute intoxication from ingestion of large doses of antimony induces GI disturbances, dehydration, and cardiac effects in human (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 Friber 1986a).

Chronic oral exposure studies in laboratory animals include two briefly reported lifetime drinking water studies in rates and mice (Kanisawa and Schroeder 1960; 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 rats. The EPA (1999bb) 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 (Schrodeder 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.

H.5.2.2 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 1986a). Antimony is classified in EPA cancer weight-of-evidence Group D (not classifiable as a carcinogenicity to humans) (EPA 1999bb).

E.5.3 ARSENIC

E.5.3.1 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, flowed by redistribution to hair, nails, teeth, bone, and skin, which are considered tissues of accumulation. Arsenic has a long 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.

E.5.3.2 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 1999b). 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 (1999b) derived an RfD of 0.3 ug/kg/day for chronic oral exposure, based on an NOAEL of 0.8 ug/kg/day for skin lesions from 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).

E.5.3.3 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 (EPA 1999b). Oral exposure to high levels in well water is associated with increased risk of skin cancer (Tseng 1977; EPA 1999b). 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 (1999b) classifies inorganic arsenic in cancer weight-of-evidence Group A (human carcinogen), and recommends an oral unit risk of 0.00005 ug/L in drinking water, based on the incidence of skin cancer in the Tseng (1977) study. The EPA presents a chronic oral slope factor of 1.5 per mg/kg/day based on the same information. The EPA (1999b) 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 in 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 1999b), equivalent to 15.1 per mg/kg/day, was derived from the same data assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg for humans.

E.5.4 BARIUM

E.5.4.1 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 (1999b) 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 (1999b) presented the same value as a provisional RfD for subchronic oral exposure. A provisional chronic inhalation RfC of 0.0005 mg/m^3 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 1999b). 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 m^3/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.

E.5.4.2 Carcinogenicity

The EPA (1999b) 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.

E.5.5 BENZO(A)ANTHRACENE

E.5.5.1 Noncancer Toxicity

The oral and inhalation RfD and RfC are not available at this time (EPA 1999b).

E.5.5.2 Carcinogenicity

Benzo(a)anthracene has a weight of evidence classification of B2, a probable human carcinogen. The classification was based on sufficient data from animal bioassays. Benzo(a)anthracene produced tumors in mice exposed by gavage; intraperitoneal, subcutaneous or intramuscular injection; and topical application. Benzo(a)anthracene produced mutations in bacteria and in mammalian cells, and transformed mammalian cells in culture.

Although there are no human data that specifically link exposure to benzo(a)anthracene to human cancers, benzo(a)anthracene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions and cigarette smoke (U.S. EPA, 1984, 1990; IARC, 1984; Lee et al., 1976; Brockhaus and Tomingas, 1976).

Benzo(a)anthracene administration caused an increase in the incidence of tumors by gavage (Klein, 1963); dermal application (IARC, 1973); and both subcutaneous injection (Steiner and Faulk, 1951; Steiner and Edgecomb, 1952) and intraperitoneal injection (Wislocki et al., 1986) assays. A group of male mice was exposed to gavage solutions containing 3% benzo(a)anthracene for 5 weeks. There was an increased incidence of pulmonary adenomas and hepatomas.

The currently used Oral Slope Factor (CSF) for Benzo(a)anthracene is 0.73 per (mg/kg)/day which is extrapolated from the CSF for Benzo(a)pyrene (BaP), i.e., 0.1 x 7.3 (BaP) = 0.73 per (mg/kg)/day (USEPA Region III Risk-Based Concentration Table, 4/12/99).

The inhalation CSF is not available.

E.5.6 BENZO(A)PYRENE (BAP)

E.5.6.1 Pharmacokinetics

Benzo(a)pyrene was readily absorbed across the GI (Rees et al. 1971) and respiratory epithelia (Kotin et al. 1969; Vainich et al. 1976). 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).

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.

Excretion of benzo(a)pyrene residue 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.

E.5.6.2 Noncancer Toxicity

The oral RfD and inhalation RfC are not available at this time.

E.5.6.3 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. 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, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were classified in Group B2 (probable human carcinogens).

The EPA (1999b) 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 (1980) 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.

Human data specifically linking benzo(a)pyrene (BAP) to a carcinogenic effect are lacking. There are, however, multiple animal studies in many species demonstrating BAP to be carcinogenic following administration by numerous routes. In addition, BAP has produced positive results in numerous genotoxicity assays.

The data for animal carcinogenicity was sufficient. The animal data consist of dietary, gavage, inhalation, intratracheal instillation, dermal and subcutaneous studies in numerous strains of at least four species of rodents and several primates. Repeated BAP administration has been associated with increased incidences of total tumors and of tumors at the site of exposure. The tumor types in mice from oral diet studies include forestomach, squamous cell papillomas and carcinomas (Neal and Rigdon 1967).

Benzo(a)pyrene has been shown to cause genotoxic effects in a broad range of prokaryotic and mammalian cell assay systems (EPA 1991a).

The oral slope factor presented in IRIS is 7.3 per mg/kg/day The cancer slope factor for inhalation is not available.

E.5.7 BENZO(B)FLUORANTHENE

E.5.7.1 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.

E.5.7.2 Carcinogenicity

The EPA (1999b) 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. The currently used Oral Slope Factor (CSF) for benzo(b)fluoranthene is 0.73 per (mg/kg)/day which is extrapolated from the CSF for Benzo(a)pyrene (BaP), i.e., 0.1 x 7.3 (BaP) = 0.73 per (mg/kg)/day (USEPA Region III Risk-Based Concentration Table, 10/1/98).

E.5.8 BIS(2-ETHYLHEXYL)PHTHALATE (DI[2-ETHYLHEXYL]PHTHALATE)

E.5.8.1 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 testament) 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 (1999b) presented a verified chronic oral RfD of 0.02 mg/kg/day based on an LOAEL for increased relative liver weight in guinea pings and an uncertainty factor of 1000. The EPA (1999b) 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.

E.5.8.2 Carcinogenicity

The EPA (1999b) classifies bis(2-ethylhexyl)phthalate in cancer weight-of evidence Group B2 (probable human carcinogen), based on inadequate human cancer date (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. An inhalation slop factor of 0.014 per mg/kg/day was presented by EPA (1999b).

E.5.9 CADMIUM

H.5.9.1 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 ion 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 to normal humans exposed to small amounts. Urinary excretion increases markedly in humans with cadmium-induced renal disease.

H.5.9.2 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 (1999bb) derived chronic oral RfD values of 05. ug/kg/day for cadmium ingested in water and 1 ug/kg/day for cadmium ingested in food, based on a toxicokinetic model that predicted NOAELs from renal cortical concentration of cadmium. The different RfD values reflect assumed differences in GI absorption of cadmium from water 95 percent) and food (2.5 percent).

H.5.9.3 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 parental injection studies that produced injection site tumors. No evidence of carcinogenicity, however, was observed in seven oral studies in rats and mice. The EPA (1999bb) 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. An inhalation unit risk of 0.0018 mg/m^3, equivalent to 6.3 per mg/kg/day, was derived from the occupational exposure study by Thun et al. (1985) assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg for humans.

E.5.10 CHLOROFORM

E.5.10.1 Noncancer Toxicity

Oral or inhalation exposure of animals to chloroform was associated with liver and kidney damage (ACGIH 1991; EPA 1999b). In humans, acute inhalation exposure to high levels induced narcosis, ventricular fibrillation, and death (ACGIH 1991). Limited occupational data associated chronic exposure to chloroform with CNS depression, digestive disturbances, and enlarged livers. The EPA (1999b) presented a verified chronic oral RfD of 0.01 mg/kg/day based on an LOAEL for fatty cyst formation in the livers of dogs treated orally for 7.5 years and an uncertainty factor of 1000. The same value was presented as a provisional subchronic oral RfD (EPA 1999b). The EPA (1999b) presented an inhalation RfD of 0.086 ug/kg/day. Target organs for the toxicity of chloroform include the liver and kidney for oral and inhalation exposure, and the heart and CNS for inhalation exposure.

E.5.10.2 Carcinogenicity

Chloroform is classified as a cancer weight-of-evidence group B2 compound (probable human carcinogen), based on increased incidence of several tumor types in rats and liver tumors in mice (EPA 1999b). Human carcinogenicity data are inadequate. An oral slope factor of 0.0061 per mg/kg/day was derived from the incidence of kidney tumors in rats treated with chloroform in drinking water for two years. An inhalation unit risk of 2.3E-05 per mg/m^3 was based on the incidence of hepatocellular carcinomas in mice treated by gavage for 78 weeks. The inhalation unit risk is equivalent to 0.081 per mg/kg/day, assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg for humans.

E.5.11 CHROMIUM

E.5.11.1 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 5% chromium (III)/kg/day in the diet for over two years (EPA 1999b). The NOEL of 5% Cr_2O_3 was the basis for a verified chronic oral RfD of 1.5 mg/kg/day (EPA 1999b). The same NOEL and an uncertainty factor of 1000 were the basis for a provisional subchronic oral RfD of 1.5 mg/kg/day (EPA 1999b).

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 0.003 mg/kg/day for chronic oral exposure (EPA 1999b).

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. An inhalation RfD of 0.03 ug/kg/day was presented for chromium (VI) by EPA (1999b).

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.

E.5.11.2 Carcinogenicity

Data were not located regarding the carcinogenicity of chromium (III). The EPA (1999b) 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 mg/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.

E.5.12 CHRYSENE

E.5.12.1 Noncancer Toxicity

Chrysene is absorbed by the oral route of exposure. Absorption may also occur following dermal exposure. Data are not available to determine whether chrysene is absorbed via the lungs. Absorbed chrysene is distributed to several tissues, i.e. it was found in a all five tissues in a study reported in 1983. It is accumulated preferentially in the adipose and mammary tissue.

There is no information on other toxic effects of chrysene in human and laboratory animals following inhalation, oral and dermal exposures. (ATSDR 1987, draft).

E.5.12.2 Carcinogenicity

The EPA (1999b) has classified chrysene 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 and malignant lymphoma in mice and chromosomal abnormalities in hamsters. The currently used Oral Slope Factor (CSF) for chrysene is 0.0073 per (mg/kg)/day which is extrapolated from the CSF for Benzo(a)pyrene (BaP), i.e., 0.001 x 7.3 (BaP) = 0.0073 per (mg/kg)/day (USEPA Region III Risk-Based Concentration Table, 4/12/99).

E.5.13 DIBENZO(A,H)ANTHRACENE

E.5.13.1 Noncancer Toxicity

The oral RfD and inhalation RfC are not available.

E.5.13.2 Carcinogenicity

The EPA (1999b) has classified dibenzo(a,h)anthracene in cancer weight-of-evidence group B2 (Probable Human Carcinogen, sufficient evidence of carcinogenicity in animals). Based on carcinomas in mice following oral or dermal exposure and injection site tumors in several species following subcutaneous or intramuscular administration. Dibenzo[a,h]anthracene has induced DNA damage and gene mutations in bacteria as well as gene mutations and transformation in several types of mammalian cell cultures.

Although there are no human data that specifically link exposure to dibenzo[a,h]anthracene with human cancers, dibenzo(a)anthracene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions and cigarette smoke (EPA, 1984, 1990; IARC, 1984).

Dibenzo[a,h]anthracene has been shown to be carcinogenic when administered to mice by the oral route (Snell and Stewart, 1962, 1963) in a water-olive oil emulsion. Mice developed pulmonary adenomas, pulmonary carcinomas, and mammary carcinomas.

Dibenzo[a,h]anthracene has produced positive results in bacterial DNA damage and mutagenicity assays and in mammalian cell DNA damage, mutagenicity and cell transformation assays.

The currently used Oral Slope Factor (CSF) for Dibenzo[a,h]anthracene is 7.3 per (mg/kg)/day which is extrapolated from the CSF for Benzo(a)pyrene i.e., 1.0 x 7.3 (BaP) = 7.3 per (mg/kg)/day) (USEPA Region III Risk-Based Concentration Table, 4/12/99).

The inhalation Cancer Slope Factor for dibenzo(a,h)anthracene is not available.

E.5.14 DDD, DDE, DDT

E.5.14.1 Pharmacokinetics

Dichlorodiphenyltrichlorothane (DDT) is readily absorbed when dissolved in oils, fats, or lipid solvents, but is poorly absorbed as dry powder or aqueous suspension. Once absorbed, DDT concentrates in adipose tissue. Storage in fat is protective because it decreases the amount of chemicals at the site of toxic action, the brain. At a constant rate of intake, concentrations in adipose tissue reach a steady state and remain relatively constant. When exposure ceases, DDT is slowly eliminated.

After absorption in mammals, DDT degrades by dehydrochlorination to unsaturated DDE and by substitution of hydrogen for one chlorine atom yielding DDD. DDD is further metabolized through a series of intermediates yielding DDA. DDA is relatively water soluble and excreted primarily in the urine. Ingestion studies of DDT administered to volunteers demonstrated that within 24 hours, urinary DDA excretion increased detectably. Excretion of DDT as DDA appeared to be totally dependent on preferential reductive dechlorination of DDT to DDD (rather than DDE) and then to DDA (Clayton 1981).

E.5.14.2 Noncancer Toxicity

The CNS is an important target organ in humans acutely exposed to DDT. Symptoms include altered sensory perception, headache, nausea, disequilibrium, confusion, tremors, and convulsions (ATSDR 1989). Tremors and hyperirritability were observed in chronically exposed animals (NCI 1978; Rossi et al. 1977). The liver appears to be the other important target organ, at least in animals. Liver effects include enzyme induction, increased liver weight, increased serum levels of liver enzymes, hepatocellular hypertrophy, and necrosis (ATSDR 1989). The EPA (1999b) derived an RfD of 0.5 ug/kg/day for chronic oral exposure from an NOEL of 0.05 mg/kg/day for liver effects in a 15- to 27-week feeding study in rats (Laug et al. 1950). An uncertainty factor of 100 was applied with factors of 10 each for inter- and intraspecies variation.

Dermal exposure has been associated with no illness and usually no irritation. Subcutaneous injection of colloidal suspensions of DDT in saline up to 30 ppm caused no irritation. Studies of DDT-impregnated clothing have found it to cause no irritation (Hayes 1982). The earliest symptom of acute DDT poisoning is paresthesia of the mouth and lower part of the face. This is followed by paresthesia of same areas and of the tongue and then dizziness, and tremors of extremities, confusion, malaise, headache, fatigue, and delayed vomiting. Vomiting is probably of central origin and not due to local irritation. Convulsions occur only in severe poisoning. Onset may be as soon as 30 minutes after ingestion of a large dose or as late as six hours after smaller but still-toxic doses. Recovery from mild poisoning usually is essentially complete in 24 hours, but recovery from severe poisoning requires several days (Hayes 1982).

There is no documented evidence that dietary absorption of DDT, alone or in combination with insecticides of the aldrin-toxaphene group, has caused cancer in the general population. No evidence has been presented that DDT has caused cancer among the millions of individuals (almost entirely men) who have been handling or spraying DDT (as dust, solution, and suspension) in all parts of the world and under all possible climatic conditions.

DDT is a mixture of p,p'-DDT and related compounds. One of the more important of the DDT isomers is o,p'-DDT. These agents have prominent estrogenic effects that have been well-characterized in a number of assay systems (Johnson, et al. 1988). The estrogenicity of DDT has lead to the supposition that it may adversely affect reproductive outcome by causing birth defects, increasing pregnancy complications, or affecting fertility (RTC 1990).

A verified chronic oral RfD value of 0.0005 mg/kg/day (EPA 1999b) was based on a NOEL of 0.05 mg/kg/day in a 27-week rat feeding study and on an uncertainty factor of 100.

E.5.14.3 Carcinogenicity

The EPA (1999b) has classified DDT in cancer weight-of-evidence Group B 2 (probable human carcinogen) based on the observation of tumors (generally of the liver) in seven studies in various mouse strains and in three studies in rats. The EPA (1993a) derived an oral slope factor of 3.4×10^{-1} per mg/kg/day for DDT and DDE from liver tumors in oral (diet) studies in the mouse and the rat. (The oral slope-factor suggested 4,4'-DDD is 2.4×10^{-1} per mg/kg/day). An inhalation unit risk of 9.7×10^{-5} per mg/m^3, equivalent to 0.34 per mg/kg/day (assuming a 70 kg adult inhales 20 m^3 of air/day), was derived for DDT from the same oral (diet) studies.

E.5.15 ALPHA-, BETA-, AND GAMMA-HEXACHLOROCYCLOHEXANES (HCH)

E.5.15.1 Pharmacokinetics

The alpha and gamma isomers of hexachlorocyclohexane (HCH) have all been shown to cause liver tumors in rats and mice. HCH has not been thoroughly tested for genotoxic effects but does not appear to be mutagenic. The alpha, beta, and delta isomers have not been tested for their teratogenic or reproductive toxicological potential. Lindane (gamma-HCH) has been tested and was not teratogenic, but in two studies it decreased the number of live young produced. Lindane has been associated with the development of aplastic anemia in humans.

E.5.15.2 Non-carcinogenic Toxicity

No data are available for alpha-HCH regarding and oral RfD or an inhalation RfC (EPA, 1999)

Twenty male and 20 female Wistar KFM-Han (outbred) SPF rats/treatment group were administered 0, 0.2, 0.8, 4, 20, or 100 ppm lindane (99.85%) in the diet. After 12 weeks, 15 animals/sex/group were sacrificed. The remaining rats were fed the control diet for an additional 6 weeks before sacrifice. No treatment-related effects were noted on mortality, hematology, clinical chemistry, or urinalysis. Rats receiving 20 and 100 ppm lindane were observed to have greater-than-control incidence of the following: liver hypertrophy, kidney tubular degeneration, hyaline droplets, tubular distension, interstitial nephritis, and basophilic tubules. Since these effects were mild or rare in animals receiving 4 ppm, this represents a NOAEL. The reviewers of the study calculated the dose to be 0.29 mg/kg/day for males and 0.33 mg/kg/day for females, based on measured food intake. In a 2-year feeding study (Fitzhugh, 1950), 10 Wistar rats/sex/group were exposed to 5, 10, 50, 100, 400, 800, or 1600 ppm lindane. Slight liver and kidney damage and increased liver weights were noted at the 100 ppm level. If a food intake equal to 5% body weight is assumed, a NOAEL of 2.5 mg/kg bw/day (50 ppm) can be determined from this assay. In a 2-year bioassay (Rivett et al., 1978), four beagle dogs/sex/group were administered 0, 25, 50, or 100 ppm lindane in the diet. Treatment-related effects noted in the animals of the 100 ppm group were increased serum alkaline phosphatase and enlarged dark friable livers. A NOAEL was determined to be 50 ppm (1.6 mg/kg bw/day). EPA (1999) presented an oral RfD of 3E-04 mg/kg/day for gamma-HCH based on liver and kidney toxicity observed in rats.

E.5.15.3 Carcinogenicity

Alpha-HCH is classified as a cancer weight-of-evidence Group B2 compound (probable human carcinogen), based on increased incidence of liver tumors in rats and mice (EPA 1999). Human carcinogenicity data are inadequate. An oral slope factor of 6.3 per mg/kg/day (EPA 1999) was derived from the incidence of liver tumors in rats and mice fed alpha-HCH. An inhalation unit risk of 1.8E-03 per ug/m^3 was based on the incidence of hepatocellular carcinomas in rats. The inhalation unit risk is equivalent to 6.3 per mg/kg/day (EPA 1999), assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg for humans.

Gamma-HCH has a oral slope factor (EPA, 1999) of 1.3 (mg/kf/day)$^{-1}$ based on increased incidence of liver tumors in mice (via gavage) (EPA 1999).

E.5.16 INDENO(1,2,3-CD)PYRENE

E.5.16.1 Noncancer Toxicity

The chronic oral RfD and chronic inhalation RfC are not available.

E.5.16.2 Carcinogenicity

EPA classifies indeno(1,2,3-cd)pyrene as cancer weight-of-evidence B2, probable human carcinogen, based on sufficient data from animal bioassays. Indeno(1,2,3-cd)pyrene produced tumors in mice following lung implants, subcutaneous injection and dermal exposure. Indeno(1,2,3-cd)pyrene tested positive in bacterial gene mutation assays.

Although there are no human data that specifically link exposure to indeno(1,2,3-cd)pyrene to human cancers, indeno(1,2,3-cd)pyrene is a component of mixtures that have been associated with human cancer. These include coal tar, soot, coke oven emissions and cigarette smoke (EPA, 1984, 1990; IARC, 1984).

In animal carcinogen bioassays indeno(1,2,3-cd)pyrene exposure resulted in increased incidences of epidermoid carcinomas in a lung implantation study (Deutsch-Wenzel et al., 1983), injection site sarcomas in a subcutaneous injection assay (Lacassagne et al., 1963) and skin tumors in dermal application studies (Hoffman and Wynder, 1966; Rice et al., 1985a, 1986).

Supporting data for carcinogenicity includes genotoxicity studies. Indeno(1,2,3-cd)pyrene produced positive results in mutation assays in Salmonella typhimurium strains (LaVoie et al., 1979; Hermann et al., 1980; Rice et al., 1985b).

The currently used Oral Slope Factor (CSF) for Indeno(1,2,3-cd)pyrene is 7.3E-01 per (mg/kg)/day which is extrapolated from the CSF for Benzo(a)pyrene (BaP), i.e., 0.1 x 7.3 (BaP) = 7.3E-01 per (mg/kg)/day (USEPA Region III Risk-Based Concentration Table, 4/12/99).

An inhalation cancer slope factor is not available.

E.5.17 IRON

E.5.17.1 Noncancer Toxicity

Iron is moderately toxic through ingestion and inhalation of iron dusts and powders. Inhalation may be irritating to the respiratory tract. The inhalation of large amounts of iron dust results in iron pneumoconiosis (arc welders lung) (Sax and Lewis, 1989). Chronic inhalation can produce mottling (spotting) of lungs (siderosis). Ingestion of greater than 50 to 100 mg of iron per day may result in pathological iron deposition in body tissues the symptoms of which are fibrosis of the pancreas, diabetes mellitus, and liver cirrhosis. Eye contact may cause conjunctivitis. The LD_{LO} intraperitoneal for rabbits is 20 mg/kg with no toxic effect observed. The ACGIH (1991) TLV for iron oxide fumes is 5 mg/m^3. EPA (1999a) presents an oral RfD for iron of 0.3 mg/kg/day.

E.5.17.2 Carcinogenicity

IARC, NTP, and OSHA do not list iron as a carcinogen although the mining of one particular ore, hematite, may be associated with an increased risk of lung cancer in miners. No other iron ores are identified specifically as a carcinogen (Sax and Lewis, 1989).

E.5.18 LEAD

E.5.18.1 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, 1999b). 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, 1999b). Excretion of absorbed lead is principally through the urine, although GI secretion, biliary excretion, and loss through hair, nails, and sweat are also significant.

E.5.18.2 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 (1999b) 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.

E.5.18.3 Carcinogenicity

USEPA (1999b) 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 (1999b) 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).

E.5.19 MANGANESE

E.5.19.1 Noncancer Toxicity

Manganese is nutritionally required in humans for normal growth and health (EPA, 1999b). 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 an increased incidence of pneumonia (ACGIH, 1991).

EPA presented the oral RfD for manganese of 0.02 mg/kg/day (EPA, 1999b) based on drinking water. The EPA (1999b) presented a verified chronic inhalation RfC based on a LOAEL for impairment of neurobehaviorial function in occupationally exposed humans. The inhalation RfC is equivalent to 0.0143 ug/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.

E.5.19.2 Carcinogenicity

The EPA (1999b) classifies manganese in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans). Quantitative cancer risk estimates are not derived from Group D chemicals.

E.5.21 PHENANTHRENE

E.5.21.1 Noncancer Toxicity

Phenanthrene is a poison by intravenous route. It is moderately toxic by ingestion. It is a human skin photosensitizer (Sax and Lewis, 1989).

E.5.21.2 Carcinogenicity

Phenanthrene is an experimental neoplastigen and tumorigen by skin contact. (Sax and Lewis, 1989). The EPA (1999bb) has classified phenanthrene in cancer weight-of-evidence Group D (Not classifiable as to Human Carcinogenicity, i.e. inadequate or no evidence).

E.5.20 POLYAROMATIC HYDROCARBONS

PAHs are a large class of ubiquitous natural and anthropogenic chemicals, all with similar chemical structures (ATSDR 1990).

E.5.20.1 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.

E.5.20.2 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.

E.5.20.3 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).

E.5.22 THALLIUM

E.5.22.1 Noncancer Toxicity

Thallium is highly toxic; acute ingestion by humans or laboratory animals induced gastroenteritis, neurological dysfunction, and renal and liver damage (Kazantzis, 1986). Chronic ingestion of more moderate doses characteristically caused alopecia. Thallium was used medicinally to induce alopecia in cases of ringworm of the scalp, sometimes with disastrous results. In industrial (inhalation, oral, dermal) exposure, neurologic signs preceded alopecia, suggesting that the nervous system is more sensitive than the hair follicle. The EPA (1999b) presented verified chronic oral RfD values for several thallium compounds (thallium acetate, thallium acetate, thallium carbonate, thallium chloride, thallium nitrate, thallium sulfate, and thallic oxide) based on increased incidence of alopecia and increased serum levels of liver enzymes indicative of hepatocellular damage in rats treated with thallium sulfate for 90 days. EPA (1999b) presented a chronic oral RfD for thallium of 0.07 mg/kg/day.

E.5.22.2 Carcinogenicity

Thallium was classified as a cancer weight-of-evidence Group D substance (not classifiable as to carcinogenicity to humans) (EPA, 1999b).

E.5.23 VANADIUM

E.5.23.1 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 of 5 ppm in rats in a lifetime drinking water study with vanadyl sulfate and an uncertainty factor of 100 (EPA 1999b). A target organ could not be identified for oral exposure. The respiratory tract is the target organ for inhalation exposure.

E.5.23.2 Carcinogenicity

No information was located regarding the carcinogenicity of vanadium.

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APPENDIX F

ECOLOGICAL RISK ASSESSMENT SUPPORT

F-1 TABLES F-1 AND F-2 BIOACCUMULATION, BIOCONCENTRATION, AND BSAF
F-2 TOXICITY PROFILES FOR ECOLOGICAL COPCs
F-3 FOOD CHAIN MODELING CALCULATIONS
F-4 TECHNICAL MEMORANDUM
F-5 REFERENCES
F-6 REPRESENTATIVE RECEPTORS
F-7 STEP 3A TABLES

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TABLES F-1 AND F-2 BIOACCUMULATION, BIOCONCENTRATION, AND BSAF

TABLE F-1

BIOACCUMULATION FACTORS
SITE 1 AND SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA
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Chemical	Bioaccumulation Factor[a]					
	Terrestrial Invertebrate	Invertebrate Source	Terrestrial Plant	Plant Source	Mammal	Mammal Source
Semivolatile Organic Compounds						
1,2,4-Trichlorobenzene	NA		NA		NA	
2-Methylnaphthalene	0.1047[b]	Beyer, 1990	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Benzo(a)anthracene	0.025	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Benzo(a)pyrene	0.0684	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Benzo(b)fluoranthene	0.0638	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Benzo(g,h,i)perylene	0.0489	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Benzo(k)fluoranthene	0.0507	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Bis(2-Ethylhexyl)phthalate	NA		0.033[c]	Travis & Arms, 1988	0.15[d]	Travis & Arms, 1998
Butylbenzylphthalate	NA		0.033[c]	Travis & Arms, 1988	0.15[d]	Travis & Arms, 1998
Carbazole	0.1047[b]		0.052[c]	Travis & Arms, 1988	0.15[d]	Travis & Arms, 1998
Chrysene	0.035	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Dibenzofuran	NA		0.033[c]	Travis & Arms, 1988	0.15[d]	Travis & Arms, 1998
Di-n-octyl phthalate	NA		NA		NA	
Fluoranthene	0.0158	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Indeno(1,2,3-cd)pyrene	0.0839	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Phenanthrene	0.0243	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Pyrene	0.0184	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1998
Pesticides/PCBs (mg/kg)						
4,4'-DDD	3.3[g]	see footnote f	0.01	see footnote h	1.2	Forsyth & Petrie, 1984
4,4'-DDE	1.7[g]	see footnote i	0.01	see footnote h	1.2	Forsyth & Petrie, 1984
4,4'-DDT	0.57[g]	see footnote j	0.01	see footnote h	1.2	Forsyth & Petrie, 1984
Aroclor-1260	6.667	Sample et al., 1998	0.12	see footnote k	3.8	see footnote l
Alpha-Chlordane	1.6[m]	Gish, 1970	0.0017[mc]	Travis & Arms, 1988	0.55	see footnote n
Gamma-Chlordane	1.6[m]	Gish, 1970	0.0017[mc]	Travis & Arms, 1988	0.55	see footnote n
alpha-BHC	NA		0.003[oc]	Travis & Arms, 1988	NA	
beta-BHC	NA		0.049[c]	Travis & Arms, 1988	NA	
delta-BHC	NA		0.003[oc]	Travis & Arms, 1988	NA	
gamma-BHC (Lindane)	NA		0.054[c]	Travis & Arms, 1988	NA	
Endrin Ketone	0.072[p]	Gish, 1970	0.009[pc]	Travis & Arms, 1988	NA	

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TABLE F-1

BIOACCUMULATION FACTORS
SITE 1 AND SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA
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Chemical	Bioaccumulation Factor[a]					
	Terrestrial Invertebrate	Invertebrate Source	Terrestrial Plant	Plant Source	Mammal	Mammal Source
Metals and Inorganic Compounds						
Aluminum	0.053	Sample et al., 1998	0.0008	Baes et al., 1984	0.075	Baes et al., 1984
Antimony	NA		0.04	Baes et al., 1984	0.05	Baes et al., 1984
Arsenic	0.224	Sample et al., 1998	0.0375	ORNL, 1998	0.1	Eisler, 1988
Barium	NA		0.03	Baes et al., 1984	0.0075	Baes et al., 1984
Beryllium	NA		NA		0.05	MacFadyen, 1980
Cadmium	7.708	Sample et al., 1998	0.586	ORNL, 1998	2.1	Baes et al., 1984
Cobalt	NA		0.004	Baes et al., 1984	1.0	Baes et al., 1984
Copper	0.515	Sample et al., 1998	0.124	ORNL, 1998	0.6	Levine et al., 1989
Iron	0.038	Sample et al., 1998	NA		NA	
Lead	0.266	Sample et al., 1998	0.0389	ORNL, 1998	0.015	Baes et al., 1984
Manganese	0.054	Sample et al., 1998	0.05	Baes et al., 1984	0.02	Baes et al., 1984
Mercury	1.693	Sample et al., 1998	0.652	ORNL, 1998	0.01	USEPA, 1985
Nickel	1.059	Sample et al., 1998	0.018	ORNL, 1998	0.3	Baes et al., 1984
Selenium	0.985	Sample et al., 1998	0.672	ORNL, 1998	0.75	Baes et al., 1984
Silver	NA		0.08	Baes et al., 1984	0.15	Baes et al., 1984
Thallium	NA		0.008	Baes et al., 1984	2.0	Baes et al., 1984
Vanadium	0.039	Sample et al., 1998	0.0011	Baes et al., 1984	0.13	Baes et al., 1984
Zinc	3.201	Sample et al., 1998	0.366	ORNL, 1998	2.1	Baes et al., 1984

NA BAF, BCF, or BSAF not available

a Bioaccumulation factors (BAFs) consist of concentrations in tissue/concentrations in soil for invertebrates and plants, and concentrations in tissue/concentrations in food for mammals

b Average of earthworm BAFs for PAH compounds (Beyer, 1990) converted from dry weight to wet weight assuming earthwomr in 80% water.

c log (Plant Uptake Factor) = 1.588-0.578 (log Kow). Converted from dry weight to wet weight plant concentration assuming 80% water content.

d Calculated using the following equation from Travis and Arms (1988) for semivolatile organic analytes with Kows>5: Log BTF (biotransfer factor) = log Kow – 7.6; results multiplied by average ingestion rates for non-lactating and lactating test animals to convert from BTFs to BAFs, and divided by a factor of 0.2 to convert from dry feed to fresh feed. With the exception of pesticides and PCBs, BAFs for analytes with long Kow s<5 are assumed to be 0.15 because they are unlikely to bioaccumulate in animal tissue (Maughan, 1993).

e Earthworm BAF converted from dry weight to wet weight assuming earthworm is 80% water.

f Geometric mean of 4,4`-DDD (Barker, 1958, Davis, 1968, Davis and Harrison, 1966; Cramp and Olney, 1967; Collett and Harrison, 1968; Wheatley and Hardman, 1968; Hunt and Sacho, 1969; and Gish, 1970)

g Dry soil concentrations calculated assuming 10% moisture content in sandy-loam soils (Donahue et al., 1977)

h Geometric mean of 4,4`-DDT, 4,4`-DDD, and 4,4`-DDE BAFs (fresh wt/dry wt) reported for roots (carrot, potato, sugar beet), grains (corn, oats), and legumes (alfalfa) derived from USEPA (1985b) converted from dry weight to wet weight per values provided by Suter (1993).

i Geometric mean of 4,4`-DDE (Davis, 1968; Davis and Harrison, 1966; Cramp and Olney, 1967; Collett and Harrison, 1968; Hunt and Sacho, 1969; and Gish, 1970

j Geometric mean of 4,4`-DDT (Davis, 1968; Davis and Harrison, 1966; Wheatley and Hardman, 1968; Bailey et al, 1970; Cramp and Olney, 1967; Beyer and Gish, 1970.

k Arithmetic mean BAF for corn, leaves, carrots, beets, surgarbeets, radishes, and soybeans (tops, roots, and whole plants) from USEPA (1985a) and Webber et al. (1983).

l BAF calculated from discussion in Eisler (1986) stating that Aroclor 1254 residues in subcutaneous fat of adult minks were up to 38 times dietary levels; value converted to whole body concentrations assuming 10% lipid content.

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TABLE F-1

BIOACCUMULATION FACTORS
SITE 1 AND SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA
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derived from USEPA (1985b) converted from dry weight to wet weight per values provided by Suter (1993).

i Geometric mean of 4,4`-DDE (Davis, 1968; Davis and Harrison, 1966; Cramp and Olney, 1967; Collett and Harrison, 1968; Hunt and Sacho, 1969; and Gish, 1970

j Geometric mean of 4,4`-DDT (Davis, 1968; Davis and Harrison, 1966; Wheatley and Hardman, 1968; Bailey et al, 1970; Cramp and Olney, 1967; Beyer and Gish, 1970.

k Arithmetic mean BAF for corn, leaves, carrots, beets, surgarbeets, radishes, and soybeans (tops, roots, and whole plants) from USEPA (1985a) and Webber et al. (1983).

l BAF calculated from discussion in Eisler (1986) stating that Aroclor 1254 residues in subcutaneous fat of adult minks were up to 38 times dietary levels; value converted to whole body concentrations assuming 10% lipid content.

m chlordane used as a surrogate

n BAF calculated from data presented in Eisler, 1990. Rats fed 20 mg/kg diet technical chlordane (equivalent to 3.6 mg/kg diet cis- and trans-chlordane) for 350 days accumulated 20 mg/kg in lipids. Assuming 10% lipid content, the whole body concentration is about 2 mg/kg.

o BHC - mixed isomers used as as surrogate

p endrin used as as surrogate

F-3

TABLE F-2

BIOCONCENTRATION FACTORS AND BIOTA-SEDIMENT ACCUMULATION FACTORS
SITE 1 AND SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical	Bioconcentration Factor	BCF Source	BSAF	BSAF Source
Semivolatile Organic Compounds				
Acenaphthylene	30	USEPA, 1997	0.0111	ERED, 1998
Anthracene	30	USEPA, 1997	0.29	Hansen, 1995
Benzo(a)anthracene	30	USEPA, 1997	0.29	Hansen, 1995
Benzo(a)pyrene	30	USEPA, 1997	0.29	Hansen, 1995
Benzo(b)fluoranthene	30	USEPA, 1997	0.29	Hansen, 1995
Benzo(g,h,i)perylene	30	USEPA, 1997	0.0152	ERED, 1998
Benzo(k)fluoranthene	30	USEPA, 1997	0.29	Hansen, 1995
Carbazole	370	Vieth et al, 1995	NA	NA
Chrysene	30	USEPA, 1997	0.29	Hansen, 1995
Dibenzo(a,h)anthracene	30[a]	USEPA, 1997	0.29	Hansen, 1995
Fluoranthene	1150	USEPA, 1997	0.29	Hansen, 1995
Fluorene	30	USEPA, 1997	0.29	Hansen, 1995
Indeno(1,2,3-cd)pyrene	30	USEPA, 1997	0.29	Hansen, 1995
Phenanthrene	30	USEPA, 1997	0.6493	ERED, 1998
Pyrene	30	USEPA, 1997	0.29	Hansen, 1995
Pesticides/PCBs				
4,4'-DDD	53600	USEPA, 1997	0.28	Cook, 1995
4,4'-DDE	53600	USEPA, 1997	7.7	Cook, 1995
4,4'-DDT	53600	USEPA, 1997	1.67	Cook, 1995
Alpha-Chlordane	14100[b]	USEPA, 1997	4.77	Cook, 1995
Gamma-Chlordane	14100[b]	USEPA, 1997	2.22	Cook, 1995
alpha-BHC	130	USEPA, 1997	1.8	Hansen, 1995
beta-BHC	130	USEPA, 1997	1.8	Hansen, 1995
delta-BHC	130	USEPA, 1997	1.8	Hansen, 1995
gamma-BHC (Lindane)	130	USEPA, 1997	1.8	Hansen, 1995

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TABLE F-2

BIOCONCENTRATION FACTORS AND BIOTA-SEDIMENT ACCUMULATION FACTORS
SITE 1 AND SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA
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Chemical	Bioconcentration Factor	BCF Source	BSAF	BSAF Source
Metals and Inorganic Compounds				
Aluminum	95	AQUIRE, 1994	NA	NA
Arsenic	44	USEPA, 1997	NA	NA
Barium	4	Barnthouse et al., 1988	NA	NA
Beryllium	19	USEPA, 1997	NA	NA
Cadmium	64	USEPA, 1997	NA	NA
Cobalt	50	Jorgensen et al., 1991	NA	NA
Copper	36	USEPA, 1997	NA	NA
Iron	450	Jorgensen et al., 1991	NA	NA
Lead	49	USEPA, 1997	NA	NA
Manganese	373	Jorgensen et al., 1991	NA	NA
Mercury	3760	USEPA, 1997	1.2 (fish)	Walter et al., 1973
			2.0 (benthic organisms)	Evans and Engel, 1994
Silver	0.5	USEPA, 1997	NA	NA
Thallium	119	USEPA, 1997	NA	NA
Vanadium	0.01	Barnthouse et al., 1988	NA	NA
Zinc	47	USEPA, 1997	NA	NA

NA not avalable (carbazole); not applicable (metals)
a Benzo(a) pyrene used as a surrogate
b Total chlordane

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TOXICITY PROFILES FOR ECOLOGICAL COPCs

Ecological Toxicological Profiles
Site 1/SWMU 41
MCRD Parris Island, South Carolina

2-Methylnaphthalene

Little information is available for 2-methylnaphthalene. This substance is a solid at room temperature. 2-Methylnaphthalene can be produced from coal tar. It is used in the synthesis of organic chemicals such as insecticides and pesticides. No information was available about the release of 2-methylnaphthalene into the environment or what happens to this substance after it is released (ATSDR, 1990e).

The NOAEL and LOAEL are 1 mg/kg/day and 10 mg/kg/day, respectively, for mammals (Sample et al., 1996).

1,2,4 - Trichlorobenzene

1,2,4 – Trichlorobenzene (TCB) is a solvent used as a dye carrier, a dielectric fluid, lubricant, heat-transfer medium, wood preservative, and as an intermediate in herbicide manufacture. The chemical is released into the environment by the above processes along with its manufacture (Spectrum, 1999c).

In soil, TCB will adsorb to soil and not leach much through it. However, the chemical has been detected in some groundwater samples. TCB may slowly biodegrade in the soil, but it will not hydrolyze or biodegrade in groundwater. When TCB is released into water, it will adsorb to the sediments and bioconcentrate in aquatic organisms. In this environment, it will slowly biodegrade from the water but will not hydrolyze. TCB will evaporate from surface water with a half-live ranging 11 to 22 days. However, sediment and microorganism adsorption my hinder the evaporation process (Spectrum, 1999c).

Toxicity reference values were unavailable for this compound.

Acetone

Acetone is a colorless, volatile liquid that has a sweetish odor (Hawley, 1987). It is considered the least toxic solvent in the industry. Acetone can be naturally occurring or manufactured artificially (Howard, 1991). Acetone is used as a solvent in the production of lubricating oils, and as a chemical intermediate in the manufacturing of chloroform, pharmaceuticals, and pesticides. Acetone also is used to produce paints, varnishes, and lacquers (ORNL, 1989).

Acetone may be released into the environment as stack emissions, fugitive emissions, and in wastewater in its production and use as a chemical intermediate and solvent. In addition to industrial releases, acetone is the product of the photodioxidation of some alkanes and alkenes found in urban air, and in releases from volcanoes and forest fires (Howard, 1991).

If released into water, acetone will most likely biodegrade. Acetone will also volatize. As a result of acetone's volatile characteristics, bioconcentration in aquatic organisms and adsorption to sediment should not be significant (Howard, 1991).

Released on soil, acetone will volatize with some leaching into soil. Acetone rapidly biodegrades in soils (Howard, 1991).

Because of acetone's ability to volatize, release into the atmosphere is the ultimate fate of acetone. In the atmosphere, acetone will undergo photolysis and react with photochemically produced hydroxyl radicals. The half-life of acetone ranges between 13 and 22 days with the

longer half-life occurring in the winter months. This relatively long half-life allows for atmospheric dispersion of acetone. The primary removal process is wash out by rain (Howard, 1991).

For mammals, the NOAEL and LOAEL are 10 mg/kg/day and 50 mg/kg/day, respectively (Sample et al., 1996). Toxicity reference values of acetone are unavailable for birds.

Aluminum

Although present in food in varying amounts, aluminum is not an essential element for mammals. The aluminum content of plants typically depends on the soil aluminum concentration and ranges from 10 to 30 mg/kg fresh weight; studies have indicated that this element stimulates the growth of several pasture plant species (Hackett, 1962). As summarized in Venugopal and Luckey (1978), aluminum is not readily absorbed through the skin and gastrointestinal absorption of ingested aluminum is poor due to the transformation of aluminum salts into insoluble aluminum phosphate. The lack of accumulation of aluminum in animals with age or of any increase in tissue levels of aluminum following fairly high dietary intake suggests that mammals possess a homeostatic mechanism for this element. For most terrestrial organisms, aluminum compounds are generally not harmful and are considered to be toxicologically inert, except in cases of high experimental doses or prolonged inhalation (Venugopal and Luckey, 1978).

Data on the toxicity of aluminum to aquatic organisms is somewhat limited. EPA (1988) stated that freshwater organisms should not be adversely affected if aluminum concentrations do not exceed 87 µg/L when pH is between 6.5 and 9.0. Some studies have shown that the acute toxicity of aluminum increases with pH, whereas other studies found the opposite to be true (EPA, 1988). The occurrence of pH effects in fish depends on aluminum and calcium concentrations in the water. Laboratory studies have established that low pH is toxic to fish, that aluminum concentrations found in acidified waters (particularly inorganic monomeric aluminum) are toxic, and that calcium is ameliorative (Suter, 1993).

EPA (1988) also reviewed sublethal effects. It was found that 169 µg/L at a pH of 6.5 to 6.6 caused a 24 percent reduction in the growth of young brook trout (*Salvelinus fontinalis*). Cleveland et al. (1991) determined that brook trout accumulated significantly higher aluminum residues at pH 5.3 than at pH 6.1 or pH 7.2. They also determined that elimination of aluminum during depuration was more rapid at pH 5.3 than at pH 6.1 or pH 7.2. Data reported in EPA (1988) indicated this metal does not bioconcentrate; bioconcentration factors range from 50 to 231 for brook trout (geometric mean value = 82).

The NOAEL for birds and mammals are 109.7 mg/kg/day and 1.93 mg/kg/day, respectively (Sample et al., 1996).

Antimony

Antimony is used in metal alloys for producing fireproofing chemicals, ceramics, glassware, and pigments. Along with its industrial uses, it is used to medicinally treat people infected with parasites (ATSDR, 1995). Antimony is absorbed slowly from the gastrointestinal tract and many antimony compounds are gastrointestinal irritants (Klaassen, 1996).

It is considered a nonessential metal and is easily taken up by plants if present in a soluble form (Kabata-Pendias and Pendias, 1992). Plants growing in soils contaminated by industrial emissions may be expected to contain elevated tissue concentrations of this metal. However, there are no reports of plant toxicity resulting from uptake of antimony (Kabata-Pendias and Pendias, 1992).

Industrial emissions make this metal a common air pollutant. When acute exposure occurs, the effects include rhinitis, and acute pulmonary edema. After chronic exposure, the effects include

rhinitis, pharyngitis, tracheitis, bronchitis, pneumoconiosis with obstructive lung disease, and emphysema (Klaassen, 1996).

When rats were orally fed antimony, it did not produce an excess of tumors. However, when Syrian hamster embryo cells were treated with antimony acetate, the cells under went neoplastic transformation (Klaassen, 1996). Antimony has been shown to produce liver damage in rabbits at 5.5 mg/kg in diet (NRC, 1980).

The NOAEL and LOAEL for mammals are 0.125 mg/kg/day and 1.25 mg/kg/day, respectively (Sample et al., 1996). Toxicity reference values for birds are unavailable.

Arsenic

Arsenic is a naturally occurring element in the earth's crust. Pure arsenic is a gray-colored metal, but this form is not common in the environment. Arsenic is usually found combined with one or more other elements such as oxygen, chlorine, and sulfur. Arsenic combined with these elements is referred to as inorganic arsenic. Arsenic combined with carbon and hydrogen is referred to as organic arsenic (ATSDR, 1989f).

Arsenic enters the environment both as the result of natural forces (volcanoes and weathering of arsenic-containing rocks) and human activity (metal smelting, glass manufacturing, pesticide production and application, and fossil fuel burning) (ATSDR, 1989f).

Arsenic in the environment may undergo a complex cycle of chemical interconversions and transfers between media. Atmospheric emissions, which are usually adsorbed to particulate matter, may undergo oxidation before being returned to the surface by wet or dry deposition. Arsenic in water may undergo either reduction or oxidation, depending on pH, the electrochemical oxidation-reduction potential (Eh), and other ions present. Soluble forms of arsenic tend to be quite mobile in water, while less soluble species adsorb to clay or soil particles (ATSDR, 1989f).

The NOAEL for birds, fish, and mammals is 5.14 mg/kg/day, 0.59 mg/kg/day, and 0.126 mg/kg/day, respectively (Sample et al., 1996; ERT, 1997). The LOAEL is 12.84 mg/kg/day for birds, 7.1 mg/kg/day for fish, and 1.26 mg/kg/day for mammals (Sample et al., 1996; ERT, 1997).

Barium

Barium is the heaviest of the stable alkaline earths (Group IIa of the Periodic Table). The free element is a silver-grey soft metal. It oxidizes readily in moist air, and it reacts with water or with dilute acids under evolution of hydrogen gas (Friberg, 1986).

In its compounds, barium is a colorless divalent positive ion. The chloride and nitrate are soluble in water. The carbonate is much less soluble in water, but is soluble in dilute acids, and the sulfate is one of the least soluble compounds in any medium (Friberg, 1986).

Barium is used in various alloys, in paints, soap, paper, and rubber, and in the manufacture of ceramics and glass. Barium fluorosilicate and carbonate have been used as insecticides. Barium is relatively abundant in nature and is found in plant and animal tissue. Plants accumulate barium from the soil (Klaassen et al., 1986).

The toxicity of barium compounds depends on their solubility. The free ion is readily absorbed from the lung or gastrointestinal tract, but barium sulfate remains essentially unabsorbed. After absorption, barium accumulates in the skeleton. An accumulation also takes place in the pigmented parts of the eye (Friberg, 1986).

Barium occurs chiefly as the mineral barite ($BaSO_4$). In recent years, about 80% of ground and crushed barite solid were used directly as a weighting agent in oil- and gas-well drilling muds.

The remainder of barite is used in the manufacture of glass, ceramics, television picture tubes, brick and tile refractories, vinyl stabilizers, railroad flares, fireworks, fine chemicals, lubricating oil additives, permanent magnets, as well as in sugar refining, paper coating, steel hardening, and as pigment in paint (Friberg, 1986).

The NOAEL for birds and mammals is 20.8 mg/kg/day and 5.1 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 41.7 mg/kg/day for birds and 51 mg/kg/day for mammals (Sample et al., 1996).

Benzene hexachloride (BHC)

Benzene hexachloride, also known as hexachlorocyclohexane (HCH) or lindane, is an organochlorine insecticide consisting of eight stereo isomers, of which four (alpha, beta, gamma, and delta) predominate in the technical product due to relatively strainless bonds. BHC isomers degrade to chlorophenols at different rates in order of their solubilities in fat (delta > gamma > alpha > beta) (Deo et al., 1982). The gamma isomer is the only isomer that is highly insecticidal (Deo et al., 1982), and constitutes at least 99 percent of lindane (Manahan, 1992). Signs of toxicity are very similar to those of DDT, and include tremors, ataxia, and convulsions (Murphy, 1986).

Newell et al. (1987) selected 0.1 mg/kg total BHC as a non-carcinogenic based wildlife criterion, and 0.51 mg/kg total BHC as a 1 in 100 cancer risk level for piscivorous wildlife.

For alpha- and delta-BHC, the NOAEL and LOAEL for mammals are 0.014 mg/kg/day and 0.14 mg/kg/day, respectively. For birds, the NOAEL and LOAEL are 0.56 mg/kg/day and 2.25 mg/kg/day, respectively. For beta-BHC, the NOAEL AND LOAEL for mammals are 0.4 mg/kg/day and 2.0 mg/kg/day. The NOAEL and LOAEL are 0.56 mg/kg/day and 2.25 mg/kg/day, respectively, for birds. With gamma-BHC, the NOAEL and LOAEL are 8.0 mg/kg/day and 80 mg/kg/day for mammals, respectively. The NOAEL and LOAEL for birds are 2.0 mg/kg/day and 20 mg/kg/day, respectively (Sample et al., 1996).

Beryllium

Beryllium occurs as a chemical component of certain rocks, soils, and volcanic dust. Beryllium is naturally emitted to the atmosphere by windblown dust and volcanic particles (ATSDR, 1991b). The major emission source to the environment is the combustion of coal and fuel oil, which release particulates and fly ash that contain beryllium into the atmosphere.

Sediment is the ultimate sink for beryllium in water, and its association with sediment would decrease the mobility in water. Beryllium does not bioconcentrate to high levels in aquatic animals, although the bioconcentration in bottom dwelling animals may be higher than nonbottom-dwelling animals. There is no evidence of biomagnification of beryllium within terrestrial or aquatic food chains (ATSDR, 1991b).

The NOAEL for mammals is 0.66 mg/kg/day, while the LOAEL is 6.6 mg/kg/day (Sample et al., 1996). A toxicity reference value was unavailable for birds.

Bis(2-ethylhexyl)phthalate

Bis(2-ethylhexyl)phthalate (DEHP) is a colorless liquid used in the production of polyvinyl chloride, which provides flexibility to plastics (ATSDR, 1993). Oral exposure in animal studies has shown noted acute effects on the liver and kidney and adverse effects on weight gain and food consumption (ATSDR, 1993). From chronic inhalation exposure, animal studies have shown increased lung weights and increased liver weights, while oral studies have reported effects on the liver (ATSDR, 1993).

Since DEHP is likely to be released air and water during production of plastics, it can be carried long distances. In aquatic environments, DEHP adsorbs to sediment and bioconcentrates in organisms (Spectrum Laboratories, 1999a). In terrestrial habitats, DEHP will not evaporate or leach into groundwater. It may biodegrade under aerobic conditions following acclimation in soil (Spectrum Laboratories, 1999a).

The NOAEL for birds and mammals is 1.1 mg/kg/day and 18.3 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 11 mg/kg/day for birds and 183 mg/kg/day for mammals (Sample et al., 1996).

Butyl Benzyl Phthalate

Butyl benzyl phthalate (BBP) is mainly used as a plasticizer for polyvinyl and cellulosic resins. Manufacture, distribution, and PVC blending operations are the sources of release of the chemical into the environment (Spectrum, 1999d).

When BBP is released to soil, it will adsorb and not leach through the soil (Koc is 65-350). Although, the compound has been detected in groundwater. Biodegradation is the most notable fate process for BBP in soil (Spectrum, 1999d).

Since BBP has a Kow of 4.77, it will partition to sediment and biota when released into the aquatic environment. Biodegradation is the most likely fate process. However, volatilization is not significant from water due to a Henry's Law constant of less than 1.0×10^{-6} atm/mol cu m. Photodegradation and hydrolysis are also not significant processes because the half-lives are greater than 100 days (Spectrum, 1999d).

For mammals, the NOAEL is 159 mg/kg/day, and the LOAEL is 1590 mg/kg/day (ERT, 1997). A toxicity reference value was not available for BBP, so bis(2-ethyl hexyl)phthalate was used as a surrogate. The NOAEL and LOAEL are 1.1 mg/kg/day and 11 mg/kg/day, respectively, for birds (Sample et al., 1996).

Cadmium

Cadmium is a soft, blue-white, malleable metal or gray-blue powder. Cadmium is used for electroplating, in pigment production, and in the manufacturing of plastic stabilizers and batteries. Sources of cadmium include smelter fumes and dusts, incineration products from cadmium-containing materials, fertilizer, and municipal wastewater and sludge discharges. It also is an industrial byproduct of the manufacturing of zinc, copper, and lead (ATSDR, 1991a).

Cadmium compounds have varying degrees of solubility ranging from very soluble (cadmium salts) to nearly insoluble (cadmium metal). The solubility affects cadmium adsorption and toxicity (ATSDR, 1991a). Cadmium may exist in water as a hydrated ion or as metal inorganic complexes. Adsorption and desorption processes are the most likely processes controlling the concentrations of cadmium released into natural waters. Cadmium is more mobile in aquatic environments than most heavy metals (Eisler, 1985).

Adsorption and desorption rates of cadmium are rapid on mud solids and particles of clay, silica, humic material, and other naturally occurring solids. Changes in the physical chemistry of a waterbody (especially pH and redox potential) influence the suspension of cadmium from the sediments into the water column. During anaerobic conditions, cadmium is more likely to release from the sediments into the water column. Cadmium is not likely to partition from the water into the atmosphere because cadmium does not form volatile compounds (ATSDR, 1991a).

Aquatic and terrestrial organisms bioaccumulate cadmium up the food chain. Bioconcentration in fish is dependent upon the pH and the organic content of the water (ATSDR, 1991a). Cadmium may adversely impact the reproduction success of fish (Davis, 1994).

Cadmium exists in soil as free cadmium compounds. Cadmium released to soils may leach into water, especially under acidic conditions. The transformation of cadmium in soil is dependent on sorption and desorption from water, and includes precipitation, dissolution, complexation, and ion exchange. Factors affecting transformation in soil include cation exchange capacity; pH; and the content of clay minerals, carbonate minerals, oxides, organic matter, and oxygen (ATSDR, 1991a).

Cadmium is readily taken up by plant roots and tranlocates through the plant and accumulated. Cadmium depresses the uptake of iron, manganese, and probably calcium, magnesium, and nitrogen. Symptoms of plant toxicity include necrosis, wilting, reduced zinc levels, and reduction in growth. Agronomic crops are more sensitive to cadmium toxicity than trees (Will and Suter, 1994).

Cadmium can exist in the atmosphere as suspended particulate matter derived from sea spray, industrial emissions, combustion of fossil fuels, or the erosion of soils. Cadmium in the atmosphere will remain for approximately one to ten days before deposition occurs. Cadmium in the atmosphere usually takes the form of oxides, sulfates, sulfides, and chlorides. These complexes are stable and do not readily undergo photochemical reactions. Transformation of cadmium compounds in the air is mainly through dissolution in water or dilute acids (ATSDR, 1991a).

The NOAEL and LOAEL are 1.0 mg/kg/day and 10 mg/kg/day for mammals, respectively. For birds, the NOAEL and LOAEL are 1.45 mg/kg/day and 20 mg/kg/day, respectively (Sample et al., 1996).

Carbazole

Carbazole is a white crystalline solid with a characteristic odor. It is a PAH produced in the United States as a constituent of coal tar, which is produced in large quantities by the steel industry as a by-product of coke manufacture. Refined carbazole is used in the synthesis of dyes and other chemicals, as an odor inhibitor in detergents, and to make photographic plates sensitive to UV light. Coal tar is used in creosote wood preservatives and anticorrosion coatings, as a feedstock for carbon-black manufacture, and as a binder for road surfacing and electrodes. Carbazole is used as an intermediate in the manufacture of commercially important dyes. It is also used commercially in the production of N-vinyl-carbazole, which is used to make rigid high-melting polymers. Other reported uses for carbazole include manufacture of explosives, insecticides, lubricants and rubber antioxidants, and making photographic plates sensitive to UV light (EPA, 1986).

The major source by which carbazole is emitted to the aquatic and atmospheric environments appears to be in emissions and releases from the coal tar use industries. Carbazole has been found in drinking waters and in ambient air of various cities and countries. Carbazole occurs as a product of incomplete combustion of nitrogen-containing organic matter and has been found in stack emissions from waste incineration (EPA, 1986).

Experimental studies have shown photolysis and biodegradation to be the dominant fate processes in the removal of carbazole from the aquatic environment. Carbazole is expected to rapidly photolyze in sunlit atmospheres based on its strong UV absorption and rapid photolytic degradation in water. Photolysis of carbazole on soil surfaces is expected to occur because of its strong UV absorption (EPA, 1986).

For mammals, the NOAEL and LOAEL are 1.3 mg/kg/day and 2.6 mg/kg/day, respectively. The NOAEL and LOAEL for birds are 10 mg/kg/day and 100 mg/kg/day, respectively (ERT, 1997).

Carbon Disulfide

Carbon disulfide is a natural product of anaerobic biodegradation and is released to the atmosphere from oceans and landmasses (Howard, 1993). It may also be released as emissions and in wastewater during its production and use. Carbon disulfide is used in the production of viscous rayon, cellophane, carbon tetrachloride, and as a solvent and fumigant (Howard, 1993).

If released to soil, carbon disulfide will be primarily lost by volatilization (Howard, 1993). Carbon disulfide also will rapidly volatilize from water with an estimated 2.6 hr half-life based on a river model (Howard, 1993). Adsorption to the sediment will not be significant (Howard, 1993). Carbon disulfide is not expected to significantly bioconcentrate in aquatic organisms (Howard, 1993).

The chemical causes harm by destroying target molecules by crosslinking cytoskeletal proteins, DNA, or DNA with proteins (Klaassen, 1996). It has also been found to be an atherogenic agent in animal studies; however, the mechanism is unknown but has been suggested to be alternations of glucose and/or lipid metabolism and blood coagulation (Klaassen, 1996).

The NOAEL for mammals is 11 mg/kg/day, and the LOAEL is 110 mg/kg/day (IRIS, 1991). There are no values available for birds.

Chlordane

Pure chlordane is a mixture composed of primarily cis-chlordane and trans-chlordane. It is a white crystalline solid with a mild, pungent odor. Chlordane is a man-made insecticide, which was used from 1948 to 1988 on food crops (specifically corn) and to control household termites. Consequently, it was intentionally applied to soils both in agricultural and urban settings. Due to its persistence indoors, its use as a termicide was stopped (ATSDR, 1990b).

Chlordane is expected to persist for more than 20 years in some soils. Volatilization appears to be the only major removal mechanism from soil. Leaching to groundwater from soil is not a likely removal mechanism. Adsorption to sediments and volatilization are significant removal mechanisms in water. In air, chlordane will degrade by photolysis and hydroxyl radical reaction. Rainout and dry deposition are not expected to be significant removal mechanisms (ATSDR, 1990b).

Chlordane will bioconcentrate in both marine and freshwater species, as well as bacteria (ATSDR, 1990b).

The NOAEL is 4.6 m/kg/day for mammals, while the LOAEL is 9.2 mg/kg/day. For birds, the NOAEL is 2.14 mg/kg/day and the LOAEL is 10.7 mg/kg/day (Sample et al., 1996).

Cobalt

Cobalt is a steel-gray, shiny, hard, ductile ferromagnetic metal (Hawley, 1987). It is a relatively rare metal produced primarily as a byproduct of other metals (EPA, 1985). The principal ores of cobalt are smaltite, cobaltite, chloanthite, and linnaeite. Cobalt is used in chemical agents, electroplating, ceramics, lamp filaments, catalysts, drier in printing inks, paints and varnishes, and in high temperature alloys (Hawley, 1987). Cobalt salts are used as paint driers, catalysts, and in the production of numerous pigments (EPA, 1985).

Cobalt released into water is expected to take a soluble form. The mobility of cobalt is controlled by its characteristic of adsorbing to the clay minerals and hydrous oxides of iron, manganese, and aluminum available in sediments and soils. Chelation of cobalt is possible in sediments and soil. Small amounts of cobalt may be solubilized by bacteriological activity. The effects of cobalt in the terrestrial environment are associated with nitrogen-fixation; however, excessive amounts can be

toxic to plants. Vegetation is differentially susceptible to cobalt depending on the species. Grasses tend to be more susceptible to cobalt toxicity than broad leafed species (Davis, 1994).

Although atmospheric transport of cobalt and cobalt compounds occurs, photolysis, volatilization, and biotransformation are important fate processes for cobalt (EPA, 1985).

The NOAEL for both birds and mammals is 1 mg/kg/day (ERT, 1997), while the LOAEL is 10 mg/kg/day for both birds and mammals (ERT, 1997).

Copper

Copper is a reddish colored metal that occurs naturally in rock, soil, water, sediment and air. Copper also occurs naturally in plants and animals. Copper is used primarily as a metal or alloy in the manufacture of wire, sheet metals, pipe, and other metal products. Copper compounds are used in agriculture to treat plant diseases, for water treatment, and as preservatives for wood, leather, and fabrics (ATSDR, 1989c).

The physicochemical form of copper released to the environment determines the impact of the element to the environment. Copper is released to water through natural weathering of soil and discharges from industries and sewage treatment plants. Copper released into water will most likely take the form of copper (II). Most copper in water is bound to organic matter; little is present in the free or readily exchangeable form. The concentration of dissolved copper in water is dependent on such factors as pH, the oxidation-reduction potential of the water, the presence of competing cations and anions of soluble cupric salts. and the presence of organic/inorganic complexing agents (ATSDR, 1989c).

The process of complexation, adsorption, and precipitation control the amount of copper (II) released into water. Copper released into water tends to bind to the bottom sediments. Organics and iron oxides are the most important contributor to binding of copper by aerobic sediments. However, copper is typically associated with carbonates. In anaerobic sediment, copper (II) will be reduced to copper (I) and insoluble cuprous salts will form (ATSDR, 1989c).

Copper released to soil will be strongly adsorbed and remain in the upper few centimeters of soil. In most soils, the pH, organic matter, and ionic strength of the soil solutions are the key factors affected adsorption. Copper will adsorb to organic matter, carbonate minerals, clay minerals, or hydrous iron and manganese oxides. Sandy soils with low pH have the greatest potential for leaching (ATSDR, 1989c).

Copper released into the air will most likely take the form of particulate matter as an oxide, sulfate, or carbonate. Copper is removed from the atmosphere by gravitational settling, dry deposition, and washout by rain and clouds (ATSDR, 1989c).

The NOAEL for birds and mammals is 47 mg/kg/day and 11.7 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 61.7 mg/kg/day for birds and 15.14 mg/kg/day for mammals (Sample et al., 1996).

DDT, DDE and DDD

Historically, DDT was released to the environment during its formulation and extensive use as a pesticide in agricultural and vector control applications. Its primary metabolites are DDE and DDD. Although DDT was banned for use in this country in 1972, it is still being used in several areas in the world, particularly tropical countries. DDT and its primary metabolites do not occur naturally in the environment. However, due to its extensive past use of DDT worldwide and the persistence of DDT and is metabolites, these compounds are virtually ubiquitous and are continually being transformed and redistributed in the environment. DDT and its metabolites have been detected in virtually all media (ATSDR, 1990c).

DDT and its metabolites may be transported among media by the processes of solubilization, adsorption, bioaccumulation or volatilization. DDT, DDE and DDD in the atmosphere are subject to photodegradation or redeposition by rain or dry deposition (ATSDR, 1990c).

DDT and its environmental degradation products preferentially bind to soil and sediment , where they may be subject to photodegradation on the surface and biodegradation in the subsurface. Under certain conditions, DDT may persist for long periods of time or may be converted to DDE, which persists for an even longer duration. Consequently, these compounds are not easily displaced from their site of application, whether by runoff or leaching to groundwater. However, volatilization of DDT and DDE from soil accounts for considerable losses of these compounds. The tendency of DDD to volatilize is approximately one-third that of DDT or DDE (ATSDR, 1990c).

When DDT is released to water, it quickly absorbs to particles and is subject to sedimentation, volatilization, photodegradation and uptake into the food chain. Similar to soil, volatilization accounts for loss of these compounds from water. One study found that DDE volatilizes from seawater 10 to 20 times faster than from freshwater (ATSDR, 1990c).

DDT, DDE and DDD are highly lipid soluble. This lipophilic property, combined with an extremely long half-life, results in bioaccumulation. When present in ambient water, DDT and its metabolites are concentrated in freshwater and marine plankton, insects, mollusks, and other invertebrates and fish. As these organisms become part of the food chain, a progressive accumulation of residues may result in high levels of residues in organisms at the top of the food chain (ATSDR, 1990c).

For mammals, the toxicity reference value depended on the metabolite. 4,4'-DDD and 4,4'-DDT have a NOAEL value of 0.8 mg/kg/day and a LOAEL value of 4 mg/kg/day (Sample et al., 1996). For all three chemicals, the NOAEL is 0.0028 mg/kg/day and the LOAEL is 0.028 mg/kg/day for birds (ERT, 1997).

Dibenzofuran

Dibenzofuran is a solid substance at room temperature that is used in the manufacture of insecticides. Dibenzofuran is released to the air from the burning of coal tar (Hawley, 1987).

If the compound is released to the air, a majority will rapidly degrade by reacting with photochemically produced hydroxyl radicals; however, some may be resistant and may be removed by wet and dry deposition. In terrestrial habitats, dibenzofuran is readily biodegraded by adapted microbes in the presence of oxygen. If oxygen is lacking, such as in groundwater areas, long periods of persistence may occur because of slow biodegradation. Soil mobility of dibenzofuran is thought to be low to none (Spectrum Laboratories, 199b).

In aquatic habitats, the compound adsorbs to sediment and suspended material which reduces the amount that can volatilize. Just as in terrestrial environments, microbes can degrade the compound only in areas where there is significant oxygen. Studies have also shown that dibenzofuran can bioaccumulate in aquatic organisms (Spectrum Laboratories, 1999b).

The NOAEL and LOAEL are 60 mg/kg/day and 125 mg/kg/day, respectively, for mammals (ATSDR, 1991c). Values were unavailable for birds.

Di-n-octyl phthalate

The phthalate ester plasticizers are used in virtually every major product category, including construction, automotive, household products, resulting in the widest possible distribution of these material. The two most abundantly produced phthalate ester plasticizers are di-2-

ethylhexylphthalate and di-n-butylphthalate (Klaassen et al., 1986).

The phthalate esters are known to be ubiquitously distributed in the environment. They have been found complexed with the fulvic acid components of humic substances in soil and in both marine and estuarine waters (Klaassen et al., 1986). Di-n-butyl phthalate may be released into the environment as emissions and in waste water during its production and use. If released into water, it will adsorb moderately to sediment and particulates in the water column. It will not bioconcentrate in fish because it is readily metabolized (Howard, 1993).

The NOAEL and LOAEL for mammals are 18.3 mg/kg/day and 183 mg/kg/day, respectively. For birds, the NOAEL and LOAEL are 1.1 mg/kg/day and 11 mg/kg/day, respectively (Sample et al., 1996).

Endrin

Endrin is a solid, white, odorless substance. Endrin has not been produced in the U.S. since 1986 (ATSDR, 1994). No natural sources of endrin are known. Endrin in the environment is the result of its use as an insecticide, avicide, and rodenticide. It has been used on agricultural crops, cotton crops, as control of birds on buildings, and mice in orchards (Howard, 1993).

Endrin released to soils will persist for long periods (up to 14 years or more). Endrin strongly adsorbs to soil and becomes relatively immobile. However, leaching into groundwater does occur under specific conditions. Runoff from rain will carry endrin into water systems. Endrin may biodegrade in flooded soils or under anaerobic conditions (Howard, 1993).

Endrin in water will not hydrolyze or biodegrade. Endrin is not very soluble in water. It will undergo photoisomerization into ketoendrin. Endrin will extensively sorb to sediment and will significantly bioconcentrate. Extensive bioconcentration of endrin has been reported in fish (Howard, 1993)..

Endrin released into the atmosphere, it is expected to be associated with particulate matter, but small amounts may exist in the vapor phase (Howard, 1993).

Since toxicity reference values could not be found for endrin ketone, values for endrin were used as a surrogate. The NOAEL and LOAEL are 0.092 mg/kg/day and 0.92 mg/kg/day, respectively, for mammals. For birds, the NOAEL is 0.01 mg/kg/day, while the LOAEL is 0.1 mg/kg/day (Sample et al., 1996).

Iron

Iron is a silvery white, malleable metal. It is the fourth most abundant (by weight) of the elements that compose the earth's crust and is a major constituent of clay soils (EPA, 1990).

Iron in water may be present in varying quantities dependent upon the geology of the area and other chemical components of the water body (EPA, 1990; EPA, 1985). The bivalent and trivalent irons are the primary forms of concern in the aquatic environment. The ferrous or bivalent form can persist in waters void of dissolved oxygen and typically originate from groundwater of mines where these are pumped or drained. The ferric or trivalent form is insoluble. Iron can exist in natural organometallic or humic compounds and colloidal forms. Black or brown swamp waters may contain iron concentrations of several milligrams per liter in the presence or absence of dissolved oxygen, but this iron form has little effect on aquatic life (EPA, 1990). The majority of iron entering water bodies is likely to partition into the bottom sediments (EPA, 1985).

Iron released into soil has relatively low mobility potential. However, iron can be transported through the atmosphere (EPA, 1985).

The NOAEL for birds and mammals is 100 mg/kg/day and 50 mg/kg/day, respectively (ERT, 1996).

Lead

Lead is ubiquitous and is a characteristic trace constituent in rocks, soils, water, plants, animals, and air. Lead is used in the manufacture of storage batteries, gasoline additives, pigments, alloys, and ammunition (Eisler, 1988).

Lead compounds are extremely persistent in water and soil. Natural lead compounds are not mobile in surface and groundwater because lead leached from ore is adsorbed by ferric hydroxide. Lead also readily combines with hydroxide, carbonate, and sulfate ions to form insoluble compounds. These compounds precipitate and settle in the bottom sediment. Lead is not volatile, therefore, volatilization is not an important transport process from the aquatic environment (EPA, 1985).

In water, lead is most soluble and bioavailable under conditions of low pH, low organic content; low concentrations of suspended sediments; and low concentrations of the salts of calcium, cadmium, iron, manganese, and zinc. Lead tends to concentrate in the water surface microlayer (the upper 0.3 mm of water), especially when surface organic matter is present in thin films. However, most lead entering natural waters will precipitate to the sediment bottom as carbonates or hydroxides. Migration and speciation of lead in water is influenced by the water flow rate, increased flow rate results in increased concentrations of particulate and labile lead and a decrease in bound forms. At low stream flow, lead is rapidly removed from the water column by sedimentation (Eisler, 1988).

Lead in sediment is mobilized and released when the pH decreases suddenly or ionic composition changes. Methylation of lead occurs in the sediments and is positively correlated to increasing temperature, reduced pH, and high microbial activities (Davis, 1994).

Sorption is a dominant effect on the distribution of lead in soil. Lead readily adsorbs to inorganic solids, organic material and hydrous iron and manganese oxides. Because of its affinity for other materials, and its solubility characteristics, the mobility of lead in soil is low (EPA, 1985). Most lead is retained in soil and not transported via leaching or runoff to surface water (ATSDR, 1990d).

Plants do not readily take up lead. Therefore, its availability to terrestrial life forms also is limited (EPA, 1985). However, excessive amounts of lead can cause growth inhabition, as well as reduced photosynthesis, mitosis, and water absorption (Eisler, 1988). Inorganic and organic lead compound disperse in the atmosphere as particulate matter. Lead is removed from the atmosphere by wet or dry deposition. Photolysis of atmospheric organic lead compounds occurs rapidly (EPA, 1985). The average residence time of atmospheric lead is seven to thirty days (ATSDR, 1990d).

Lead does not appear to significantly bioaccumulate in most fish (ATSDR, 1990d). Microcosm studies indicate that lead is not biomagnified through the food chain (EPA, 1985). Lead concentrations tended to decrease markedly with increasing trophic level in both detritus-based and grazing aquatic food chains. However, lead is toxic to all phyla of aquatic biota, though effects are modified significantly by various biological and abiotic conditions (Eisler, 1988).

Lead adversely impacts survival, growth, development, and metabolism of most terrestrial species. The organic forms of lead tend to be more toxic to wildlife than the inorganic lead compounds, but the inorganic forms are easily converted into organic lead forms by microorganisms (Davis, 1994).

The NOAEL for birds and mammals is 1.13 mg/kg/day and 8 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 11.3 mg/kg/day for birds and 80 mg/kg/day for mammals (Sample et al., 1996).

Manganese

Manganese is a brittle silvery metal that usually occurs as a complex with other metals such as iron. Manganese and its compounds are used in the making of steel alloys, dry-cell batteries, electrical coils, and other metallic fabrication applications. Other uses of manganese include as an oxidizing agent and as a food additive (Klaassen et al., 1986; Hawley, 1987).

Manganese can occur in soil, water, or air. Because it is an element, environmental processes cannot degrade manganese. However, it may transform from one manganese compound to another. While manganese can be transported in dusts or in water, the main source of routine manganese exposure is through ingestion of food. Vegetables, the germinal portions of grains, fruits, nuts, tea, and some spices are rich in manganese (Klaassen et al., 1986).

In the soil, pH, cation exchange capacity, drainage, and other factors affect the concentrations and chemical form in which manganese can occur. Lower pH and reducing conditions tend to favor solubility and hence, the mobility of manganese. Manganese often occurs at higher concentrations in the bottom of stratified lakes as a result of its release from bottom sediments as manganous ion under reducing conditions (EPA, 1985).

The NOAEL for birds and mammals is 977 mg/kg/day and 88 mg/kg/day, respectively (Sample et al., 1996). The LOAEL for mammals is 284 mg/kg/day (Sample et al., 1996).

Mercury

Mercury is a silvery, heavy liquid with valences of +1 and +2. Mercury exists as insoluble elemental mercury, organic species, and inorganic species. Solubility depends upon the reduction-oxidation potential, and the pH of the environment (EPA, 1985). Mercury is commonly used for amalgams, catalysts, electrical apparatuses, instruments such as thermometers and barometers, and neutron absorbers in nuclear power plants (Hawley, 1987).

Mercury released to the environment will remain there indefinitely. The form that mercury exists in (organic or inorganic) may change with time. Chemical speciation is probably the most important variable influencing the ecotoxicology of mercury (Eisler, 1987). Inorganic mercury can be methylated by microorganisms indigenous to soils, freshwater, and salt water. This process is mediated by various microbial populations under both aerobic and anaerobic conditions. Methyl mercury is the most hazardous mercury species due to its high stability, its lipid solubility, and its possession of ionic properties that create a high ability to penetrate membranes in living organisms. Methylmercury in surface waters is rapidly accumulated by aquatic organisms. The top-level predator species usually contain the highest concentrations of methyl mercury (Eisler, 1987).

Freshwater plants exhibit a wide range of sensitivity to mercury; however, the most sensitive aquatic plant is less sensitive than the most sensitive freshwater animal. Fish tend to be more resistant to mercury than mollusks and crustaceans.

Mercury released into soils or surface water will exist in the mercuric state (Hg^{++}) and mercurous (H^{+}) states as a number of complex ions with varying water solubilities. Mercuric mercury, present as complexes and chelates with ligands, is probably the most predominant form of mercury present in surface waters (ATSDR, 1989g).

Volatile forms of mercury present in surface water are expected to evaporate into the air; whereas, solid forms of mercury partition to particulates or are transported in the water column,

depending on their solubility. The two most important transformation processes in the fate of mercury in surface waters are biotransformation and bioaccumulation. Photolysis of organomercurials also may occur in surface waters (ATSDR, 1989g).

Mercury released into soils may undergo the same chemical and biological transformations as mercury released into surface waters. Mercuric mercury usually forms complexes with chloride and hydroxide ions in soils, the specific compounds form are dependent on pH, salt content, and composition of the soil solution (ATSDR, 1989g).

Mercury released into the atmosphere will most likely undergo photolysis. Metallic mercury vapor may be oxidized to other forms in the removal of the compound from the atmosphere by precipitation. Mercury vapor can be transported long distances before wet and dry deposition processes return the element to the earth. The atmosphere is the smallest environmental reservoir of mercury (ATSDR, 1989g).

The NOAEL for birds, fish, and mammals is 0.0064 mg/kg/day, 0.008 mg/kg/day, and 0.015 mg/kg/day, respectively (Sample et al., 1996; ERT, 1997). The LOAEL is 0.94 mg/kg/day for fish, and 0.025 mg/kg/day for mammals (Sample et al., 1996; ERT, 1997).

Nickel

Nickel is a naturally occurring silvery metal that is found in the earth's crust. Nickel and its compounds are found in all parts of the environment, including plants and animals. Primary nickel is recovered from mined ore and nickel matte, and secondary nickel is recovered from scrap metal (ATSDR, 1988).

Nickel released into water will exist in both soluble and insoluble forms depending on the chemical and physical properties of the water. Nickel has not been shown to volatize from the water surface. Nickel is significantly bioaccumulated in some, but not all aquatic species (ATSDR, 1988). Nickel adversely influences cell membranes with increasing water hardness (Davis, 1994).

Nickel is extremely persistent in soil; however, it still has the potential to leach through soil into groundwater. The average residence time of nickel in soil is estimated to be 2,400 to 3,500 years. The sorption of nickel into soils has found to correlate with suspension pH, total iron, and surface area. Organic complexing agents in soil tend to restrict the movement and availability of nickel in soil by forming organo-nickel complexes. Nickel is not expected to volatize from soils (ATSDR, 1988). Nickel is not essential to plants and in some instances it produces toxic effects (Davis, 1994).

Nickel released into the atmosphere will exist primarily in aerosol form. Airborne nickel will remain in the atmosphere for varying periods of time depending upon factors such as concentration, density and particle size, and precipitation. The average residence time of nickel in the atmosphere is seven days, with typical residence time ranging from one to twenty-one days. The predominant nickel species in air tend to be nickel oxide, nickel sulfate, complex oxides of nickel and other metals, and to a lesser extent, metallic nickel, and nickel subsulfide (ATSDR, 1988).

The NOAEL for birds and mammals is 77.4 mg/kg/day and 40 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 107 mg/kg/day for birds and 80 mg/kg/day for mammals (Sample et al., 1996).

Pentachlorophenol

Pentachlorophenol (PCP) is a man-made compound that is used as an insecticide, fungicide, molluscicide, defoliant, herbicide, and wood preservative. At one time, it was one of the most

widely used biocides in the United States. However, its use has been restricted only to certified applicators. The compound is a semi-volatile solvent that was broadly used in the wood protection and pulp and paper mills, but this widespread use led to substantial environmental contamination (Irwin et al., 1997).

Biota are usually effected after a spill or by indirect exposure due to groundwater or soil contamination. PCP is toxic to animals by causing major effects on the liver, kidney, central nervous system, and immune system. Growth and survival are affected in sensitive aquatic species. In organisms, the compound is rapidly accumulated and excreted. It degrades in the environment by chemical, microbial, and photochemical processes. Concentrations are high in soils because of slow biodegradation and leaching into groundwater. In water, PCP adsorbs to sediment, photodegrades, and slowly biodegrades (Irwin et al., 1997).

For mammals, the NOAEL and LOAEL are 0.24 mg/kg/day and 2.4 mg/kg/day, respectively. The NOAEL and LOAEL for birds are 6.85 mg/kg/day and 68.5 mg/kg/day, respectively (Sample et al., 1996).

Polycyclic aromatic hydrocarbons

Acenaphthylene, acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene

The PAHs are a diverse group of compounds consisting of two or more substituted and unsubstituted polycyclic aromatic rings formed by the incomplete combustion of carbonaceous materials(ATSDR, 1990a).

PAHs are ubiquitous in the modern environment and commonly are constituents of coal tar, soot, vehicular exhausts, cigarette smoke, certain petroleum products, road tar, mineral oils, creosote and many cooked foods. PAHs also are released to the environment through natural sources such as volcano and forest fire emissions. However, most of the emissions result from anthropogenic sources, largely wood burning for homes. Vehicular emissions are another primary source of PAHs. Hazardous waste sites can be a concentrated source on a local scale. Examples of such sites include former manufactured gas sites (i.e., sources of coal tar) and abandoned wood treatment plants (i.e., sources of creosote) (ATSDR, 1990a).

In the air, PAHs are found sorbed to particulates and as gases. Particle-bound PAHs can be transported long distances and are removed from the atmosphere by precipitation and dry deposition(ATSDR, 1990a).

PAHs are transferred from surface water by volatilization and sorption to settling particles. The compounds are transformed in surface water by photooxidation, chemical oxidation and microbial metabolism (ATSDR, 1990a).

In soil and sediments, microbial metabolism is the major process for degradation of PAHs (ATSDR, 1990a). Although PAHs accumulate in terrestrial and aquatic plants, many organisms are able to metabolize and eliminate these compounds. Vertebrates can readily metabolize PAHs; whereas, lower forms (insects and worms) cannot metabolize PAHs as quickly. Food chain uptake does not appear to be a major exposure source to PAHs for aquatic animals (ATSDR, 1990a).

The NOAEL and LOAEL are 1.3 mg/kg/day and 2.6 mg/kg/day, respectively, for mammals. For birds, the NOAEL and LOAEL are 10 mg/kg/day and 100 mg/kg/day, respectively (ERT, 1997). The above toxicity reference values are used for all of the PAHs except benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, and benzo(a)pyrene. The NOAEL and LOAEL for these compounds are 1 mg/kg/day and 10 mg/kg/day, respectively, for

mammals (Sample et al, 1996). The NOAEL and LOAEL for birds is still used.

Polychlorinated biphenyls (Aroclor-1260)

The term polychlorinated biphenyls (PCBs) commonly refers to a variety of mixtures of individual biphenyl isomers, each consisting of two joined benzene rings and up to ten chlorine atoms. Mixtures of these isomers are known by their commercial designation of Aroclor. This trade name is followed by a four-digit number; the first two numbers indicate the type of isomer mixture and the last two numbers indicate the approximate weight percent of chlorine in the mixture (EPA, 1985).

PCBs are man-made chemicals that were used widely in transformers, electrical equipment, and as lubricants (ATSDR, 1989b). PCBs are inert, thermally and chemically stable compounds with dielectric properties. Because of their persistence and toxicity in the environment, their manufacture was discontinued in the United States in 1977 (EPA, 1995). However, PCB equipment manufactured before 1977 is currently still being used in the United States and this use is regulated by the Environmental Protection Agency.

PCBs are very stable chemically and tend to be persistent in the environment. Persistence and bioaccumulation in living organisms also occurs due to the high lipophilicity of these compounds (ATSDR, 1989b).

PCBs released into water adsorb to sediments and other organic matter. Typically PCB concentrations are greater in the sediment and suspended material than in the water column. Substantial quantities of PCBs in aquatic sediments can act as an environmental reservoir from which PCBs may be released slowly over a long period of time (ATSDR, 1989b). For PCBs that exist in the dissolved state in water, volatilization becomes the primary fate process. Therefore, the volatilization process is the major removal mechanisms of PCBs from water sources. However, the rate of volatilization is dependent upon PCB adsorption to sediment (ATSDR, 1989b). PCBs have the capability to bioaccumulate and biomagnify (EPA, 1985).

PCBs are expected to be highly immobile in the soil due to rapid and strong sorption. Accumulation of PCBs in terrestrial vegetation can occur by uptake from soil through the root and by deposition of atmospheric particulates on aerial plant surfaces. However, the transfer of vapor-phase PCBs from air to aerial plant parts may be the main source of vegetation contamination (ATSDR, 1989b).

PCBs can affect terrestrial wildlife in three primary ways: mortality, adversely affecting reproduction, and changing behavior. Behavioral effects include increased activity, decreased avoidance response, and decreased nesting (EPA, 1985).

Degradation of PCBs in the environment is dependent upon the degree of chlorination. Generally, the more chlorinated the PCB molecule, the persistent it will be in the environment. Factors which determine biodegradability include the amount of chlorination, concentration, type of microbial population, available nutrients, and the temperature (ATSDR, 1989b).

In the atmosphere, PCBs exist almost entirely in the vapor phase. An estimated 87 percent and 100 percent of the PCBs in the atmosphere are present in the vapor phase, and therefore are readily dispersed. The tendency of PCBs to adsorb to airborne particulates will increase as the degree of chlorination increases. The dominant degradation process in the atmosphere is dependent upon the vapor phase reaction of PCBs with hydroxyl radicals. PCBs are physically removed from the atmosphere through wet and dry deposition (ATSDR, 1989b).

The NOAEL and LOAEL are 0.068 mg/kg/day and 0.68 mg/kg/day for mammals, respectively. The NOAEL and LOAEL for birds are 0.18 mg/kg/day and 1.8 mg/kg/day, respectively (Sample et al., 1996).

Selenium

Selenium is essential in amounts from trace to part-per-billion concentrations for humans and certain plants and animals, but toxic at some concentrations present in the environment. Selenium is widely distributed in nature, being especially abundant with sulfide minerals of various metals, such as iron, lead, and copper. The major source of environmental selenium is the weathering of natural rock. Authorities agree that selenium may favorably or adversely affect growth, survival, and reproduction of algae and higher plants, bacteria and yeasts, crustaceans, mollusk, insects, fish, birds, and mammals (ATSDR, 1989e).

There is a general agreement among authorities on four points concerning selenium. First, that selenium chemistry is complex, and that additional research is warranted on chemical and biochemical transformations among valence states, allotropic forms, and isomers of selenium. Second, that selenium metabolism and degradation is significantly modified by interaction with heavy metals, agricultural chemicals, microorganisms, and a variety of physicochemical factors. Third, that anthropogenic activities (including fossil fuel combustion and metal smelting) and naturally seleniferous areas pose the greatest hazards to fish and wildlife. And fourth, that selenium deficiency is not as well documented as selenium poisoning, but may be equally significant (ATSDR, 1989e).

Elemental selenium is insoluble and largely unavailable to the biosphere, although it is still capable of satisfying metabolic nutritional requirements. In areas of acid or neutral soils, the amount of biologically available selenium should steadily decline. The decline may be accelerated by active agricultural or industrial practices. In dry areas with alkaline soils and oxidizing conditions, elemental selenium and selenides in rocks and volcanic soils may oxidize sufficiently to maintain the availability of biologically active selenium. Concentrations of selenium in water are a function of selenium levels in the drainage system and of water pH. Selenium volatilizes from soils at rates that are modified by temperature, moisture, time, season of year, concentrations of water-soluble selenium, and microbiological activity (ATSDR, 1989e).

Selenium was used in the early 1900s as a pesticide to control plant pests, and is still used sparingly to control pests of greenhouse chrysanthemums and carnations. It has been used to control cotton pests, mites and spiders that attack citrus, and mites that damage apples. Although no insect-resistant strains have developed, the use of selenium pesticides has been discontinued, owing to their stability in soils and resultant contamination of food crops, their high price, and their proven toxicity to mammals and birds. Selenium is used extensively in the manufacture and production of glass, pigments, rubber, metal alloys, textiles, petroleum, medical therapeutic agents, and photographic emulsions (ATSDR, 1989e).

Air and surface waters generally contain nonhazardous concentrations of selenium. Significant increases of selenium in specific areas are attributed exclusively to industrial sources, and to leaching of groundwater from seleniferous soils (ATSDR, 1989e).

The NOAEL for birds and mammals is 0.4 mg/kg/day and 0.2 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 0.8 mg/kg/day for birds and 0.33 mg/kg/day for mammals (Sample et al., 1996).

Silver

Numerous studies have indicated that free soluble silver (Ag) is among the most toxic metals to freshwater organisms. In most natural waters, the monovalent form of silver is of greatest concern. Silver may exist as a simple hydrated monovalent ion, or it may exist in various degrees of association with inorganic ions such as sulfate, bicarbonate, or nitrate (EPA 1980). Silver is more toxic in soft water than in hard water (EPA 1980). The sorption of silver by manganese dioxide, various ferric compounds, and clay minerals, and its subsequent partitioning by the

sediment layer is strongly pH-dependent (Dyck, 1968). Olcott (1950) administered 0.1% silver nitrate to rats in drinking water for 218 days. Upon necropsy, advanced pigmentation and ventricular hypertrophy were observed, although the hypertrophy was not attributed to silver toxicity.

Silver exhibits a limited ability to bioconcentrate. Bioconcentration factors for freshwater species reported by EPA (1980) ranged from <1 for bluegill sunfish (*Lepomis macrochirus*) to 240 for a mayfly (*Ephemeralla grandis)* with a geometric mean bioconcentration factor of 57. Based on studies of rats, chickens, and turkeys, the maximum tolerable level for silver in animal food is 100 mg/kg (NRC, 1980).

NOAEL and LOAEL values were unavailable for both birds and mammals.

Thallium

Thallium is crystalline form blue-white metal. Thallium metal forms a brownish-black oxide upon exposure to air. Thallium is highly reactive, readily soluble in acids and forms monovalent thallous and trivalent thallic salts, the latter being less stable (Friberg, 1986).

Thallium is found in the U.S.A. and Brazil in the minerals lorandite and crookesite. However, it is usually recovered from flue-dust residues in zinc and lead smelters and as a by-product of cadmium production. Thallous sulfate was used on a large scale as a rodenticide, but this has been replaced in some countries. Thallium is also used in photoelectric cells, lamps, in electronics, and in semiconductors and scintillation counters (Friberg, 1986).

Thallium is widely but sparingly distributed over the earth, mainly in rock formations and soils containing potassium feldspars and micas. Thallium is also found in potash, lead and zinc ores; and in fossil fuels. The most important sources of thallium exposure in the general population are air emissions from coal-burning power plants, and copper, lead, and zinc smelters (Friberg, 1986).

Thallium is one of the more toxic metals and can cause neural, hepatic, and renal injury. It may also cause deafness and loss of vision. Thallium is not a normal constituent of animal tissues. It is absorbed through the skin and gastrointestinal tract (Klaassen et al., 1986).

For mammals, the NOAEL and LOAEL are 0.0074 mg/kg/day and 0.074 mg/kg/day, respectively (Sample et al., 1996). The NOAEL and LOAEL for birds are 0.47 mg/kg/day and 4.7 mg/kg/day, respectively (Hudson et al., 1984).

Toluene

Toluene is a colorless liquid at standard temperature and pressure. It is primarily used as a component in gasoline but is also used in the synthesis of benzene, methane foams and other organic chemicals (ATSDR, 1989a).

Toluene can be present in the air, water, and soil. The low vapor pressure indicates that volatilization is the most probable route of transport among medium.

Photooxidation is the primary fate mechanism for atmospheric toluene. In the atmosphere, it is readily degraded by reacting with hydroxyl radicals resulting in benzaldehyde and cresols. Benzaldehyde is the principal organic product of this atmospheric conversion (ATSDR, 1989a). These rings undergo cleavage to form simple hydrocarbons. Toluene is also oxidized by reacting with nitrogen dioxide, oxygen, and ozone (ATSDR, 1989a).

Volatilization is a primary means of transport from surface water (ATSDR, 1989a). This volatilization from water depends on the turbulence of the water. Toluene in static water has a

half-life of one to six days. In turbulent water, the half-life is reduced to five to six hours. In the aquatic environment, toluene can also be oxidized by a reaction similar to that of atmospheric toluene. However, the rate of the reaction is much slower. Degradation of toluene that is not volatilized is primarily through microbial action (ATSDR, 1989a).
The partition coefficients in conjunction with water solubility indicate that toluene would tend to leach into groundwater (ATSDR, 1989a).

The primary route of transport from surface soil is volatilization. The rate of evaporation from soil depends on environmental setting characteristics such as temperature, humidity, and soil type. In general, more than 90 percent of toluene present in soil vaporizes within the first 24 hours. Toluene that has not evaporated from soil is rapidly biodegraded by various bacterial species (ATSDR, 1989a).

Toluene has a low to moderate tendency to bioaccumulate in lipophilic tissues (ATSDR, 1989a). Consequently, bioaccumulation is most likely not a significant environmental fate process (EPA, 1985).

For mammals, the NOAEL and LOAEL are 26 mg/kg/day and 260 mg/kg/day, respectively (Sample et al., 1996). Toxicity reference values are unavailable for birds.

Vanadium

Vanadium is a bright, white, soft ductile metal. Vanadium is found in the following ores: patronite, roscoelite, carnotite, and vanadinite (Hawley, 1987). It can also be found in foods, such as milk, seafood, cereals, and vegetables (Klaassen et al., 1986). Vanadium is used as the target material for x-rays, in the manufacture of alloy steels, and as a catalyst for sulfuric acid and synthetic rubber (Hawley, 1987).

Vanadium released into surface water can be transported depending on the chemical species present and by environmental factors determining its solubility and binding to organic materials. Vanadium released into the atmosphere is transported as fumes and particulates (Hawley, 1987).

The NOAEL for birds and mammals is 11.4 mg/kg/day and 0.21 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 114 mg/kg/day for birds and 2.1mg/kg/day for mammals (Sample et al., 1996).

Zinc

Zinc is bluish-white metal that dissolves readily in strong acids. Zinc compounds are found naturally in air, soil, and water, and are present in all foods. However, zinc is not found in nature in the free state. Zinc is commonly mined by underground and open pit mining. It is commonly used as a protective coating for other metals. Zinc also is used in alloys such as bronze and brass, for electrical apparatus in many common goods, and in organic chemical extractions and reductions. Zinc chloride is used by the military to create smoke bombs. In pharmaceuticals, salts of zinc are used as solubilizing agents in many drugs. In addition, zinc is used with copper to make U.S. pennies (ATSDR, 1989d).

Zinc released into surface water does not volatize, but primarily settles into the bottom sediments. Zinc can be present in water as either suspended or dissolved compounds. Dissolved zinc may occur as the free (hydrated) zinc ion or as dissolved complexes and compounds with varying degrees of stability. Suspended (undissolved) zinc may be dissolved following minor changes in the water chemistry or may be sorbed to suspended matter. The sorption of zinc is affected by the nature of the zinc, the concentrations of the zinc, the pH, and the salinity of the water. Zinc tends to be more absorbed at higher pH concentration (>7). Desorption of zinc from sediments occurs as salinity increases (ATSDR, 1989d).

Sorption of zinc is the dominant fate of zinc in the aquatic environment. Zinc partitions to sediments or suspended solids in surface water via sorption onto hydrous iron and manganese oxides, clay minerals, and organic matter. Transport of zinc in the aquatic environment is dependent upon the composition of suspended and bed sediments. Dissolved and particulate iron and manganese concentrations, pH, salinity, concentrations of complexing ligands, and the concentration of zinc affect the transport of zinc (Eisler, 1993). In freshwater, zinc is the most soluble at low pH and low alkalinity concentrations. In natural waters, two reactions can occur: the competition for complexation sites between metal ions, and the competition between different ligands for the same metal ion (ATSDR, 1989d).

Zinc is actively accumulated in aquatic systems. However, biota appear to represent a minor sink for zinc compared with the sediments (ATSDR, 1989d). Zinc bioavailability and toxicity to aquatic organisms are highest under conditions of low pH, low alkalinity, low dissolved oxygen, and elevated temperatures. Soluble species of zinc are the most bioavailable and most toxic (Eisler, 1993).

Zinc released onto soil is likely to be strongly absorbed. The mobility of zinc in soil is dependent upon the solubility of the speciated forms of the compound and on the soil properties (sorption potential, pH, and salinity; anaerobic). Little land-disposed zinc is in a soluble form; therefore, mobility is limited by a slow dissolution. Consequently, zinc is not likely to migrate into groundwater (ATSDR, 1989d).

Zinc released to the air is commonly found as a stable species such as zinc oxide. Chemical interaction of zinc compounds in the atmosphere may result in a change in the speciation of the compound. Atmospheric interactions are greatest for particles with smaller diameters. Zinc concentrations in the environment are relatively low. Volatilization may not be an important process for zinc (ATSDR, 1989d).

The NOAEL for birds and mammals is 14.5 mg/kg/day and 160 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 131 mg/kg/day for birds and 320 mg/kg/day for mammals (Sample et al., 1996).

Chromium

This metallic element naturally occurs in rocks, animals, plants, soil, and volcanic dust and gases (USDHHS, 1993). However, the toxic forms of the metal are mostly produced from anthropogenic activities, particularly chromite ore mining (Irwin et al., 1997). Since the trivalent (Cr^{3+}) and hexavalent (Cr^{6+}) forms have been found to be more stable than other ionic forms, these are the forms mostly found in the environment (Eisler, 1986). Cr^{6+} is more toxic because it has a high oxidizing potential and can easily penetrate biological membranes, thus causing cellular damage (Eisler, 1986; Irwin et al., 1997). Although not as toxic as Cr^{6+}, Cr^{3+} can impose damage by inhibiting different enzyme systems or reacting with organic molecules (Irwin et al, 1997).

Chromium toxicity is not prevalent in mammals because normal stomach pH converts Cr^{6+} to Cr^{3+}, which has low membrane permeability (Irwin et al., 1997). However, plants are adversely affected by chromium because it interferes with uptake translocation and iron metabolism (Irwin et al., 1997). For aquatic organisms, the pH, salinity, hardness, organic matter content, species and temperature are some of the factors that affect chromium toxicity (Eisler, 1986; Irwin et al., 1997). It has been found that Cr^{6+} is more toxic to freshwater species in soft and acidic waters (Eisler, 1986).

The NOAEL for birds, fish, and mammals is 1 mg/kg/day, 0.02 mg/kg/day, and 3.28 mg/kg/day, respectively (Sample et al., 1996; ERT, 1997). The LOAEL is 5 mg/kg/day for birds, 0.12 mg/kg/day for fish, and 32.8 mg/kg/day for mammals (Sample et al., 1996; ERT, 1997).

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EXAMPLE FOOD CHAIN MODELING CALCULATIONS

FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.0310000 kg		
Food Ingestion Rate	0.0086000 kg/day	0.98	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0086000 kg/day	0.02	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.189	0.189	5.24E-02	NA	NA	NA	NA
2-Methylnaphthalene	0.189	0.0012663	1.39E-03	1	10	1.39E-03	1.39E-04
Benzo(a)anthracene	0.0847	0.00056749	6.24E-04	1	10	6.24E-04	6.24E-05
Benzo(a)pyrene	0.0978	0.00065526	7.21E-04	1	10	7.21E-04	7.21E-05
Benzo(b)fluoranthene	0.1206	0.00080802	8.89E-04	1	10	8.89E-04	8.89E-05
Benzo(g,h,i)perylene	0.0739	0.00049513	5.45E-04	1	10	5.45E-04	5.45E-05
Benzo(k)fluoranthene	0.0415	0.00027805	3.06E-04	1	10	3.06E-04	3.06E-05
Bis(2-Ethylhexyl)phthalate	0.5546	0.0183018	8.05E-03	18.3	183	4.40E-04	4.40E-05
Butylbenzylphthalate	0.3202	0.0105666	4.65E-03	159	1590	2.92E-05	2.92E-06
Carbazole	0.2621	0.0136292	5.16E-03	1.3	2.6	3.97E-03	1.98E-03
Chrysene	0.0975	0.00065325	7.19E-04	1.3	2.6	5.53E-04	2.76E-04
Dibenzofuran	0.191	0.006303	2.77E-03	60	125	4.62E-05	2.22E-05
Di-n-octyl phthalate	0.634	0.634	1.76E-01	18.3	183	9.61E-03	9.61E-04
Fluoranthene	0.174	0.0011658	1.28E-03	1.3	2.6	9.86E-04	4.93E-04
Indeno(1,2,3-cd)pyrene	0.0718	0.00048106	5.29E-04	1.3	2.6	4.07E-04	2.04E-04
Phenanthrene	0.891	0.0059697	6.57E-03	1.3	2.6	5.05E-03	2.53E-03
Pyrene	0.1349	0.00090383	9.94E-04	1.3	2.6	7.65E-04	3.82E-04
Pesticides/PCBs							
4,4'-DDD	0.0356	0.000356	2.94E-04	0.8	4	3.68E-04	7.36E-05
4,4'-DDE	0.3952	0.003952	3.27E-03	0.8	4	4.08E-03	8.17E-04

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FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.0310000 kg		
Food Ingestion Rate	0.0086000 kg/day	0.98	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0086000 kg/day	0.02	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDT	0.389	0.00389	3.22E-03	0.8	4	4.02E-03	8.04E-04
Aroclor-1260	0.0178	0.002136	6.79E-04	0.068	0.68	9.99E-03	9.99E-04
alpha-BHC	0.0091	0.000027846	5.81E-05	0.014	0.14	4.15E-03	4.15E-04
beta-BHC	0.0088	0.0004312	1.66E-04	0.4	2	4.15E-04	8.30E-05
delta-BHC	0.0091	0.000027846	5.81E-05	0.014	0.14	4.15E-03	4.15E-04
gamma-BHC (Lindane)	0.0113	0.000611104	2.29E-04	8	80	2.86E-05	2.86E-06
Alpha-Chlordane	0.0077	0.00001309	4.63E-05	4.6	9.2	1.01E-05	5.03E-06
Gamma-Chlordane	0.0067	0.00001139	4.03E-05	4.6	9.2	8.75E-06	4.38E-06
Endrin Ketone	0.0128	0.00118016	3.92E-04	0.092	0.92	4.26E-03	4.26E-04
Metals and Inorganics							
Aluminum	5667.5	4.534	3.27E+01	1.93	19.3	1.69E+01	1.69E+00
Antimony	7.03	0.2812	1.15E-01	0.125	1.25	9.24E-01	9.24E-02
Arsenic	4.33	0.162375	6.82E-02	0.126	1.26	5.41E-01	5.41E-02
Barium	70.7	2.121	9.69E-01	5.1	51	1.90E-01	1.90E-02
Beryllium	0.19	0.00038	1.16E-03	0.66	6.6	1.75E-03	1.75E-04
Cadmium	0.923	0.540878	1.52E-01	1	10	1.52E-01	1.52E-02
Copper	44.34	5.49816	1.74E+00	11.7	15.14	1.49E-01	1.15E-01
Iron	19557.5	19557.5	5.43E+03	50	500	1.09E+02	1.09E+01
Lead	834	32.4426	1.34E+01	8	80	1.68E+00	1.68E-01
Manganese	123.3	6.165	2.36E+00	88	284	2.68E-02	8.31E-03
Mercury	0.21	0.13692	3.84E-02	0.015	0.025	2.56E+00	1.54E+00

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FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.0310000 kg		
Food Ingestion Rate	0.0086000 kg/day	0.98	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0086000 kg/day	0.02	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Nickel	8.23	0.14814	8.59E-02	40	80	2.15E-03	1.07E-03
Selenium	0.288	0.193536	5.42E-02	0.2	0.33	2.71E-01	1.64E-01
Silver	0.6	0.048	1.64E-02	1.8	18	9.10E-03	9.10E-04
Vanadium	12.1	0.01331	7.08E-02	0.21	2.1	3.37E-01	3.37E-02
Zinc	177	64.782	1.86E+01	160	320	1.16E-01	5.81E-02

a = Value calculated by multiplying the plant BAF by the surface soil concentration.
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.0310000 kg		
Food Ingestion Rate	0.0086000 kg/day	0.98	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0086000 kg/day	0.02	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.14	0.14	3.88E-02	NA	NA	NA	NA
2-Methylnaphthalene	0.13	0.000871	9.58E-04	1	10	9.58E-04	9.58E-05
Benzo(a)anthracene	0.28	0.001876	2.06E-03	1	10	2.06E-03	2.06E-04
Benzo(a)pyrene	0.31	0.002077	2.28E-03	1	10	2.28E-03	2.28E-04
Benzo(b)fluoranthene	0.51	0.003417	3.76E-03	1	10	3.76E-03	3.76E-04
Benzo(g,h,i)perylene	0.21	0.001407	1.55E-03	1	10	1.55E-03	1.55E-04
Benzo(k)fluoranthene	0.16	0.001072	1.18E-03	1	10	1.18E-03	1.18E-04
Bis(2-Ethylhexyl)phthalate	5.6	0.1848	8.13E-02	18.3	183	4.44E-03	4.44E-04
Butylbenzylphthalate	2	0.066	2.90E-02	159	1590	1.83E-04	1.83E-05
Carbazole	0.49	0.02548	9.65E-03	1.3	2.6	7.42E-03	3.71E-03
Chrysene	0.33	0.002211	2.43E-03	1.3	2.6	1.87E-03	9.35E-04
Dibenzofuran	0.2	0.0066	2.90E-03	60	125	4.84E-05	2.32E-05
Di-n-octyl phthalate	6.4	6.4	1.78E+00	18.3	183	9.70E-02	9.70E-03
Fluoranthene	0.63	0.004221	4.64E-03	1.3	2.6	3.57E-03	1.79E-03
Indeno(1,2,3-cd)pyrene	0.23	0.001541	1.70E-03	1.3	2.6	1.30E-03	6.52E-04
Phenanthrene	0.19	0.001273	1.40E-03	1.3	2.6	1.08E-03	5.39E-04
Pyrene	0.51	0.003417	3.76E-03	1.3	2.6	2.89E-03	1.45E-03
Pesticides/PCBs							
4,4'-DDD	0.18	0.0018	1.49E-03	0.8	4	1.86E-03	3.72E-04
4,4'-DDE	4.2	0.042	3.47E-02	0.8	4	4.34E-02	8.68E-03

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FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.0310000 kg		
Food Ingestion Rate	0.0086000 kg/day	0.98	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0086000 kg/day	0.02	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDT	4.4	0.044	3.64E-02	0.8	4	4.55E-02	9.09E-03
Aroclor-1260	0.08	0.0096	3.05E-03	0.068	0.68	4.49E-02	4.49E-03
alpha-BHC	0.042	0.00012852	2.68E-04	0.014	0.14	1.91E-02	1.91E-03
beta-BHC	0.033	0.001617	6.23E-04	0.4	2	1.56E-03	3.11E-04
delta-BHC	0.45	0.001377	2.87E-03	0.014	0.14	2.05E-01	2.05E-02
gamma-BHC (Lindane)	0.75	0.04056	1.52E-02	8	80	1.90E-03	1.90E-04
Alpha-Chlordane	0.018	0.0000306	1.08E-04	4.6	9.2	2.35E-05	1.18E-05
Gamma-Chlordane	0.0081	0.00001377	4.87E-05	4.6	9.2	1.06E-05	5.29E-06
Endrin Ketone	0.012	0.0011064	3.67E-04	0.092	0.92	3.99E-03	3.99E-04
Metals and Inorganics							
Aluminum	8610	6.888	4.96E+01	1.93	19.3	2.57E+01	2.57E+00
Antimony	90.6	3.624	1.49E+00	0.125	1.25	1.19E+01	1.19E+00
Arsenic	24.9	0.93375	3.92E-01	0.126	1.26	3.11E+00	3.11E-01
Barium	178	5.34	2.44E+00	5.1	51	4.78E-01	4.78E-02
Beryllium	0.51	0.00102	3.11E-03	0.66	6.6	4.71E-03	4.71E-04
Cadmium	5.4	3.1644	8.90E-01	1	10	8.90E-01	8.90E-02
Copper	131	16.244	5.14E+00	11.7	15.14	4.40E-01	3.40E-01
Iron	147000	147000	4.08E+04	50	500	8.16E+02	8.16E+01
Lead	8380	325.982	1.35E+02	8	80	1.69E+01	1.69E+00
Manganese	752	37.6	1.44E+01	88	284	1.64E-01	5.07E-02
Mercury	1.1	0.7172	2.01E-01	0.015	0.025	1.34E+01	8.04E+00

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FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.0310000 kg		
Food Ingestion Rate	0.0086000 kg/day	0.98	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0086000 kg/day	0.02	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Nickel	47.8	0.8604	4.99E-01	40	80	1.25E-02	6.24E-03
Selenium	1.1	0.7392	2.07E-01	0.2	0.33	1.04E+00	6.27E-01
Silver	2.4	0.192	6.55E-02	1.8	18	3.64E-02	3.64E-03
Vanadium	47.4	0.05214	2.77E-01	0.21	2.1	1.32E+00	1.32E-01
Zinc	497	181.902	5.22E+01	160	320	3.26E-01	1.63E-01

a = Value calculated by multiplying the plant BAF by the surface soil concentration.
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
RED FOX - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox
(Conservative Inputs)

Body Weight	4.5300000 kg		
Food Ingestion Rate	0.4980000 kg/day	0.972	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.4980000 kg/day	0.028	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Small Mammal[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.189	0.189	2.08E-02	NA	NA	NA	NA
2-Methylnaphthalene	0.189	0.00315785	9.19E-04	1	10	9.19E-04	9.19E-05
Benzo(a)anthracene	0.0847	0.000402749	3.04E-04	1	10	3.04E-04	3.04E-05
Benzo(a)pyrene	0.0978	0.001102025	4.19E-04	1	10	4.19E-04	4.19E-05
Benzo(b)fluoranthene	0.1206	0.001276177	5.08E-04	1	10	5.08E-04	5.08E-05
Benzo(g,h,i)perylene	0.0739	0.000616204	2.93E-04	1	10	2.93E-04	2.93E-05
Benzo(k)fluoranthene	0.0415	0.00035711	1.66E-04	1	10	1.66E-04	1.66E-05
Bis(2-Ethylhexyl)phthalate	0.5546	0.042967635	6.30E-03	18.3	183	3.44E-04	3.44E-05
Butylbenzylphthalate	0.3202	0.024807495	3.64E-03	159	1590	2.29E-05	2.29E-06
Carbazole	0.2621	0.003080094	1.14E-03	1.3	2.6	8.74E-04	4.37E-04
Chrysene	0.0975	0.000609863	3.65E-04	1.3	2.6	2.81E-04	1.40E-04
Dibenzofuran	0.191	0.001905225	7.92E-04	60	125	1.32E-05	6.33E-06
Di-n-octyl phthalate	0.634	0.634	6.97E-02	18.3	183	3.81E-03	3.81E-04
Fluoranthene	0.174	0.000588111	5.98E-04	1.3	2.6	4.60E-04	2.30E-04
Indeno(1,2,3-cd)pyrene	0.0718	0.00097545	3.25E-04	1.3	2.6	2.50E-04	1.25E-04
Phenanthrene	0.891	0.004149565	3.19E-03	1.3	2.6	2.45E-03	1.23E-03
Pyrene	0.1349	0.000507899	4.70E-04	1.3	2.6	3.61E-04	1.81E-04
Pesticides/PCBs							
4,4'-DDD	0.0356	0.0707016	7.66E-03	0.8	4	9.58E-03	1.92E-03

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FOOD CHAIN MODELING CALCULATION
RED FOX - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox
(Conservative Inputs)

Body Weight	4.5300000 kg		
Food Ingestion Rate	0.4980000 kg/day	0.972	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.4980000 kg/day	0.028	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Small Mammal[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDE	0.3952	0.4054752	4.45E-02	0.8	4	5.57E-02	1.11E-02
4,4'-DDT	0.389	0.135372	1.57E-02	0.8	4	1.96E-02	3.92E-03
Aroclor-1260	0.0178	0.22953634	2.46E-02	0.068	0.68	3.62E-01	3.62E-02
alpha-BHC	0.0091	0.004563923	5.16E-04	0.014	0.14	3.68E-02	3.68E-03
beta-BHC	0.0088	0.0046156	5.20E-04	0.4	2	1.30E-03	2.60E-04
delta-BHC	0.0091	0.004563923	5.16E-04	0.014	0.14	3.68E-02	3.68E-03
gamma-BHC (Lindane)	0.0113	0.005955552	6.71E-04	8	80	8.39E-05	8.39E-06
Alpha-Chlordane	0.0077	0.0033916	3.86E-04	4.6	9.2	8.39E-05	4.20E-05
Gamma-Chlordane	0.0067	0.002951132	3.36E-04	4.6	9.2	7.30E-05	3.65E-05
Endrin Ketone	0.0128	0.00105088	1.52E-04	0.092	0.92	1.65E-03	1.65E-04
Metals and Inorganics							
Aluminum	5667.5	11.43418125	1.87E+01	1.93	19.3	9.67E+00	9.67E-01
Antimony	7.03	0.18278	4.12E-02	0.125	1.25	3.29E-01	3.29E-02
Arsenic	4.33	0.05661475	1.94E-02	0.126	1.26	1.54E-01	1.54E-02
Barium	70.7	0.27307875	2.47E-01	5.1	51	4.84E-02	4.84E-03
Beryllium	0.19	0.0047595	1.09E-03	0.66	6.6	1.66E-03	1.66E-04
Cadmium	0.923	8.0381301	8.62E-01	1	10	8.62E-01	8.62E-02
Copper	44.34	8.499978	1.04E+00	11.7	15.14	8.93E-02	6.90E-02
Iron	19557.5	10150.3425	1.14E+03	50	500	2.29E+01	2.29E+00
Lead	834	1.9071495	2.77E+00	8	80	3.46E-01	3.46E-02
Manganese	123.3	0.128232	3.93E-01	88	284	4.47E-03	1.38E-03
Mercury	0.21	0.00246225	9.10E-04	0.015	0.025	6.06E-02	3.64E-02
Nickel	8.23	1.3295565	1.67E-01	40	80	4.19E-03	2.09E-03

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FOOD CHAIN MODELING CALCULATION
RED FOX - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox
(Conservative Inputs)

Body Weight	4.5300000 kg		
Food Ingestion Rate	0.4980000 kg/day	0.972	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.4980000 kg/day	0.028	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Small Mammal[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Selenium	0.288	0.178956	2.00E-02	0.2	0.33	1.00E-01	6.06E-02
Silver	0.6	0.0486	7.04E-03	1.8	18	3.91E-03	3.91E-04
Vanadium	12.1	0.03153865	4.06E-02	0.21	2.1	1.93E-01	1.93E-02
Zinc	177	662.92695	7.14E+01	160	320	4.46E-01	2.23E-01

a = Value calculated by determining shrew concentration and mouse concentration. For the shrew concentration, the earthworm concentration was calculated by multiplying the invertebrate BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a shrew. This procedure was also done for the mouse except vegetation concentration was calculated by multiplying the plant BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a mouse. The predicted shrew and mouse concentrations were then averaged to calculate the prey concentration.

NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
RED FOX - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox
(Conservative Inputs)

Body Weight	4.5300000 kg		
Food Ingestion Rate	0.4980000 kg/day	0.972	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.4980000 kg/day	0.028	Surface soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Small Mammal[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.14	0.14	1.54E-02	NA	NA	NA	NA
2-Methylnaphthalene	0.13	0.002172066	6.32E-04	1	10	6.32E-04	6.32E-05
Benzo(a)anthracene	0.28	0.0013314	1.00E-03	1	10	1.00E-03	1.00E-04
Benzo(a)pyrene	0.31	0.003493127	1.33E-03	1	10	1.33E-03	1.33E-04
Benzo(b)fluoranthene	0.51	0.005396769	2.15E-03	1	10	2.15E-03	2.15E-04
Benzo(g,h,i)perylene	0.21	0.001751054	8.34E-04	1	10	8.34E-04	8.34E-05
Benzo(k)fluoranthene	0.16	0.001376808	6.40E-04	1	10	6.40E-04	6.40E-05
Bis(2-Ethylhexyl)phthalate	5.6	0.43386	6.36E-02	18.3	183	3.48E-03	3.48E-04
Butylbenzylphthalate	2	0.15495	2.27E-02	159	1590	1.43E-04	1.43E-05
Carbazole	0.49	0.005758284	2.12E-03	1.3	2.6	1.63E-03	8.17E-04
Chrysene	0.33	0.00206415	1.24E-03	1.3	2.6	9.51E-04	4.76E-04
Dibenzofuran	0.2	0.001995	8.29E-04	60	125	1.38E-05	6.63E-06
Di-n-octyl phthalate	6.4	6.4	7.04E-01	18.3	183	3.84E-02	3.84E-03
Fluoranthene	0.63	0.002129369	2.17E-03	1.3	2.6	1.67E-03	8.33E-04
Indeno(1,2,3-cd)pyrene	0.23	0.0031247	1.04E-03	1.3	2.6	8.01E-04	4.01E-04
Phenanthrene	0.19	0.000884868	6.79E-04	1.3	2.6	5.23E-04	2.61E-04
Pyrene	0.51	0.00192015	1.78E-03	1.3	2.6	1.37E-03	6.83E-04
Pesticides/PCBs							
4,4'-DDD	0.18	0.35748	3.88E-02	0.8	4	4.84E-02	9.69E-03
4,4'-DDE	4.2	4.3092	4.73E-01	0.8	4	5.92E-01	1.18E-01
4,4'-DDT	4.4	1.5312	1.77E-01	0.8	4	2.21E-01	4.43E-02
Aroclor-1260	0.08	1.031624	1.10E-01	0.068	0.68	1.62E+00	1.62E-01

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FOOD CHAIN MODELING CALCULATION
RED FOX - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox
(Conservative Inputs)

Body Weight	4.5300000 kg		
Food Ingestion Rate	0.4980000 kg/day	0.972	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.4980000 kg/day	0.028	Surface soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Small Mammal[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
alpha-BHC	0.042	0.02106426	2.38E-03	0.014	0.14	1.70E-01	1.70E-02
beta-BHC	0.033	0.0173085	1.95E-03	0.4	2	4.88E-03	9.76E-04
delta-BHC	0.45	0.2256885	2.55E-02	0.014	0.14	1.82E+00	1.82E-01
gamma-BHC (Lindane)	0.75	0.39528	4.45E-02	8	80	5.57E-03	5.57E-04
Alpha-Chlordane	0.018	0.007928415	9.03E-04	4.6	9.2	1.96E-04	9.81E-05
Gamma-Chlordane	0.0081	0.003567787	4.06E-04	4.6	9.2	8.83E-05	4.41E-05
Endrin Ketone	0.012	0.0009852	1.42E-04	0.092	0.92	1.55E-03	1.55E-04
Metals and Inorganics							
Aluminum	8610	17.370675	2.84E+01	1.93	19.3	1.47E+01	1.47E+00
Antimony	90.6	2.3556	5.31E-01	0.125	1.25	4.24E+00	4.24E-01
Arsenic	24.9	0.3255675	1.11E-01	0.126	1.26	8.84E-01	8.84E-02
Barium	178	0.687525	6.21E-01	5.1	51	1.22E-01	1.22E-02
Beryllium	0.51	0.0127755	2.93E-03	0.66	6.6	4.45E-03	4.45E-04
Cadmium	5.4	47.02698	5.04E+00	1	10	5.04E+00	5.04E-01
Copper	131	25.1127	3.09E+00	11.7	15.14	2.64E-01	2.04E-01
Iron	147000	76293	8.60E+03	50	500	1.72E+02	1.72E+01
Lead	8380	19.162965	2.78E+01	8	80	3.48E+00	3.48E-01
Manganese	752	0.78208	2.40E+00	88	284	2.73E-02	8.44E-03
Mercury	1.1	0.0128975	4.76E-03	0.015	0.025	3.18E-01	1.91E-01
Nickel	47.8	7.72209	9.72E-01	40	80	2.43E-02	1.22E-02
Selenium	1.1	0.6835125	7.64E-02	0.2	0.33	3.82E-01	2.32E-01
Silver	2.4	0.1944	2.82E-02	1.8	18	1.56E-02	1.56E-03
Vanadium	47.4	0.1235481	1.59E-01	0.21	2.1	7.58E-01	7.58E-02

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FOOD CHAIN MODELING CALCULATION
RED FOX - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox
(Conservative Inputs)

Body Weight	4.5300000 kg		
Food Ingestion Rate	0.4980000 kg/day	0.972	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.4980000 kg/day	0.028	Surface soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Small Mammal[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Zinc	497	1861.43895	2.00E+02	160	320	1.25E+00	6.26E-01

a = Value calculated by determining shrew concentration and mouse concentration. For the shrew concentration, the earthworm concentration was calculated by multiplying the invertebrate BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a shrew. This procedure was also done for the mouse except vegetation concentration was calculated by multiplying the plant BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a mouse. The predicted shrew and mouse concentrations were then averaged to calculate the prey concentration.

NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
RACCOON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000 kg		
Food Ingestion Rate	0.8560000 kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)								
Acenaphthylene	0.350571	0	0.054697523	1.77E-02	1.3	2.6	1.36E-02	6.81E-03
Anthracene	0.14327	0	0.058401225	1.42E-02	1.3	2.6	1.10E-02	5.48E-03
Benzo(a)anthracene	0.352164	0	0.143552795	3.50E-02	1	10	3.50E-02	3.50E-03
Benzo(a)pyrene	0.319114	0	0.130080606	3.17E-02	1	10	3.17E-02	3.17E-03
Benzo(b)fluoranthene	0.31793	0	0.129597972	3.16E-02	1	10	3.16E-02	3.16E-03
Benzo(g,h,i)perylene	0.198804	0	0.004247539	4.83E-03	1	10	4.83E-03	4.83E-04
Benzo(k)fluoranthene	0.149663	0	0.061007207	1.49E-02	1	10	1.49E-02	1.49E-03
Carbazole	0.376778	0	0.529607631	1.11E-01	1.3	2.6	8.50E-02	4.25E-02
Chrysene	0.389771	0.00075	0.158882556	3.87E-02	1.3	2.6	2.98E-02	1.49E-02
Dibenzo(a,h)anthracene	0.215946	0	0.088026181	2.15E-02	1.3	2.6	1.65E-02	8.26E-03
Fluoranthene	0.903414	0.0000815	0.36825912	8.98E-02	1.3	2.6	6.91E-02	3.45E-02
Fluorene	0.111375	0	0.045399849	1.11E-02	1.3	2.6	8.52E-03	4.26E-03
Indeno(1,2,3-cd)pyrene	0.219521	0	0.08948346	2.18E-02	1.3	2.6	1.68E-02	8.39E-03
Phenanthrene	0.408804	0	0.373103426	8.08E-02	1.3	2.6	6.21E-02	3.11E-02
Pyrene	0.769304	0	0.313591791	7.65E-02	1.3	2.6	5.88E-02	2.94E-02
Pesticides/PCBs (mg/kg)								
4,4'-DDD	0.025818	0	0.010161301	2.50E-03	0.8	4	3.12E-03	6.24E-04
4,4'-DDE	0.017579	0	0.190262671	3.73E-02	0.8	4	4.67E-02	9.33E-03
4,4'-DDT	0.026292	0	0.061717566	1.25E-02	0.8	4	1.57E-02	3.13E-03
Alpha-Chlordane	0.008338	0	0.055904783	1.10E-02	4.6	9.2	2.40E-03	1.20E-03

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FOOD CHAIN MODELING CALCULATION
RACCOON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000 kg		
Food Ingestion Rate	0.8560000 kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.011982	0	0.037389614	7.51E-03	4.6	9.2	1.63E-03	8.16E-04
alpha-BHC	0.002968	0	0.007509398	1.52E-03	0.014	0.14	1.09E-01	1.09E-02
beta-BHC	0.003161	0	0.007997711	1.62E-03	0.4	2	4.05E-03	8.09E-04
delta-BHC	0.002968	0	0.007509398	1.52E-03	0.014	0.14	1.09E-01	1.09E-02
gamma-BHC (Lindane)	0.002925	0	0.007400602	1.50E-03	8	80	1.87E-04	1.87E-05
Inorganics (mg/kg)								
Aluminum	10178.57143	3.832125	10178.57143	2.18E+03	1.93	19.3	1.13E+03	1.13E+02
Arsenic	6.248929	0.003025	6.248929	1.34E+00	0.126	1.26	1.06E+01	1.06E+00
Barium	23.925	0.020325	23.925	5.13E+00	5.1	51	1.01E+00	1.01E-01
Beryllium	0.390893	0	0.390893	8.39E-02	0.66	6.6	1.27E-01	1.27E-02
Cadmium	0.083393	0.000203125	0.083393	1.79E-02	1	10	1.79E-02	1.79E-03
Cobalt	1.953571	0.000769375	1.953571	4.19E-01	1	10	4.19E-01	4.19E-02
Copper	27.425	0.01141875	27.425	5.88E+00	11.7	15.14	5.03E-01	3.89E-01
Iron	13220.71429	3.4045625	13220.71429	2.84E+03	50	500	5.67E+01	5.67E+00
Lead	48.457143	0.0147	48.457143	1.04E+01	8	80	1.30E+00	1.30E-01
Manganese	92.517857	0.0583375	92.517857	1.98E+01	88	284	2.26E-01	6.99E-02
Mercury	0.12625	0.000065	0.12625	2.71E-02	0.015	0.025	1.81E+00	1.08E+00
Silver	0.2875	0.0003925	0.2875	6.17E-02	1.8	18	3.43E-02	3.43E-03
Thallium	0.348393	0	0.348393	7.47E-02	0.0074	0.074	1.01E+01	1.01E+00
Vanadium	27.282143	0.008059375	27.282143	5.85E+00	0.21	2.1	2.79E+01	2.79E+00
Zinc	44.985714	0.017825	44.985714	9.65E+00	160	320	6.03E-02	3.02E-02

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FOOD CHAIN MODELING CALCULATION
RACCOON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000 kg		
Food Ingestion Rate	0.8560000 kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a = Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).

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FOOD CHAIN MODELING CALCULATION
RACCOON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000 kg		
Food Ingestion Rate	0.8560000 kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)								
Acenaphthylene	0.38	0	0.059289157	1.92E-02	1.3	2.6	1.48E-02	7.38E-03
Anthracene	0.77	0	0.313875502	7.65E-02	1.3	2.6	5.89E-02	2.94E-02
Benzo(a)anthracene	2.2	0	0.896787149	2.19E-01	1	10	2.19E-01	2.19E-02
Benzo(a)pyrene	1.7	0	0.692971888	1.69E-01	1	10	1.69E-01	1.69E-02
Benzo(b)fluoranthene	1.8	0	0.73373494	1.79E-01	1	10	1.79E-01	1.79E-02
Benzo(g,h,i)perylene	0.99	0	0.021151807	2.41E-02	1	10	2.41E-02	2.41E-03
Benzo(k)fluoranthene	0.85	0	0.346485944	8.45E-02	1	10	8.45E-02	8.45E-03
Carbazole	0.58	0	0.815261044	1.70E-01	1.3	2.6	1.31E-01	6.54E-02
Chrysene	2.3	0.0001	0.937550201	2.29E-01	1.3	2.6	1.76E-01	8.79E-02
Dibenzo(a,h)anthracene	1.6	0	0.652208835	1.59E-01	1.3	2.6	1.22E-01	6.12E-02
Fluoranthene	6.6	0.00022	2.690361446	6.56E-01	1.3	2.6	5.05E-01	2.52E-01
Fluorene	0.16		0.065220884	1.59E-02	1.3	2.6	1.22E-02	6.12E-03
Indeno(1,2,3-cd)pyrene	1.1	0	0.448393574	1.09E-01	1.3	2.6	8.41E-02	4.21E-02
Phenanthrene	2.6	0	2.372943775	5.14E-01	1.3	2.6	3.95E-01	1.98E-01
Pyrene	5.4	0	2.201204819	5.37E-01	1.3	2.6	4.13E-01	2.06E-01
Pesticides/PCBs (mg/kg)								
4,4'-DDD	0.26	0	0.102329317	2.51E-02	0.8	4	3.14E-02	6.28E-03
4,4'-DDE	0.12	0	1.298795181	2.55E-01	0.8	4	3.19E-01	6.37E-02
4,4'-DDT	0.27	0	0.633795181	1.29E-01	0.8	4	1.61E-01	3.22E-02
Alpha-Chlordane	0.052	0	0.348650602	6.88E-02	4.6	9.2	1.50E-02	7.48E-03

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FOOD CHAIN MODELING CALCULATION
RACCOON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000 kg		
Food Ingestion Rate	0.8560000 kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.13	0	0.405662651	8.15E-02	4.6	9.2	1.77E-02	8.86E-03
alpha-BHC	0.0027	0	0.006831325	1.38E-03	0.014	0.14	9.87E-02	9.87E-03
beta-BHC	0.0054	0	0.013662651	2.76E-03	0.4	2	6.91E-03	1.38E-03
delta-BHC	0.0027	0	0.006831325	1.38E-03	0.014	0.14	9.87E-02	9.87E-03
gamma-BHC (Lindane)	0.0021	0	0.005313253	1.08E-03	8	80	1.34E-04	1.34E-05
Inorganics (mg/kg)								
Aluminum	23400	13.435	23400	5.02E+03	1.93	19.3	2.60E+03	2.60E+02
Arsenic	15.6	0.0139	15.6	3.35E+00	0.126	1.26	2.66E+01	2.66E+00
Barium	88.5	0.03715	88.5	1.90E+01	5.1	51	3.72E+00	3.72E-01
Beryllium	1.2	0	1.2	2.57E-01	0.66	6.6	3.90E-01	3.90E-02
Cadmium	0.79	0.00042	0.79	1.69E-01	1	10	1.69E-01	1.69E-02
Cobalt	3.9	0.0029	3.9	8.37E-01	1	10	8.37E-01	8.37E-02
Copper	95.3	0.06295	95.3	2.04E+01	11.7	15.14	1.75E+00	1.35E+00
Iron	24000	15.6	24000	5.15E+03	50	500	1.03E+02	1.03E+01
Lead	194	0.0775	194	4.16E+01	8	80	5.20E+00	5.20E-01
Manganese	190	0.124	190	4.08E+01	88	284	4.63E-01	1.44E-01
Mercury	0.67	0.00012	0.67	1.44E-01	0.015	0.025	9.58E+00	5.75E+00
Silver	2.4	0.00089	2.4	5.15E-01	1.8	18	2.86E-01	2.86E-02
Thallium	0.925	0	0.925	1.98E-01	0.0074	0.074	2.68E+01	2.68E+00
Vanadium	50.65	0.0361	50.65	1.09E+01	0.21	2.1	5.17E+01	5.17E+00
Zinc	124	0.051025	124	2.66E+01	160	320	1.66E-01	8.31E-02

FOOD CHAIN MODELING CALCULATION
RACCOON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000 kg		
Food Ingestion Rate	0.8560000 kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a = Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).

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FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.1970000 kg		
Food Ingestion Rate	0.1520000 kg/day	0.896	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.1520000 kg/day	0.104	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.189	0.189	1.46E-01	NA	NA	NA	NA
2-Methylnaphthalene	0.189	0.019786032	2.88E-02	10	100	2.88E-03	2.88E-04
Benzo(a)anthracene	0.0847	0.0021175	8.26E-03	10	100	8.26E-04	8.26E-05
Benzo(a)pyrene	0.0978	0.006691574	1.25E-02	10	100	1.25E-03	1.25E-04
Benzo(b)fluoranthene	0.1206	0.007699828	1.50E-02	10	100	1.50E-03	1.50E-04
Benzo(g,h,i)perylene	0.0739	0.003612897	8.43E-03	10	100	8.43E-04	8.43E-05
Benzo(k)fluoranthene	0.0415	0.002102681	4.78E-03	10	100	4.78E-04	4.78E-05
Bis(2-Ethylhexyl)phthalate	0.5546	0.5546	4.28E-01	1.1	11	3.89E-01	3.89E-02
Butylbenzylphthalate	0.3202	0.3202	2.47E-01	1.1	11	2.25E-01	2.25E-02
Carbazole	0.2621	0.027438725	4.00E-02	10	100	4.00E-03	4.00E-04
Chrysene	0.0975	0.0034125	1.02E-02	10	100	1.02E-03	1.02E-04
Dibenzofuran	0.191	0.0191	2.85E-02	NA	NA	NA	NA
Di-n-octyl phthalate	0.634	0.634	4.89E-01	1.1	11	4.45E-01	4.45E-02
Fluoranthene	0.174	0.002754942	1.59E-02	10	100	1.59E-03	1.59E-04
Indeno(1,2,3-cd)pyrene	0.0718	0.006021938	9.92E-03	10	100	9.92E-04	9.92E-05
Phenanthrene	0.891	0.021694068	8.65E-02	10	100	8.65E-03	8.65E-04
Pyrene	0.1349	0.00248216	1.25E-02	10	100	1.25E-03	1.25E-04
Pesticides/PCBs							
4,4'-DDD	0.0356	0.11748	8.41E-02	0.0028	0.028	3.00E+01	3.00E+00
4,4'-DDE	0.3952	0.67184	4.96E-01	0.0028	0.028	1.77E+02	1.77E+01

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FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.1970000 kg		
Food Ingestion Rate	0.1520000 kg/day	0.896	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.1520000 kg/day	0.104	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDT	0.389	0.22173	1.85E-01	0.0028	0.028	6.59E+01	6.59E+00
Aroclor-1260	0.0178	0.1186726	8.35E-02	0.18	1.8	4.64E-01	4.64E-02
alpha-BHC	0.0091	0.0091	7.02E-03	0.56	2.25	1.25E-02	3.12E-03
beta-BHC	0.0088	0.0088	6.79E-03	0.56	2.25	1.21E-02	3.02E-03
delta-BHC	0.0091	0.0091	7.02E-03	0.56	2.25	1.25E-02	3.12E-03
gamma-BHC (Lindane)	0.0113	0.0113	8.72E-03	2	20	4.36E-03	4.36E-04
Alpha-Chlordane	0.0077	0.01232	9.14E-03	2.14	10.7	4.27E-03	8.54E-04
Gamma-Chlordane	0.0067	0.01072	7.95E-03	2.14	10.7	3.71E-03	7.43E-04
Endrin Ketone	0.0128	0.0009216	1.66E-03	0.01	0.1	1.66E-01	1.66E-02
Metals and Inorganics							
Aluminum	5667.5	300.3775	6.62E+02	109.7	1097	6.04E+00	6.04E-01
Antimony	7.03	7.03	5.42E+00	NA	NA	NA	NA
Arsenic	4.33	0.96992	1.02E+00	2.46	7.38	4.14E-01	1.38E-01
Barium	70.7	70.7	5.46E+01	20.8	41.7	2.62E+00	1.31E+00
Beryllium	0.19	0.19	1.47E-01	NA	NA	NA	NA
Cadmium	0.923	7.114484	4.99E+00	1.45	20	3.44E+00	2.50E-01
Copper	44.34	22.8351	1.93E+01	47	61.7	4.12E-01	3.14E-01
Iron	19557.5	743.185	2.08E+03	100	1000	2.08E+01	2.08E+00
Lead	834	221.844	2.20E+02	1.13	11.3	1.95E+02	1.95E+01
Manganese	123.3	6.6582	1.45E+01	977	9770	1.48E-02	1.48E-03
Mercury	0.21	0.35553	2.63E-01	0.0064	0.064	4.10E+01	4.10E+00

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FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.1970000 kg		
Food Ingestion Rate	0.1520000 kg/day	0.896	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.1520000 kg/day	0.104	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Nickel	8.23	8.71557	6.69E+00	77.4	107	8.64E-02	6.25E-02
Selenium	0.288	0.28368	2.19E-01	0.4	0.8	5.48E-01	2.74E-01
Silver	0.6	0.6	4.63E-01	NA	NA	NA	NA
Vanadium	12.1	0.4719	1.30E+00	11.4	114	1.14E-01	1.14E-02
Zinc	177	566.577	4.06E+02	14.5	131	2.80E+01	3.10E+00

a = Value calculated by multiplying the invertebrate BAF by the surface soil concentration.
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.1970000 kg		
Food Ingestion Rate	0.1520000 kg/day	0.896	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.1520000 kg/day	0.104	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.14	0.14	1.08E-01	NA	NA	NA	NA
2-Methylnaphthalene	0.13	0.01360944	1.98E-02	10	100	1.98E-03	1.98E-04
Benzo(a)anthracene	0.28	0.007	2.73E-02	10	100	2.73E-03	2.73E-04
Benzo(a)pyrene	0.31	0.02121051	3.95E-02	10	100	3.95E-03	3.95E-04
Benzo(b)fluoranthene	0.51	0.03256146	6.34E-02	10	100	6.34E-03	6.34E-04
Benzo(g,h,i)perylene	0.21	0.01026669	2.39E-02	10	100	2.39E-03	2.39E-04
Benzo(k)fluoranthene	0.16	0.00810672	1.84E-02	10	100	1.84E-03	1.84E-04
Bis(2-Ethylhexyl)phthalate	5.6	5.6	4.32E+00	1.1	11	3.93E+00	3.93E-01
Butylbenzylphthalate	2	2	1.54E+00	1.1	11	1.40E+00	1.40E-01
Carbazole	0.49	0.05129712	7.48E-02	10	100	7.48E-03	7.48E-04
Chrysene	0.33	0.01155	3.45E-02	10	100	3.45E-03	3.45E-04
Dibenzofuran	0.2	0.02	2.99E-02	NA	NA	NA	NA
Di-n-octyl phthalate	6.4	6.4	4.94E+00	1.1	11	4.49E+00	4.49E-01
Fluoranthene	0.63	0.00997479	5.74E-02	10	100	5.74E-03	5.74E-04
Indeno(1,2,3-cd)pyrene	0.23	0.01929033	3.18E-02	10	100	3.18E-03	3.18E-04
Phenanthrene	0.19	0.00462612	1.84E-02	10	100	1.84E-03	1.84E-04
Pyrene	0.51	0.009384	4.74E-02	10	100	4.74E-03	4.74E-04
Pesticides/PCBs							
4,4'-DDD	0.18	0.594	4.25E-01	0.0028	0.028	1.52E+02	1.52E+01
4,4'-DDE	4.2	7.14	5.27E+00	0.0028	0.028	1.88E+03	1.88E+02

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FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.1970000 kg		
Food Ingestion Rate	0.1520000 kg/day	0.896	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.1520000 kg/day	0.104	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDT	4.4	2.508	2.09E+00	0.0028	0.028	7.45E+02	7.45E+01
Aroclor-1260	0.08	0.53336	3.75E-01	0.18	1.8	2.08E+00	2.08E-01
alpha-BHC	0.042	0.042	3.24E-02	0.56	2.25	5.79E-02	1.44E-02
beta-BHC	0.033	0.033	2.55E-02	0.56	2.25	4.55E-02	1.13E-02
delta-BHC	0.45	0.45	3.47E-01	0.56	2.25	6.20E-01	1.54E-01
gamma-BHC (Lindane)	0.75	0.75	5.79E-01	2	20	2.89E-01	2.89E-02
Alpha-Chlordane	0.018	0.0288	2.14E-02	2.14	10.7	9.98E-03	2.00E-03
Gamma-Chlordane	0.0081	0.01296	9.61E-03	2.14	10.7	4.49E-03	8.98E-04
Endrin Ketone	0.012	0.000864	1.56E-03	0.01	0.1	1.56E-01	1.56E-02
Metals and Inorganics							
Aluminum	8610	456.33	1.01E+03	109.7	1097	9.17E+00	9.17E-01
Antimony	90.6	90.6	6.99E+01	NA	NA	NA	NA
Arsenic	24.9	5.5776	5.85E+00	2.46	7.38	2.38E+00	7.93E-01
Barium	178	178	1.37E+02	20.8	41.7	6.60E+00	3.29E+00
Beryllium	0.51	0.51	3.94E-01	NA	NA	NA	NA
Cadmium	5.4	41.6232	2.92E+01	1.45	20	2.01E+01	1.46E+00
Copper	131	67.465	5.72E+01	47	61.7	1.22E+00	9.26E-01
Iron	147000	5586	1.57E+04	100	1000	1.57E+02	1.57E+01
Lead	8380	2229.08	2.21E+03	1.13	11.3	1.96E+03	1.96E+02
Manganese	752	40.608	8.84E+01	977	9770	9.05E-02	9.05E-03
Mercury	1.1	1.8623	1.38E+00	0.0064	0.064	2.15E+02	2.15E+01

FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.1970000 kg		
Food Ingestion Rate	0.1520000 kg/day	0.896	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.1520000 kg/day	0.104	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Nickel	47.8	50.6202	3.88E+01	77.4	107	5.02E-01	3.63E-01
Selenium	1.1	1.0835	8.37E-01	0.4	0.8	2.09E+00	1.05E+00
Silver	2.4	2.4	1.85E+00	NA	NA	NA	NA
Vanadium	47.4	1.8486	5.08E+00	11.4	114	4.46E-01	4.46E-02
Zinc	497	1590.897	1.14E+03	14.5	131	7.86E+01	8.70E+00

a = Value calculated by multiplying the invertebrate BAF by the surface soil concentration.
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	1.1260000 kg		
Food Ingestion Rate	0.1260000 kg/day	1.0	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Prey[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.189	0.189	2.11E-02	NA	NA	NA	NA
2-Methylnaphthalene	0.189	0.00315785	3.53E-04	10	100	3.53E-05	3.53E-06
Benzo(a)anthracene	0.0847	0.000402749	4.51E-05	10	100	4.51E-06	4.51E-07
Benzo(a)pyrene	0.0978	0.001102025	1.23E-04	10	100	1.23E-05	1.23E-06
Benzo(b)fluoranthene	0.1206	0.001276177	1.43E-04	10	100	1.43E-05	1.43E-06
Benzo(g,h,i)perylene	0.0739	0.000616204	6.90E-05	10	100	6.90E-06	6.90E-07
Benzo(k)fluoranthene	0.0415	0.00035711	4.00E-05	10	100	4.00E-06	4.00E-07
Bis(2-Ethylhexyl)phthalate	0.5546	0.042967635	4.81E-03	1.1	11	4.37E-03	4.37E-04
Butylbenzylphthalate	0.3202	0.024807495	2.78E-03	1.1	11	2.52E-03	2.52E-04
Carbazole	0.2621	0.003080094	3.45E-04	10	100	3.45E-05	3.45E-06
Chrysene	0.0975	0.000609863	6.82E-05	10	100	6.82E-06	6.82E-07
Dibenzofuran	0.191	0.001905225	2.13E-04	NA	NA	NA	NA
Di-n-octyl phthalate	0.634	0.634	7.09E-02	1.1	11	6.45E-02	6.45E-03
Fluoranthene	0.174	0.000588111	6.58E-05	10	100	6.58E-06	6.58E-07
Indeno(1,2,3-cd)pyrene	0.0718	0.00097545	1.09E-04	10	100	1.09E-05	1.09E-06
Phenanthrene	0.891	0.004149565	4.64E-04	10	100	4.64E-05	4.64E-06
Pyrene	0.1349	0.000507899	5.68E-05	10	100	5.68E-06	5.68E-07
Pesticides/PCBs							
4,4'-DDD	0.0356	0.0707016	7.91E-03	0.0028	0.028	2.83E+00	2.83E-01

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FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	1.1260000 kg		
Food Ingestion Rate	0.1260000 kg/day	1.0	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Prey[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDE	0.3952	0.4054752	4.54E-02	0.0028	0.028	1.62E+01	1.62E+00
4,4'-DDT	0.389	0.135372	1.51E-02	0.0028	0.028	5.41E+00	5.41E-01
Aroclor-1260	0.0178	0.22953634	2.57E-02	0.18	1.8	1.43E-01	1.43E-02
alpha-BHC	0.0091	0.004563923	5.11E-04	0.56	2.25	9.12E-04	2.27E-04
beta-BHC	0.0088	0.0046156	5.16E-04	0.56	2.25	9.22E-04	2.30E-04
delta-BHC	0.0091	0.004563923	5.11E-04	0.56	2.25	9.12E-04	2.27E-04
gamma-BHC (Lindane)	0.0113	0.005955552	6.66E-04	2	20	3.33E-04	3.33E-05
Alpha-Chlordane	0.0077	0.0033916	3.80E-04	2.14	10.7	1.77E-04	3.55E-05
Gamma-Chlordane	0.0067	0.002951132	3.30E-04	2.14	10.7	1.54E-04	3.09E-05
Endrin Ketone	0.0128	0.00105088	1.18E-04	0.01	0.1	1.18E-02	1.18E-03
Metals and Inorganics							
Aluminum	5667.5	11.43418125	1.28E+00	109.7	1097	1.17E-02	1.17E-03
Antimony	7.03	0.18278	2.05E-02	NA	NA	NA	NA
Arsenic	4.33	0.05661475	6.34E-03	2.46	7.38	2.58E-03	8.58E-04
Barium	70.7	0.27307875	3.06E-02	20.8	41.7	1.47E-03	7.33E-04
Beryllium	0.19	0.0047595	5.33E-04	NA	NA	NA	NA
Cadmium	0.923	8.0381301	8.99E-01	1.45	20	6.20E-01	4.50E-02
Copper	44.34	8.499978	9.51E-01	47	61.7	2.02E-02	1.54E-02
Iron	19557.5	10150.3425	1.14E+03	100	1000	1.14E+01	1.14E+00
Lead	834	1.9071495	2.13E-01	1.13	11.3	1.89E-01	1.89E-02
Manganese	123.3	0.128232	1.43E-02	977	9770	1.47E-05	1.47E-06
Mercury	0.21	0.00246225	2.76E-04	0.0064	0.064	4.31E-02	4.31E-03
Nickel	8.23	1.3295565	1.49E-01	77.4	107	1.92E-03	1.39E-03

FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	1.1260000 kg		
Food Ingestion Rate	0.1260000 kg/day	1.0	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Prey[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Selenium	0.288	0.178956	2.00E-02	0.4	0.8	5.01E-02	2.50E-02
Silver	0.6	0.0486	5.44E-03	NA	NA	NA	NA
Vanadium	12.1	0.03153865	3.53E-03	11.4	114	3.10E-04	3.10E-05
Zinc	177	662.92695	7.42E+01	14.5	131	5.12E+00	5.66E-01

a = Value calculated by determining shrew concentration and mouse concentration. For the shrew concentration, the earthworm concentration was calculated by multiplying the invertebrate BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a shrew. This procedure was also done for the mouse except vegetation concentration was calculated by multiplying the plant BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a mouse. The predicted shrew and mouse concentrations were then averaged to calculate the prey concentration.

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FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	1.1260000 kg		
Food Ingestion Rate	0.1260000 kg/day	1.0	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Prey[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.14	0.14	1.57E-02	NA	NA	NA	NA
2-Methylnaphthalene	0.13	0.002172066	2.43E-04	10	100	2.43E-05	2.43E-06
Benzo(a)anthracene	0.28	0.0013314	1.49E-04	10	100	1.49E-05	1.49E-06
Benzo(a)pyrene	0.31	0.003493127	3.91E-04	10	100	3.91E-05	3.91E-06
Benzo(b)fluoranthene	0.51	0.005396769	6.04E-04	10	100	6.04E-05	6.04E-06
Benzo(g,h,i)perylene	0.21	0.001751054	1.96E-04	10	100	1.96E-05	1.96E-06
Benzo(k)fluoranthene	0.16	0.001376808	1.54E-04	10	100	1.54E-05	1.54E-06
Bis(2-Ethylhexyl)phthalate	5.6	0.43386	4.85E-02	1.1	11	4.41E-02	4.41E-03
Butylbenzylphthalate	2	0.15495	1.73E-02	1.1	11	1.58E-02	1.58E-03
Carbazole	0.49	0.005758284	6.44E-04	10	100	6.44E-05	6.44E-06
Chrysene	0.33	0.00206415	2.31E-04	10	100	2.31E-05	2.31E-06
Dibenzofuran	0.2	0.001995	2.23E-04	NA	NA	NA	NA
Di-n-octyl phthalate	6.4	6.4	7.16E-01	1.1	11	6.51E-01	6.51E-02
Fluoranthene	0.63	0.002129369	2.38E-04	10	100	2.38E-05	2.38E-06
Indeno(1,2,3-cd)pyrene	0.23	0.0031247	3.50E-04	10	100	3.50E-05	3.50E-06
Phenanthrene	0.19	0.000884868	9.90E-05	10	100	9.90E-06	9.90E-07
Pyrene	0.51	0.00192015	2.15E-04	10	100	2.15E-05	2.15E-06
Pesticides/PCBs							
4,4'-DDD	0.18	0.35748	4.00E-02	0.0028	0.028	1.43E+01	1.43E+00
4,4'-DDE	4.2	4.3092	4.82E-01	0.0028	0.028	1.72E+02	1.72E+01
4,4'-DDT	4.4	1.5312	1.71E-01	0.0028	0.028	6.12E+01	6.12E+00
Aroclor-1260	0.08	1.031624	1.15E-01	0.18	1.8	6.41E-01	6.41E-02

FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	1.1260000 kg		
Food Ingestion Rate	0.1260000 kg/day	1.0	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Prey[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
alpha-BHC	0.042	0.02106426	2.36E-03	0.56	2.25	4.21E-03	1.05E-03
beta-BHC	0.033	0.0173085	1.94E-03	0.56	2.25	3.46E-03	8.61E-04
delta-BHC	0.45	0.2256885	2.53E-02	0.56	2.25	4.51E-02	1.12E-02
gamma-BHC (Lindane)	0.75	0.39528	4.42E-02	2	20	2.21E-02	2.21E-03
Alpha-Chlordane	0.018	0.007928415	8.87E-04	2.14	10.7	4.15E-04	8.29E-05
Gamma-Chlordane	0.0081	0.003567787	3.99E-04	2.14	10.7	1.87E-04	3.73E-05
Endrin Ketone	0.012	0.0009852	1.10E-04	0.01	0.1	1.10E-02	1.10E-03
Metals and Inorganics							
Aluminum	8610	17.370675	1.94E+00	109.7	1097	1.77E-02	1.77E-03
Antimony	90.6	2.3556	2.64E-01	NA	NA	NA	NA
Arsenic	24.9	0.3255675	3.64E-02	2.46	7.38	1.48E-02	4.94E-03
Barium	178	0.687525	7.69E-02	20.8	41.7	3.70E-03	1.84E-03
Beryllium	0.51	0.0127755	1.43E-03	NA	NA	NA	NA
Cadmium	5.4	47.02698	5.26E+00	1.45	20	3.63E+00	2.63E-01
Copper	131	25.1127	2.81E+00	47	61.7	5.98E-02	4.55E-02
Iron	147000	76293	8.54E+03	100	1000	8.54E+01	8.54E+00
Lead	8380	19.162965	2.14E+00	1.13	11.3	1.90E+00	1.90E-01
Manganese	752	0.78208	8.75E-02	977	9770	8.96E-05	8.96E-06
Mercury	1.1	0.0128975	1.44E-03	0.0064	0.064	2.26E-01	2.26E-02
Nickel	47.8	7.72209	8.64E-01	77.4	107	1.12E-02	8.08E-03
Selenium	1.1	0.6835125	7.65E-02	0.4	0.8	1.91E-01	9.56E-02
Silver	2.4	0.1944	2.18E-02	NA	NA	NA	NA
Vanadium	47.4	0.1235481	1.38E-02	11.4	114	1.21E-03	1.21E-04

FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	1.1260000 kg		
Food Ingestion Rate	0.1260000 kg/day	1.0	Prey Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Prey[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Zinc	497	1861.43895	2.08E+02	14.5	131	1.44E+01	1.59E+00

a = Value calculated by determining shrew concentration and mouse concentration. For the shrew concentration, the earthworm concentration was calculated by multiplying the invertebrate BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a shrew. This procedure was also done for the mouse except vegetation concentration was calculated by multiplying the plant BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a mouse. The predicted shrew and mouse concentrations were then averaged to calculate the prey concentration.

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FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg		
Food Ingestion Rate	0.3120000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0000000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)							
Acenaphthylene	0.350571	0.01719065	3.61E-03	10	100	3.61E-04	3.61E-05
Anthracene	0.14327	0.018354671	3.85E-03	10	100	3.85E-04	3.85E-05
Benzo(a)anthracene	0.352164	0.045116593	9.47E-03	10	100	9.47E-04	9.47E-05
Benzo(a)pyrene	0.319114	0.040882476	8.58E-03	10	100	8.58E-04	8.58E-05
Benzo(b)fluoranthene	0.31793	0.040730791	8.55E-03	10	100	8.55E-04	8.55E-05
Benzo(g,h,i)perylene	0.198804	0.001334941	2.80E-04	10	100	2.80E-05	2.80E-06
Benzo(k)fluoranthene	0.149663	0.019173694	4.03E-03	10	100	4.03E-04	4.03E-05
Carbazole	0.376778	0.166448112	3.49E-02	10	100	3.49E-03	3.49E-04
Chrysene	0.389771	0.049934518	1.05E-02	10	100	1.05E-03	1.05E-04
Dibenzo(a,h)anthracene	0.215946	0.027665371	5.81E-03	10	100	5.81E-04	5.81E-05
Fluoranthene	0.903414	0.115738581	2.43E-02	10	100	2.43E-03	2.43E-04
Fluorene	0.111375	0.014268524	3.00E-03	10	100	3.00E-04	3.00E-05
Indeno(1,2,3-cd)pyrene	0.219521	0.028123373	5.90E-03	10	100	5.90E-04	5.90E-05
Phenanthrene	0.408804	0.117261077	2.46E-02	10	100	2.46E-03	2.46E-04
Pyrene	0.769304	0.09855742	2.07E-02	10	100	2.07E-03	2.07E-04
Pesticides/PCBs (mg/kg)							
4,4'-DDD	0.025818	0.003193552	6.71E-04	0.0028	0.028	2.39E-01	2.39E-02
4,4'-DDE	0.017579	0.059796839	1.26E-02	0.0028	0.028	4.48E+00	4.48E-01
4,4'-DDT	0.026292	0.019396949	4.07E-03	0.0028	0.028	1.45E+00	1.45E-01
Alpha-Chlordane	0.008338	0.017570075	3.69E-03	2.14	10.7	1.72E-03	3.45E-04

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FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg		
Food Ingestion Rate	0.3120000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0000000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.011982	0.011751022	2.47E-03	2.14	10.7	1.15E-03	2.31E-04
alpha-BHC	0.002968	0.002360096	4.96E-04	0.56	2.25	8.85E-04	2.20E-04
beta-BHC	0.003161	0.002513566	5.28E-04	0.56	2.25	9.42E-04	2.35E-04
delta-BHC	0.002968	0.002360096	4.96E-04	0.56	2.25	8.85E-04	2.20E-04
gamma-BHC (Lindane)	0.002925	0.002325904	4.88E-04	2	20	2.44E-04	2.44E-05
Inorganics (mg/kg)							
Aluminum	10178.57143	10178.57143	2.14E+03	109.7	1097	1.95E+01	1.95E+00
Arsenic	6.248929	6.248929	1.31E+00	2.46	7.38	5.33E-01	1.78E-01
Barium	23.925	23.925	5.02E+00	20.8	41.7	2.42E-01	1.20E-01
Beryllium	0.390893	0.390893	8.21E-02	NA	NA	NA	NA
Cadmium	0.083393	0.083393	1.75E-02	1.45	20	1.21E-02	8.75E-04
Cobalt	1.953571	1.953571	4.10E-01	1	10	4.10E-01	4.10E-02
Copper	27.425	27.425	5.76E+00	47	61.7	1.23E-01	9.33E-02
Iron	13220.71429	13220.71429	2.78E+03	100	1000	2.78E+01	2.78E+00
Lead	48.457143	48.457143	1.02E+01	1.13	11.3	9.00E+00	9.00E-01
Manganese	92.517857	92.517857	1.94E+01	977	9770	1.99E-02	1.99E-03
Mercury	0.12625	0.12625	2.65E-02	0.0064	0.064	4.14E+00	4.14E-01
Silver	0.2875	0.2875	6.04E-02	NA	NA	NA	NA
Thallium	0.348393	0.348393	7.31E-02	NA	NA	NA	NA
Vanadium	27.282143	27.282143	5.73E+00	11.4	114	5.02E-01	5.02E-02
Zinc	44.985714	44.985714	9.45E+00	14.5	131	6.51E-01	7.21E-02

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FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg		
Food Ingestion Rate	0.3120000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0000000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg		
Food Ingestion Rate	0.3120000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0000000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)							
Acenaphthylene	0.38	0.018633735	3.91E-03	10	100	3.91E-04	3.91E-05
Anthracene	0.77	0.098646586	2.07E-02	10	100	2.07E-03	2.07E-04
Benzo(a)anthracene	2.2	0.28184739	5.92E-02	10	100	5.92E-03	5.92E-04
Benzo(a)pyrene	1.7	0.217791165	4.57E-02	10	100	4.57E-03	4.57E-04
Benzo(b)fluoranthene	1.8	0.23060241	4.84E-02	10	100	4.84E-03	4.84E-04
Benzo(g,h,i)perylene	0.99	0.006647711	1.40E-03	10	100	1.40E-04	1.40E-05
Benzo(k)fluoranthene	0.85	0.108895582	2.29E-02	10	100	2.29E-03	2.29E-04
Carbazole	0.58	0.2562249	5.38E-02	10	100	5.38E-03	5.38E-04
Chrysene	2.3	0.294658635	6.19E-02	10	100	6.19E-03	6.19E-04
Dibenzo(a,h)anthracene	1.6	0.20497992	4.30E-02	10	100	4.30E-03	4.30E-04
Fluoranthene	6.6	0.845542169	1.78E-01	10	100	1.78E-02	1.78E-03
Fluorene	0.16	0.020497992	4.30E-03	10	100	4.30E-04	4.30E-05
Indeno(1,2,3-cd)pyrene	1.1	0.140923695	2.96E-02	10	100	2.96E-03	2.96E-04
Phenanthrene	2.6	0.745782329	1.57E-01	10	100	1.57E-02	1.57E-03
Pyrene	5.4	0.691807229	1.45E-01	10	100	1.45E-02	1.45E-03
Pesticides/PCBs (mg/kg)							
4,4'-DDD	0.26	0.032160643	6.75E-03	0.0028	0.028	2.41E+00	2.41E-01
4,4'-DDE	0.12	0.408192771	8.57E-02	0.0028	0.028	3.06E+01	3.06E+00
4,4'-DDT	0.27	0.199192771	4.18E-02	0.0028	0.028	1.49E+01	1.49E+00
Alpha-Chlordane	0.052	0.109575904	2.30E-02	2.14	10.7	1.08E-02	2.15E-03

FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg		
Food Ingestion Rate	0.3120000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0000000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.13	0.127493976	2.68E-02	2.14	10.7	1.25E-02	2.50E-03
alpha-BHC	0.0027	0.002146988	4.51E-04	0.56	2.25	8.05E-04	2.00E-04
beta-BHC	0.0054	0.004293976	9.02E-04	0.56	2.25	1.61E-03	4.01E-04
delta-BHC	0.0027	0.002146988	4.51E-04	0.56	2.25	8.05E-04	2.00E-04
gamma-BHC (Lindane)	0.0021	0.00166988	3.51E-04	2	20	1.75E-04	1.75E-05
Inorganics (mg/kg)							
Aluminum	23400	23400	4.91E+03	109.7	1097	4.48E+01	4.48E+00
Arsenic	15.6	15.6	3.28E+00	2.46	7.38	1.33E+00	4.44E-01
Barium	88.5	88.5	1.86E+01	20.8	41.7	8.93E-01	4.46E-01
Beryllium	1.2	1.2	2.52E-01	NA	NA	NA	NA
Cadmium	0.79	0.79	1.66E-01	1.45	20	1.14E-01	8.29E-03
Cobalt	3.9	3.9	8.19E-01	1	10	8.19E-01	8.19E-02
Copper	95.3	95.3	2.00E+01	47	61.7	4.26E-01	3.24E-01
Iron	24000	24000	5.04E+03	100	1000	5.04E+01	5.04E+00
Lead	194	194	4.07E+01	1.13	11.3	3.60E+01	3.60E+00
Manganese	190	190	3.99E+01	977	9770	4.08E-02	4.08E-03
Mercury	0.67	0.67	1.41E-01	0.0064	0.064	2.20E+01	2.20E+00
Silver	2.4	2.4	5.04E-01	NA	NA	NA	NA
Thallium	0.925	0.925	1.94E-01	NA	NA	NA	NA
Vanadium	50.65	50.65	1.06E+01	11.4	114	9.33E-01	9.33E-02
Zinc	124	124	2.60E+01	14.5	131	1.80E+00	1.99E-01

FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg		
Food Ingestion Rate	0.3120000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0000000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
GREAT BLUE HERON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg		
Food Ingestion Rate	0.4010000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0800000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)								
Acenaphthylene	0.350571	0	0.054697523	9.84E-03	10	100	9.84E-04	9.84E-05
Anthracene	0.14327	0	0.058401225	1.05E-02	10	100	1.05E-03	1.05E-04
Benzo(a)anthracene	0.352164	0	0.143552795	2.58E-02	10	100	2.58E-03	2.58E-04
Benzo(a)pyrene	0.319114	0	0.130080606	2.34E-02	10	100	2.34E-03	2.34E-04
Benzo(b)fluoranthene	0.31793	0	0.129597972	2.33E-02	10	100	2.33E-03	2.33E-04
Benzo(g,h,i)perylene	0.198804	0	0.004247539	7.64E-04	10	100	7.64E-05	7.64E-06
Benzo(k)fluoranthene	0.149663	0	0.061007207	1.10E-02	10	100	1.10E-03	1.10E-04
Carbazole	0.376778	0	0.529607631	9.53E-02	10	100	9.53E-03	9.53E-04
Chrysene	0.389771	0.00075	0.158882556	2.86E-02	10	100	2.86E-03	2.86E-04
Dibenzo(a,h)anthracene	0.215946	0	0.088026181	1.58E-02	10	100	1.58E-03	1.58E-04
Fluoranthene	0.903414	0.0000815	0.36825912	6.63E-02	10	100	6.63E-03	6.63E-04
Fluorene	0.111375	0	0.045399849	8.17E-03	10	100	8.17E-04	8.17E-05
Indeno(1,2,3-cd)pyrene	0.219521	0	0.08948346	1.61E-02	10	100	1.61E-03	1.61E-04
Phenanthrene	0.408804	0	0.373103426	6.71E-02	10	100	6.71E-03	6.71E-04
Pyrene	0.769304	0	0.313591791	5.64E-02	10	100	5.64E-03	5.64E-04
Pesticides/PCBs (mg/kg)								
4,4'-DDD	0.025818	0	0.010161301	1.83E-03	0.0028	0.028	6.53E-01	6.53E-02
4,4'-DDE	0.017579	0	0.190262671	3.42E-02	0.0028	0.028	1.22E+01	1.22E+00
4,4'-DDT	0.026292	0	0.061717566	1.11E-02	0.0028	0.028	3.97E+00	3.97E-01
Alpha-Chlordane	0.008338	0	0.055904783	1.01E-02	2.14	10.7	4.70E-03	9.40E-04

FOOD CHAIN MODELING CALCULATION
GREAT BLUE HERON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg		
Food Ingestion Rate	0.4010000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0800000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.011982	0	0.037389614	6.73E-03	2.14	10.7	3.14E-03	6.29E-04
alpha-BHC	0.002968	0	0.007509398	1.35E-03	0.56	2.25	2.41E-03	6.00E-04
beta-BHC	0.003161	0	0.007997711	1.44E-03	0.56	2.25	2.57E-03	6.39E-04
delta-BHC	0.002968	0	0.007509398	1.35E-03	0.56	2.25	2.41E-03	6.00E-04
gamma-BHC (Lindane)	0.002925	0	0.007400602	1.33E-03	2	20	6.66E-04	6.66E-05
Inorganics (mg/kg)								
Aluminum	10178.57143	3.832125	10178.57143	1.83E+03	109.7	1097	1.67E+01	1.67E+00
Arsenic	6.248929	0.003025	6.248929	1.12E+00	2.46	7.38	4.57E-01	1.52E-01
Barium	23.925	0.020325	23.925	4.30E+00	20.8	41.7	2.07E-01	1.03E-01
Beryllium	0.390893	0	0.390893	7.03E-02	NA	NA	NA	NA
Cadmium	0.083393	0.000203125	0.083393	1.50E-02	1.45	20	1.04E-02	7.50E-04
Cobalt	1.953571	0.000769375	1.953571	3.51E-01	1	10	3.51E-01	3.51E-02
Copper	27.425	0.01141875	27.425	4.93E+00	47	61.7	1.05E-01	8.00E-02
Iron	13220.71429	3.4045625	13220.71429	2.38E+03	100	1000	2.38E+01	2.38E+00
Lead	48.457143	0	48.457143	8.72E+00	1.13	11.3	7.71E+00	7.71E-01
Manganese	92.517857	0	92.517857	1.66E+01	977	9770	1.70E-02	1.70E-03
Mercury	0.12625	0	0.12625	2.27E-02	0.0064	0.064	3.55E+00	3.55E-01
Silver	0.2875	0	0.2875	5.17E-02	NA	NA	NA	NA
Thallium	0.348393	0	0.348393	6.27E-02	NA	NA	NA	NA
Vanadium	27.282143	0	27.282143	4.91E+00	11.4	114	4.31E-01	4.31E-02
Zinc	44.985714	0	44.985714	8.09E+00	14.5	131	5.58E-01	6.18E-02

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FOOD CHAIN MODELING CALCULATION
GREAT BLUE HERON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000	kg		
Food Ingestion Rate	0.4010000	kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0800000	L/day		
Sediment Ingestion Rate	0.0000000	kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
GREAT BLUE HERON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg		
Food Ingestion Rate	0.4010000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0800000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)								
Acenaphthylene	0.38	0	0.059289157	1.07E-02	10	100	1.07E-03	1.07E-04
Anthracene	0.77	0	0.313875502	5.65E-02	10	100	5.65E-03	5.65E-04
Benzo(a)anthracene	2.2	0	0.896787149	1.61E-01	10	100	1.61E-02	1.61E-03
Benzo(a)pyrene	1.7	0	0.692971888	1.25E-01	10	100	1.25E-02	1.25E-03
Benzo(b)fluoranthene	1.8	0	0.73373494	1.32E-01	10	100	1.32E-02	1.32E-03
Benzo(g,h,i)perylene	0.99	0	0.021151807	3.81E-03	10	100	3.81E-04	3.81E-05
Benzo(k)fluoranthene	0.85	0	0.346485944	6.23E-02	10	100	6.23E-03	6.23E-04
Carbazole	0.58	0	0.815261044	1.47E-01	10	100	1.47E-02	1.47E-03
Chrysene	2.3	0.0001	0.937550201	1.69E-01	10	100	1.69E-02	1.69E-03
Dibenzo(a,h)anthracene	1.6	0	0.652208835	1.17E-01	10	100	1.17E-02	1.17E-03
Fluoranthene	6.6	0.00022	2.690361446	4.84E-01	10	100	4.84E-02	4.84E-03
Fluorene	0.16	0	0.065220884	1.17E-02	10	100	1.17E-03	1.17E-04
Indeno(1,2,3-cd)pyrene	1.1	0	0.448393574	8.07E-02	10	100	8.07E-03	8.07E-04
Phenanthrene	2.6	0	2.372943775	4.27E-01	10	100	4.27E-02	4.27E-03
Pyrene	5.4	0	2.201204819	3.96E-01	10	100	3.96E-02	3.96E-03
Pesticides/PCBs (mg/kg)								
4,4'-DDD	0.26	0	0.102329317	1.84E-02	0.0028	0.028	6.57E+00	6.57E-01
4,4'-DDE	0.12	0	1.298795181	2.34E-01	0.0028	0.028	8.34E+01	8.34E+00
4,4'-DDT	0.27	0	0.633795181	1.14E-01	0.0028	0.028	4.07E+01	4.07E+00
Alpha-Chlordane	0.052	0	0.348650602	6.27E-02	2.14	10.7	2.93E-02	5.86E-03

FOOD CHAIN MODELING CALCULATION
GREAT BLUE HERON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg		
Food Ingestion Rate	0.4010000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0800000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.13	0	0.405662651	7.30E-02	2.14	10.7	3.41E-02	6.82E-03
alpha-BHC	0.0027	0	0.006831325	1.23E-03	0.56	2.25	2.19E-03	5.46E-04
beta-BHC	0.0054	0	0.013662651	2.46E-03	0.56	2.25	4.39E-03	1.09E-03
delta-BHC	0.0027	0	0.006831325	1.23E-03	0.56	2.25	2.19E-03	5.46E-04
gamma-BHC (Lindane)	0.0021	0	0.005313253	9.56E-04	2	20	4.78E-04	4.78E-05
Inorganics (mg/kg)								
Aluminum	23400	13.435	23400	4.21E+03	109.7	1097	3.84E+01	3.84E+00
Arsenic	15.6	0.0139	15.6	2.81E+00	2.46	7.38	1.14E+00	3.80E-01
Barium	88.5	0.03715	88.5	1.59E+01	20.8	41.7	7.66E-01	3.82E-01
Beryllium	1.2	0	1.2	2.16E-01	NA	NA	NA	NA
Cadmium	0.79	0.00042	0.79	1.42E-01	1.45	20	9.80E-02	7.11E-03
Cobalt	3.9	0.0029	3.9	7.02E-01	1	10	7.02E-01	7.02E-02
Copper	95.3	0.06295	95.3	1.71E+01	47	61.7	3.65E-01	2.78E-01
Iron	24000	0	24000	4.32E+03	100	1000	4.32E+01	4.32E+00
Lead	194	0	194	3.49E+01	1.13	11.3	3.09E+01	3.09E+00
Manganese	190	0	190	3.42E+01	977	9770	3.50E-02	3.50E-03
Mercury	0.67	0	0.67	1.21E-01	0.0064	0.064	1.88E+01	1.88E+00
Silver	2.4	0	2.4	4.32E-01	NA	NA	NA	NA
Thallium	0.925	0	0.925	1.66E-01	NA	NA	NA	NA
Vanadium	50.65	0	50.65	9.11E+00	11.4	114	7.99E-01	7.99E-02
Zinc	124	0	124	2.23E+01	14.5	131	1.54E+00	1.70E-01

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FOOD CHAIN MODELING CALCULATION
GREAT BLUE HERON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg		
Food Ingestion Rate	0.4010000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0800000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Mummichog[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1.4000000 kg		
Food Ingestion Rate	0.0280000 kg/day	0.85	Fish Fraction
Water Ingestion Rate	0.0000000 L/day	0.15	Sediment Fraction
Sediment Ingestion Rate	0.0280000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)							
Acenaphthylene	0.350571	0.054697523	1.98E-03	0.3	3	6.61E-03	6.61E-04
Anthracene	0.14327	0.058401225	1.42E-03	0.3	3	4.74E-03	4.74E-04
Benzo(a)anthracene	0.352164	0.143552795	3.50E-03	0.3	3	1.17E-02	1.17E-03
Benzo(a)pyrene	0.319114	0.130080606	3.17E-03	0.3	3	1.06E-02	1.06E-03
Benzo(b)fluoranthene	0.31793	0.129597972	3.16E-03	0.3	3	1.05E-02	1.05E-03
Benzo(g,h,i)perylene	0.198804	0.004247539	6.69E-04	0.3	3	2.23E-03	2.23E-04
Benzo(k)fluoranthene	0.149663	0.061007207	1.49E-03	0.3	3	4.95E-03	4.95E-04
Carbazole	0.376778	0.529607631	1.01E-02	0.3	3	3.38E-02	3.38E-03
Chrysene	0.389771	0.158882556	3.87E-03	0.3	3	1.29E-02	1.29E-03
Dibenzo(a,h)anthracene	0.215946	0.088026181	2.14E-03	0.3	3	7.15E-03	7.15E-04
Fluoranthene	0.903414	0.36825912	8.97E-03	0.3	3	2.99E-02	2.99E-03
Fluorene	0.111375	0.045399849	1.11E-03	0.3	3	3.69E-03	3.69E-04
Indeno(1,2,3-cd)pyrene	0.219521	0.08948346	2.18E-03	0.3	3	7.27E-03	7.27E-04
Phenanthrene	0.408804	0.373103426	7.57E-03	0.3	3	2.52E-02	2.52E-03
Pyrene	0.769304	0.313591791	7.64E-03	0.3	3	2.55E-02	2.55E-03
Pesticides/PCBs (mg/kg)							
4,4'-DDD	0.025818	0.010161301	2.50E-04	NA	NA	NA	NA
4,4'-DDE	0.017579	0.190262671	3.29E-03	NA	NA	NA	NA
4,4'-DDT	0.026292	0.061717566	1.13E-03	NA	NA	NA	NA
Alpha-Chlordane	0.008338	0.055904783	9.75E-04	NA	NA	NA	NA

FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1.4000000 kg		
Food Ingestion Rate	0.0280000 kg/day	0.85	Fish Fraction
Water Ingestion Rate	0.0000000 L/day	0.15	Sediment Fraction
Sediment Ingestion Rate	0.0280000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.011982	0.037389614	6.72E-04	NA	NA	NA	NA
alpha-BHC	0.002968	0.007509398	1.37E-04	NA	NA	NA	NA
beta-BHC	0.003161	0.007997711	1.45E-04	NA	NA	NA	NA
delta-BHC	0.002968	0.007509398	1.37E-04	NA	NA	NA	NA
gamma-BHC (Lindane)	0.002925	0.007400602	1.35E-04	NA	NA	NA	NA
Inorganics (mg/kg)							
Aluminum	10178.57143	10178.57143	2.04E+02	NA	NA	NA	NA
Arsenic	6.248929	6.248929	1.25E-01	0.59	7.1	2.12E-01	1.76E-02
Barium	23.925	23.925	4.79E-01	NA	NA	NA	NA
Beryllium	0.390893	0.390893	7.82E-03	NA	NA	NA	NA
Cadmium	0.083393	0.083393	1.67E-03	NA	NA	NA	NA
Cobalt	1.953571	1.953571	3.91E-02	NA	NA	NA	NA
Copper	27.425	27.425	5.49E-01	NA	NA	NA	NA
Iron	13220.71429	13220.71429	2.64E+02	NA	NA	NA	NA
Lead	48.457143	48.457143	9.69E-01	NA	NA	NA	NA
Manganese	92.517857	92.517857	1.85E+00	NA	NA	NA	NA
Mercury	0.12625	0.12625	2.53E-03	0.008	0.94	3.16E-01	2.69E-03
Silver	0.2875	0.2875	5.75E-03	NA	NA	NA	NA
Thallium	0.348393	0.348393	6.97E-03	NA	NA	NA	NA
Vanadium	27.282143	27.282143	5.46E-01	NA	NA	NA	NA
Zinc	44.985714	44.985714	9.00E-01	NA	NA	NA	NA

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FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1.4000000 kg		
Food Ingestion Rate	0.0280000 kg/day	0.85	Fish Fraction
Water Ingestion Rate	0.0000000 L/day	0.15	Sediment Fraction
Sediment Ingestion Rate	0.0280000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1.4000000 kg		
Food Ingestion Rate	0.0280000 kg/day	0.85	Fish Fraction
Water Ingestion Rate	0.0000000 L/day	0.15	Sediment Fraction
Sediment Ingestion Rate	0.0280000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)							
Acenaphthylene	0.38	0.059289157	2.15E-03	0.3	3	7.16E-03	7.16E-04
Anthracene	0.77	0.313875502	7.65E-03	0.3	3	2.55E-02	2.55E-03
Benzo(a)anthracene	2.2	0.896787149	2.18E-02	0.3	3	7.28E-02	7.28E-03
Benzo(a)pyrene	1.7	0.692971888	1.69E-02	0.3	3	5.63E-02	5.63E-03
Benzo(b)fluoranthene	1.8	0.73373494	1.79E-02	0.3	3	5.96E-02	5.96E-03
Benzo(g,h,i)perylene	0.99	0.021151807	3.33E-03	0.3	3	1.11E-02	1.11E-03
Benzo(k)fluoranthene	0.85	0.346485944	8.44E-03	0.3	3	2.81E-02	2.81E-03
Carbazole	0.58	0.815261044	1.56E-02	0.3	3	5.20E-02	5.20E-03
Chrysene	2.3	0.937550201	2.28E-02	0.3	3	7.61E-02	7.61E-03
Dibenzo(a,h)anthracene	1.6	0.652208835	1.59E-02	0.3	3	5.30E-02	5.30E-03
Fluoranthene	6.6	2.690361446	6.55E-02	0.3	3	2.18E-01	2.18E-02
Fluorene	0.16	0.065220884	1.59E-03	0.3	3	5.30E-03	5.30E-04
Indeno(1,2,3-cd)pyrene	1.1	0.448393574	1.09E-02	0.3	3	3.64E-02	3.64E-03
Phenanthrene	2.6	2.372943775	4.81E-02	0.3	3	1.60E-01	1.60E-02
Pyrene	5.4	2.201204819	5.36E-02	0.3	3	1.79E-01	1.79E-02
Pesticides/PCBs (mg/kg)							
4,4'-DDD	0.26	0.102329317	2.52E-03	NA	NA	NA	NA
4,4'-DDE	0.12	1.298795181	2.24E-02	NA	NA	NA	NA
4,4'-DDT	0.27	0.633795181	1.16E-02	NA	NA	NA	NA
Alpha-Chlordane	0.052	0.348650602	6.08E-03	NA	NA	NA	NA

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FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1.4000000 kg		
Food Ingestion Rate	0.0280000 kg/day	0.85	Fish Fraction
Water Ingestion Rate	0.0000000 L/day	0.15	Sediment Fraction
Sediment Ingestion Rate	0.0280000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.13	0.405662651	7.29E-03	NA	NA	NA	NA
alpha-BHC	0.0027	0.006831325	1.24E-04	NA	NA	NA	NA
beta-BHC	0.0054	0.013662651	2.48E-04	NA	NA	NA	NA
delta-BHC	0.0027	0.006831325	1.24E-04	NA	NA	NA	NA
gamma-BHC (Lindane)	0.0021	0.005313253	9.66E-05	NA	NA	NA	NA
Inorganics (mg/kg)							
Aluminum	23400	23400	4.68E+02	NA	NA	NA	NA
Arsenic	15.6	15.6	3.12E-01	0.59	7.1	5.29E-01	4.39E-02
Barium	88.5	88.5	1.77E+00	NA	NA	NA	NA
Beryllium	1.2	1.2	2.40E-02	NA	NA	NA	NA
Cadmium	0.79	0.79	1.58E-02	NA	NA	NA	NA
Cobalt	3.9	3.9	7.80E-02	NA	NA	NA	NA
Copper	95.3	95.3	1.91E+00	NA	NA	NA	NA
Iron	24000	24000	4.80E+02	NA	NA	NA	NA
Lead	194	194	3.88E+00	NA	NA	NA	NA
Manganese	190	190	3.80E+00	NA	NA	NA	NA
Mercury	0.67	0.67	1.34E-02	0.008	0.94	1.68E+00	1.43E-02
Silver	2.4	2.4	4.80E-02	NA	NA	NA	NA
Thallium	0.925	0.925	1.85E-02	NA	NA	NA	NA
Vanadium	50.65	50.65	1.01E+00	NA	NA	NA	NA
Zinc	124	124	2.48E+00	NA	NA	NA	NA

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FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1.4000000 kg		
Food Ingestion Rate	0.0280000 kg/day	0.85	Fish Fraction
Water Ingestion Rate	0.0000000 L/day	0.15	Sediment Fraction
Sediment Ingestion Rate	0.0280000 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.0030000	kg
Food Ingestion Rate	0.0001740	kg/day
Water Ingestion Rate	0.0000000	L/day
Sediment Ingestion Rate	0.0000000	kg/day

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)						
Acenaphthylene	0.350571	2.03E-02	0.3	3	6.78E-02	6.78E-03
Anthracene	0.14327	8.31E-03	0.3	3	2.77E-02	2.77E-03
Benzo(a)anthracene	0.352164	2.04E-02	0.3	3	6.81E-02	6.81E-03
Benzo(a)pyrene	0.319114	1.85E-02	0.3	3	6.17E-02	6.17E-03
Benzo(b)fluoranthene	0.31793	1.84E-02	0.3	3	6.15E-02	6.15E-03
Benzo(g,h,i)perylene	0.198804	1.15E-02	0.3	3	3.84E-02	3.84E-03
Benzo(k)fluoranthene	0.149663	8.68E-03	0.3	3	2.89E-02	2.89E-03
Carbazole	0.376778	2.19E-02	0.3	3	7.28E-02	7.28E-03
Chrysene	0.389771	2.26E-02	0.3	3	7.54E-02	7.54E-03
Dibenzo(a,h)anthracene	0.215946	1.25E-02	0.3	3	4.17E-02	4.17E-03
Fluoranthene	0.903414	5.24E-02	0.3	3	1.75E-01	1.75E-02
Fluorene	0.111375	6.46E-03	0.3	3	2.15E-02	2.15E-03
Indeno(1,2,3-cd)pyrene	0.219521	1.27E-02	0.3	3	4.24E-02	4.24E-03
Phenanthrene	0.408804	2.37E-02	0.3	3	7.90E-02	7.90E-03
Pyrene	0.769304	4.46E-02	0.3	3	1.49E-01	1.49E-02
Pesticides/PCBs (mg/kg)						
4,4'-DDD	0.025818	1.50E-03	NA	NA	NA	NA
4,4'-DDE	0.017579	1.02E-03	NA	NA	NA	NA
4,4'-DDT	0.026292	1.52E-03	NA	NA	NA	NA
Alpha-Chlordane	0.008338	4.84E-04	NA	NA	NA	NA

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FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.0030000 kg
Food Ingestion Rate	0.0001740 kg/day
Water Ingestion Rate	0.0000000 L/day
Sediment Ingestion Rate	0.0000000 kg/day

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.011982	6.95E-04	NA	NA	NA	NA
alpha-BHC	0.002968	1.72E-04	NA	NA	NA	NA
beta-BHC	0.003161	1.83E-04	NA	NA	NA	NA
delta-BHC	0.002968	1.72E-04	NA	NA	NA	NA
gamma-BHC (Lindane)	0.002925	1.70E-04	NA	NA	NA	NA
Inorganics (mg/kg)						
Aluminum	10178.57143	5.90E+02	NA	NA	NA	NA
Arsenic	6.248929	3.62E-01	0.59	7.1	6.14E-01	5.10E-02
Barium	23.925	1.39E+00	NA	NA	NA	NA
Beryllium	0.390893	2.27E-02	NA	NA	NA	NA
Cadmium	0.083393	4.84E-03	NA	NA	NA	NA
Cobalt	1.953571	1.13E-01	NA	NA	NA	NA
Copper	27.425	1.59E+00	NA	NA	NA	NA
Iron	13220.71429	7.67E+02	NA	NA	NA	NA
Lead	48.457143	2.81E+00	NA	NA	NA	NA
Manganese	92.517857	5.37E+00	NA	NA	NA	NA
Mercury	0.12625	7.32E-03	0.008	0.94	9.15E-01	7.79E-03
Silver	0.2875	1.67E-02	NA	NA	NA	NA
Thallium	0.348393	2.02E-02	NA	NA	NA	NA
Vanadium	27.282143	1.58E+00	NA	NA	NA	NA
Zinc	44.985714	2.61E+00	NA	NA	NA	NA

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.0030000	kg
Food Ingestion Rate	0.0001740	kg/day
Water Ingestion Rate	0.0000000	L/day
Sediment Ingestion Rate	0.0000000	kg/day

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.0030000	kg
Food Ingestion Rate	0.0001740	kg/day
Water Ingestion Rate	0.0000000	L/day
Sediment Ingestion Rate	0.0000000	kg/day

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organics (mg/kg)						
Acenaphthylene	0.38	2.20E-02	0.3	3	7.35E-02	7.35E-03
Anthracene	0.77	4.47E-02	0.3	3	1.49E-01	1.49E-02
Benzo(a)anthracene	2.2	1.28E-01	0.3	3	4.25E-01	4.25E-02
Benzo(a)pyrene	1.7	9.86E-02	0.3	3	3.29E-01	3.29E-02
Benzo(b)fluoranthene	1.8	1.04E-01	0.3	3	3.48E-01	3.48E-02
Benzo(g,h,i)perylene	0.99	5.74E-02	0.3	3	1.91E-01	1.91E-02
Benzo(k)fluoranthene	0.85	4.93E-02	0.3	3	1.64E-01	1.64E-02
Carbazole	0.58	3.36E-02	0.3	3	1.12E-01	1.12E-02
Chrysene	2.3	1.33E-01	0.3	3	4.45E-01	4.45E-02
Dibenzo(a,h)anthracene	1.6	9.28E-02	0.3	3	3.09E-01	3.09E-02
Fluoranthene	6.6	3.83E-01	0.3	3	1.28E+00	1.28E-01
Fluorene	0.16	9.28E-03	0.3	3	3.09E-02	3.09E-03
Indeno(1,2,3-cd)pyrene	1.1	6.38E-02	0.3	3	2.13E-01	2.13E-02
Phenanthrene	2.6	1.51E-01	0.3	3	5.03E-01	5.03E-02
Pyrene	5.4	3.13E-01	0.3	3	1.04E+00	1.04E-01
Pesticides/PCBs (mg/kg)		0.00E+00				
4,4'-DDD	0.26	1.51E-02	NA	NA	NA	NA
4,4'-DDE	0.12	6.96E-03	NA	NA	NA	NA
4,4'-DDT	0.27	1.57E-02	NA	NA	NA	NA
Alpha-Chlordane	0.052	3.02E-03	NA	NA	NA	NA

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FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.0030000	kg
Food Ingestion Rate	0.0001740	kg/day
Water Ingestion Rate	0.0000000	L/day
Sediment Ingestion Rate	0.0000000	kg/day

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Gamma-Chlordane	0.13	7.54E-03	NA	NA	NA	NA
alpha-BHC	0.0027	1.57E-04	NA	NA	NA	NA
beta-BHC	0.0054	3.13E-04	NA	NA	NA	NA
delta-BHC	0.0027	1.57E-04	NA	NA	NA	NA
gamma-BHC (Lindane)	0.0021	1.22E-04	NA	NA	NA	NA
Inorganics (mg/kg)		0.00E+00				
Aluminum	23400	1.36E+03	NA	NA	NA	NA
Arsenic	15.6	9.05E-01	0.59	7.1	1.53E+00	1.27E-01
Barium	88.5	5.13E+00	NA	NA	NA	NA
Beryllium	1.2	6.96E-02	NA	NA	NA	NA
Cadmium	0.79	4.58E-02	NA	NA	NA	NA
Cobalt	3.9	2.26E-01	NA	NA	NA	NA
Copper	95.3	5.53E+00	NA	NA	NA	NA
Iron	24000	1.39E+03	NA	NA	NA	NA
Lead	194	1.13E+01	NA	NA	NA	NA
Manganese	190	1.10E+01	NA	NA	NA	NA
Mercury	0.67	3.89E-02	0.008	0.94	4.86E+00	4.13E-02
Silver	2.4	1.39E-01	NA	NA	NA	NA
Thallium	0.925	5.37E-02	NA	NA	NA	NA
Vanadium	50.65	2.94E+00	NA	NA	NA	NA
Zinc	124	7.19E+00	NA	NA	NA	NA

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.0030000	kg
Food Ingestion Rate	0.0001740	kg/day
Water Ingestion Rate	0.0000000	L/day
Sediment Ingestion Rate	0.0000000	kg/day

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

a Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.0773000 kg		
Food Ingestion Rate	0.0690000 kg/day	0.6	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day	0.35	Earthworm Fraction
Soil Ingestion Rate	0.0690000 kg/day	0.05	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/L)	Invertebrate[b] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds								
1,2,4-Trichlorobenzene	0.189	0.189	0.189	1.69E-01	NA	NA	NA	NA
2-Methylnaphthalene	0.189	0.0012663	0.019786032	1.53E-02	10	100	1.53E-03	1.53E-04
Benzo(a)anthracene	0.0847	0.00056749	0.0021175	4.75E-03	10	100	4.75E-04	4.75E-05
Benzo(a)pyrene	0.0978	0.00065526	0.006691574	6.81E-03	10	100	6.81E-04	6.81E-05
Benzo(b)fluoranthene	0.1206	0.00080802	0.007699828	8.22E-03	10	100	8.22E-04	8.22E-05
Benzo(g,h,i)perylene	0.0739	0.00049513	0.003612897	4.69E-03	10	100	4.69E-04	4.69E-05
Benzo(k)fluoranthene	0.0415	0.00027805	0.002102681	2.66E-03	10	100	2.66E-04	2.66E-05
Bis(2-Ethylhexyl)phthalate	0.5546	0.0183018	0.5546	2.08E-01	1.1	11	1.89E-01	1.89E-02
Butylbenzylphthalate	0.3202	0.0105666	0.3202	1.20E-01	1.1	11	1.09E-01	1.09E-02
Carbazole	0.2621	0.0136292	0.027438725	2.76E-02	10	100	2.76E-03	2.76E-04
Chrysene	0.0975	0.00065325	0.0034125	5.77E-03	10	100	5.77E-04	5.77E-05
Dibenzofuran	0.191	0.006303	0.0191	1.79E-02	NA	NA	NA	NA
Di-n-octyl phthalate	0.634	0.634	0.634	5.66E-01	1.1	11	5.14E-01	5.14E-02
Fluoranthene	0.174	0.0011658	0.002754942	9.25E-03	10	100	9.25E-04	9.25E-05
Indeno(1,2,3-cd)pyrene	0.0718	0.00048106	0.006021938	5.34E-03	10	100	5.34E-04	5.34E-05
Phenanthrene	0.891	0.0059697	0.021694068	4.97E-02	10	100	4.97E-03	4.97E-04
Pyrene	0.1349	0.00090383	0.00248216	7.28E-03	10	100	7.28E-04	7.28E-05
Pesticides/PCBs								
4,4'-DDD	0.0356	0.000356	0.11748	3.85E-02	0.0028	0.028	1.37E+01	1.37E+00
4,4'-DDE	0.3952	0.003952	0.67184	2.30E-01	0.0028	0.028	8.20E+01	8.20E+00

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FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.0773000 kg		
Food Ingestion Rate	0.0690000 kg/day	0.6	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day	0.35	Earthworm Fraction
Soil Ingestion Rate	0.0690000 kg/day	0.05	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/L)	Invertebrate[b] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDT	0.389	0.00389	0.22173	8.87E-02	0.0028	0.028	3.17E+01	3.17E+00
Aroclor-1260	0.0178	0.002136	0.1186726	3.90E-02	0.18	1.8	2.17E-01	2.17E-02
alpha-BHC	0.0091	0.000027846	0.0091	3.26E-03	0.56	1.8	5.83E-03	1.81E-03
beta-BHC	0.0088	0.0004312	0.0088	3.37E-03	0.56	2.25	6.02E-03	1.50E-03
delta-BHC	0.0091	0.000027846	0.0091	3.26E-03	0.56	2.25	5.83E-03	1.45E-03
gamma-BHC (Lindane)	0.0113	0.000611104	0.0113	4.36E-03	2	20	2.18E-03	2.18E-04
Alpha-Chlordane	0.0077	0.00001309	0.01232	4.20E-03	2.14	10.7	1.96E-03	3.92E-04
Gamma-Chlordane	0.0067	0.00001139	0.01072	3.65E-03	2.14	10.7	1.71E-03	3.42E-04
Endrin Ketone	0.0128	0.00118016	0.0009216	1.49E-03	0.01	0.1	1.49E-01	1.49E-02
Metals and Inorganics								
Aluminum	5667.5	4.534	300.3775	3.49E+02	109.7	1097	3.18E+00	3.18E-01
Antimony	7.03	0.2812	7.03	2.66E+00	NA	NA	NA	NA
Arsenic	4.33	0.162375	0.96992	5.83E-01	2.46	7.38	2.37E-01	7.90E-02
Barium	70.7	2.121	70.7	2.64E+01	20.8	41.7	1.27E+00	6.33E-01
Beryllium	0.19	0.00038	0.19	6.80E-02	NA	NA	NA	NA
Cadmium	0.923	0.540878	7.114484	2.55E+00	1.45	20	1.76E+00	1.28E-01
Copper	44.34	5.49816	22.8351	1.21E+01	47	61.7	2.57E-01	1.95E-01
Iron	19557.5	19557.5	743.185	1.16E+04	100	1000	1.16E+02	1.16E+01
Lead	834	32.4426	221.844	1.24E+02	1.13	11.3	1.10E+02	1.10E+01
Manganese	123.3	6.165	6.6582	1.09E+01	977	9770	1.11E-02	1.11E-03
Mercury	0.21	0.13692	0.35553	1.94E-01	0.0064	0.064	3.03E+01	3.03E+00

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FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.0773000 kg		
Food Ingestion Rate	0.0690000 kg/day	0.6	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day	0.35	Earthworm Fraction
Soil Ingestion Rate	0.0690000 kg/day	0.05	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/L)	Invertebrate[b] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Nickel	8.23	0.14814	8.71557	3.17E+00	77.4	107	4.10E-02	2.96E-02
Selenium	0.288	0.193536	0.28368	2.05E-01	0.4	0.8	5.13E-01	2.56E-01
Silver	0.6	0.048	0.6	2.40E-01	NA	NA	NA	NA
Vanadium	12.1	0.01331	0.4719	6.95E-01	11.4	114	6.09E-02	6.09E-03
Zinc	177	64.782	566.577	2.20E+02	14.5	131	1.51E+01	1.68E+00

a = Value calculated by multiplying the plant BAF by the surface soil concentration.
b = Value calculated by multiplying the invertebrate BAF by the surface soil concentration.
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.0773000 kg		
Food Ingestion Rate	0.0690000 kg/day	0.6	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day	0.35	Earthworm Fraction
Soil Ingestion Rate	0.0690000 kg/day	0.05	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/L)	Invertebrate[b] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds								
1,2,4-Trichlorobenzene	0.14	0.14	0.14	1.25E-01	NA	NA	NA	NA
2-Methylnaphthalene	0.13	0.000871	0.01360944	1.05E-02	10	100	1.05E-03	1.05E-04
Benzo(a)anthracene	0.28	0.001876	0.007	1.57E-02	10	100	1.57E-03	1.57E-04
Benzo(a)pyrene	0.31	0.002077	0.02121051	2.16E-02	10	100	2.16E-03	2.16E-04
Benzo(b)fluoranthene	0.51	0.003417	0.03256146	3.48E-02	10	100	3.48E-03	3.48E-04
Benzo(g,h,i)perylene	0.21	0.001407	0.01026669	1.33E-02	10	100	1.33E-03	1.33E-04
Benzo(k)fluoranthene	0.16	0.001072	0.00810672	1.02E-02	10	100	1.02E-03	1.02E-04
Bis(2-Ethylhexyl)phthalate	5.6	0.1848	5.6	2.10E+00	1.1	11	1.91E+00	1.91E-01
Butylbenzylphthalate	2	0.066	2	7.49E-01	1.1	11	6.81E-01	6.81E-02
Carbazole	0.49	0.02548	0.05129712	5.15E-02	10	100	5.15E-03	5.15E-04
Chrysene	0.33	0.002211	0.01155	1.95E-02	10	100	1.95E-03	1.95E-04
Dibenzofuran	0.2	0.0066	0.02	1.87E-02	NA	NA	NA	NA
Di-n-octyl phthalate	6.4	6.4	6.4	5.71E+00	1.1	11	5.19E+00	5.19E-01
Fluoranthene	0.63	0.004221	0.00997479	3.35E-02	10	100	3.35E-03	3.35E-04
Indeno(1,2,3-cd)pyrene	0.23	0.001541	0.01929033	1.71E-02	10	100	1.71E-03	1.71E-04
Phenanthrene	0.19	0.001273	0.00462612	1.06E-02	10	100	1.06E-03	1.06E-04
Pyrene	0.51	0.003417	0.009384	2.75E-02	10	100	2.75E-03	2.75E-04
Pesticides/PCBs								
4,4'-DDD	0.18	0.0018	0.594	1.95E-01	0.0028	0.028	6.95E+01	6.95E+00
4,4'-DDE	4.2	0.042	7.14	2.44E+00	0.0028	0.028	8.72E+02	8.72E+01

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FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.0773000 kg		
Food Ingestion Rate	0.0690000 kg/day	0.6	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day	0.35	Earthworm Fraction
Soil Ingestion Rate	0.0690000 kg/day	0.05	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/L)	Invertebrate[b] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDT	4.4	0.044	2.508	1.00E+00	0.0028	0.028	3.58E+02	3.58E+01
Aroclor-1260	0.08	0.0096	0.53336	1.75E-01	0.18	1.8	9.74E-01	9.74E-02
alpha-BHC	0.042	0.00012852	0.042	1.51E-02	0.56	1.8	2.69E-02	8.37E-03
beta-BHC	0.033	0.001617	0.033	1.26E-02	0.56	2.25	2.26E-02	5.62E-03
delta-BHC	0.45	0.001377	0.45	1.61E-01	0.56	2.25	2.88E-01	7.17E-02
gamma-BHC (Lindane)	0.75	0.04056	0.75	2.90E-01	2	20	1.45E-01	1.45E-02
Alpha-Chlordane	0.018	0.0000306	0.0288	9.82E-03	2.14	10.7	4.59E-03	9.18E-04
Gamma-Chlordane	0.0081	0.00001377	0.01296	4.42E-03	2.14	10.7	2.06E-03	4.13E-04
Endrin Ketone	0.012	0.0011064	0.000864	1.40E-03	0.01	0.1	1.40E-01	1.40E-02
Metals and Inorganics								
Aluminum	8610	6.888	456.33	5.31E+02	109.7	1097	4.84E+00	4.84E-01
Antimony	90.6	3.624	90.6	3.43E+01	NA	NA	NA	NA
Arsenic	24.9	0.93375	5.5776	3.35E+00	2.46	7.38	1.36E+00	4.54E-01
Barium	178	5.34	178	6.64E+01	20.8	41.7	3.19E+00	1.59E+00
Beryllium	0.51	0.00102	0.51	1.83E-01	NA	NA	NA	NA
Cadmium	5.4	3.1644	41.6232	1.49E+01	1.45	20	1.03E+01	7.47E-01
Copper	131	16.244	67.465	3.56E+01	47	61.7	7.58E-01	5.77E-01
Iron	147000	147000	5586	8.70E+04	100	1000	8.70E+02	8.70E+01
Lead	8380	325.982	2229.08	1.25E+03	1.13	11.3	1.10E+03	1.10E+02
Manganese	752	37.6	40.608	6.64E+01	977	9770	6.79E-02	6.79E-03
Mercury	1.1	0.7172	1.8623	1.02E+00	0.0064	0.064	1.59E+02	1.59E+01

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FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.0773000 kg		
Food Ingestion Rate	0.0690000 kg/day	0.6	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day	0.35	Earthworm Fraction
Soil Ingestion Rate	0.0690000 kg/day	0.05	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation[a] Concentration (mg/L)	Invertebrate[b] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Nickel	47.8	0.8604	50.6202	1.84E+01	77.4	107	2.38E-01	1.72E-01
Selenium	1.1	0.7392	1.0835	7.83E-01	0.4	0.8	1.96E+00	9.79E-01
Silver	2.4	0.192	2.4	9.60E-01	NA	NA	NA	NA
Vanadium	47.4	0.05214	1.8486	2.72E+00	11.4	114	2.39E-01	2.39E-02
Zinc	497	181.902	1590.897	6.17E+02	14.5	131	4.25E+01	4.71E+00

a = Value calculated by multiplying the plant BAF by the surface soil concentration.
b = Value calculated by multiplying the invertebrate BAF by the surface soil concentration.
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097300 kg		
Food Ingestion Rate	0.0052000 kg/day	0.9	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0005200 kg/day	0.1	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.189	0.189	9.19E-02	NA	NA	NA	NA
2-Methylnaphthalene	0.189	0.019786032	1.05E-02	1	10	1.05E-02	1.05E-03
Benzo(a)anthracene	0.0847	0.0021175	1.47E-03	1	10	1.47E-03	1.47E-04
Benzo(a)pyrene	0.0978	0.006691574	3.74E-03	1	10	3.74E-03	3.74E-04
Benzo(b)fluoranthene	0.1206	0.007699828	4.35E-03	1	10	4.35E-03	4.35E-04
Benzo(g,h,i)perylene	0.0739	0.003612897	2.13E-03	1	10	2.13E-03	2.13E-04
Benzo(k)fluoranthene	0.0415	0.002102681	1.23E-03	1	10	1.23E-03	1.23E-04
Bis(2-Ethylhexyl)phthalate	0.5546	0.5546	2.70E-01	18.3	183	1.47E-02	1.47E-03
Butylbenzylphthalate	0.3202	0.3202	1.56E-01	159	1590	9.79E-04	9.79E-05
Carbazole	0.2621	0.027438725	1.46E-02	1.3	2.6	1.12E-02	5.61E-03
Chrysene	0.0975	0.0034125	2.16E-03	1.3	2.6	1.66E-03	8.32E-04
Dibenzofuran	0.191	0.0191	1.02E-02	60	125	1.70E-04	8.17E-05
Di-n-octyl phthalate	0.634	0.634	3.08E-01	18.3	183	1.68E-02	1.68E-03
Fluoranthene	0.174	0.002754942	2.25E-03	1.3	2.6	1.73E-03	8.67E-04
Indeno(1,2,3-cd)pyrene	0.0718	0.006021938	3.28E-03	1.3	2.6	2.52E-03	1.26E-03
Phenanthrene	0.891	0.021694068	1.52E-02	1.3	2.6	1.17E-02	5.84E-03
Pyrene	0.1349	0.00248216	1.91E-03	1.3	2.6	1.47E-03	7.36E-04
Pesticides/PCBs							
4,4'-DDD	0.0356	0.11748	5.67E-02	0.8	4	7.09E-02	1.42E-02
4,4'-DDE	0.3952	0.67184	3.25E-01	0.8	4	4.07E-01	8.13E-02

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FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097300 kg		
Food Ingestion Rate	0.0052000 kg/day	0.9	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0005200 kg/day	0.1	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDT	0.389	0.22173	1.09E-01	0.8	4	1.36E-01	2.72E-02
Aroclor-1260	0.0178	0.1186726	5.72E-02	0.068	0.68	8.41E-01	8.41E-02
alpha-BHC	0.0091	0.0091	4.43E-03	0.014	0.14	3.16E-01	3.16E-02
beta-BHC	0.0088	0.0088	4.28E-03	0.4	2	1.07E-02	2.14E-03
delta-BHC	0.0091	0.0091	4.43E-03	0.014	0.14	3.16E-01	3.16E-02
gamma-BHC (Lindane)	0.0113	0.0113	5.50E-03	8	80	6.87E-04	6.87E-05
Alpha-Chlordane	0.0077	0.01232	5.97E-03	4.6	9.2	1.30E-03	6.49E-04
Gamma-Chlordane	0.0067	0.01072	5.19E-03	4.6	9.2	1.13E-03	5.64E-04
Endrin Ketone	0.0128	0.0009216	5.12E-04	0.092	0.92	5.56E-03	5.56E-04
Metals and Inorganics							
Aluminum	5667.5	300.3775	1.75E+02	1.93	19.3	9.06E+01	9.06E+00
Antimony	7.03	7.03	3.42E+00	0.125	1.25	2.74E+01	2.74E+00
Arsenic	4.33	0.96992	4.90E-01	0.126	1.26	3.89E+00	3.89E-01
Barium	70.7	70.7	3.44E+01	5.1	51	6.74E+00	6.74E-01
Beryllium	0.19	0.19	9.24E-02	0.66	6.6	1.40E-01	1.40E-02
Cadmium	0.923	7.114484	3.43E+00	1	10	3.43E+00	3.43E-01
Copper	44.34	22.8351	1.12E+01	11.7	15.14	9.59E-01	7.41E-01
Iron	19557.5	743.185	4.62E+02	50	500	9.24E+00	9.24E-01
Lead	834	221.844	1.11E+02	8	80	1.39E+01	1.39E+00
Manganese	123.3	6.6582	3.86E+00	88	284	4.39E-02	1.36E-02
Mercury	0.21	0.35553	1.72E-01	0.015	0.025	1.15E+01	6.89E+00

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FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097300 kg		
Food Ingestion Rate	0.0052000 kg/day	0.9	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0005200 kg/day	0.1	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Nickel	8.23	8.71557	4.24E+00	40	80	1.06E-01	5.30E-02
Selenium	0.288	0.28368	1.38E-01	0.2	0.33	6.90E-01	4.18E-01
Silver	0.6	0.6	2.92E-01	1.8	18	1.62E-01	1.62E-02
Vanadium	12.1	0.4719	2.92E-01	0.21	2.1	1.39E+00	1.39E-01
Zinc	177	566.577	2.73E+02	160	320	1.71E+00	8.55E-01

a = Value calculated by multiplying the invertebrate BAF by the surface soil concentration.
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097300 kg		
Food Ingestion Rate	0.0052000 kg/day	0.9	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0005200 kg/day	0.1	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
1,2,4-Trichlorobenzene	0.14	0.14	6.81E-02	NA	NA	NA	NA
2-Methylnaphthalene	0.13	0.01360944	7.24E-03	1	10	7.24E-03	7.24E-04
Benzo(a)anthracene	0.28	0.007	4.86E-03	1	10	4.86E-03	4.86E-04
Benzo(a)pyrene	0.31	0.02121051	1.19E-02	1	10	1.19E-02	1.19E-03
Benzo(b)fluoranthene	0.51	0.03256146	1.84E-02	1	10	1.84E-02	1.84E-03
Benzo(g,h,i)perylene	0.21	0.01026669	6.06E-03	1	10	6.06E-03	6.06E-04
Benzo(k)fluoranthene	0.16	0.00810672	4.75E-03	1	10	4.75E-03	4.75E-04
Bis(2-Ethylhexyl)phthalate	5.6	5.6	2.72E+00	18.3	183	1.49E-01	1.49E-02
Butylbenzylphthalate	2	2	9.73E-01	159	1590	6.12E-03	6.12E-04
Carbazole	0.49	0.05129712	2.73E-02	1.3	2.6	2.10E-02	1.05E-02
Chrysene	0.33	0.01155	7.32E-03	1.3	2.6	5.63E-03	2.82E-03
Dibenzofuran	0.2	0.02	1.07E-02	60	125	1.78E-04	8.55E-05
Di-n-octyl phthalate	6.4	6.4	3.11E+00	18.3	183	1.70E-01	1.70E-02
Fluoranthene	0.63	0.00997479	8.16E-03	1.3	2.6	6.28E-03	3.14E-03
Indeno(1,2,3-cd)pyrene	0.23	0.01929033	1.05E-02	1.3	2.6	8.08E-03	4.04E-03
Phenanthrene	0.19	0.00462612	3.24E-03	1.3	2.6	2.49E-03	1.25E-03
Pyrene	0.51	0.009384	7.24E-03	1.3	2.6	5.57E-03	2.78E-03
Pesticides/PCBs							
4,4'-DDD	0.18	0.594	2.87E-01	0.8	4	3.58E-01	7.17E-02
4,4'-DDE	4.2	7.14	3.46E+00	0.8	4	4.32E+00	8.64E-01

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FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097300 kg		
Food Ingestion Rate	0.0052000 kg/day	0.9	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0005200 kg/day	0.1	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
4,4'-DDT	4.4	2.508	1.23E+00	0.8	4	1.54E+00	3.07E-01
Aroclor-1260	0.08	0.53336	2.57E-01	0.068	0.68	3.78E+00	3.78E-01
alpha-BHC	0.042	0.042	2.04E-02	0.014	0.14	1.46E+00	1.46E-01
beta-BHC	0.033	0.033	1.60E-02	0.4	2	4.01E-02	8.02E-03
delta-BHC	0.45	0.45	2.19E-01	0.014	0.14	1.56E+01	1.56E+00
gamma-BHC (Lindane)	0.75	0.75	3.65E-01	8	80	4.56E-02	4.56E-03
Alpha-Chlordane	0.018	0.0288	1.39E-02	4.6	9.2	3.03E-03	1.52E-03
Gamma-Chlordane	0.0081	0.01296	6.28E-03	4.6	9.2	1.36E-03	6.82E-04
Endrin Ketone	0.012	0.000864	4.80E-04	0.092	0.92	5.21E-03	5.21E-04
Metals and Inorganics							
Aluminum	8610	456.33	2.66E+02	1.93	19.3	1.38E+02	1.38E+01
Antimony	90.6	90.6	4.41E+01	0.125	1.25	3.52E+02	3.52E+01
Arsenic	24.9	5.5776	2.82E+00	0.126	1.26	2.23E+01	2.23E+00
Barium	178	178	8.66E+01	5.1	51	1.70E+01	1.70E+00
Beryllium	0.51	0.51	2.48E-01	0.66	6.6	3.76E-01	3.76E-02
Cadmium	5.4	41.6232	2.00E+01	1	10	2.00E+01	2.00E+00
Copper	131	67.465	3.31E+01	11.7	15.14	2.83E+00	2.19E+00
Iron	147000	5586	3.47E+03	50	500	6.94E+01	6.94E+00
Lead	8380	2229.08	1.12E+03	8	80	1.40E+02	1.40E+01
Manganese	752	40.608	2.36E+01	88	284	2.68E-01	8.29E-02
Mercury	1.1	1.8623	9.02E-01	0.015	0.025	6.01E+01	3.61E+01

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FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097300 kg		
Food Ingestion Rate	0.0052000 kg/day	0.9	Earthworm Fraction
Water Ingestion Rate	0.0000000 L/day		
Soil Ingestion Rate	0.0005200 kg/day	0.1	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Nickel	47.8	50.6202	2.46E+01	40	80	6.15E-01	3.08E-01
Selenium	1.1	1.0835	5.27E-01	0.2	0.33	2.64E+00	1.60E+00
Silver	2.4	2.4	1.17E+00	1.8	18	6.48E-01	6.48E-02
Vanadium	47.4	1.8486	1.14E+00	0.21	2.1	5.44E+00	5.44E-01
Zinc	497	1590.897	7.68E+02	160	320	4.80E+00	2.40E+00

a = Value calculated by multiplying the invertebrate BAF by the surface soil concentration.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION USING FILTERED WATER DATA
RACCOON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000 kg		
Food Ingestion Rate	0.8560000 kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Filtered Water Concentration (mg/L)	Unfiltered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics									
Antimony	0.697143	0.001084375	0	0.001084375	0.014	0.125	1.25	1.14E-01	1.14E-02
Barium	23.925	0.1885125	0.020325	0.75405	0.629	5.1	51	1.23E-01	1.23E-02
Manganese	92.517857	0.029740625	0.0583375	11.09325313	4.023	88	284	4.57E-02	1.42E-02
Zinc	44.985714	0.052959375	0.017825	2.489090625	1.391	160	320	8.69E-03	4.35E-03

Dose to raccoon = (filtered water x fish BCF + sediment ingestion + ingestion of unfiltered water)/body weight
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION USING FILTERED WATER DATA
RACCOON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000 kg		
Food Ingestion Rate	0.8560000 kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Filtered Water Concentration (mg/L)	Unfiltered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics									
Antimony	1.3	0.002075	0	0.002075	0.02661966	0.125	1.25	2.13E-01	2.13E-02
Barium	88.5	0.263	0.03715	1.052	1.9895681	5.1	51	3.90E-01	3.90E-02
Manganese	190	0.0438	0.124	16.3374	7.00833029	88	284	7.96E-02	2.47E-02
Zinc	124	0.0964	0.051025	4.5308	3.38178558	160	320	2.11E-02	1.06E-02

Dose to raccoon = (filtered water x fish BCF + sediment ingestion + ingestion of unfiltered water)/body weight
NA = NOAEL/LOAEL not available
ND = Not detected

FOOD CHAIN MODELING CALCULATION USING FILTERED WATER DATA
OSPREY - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg		
Food Ingestion Rate	0.3120000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0000000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Filtered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics							
Antimony	0.001084375	0.001084375	2.28E-04	NA	NA	NA	NA
Barium	0.1885125	0.75405	0.158	20.8	41.7	7.61E-03	3.80E-03
Manganese	0.029740625	11.09325313	2.329	977	9770	2.38E-03	2.38E-04
Zinc	0.052959375	2.489090625	0.523	14.5	131	3.60E-02	3.99E-03

NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION USING FILTERED WATER DATA
OSPREY - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000	kg		
Food Ingestion Rate	0.3120000	kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0000000	L/day		
Sediment Ingestion Rate	0.0000000	kg/day		

Maximum Concentrations

COPC	Filtered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics							
Antimony	0.002075	0.002075	0.00043567	NA	NA	NA	NA
Barium	0.263	1.052	0.22087752	20.8	41.7	1.06E-02	5.30E-03
Manganese	0.0438	16.3374	3.43019435	977	9770	3.51E-03	3.51E-04
Zinc	0.0964	4.5308	0.95128506	14.5	131	6.56E-02	7.26E-03

NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION USING FILTERED WATER DATA
GREAT BLUE HERON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000	kg		
Food Ingestion Rate	0.4010000	kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0800000	L/day		
Sediment Ingestion Rate	0.0000000	kg/day		

Mean Concentrations

COPC	Filtered Water Concentration (mg/L)	Unfiltered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics								
Antimony	0.001084375	0	0.001084375	1.95E-04	NA	NA	NA	NA
Barium	0.1885125	0.020325	0.75405	0.136	20.8	41.7	6.56E-03	3.27E-03
Manganese	0.029740625	0.0583375	11.09325313	1.998	977	9770	2.04E-03	2.04E-04
Zinc	0.052959375	0.017825	2.489090625	0.448	14.5	131	3.09E-02	3.42E-03

Dose to heron = (filtered water x fish BCF + ingestion of unfiltered water)/body weight
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION USING FILTERED WATER DATA
GREAT BLUE HERON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg		
Food Ingestion Rate	0.4010000 kg/day	1.0	Fish Fraction
Water Ingestion Rate	0.0800000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Maximum Concentrations

COPC	Filtered Water Concentration (mg/kg)	Unfiltered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics								
Antimony	0.002075	0	0.002075	0.0003733	NA	NA	NA	NA
Barium	0.263	0.020325	1.052	0.18998564	20.8	41.7	9.13E-03	4.56E-03
Manganese	0.0438	0.0583375	16.3374	2.94121328	977	9770	3.01E-03	3.01E-04
Zinc	0.0964	0.017825	4.5308	0.81573656	14.5	131	5.63E-02	6.23E-03

Dose to heron = (filtered water x fish BCF + ingestion of unfiltered water)/body weight
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION USING FILTERED WATER DATA
RACCOON - AVERAGE CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000	kg		
Food Ingestion Rate	0.8560000	kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000	L/day		
Sed Ingestion Rate	0.8560000	kg/day	0.094	Sediment Fraction

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Filtered Water Concentration (mg/L)	Unfiltered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics									
Antimony	0.697143	0.001084375	0	0.001084375	0.014	0.125	1.25	1.14E-01	1.14E-02
Barium	23.925	0.1885125	0.020325	0.75405	0.629	5.1	51	1.23E-01	1.23E-02
Manganese	92.517857	0.029740625	0.0583375	11.09325313	4.023	88	284	4.57E-02	1.42E-02
Zinc	44.985714	0.052959375	0.017825	2.489090625	1.391	160	320	8.69E-03	4.35E-03

Dose to raccoon = (filtered water x fish BCF + sediment ingestion + ingestion of unfiltered water)/body weight
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION USING FILTERED WATER DATA
RACCOON - MAXIMUM CONCENTRATION
SITE 1/SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Raccoon
(Conservative Inputs)

Body Weight	3.9900000	kg		
Food Ingestion Rate	0.8560000	kg/day	0.906	Prey Fraction
Water Ingestion Rate	0.0390000	L/day		
Sed Ingestion Rate	0.8560000	kg/day	0.094	Sediment Fraction

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Filtered Water Concentration (mg/L)	Unfiltered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics									
Antimony	1.3	0.002075	0	0.002075	0.02661966	0.125	1.25	2.13E-01	2.13E-02
Barium	88.5	0.263	0.03715	1.052	1.9895681	5.1	51	3.90E-01	3.90E-02
Manganese	190	0.0438	0.124	16.3374	7.00833029	88	284	7.96E-02	2.47E-02
Zinc	124	0.0964	0.051025	4.5308	3.38178558	160	320	2.11E-02	1.06E-02

Dose to raccoon = (filtered water x fish BCF + sediment ingestion + ingestion of unfiltered water)/body weight
NA = NOAEL/LOAEL not available
ND = Not detected

Paris Island
SWMU 41 - surface soils
Summary of Positive Detects

order	01	02	03	04	
aoc	SITE 41	SITE 41	SITE 41	SITE 41	
laboratory	RECRA LABN	RECRA LABN	RECRA LABN	RECRA LABN	
site	SITE 41	SITE 41	SITE 41	SITE 41	
location	PAI-41-SS-01	PAI-41-SS-02	PAI-41-SS-03	PAI-41-SS-04	
matrix	SS	SS	SS	SS	
nsample	PAI-41-SS-01-01	PAI-41-SS-02-01	PAI-41-SS-03-01	PAI-41-SS-04-01	
sample	PAI-41-SS-001-01	PAI-41-SS-002-01	PAI-41-SS-003-01	PAI-41-SS-004-01	
sacode	NORMAL	NORMAL	NORMAL	NORMAL	
top_depth	0	0	0	0	
bottom_dep	1	1	1	1	
sample_dat	01-Jun-98	03-Jun-98	01-Jun-98	01-Jun-98	
cto_proj	020	020	020	020	
sort	**c_01**	**c_02**	**c_03**	**c_04**	**count**
Volatile Organics (ug/kg)					
ACETONE	7 UR	730 J	7 UR	6 UR	4
Semivolatile Organics (ug/kg)					
BENZO(A)ANTHRACENE	24 J	22 U	63	21 U	4
BENZO(A)PYRENE	32 J	22 U	37 J	21 U	4
BENZO(B)FLUORANTHENE	43	13	68	10	4
BENZO(G,H,I)PERYLENE	70 U	36 U	70	34 U	4
BENZO(K)FLUORANTHENE	19	8.9 U	18 U	8.6 U	4
CHRYSENE	44 U	22 U	44 U	12 J	4
FLUORANTHENE	63	26	200	26	4
FLUORENE	87 U	44 U	28	43 U	4
INDENO(1,2,3-CD)PYRENE	26 J	22 U	44 U	21 U	4
PHENANTHRENE	30 J	69	190	31	4
PYRENE	87 U	44 U	120	43 U	4
Pesticides/PCBs (ug/kg)					
4,4'-DDE	43	34	180 U	85 U	4
4,4'-DDT	65	12	180 U	85 U	4
Inorganics (mg/kg)					
ALUMINUM	3240	3130	5830	6290	4
ARSENIC	0.87	0.48	6.3	0.69	4
BARIUM	44.1	20.7	151	29.6	4
BERYLLIUM	0.05	0.14 U	0.51	0.13	4
CADMIUM	0.32	0.11	1.1	0.13 U	4
CALCIUM	1620	1640	1830	384	4
CHROMIUM	9.6	4.8	13.4	5.1	4
COBALT	0.51	0.36	4.3	0.54	4
COPPER	10.5	9	114	4.8	4
IRON	3320	2150	15500	2910	4
LEAD	161	34.5	156	26.4	4
MAGNESIUM	281	187	604	292	4
MANGANESE	31.8	28.3	95.7	71.8	4
MERCURY	0.04	0.16	0.18	0.05	4
NICKEL	1.6	1.1	13.9	2.4	4
POTASSIUM	249	148	1170	205	4
SELENIUM	0.22	0.23	1.1	0.23	4
SILVER	0.18	0.25 U	0.89	0.05 U	4
SODIUM	263	358	425	408	4
VANADIUM	5.4	4.8	11	6.6	4
ZINC	63.3	30.9	158	27.8	4

from p41p_sam.dbf
from p41p_res.dbf
from p41p_res.xls
from p:\

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TECHNICAL MEMORANDUM

TECHNICAL MEMORANDUM NUMBER 1
DETERMINATION OF TYPICAL FACILITY PESTICIDE CONCENTRATIONS
MCRD PARRIS ISLAND, SOUTH CAROLINA

INTRODUCTION

Pesticides have been used at MCRD Parris Island for several decades to control insect populations. For most areas, these chemicals have been applied in accordance with normal practices for treatment. One reported distribution method was to fog an area with a truck mounted spray nozzle. Pesticides (including DDT) would then migrate as a mist and settle on adjacent vegetation and soils. Because of this practice, some pesticides may be present in soil and sediment at the base that are not related to waste management (NPL Sites and RCRA SWMUs). In addition, insecticides would mostly be used in recreational, training, and work areas (picnic grounds, parks, etc.) near stagnant water.

At sites/SWMUs where pesticides can be present from both disposal and insect control, an approach is needed to distinguish between these two potential sources. Otherwise, site-specific chemical data cannot be used to identify the extent of site/SWMU-related contamination.

BACKGROUND DATA FROM REMOTE AREAS AT PARRIS AND PINCKNEY ISLANDS

Background samples were collected in 1998 from remote areas of Parris and Pinckney Islands. These samples consisted of 6 soil, 6 sediment, and 6 surface water samples. Three samples of each medium were collected from Pinckney Island and the three samples of each medium were collected from Parris Island. The sample locations are considered to be relatively remote from human activity. Based on limited access and a review of the surrounding area, the potential for local anthropogenic sources of TAL/TCL chemicals is limited. Pesticides were not detected in these background soil, sediment, and surface water samples, indicating that pesticides are not found uniformly throughout the region.

Regional sediment data from estuaries in the Carolinian Province (NOAA, 1998) have also been attached to this technical memorandum. The unbiased sediment samples results indicate that low-level concentrations of pesticides have been detected throughout the Carolinian Province.

MCRD PARRIS ISLAND DATA FROM NON PESTICIDE SITES AT PARRIS ISLAND

Soil and sediment samples were collected at 8 sites at MCRD Parris Island in 1996. Additionally, two soil samples were collected in 1999 near the picnic area in the vicinity of Site 1. A listing of the sites and discussion of site histories are presented in Table 1. Also presented in Table 1 are recommendations for potential use of these sites as a background location for pesticides. Based on this review, 5 of the 8 sites

(Sites 5, 14, 15, and 21 and the picnic area near Site 1) are considered for use as local background (for pesticides).

The data for these sites are presented in Table 2. Based on the results of the testing, six pesticides were detected at two or more sites. Of these pesticides, DDT was detected in 6 of 9 samples with detected concentrations ranging from 1.8 ug/kg to 70 J ug/kg. 4,4'-DDD was detected in 1 of 9 samples, at a concentration of 160 ug/kg. 4,4'-DDE was detected in 6 of 9 samples with detected concentrations ranging from 3.8 J to 76 J ug/kg. Chlordanes were detected in 2 of 9 samples with detected concentrations ranging from 1.6 ug/kg to 62 ug/kg. Also detected in the samples were Endosulfan I.

TYPICAL FACILITY PESTICIDE CONCENTRATIONS FOR MCRD PARRIS ISLAND

The data used to calculate the typical facility background concentrations consists of data from Sites 5, 14, 15, and 21, the picnic area near Site 1, and 3 background sediment samples collected on Parris Island. The calculated arithmetic mean for each chemical is presented in Table 2. To provide a reasonable estimate of the upper bound of these chemicals in soils and sediments, two times the arithmetic mean value is used. These values are also presented in Table 2.

SUMMARY

Based on the data presented in this memorandum, pesticides can be found at the base in areas used for recreation and work. The areas considered have not been identified as pesticide waste management areas, but are areas where insect control likely occurred. The absence of pesticides in several locations indicates that pesticides are not spread throughout the facility and as a result, pesticides would not be expected to be found at all locations. However, based on this evaluation, a finding of low concentrations of pesticides in one or more or more samples at a site should not be considered as conclusive evidence of site/SWMU-related contamination.

TABLE 1

SELECTION OF SAMPLE LOCATIONS FOR TYPICAL FACILITY PESTICIDE CONCENTRATIONS (1996 AND 1999 TESTING)
MCRD PARIS ISLAND, SOUTH CAROLINA

Site	Discussion[1]	Potential background constituents
Picnic Area Near Site 1	Consists of a picnic area used by base personnel and guests of the facility. The picnic area is located along Malecon Drive approximately 300 feet southeast of Site 1. Historically, pesticides have been applied to the area for insect-control purposes.	Use for pesticides.
5 – Former Paint Shop Disposal Area	Site disposal activities limited to solvents, fuels, and paints (metals). No evidence that pesticides would be disposed at this location. Site is adjacent to Beaufort River.	Use for pesticides.
8 – PCB spill Areas	Insufficient data on site history to indicate potential for waste disposal other than PCBs.	Do not use.
9 – Paint Waste Storage Area	Site activities limited to storage of solvents, fuels, and paints. No evidence of pesticide storage or disposal. Because the site was used for storage, other chemicals may have been stored here.	Do not use.
12 – Jericho Island	Site is being investigated under a RFI/RI. Source of wastes not well defined at this time.	Do not use.
13 – Dredge Spoil Area	Sediments were dredged from area near Marina. Fire training pit was also in the area. The topography in the area has been altered. Samples were collected in the trench around sediments.	Do not use.
14 – Storm Sewer System	Sediments near three storm sewers were evaluated, with samples collected from near the motor pool discharge, the dry cleaner discharge, and the pest control discharge. The motor pool and dry cleaners sites are listed for solvents, battery acid, and x-ray fixer. No evidence of fuel or pesticides activities at these two sites. Because of the site name, do not use storm sewer for pest control.	Use 2 of 3 areas for pesticides.
15 – Potential PCB Area	Oil sprayed roads near Elliott's Beach. Site concern was PCBs.	Use for pesticides.
21 – Weapons Power Plant Oil/Water Separator	Sediments near discharge point were evaluated because of potential concerns with sump within power plant. Sump was later found to discharge to sanitary treatment plant. Trace levels of fuels may have entered discharge point through oil/water separator.	Use for pesticides.

1. Background information obtained from the 1990 RCRA Facility Assessment.

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TABLE 2

TYPICAL FACILITY PESTICIDE CONCENTRATIONS (UG/KG)
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	PI-005-01	PI-005-02	PAI-01-SS-15	PAI-01-SS-16	PI-014-01	PI-014-02	PI-015A-01
4,4'-DDD	11 U	3.7 U	1.7 U	3.4 U	160	19 U	3.8 U
4,4'-DDE	19 J	3.7 U	3.8 J	76 J	18 J	14	9.2 U
4,4'-DDT	42	1.8 J	5.2 J	70 J	24 U	5.2 U	3 J
ALPHA-CHLORDANE	62	1.6 J	0.86 U	1.7 U	11 U	2.6 U	2 U
ENDOSULFON I	5.7 J	2.8	0.86 U	1.7 U	11 U	2.6 U	2 U
GAMMA-CHLORDANE	58	1.7 J	0.86 U	1.7 U	11 U	2.6 U	2 U
Total DDT/DDE/DDD	66.5	5.5	9.85	147.7	190	26.1	9.5

Parameter	PI-015B-01	PI-021-01	PAI-10-SD-15	PAI-10-SD-16	PAI-10-SD-17	Mean	Typical Facility Pesticide Conc. 2 x Mean
4,4'-DDD	4 U	6.9 U	8 U	12 U	10 U	16.81	33.6
4,4'-DDE	34	6.9 U	8 U	12 U	10 U	15.81	31.6
4,4'-DDT	52	6.9 U	8 U	12 U	10 U	17.25	34.5
ALPHA-CHLORDANE	2.1 U	3.5 U	4.1 U	6.1 U	5.3 U	6.94	13.9
ENDOSULFON I	2.1 U	3.5 U	4.1 U	6.1 U	5.3 U	2.34	4.7
GAMMA-CHLORDANE	2.1 U	3.5 U	4.1 U	6.1 U	5.3 U	6.61	13.2
Total DDT/DDE/DDD	88	10.35	12	18	15	49.88	99.8

One-half the detection limit was used in mean and Total DDT/DDE/DDD calculations.

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TABLE 3.2-2. Summary of contaminant concentrations in sediments at EMAP sites in the Carolinian Province in 1995. Number and % area (± 95% C.I.s) of stations with contaminant concentrations in excess of corresponding sediment quality guideline values also are given. [Actual bioeffect guideline values are included at the end of Appendices C, D, and E for hydrocarbons, PCBs and pesticides, and metals, respectively.] N.D. = Not detectable.

Contaminant	Median Conc.	Mean Conc.	Range (Min – Max)	ER-L / TEL exceedances No. Sites[e]	ER-L / TEL exceedances % Area	ER-M / PEL exceedances No. Sites	ER-M / PEL exceedances % Area
Metals (µg/g) = mg/kg							
Antimony	N.D.	0.15	N.D. – 0.90	0	0	0	0
Arsenic	2.98	4.65	N.D. – 22.29	18	32 ± 15	0	0
Cadmium	0.05	0.12	N.D. – 1.30	1	1 ± 2	0	0
Chromium	25.66	35.76	0.79 – 98.07	7	14 ± 11	0	0
Copper	2.54	6.80	0.52 – 35.41	1	3 ± 6	0	0
Lead	8.87	14.19	0.90 – 45.62	0	0	0	0
Mercury	0.02	0.04	N.D. – 0.19	2	1 ± 2	0	0
Nickel	3.75	8.10	0.50 – 40.30	12	23 ± 12	0	0
Silver	0.02	0.05	N.D. – 0.51	0	0	0	0
Zinc	25.74	42.95	5.83 – 156.73	1	4 ± 7	0	0
PAHs (ng/g) = µg/kg							
Acenaphthene	0.30	1.44	N.D. – 53.20	1	< 1 ± < 1	0	0
Acenaphthylene	0.35	3.33	N.D. – 56.30	1	< 1 ± < 1	0	0
Anthracene	0.50	5.19	N.D. – 142.40	1	< 1 ± < 1	0	0
Benzo[a]anthracene	1.30	19.68	N.D. – 333.20	2	< 1 ± < 1	0	0
Benzo[a]pyrene	1.75	27.33	N.D. – 685.90	1	< 1 ± < 1	0	0
Chrysene	1.85	26.92	N.D. – 620.50	1	< 1 ± < 1	0	0
Dibenz[a,h]anthracene	0.30	3.86	N.D. – 71.40	1	< 1 ± < 1	0	0
Fluoranthene	3.00	38.27	0.10 – 701.60	1	< 1 ± < 1	0	0
Fluorene	0.50	2.24	0.10 – 45.60	1	< 1 ± < 1	0	0
2-Methylnaphthalene	0.75	1.74	0.10 – 12.00	0	0	0	0
Naphthalene	2.90	5.92	1.10 – 39.90	0	0	0	0
Phenanthrene	1.15	8.13	0.20 – 114.60	0	0	0	0
Pyrene	3.45	80.37	0.30 – 3855.40	1	< 1 ± < 1	1	< 1 ± < 1
Total PAHs [a]	50.70	534.18	9.10 – 12307.90	2	4 ± 7	0	0
PCBs (ng/g) = µg/kg							
Total PCBs	4.15	8.27	2.22 – 80.88	5	11 ± 11	0	0
Pesticides (ng/g) = µg/kg							
Chlordane [b]	0.12	0.26	N.D. – 3.12	1	< 1 ± < 1	0	0
4,4'-DDD (p,p'-DDD)	0.03	3.30	N.D. – 150.91	13	11 ± 8	5	6 ± 8
4,4'-DDE (p,p'-DDE)	0.07	1.62	N.D. – 34.16	10	6 ± 4	2	1 ± 2
4,4'-DDT (p,p'-DDT)	N.D.	1.64	N.D. – 35.01	10	8 ± 8	6	3 ± 3
Dieldrin	N.D.	1.38	N.D. – 38.53	11	9 ± 8	5	3 ± 3
Lindane [c]	N.D.	1.20	N.D. – 30.52	15	12 ± 9	10	4 ± 4
Total DDT [d]	0.34	8.06	N.D. – 213.17	22	27 ± 12	4	2 ± 2

[a] without Perylene
[b] alpha-, gamma-, and oxychlordane
[c] gamma BHC (or HCH)
[d] all six DDD, DDE, and DDT congeners
[e] Note that ER-M/PEL exceedances are included in counts of ER-L/TEL exceedances.

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REPRESENTATIVE RECEPTORS

REPRESENTATIVE RECEPTORS

One method recommended by EPA (1997) for assessing the potential risks of environmental contaminants is to compare toxic doses of contaminants to doses predicted for representative receptors. The predicted doses are derived through food chain modeling. The species used in food chain modeling are representative of other species within the same trophic group or guild and also represent the groups of organisms specified in the assessment endpoints. Information on life history and exposure factors (diet, average body weight, food ingestion rate, home range) for each representative species is collected for use in ecological risk assessments.

Great Blue Heron versus Green Heron in Food Chain Modeling

Great Blue Heron

The great blue heron has been used in ecological risk assessments at MCRD Parris Island to represent piscivorous (fish eating) avian receptors. This wading bird forages primarily in marshes and along gently sloping shorelines, particularly where small fish are plentiful in shallow areas. Fish are the preferred prey, commonly comprising about 90 to 98 percent of the diet, and are usually less than 25 cm in length. This species is one of several for which exposure factors are contained in EPA's (1993) *Wildlife Exposures Factors Handbook*. Body weights for the great blue heron (and other species) are variable, depending on factors such as age, sex, health, available food resources, etc. The body weight used to represent great blue herons at MCRD Parris Island (Table F-3) is based on the weights of both sexes in eastern North America (EPA, 1993). The estimated food ingestion rate for the great blue heron is 0.18 grams of food per gram of body weight per day (g/g bw/day), and was derived by EPA (1993) using Kushlan's (1978) allometric equation for daily food ingestion rate by herons:

$$\log I_f = 0.966 (\log BW) - 0.64$$

where I_f = food ingestion rate (g fresh weight/bird/day)

BW = body weight (g)

Based on the above equation, a great blue heron with a body weight of 2229 g would ingest 393 g food per day, which equates to 0.18 g/g bw/day (Table F-3).

The home range of birds (and many other species) is highly variable, depending largely on the quality of available habitat. The *Wildlife Exposures Factors Handbook* does not provide home range data for the great blue heron, but it does provide data from several studies where the distance that great blue herons travel from the nest or roosting area to foraging areas was measured. There is no single foraging distance that can be considered to represent all great blue herons, since they will forage in water bodies adjacent to their nest when food resources are adequate, but have been known to travel as far as 34.1 km (21 miles) to forage (EPA, 1993).

Among studies cited in the *Wildlife Exposures Factors Handbook*, the study nearest MCRD Parris Island was coastal North Carolina, where the average distance traveled to foraging areas by great blue herons was 7 to 8 km (4.3 to 5 miles). Values of 2 to 8 km (1.3 to 5 miles) encompass most of the foraging distances in studies summarized in the *Wildlife Exposures Factors Handbook.*

Green Heron

Other wading birds such as the little blue heron, snowy egret, tricolored heron, and green heron (all of which occur at MCRD Parris Island) could serve as representative piscivorous birds. All of these species are wading birds and have similar feeding habits. However, none of these species are included in the *Wildlife Exposures Factors Handbook.* The average body weight of the green heron is 212 g (Dunning, 1993). Using this body weight and Kushlan's (1978) equation for food ingestion rate by herons, a green heron would ingest 40 g food/day, which equates to 0.19 g/g bw/day (Table F-3). Based on average body weights from Dunning (1993) and Kushlan's (1978) equation, the estimated food ingestion rates for the little blue heron, snowy egret, and tricolored heron would also be 0.19 g/g bw/day.

Home range data for the green heron was not located. Peters (1983) used data from several studies to develop the following formula for the relationship of body size to home range for birds that prey upon animals:

$$\text{home range } (km^2) = 8.3\ W^{1.37}$$

where W = body mass (kg)

Using this formula and a body weight of 212 g, the estimated home range for a green heron would be 0.99 km^2 (245 acres). Using the same formula, the estimated home range for a great blue heron with a body weight of 2229 g would be 24.9 km^2 (6150 acres).

Conclusions Regarding Great Blue Heron versus Green Heron in Food Chain Modeling

The ingested dose varies directly with the food ingestion rate. Since the food ingestion rate is 0.18 g/g bw/day for the great blue heron and 0.19 g/g bw/day for the green heron, the food chain HQ for the green heron would be approximately 6 percent greater than the food chain HQ value for the great blue heron (0.19/0.18 = 1.06).

Comparisons of these two species' home ranges are very uncertain. However, the green heron's home range would usually be less than that of the great blue heron, since the green heron is a much smaller bird.

TABLE F-3

COMPARISON OF EXPOSURE PARAMETERS FOR REPRESENTATIVE ECOLOGICAL RECEPTORS GREAT BLUE HERON VERSUS GREEN HERON

Receptor	Representative Group	Body Weight (grams)	Food Ingestion (g/g body weight/day)	Assumed Diet for Exposure Assessment[1]	Home Range[1]
Great Blue Heron (*Ardea herodias*)	Piscivorous Bird	2229[1]	0.18[1,2]	100% fish soil, sediment: none[3]	1.3 to 5 miles[4] 6,150 acres[5]
Green Heron (*Butorides striatus*)	Piscivorous Bird	212[6]	0.19[2]	100% fish soil, sediment: none[3]	245 acres[5]

1 EPA (1993)
2 Estimated using Kushlan's (1978) equation for food ingestion rate of herons
3 Sample and Suter (1994)
4 Foraging radius (home range acreage not available in EPA, 1993)
5 Home range estimated using allometric equation from Peters (1983)
6 Dunning (1993)

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STEP 3A TABLES

TABLE F-4

COPC REFINEMENT
SURFACE WATER - SITE 1
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Surface Water?[a]
		Minimum	Maximum									
Volatile Organics (µg/L)												
Acetone	1/2	7	7	PAI-01-SW-09-00	4.0	NA	NA	NA	NA	2	<2 to <5	No[ab]
Semivolatile Organics (µg/L)												
2-Methylnaphthalene	1/8	10	10	PAI-01-SW-03-00	5.8	NA	NA	NA	NA	10 - 11.5	<5 to <10	No[ab]
Bis(2-ethylhexyl)phthalate	3/8	14	56	PAI-01-SW-03-00	14.8	NA	NA	NA	NA	10 - 11.5	45.0	No[c]
Chrysene	1/8	0.1	0.1	PAI-01-SW-10-00	0.1	NA	NA	NA	NA	0.12 - 0.24	<0.12 to <5	No[ab]
Dibenzofuran	1/8	10	10	PAI-01-SW-03-00	5.8	NA	NA	NA	NA	10 - 11.5	<5 to <10	No[ab]
Pentachlorophenol	1/8	110	110	PAI-01-SW-03-00	36.2	11.9[2]	9.2	3.0	1	48 - 57	<10 to <52	Yes[d]
Inorganics (µg/L)												
Aluminum	6/8	434	13435	PAI-01-SW-01-00-AVG	3832.1	NA	NA	NA	NA	262 - 309	3100 UF, <22 to <99.4 F	Yes[d]
Antimony	1/8	2.1	2.1	PAI-01-SW-01-00-F-AVG	1.1 F	NA	NA	NA	NA	1.7 - 2.2	<1.7 to <19 UF & F	No[abe]
Barium	8/8	12.6	263	PAI-01-SW-12-00-F	20.3 UF, 188.5 F	NA	NA	NA	NA	0	38 UF, 256 F	No[af]
Cobalt	2/8	1.76	2.9	PAI-01-SW-10-00	0.8	NA	NA	NA	NA	0.4 - 0.6	<0.6 to <3.7 UF & F	No[ab]
Copper	2/8	13.6	62.95	PAI-01-SW-01-00-AVG	11.4	2.9	21.7	3.9	2	1.4 - 9	7 UF, 13 F	Yes[dg]
Iron	8/8	175	15600	PAI-01-SW-10-00	3404.6	NA	NA	NA	NA	0	2090 UF, 48 F	Yes[d]
Lead	2/8	20.9	77.5	PAI-01-SW-01-00-AVG	14.7	8.5	9.12	1.7	2	1 - 17	<1 to <11 UF, 11 F	Yes[dg]
Manganese	8/8	21.65	124	PAI-01-SW-10-00	58.3 UF, 29.7 F	NA	NA	NA	NA	0	53 UF, 18 F	Yes[c]
Mercury	2/8	0.09	0.12	PAI-01-SW-10-00	0.06	0.025	4.8	2.40	2	0.1 - 0.12	<0.1 to < 0.2 UF & F	Yes[dg]
Silver	1/8	0.89	0.89	PAI-01-SW-11-00	0.39	0.23	3.87	1.7	1	0.6 - 0.7	<0.6 to < 86 UF & F	Yes[d]
Vanadium	2/8	24.2	36.1	PAI-01-SW-10-00	8.1	NA	NA	NA	NA	0.5 - 4.1	18 UF, 15 F	Yes[d]
Zinc	6/8	7.3	96.4	PAI-01-SW-12-00-F	17.8 UF, 53.0 F	86	1.12	0.6 F	1	5 - 36.7	11 UF, 66 F	Yes[dg]

COPC = Contaminant of potential concern.
ESV = Ecological screening value for saltwater
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available
Note: Inorganics were analyzed in filtered and unfiltered samples. Antimony, barium, manganese, and zinc were the only analytes detected in filtered surface water samples at Site 1.
F = Filtered, UF = Unfiltered
1 For chemicals with at least one detection in background samples, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detected background samples. If the chemical was not detected in any background sample, the range of detection limits in background samples is shown.
2 Based on site specific pH of 7.73.

a This chemical does not biomagnify in the food chain.
b No screening values were identified for this chemical.
c Maximum detected concentration is similar to background concentration
d Potential risk to aquatic organisms via direct toxicity.
e Although a U.S. EPA Region IV ESV is not available, measured concentrations were less than alternate screening values provided in Section 7.8.4 of text.
f Maximum concentration in unfiltered surface water was less than background value for unfiltered surface water. Maximum concentration in filtered surface water exceeded the background value for filtered surface water, but the exceedance was slight (263 ug/L vs 256 ug/L).
g Potential risk to aquatic and semi-aquatic receptors via the food chain.

TABLE F-5

COPC REFINEMENT
SEDIMENT - SITE 1
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Analyte	Frequency of Detection	Range of Detection Min.	Range of Detection Max.	Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Sediment?
Volatile Organics (µg/kg)												
Acetone	3/3	16	63	PAI-01-SD-09-01	37	NA	NA	NA	NA	0	<7 to <110	No[ab]
Carbon Disulfide	6/9	2	24	PAI-01-SD-001	77	NA	NA	NA	NA	8.0 - 1200	9.2	No[ab]
Toluene	6/9	3	7	PAI-01-SD-09-01	73	NA	NA	NA	NA	19 - 1200	9.7	No[ab]
Semivolatile Organics (µg/kg)												
Acenaphthylene	1/14	380	380	PAI-01-SD-02-01	351	5.87	64.7	59.8	1	71 - 3600	<51 to <1200	Yes[c]
Anthracene	6/14	11	770	PAI-01-SD-001	143	46.9	16.4	3.0	4	2.8 -850	<2 to <1200	Yes[c]
Benzo(a)anthracene	8/14	30	2200	PAI-01-SD-017	352	74.8	29.4	4.7	5	7.1 - 850	<5.1 to <1200	Yes[c]
Benzo(a)pyrene	9/14	7.8	1700	PAI-01-SD-017	319	88.8	19.1	3.6	6	7.1 - 850	<5.1 to <1200	Yes[c]
Benzo(b)fluoranthene	10/14	8.1	1800	PAI-01-SD-017	318	88.8[2]	20.3	3.6	6	2.8 -850	<2 to <1200	Yes[c]
Benzo(g,h,i)perylene	7/14	30	990	PAI-01-SD-017	199	88.8[2]	11.1	2.2	6	11 - 850	<8.1 to <1200	Yes[c]
Benzo(k)fluoranthene	9/14	3.1	850	PAI-01-SD-017	150	88.8[2]	9.6	1.7	3	2.8 -850	<2 to <1200	Yes[c]
Carbazole	3/9	86	580	PAI-01-SD-02-01	377	88.8[2]	6.5	4.2	2	470 - 1200	<400 to <1200	Yes[c]
Chrysene	9/14	13	2300	PAI-01-SD-017	390	108	21.3	3.6	5	7.1 - 850	<5.1 to <1200	Yes[c]
Dibenzo(a,h)anthracene	1/14	1600	1600	PAI-01-SD-017	216	6.22	257.2	34.7	1	11 - 850	<20 to <1200	Yes[c]
Fluoranthene	9/14	25	6600	PAI-01-SD-017	903	113	58.4	8.0	6	7.1 - 850	<5.1 to <1200	Yes[c]
Fluorene	1/14	160	160	PAI-01-SD-03-01-AVG	111	21.2	7.5	5.2	1	14 - 850	<10 to <1200	Yes[c]
Indeno(1,2,3-cd)pyrene	8/14	30	1100	PAI-01-SD-017	220	88.8[2]	12.4	2.5	6	7.1 - 850	518	Yes[c]
Phenanthrene	8/14	25	2600	PAI-01-SD-001	409	86.7	30.0	4.7	5	5.7 - 850	<4 to <1200	Yes[c]
Pyrene	7/14	64	5400	PAI-01-SD-017	769	153	35.3	5.0	5	14 - 850	<10 to <1200	Yes[c]
Total PAHs	10/14	21.1	26580	PAI-01-SD-017	3957	1684	15.8	2.3	5	See note 1	See note 2	Yes[c]
Pesticides/PCBs (µg/kg)												
4,4'-DDD	4/14	3.6	260	PAI-01-SD-09-01	25.8	1.22	213.1	21.1	4	5.7 - 32	<2 to <22	Yes[cd]
4,4'-DDE	6/14	5.5	120	PAI-01-SD-09-01	17.6	2.07	58.0	8.5	6	5.7 - 32	<2 to <22	Yes[cd]
4,4'-DDT	4/13	3.2	270	PAI-01-SD-09-01	26.3	1.19	226.9	22.1	4	4.6 - 32	<2 to <22	Yes[cd]
Alpha-Chlordane	1/8	52	52	PAI-01-SD-09-01	8.3	0.5[3]	104.0	16.6	1	2.3 - 7.4	<0.99 to <11	Yes[cd]
Gamma-Chlordane	1/14	130	130	PAI-01-SD-09-01	12.0	0.5[3]	260.0	24.0	1	2.3 - 15.5	<0.99 to <11	Yes[cd]
alpha-BHC	1/14	2.7	2.7	PAI-01-SD-02-01	3.0	NA	NA	NA	NA	2.3 - 15.5	<0.99 to <11	Yes[cd]
beta-BHC	1/14	5.4	5.4	PAI-01-SD-02-01	3.2	NA	NA	NA	NA	2.3 - 15.5	7.1	Yes[cd]
delta-BHC	1/14	2.7	2.7	PAI-01-SD-02-01	3.0	NA	NA	NA	NA	2.3 - 15.5	<0.99 to <11	Yes[cd]
gamma-BHC (Lindane)	1/14	2.1	2.1	PAI-01-SD-02-01	2.9	0.32	6.6	9.1	1	2.3 - 15.5	<0.99 to <11	Yes[cd]
Inorganics (mg/kg)												
Aluminum	14/14	2110	23400	PAI-01-SD-02-02	10179	NA	NA	NA	NA	0	24200	No[e]
Arsenic	13/14	1.2	15.6	PAI-01-SD-10-01	6.2	7.24	2.2	0.9	4	0.27	12	Yes[cd]
Barium	14/14	5.7	88.5	PAI-01-SD-09-01	23.9	NA	NA	NA	NA	0	28	Yes[c]
Beryllium	3/14	0.7075	1.2	PAI-01-SD-10-01	0.39	NA	NA	NA	NA	0.17 - 0.95	0.98	No[bh]
Cadmium	1/14	0.79	0.79	PAI-01-SD-02-02	0.08	0.676	1.2	0.1	1	0.04 - 0.09	0.28	Yes[cd]
Cobalt	13/14	0.19	3.9	PAI-01-SD-10-01	1.95	NA	NA	NA	NA	5.7	2.6	No[abf]

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TABLE F-5

COPC REFINEMENT
SEDIMENT - SITE 1
MCRD PARRIS ISLAND, SOUTH CAROLINA
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Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Sediment?
		Min.	Max.									
Copper	13/14	5.5	95.3	PAI-01-SD-001	27.4	18.7	5.1	1.5	5	3.3	10	Yes[cd]
Iron	14/14	1930	24000	PAI-01-SD-02-02	13221	NA	NA	NA	NA	0	21500	Yes[c]
Lead	14/14	6.6	194	PAI-01-SD-09-01	48.5	30.2	6.4	1.6	4	0	21	Yes[cd]
Manganese	14/14	12.3	190	PAI-01-SD-013-AVG	92.5	NA	NA	NA	NA	0	186	No[abfh]
Mercury	2/14	0.16	0.67	PAI-01-SD-09-01	0.126	0.13	5.2	0.97	2	0.07 - 0.28	0.09	Yes[cd]
Silver	2/14	0.36	2.4	PAI-01-SD-09-01	0.29	0.733	3.3	0.4	1	0.06 - 1.1	<0.06 to <1.9	Yes[c]
Thallium	1/14	0.925	0.925	PAI-01-SD-013-AVG	0.348	NA	NA	NA	NA	0.38 - 1.1	0.41	No[abg]
Vanadium	14/14	4.3	50.65	PAI-01-SD-013-AVG	27.3	NA	NA	NA	NA	0	50	No[abfh]
Zinc	14/14	10.5	124	PAI-01-SD-09-01	45.0	124	1.0	0.4	0	0	45	Yes[cd]

COPC = Contaminant of potential concern.
ESV = Ecological screening value
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available
Total organic carbon (TOC) in sediment samples ranged from 0.8 to 4.3 percent. Grain size ranged from 0.1 to 0.5 per cent gravel, 58.2 to 67.3 per cent sand, 17.1 to 23.4 per cent silt, and 15.2 to 18.8 per cent clay. See Table 4-6 for TOC and grain size data in individual sediment samples.
1 For chemicals with at least one detection, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detected samples. If the chemical was not detected in any background sample, the range of detection limits is shown.
2 Benzo(a)pyrene used as a surrogate.
3 Chlordane used as a surrogate.
Note 1: Total PAH concentrations were calculated as the sum of individual detected PAHs. Therefore, the range of non-detects is not applicable for total PAHs
Note 2: Indeno(1,2,3-cd)pyrene was the only PAH detected in background sediments; its background concentration is provided above.
a This chemical does not biomagnify in the food chain.
b No screening values were identified for this chemical.
c Potential risk to benthic receptors via direct toxicity.
d Potential risk to aquatic and semi-aquatic receptors via the food chain.
e Maximum detected concentration is less than background concentration[1].
f Measured concentrations were less than alternate screening values shown in Table 7-18.
g Infrequent detection.
h Maximum detected concentration is similar to background concentration.

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TABLE F-6

COPC REFINEMENT
SURFACE SOIL - SITE 1 AND SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Surface Soil?[a]
		Min	Max									
Volatile Organics (µg/kg)												
Acetone	1/5	730	730	PAI-41-SS-02-01	152.4	NA	NA	NA	NA	9-27	267	Yes[a]
Semivolatile Organics (µg/kg)												
1,2,4 Trichlorobenzene	1/14	140	140	PAI-01-SS-07-01	189.5	NA	NA	NA	NA	340-530	<340 to <390	Yes[b]
2-Methylnaphthalene	1/14	130	130	PAI-01-SS-07-01	188.8	NA	NA	NA	NA	340-530	<340 to <390	Yes[b]
Benzo(a)anthracene	12/14	18	280	PAI-01-SS-07-01	84.7	100[2]	2.8	0.8	5	21-22	<43 to <370	Yes[b]
Benzo(a)pyrene	12/14	20	310	PAI-01-SS-07-01	97.9	100	3.1	0.98	6	21-22	<43 to <370	Yes[b]
Benzo(b)fluoranthene	14/14	10	510	PAI-01-SS-07-01	120.6	100[2]	5.1	1.2	5	0	<17 to <370	Yes[b]
Benzo(g,h,i)perylene	8/14	38	210	PAI-01-SS-07-01	73.9	100[2]	2.1	0.7	4	34-81	<69 to <370	Yes[b]
Benzo(k)fluoranthene	11/14	11	160	PAI-01-SS-07-01	41.5	100[2]	1.6	0.4	1	8.6-18	<17 to <370	Yes[b]
Bis(2-Ethylhexyl) phthalate	4/14	60	5600	PAI-01-SS-12-01	554.7	100[3]	56.0	5.5	1	350-530	<340 to <390	Yes[b]
Butylbenzyl phthalate	1/14	2000	2000	PAI-01-SS-12-01	320.2	100[3]	20.0	3.2	1	340-530	<340 to <390	Yes[b]
Carbazole	5/14	260	490	PAI-01-SS-14-01-AVG	262.1	100[2]	4.9	2.6	5	350-400	<340 to <390	Yes[b]
Chrysene	11/14	12	330	PAI-01-SS-07-01	97.5	100[2]	3.3	0.98	5	22-44	<43 to <370	Yes[b]
Di-n-octyl phthalate	1/14	6400	6400	PAI-01-SS-12-01	634.5	100[3]	64.0	6.3	1	340-530	<340 to <390	Yes[b]
Dibenzofuran	3/14	170	200	PAI-01-SS-14-01-AVG	191.1	NA	NA	NA	NA	340-530	<340 to <390	Yes[b]
Fluoranthene	14/14	26	630	PAI-01-SS-07-01	174.1	100	6.3	1.7	7	0	<43 to <370	Yes[b]
Indeno(1,2,3-cd)pryene	9/14	19	230	PAI-01-SS-07-01	71.8	100[2]	2.3	0.7	4	21-47	<43 to <370	Yes[b]
Phenanthrene	13/14	21	190	PAI-41-SS-03-01	89.1	100	1.9	0.9	5	37	<35 to <370	Yes[b]
Pyrene	10/14	30	510	PAI-01-SS-07-01	134.9	100	5.1	1.3	6	43-94	<87 to <370	Yes[b]
Pesticides/PCBs (µg/kg)												
4,4'-DDD	8/14	2.1	180	PAI-01-SS-07-01	35.7	2.5	72.0	14.3	7	3.5-180	<3.6 to <18	Yes[c]
4,4'-DDE	12/14	5.6	4200	PAI-01-SS-07-01	395.2	2.5	1680.0	158.1	12	85-180	<3.6 to <18	Yes[bc]
4,4'-DDT	12/14	2.1	4400	PAI-01-SS-07-01	389.0	2.5	1760.0	155.6	11	85-180	<3.6 to <18	Yes[bc]
Alpha-Chlordane	2/14	9.5	18	PAI-01-SS-07-01	7.7	NA	NA	NA	NA	0.87-88	<1.8 to <8.9	Yes[c]
Aroclor 1260	3/14	21	80	PAI-01-SS-09-01	17.8	20[4]	4.0	0.9	3	8.5-88	<8.7 to <36	Yes[c]
Endrin Ketone	1/14	12	12	PAI-01-SS-07-01	12.8	NA	NA	NA	NA	1.7-180	<3.6 to <18	Yes[c]
Gamma-Chlordane	2/14	6	8.1	PAI-01-SS-09-01	6.7	NA	NA	NA	NA	8.5-88	<1.8 to <8.9	Yes[c]
alpha-BHC	2/14	3.7	42	PAI-01-SS-07-01	9.1	2.5	16.8	3.6	2	8.5-88	<1.8 to <8.9	Yes[c]
beta-BHC	2/14	8.9	33	PAI-01-SS-07-01	8.8	1	33.0	8.8	2	8.5-88	<1.8 to <8.9	Yes[c]
delta-BHC	1/14	45	45	PAI-01-SS-07-01	9.1	NA	NA	NA	NA	8.5-88	<1.8 to <8.9	Yes[c]
gamma-BHC (Lindane)	1/14	75	75	PAI-01-SS-07-01	11.3	0.05	1500.0	225.1	1	8.5-88	<1.8 to <8.9	Yes[c]
Inorganics (mg/kg)												
Aluminum	14/14	3130	8610	PAI-01-SS-08-01	5667.5	50	172.2	113.4	14	0	7270	Yes[b]
Antimony	9/14	0.1875	90.6	PAI-01-SS-09-01	7.0	3.5	25.9	2.0	1	0.15-0.89	<0.15 to <2.1	Yes[b]
Arsenic	14/14	0.48	24.9	PAI-01-SS-09-01	4.3	10	2.5	0.4	2	0	1.4	Yes[bc]
Barium	14/14	15.2	178	PAI-01-SS-08-01	70.7	165	1.1	0.4	1	0	24	Yes[b]
Cadmium	13/14	0.1	5.4	PAI-01-SS-08-01	0.9	1.6	3.4	0.6	2	0.13	<0.03 to <0.22	Yes[bc]
Chromium (total)	14/14	4.8	53.2	PAI-01-SS-08-01	14.2	0.4[5]	133.0	35.5	14	0	6.2	Yes[bc]

TABLE F-6

COPC REFINEMENT
SURFACE SOIL - SITE 1 AND SWMU 41
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Surface Soil?[a]
		Min	Max									
Copper	14/14	4.8	131	PAI-01-SS-08-01	44.3	40	3.3	1.1	4	0	1.5	Yes[bc]
Iron	14/14	2150	147000	PAI-01-SS-08-01	19557.5	200	735.0	97.8	14	0	3920	Yes[b]
Lead	14/14	26.4	8380	PAI-01-SS-09-01	834.1	50	167.6	16.7	12	0	12.5	Yes[bc]
Manganese	14/14	17.4	752	PAI-01-SS-08-01	123.4	100	7.5	1.2	3	0	129	Yes[b]
Mercury	14/14	0.04	1.1	PAI-01-SS-07-01	0.2	0.1	11.0	2.10	9	0	0.11	Yes[bc]
Nickel	14/14	1.8	47.8	PAI-01-SS-08-01	8.2	30	1.6	0.27	1	0	1.8	Yes[bc]
Selenium	9/14	0.18	1.1	PAI-41-SS-03-01	0.3	0.81	1.4	0.35	1	0.17-0.2	0.29	Yes[bc]
Silver	7/14	0.18	2.4	PAI-01-SS-09-01	0.6	2	1.2	0.31	2	0.05-0.44	<0.05 to 0.6	Yes[b]
Vanadium	14/14	4.8	47.4	PAI-01-SS-09-01	12.2	2	23.7	6.08	14	0	9.5	Yes[b]
Zinc	14/14	27.8	497	PAI-01-SS-08-01	177.3	50	9.9	3.5	11	0	9.7	Yes[bc]

COPC = Contaminant of potential concern.
ESV = Ecological screening value
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available
1 For chemicals with at least one detection in background samples, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detected background samples. If the chemical was not detected in any background sample, the range of detection limits in background samples is shown.
2 Benzo(a)pyrene used as a surrogate.
3 ESV for total phthalates.
4 ESV for total PCBs.
5 ESV for haxavalent chromium.

a Maximum concentration greater than background concentration
b Potential risk to terrestrial receptors via direct contact.
c Potential risk to terrestrial receptors via the food chain.

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TABLE F-7

COPC REFINEMENT
GROUNDWATER - SITE 1
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration[1]	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[2]	Retained as COPC in Groundwater?[a]
		Minimum	Maximum									
Volatile Organics (µg/L)												
2-Butanone	1/1	3.4	3.4	PAI-01-GW-10-01	3.4	NA	NA	NA	NA	0	See Note	No[ab]
Acetone	4/4	1.4	13	PAI-01-GW-14-01	6.5	NA	NA	NA	NA	0	See Note	No[ab]
Carbon Disulfide	6/11	0.7	16	PAI-01-GW-14-01	3.5	NA	NA	NA	NA	1	<1	No[ab]
Xylenes, Total	2/11	1.4	2	PAI-01-GW-09-01	0.7	NA	NA	NA	NA	1	<1	No[ab]
Semivolatile Organics (µg/L)												
2,4 Dimethylphenol	2/11	2	5	PAI-01-GW-09-01	2.8	NA	NA	NA	NA	5 - 6	<5	No[abf]
2-Methylnaphthalene	1/11	7	7	PAI-01-GW-10-01	3.0	NA	NA	NA	NA	5 - 6	<5	No[abf]
2-Methylphenol	1/11	1	1	PAI-01-GW-10-01	2.5	NA	NA	NA	NA	5 - 6	<5	No[abcf]
Bis(2-ethylhexyl) phthalate	3/11	1	1	PAI-01-GW-07-01; -08-01; -10-01	2.5	NA	NA	NA	NA	5 - 10	3.0	No[abf]
Carbazole	1/10	2	2	PAI-01-GW-13-01	2.6	NA	NA	NA	NA	5 - 6	<5	No[abcf]
Di-n-octyl phthalate	1/11	7	7	PAI1-GW4-01	3.0	NA	NA	NA	NA	5 - 6	8.0	No[abcf]
Dibenzofuran	2/11	1	3	PAI-01-GW-10-01	2.5	NA	NA	NA	NA	5 - 6	<5	No[abcf]
Naphthalene	4/11	1	57	PAI-01-GW-10-01	7.6	23.5	2.4	0.3	1	5 - 6	<5	Yes[d]
Pyrene	1/11	1	1	PAI-01-GW-10-01/-13-01	2.4	NA	NA	NA	NA	5 - 6	<5	No[abcf]
Inorganics (µg/L)												
Aluminum	5/10	23.3	3970	PAI1-GW4-01	430.6 UF, 14.7 F	NA	NA	NA	NA	22 - 27	8	Yes[d]
Barium	11/11	16.2	1230	PAI-01-GW-10-01-F	424 UF, 630 F	NA	NA	NA	NA	0	74.7	Yes[d]
Beryllium	5/11	0.2	0.7	PAI-01-GW-09-01	0.2 UF, 0.2 F	NA	NA	NA	NA	0.2 - 0.7	0.5	No[f]
Copper	4/11	2.55	7.8	PAI-01-GW-05-01	2.6 UF, 2.0 F	2.9	2.7	0.9 UF	3	2.1 - 3.7	22.9	No[f]
Iron	7/11	114	1330	PAI-01-GW-06-01-F	3023 UF, 3677 F	NA	NA	NA	NA	8.6 - 112	2147	No[f]
Lead	10/11	0.5	36.4	PAI-01-GW-09-01-F	11.4 UF, 10.8 F	8.5	4.3	1.3 UF	8	0.9	10.7	Yes[de]
Manganese	7/10	40.3	1320	PAI-01-GW-05-01	223.9 UF, 209.7F	NA	NA	NA	NA	13.7 - 96.6	128	Yes[d]
Mercury	1/11	0.23	0.23	PAI-01-GW-05-01-F	0.11 F	0.025	9.2	4.4 F	1	0.2	<0.1 to < 0.2	Yes[de]
Vanadium	8/11	3.1	32.6	PAI-01-GW-09-01	8.0 UF, 7.2 F	NA	NA	NA	NA	2.6 - 9.8	3.8	Yes[d]
Zinc	10/11	4.6	112	PAI-01-GW-06-01-F	9.1 UF, 55.2 F	86	1.3	0.6 F	2	4.3	23.1	Yes[de]

COPC = Contaminant of potential concern.
ESV = Ecological screening value for salt surface water (average salinity in groundwater = 20 ppt)
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available
Note: Analytical data for this chemical were rejected in the data validation process.

1 Inorganics were analyzed in filtered (F) and unfiltered (UF) samples.
2 Groundwater samples were not collected from background sites. Background data for this table are from two "upgradient" monitoring wells at Site 2 (PAI2-MW1[S] and PAI2-MW2[S]) and from one "upgradient" monitoring well at Site 1 (PAI1-MW4[S]). For chemicals with at least one detection in these three groundwater samples, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detected samples. If the chemical was not detected in any of these three samples, the range of detection limits in the three samples is shown. All values in this column are from unfiltered samples.

a This chemical does not biomagnify in the food chain.
b No screening values were identified for this chemical.
c Infrequent detection.
d Potential risk to aquatic organisms via direct toxicity.
e Potential risk to aquatic and semi-aquatic receptors via the food chain.
f Maximum detected concentration is similar to or less than "background" concentration.

APPENDIX G

TCDD TECH MEMO

TECHNICAL MEMORANDUM
EVALUATION OF TCDD AND TCDF RESULTS
SITE/SWMU 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

At the request of U.S. Environmental Protection Agency and the South Carolina Department of Health and Environmental Control, samples were collected at Site/SWMU 1 (Site 1) to determine whether waste disposal activities at the former incinerator resulted in the deposition of significant concentrations of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and related isomers in the landfill. Once in the landfill, TCDD may have migrated into the surrounding sediments. Based on information on the type of waste burned at the site, the configuration of the incinerator, and the type of ash disposed at the site, the Navy does not believe TCDD to be an environmental concern at the site. However, to resolve potential community concerns, the MCRD Parris Island partnering team decided to collect representative samples at the site to determine the level of TCDD and related isomers. As a result, one sample of exposed sediment/ash (PAI-01-SD-02A), one sample of marsh sediment (PAI-01-SD-11), and one sample of groundwater (PAI-01-GW-09 (S)) were collected. The "A" designator on sample PAI-01-SD-02A indicates that this sample was obtained approximately 20 feet from the original PAI-01-SD-02 location to allow collection of an exposed ash-like material. Based on analytical data from similar studies at other sites and Site 1 geometry, these results were expected to represent mid- to upper-bound potential for TCDD presence and concentration.

Documentation including chain-of-custody forms, sample log sheets, validation letters, analytical data sheets, and monitoring well purge sheets are attached. The results are discussed below.

The two sediment samples and one duplicate sediment sample were collected at the Site and analyzed for TCDD and tetrachlorodibenzofuran (TCDF) isomers. The detected isomers are presented in Table 1. Also presented in Table 1 are toxicity equivalent concentrations of TCDD (TEQs) for human receptors that were calculated in accordance with EPA's *Interim Report on Data Methods for Assessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin Risks.* TEQ concentrations in sediment ranged from 0.06 ng/kg to 3.3 ng/kg with a Site arithmetic average of 1.8 ng/kg. Table 1 also presents a comparison of the TEQs to EPA Region III Risk-based Concentrations (RBCs) and potential applicable or relevant and appropriate requirements

(ARARs). The TEQs are below the most stringent RBCs and potential ARARs for human health (i.e. 1E-6 incremental lifetime cancer risk (ILCR) - residential scenario).

Table 2 presents a comparison of TEQs in sediment for mammals, fish, and avian receptors to applicable screening criteria. The TEQs were calculated using two methods. One method was to assign a zero value to the non detected isomers. The second method was to assign a value of 1/2 the detection limit to the non detected isomers. For the purpose of the discussion below, both values are presented, with TEQs calculated according to the second method presented in parentheses.

The sample specific TEQs for mammals ranged from 0.06 (2.0) ng/kg to 3.3 (4.3) ng/kg with a Site average TEQ of 1.8 (3.2) ng/kg. The TEQ of (3.1) ng/kg in sample PAI-01-SD-02A and 3.3 (4.3) ng/kg in sample PAI-SD-11-02 exceeded the screening criteria of 2.5 ng/kg for mammals. The TEQ for the duplicate to sample PAI-SD-11-02 was 0.06 (2.2) ng/kg, and the resulting average TEQ was 1.7 (3.3) ng/kg for sample location PAI-01-SD-11. The site average TEQ of 1.8 ng/kg using zero for non detected isomers was less than the screening criteria for mammals. If 1/2 the detection limit is used for the non detected isomers, the site average TEQ increases to 3.3 ng/kg. This value exceeds the screening value of 2.5 ng/kg for mammals; however it is less than the TEQ measured in a background sample location that is remote from Site 1.

TEQs were also calculated for fish and avian receptors. TEQs for fish ranged from 0.06 (1.4) ng/kg to 2.6 (2.8) ng/kg with a Site average TEQ of 1.1 (1.8) ng/kg. TEQs for avian receptors ranged from 0.06 (2.5) ng/kg to 2.6 (3.9) ng/kg with a Site average TEQ of 1.0 (2.8) ng/kg. The TEQs for fish and avian were below their applicable screening criteria. Note that the toxicity equivalency factors for fish and avian used for ecological receptors are different than that for mammals/humans.

One groundwater sample and one duplicate groundwater sample were collected at the Site and analyzed for TCDD and isomers. The detected congeners are presented in Table 3. Also presented in Table 3 are TEQs for human receptors. The measured TEQ concentrations are 0.004 pg/L in the original groundwater sample and 0.017 pg/L in the duplicate sample resulting in an average concentration of 0.01 pg/L. Table 3 also presents a comparison of TEQs with EPA Region III RBCs and EPA MCLs. The TEQs are less than the most stringent RBCs and MCLs.

There are no ecological screening criteria available for TEQ concentrations in groundwater or surface water; consequently, comparisons of the calculated TEQs to screening criteria were not conducted. For ecological receptors in a tidal marsh, such as is present at Site 1, sediment data as presented in Table 2 is generally considered to be a more reliable (although conservative) indicator of potential threats to ecological receptors than the evaluation of concentrations in transient surface water.

Based on the results of this testing, three conclusions were developed as follows.

- TCDD and related isomers, measured as TEQ, were found in both sediment and groundwater at the site, but at concentrations below the most stringent risk based human health and drinking water criteria.

- The detected TEQ at the site were at concentrations similar to the most stringent ecological screening criteria for mammals and significantly less than the most stringent criteria for fish and avian receptors. Based on the method used to calculate the TEQ, the site average TEQ was either 32% greater than or 28% less than the screening value for mammals. As a result, significant impact to site ecological receptor would not be anticipated.

- The concentration of TEQ detected in Site sediments is also similar to that found in a background sample location. As a result, the presence of TEQ is likely to be present from a regional source and is not related to Site 1 waste disposal activities.

TABLE 1
COMPARISON OF 2,3,7,8-TCDD CONCENTRATIONS IN SEDIMENT TO HUMAN HEALTH CRITERIA
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	Exposed Ash PAI-01-SD-02A-02 (ng/kg)	Sediment PAI-01-SD-11-02 (ng/kg)	Sediment PAI-01-SD-DU11-02 (ng/kg)	Typical (1) (ng/kg)	EPA Region III RBC (2)		Potential ARARs (3)	
					Residential (ng/kg)	Industrial (ng/kg)	Residential (ng/kg)	Industrial (ng/kg)
1,2,3,7,8 - PeCDD	ND	1.2	ND	ND	NA	NA	NA	NA
1,2,3,4,7,8 - HxCDD	1	1.7	ND	ND	NA	NA	NA	NA
1,2,3,6,7,8 - HxCDD	3.3	3.6	ND	1.7	NA	NA	NA	NA
1,2,3,7,8,9 - HxCDD	3.7	5.6	ND	4.4	NA	NA	NA	NA
1,2,3,4,6,7,8 - HpCDD	100	59	ND	41	NA	NA	NA	NA
2,3,7,8-TCDD	ND	ND 1.6	ND	ND	4.3	38	1000	5,000 to 20,000
OCDD	680	420	130	350	NA	NA	NA	NA
1,2,3,7,8 -PeCDF	ND	ND	ND	ND	NA	NA	NA	NA
2,3,4,7,8 - PeCDF	ND	0.45	ND	ND	NA	NA	NA	NA
1,2,3,4,7,8 - HxCDF	0.4	ND	0.48	ND	NA	NA	NA	NA
1,2,3,6,7,8 - HxCDF	ND	ND	ND	ND	NA	NA	NA	NA
2,3,4,6,7,8 - HxCDF	ND	0.75	ND	ND	NA	NA	NA	NA
1,2,3,4,6,7,8 - HpCDF	6.9	7.6	ND	ND	NA	NA	NA	NA
1,2,3,4,7,8,9 - HpCDF	0.43	ND	ND	ND	NA	NA	NA	NA
OCDF	15	9.8	5.1	2.7	NA	NA	NA	NA
TEQ Human	2.0	3.3	0.06	1.1	4.3	38	1000	5,000 to 20,000

Notes:
1 - Background sample collected at Parris Island, PAI-10-SD-16A.
2 - U.S. EPA Region III Risk-Based Concentration Table, October 27, 1999. (Cancer benchmark value = 1E-06).
3 - U.S. EPA, Approach for Addressing Dioxin in Soil at CERCLA and RCRA Sites. OSWER Directive 9200.4-26.
TEQ - Toxicity equivalent concentration.

TABLE 2
COMPARISON OF 2,3,7,8-TCDD CONCENTRATIONS IN SEDIMENT TO ECOLOGICAL CRITERIA
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample Location	Mammals		Fish		Avian	
	TEQ (ND=0) (ng/kg)	TEQ (1/2 DL) (ng/kg)	TEQ (ND=0) (ng/kg)	TEQ (1/2 DL) (ng/kg)	TEQ (ND=0) (ng/kg)	TEQ (1/2 DL) (ng/kg)
Criteria (1)	2.5	2.5	60	60	21	21
PAI-01-SD-02A-02	2.0	3.1	0.9	1.5	0.7	2.5
PAI-01-SD-11-02	3.3	4.3	2.6	2.8	2.6	3.9
PAI-01-SD-DU11-02	0.06	2.2	0.06	1.4	0.06	2.5
Site Average	1.8	3.3	1.1	1.8	1.0	2.8
Typical (2)	1.1	4.5	0.14	2.5	0.53	4

Notes:
1 - EPA, 1993. Interim Report on Data Methods for Assessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin Risks to Aquatic Life and Associated Wildlife.
2 - Background sample collected at Parris Island, PAI-10-SD-16A.
TEQ - Toxicity equivalent concentration.
TEQ (ND=0) was calculated using zero for non detected isomers.
TEQ (1/2 DL) was calculated using 1/2 the detection limit for non detected isomers.
Shading indicates that the criteria was exceeded.

TABLE 3
COMPARISON OF 2,3,7,8-TCDD CONCENTRATIONS IN GROUNDWATER TO HUMAN HEALTH CRITERIA
SITE 1 - INCINERATOR LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	PAI-01-GW-09(S)-02 (pg/L)	PAI-01-GW-DU09(S)-02 (pg/L)	EPA Region III RBC (1) (pg/L)	Potential ARAR (2) (pg/L)
1,2,3,4,6,7,8 - HpCDD	ND	1.5	NA	NA
2,3,7,8-TCDD	ND	ND	0.45	30
OCDD	39	15	NA	NA
TEQ Human	0.004	0.017	0.45	30

Notes:
1 - U.S. EPA Region III Risk-Based Concentration Table, October 27, 1999. (Cancer benchmark value = 1E-06).
2 - U.S. EPA MCL.
TEQ - Toxicity equivalent concentration.

DOCUMENTATION

Sediment Sampling

Three sediment samples (along with a duplicate sample) were collected as part of this field event. Two samples and a duplicate (PAI-01-SD-02A-02, PAI-01-SD-11-02, and PAI-01-SD-DU11-02) were collected at Site1/SWMU 41. Sample PAI-01-SD-02A-02 was collected 20 feet to the south-southeast of sample location PaI-01-SD-02-01 from the 1998 event. This location was chosen because of the presence of ash material within the area. Sediment sample location PAI-01-SD-11-02 was chosen due to the lack of obvious ash deposits at the location. Sediment sample PAI-10-SD-16A-02 was collected at a background sample location associated with SWMU 10 with the intent of being representative of background characteristics for Parris Island. This sample is located adjacent to the Broad River southwest of Page Field across from the Elliot's Beach boat ramp. The sample location marker for the original sample PAI-10-SD-16-01 could not be located in the field. A site location map was used to determine the approximate location of the original sample from the 1998 sample event. The sample was collected as PAI-10-SD-16A-02 to denote the uncertainty of the original location.

The analyses for the samples are summarized in Table 1. Sediment sampling was performed in accordance with the RFI Work Plan for SWMUs 1, 2, 3, 15, and 41 (B&R Environmental, 1998).

Groundwater Sampling

A groundwater sample was collected from well PAI-01-MW-09(S) using a peristaltic pump and pre-cleaned disposable tubing. The tubing was lowered into the well to approximately the midpoint of the well screen. The well was purged in accordance with the low-flow sampling techniques specified in the approved work plan (B&R Environmental, 1998b) and in accordance with SCDHEC's request that three well volumes be purged prior to sampling. The recovery of the well was not sufficient for the water level in the well to sustain a groundwater draw down of less than 0.3 feet while pumping at the slowest rate possible. Three well volumes were purged prior to collecting groundwater sample PAI-01-GW-09(S)-02 and duplicate sample PAI-01-GW-DU09(S)-02. The groundwater sample was collected by reducing the flow to minimize

volatilization and collecting the sample directly after it passed through the peristaltic pump.

The groundwater analytical parameters are summarized in Table 2. The groundwater quality information (including dissolved oxygen, salinity, temperature, pH, and turbidity) was also collected and is summarized in Table 3.

Investigative Derived Waste (IDW)

Purged water from well PAI-01-MW-09 was containerized, properly labeled and stored within the Depot's waste storage facility pending final disposition of the IDW. All IDW was handled in accordance with the Master Work Plan (B&R Environmental, 1998a).

TABLE 1

SUMMARY OF SEDIMENT SAMPLES COLLECTED
SITE 1/SWMU 41 - INCINERATOR LANDFILL/FORMER INCINERATOR UNIT
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	Date Collected	Media	Depth Collected (Feet)	Analysis
PAI-01-SD-02A-02	1999	Sediment	0-0.5	(1)
PAI-01-SD-11-02 PAI-01-SD-DU11-02	1999 1999	Sediment Sediment	0-0.5 0-0.5	(1) (1)
PAI-10-SD-16A-02	1999	Sediment	0-0.5	(1)

PAI-01-SD-DU11-02 - duplicate sample
1. TCDD and related isomers.

TABLE 2

SUMMARY OF GROUNDWATER SAMPLES COLLECTED
SITE 1/SWMU 41 - INCINERATOR LANDFILL/FORMER INCINERATOR UNIT
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	Date Collected	Media	Depth Collected (Feet)	Analysis
PAI-01-GW-09(S)-02	1999	Groundwater	Shallow surficial	(1)
PAI-01-GW-DU09(S)-02	1999	Groundwater	Shallow surficial	(1)

PAI-01-GW-DU09(S)-02 - duplicate sample
1. TCDD and related isomers.

TABLE 3

SUMMARY OF GROUND WATER QUALITY PARAMETERS COLLECTED DURING PURGING
Site 1/SWMU 41 – INCINERATOR LANDFILL/FORMER INCINERATOR UNIT
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample Number	Temperature (°C)	pH	Specific Conductance (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (%)	Turbidity (NTU)
PAI-01-GW-09(S)-02	24.6	6.91	53.8	0.17	3.54	<10

mS/cm - milliSiemens per centimeter
mg/L - milligram per Liter
NTU - Nephlometric Turbidity Units

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO: **MR. D. BRAYACK** **DATE:** **NOVEMBER 29, 1999**

FROM: **LINDA KARSONOVICH** **CC:** **DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION - DIOXINS/FURANS**
CTO 020, MCRD PARRIS ISLAND
SDG H9J07

SAMPLES: 2/Aqueous/

PAI-01-GW-09(S)-02 PAI-01-GW-DU09(S)-02

4/Sediment/

PAI-01-SD-02A-02 PAI-01-SD-11-02 PAI-01-SD-DU11-02
PAI-10-SD-16A-02

Overview

The sample set for the CTO 20 MCRD Parris Island, SDG H9J07consists of two (2) aqueous environmental samples and four (4) sediment environmental samples which were analyzed for polychlorinated dibenzodioxins and furans. Two pairs of field duplicates were included in the SDG: PAI-01-GW-09(S)-02 and PAI-01-GW-DU09(S)-02; and PAI-01-SD-11-02 and PAI-01-SD-DU11-02.

The samples were collected by Tetra Tech NUS on October 6, 1999 and analyzed by Quanterra. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using SW-846 Method 8290 analytical and reporting protocols The data contained in this SDG were validated with regard to the following parameters:

* • Data completeness
* • Holding times
* • Initial/continuing calibrations
  • Laboratory method and field quality control blank results
* • Surrogate spike recoveries
* • Internal Standard Recoveries
* • Ion Ratios
* • Blank Spike/Blank Spike Duplicate Results
* • Compound Identification
  • Compound Quantitation
* • Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A.

The following table summarizes the maximum concentration of compounds detected in the laboratory method blanks analyzed in this SDG.

Compound	Maximum Concentration	Action Level
OCDD	1.7 pg/L	8.5 pg/L
OCDD	1.2 pg/g	6.0 pg/g

Dilution factors, percent solids, and sample aliquot used for analysis were taken into consideration during the application of all action levels. No qualifiers were assigned on this basis.

The positive results for 1,2,3,7,8,9-HxCDD in samples PAI-01-SD-02A-02 and PAI-10-SD-16A-02 were affected by ion suppression. The positive results were qualified as estimated, J.

The field duplicate relative percent difference (RPD) criteria of 30% for aqueous samples was exceeded by OCDD. The field duplicate RPD criteria of 50% for solid samples was exceeded by several compounds. Refer to the field duplicate table for specific results. No action was taken for field duplicate imprecision.

Estimated Detection Limits (EDLs) were calculated using the following equation:

$$EDL = \frac{[(2.5)\ (A_x)\ (pg_{is})]}{[(A_{is})\ (RRF)\ (W)]}$$

where: A_x = area of the quantitation ion of the analyte of interest.

pg_{is} = amount of internal standard in picograms.

A_{is} = area of internal standard peak.

RRF = relative response factor of continuing calibration 12 hour standard.

W = for solid samples dry weight in grams; for aqueous samples volume in L.

2.5 = Constant - a signal with a peak height of 2.5 times the background signal height

Verification for 2,3,7,8-TCDD in sample PAI-01-SD-11-02 where EDL = 1.6 U pg/g.

$$EDL = \frac{[(2.5)\ (53)\ (1000\ pg)]}{[(10859)\ (6.4\ g)\ (1.152)]}$$

EDL = 1.6 U pg/g

Sample calculations of positive results were calculated using the following equation:

$$Concentration = \frac{[(A_x)\ (pg_{is})]}{[(A_{is})\ (RRF)\ (W)]}$$

where: A_x = area of the quantitation ion of the analyte of interest.

pg_{is} = amount of internal standard in picograms.

A_{is} = area of internal standard peak.

RRF = relative response factor of continuing calibration 12 hour standard

W = for solid samples dry weight in grams; for aqueous samples volume in L

Verification for concentration of 1,2,3,4,6,7,8-HpCDD in sample PAI-01-SD-11-02 = 59 pg/g

$$\text{Conc. HpCDD} = \frac{[(135374)\ (1000\ \text{pg})]}{[(344679)\ (6.4\ \text{g})\ (1.028)]}$$

Conc. HpCDD = 59.7 pg/g

Executive Summary

Laboratory Performance: OCDD was detected in the laboratory method blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Dioxin/Furan Data Validation (12/96). 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)."

Tetra Tech NUS

Linda Karsonovich
Chemist/Data Validator

Tetra Tech NUS

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.
J	-	Qualified as estimated, J, due to technical noncompliance.

Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
D = MS/MSD Noncompliance
E = LCS/LCSD Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS - GFAA MSA's $r < 0.995$
K = ICP Interference - include ICSAB % R's
L = Instrument Calibration Range Exceedance
M = Sample Preservation
N = Internal Standard Noncompliance
O = Poor Instrument Performance (i.e., base-time drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DDT and Endrin
U = Pest/PCB D% between columns for positive results
V = Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)
W = EMPC result
X = Signal to noise response drop
Y = % Solid content is less than 30%

Appendix A

Qualified Analytical Results

CTO020 - PARRIS ISLAND
SOIL DATA
QUANTERRA
SDG: H9J07

SAMPLE NUMBER:	PAI-01-SD-02A-02			PAI-01-SD-11-02			PAI-01-SD-DU11-02			PAI-10-SD-16A-02		
SAMPLE DATE:	10/06/99			10/06/99			10/06/99			10/06/99		
LABORATORY ID:	H9J070191003			H9J070191004			H9J070191005			H9J070191006		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	75.0 %			64.0 %			71.0 %			42.0 %		
UNITS:	PG/G			PG/G			PG/G			PG/G		
FIELD DUPLICATE OF:							PAI-01-SD-11-02					
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
DIOXINS/FURANS												
1,2,3,4,6,7,8-HPCDD	100			59	J	P	21	U	W	41	J	P
1,2,3,4,6,7,8-HPCDF	6.9	J	P	7.6	J	P	3.2	U	W	1.3	U	W
1,2,3,4,7,8,9-HPCDF	0.43	J	P	0.46	U	W	1.7	U		1.2	U	
1,2,3,4,7,8-HXCDD	1	J	P	1.7	J	P	0.52	U	W	1.3	U	W
1,2,3,4,7,8-HXCDF	0.4	J	P	0.53	U	W	0.48	J	P	1.1	U	
1,2,3,6,7,8-HXCDD	3.3	J	P	3.6	J	P	1.3	U	W	1.7	J	P
1,2,3,6,7,8-HXCDF	0.88	U	W	0.91	U	W	0.6	U	W	1.1	U	
1,2,3,7,8,9-HXCDD	3.7	J	PX	5.6	J	P	1.5	U	W	4.4	J	PX
1,2,3,7,8,9-HXCDF	0.71	U		0.42	U		0.57	U		0.93	U	
1,2,3,7,8-PECDD	0.58	U	W	1.2	J	P	1.3	U		2.9	U	
1,2,3,7,8-PECDF	0.79	U		0.4	U	W	0.78	U		1.2	U	
2,3,4,6,7,8-HXCDF	0.41	U		0.75	J	P	0.8	U		0.86	U	
2,3,4,7,8-PECDF	0.88	U		0.45	J	P	1.2	U		1.2	U	
2,3,7,8-TCDD	0.88	U		1.6	U		1.4	U		2.6	U	
2,3,7,8-TCDF	1.8	U		2.4	U		1.8	U		2.2	U	
OCDD	680			420			130	J	P	350		
OCDF	15	J	P	9.8	J	P	5.1	J	P	2.7	J	P
TOTAL HPCDD	190			160			52	U	W	130	J	P
TOTAL HPCDF	19	U	W	17	U	W	7.5	U	W	2.4	U	W
TOTAL HXCDD	36	U	W	99	U	W	27	U	W	96	U	W
TOTAL HXCDF	18	U	W	22	U	W	8.8	U	W	2.4	U	W
TOTAL PECDD	5.8	U	W	16	U	W	3.2	U	W	13	U	W
TOTAL PECDF	10	U	W	12	U	W	1.6	U	W	1.9	U	
TOTAL TCDD	2.9	U		2.8	U	W	2.9	U		4	J	P
TOTAL TCDF	15	U	W	14	U	W	0.68	U	W	4.8	U	

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CTO020 - PARRIS ISLAND
WATER DATA
QUANTERRA
SDG: H9J07

SAMPLE NUMBER:	PAI-01-GW-09(S)-02			PAI-01-GW-DU09(S)-02								
SAMPLE DATE:	10/06/99			10/06/99			/ /			/ /		
LABORATORY ID:	H9J070191001			H9J070191002								
QC_TYPE:	NORMAL			NORMAL								
% SOLIDS:	0.0 %			0.0 %			100.0 %			100.0 %		
UNITS:	PG/L			PG/L								
FIELD DUPLICATE OF:				PAI-01-GW-09(S)-02								
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
DIOXINS/FURANS												
1,2,3,4,6,7,8-HPCDD	3.5	U	W	1.5	J	P						
1,2,3,4,6,7,8-HPCDF	2.5	U	W	1.1	U							
1,2,3,4,7,8,9-HPCDF	0.99	U		1.3	U							
1,2,3,4,7,8-HXCDD	1.8	U		1.5	U							
1,2,3,4,7,8-HXCDF	0.65	U	W	0.94	U							
1,2,3,6,7,8-HXCDD	2	U		1.7	U							
1,2,3,6,7,8-HXCDF	1.9	U		0.94	U							
1,2,3,7,8,9-HXCDD	1.8	U		1.5	U							
1,2,3,7,8,9-HXCDF	1.1	U		1.1	U							
1,2,3,7,8-PECDD	1.4	U		1.4	U							
1,2,3,7,8-PECDF	1.5	U		1	U							
2,3,4,6,7,8-HXCDF	1	U		1	U							
2,3,4,7,8-PECDF	1.4	U		0.99	U							
2,3,7,8-TCDD	2	U		2.1	U							
2,3,7,8-TCDF	1.4	U		1	U							
OCDD	39	J	P	15	J	P						
OCDF	0.82	U	W	0.29	U	W						
TOTAL HPCDD	6.6	U	W	2.7	U	W						
TOTAL HPCDF	2.5	U	W	1.2	U							
TOTAL HXCDD	1.7	U	W	0.8	J	P						
TOTAL HXCDF	0.65	U	W	1	U							
TOTAL PECDD	1.4	U		1.4	U							
TOTAL PECDF	1.5	U		1	U							
TOTAL TCDD	3.9	U		3.3	U							
TOTAL TCDF	3.4	U		2.4	U							

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Tetra Tech NUS, Inc. **GROUNDWATER SAMPLE LOG SHEET**

Project / Site: Parris Island / Site 1
Project No.: 7394

Sample ID No.: PAI-01-GW-09(S)-02
Sample Location: PAI-01-MW-09S

[X] Monitoring Well
[ ] Domestic Well
[ ] Other:

Sampler: G. Gunter

SAMPLING DATA

Date: 10/6/99 Time: 1330	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/L	Salinity ~~ppt~~ %	Eh mV
Method: Low Flow	Sl. Tea	6.91	53.8	24.6	<10	0.17	3.54	

PURGE DATA

Date: 10/6/99	See Attached Low Flow Purge Data Sheet for Purge Data
Method: Low Flow	
Monitor Reading (ppm): —	
Well Casing Diameter: 2 inch	
Well Casing Material: Sch 40 PVC	
Total Well Depth (TD): 15.88	* Diff. meter used from initial read.
Static Water Level (WL): 3.23	
One Casing Volume(gal/L): 2.06	
Start Purge (hrs): 1021	
End Purge (hrs): 1312	
Total Purge Time (min): 171	
Total Vol. Purged (gal/L): 6.4	

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Laboratory	Collected
TCL VOLATILES (LOW-LEVEL)				
TCL SEMIVOLATILES				
TCL PEST/PCBs				
TCL PAH				
TAL METALS (TOTAL)				
TAL METALS (FILTERED)				
Dioxin	—	2-1LA	Quanterra	✓

OBSERVATIONS / NOTES

15.88
- 3.23
12.65
× .163
3795
7590
1265
2.061 95

Could not reduce flow enough to limit drawdown in well. Pumped 6.4 gal. (3 vol).

LAB INFO

LAB:
COC #: 02217
LAB: Quanterra
COC #:

Check If Collected:

[X] MS / MSD [X] DUPLICATE / ID No.: ~~PAI-01-GW-09(S)~~ GG

Signature(s): G. Gunter

PAI-01-GW-DU09(S)-02

Tetra Tech NUS, Inc.

LOW FLOW PURGE DATA SHEET

Well No.: PAI-01-MW09(S)

PROJECT: Parris Island
PROJECT NUMBER: 7394
SITE: Site 1

DATE: 10/6/99
WEATHER: Cool & Sunny
PERSONNEL: G. Gunter

Well Screen Depth: 3.5 / 13.5 bgs ft.
Initial Water Level: 3.23 @ 1021 hrs.

Pump Type/Material: Peristaltic
Pump Intake Depth: ≈ 8 FT bgs

Tide Cycle: ☐ High @ ☐ Low @ ☐ Not Affected

**Total Purge Volume= 6.4 (gal / L)

Total Purge Time= (min)

Time	Water Level feet below TOC	Volume mL	Flow Rate mL/min	Pump Settings	Temp °C	pH	Sp Cond mS/cm	DO mg/L	Turbidity NTU	Salinity ~~ppt~~ %	Eh mV	Comments
1021	3.23											initial
1025	4.63	700			22.8	6.90	52.7	1.52	10	3.49		reduced Speed
1039	5.88	2800			23.7	6.92	52.9	0.57	<10	3.49		
1048	7.82	4800			23.8	7.02	52.3	0.41	<10	3.45		≈ 1.8 gal
1056	7.88	6200			23.7	7.01	52.3	0.60	<10	3.45		pump stopped
1108	8.65	7600			23.9	6.96	52.7	0.22	<10	3.48		had to readjust
1118	9.07	9000			24.0	6.90	52.7	0.17	<10	3.48		reduced Flow
1128	9.40	10.400			24.3	6.92	52.6	0.42	<10	3.48		
1138	9.94	11800			24.4	6.91	53.1	0.27	<10	3.51		
1148	10.51	13200			24.7	6.89	53.3	0.20	<10	3.53		lowered intake
1159	11.04	14600			24.9	6.91	53.5	0.30	<10	3.54		2 FT
1210	11.44	16000			24.8	6.90	53.4	0.19	<10	3.54		
1221	11.50	17400			24.7	6.90	53.7	0.09	<10	3.57		
1232	12.35	18800			24.7	6.91	53.8	0.11	<10	3.57		
1242	12.76	20200			24.9	6.89	53.6	0.20	<10	3.54		
1252	13.19	21600			24.5	6.91	54.0	0.38	<10	3.56		
1302	13.49	23000			24.5	6.91	53.8	0.17	<10	3.54		

Water Quality Meter (S/N): Horiba U-10 Water Checker
Control Box Type (S/N):
Turbidim[illegible] (S/N):

Notes: Vol. cal. is # of beakers by 700
** TOTAL is in Container (bucket)

[illegible]	[illegible]	[illegible]			1340	6.92	53.7	0.16	<10	3.52		

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SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parvus Island
Project No.: 7394

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

Sample ID No.: PAI-01-SD-11-02
Sample Location: PAI-01-SD11
Sampled By: GG
C.O.C. No.: 02217

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/6/98 Time: 1525 Method: Grab Monitor Reading (ppm): —	0-0.5	Gray-Black	Si F/Co Sand

COMPOSITE SAMPLE DATA:

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

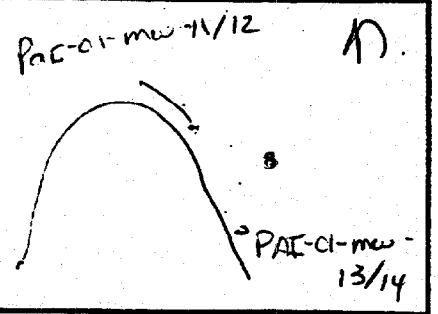
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Dioxin	2-125ml gj	✓	

OBSERVATIONS / NOTES:

Found Flag For Original Sample Location.

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.: PAI-01-SD-Du11-02

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island
Project No.: 7394

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

Sample ID No.: PAI-01-SD-02A-02
Sample Location: PAI-01-SD-02A
Sampled By: GG
C.O.C. No.: 02217

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/6/99 Time: 1440 Method: Grab Monitor Reading (ppm): —	0-0.5	Brn w/ blk mottling	F/Co SAND - Ash

COMPOSITE SAMPLE DATA:

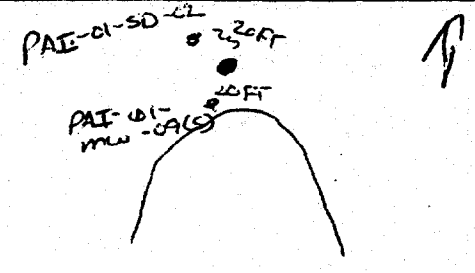
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
Dioxin	2 x ~~4~~ 125 mL G.	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

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Project Site Name: Parris Island
Project No.: 7394

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

Sample ID No.: PAI-10-SD-16A-02
Sample Location: PAI-10-SD16
Sampled By: GG
C.O.C. No.: 02217

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10/6/99 Time: 1645 Method: Grab Monitor Reading (ppm): —	0-0.5	Gray-Black	Sil Clay Trace Sand

COMPOSITE SAMPLE DATA:

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

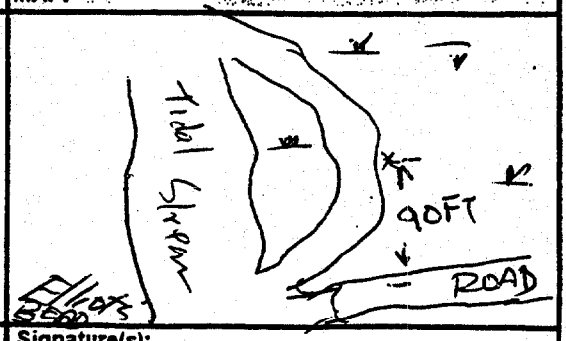
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
DI 20 ml	2-125mL	✓	

OBSERVATIONS / NOTES:

Could not find original flag. Area has undergone flooding from initial sampling, area has changed dramatically.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Gary Gunter

APPENDIX H

TECHNICAL MEMORANDUM

DETERMINATION OF TYPICAL DDT APPLICATION RATES

TECHNICAL MEMORANDUM
DETERMINATION OF TYPICAL DDT APPLICATION RATES
MCRD PARRIS ISLAND

Purpose: The purpose of this technical memorandum is to provide an estimate of expected DDT (and similar pesticides) concentrations that may be present in soils and sediments at MCRD Parris Island because of historic commercial application. The approach presented in this technical memorandum is to develop a reasonable historical scenario that accounts for both normal historical application of pesticides as well as natural degradation rates.

Background: DDT and similar pesticides have been used to control the insect population at MCRD Parris Island. Pesticides were commonly spread by dusting or fogging operations and target areas would include wet areas that are conducive breading insect near human activities. Similar pesticide practices continue to this day. Once sprayed, the pesticides would settle and adhere to nearby soils, vegetation, sediments, and water. Additional migration would then occur via dissolution into water, erosion, and volatilization. In addition, biodegradation and photodegradation should also occur.

A typical facility concentration for DDT of approximately 32 to 35 ug/kg were established based on soil/sediment sample results from non pesticide disposal areas at the site. Remote areas at the site (e.g. background samples) did not contain detectable levels of these pesticides, whereas areas in close proximity to both human activities and stagnant water commonly had measurable levels of these pesticides.

Application Rates: A direct reference from a manufacturer could not be located for recommended application rate in the 1940s to the 1970s. However, a current reference for the control of the tsetse fly in Africa states an application rate of 160 to 250 grams of active ingredient per hectare, ("DDT in the Tropics: The Impact in Zimbabwe of Ground-spraying for Tsetse Fly Control", R.J. Douthwaite and C.C.D Tingle, Natural Resources Institute, Chatham, U.K., 1994).

To convert this application rate to a soil concentration, the following assumptions were used.

Average application rate:	200 grams per hectare
Application frequency:	4 times per year
Application duration:	12 years (1960 to 1972)
Mix zone:	Upper 12 inches of soil.

Using this set of assumptions, the estimated DDT concentration in surface soils and sediments would be 38 ug/kg per application. Over a 12 year period and assuming no degradation, the total DDT concentration in soils and sediments would be 1,824 ug/kg. A sensitivity analysis of these assumptions is presented below.

DDT use likely started prior to the assumed start date of 1960 and was reportedly in common use in the 1940s and 1950s. Therefore, the application start date of 1960 is likely conservative. Also, in practice, the application rate would be expected to be highly variable based on wind conditions and proximity to the application point. Under stagnant atmospheric conditions, higher levels of pesticides would be expected near the application point than in more remote locations.

The stated application frequency may be on the high side, but is based on an assumption of one application per season. Realistically, most areas would likely receive less frequent applications, but for some areas in which pesticides would degrade or disperse more quickly, then more frequent applications would be expected. The mix zone of 12 inches is based the sample interval during collection.

For comparison, in the United States in 1965 to 1967 in cotton and vegetable fields with regular pesticide use, DDT was detected in 100% of the soils tested at concentrations ranging from 290 to 15,630 ug/kg, (Stevens, LJ et al; Pesticides Monitoring J 4, pp 145-166, 1970). Therefore, the calculated concentration of DDT in soil and sediment is consistent with typical concentrations measured in the mid 1960s.

Attenuation Rates: Although DDT is considered to be relatively persistent, DDT does degrade via biological and photochemical mechanisms and does volatilize into the atmosphere. Biodegradation rates reportedly range under aerobic conditions with half lives of 2 to 15.6 years and under anaerobic conditions with half lives of 0.04 to 0.27 years. The initial degradation

products are DDD and DDE. The degradation rates for DDD and DDE are reportedly similar to that of DDT. Also, in soil because of volatilization, the reported half life is 0.27 years.

To estimate anticipated DDT concentrations in current soils and sediments, the geometric mean half life biodegradation rate of 5.6 years will be used initially. Based on an estimated concentration of 1,824 ug/kg in 1972, the calculated DDT concentration in 2000 would be approximately 57 ug/kg. This value compares favorably with the measured typical facility concentration for the site of approximately 32 to 35 ug/kg.

As a sensitivity analysis, shorter and longer biodegradation rates were considered. In the event that a faster biodegradation rate was used, e.g. (2 years half life), then the calculated DDT concentration in 2000 would be less than 1 ug/kg. Similarly, if a slower biodegradation rate was used, e.g. (15.6 years half life), then the calculated DDT concentration in 2000 would be 523 ug/kg. Which is much higher than measured in most of the site soils and sediments.

Conclusion: The site specific typical facility concentrations for DDT and similar pesticides are consistent with expected concentrations resulting from normal commercial applications conducted in the 1940s to 1972 time frame.

APPENDIX I

TOTAL PAH CONCENTRATION CALCULATIONS

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Soil Samples from Site 1 RFI/RI	DRAWING NUMBER:	

Objective:

Using PAH data for soil samples collected during the Site 1 RFI/RI, calculate Total PAH and BAP Equivalent concentrations.

Assumptions:

(1) Total PAH #1 uses 1/2 the detection limit for nondetects, if at least one PAH is detected. Assume a value of zero, if all PAHs are nondetect.

(2) Total PAH #2 assumes a value of zero for nondetects.

(3) For Total PAHs #1 and #2 = Low Molecular Weight PAHs + High Molecular Weight PAHs.

(4) Low Molecular Weight PAHs = 2-methylnaphthalene + acenaphthene + acenaphthylene + anthracene + fluorene + naphthalene + phenanthrene.

(5) High Molecular Weight PAHs = benzo(a)anthracene + benzo(a)pyrene + chyrsene + dibenzo(a,h)anthracene + fluoranthene + pyrene.

(6) Reference for Total PAHs: MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. FDEP.

(7) BAP equivalents = benzo(a)anthracene(0.1) + benzo(a)pyrene(1.0) + benzo(b)fluoranthene(0.1) + benzo(k)fluoranthene(0.01) + chyrsene(0.001) + dibenzo(a,h)anthracene(1.0) + indeno(1,2,3-cd)pyrene (0.1)

Calculations:

PAH Chemicals	Sample PAI-01-SS-005-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	370	U	185	0	
Acenaphthene	940	U	470	0	
Acenaphthylene	470	U	235	0	
Anthracene	19	U	9.5	0	
Benzo(a)anthracene	29	J	29	29	2.9
Benzo(a)pyrene	40	J	40	40	40
Benzo(b)fluoranthene	53		0	0	5.3
Benzo(k)fluoranthene	15	J	0	0	0.15
Chrysene	56		56	56	0.056
Dibenzo(a,h)anthracene	190	U	95	0	95
Fluoranthene	77		77	77	
Fluorene	95		95	95	
Indeno(1,2,3-cd)pyrene	47	U	0	0	2.35
Naphthalene	470	U	235	0	
Phenanthrene	37	U	18.5	0	
Pyrene	94	U	47	0	
		SUM	1592	297	145.756

PAH Chemicals	Sample PAI-01-SS-06-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	530	U	265	0	
Acenaphthene	1300	U	650	0	
Acenaphthylene	640	U	320	0	
Anthracene	17	J	17	17	
Benzo(a)anthracene	160		160	160	16
Benzo(a)pyrene	220		220	220	220
Benzo(b)fluoranthene	300		0	0	30
Benzo(k)fluoranthene	96		0	0	0.96
Chrysene	230		230	230	0.23
Dibenzo(a,h)anthracene	260	U	130	0	130
Fluoranthene	340		340	340	
Fluorene	130	U	65	0	
Indeno(1,2,3-cd)pyrene	180		0	0	18
Naphthalene	640	U	320	0	
Phenanthrene	180		180	180	
Pyrene	290		290	290	
		SUM	3187	1437	415.19

PAH Sample PAI-01-SS-07-01

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Soil Samples from Site 1 RFI/RI	DRAWING NUMBER:	

Chemicals	Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	130	J	130	130	
Acenaphthene	4400	U	2200	0	
Acenaphthylene	2200	U	1100	0	
Anthracene	88	U	44	0	
Benzo(a)anthracene	280		280	280	28
Benzo(a)pyrene	310		310	310	310
Benzo(b)fluoranthene	510		0	0	51
Benzo(k)fluoranthene	160		0	0	1.6
Chrysene	330		330	330	0.33
Dibenzo(a,h)anthracene	880	U	440	0	440
Fluoranthene	630		630	630	
Fluorene	440	U	220	0	
Indeno(1,2,3-cd)pyrene	230		0	0	23
Naphthalene	2200	U	1100	0	
Phenanthrene	170	J	170	170	
Pyrene	510		510	510	
		SUM	7464	2360	853.93

PAH Chemicals	Sample PAI-01-SS-08-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	380	U	190	0	
Acenaphthene	930	U	465	0	
Acenaphthylene	470	U	235	0	
Anthracene	19	U	9.5	0	
Benzo(a)anthracene	62		62	62	6.2
Benzo(a)pyrene	110		110	110	110
Benzo(b)fluoranthene	110		0	0	11
Benzo(k)fluoranthene	39		0	0	0.39
Chrysene	74		74	74	0.074
Dibenzo(a,h)anthracene	190	U	95	0	95
Fluoranthene	91		91	91	
Fluorene	93	U	46.5	0	
Indeno(1,2,3-cd)pyrene	130		0	0	13
Naphthalene	470	U	235	0	
Phenanthrene	63		63	63	
Pyrene	86	J	86	86	
		SUM	1762	486	235.664

PAH Chemicals	Sample PAI-01-SS-09-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	360	U	180	0	
Acenaphthene	900	U	450	0	
Acenaphthylene	450	U	225	0	
Anthracene	35		35	35	
Benzo(a)anthracene	200		200	200	20
Benzo(a)pyrene	220		220	220	220
Benzo(b)fluoranthene	220		0	0	22
Benzo(k)fluoranthene	92		0	0	0.92
Chrysene	210		210	210	0.21
Dibenzo(a,h)anthracene	180	U	90	0	90
Fluoranthene	300		300	300	
Fluorene	90	U	45	0	
Indeno(1,2,3-cd)pyrene	160		0	0	16
Naphthalene	450	U	225	0	
Phenanthrene	170		170	170	
Pyrene	240		240	240	
		SUM	2590	1375	369.13

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Soil Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SS-010-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	340	U	170	0	
Acenaphthene	420	U	210	0	
Acenaphthylene	210	U	105	0	
Anthracene	8.5	U	4.25	0	
Benzo(a)anthracene	29		29	29	2.9
Benzo(a)pyrene	33		33	33	33
Benzo(b)fluoranthene	34		0	0	3.4
Benzo(k)fluoranthene	16		0	0	0.16
Chrysene	32		32	32	0.032
Dibenzo(a,h)anthracene	85	U	42.5	0	42.5
Fluoranthene	61		61	61	
Fluorene	42	U	21	0	
Indeno(1,2,3-cd)pyrene	19	J	0	0	1.9
Naphthalene	210	U	105	0	
Phenanthrene	21		21	21	
Pyrene	42	J	42	42	
		SUM	875.75	218	83.892

PAH Chemicals	Sample PAI-01-SS-11-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	400	U	200	0	
Acenaphthene	1000	U	500	0	
Acenaphthylene	510	U	255	0	
Anthracene	12	J	12	12	
Benzo(a)anthracene	76		76	76	7.6
Benzo(a)pyrene	90		90	90	90
Benzo(b)fluoranthene	81		0	0	8.1
Benzo(k)fluoranthene	27		0	0	0.27
Chrysene	80		80	80	0.08
Dibenzo(a,h)anthracene	200	U	100	0	100
Fluoranthene	160		160	160	
Fluorene	100	U	50	0	
Indeno(1,2,3-cd)pyrene	41	J	0	0	4.1
Naphthalene	510	U	255	0	
Phenanthrene	70		70	70	
Pyrene	100	J	100	100	
		SUM	1948	588	210.15

PAH Chemicals	Sample PAI-01-SS-012-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	400	U	200	0	
Acenaphthene	500	U	250	0	
Acenaphthylene	250	U	125	0	
Anthracene	10	U	5	0	
Benzo(a)anthracene	18	J	18	18	1.8
Benzo(a)pyrene	20	J	20	20	20
Benzo(b)fluoranthene	20		0	0	2
Benzo(k)fluoranthene	11		0	0	0.11
Chrysene	19	J	19	19	0.019
Dibenzo(a,h)anthracene	100	U	50	0	50
Fluoranthene	33		33	33	
Fluorene	50	U	25	0	
Indeno(1,2,3-cd)pyrene	25	U	0	0	1.25
Naphthalene	250	U	125	0	
Phenanthrene	23		23	23	
Pyrene	30	J	30	30	
		SUM	923	143	75.179

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Soil Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SS-013-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	420	U	210	0	
Acenaphthene	530	U	265	0	
Acenaphthylene	260	U	130	0	
Anthracene	19		19	19	
Benzo(a)anthracene	120		120	120	12
Benzo(a)pyrene	130		130	130	130
Benzo(b)fluoranthene	130		0	0	13
Benzo(k)fluoranthene	49		0	0	0.49
Chrysene	120		120	120	0.12
Dibenzo(a,h)anthracene	100	U	50	0	50
Fluoranthene	230		230	230	
Fluorene	53	U	26.5	0	
Indeno(1,2,3-cd)pyrene	84		0	0	8.4
Naphthalene	260	U	130	0	
Phenanthrene	100		100	100	
Pyrene	180		180	180	
		SUM	1710.5	899	214.01

PAH Chemicals	Sample PAI-01-SS-14-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	420	U	210	0	
Acenaphthene	530	U	265	0	
Acenaphthylene	260	U	130	0	
Anthracene	44		44	44	
Benzo(a)anthracene	170		170	170	17
Benzo(a)pyrene	160		160	160	160
Benzo(b)fluoranthene	140		0	0	14
Benzo(k)fluoranthene	57		0	0	0.57
Chrysene	230		230	230	0.23
Dibenzo(a,h)anthracene	100	U	50	0	50
Fluoranthene	330		330	330	
Fluorene	53	U	26.5	0	
Indeno(1,2,3-cd)pyrene	82		0	0	8.2
Naphthalene	260	U	130	0	
Phenanthrene	200		200	200	
Pyrene	260		260	260	
			2205.5	1394	250
		SUM	4201	2788	500

PAH Chemicals	Sample PAI-01-SS-14-D Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	410	U	205	0	
Acenaphthene	520	U	260	0	
Acenaphthylene	260	U	130	0	
Anthracene	10	U	5	0	
Benzo(a)anthracene	37		37	37	3.7
Benzo(a)pyrene	53		53	53	53
Benzo(b)fluoranthene	54		0	0	5.4
Benzo(k)fluoranthene	22		0	0	0.22
Chrysene	64		64	64	0.064
Dibenzo(a,h)anthracene	100	U	50	0	50
Fluoranthene	70		70	70	
Fluorene	52	U	26	0	
Indeno(1,2,3-cd)pyrene	30		0	0	3
Naphthalene	260	U	130	0	
Phenanthrene	24		24	24	
Pyrene	53	J	53	53	
		SUM	1107	301	115.384

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Soil Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SS-41-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	350	U	175	0	
Acenaphthene	870	U	435	0	
Acenaphthylene	440	U	220	0	
Anthracene	17	U	8.5	0	
Benzo(a)anthracene	24	J	24	24	2.4
Benzo(a)pyrene	32	J	32	32	32
Benzo(b)fluoranthene	43		0	0	4.3
Benzo(k)fluoranthene	19		0	0	0.19
Chrysene	44	U	22	0	0.022
Dibenzo(a,h)anthracene	170	U	85	0	85
Fluoranthene	63		63	63	
Fluorene	87	U	43.5	0	
Indeno(1,2,3-cd)pyrene	26	J	0	0	2.6
Naphthalene	440	U	220	0	
Phenanthrene	30	J	30	30	
Pyrene	87	U	43.5	0	
		SUM	1401.5	149	126.512

PAH Chemicals	Sample PAI-01-SS-41-02 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	350	U	175	0	
Acenaphthene	440	U	220	0	
Acenaphthylene	220	U	110	0	
Anthracene	8.9	U	4.45	0	
Benzo(a)anthracene	22	U	11	0	1.1
Benzo(a)pyrene	22	U	11	0	11
Benzo(b)fluoranthene	13		0	0	1.3
Benzo(k)fluoranthene	8.9	U	0	0	0.0445
Chrysene	22	U	11	0	0.011
Dibenzo(a,h)anthracene	89	U	44.5	0	44.5
Fluoranthene	26		26	26	
Fluorene	44	U	22	0	
Indeno(1,2,3-cd)pyrene	22	U	0	0	1.1
Naphthalene	220	U	110	0	
Phenanthrene	69		69	69	
Pyrene	44	U	22	0	
		SUM	835.95	95	59.0555

PAH Chemicals	Sample PAI-01-SS-41-03 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	360	U	180	0	
Acenaphthene	890	U	445	0	
Acenaphthylene	890	U	445	0	
Anthracene	18	U	9	0	
Benzo(a)anthracene	63		63	63	6.3
Benzo(a)pyrene	37	J	37	37	37
Benzo(b)fluoranthene	68		0	0	6.8
Benzo(k)fluoranthene	18	U	0	0	0.09
Chrysene	44	U	22	0	0.022
Dibenzo(a,h)anthracene	180	U	90	0	90
Fluoranthene	200		200	200	
Fluorene	28		28	28	
Indeno(1,2,3-cd)pyrene	44	U	0	0	2.2
Naphthalene	440	U	220	0	
Phenanthrene	190		190	190	
Pyrene	120		120	120	
		SUM	2049	638	142.412

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Soil Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SS-41-04 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	350	U	175	0	
Acenaphthene	430	U	215	0	
Acenaphthylene	210	U	105	0	
Anthracene	8.6	U	4.3	0	
Benzo(a)anthracene	21	U	10.5	0	1.05
Benzo(a)pyrene	21	U	10.5	0	10.5
Benzo(b)fluoranthene	10		0	0	1
Benzo(k)fluoranthene	8.6	U	0	0	0.043
Chrysene	12	J	12	12	0.012
Dibenzo(a,h)anthracene	86	U	43	0	43
Fluoranthene	26	0	26	26	
Fluorene	43	U	21.5	0	
Indeno(1,2,3-cd)pyrene	21	U	0	0	1.05
Naphthalene	210	U	105	0	
Phenanthrene	31	0	31	31	
Pyrene	43	U	21.5	0	
		SUM	780.3	69	56.655

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Sediment Samples from Site 1 RFI/RI	DRAWING NUMBER:	

Objective:

Using PAH data for sediment samples collected during the Site 1 RFI/RI, calculate Total PAH and BAP Equivalent concentrations.

Assumptions:

(1) Total PAH concentrations will be used to compare against ecological RGOs to determine the extent of impacted sediment.

(2) BAP Equivalent concentrations will be used to compare against the human health RGO to determine the extent of impacted sediment.

(3) Total PAH #1 uses 1/2 the detection limit for nondetects, if at least one PAH is detected. Assume a value of zero, if all PAHs are nondetect.

(4) Total PAH #2 assumes a value of zero for nondetects.

(5) For Total PAHs #1 and #2 = Low Molecular Weight PAHs + High Molecular Weight PAHs.

(6) Low Molecular Weight PAHs = 2-methylnaphthalene + acenaphthene + acenaphthylene + anthracene + fluorene + naphthalene + phenanthrene.

(7) High Molecular Weight PAHs = benzo(a)anthracene + benzo(a)pyrene + chyrsene + dibenzo(a,h)anthracene + fluoranthene + pyrene.

(7) Reference for Total PAHs: MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. FDEP.

(8) BAP equivalents = benzo(a)anthracene(0.1) + benzo(a)pyrene(1.0) + benzo(b)fluoranthene(0.1) + benzo(k)fluoranthene(0.01) + chyrsene(0.001) + dibenzo(a,h)anthracene(1.0) + indeno(1,2,3-cd)pyrene (0.1)

Calculations:

PAH Chemicals	Sample PAI-01-SD-001-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	1200	U	600	0	
Acenaphthene	1200	U	600	0	
Acenaphthylene	1200	U	600	0	
Anthracene	770		770	770	
Benzo(a)anthracene	1200		1200	1200	120
Benzo(a)pyrene	980		980	980	980
Benzo(b)fluoranthene	940		0	0	94
Benzo(k)fluoranthene	410		0	0	4.1
Chrysene	1100		1100	1100	1.1
Dibenzo(a,h)anthracene	480	U	240	0	240
Fluoranthene	3200		3200	3200	
Fluorene	590	U	295	0	
Indeno(1,2,3-cd)pyrene	620		0	0	62
Naphthalene	1200	U	600	0	
Phenanthrene	2600		2600	2600	
Pyrene	3200		3200	3200	
		SUM	15985	13050	1501.2

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Sediment Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SD-002-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	520	U	260	0	
Acenaphthene	1300	U	650	0	
Acenaphthylene	380	J	380	380	
Anthracene	47		47	47	
Benzo(a)anthracene	250		250	250	25
Benzo(a)pyrene	260		260	260	260
Benzo(b)fluoranthene	270		0	0	27
Benzo(k)fluoranthene	84		0	0	0.84
Chrysene	370		370	370	0.37
Dibenzo(a,h)anthracene	260	U	130	0	130
Fluoranthene	590		590	590	
Fluorene	130	U	65	0	
Indeno(1,2,3-cd)pyrene	170		0	0	17
Naphthalene	660	U	330	0	
Phenanthrene	160		160	160	
Pyrene	420		420	420	
		SUM	3912	2477	460.21

PAH Chemicals	Sample PAI-01-SD-003-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	650	U	325	0	
Acenaphthene	1600	U	800	0	
Acenaphthylene	810	U	405	0	
Anthracene	240		240	240	
Benzo(a)anthracene	730		730	730	73
Benzo(a)pyrene	770		770	770	770
Benzo(b)fluoranthene	720		0	0	72
Benzo(k)fluoranthene	240		0	0	2.4
Chrysene	1000		1000	1000	1
Dibenzo(a,h)anthracene	320	U	160	0	160
Fluoranthene	1500		1500	1500	
Fluorene	160	J	160	160	
Indeno(1,2,3-cd)pyrene	480		0	0	48
Naphthalene	810	U	405	0	
Phenanthrene	1100		1100	1100	
Pyrene	1100		1100	1100	
		SUM	8695	6600	1126.4

PAH Chemicals	Sample PAI-01-SD-003-D Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	780	U	390	0	
Acenaphthene	1900	U	950	0	
Acenaphthylene	970	U	485	0	
Anthracene	59		59	59	
Benzo(a)anthracene	360		360	360	36
Benzo(a)pyrene	470		470	470	470
Benzo(b)fluoranthene	410		0	0	41
Benzo(k)fluoranthene	130	J	0	0	1.3
Chrysene	490		490	490	0.49
Dibenzo(a,h)anthracene	390	U	195	0	195
Fluoranthene	680		680	680	
Fluorene	190	U	95	0	
Indeno(1,2,3-cd)pyrene	330		0	0	33
Naphthalene	970	U	485	0	
Phenanthrene	290		290	290	
Pyrene	510		510	510	
		SUM	5459	2859	776.79

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Sediment Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SD-004-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	580	U	290	0	
Acenaphthene	730	U	365	0	
Acenaphthylene	360	U	180	0	
Anthracene	15	U	7.5	0	
Benzo(a)anthracene	30	J	30	30	3
Benzo(a)pyrene	50		50	50	50
Benzo(b)fluoranthene	52		0	0	5.2
Benzo(k)fluoranthene	16		0	0	0.16
Chrysene	60		60	60	0.06
Dibenzo(a,h)anthracene	150	U	75	0	75
Fluoranthene	80		80	80	
Fluorene	73	U	36.5	0	
Indeno(1,2,3-cd)pyrene	30	J	0	0	3
Naphthalene	360	U	180	0	
Phenanthrene	25	J	25	25	
Pyrene	64	J	64	64	
		SUM	1443	309	136.42

PAH Chemicals	Sample PAI-01-SD-009-01 (Calculated using the MDL as the detection limit). Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	523.8	U	261.9	0	
Acenaphthene	120	U	60	0	
Acenaphthylene	84	U	42	0	
Anthracene	2.64	U	1.32	0	
Benzo(a)anthracene	50	J	50	50	5
Benzo(a)pyrene	170		170	170	170
Benzo(b)fluoranthene	170		0	0	17
Benzo(k)fluoranthene	50		0	0	0.5
Chrysene	95		95	95	0.095
Dibenzo(a,h)anthracene	64.8	U	32.4	0	32.4
Fluoranthene	150		150	150	
Fluorene	20.4	U	10.2	0	
Indeno(1,2,3-cd)pyrene	140		0	0	14
Naphthalene	102	U	51	0	
Phenanthrene	61		61	61	
Pyrene	120	U	60	0	
		SUM	1044.82	526	238.995

PAH Chemicals	Sample PAI-01-SD-010-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	840	U	420	0	
Acenaphthene	420	U	210	0	
Acenaphthylene	210	U	105	0	
Anthracene	8.5	U	4.25	0	
Benzo(a)anthracene	21	U	10.5	0	1.05
Benzo(a)pyrene	21	U	10.5	0	10.5
Benzo(b)fluoranthene	8.1	J	0	0	0.81
Benzo(k)fluoranthene	8.5	U	0	0	0.0425
Chrysene	13	J	13	13	0.013
Dibenzo(a,h)anthracene	85	U	42.5	0	42.5
Fluoranthene	21	U	10.5	0	
Fluorene	42	U	21	0	
Indeno(1,2,3-cd)pyrene	21	U	0	0	1.05
Naphthalene	210	U	105	0	
Phenanthrene	17	U	8.5	0	
Pyrene	42	U	21	0	
		SUM	981.75	13	55.9655

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Sediment Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SD-011-01 (Calculated using the MDL as the detection limit) Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	253.8	U	126.9	0	
Acenaphthene	110	U	55	0	
Acenaphthylene	79.8	U	39.9	0	
Anthracene	30		30	30	
Benzo(a)anthracene	150		150	150	15
Benzo(a)pyrene	170		170	170	170
Benzo(b)fluoranthene	150		0	0	15
Benzo(k)fluoranthene	48		0	0	0.48
Chrysene	250		250	250	0.25
Dibenzo(a,h)anthracene	62.1	U	31.05	0	31.05
Fluoranthene	360		360	360	
Fluorene	18.7	U	9.35	0	
Indeno(1,2,3-cd)pyrene	110		0	0	11
Naphthalene	96.9	U	48.45	0	
Phenanthrene	160		160	160	
Pyrene	240		240	240	
		SUM	1670.65	1360	242.78

PAH Chemicals	Sample PAI-01-SD-012-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	470	U	235	0	
Acenaphthene	590	U	295	0	
Acenaphthylene	300	U	150	0	
Anthracene	11	J	11	11	
Benzo(a)anthracene	46		46	46	4.6
Benzo(a)pyrene	57		57	57	57
Benzo(b)fluoranthene	54		0	0	5.4
Benzo(k)fluoranthene	13		0	0	0.13
Chrysene	75		75	75	0.075
Dibenzo(a,h)anthracene	120	U	60	0	60
Fluoranthene	100		100	100	
Fluorene	59	U	29.5	0	
Indeno(1,2,3-cd)pyrene	39		0	0	3.9
Naphthalene	300	U	150	0	
Phenanthrene	70		70	70	
Pyrene	88		88	88	
		SUM	1366.5	447	131.105

PAH Chemicals	Sample PAI-01-SD-013-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	648	U*	648	648	
Acenaphthene	310	U	155	0	
Acenaphthylene	150	U	75	0	
Anthracene	6.2	U	3.1	0	
Benzo(a)anthracene	15	U	7.5	0	0.75
Benzo(a)pyrene	15	U	7.5	0	7.5
Benzo(b)fluoranthene	6.2	U	0	0	0.31
Benzo(k)fluoranthene	6.2	U	0	0	0.031
Chrysene	15	U	7.5	0	0.0075
Dibenzo(a,h)anthracene	25	U	12.5	0	12.5
Fluoranthene	15	U	7.5	0	
Fluorene	31	U	15.5	0	
Indeno(1,2,3-cd)pyrene	15	U	0	0	0.75
Naphthalene	150	U	75	0	
Phenanthrene	12	U	6	0	
Pyrene	31	U	15.5	0	
			1035.6	648	21.8485
		SUM	1423.2	648	43.697

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Sediment Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SD-013-D Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	648	U*	648	648	
Acenaphthene	320	UJ	320	320	
Acenaphthylene	160	UJ	160	160	
Anthracene	6.5	UJ	6.5	6.5	
Benzo(a)anthracene	16	UJ	16	16	1.6
Benzo(a)pyrene	16	UJ	16	16	16
Benzo(b)fluoranthene	6.5	UJ	0	0	0.65
Benzo(k)fluoranthene	6.5	UJ	0	0	0.065
Chrysene	16	UJ	16	16	0.016
Dibenzo(a,h)anthracene	26	UJ	26	26	26
Fluoranthene	16	UJ	16	16	
Fluorene	32	UJ	32	32	
Indeno(1,2,3-cd)pyrene	16	UJ	0	0	1.6
Naphthalene	160	UJ	160	160	
Phenanthrene	13	UJ	13	13	
Pyrene	32	UJ	32	32	
		SUM	1461.5	1461.5	45.931

PAH Chemicals	Sample PAI-01-SD-014-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	648	U*	648	648	
Acenaphthene	230	U	115	0	
Acenaphthylene	120	U	60	0	
Anthracene	4.7	U	2.35	0	
Benzo(a)anthracene	12	U	6	0	0.6
Benzo(a)pyrene	12	U	6	0	6
Benzo(b)fluoranthene	4.7	U	0	0	0.235
Benzo(k)fluoranthene	4.7	U	0	0	0.0235
Chrysene	12	U	6	0	0.006
Dibenzo(a,h)anthracene	19	U	9.5	0	9.5
Fluoranthene	12	U	6	0	
Fluorene	23	U	11.5	0	
Indeno(1,2,3-cd)pyrene	12	U	0	0	0.6
Naphthalene	120	U	60	0	
Phenanthrene	9.3	U	4.65	0	
Pyrene	23	U	11.5	0	
		SUM	946.5	648	16.9645

PAH Chemicals	Sample PAI-01-SD-015-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	648	U*	648	648	
Acenaphthene	260	U	130	0	
Acenaphthylene	130	U	65	0	
Anthracene	5.2	U	2.6	0	
Benzo(a)anthracene	13	U	6.5	0	0.65
Benzo(a)pyrene	7.8	J	7.8	7.8	7.8
Benzo(b)fluoranthene	10		0	0	1
Benzo(k)fluoranthene	3.1	J	0	0	0.031
Chrysene	13	U	6.5	0	0.0065
Dibenzo(a,h)anthracene	21	U	10.5	0	10.5
Fluoranthene	25		25	25	
Fluorene	26	U	13	0	
Indeno(1,2,3-cd)pyrene	13	U	0	0	0.65
Naphthalene	130	U	65	0	
Phenanthrene	10	U	5	0	
Pyrene	26	U	13	0	
		SUM	997.9	680.8	20.6375

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7394 - DRAFT FS/CMS
SUBJECT:	SITE 1 - INCINERATOR LANDFILL (TOTAL PAH AND BAP EQUIVALENT CALCULATION)		
BASED ON:	PAH data for Sediment Samples from Site 1 RFI/RI	DRAWING NUMBER:	

PAH Chemicals	Sample PAI-01-SD-016-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	648	U*	648	648	
Acenaphthene	140	U	70	0	
Acenaphthylene	71	U	35.5	0	
Anthracene	2.8	U	1.4	0	
Benzo(a)anthracene	7.1	U	3.55	0	0.355
Benzo(a)pyrene	7.1	U	3.55	0	3.55
Benzo(b)fluoranthene	2.8	U	0	0	0.14
Benzo(k)fluoranthene	2.8	U	0	0	0.014
Chrysene	7.1	U	3.55	0	0.00355
Dibenzo(a,h)anthracene	11	U	5.5	0	5.5
Fluoranthene	7.1	U	3.55	0	
Fluorene	14	U	7	0	
Indeno(1,2,3-cd)pyrene	7.1	U	0	0	0.355
Naphthalene	71	U	35.5	0	
Phenanthrene	5.7	U	2.85	0	
Pyrene	14	U	7	0	
		SUM	826.95	648	9.91755

PAH Chemicals	Sample PAI-01-SD-017-01 Concentration	Qualifier	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	648	U*	648	648	
Acenaphthene	7300	U	3650	0	
Acenaphthylene	3600	U	1800	0	
Anthracene	540		540	540	
Benzo(a)anthracene	2200		2200	2200	220
Benzo(a)pyrene	1700		1700	1700	1700
Benzo(b)fluoranthene	1800		0	0	180
Benzo(k)fluoranthene	850		0	0	8.5
Chrysene	2300		2300	2300	2.3
Dibenzo(a,h)anthracene	1600		1600	1600	1600
Fluoranthene	6600		6600	6600	
Fluorene	730	U	365	0	
Indeno(1,2,3-cd)pyrene	1100		0	0	110
Naphthalene	3600	U	1800	0	
Phenanthrene	1500		1500	1500	
Pyrene	5400		5400	5400	
		SUM	30103	22488	3820.8

Conclusions:

(1) Use Total PAH #1 for delineation of impacted sediments (ecological).

(2) Use BAP Equivalent for delineation of impacted sediments (human health).

(*) 2-methylnapthalene was not analyzed for in these samples. 1/2 of the MDL of the highest non detect value was used.