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MCRD PARRIS ISLAND
5090.3a

RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION/REMEDIAL INVESTIGATION FOR SITE 2 BORROW PIT LANDFILL AND SITE 15 DIRT ROADS VOLUME 2 OF 2 APPENDICES MCRD PARRIS ISLAND SC

8/7/2000

TETRA TECH NUS

DOC: ID 170

RCRA Facilities Investigation/ Remedial Investigation for Site/SWMU 2 - Borrow Pit Landfill and Site/SWMU 15 - Dirt Roads

Marine Corps Recruit Depot

Parris Island, South Carolina

Volume II - Appendices

Southern Division
Naval Facilities Engineering Command

Contract Number N62467-94-D-0888
Contract Task Order 0020

August 2000

APPENDIX A

FIELD FORMS

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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-98-030

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

For the installation of two (2) permanent monitoring wells at SWMU-2 as follows:

1) One (1) shallow and one (1) deep permanent monitoring well to be installed at the locations specified on Figure 7-3 (attached).

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

3) The deep well 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.

DD980317.DCH

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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.

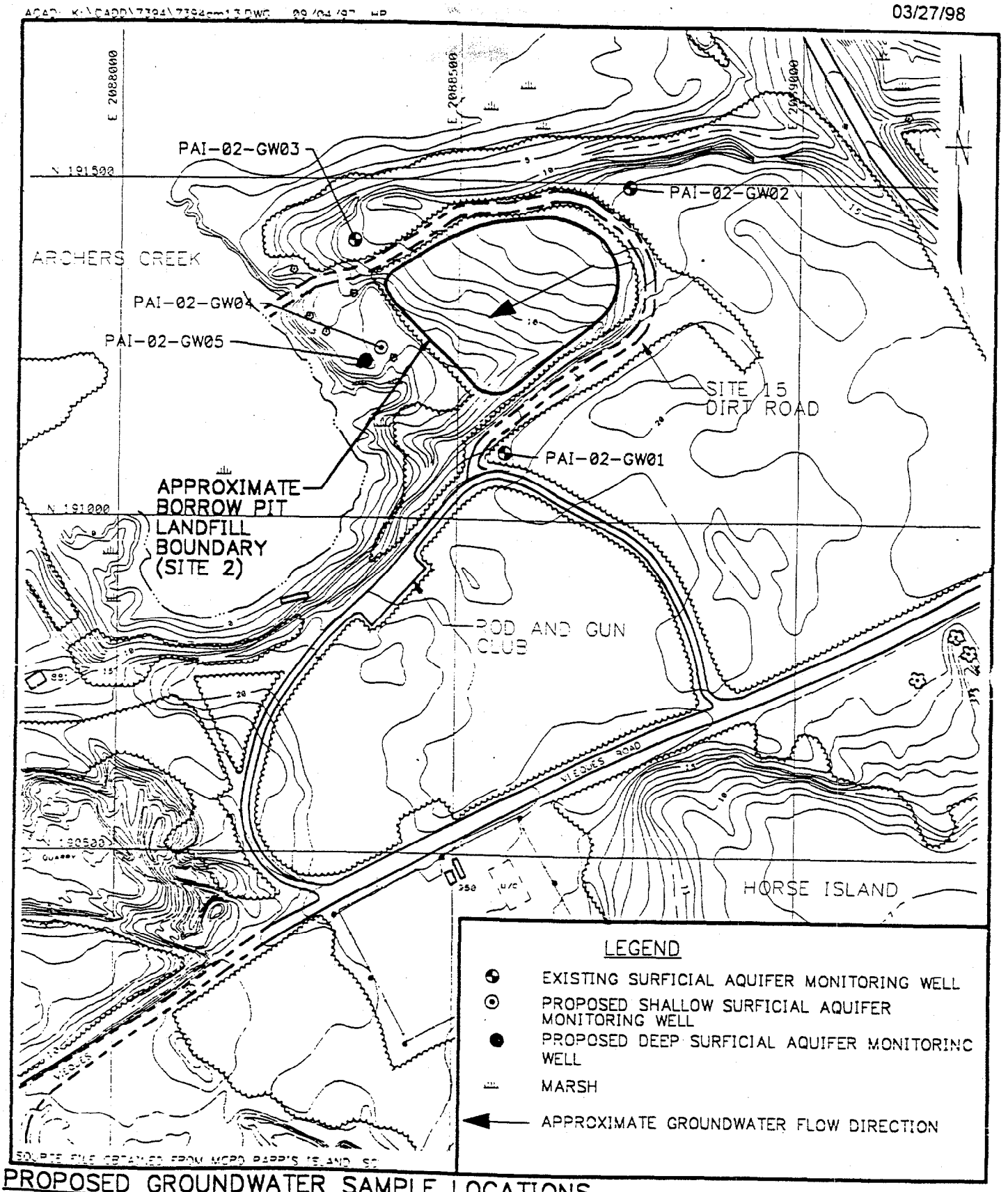
This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Environmental Control's Regulation R.61-71.

Approval granted by:

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

Attachment: Figure 7-3, Proposed Groundwater Sample 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 2 – BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

FIGURE 7-3

0 200 400
SCALE IN FEET

Brown & Root Environmental

069707/P

CTO 0020

A-2

SOIL BORING LOGS

BORING LOG

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

BORING NUMBER: PAI-02-SB01
DATE: 7/11/98
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
1	0-2	WOH / WOH			V. Loose	Blk	F SAND	SP		0	0	0
		WOH / WOH	2"									
2	2-4	WOH / WOH			V. Loose	Blk	Same	SP	wet	0	0	0
		1 / 1	10"									
3	4-6	1 / 1			V. Loose	Gray Grn	F/med SAND	SP		0	0	0
		2 / 2	10"									
4	6-8	1 / 2			Loose	Gray Grn	Same	SP		0	0	0
		2 / 2	18"									
5	8-10	2 / 2			Loose	L. Brn & Gray Grn	Same	SP		0	0	0
		2 / 1	18"									
6	10-12	WOH / 1			V. Loose	Grn	Same	SP		0	0	0
		1 / 1	10"									
7	12-14	WOH / WOH			V. Loose	Grn	Same	SP		0	0	0
		1 / 1	10"									
8	14-16	WOH / WOH			V. Loose	Gray Grn & Blk	F/med Sand	SP	6" clay Seam @ 14.5 Ft	0	0	0
		3 / 1	18"									
9	16-18	WOH / 2			Loose	Grn	F/med SAND	SP	2" CLAY Seam @ 17 FT	0	0	0
		2 / 3	18"									
10	18-20	2 / 3			Loose	Grn	Clayey F/med SAND	SC		0	0	0
		5 / 5	20"									
11	20-22	WOH / 1			V. Loose	Grn	Same	SC		0	0	0
		2 / 3	18"									
12	22-24	2 / 3			Loose	Grn	Same	SC		0	0	0
		3 / 2	20"									
13	24-26	WOH / 3			Loose	Grn	F/med SAND w/ trSi	SP		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. #: -

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-02-SB01
DATE: 7/11/98
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**	
		4/7	20"										
14	26-28	5/7			Firm	Grn	F/co SAND w/tr. CL	SW		0	0	0	
		13/10	18"										
15	28-30	10/10			Firm	Grn	F/co SAND	SW		0	0	0	
		13/8	18"										
16	30-32	2/3			Loose	Grn	F/co SAND w/tr. CL	SW		0	0	0	
		4/4	12"										
17	32-34	3/5			Loose	Gray Grn	F/co SAND w/tr. Clay	SW	Some cemented sand	0	0	0	
		5/4	18"										
18	34-36	WOR/2			V. Loose	Gray Grn	F/co SAND w/tr CL	SW		0	0		
		2/2	10"										
19	36-38	4/4			Loose	Gray Grn	Clayey F/co SAND	SC		0	0	0	
		4/4	18"										
20	38-40	4/3			Loose	Gray Grn	Same	SC	Becoming Drier	0	0	0	
		4/5	18"										
21	40-42	WOH/WOH			V. Loose	Gray Grn	F/co SAND	SW	Becoming Drier	0	0	0	
		3/4	18"										
22	42-44	4/3			Loose	Gray Grn	Same	SW	Becoming Drier	0	0	0	
		7/10	20"										
23	44-46	7/10			Firm	Gray Grn	F/med SAND w/tr. CL	SP	Dry	0	0	0	
		13/16	20"										
24	46-48	13/17			Dense	Gray Grn	Same	SP	Dry	0	0	0	
		23/27	24										
				48									

* 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
LOG USED FOR wells PAI-02-MW04, PAI-02-MW05

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

BORING LOG

PROJECT NAME: MCRD-PARRIS ISLAND
PROJECT NUMBER: 7394
DRILLING COMPANY: NA
DRILLING RIG: NA
BORING NUMBER: PAI-02-SS-01
DATE: 6/30/98
GEOLOGIST: RLM/EJH
DRILLER: NA

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**
			0-1'			lt br.	fine-med gr. sd., dry						

* 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):

Remarks: Samples collected at 0-1'. No hand-augers were performed at this location. borings Log prepared on 4/13/99 by VS

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

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: NA
BORING NUMBER: PAI-02-SS02
DATE: 07-22-98
GEOLOGIST: S. Pelaske / S. Barton
DRILLER: NA

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"			dk. brn	litter / humus		damp / organic rich				
			1			lt brn tan	f.g. sand, trace silt		moist, roots				
			2			lt. brn tan	as above						
			3			lt. brn tan	as above						
				▽4'									
			4			tan lt. gray	f.g. - m.g. sand		saturated lt. brn mottling				
			5			tan lt. gray	as above						
			6			tan lt. gray	as above						
			6.5			tan lt. gray	as above		lt. brn mottling / staining				
				T.D= 6.5'									

* 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):

Remarks: no conclusive evidence of trash encountered
boring was backfilled using soil that was originally removed
samples collected at 0-1'
drilling method: hand auger

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

BORING LOG

PROJECT NAME: MCRD - Parris Island
BORING NUMBER: PAI-02-SS03
PROJECT NUMBER: 7394
DATE: 07-22-98
DRILLING COMPANY: Parratt Wolff
GEOLOGIST: S. Pelepko / S. Barton
DRILLING RIG: NA
DRILLER: NA

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"					dk. brn	litter / humus		damp				
	1					lt. brn tan	f.g. - m.g. sand		damp				
	2					tan lt. gray	f.g. sand		moist, roots				
	2.5					tan lt. gray	f.g. - m.g. sand		light brown mottling musty odor				
	3.0					tan lt. gray	f.g. - m.g. sand some c.g. clasts						
				▽ 4'									
	4.0					tan - lt. gray	as above		saturated				
	5.0					lt. brn tan	f.g. - m.g. sand		saturated brown mottling				
	6.0					lt. brn tan	as above		saturated				
				T.D. = 6'									

* 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):

Remarks: no conclusive evidence of trash encountered
boring was backfilled using soil that was originally removed
samples collected at 0-1' drilling method: hand auger

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

BORING LOG

PROJECT NAME: MCRD - Parris Island
BORING NUMBER: PAI-02-SS04
PROJECT NUMBER: 7394
DATE: 07-22-98
DRILLING COMPANY: Parratt Wolff
GEOLOGIST: S. Palapka / S. Barton
DRILLING RIG: NA
DRILLER: NA

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"					dk. brn	litter / humus		damp				
	1					H. brn tan	f.g. sand, trace silt		damp, roots				
	1.5					tan H.gray	f.g. sand		damp				
	3.0					tan H.gray	f.g. - m.g. sand		moist brown mottling				
	3.5			▽4'		red brn	m.g. - c.g. sand		moist				
	4.0					tan H.gray	f.g. - m.g. sand, trace c.g. sand		saturated				
	5.0					tan H.gray	f.g. - m.g. sand		brown mottling saturated				
	6.0					tan H.gray	as above						
	6.5					H. brn tan	f.g. - m.g. sand		brown mottling saturated				
				T.D.=6.5'									

* 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):

Remarks: no conclusive evidence of trash encountered
boring was backfilled using soil that was originally removed
samples collected at 0-1' drilling method: hand auger

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

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: NA
BORING NUMBER: PAI-02-SS05
DATE: 07-22-98
GEOLOGIST: S. Pelepka / S. Barton
DRILLER: NA

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"					dk. brn	litter / humus		damp/organic rich				
	1					lt brn tan	f.g. sand, trace silt						
	2					lt brn tan	as above						
				▽ 3'									
	3					tan lt. gray	f.g - m.g. sand		saturated				
	4					tan lt. gray	f.g. - m.g sand		slight musty odor gw infiltrating boring				
	5					lt. brn	f.g. - m.g. sand		saturated				
	6					lt. brn	as above		saturated				
				T.D.=6'									

* 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):

Remarks: no conclusive evidence of trash encountered
boring was backfilled using soil that was originally removed
samples collected at 0-1' drilling method: hand auger

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

BORING LOG

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: NA
DRILLING RIG: NA
BORING NUMBER: PAI-02-SS-06
DATE: 6/30/98
GEOLOGIST: RLM/EJH
DRILLER: NA

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**
			0-1'			Lt. br.	fine-med. gr. sd., dry						

* 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):

Remarks: Samples collected at 0-1' No hand augers were performed at this location borings Log prepared on 4/13/99 by VS

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

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7394
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: NA
BORING NUMBER: PAI-02-SS07
DATE: 07-22-98
GEOLOGIST: S. Pekpk / S. Burton
DRILLER: NA

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"					dk. brn	litter / humus		dump				
	1					lt. brn tan	f.g. - m.g. sand		roots, moist				
	2					tan lt. gray	as above		moist				
	2.5					tan lt. gray	as above		brown mottling moist				
	3.0					tan lt. gray	as above		very moist				
				▽ 4'									
	4.0					tan lt. gray	as above		saturated				
	5.0				dense				very compacted hard to auger				
	5.5				v. dense	tan lt. gray	as above		discrete volume of rust-colored staining at 5.5'				
				T.D. = 5.5									

* 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):

Remarks: no conclusive evidence of trash encountered
boring was backfilled using soil that was originally removed
samples collected at 0-1'
drilling method: hand auger

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

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BORING LOG

PROJECT NAME: MCRD - PARRIS ISLAND
BORING NUMBER: PAI-02-SS-08
PROJECT NUMBER: 7394
DATE: 6/30/98
DRILLING COMPANY: NA
GEOLOGIST: RLM/EJH
DRILLING RIG: NA
DRILLER: NA

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**
			0-1'			lt. br	fine-med. gr sd, dry						

* 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):

Remarks: Samples collected at 0-1'. No hand-augers were performed at this location.

borings Log prepared on 4/13/99 by VS

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

LOG OF BORING NO. PAI 2-1

Site 2 - Borrow Pit Landfill
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 16.5'

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
			SILTY SAND, brown									
			- with roots to 4.0'									
5			- light brown below 4.0'									
10												
15												
			- gray at 17.0'									
20			- with a few 1/2" thick clay seams, 20.0' to 21.0'									
			- sand, medium to coarse below 24.0' (25.5')									
25			CLAY, soft, gray									
			- with some plant debris (26.0')									
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 26.0'
Water First Noticed: 14.0'
Date: February 24, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 16'
Wet Rotary: 16' to 26'
Boring Sealed: Well Installed

McCLELLAND ENGINEERS

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PLATE >

LOG OF BORING NO. PAI 2-2

Site 2 - Borrow Pit Landfill
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 17.8'

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
			SILTY SAND, brown									
			- with roots to 2.0'									
			- light brown below 4.0'									
5												
10												
			- wet at 13.0'									
15												
20												
			- gray at 23.0'									
25			- with a few clay pockets below 25.0'									
30			(30.0')									
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 30.0'
Water First Noticed: --
Date: February 22, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 14'
Wet Rotary: 14' to 30'?
Boring Sealed: Well Installed

McCLELLAND ENGINEERS

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PLATE >

LOG OF BORING NO. PAI 2-3

Site 2 - Borrow Pit Landfill
Marine Corps Recruit Depot
Beaufort County, South Carolina

Location: See Plate >

Surface Elevation: 14.7'

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
			SILTY SAND, dark brown									
			- with roots									
5			- light brown below 5.0'									
10			- wet below 11.0'									
15			- gray below 14.0'									
			- with a few clay seams at 18.0'									
20												
			- with clayey sand seam at 24.0'									
25			(26.0')									
			SANDY CLAY, gray									
			(28.0')									
30												
35												
40												
45												
50												
55												

See Key for Terms and Symbols.

Completion Depth: 28.0'
Water First Noticed: --
Date: February 22, 1988
Depth to Water: --
Caved: --
Date: --

Job No.: 1387-3606
Drilled By: A. Clark
Logged By: J. Byars
Dry Auger: 0' to 12'
Wet Rotary: 12' to 28'
Boring Sealed: Well Installed

A-3

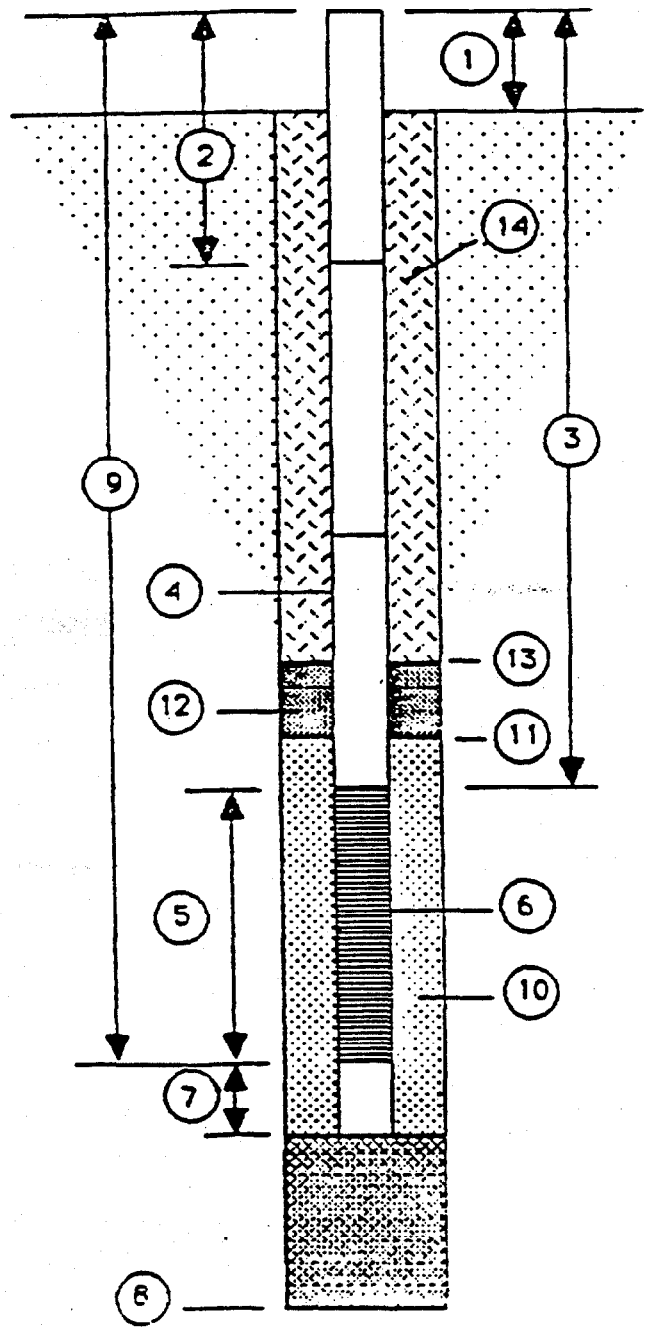
WELL INSTALLATION RECORDS

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 PA1-2-1

DATE OF INSTALLATION 2-21-88



1. Height of Casing above ground 3.5'
2. Depth to first Coupling 9.5'

   Coupling Interval Depths 10.0'

3. Total Length of Blank Pipe 9.5'
4. Type of Blank Pipe 2" SCH 40 PVC THREADED
5. Length of Screen 20.0'
6. Type of Screen 2" SCH 40 PVC THREADED 0.010"
7. Length of Sump —
8. Total Depth of Boring 26.0' Hole Diameter 6.0
9. Depth To Bottom of Screen 26.0'
10. Type of Screen Filter FRAC SAND

    Quantity Used 300 LBS Size 16/30 U/C

11. Depth To Top of Filter 4.0'
12. Type of Seal BENTONITE PELLETS

    Quantity Used 25 LBS

13. Depth To Top of Seal 2.5'
14. Type of Grout CEMENT/BENTONITE

    Grout Mixture 94/5

    Method of Placement POUR IN DRY HOLE

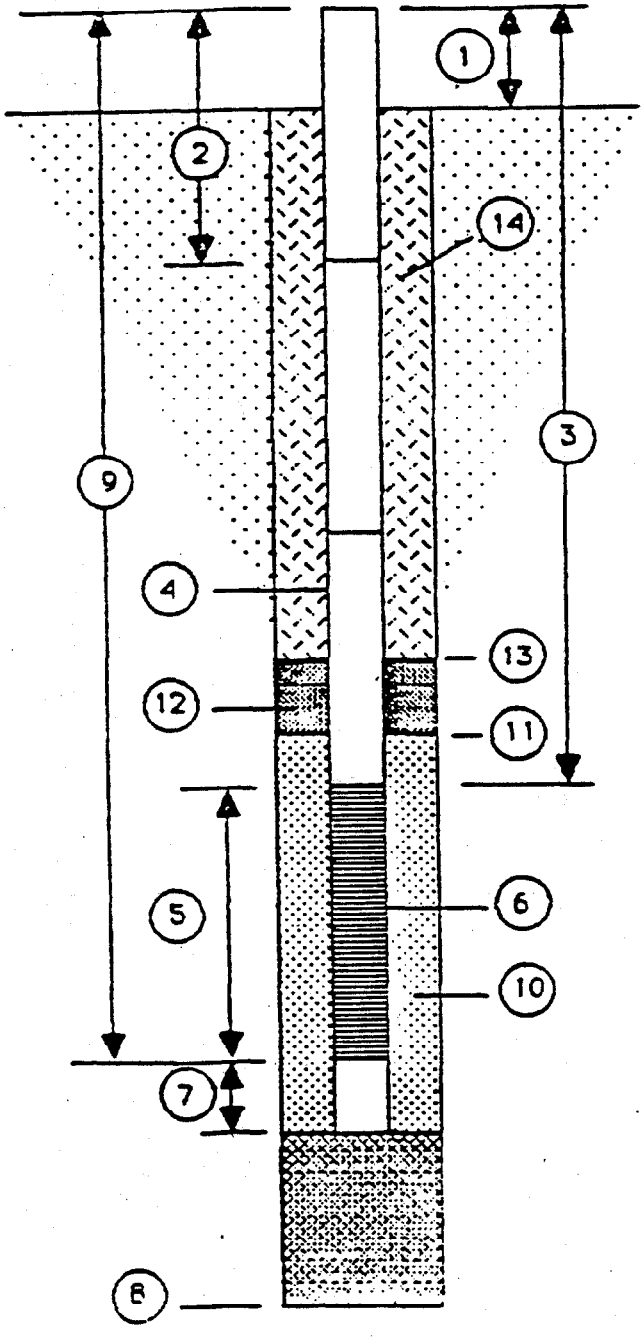
COMMENTS ON INSTALLATION

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 PA1-2-2

DATE OF INSTALLATION 2-22-88



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

   Coupling Interval Depths 8.5, 18.5, 28.5, 33.5
3. Total Length of Blank Pipe 8.5'
4. Type of Blank Pipe 2" SCH 40 THREADED PVC
5. Length of Screen 25.0'
6. Type of Screen 2" SCH 40 PVC THREADED 0.010" SL
7. Length of Sump —
8. Total Depth of Boring 30.0' Hole Diameter 6.0
9. Depth To Bottom of Screen 30.0'
10. Type of Screen Filter FRAC SAND

    Quantity Used 450 LBS Size 16/30 U/C —
11. Depth To Top of Filter 3.9'
12. Type of Seal BENTONITE PELLET

    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

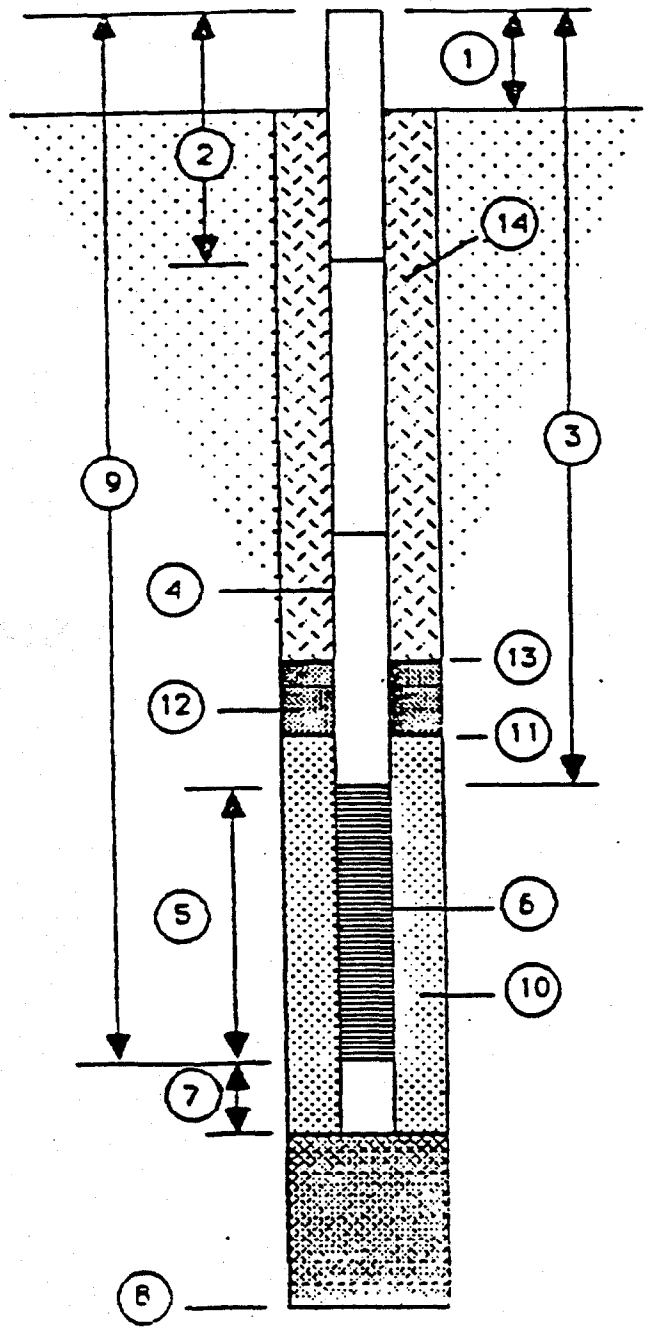
COMMENTS ON INSTALLATION.

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 PA1-2-3

DATE OF INSTALLATION 2-22-88



1. Height of Casing above ground 3.5'
2. Depth to first Coupling 9.5'

   Coupling Interval Depths 10.0'

3. Total Length of Blank Pipe 9.5'
4. Type of Blank Pipe 2" SCH 40 PVC THREADED
5. Length of Screen 20.0'
6. Type of Screen 2" SCH 40 PVC THREADED 0.0
7. Length of Sump ——
8. Total Depth of Boring 26.0' Hole Diameter 6.0
9. Depth To Bottom of Screen 26.0'
10. Type of Screen Filter FRAC SAND

    Quantity Used 450 LBS Size 16/30 U/C —
11. Depth To Top of Filter 4.1'
12. Type of Seal BENTONITE PELLET

    Quantity Used 25 LBS.
13. Depth To Top of Seal 2.8'
14. Type of Grout CEMENT / BENTONITE

    Grout Mixture 94/5

    Method of Placement POUR IN DRY HOLE

COMMENTS ON INSTALLATION.

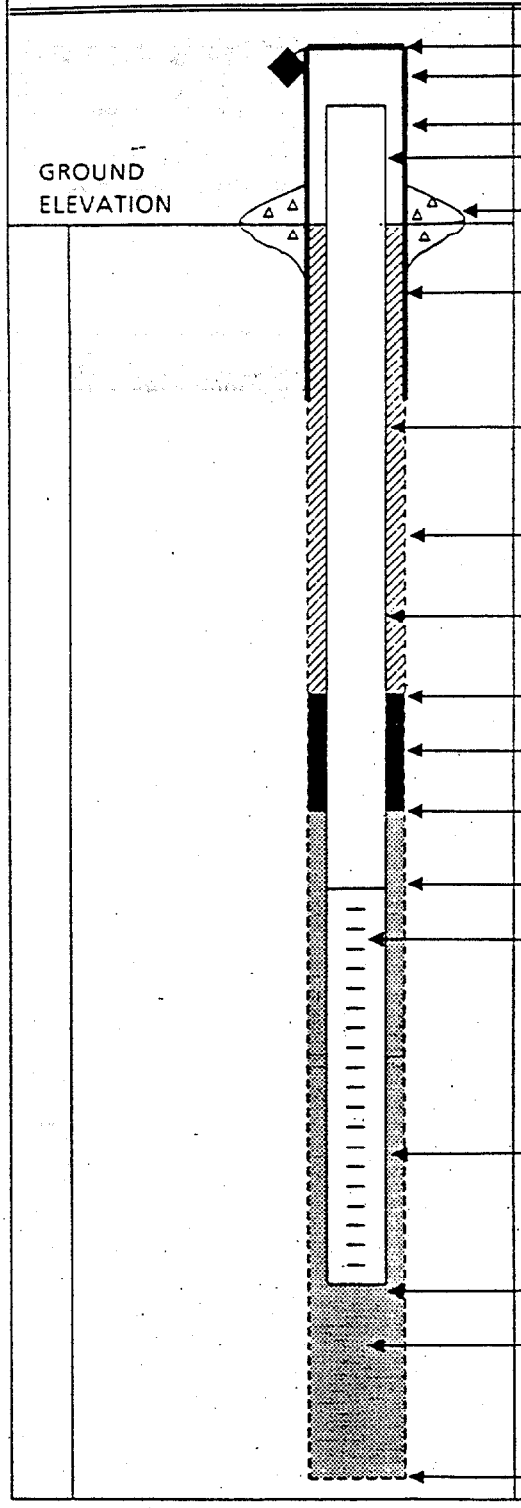
PAI-02-MW02

OVERBURDEN
MONITORING WELL SHEET

PROJECT MCRD PARRIS ISLAND
PROJECT NO. 7394
ELEVATION (GROUND) 5.0
FIELD GEOLOGIST G. GUNTER

LOCATION SWMU 02
BORING PAI-02-SB01
DATE 5/12/98

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



ELEVATION OF TOP OF SURFACE CASING: TRP+4"
ELEVATION OF TOP OF RISER PIPE: 7.63 FT

STICK - UP TOP OF SURFACE CASING: STEEL
STICK - UP RISER PIPE: SCH 40 PVC

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

TYPE OF SEAL: BENTONITE PELLETS

DEPTH TOP OF SAND PACK: 2.9 FT

ELEVATION / DEPTH TOP OF SCREEN: 3.6 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: 13.6 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: 14 FT

TYPE OF BACKFILL BELOW OBSERVATION WELL: #1 SAND
BACKFILL CONSISTS OF 6-8" OF SAND

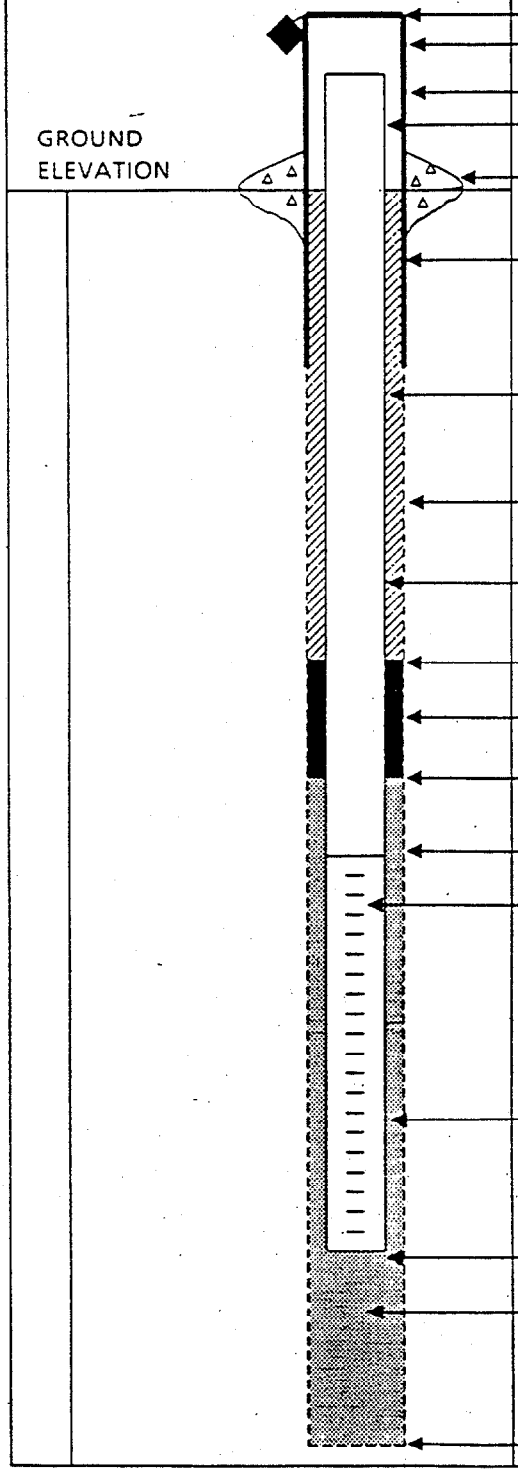
ELEVATION / DEPTH OF HOLE: 14 FT

PAI-02-MWO

OVERBURDEN
MONITORING WELL SHEET

PROJECT MCRD Parris Island LOCATION Swmu 02
PROJECT NO. 7394 BORING PAI-02-SB01
ELEVATION (GROUND) 5.0 DATE 5/12/98
FIELD GEOLOGIST G. GUNTER

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



ELEVATION OF TOP OF SURFACE CASING: TRP + 4"
ELEVATION OF TOP OF RISER PIPE: 7.98 FT

STICK - UP TOP OF SURFACE CASING: STEEL
STICK - UP RISER PIPE: SCH 40 PV

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: /24F

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 29 FT

ELEVATION / DEPTH TOP OF SCREEN: /31F

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: /36F

ELEVATION / DEPTH BOTTOM OF SAND PACK: /36F

TYPE OF BACKFILL BELOW OBSERVATION WELL:
BACKFILL CONSISTS OF 6-8" OF SAND

ELEVATION / DEPTH OF HOLE: /36F

A-4

WELL DEVELOPMENT RECORDS

MONITORING WELL DEVELOPMENT RECORD

well Screen 6-26' deep.

Well: ~~PAT-02-MW01~~ PAT-2-MW(S)
Site: SWMU 02
Date Installed: 2/21/88
Date Developed: 7/26/98
Dev. Method: Surge + Pump
Pump Type: Submersible

Depth to Bottom (ft.): 28.45 TOC
Static Water Level Before (ft.): 14.35
Static Water Level After (ft.): -
Screen Length (ft.): 20 FT
Specific Capacity: --
Casing ID (in.): 2

Responsible Personnel: GG
Drilling Co.: Parratt Wolff
Project Name: 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.
0815	–	initial	16.35	21.2	5.07	.279	>999	0.01	1.20
0843	–	15		20.8	4.98	.175	>999	0.00	1.38
well going dry regularly. Lots of Fine Sand in well. Formation Sand									
1140	–	22		22.3	5.30	.179	656	0.00	3.04
1200	Stop	24		—	—	—	—	—	—
need Bailer?									
well not going dry. well pumping formation Sand & Clogging Hose. Sand appears to be entering Screen Additional Development not likely to stabilize well pack. Will try to sample. If Turbidity persists will redevelop.									

A-22

MONITORING WELL DEVELOPMENT RECORD

NW 2(S)

(w/ possible root mass @ bottom)

Well: PAI 2-GW2
Site: Area 2- SWMU2
Date Installed: 2/22/88
Date Developed: 7/26/98
Dev. Method: Pumping
Pump Type: 1.66" OD Subm. Pump

Depth to Bottom (ft.): 28.5
Static Water Level Before (ft.): 17.30
Static Water Level After (ft.): —
Screen Length (ft.): 25
Specific Capacity: —
Casing ID (in.): 2.0" OD

Responsible Personnel: Mark Darrington (MD)
Drilling Co.: Parratt Wolfe, Inc.
Project Name: Parris Island, SC
Project Number: 7394

Recharge Rate = 1.0' rise in 33 sec.

* Obstruction @ 17.5' — obstruction believed to be a tree root fiber mass 1-2' thick.

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.) DO = mg/l / Sal. = %
0844	—	0	17.3	23.1	4.76	.306	7999	DO = 4.33 / Sal = 0.01
0851	—	5	25.3	21.2	4.58	.181	7999	DO = 2.42 / Sal = 0.00
0904	—	5-10	>26.5	20.5	4.55	.202	281	DO = 1.81 / Sal = 0.00
0911	—	10-12	>26.5	20.2	4.70	.207	231	DO = 1.71 / Sal = 0.00
0916	—	12-15	>26.5	20.1	4.90	0.214	-10	DO = 2.13 / Sal = 0.00
—	Stopped pumping for 5 min. to allow recharge, then surge, then begin pumping.							
0931	—	17-18	>26.5	20.1	4.71	.222	-10	DO = 1.41 / Sal = 0.00
—	Stopped pump for 5 min. to allow recharge, then surged, then resumed pumping.							
0943	—	20-25	>26.5	19.9	5.25	0.16	-10	DO = 2.09 / Sal. = 0.00
0945 —	Development Concluded —							

(*) Note: Gary Gunter Developed remaining 3 wells in Area 2 (2 new wells & 1 existing)

A-23

MONITORING WELL DEVELOPMENT RECORD

Well: PAI2-~~GW3~~ MW 3(5) ✓
Site: Area 2 - SW MW 2
Date Installed: 2/22/1988
Date Developed: 7/25/98
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Sub m. Pump

Depth to Bottom (ft.): 28.28
Static Water Level Before (ft.): 15.02
Static Water Level After (ft.): —
Screen Length (ft.): 20 FT
Specific Capacity: —
Casing ID (in.): 2.0" OD

Responsible Personnel: Mark Dannington (MD)
Drilling Co.: Dunaff Wolke, Inc.
Project Name: Parris Island, SC
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 ~~mS~~ mS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.) DO = mg/l / Sal. = %
1458	—	~~0~~	15.02	25.5	6.44	0.92	>999	DO = 2.53 / Sal. = 0.04
1532	—	35	~~17.05~~ ~~15.5~~	22.4	5.49	14.0	638	DO = 0.50 / Sal = 0.81
1544	—	(MD) ~~25~~ 40	19.90	21.7	5.44	14.9	57	DO = 0.78 / Sal = 0.86
1559	—	(MD) ~~50~~ 45	20.40	21.9	5.61	14.5	240	DO = 1.09 / Sal = 0.84
1618	—	50	19.75	22.2	5.39	15.8	284	DO = 0.96 / Sal = 0.93
1624	—	52	19.20	22.3	5.50	17.1	60	DO = 1.61 / Sal = 1.01
1638	—	55	19.85	21.9	5.46	15.0	38	DO = 1.27 / Sal = 0.87
1645		55	19.80	21.6	5.40	15.3	24	DO = 1.25 / Sal = 0.89
		1.0 drum						
— Development Concluded —								

A-24

MONITORING WELL DEVELOPMENT RECORD

Well: RAI-02-MW04(S)
Site: SWMU 02
Date Installed: 5/12/98
Date Developed: 7/25/98
Dev. Method: Surge & Pump
Pump Type: Submersible

Depth to Bottom (ft.): 39.2
Static Water Level Before (ft.): 7.98
Static Water Level After (ft.): –
Screen Length (ft.): 5 FT
Specific Capacity: –
Casing ID (in.): 2 in

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

Horiba U10 Serial # 50002

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.)
1424	—	—	7.98	23.8	6.61	2.10	>999	initial Sal D.O.
1414	—	14	—	22.0	6.25	2.05	>999	0.10 0.60
~~1458~~	—	~~23~~	—	~~21.2~~	~~6.1~~			0.09 0.75
1458	—	23	—	21.2	6.10	2.28	373	0.12 0.91
1526	—	55	—	21.5	6.09	2.41	<10	0.11 0.85
1534		60	—	21.3	6.09	2.44	<10	0.11 0.88
1538		65	—	21.3	6.09	2.42	<10	0.11 0.90
1539	Stop	—	—	—	—	—	—	—

4-25

MONITORING WELL DEVELOPMENT RECORD

Well: PAF-02-MW05(D)
Site: Swmu 02
Date Installed: 3/12/93
Date Developed: 7/25/93
Dev. Method: Surge & Pump
Pump Type: Submersible

Depth to Bottom (ft.): 15.03
Static Water Level Before (ft.): 6.30
Static Water Level After (ft.): –
Screen Length (ft.): 10 FT
Specific Capacity: –
Casing ID (in.): 2"

Responsible Personnel: GG
Drilling Co.: Pagratt wolfe
Project Name: Paria closed
Project Number: 7394

Horiba U-10 water checker ser.# 50000 2

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.
1543	–	INITIAL	6.30	26.2	6.66	22.6	>999	1.37	0.82
1600	–	15	–	24.0	6.39	~~38.2~~	878	2.44	1.38
1612	–	20	–	24.0	6.34	38.1	572	2.44	1.31
1619	–	26	–	24.0	6.31	39.9	<10	2.56	1.29
1627	–	36	–	24.0	6.32	40.1	<10	2.57	1.35
1630	–	55	–	24.0	6.32	40.2	<10	2.58	1.32
		Stop							

A-26

A-5

GEOTECHNICAL/ECOLOGICAL DATA

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:

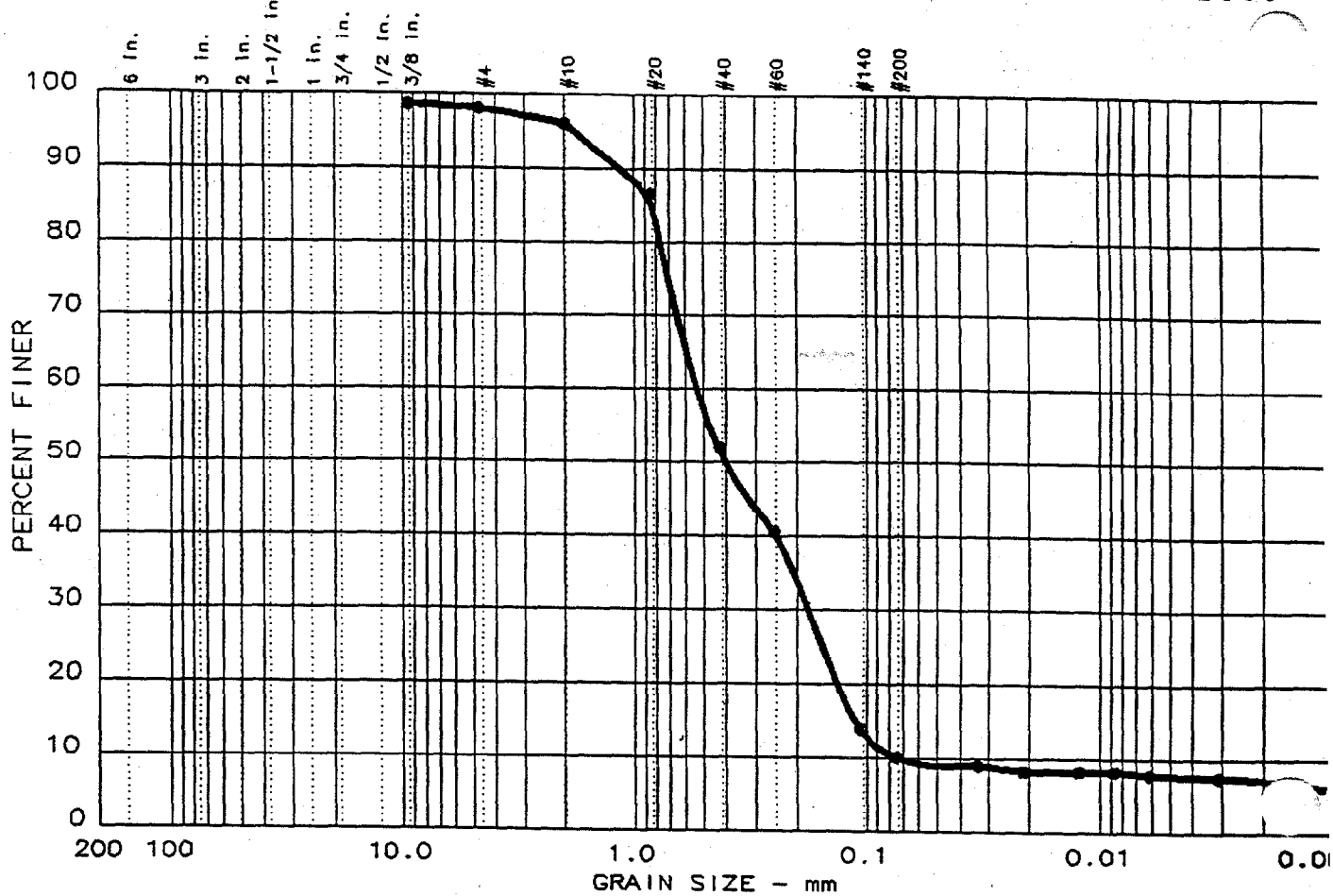
Sediment sample location PAI-15-SD-002 is referred to as PAI-15-SD-02.

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.

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	1	0.0	2.0	87.9	2.4	7.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.829	0.534	0.400	0.177	0.111	0.0736	0.80	7.3

MATERIAL DESCRIPTION	USCS	AASHTO
● Gray Brown Poorly Graded Sand with Silt	SP-SM	A-3

Project No.: 2857
Project: Parris Island
● Location: PAI 02-SB-001-30

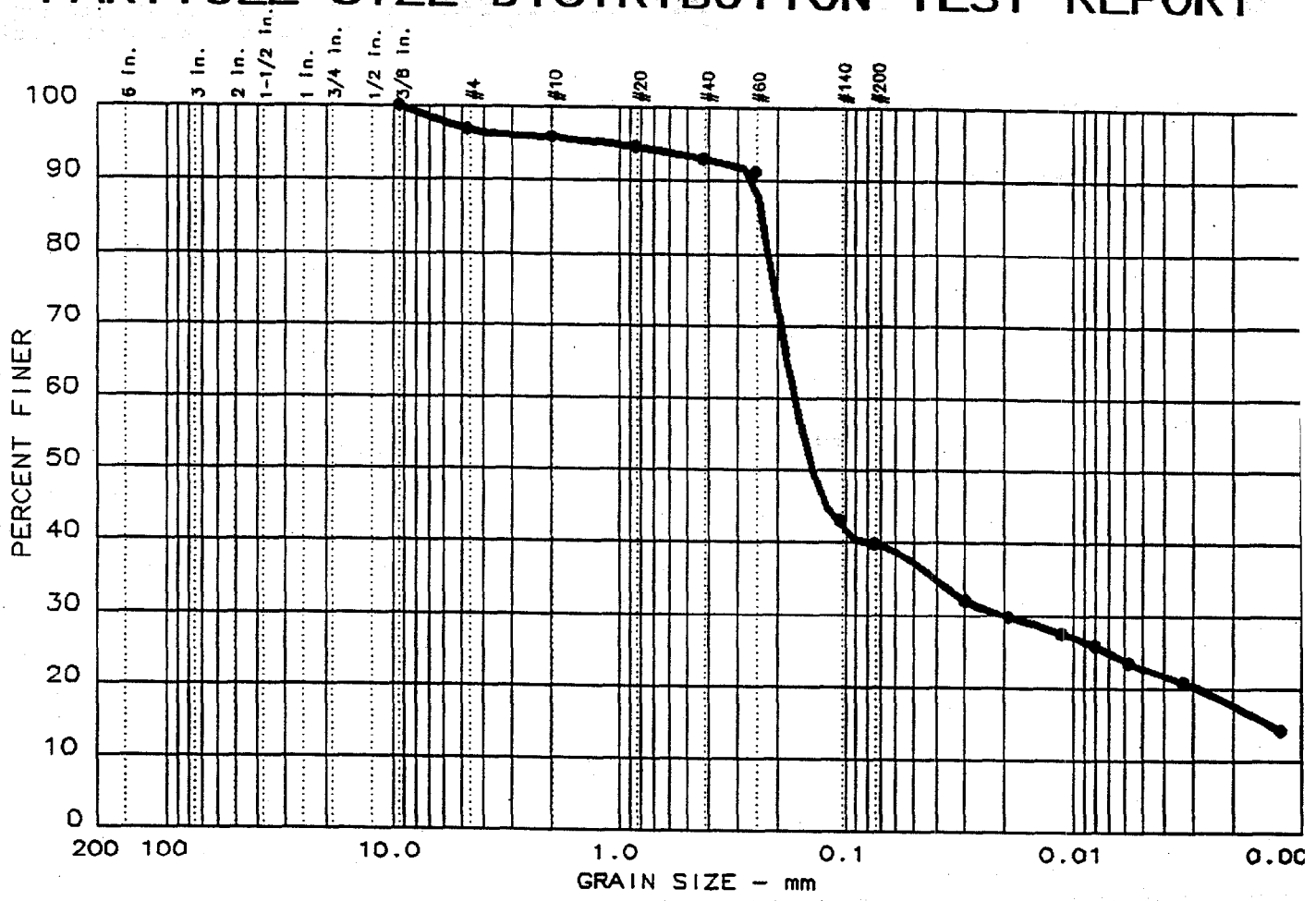
Date: 24 JULT 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	6	0.0	3.2	57.1	17.0	22.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.232	0.166	0.139	0.0199	0.0014			

MATERIAL DESCRIPTION	USCS	AASHTO
● Green Brown Silty Clayey Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI-02-SD-001-01

Date: 22 September 1998

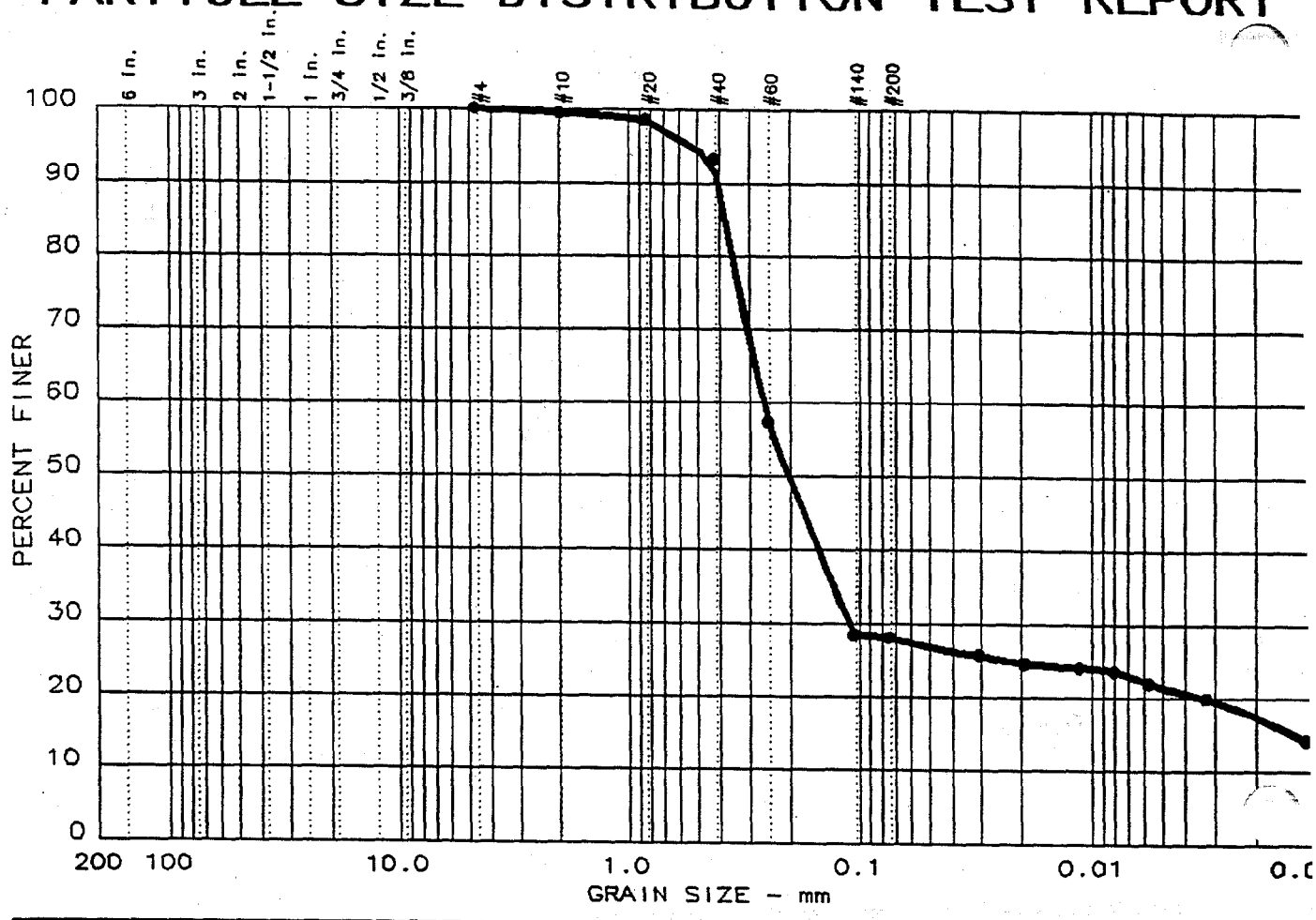
KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

A-29

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	1	0.0	0.0	71.9	6.7	21.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.377	0.262	0.201	0.110	0.0014			

MATERIAL DESCRIPTION	USCS	AASHTO
● Green Brown Clayey Sand		

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

Date: 22 September 1998

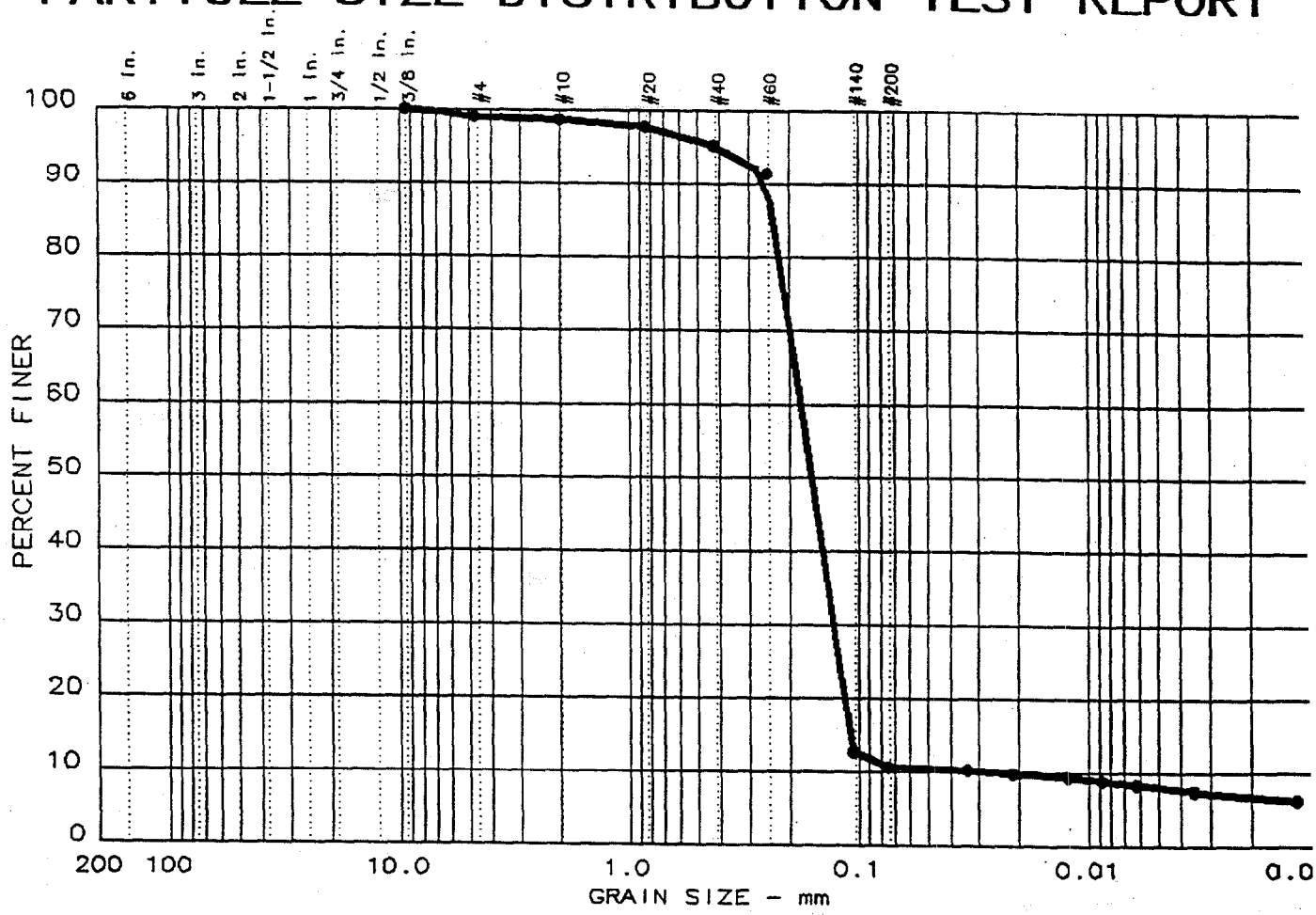
KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

A-30

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	1.1	88.2	2.7	8.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.233	0.177	0.159	0.128	0.109	0.0237	3.88	7.5

MATERIAL DESCRIPTION	USCS	AASHTO
● Green Brown Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI-02-SD-003-01

Date: 22 September 1998

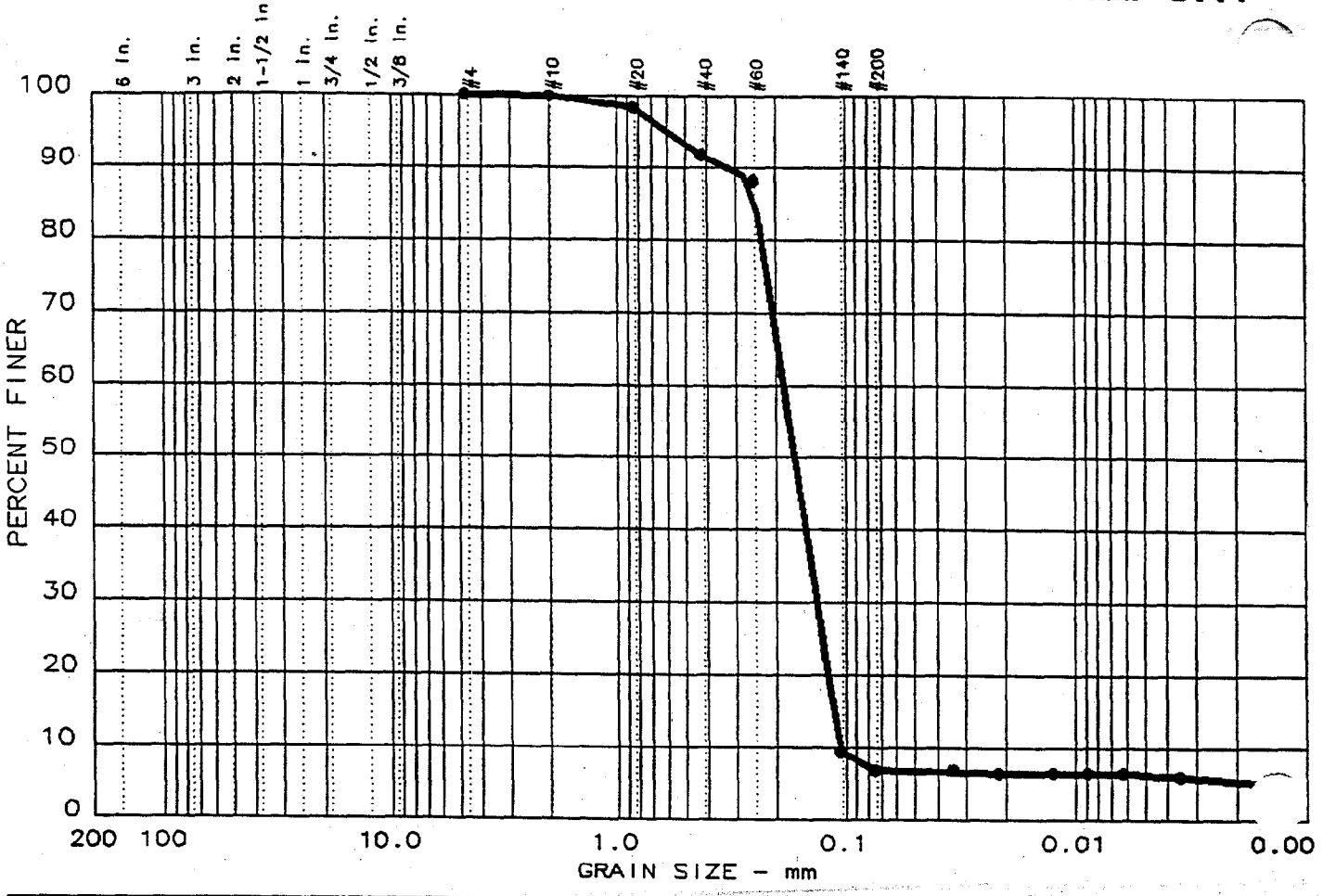
KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

A-31

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	7	0.0	0.0	93.1	0.6	6.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.242	0.184	0.165	0.132	0.112	0.107	0.90	1.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Brown Sand		

Project No.: 2857
Project: Parris Island
● Location: PAI-02-SD-004-01

Date: 22 September 1998

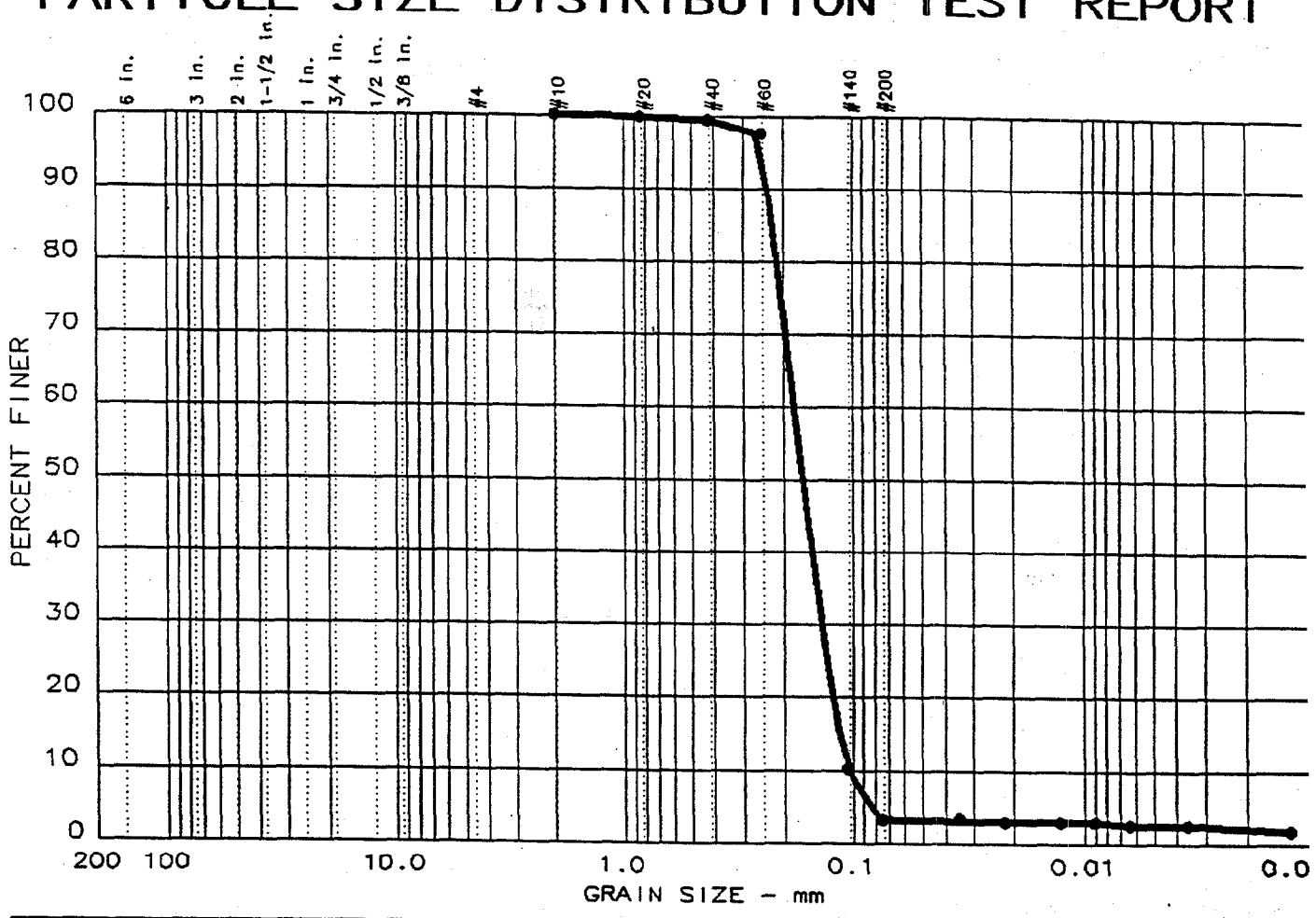
KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

A-32

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	8	0.0	0.0	96.8	0.7	2.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.222	0.179	0.164	0.136	0.114	0.104	1.00	1.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Dark Brown Poorly Graded Sand	SP	A-3

Project No.: 2857
Project: Parris Island
● Location: PAI-02-SS-007-01

Date: 22 September 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

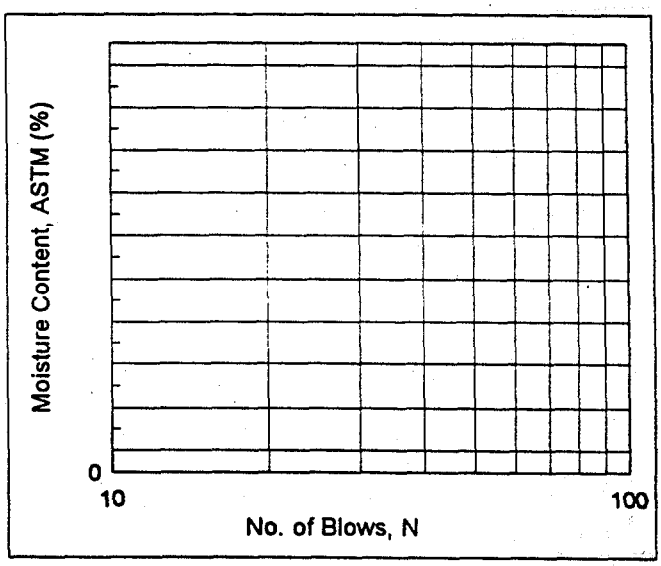
Figure No. _____

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	PARRIS ISLAND	Testing Date:	24 JULY 1998
Project No.:	2857	Tested By:	DG
Sample No.	PAI-02-SB-001-30	Tracking Code:	7815_AT
Description:			

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



Liquid Limit:
Plastic Limit:
Plasticity Index: ***N/A***

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

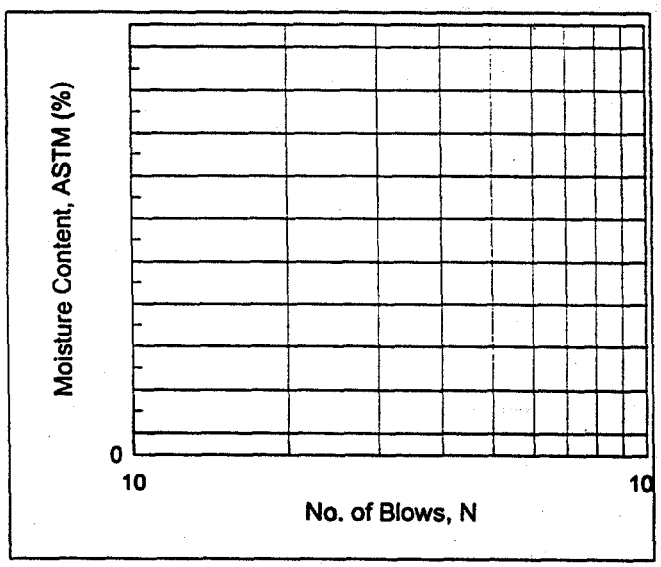
Plastic Limit Determination		
Pan No.		
Pan Weight		
Wet Soil + Pan		
Dry Soil + Pan		
Wt of Dry Soil, Ws		
Wt of Water, Ww		
Moisture Content, ASTM		
Plastic Limit	***NP***	

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	PARRIS ISLAND	Testing Date:	20 SEPTEMBER 1998
Project No.:	2857	Tested By:	DG
Sample No.	PAI-02-SS-007-01	Tracking Code:	8026_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***	

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
TESTING DATE:	30 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7818-GS2

SOLID SPECIFIC GRAVITY			
1. SAMPLE NUMBER	03-SB-002-24	03-SB-003-12	02-SB-001-30
2. FLASK NUMBER	1	2	3
3. TEMPERATURE	22.2 C	22.2 °C	22.3 °C
4. WT. FLASK & WATER	0.00 g	0.00 g	0.00 g
5. WT. WATER, FLASK & SOIL	30.78 g	24.10 g	25.18 g
6. WT OF SOIL	30.78 g	24.10 g	25.18 g
7. CALIBRATION WATER & FLASK	353.6853 g	353.2933 g	352.78 g
8. DEAIRED SAMPLE	373.15 g	368.36 g	368.67 g
9. SPECIFIC GRAVITY	2.72	2.67	2.71
10. CORRECTION FACTOR K	0.9996	0.9996	0.9995
11. Gs @ 20 °C	2.72	2.67	2.71

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
TESTING DATE:	17 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8026-GS2

SOLID SPECIFIC GRAVITY			
1. SAMPLE NUMBER	02-SS-007-01		
2. FLASK NUMBER	1		
3. TEMPERATURE	21.6 C	°C	°C
4. WT. FLASK & WATER	0.00 g	g	g
5. WT. WATER, FLASK & SOIL	33.40 g	g	g
6. WT OF SOIL	33.40 g	g	g
7. CALIBRATION WATER & FLASK	353.72 g	g	g
8. DEAIRED SAMPLE	374.72 g	g	g
9. SPECIFIC GRAVITY	2.69		
10. CORRECTION FACTOR K	0.9997		
11. Gs @ 20 °C	2.69		

PERMEABILITY
SUMMARY OF RESULTS

PROJECT:	PARRIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7819 PM
SAMPLE No.:	PAI-02-SB-001-36	EQUIPMENT No.:	1
TEST DATE:	30 JULY 1998		

TESTING PARAMETER	INITIAL	FINAL
BULK UNIT WEIGHT	119.9 pcf	122.7 pcf
DRY UNIT WEIGHT	96.1 pcf	96.8 pcf
MOISTURE CONTENT	24.7 %	26.8 %
PERMEABILITY	1.8E-05 cm/sec	

PERMEABILITY

SPECIMEN CONDITIONS

PROJECT:	PARRIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7819 PM
SAMPLE No.:	PAI-02-SB-001-36	EQUIPMENT No.:	1
TEST DATE:	30 JULY 1998		

MOISTURE CONTENT (Dry Basis)	*INITIAL*	*FINAL*
1. MOISTURE TIN NO.	001-36	001-36
2. WT MOISTURE TIN (tare weight)	0.00 g	210.09 g
3. WT WET SOIL + TARE	596.51 g	816.54 g
4. WT DRY SOIL + TARE	478.20 g	688.29 g
5. WT WATER, Ww	118.31 g	128.25 g
6. WT DRY SOIL, Ws	478.20 g	478.20 g
7. MOISTURE CONTENT, W	24.74 %	26.82 %

SOIL SPECIMEN DIMENSIONS				
TRIPLICATE	*DIAMETER*		*HEIGHT*	
ANALYSES	*INITIAL*	*FINAL*	*INITIAL*	*FINAL*
No. 1	*2.87 in.*	*2.88 in.*	*2.92 in.*	*2.88 in.*
No. 2	*2.87 in.*	*2.87 in.*	*2.92 in.*	*2.93 in.*
No. 3	*2.88 in.*	*2.86 in.*	*2.93 in.*	*2.92 in.*
Average	2.87 in.	2.87 in.	2.92 in.	2.91 in.

SPECIMEN CONDITIONS	*INITIAL*	*FINAL*
Specimen WT, Wo	*596.51 g*	*606.45 g*
Area, Ao	6.48 in^2	6.47 in^2
Volume, Vo	18.96 in^3	18.83 in^3
Bulk Unit Weight	119.9 pcf	122.7 pcf
Dry Unit Weight	96.1 pcf	96.8 pcf

PERMEABILITY

BACK-PRESSURE SATURATION

PROJECT:	PARRIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7819 PM
SAMPLE No.:	PAI-02-SB-001-36	EQUIPMENT No.:	1
TEST DATE:	30 JULY 1998		

TEST DATE	TIME (military)	TESTED BY	TEST PRESSURES (psi)						
			APPLIED		PORE		PRESSURE CHANGE		
			CELL	BACK	SAT.	TEST	CELL	PORE	B-Value
7/30/98	12 : 40	MC	7.0	5.0	*				
7/30/98	13 : 0	MC	17.0	15.0	*	*	*	*	*
7/30/98	14 : 2	MC	27.0	25.0	*	*	*	*	*
7/30/98	15 : 8	MC	37.0	35.0	*	*	*	*	*
7/30/98	15 : 41	MC	47.0	45.0	45.4	*	*	*	*
7/30/98	16 : 17	MC	57.0	55.0	*	55.0	10.0	9.6	0.96
7/30/98	16 : 19	MC	47.0	45.0	*	*	*	*	*

* Saturation check - no data available.

PERMEABILITY

SPECIMEN CONSOLIDATION

PROJECT:	PARRIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7819 PM
SAMPLE No.:	PAI-02-SB-001-36	EQUIPMENT No.:	1
TEST DATE:	30 JULY 1998		

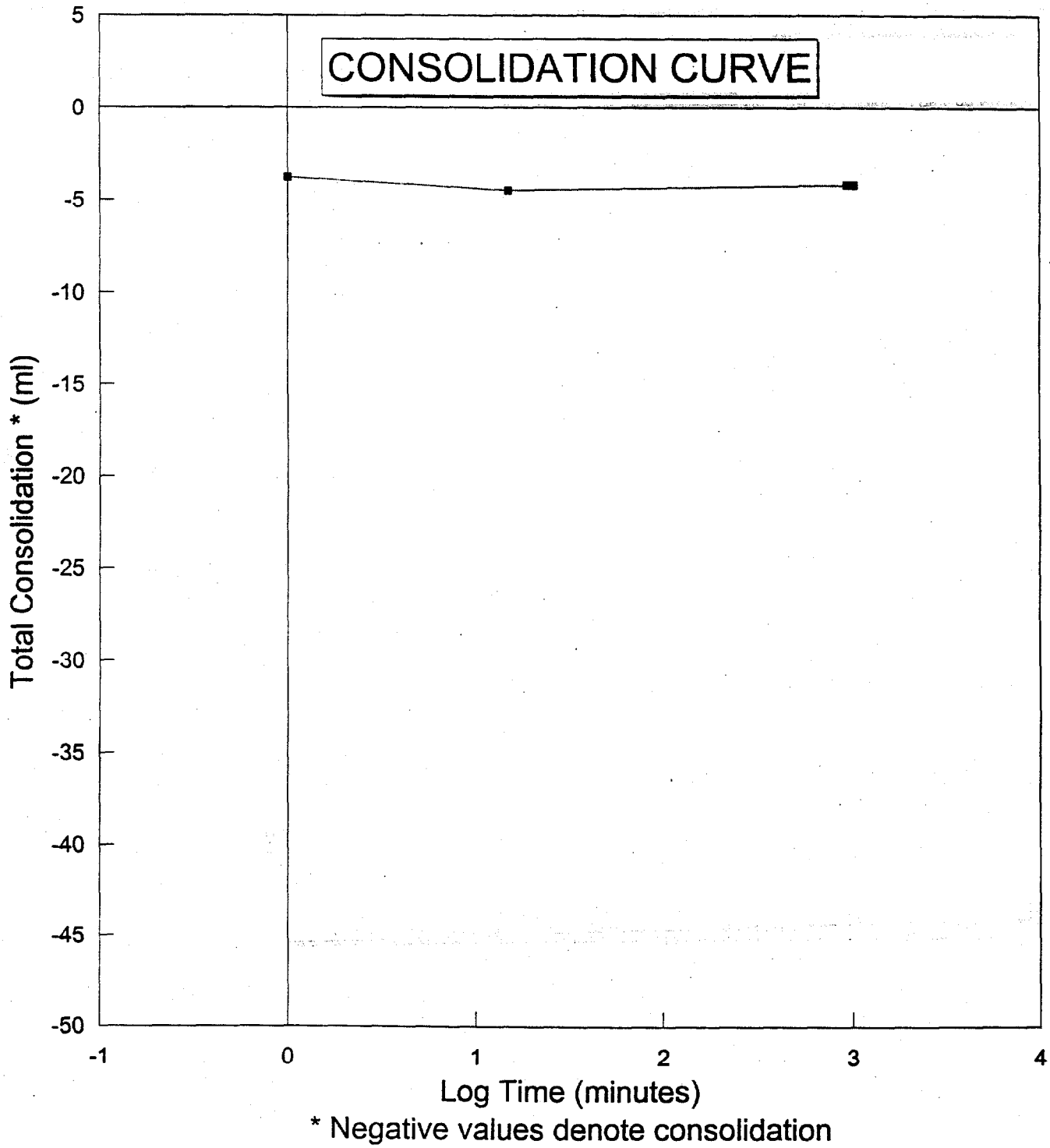
CELL PRESSURE: 45 psi BACK PRESSURE: 35 psi EFFECTIVE STRESS: 10 psi

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)
7 / 30 / 98	MC	16 : 20				0.0	24.0	24.0	0.0	0.0
7 / 30 / 98	MC	16 : 21	1	1	-0.00	3.4	22.2	22.0	3.4	3.8
7 / 30 / 98	MC	16 : 35	14	15	1.18	4.3	21.9	21.6	4.3	4.5
7 / 31 / 98	MC	7 : 51	916	931	2.97	9.0	22.0	21.8	9.0	4.2
7 / 31 / 98	MC	9 : 13	82	1013	3.01	9.1	22.0	21.8	9.1	4.2

PERMEABILITY

CONSOLIDATION CURVE

PROJECT:	PARRIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7819_PM
SAMPLE No.:	PAI-02-SB-001-36	EQUIPMENT No.:	1
TEST DATE:	30 JULY 1998		



* Negative values denote consolidation

PERMEABILITY

TEST DATA

PROJECT:	PARRIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7819 PM
SAMPLE No.:	PAI-02-SB-001-36	EQUIPMENT No.:	1
TEST DATE:	30 JULY 1998		

DATE	TESTED BY	TIME (military)	ELAPSED TIME (minutes)	HYDRAULIC HEAD (cm)		GAUGE PRESSURE (psi)		
				INFLUENT	EFFLUENT	CELL	INFLUENT	EFFLUENT
7 /31 /98	MC	9 : 36		0.0	24.0	55.0	45.0	45.0
7 /31 /98	MC	9 : 45	9	1.3	22.7	55.0	45.0	45.0
7 /31 /98	MC	9 : 50	5	2.0	22.0	55.0	45.0	45.0
7 /31 /98	MC	9 : 56	6	2.6	21.4	55.0	45.0	45.0
7 /31 /98	MC	10 : 3	7	3.3	20.7	55.0	45.0	45.0
7 /31 /98	MC	10 : 11	8	4.1	19.9	55.0	45.0	45.0

PERMEABILITY

TEST DATA (continued)

PROJECT:	PARRIS ISLAND	TESTED BY:	MC
PROJECT No.:	2857	TRACKING CODE:	7819 PM
SAMPLE No.:	PAI-02-SB-001-36	EQUIPMENT No.:	1
TEST DATE:	30 JULY 1998		

ELAPSED TIME (minutes)	HYDRAULIC HEAD DIFFERENCE (cm)		EFFLUENT - INFLUENT RATIO	HYDRAULIC GRADIENT (cm/cm)	HYDRAULIC CONDUCTIVITY (cm/sec)
	INFLUENT	EFFLUENT			
RESET				3.232	
9	1.3	1.3	1.00	2.882	1.88E-05
5	0.7	0.7	1.00	2.694	2.00E-05
6	0.6	0.6	1.00	2.532	1.53E-05
7	0.7	0.7	1.00	2.343	1.64E-05
8	0.8	0.8	1.00	2.128	1.78E-05

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 02-SB-001-30
TESTING DATE:	23 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7815_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	337.36 g	342.62 g	338.45 g
4. WT OF WET SOIL, W	316.32 g	321.58 g	317.41 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	3.00 in	3.00 in	3.00 in
7. VOLUME OF SPECIMEN	9.42 in^3	9.42 in^3	9.42 in^3
8. BULK UNIT WEIGHT	127.9 pcf	130.0 pcf	128.3 pcf
9. BULK SPECIFIC GRAVITY	2.0	2.1	2.1

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-02-SD-001-01
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8023 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	342.12 g	341.54 g	344.01 g
4. WT OF WET SOIL, W	321.07 g	320.49 g	322.96 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	97.3 pcf	97.2 pcf	97.9 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-02-SD-002-01
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8025_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	353.70 g	352.08 g	350.19 g
4. WT OF WET SOIL, W	332.66 g	331.04 g	329.15 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	100.8 pcf	100.4 pcf	99.8 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-02-SD-003-01
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8019_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	393.63 g	394.66 g	393.15 g
4. WT OF WET SOIL, W	372.58 g	373.61 g	372.10 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	112.9 pcf	113.3 pcf	112.8 pcf
9. BULK SPECIFIC GRAVITY	1.8	1.8	1.8

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-02-SD-004-01
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8024_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	414.26 g	411.94 g	412.89 g
4. WT OF WET SOIL, W	393.24 g	390.92 g	391.87 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	119.2 pcf	118.5 pcf	118.8 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-02-SS-007-01
TESTING DATE:	16 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8026_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.06 g	21.06 g	21.06 g
3. WT OF MOLD + SOIL	397.53 g	399.73 g	400.44 g
4. WT OF WET SOIL, W	376.47 g	378.67 g	379.38 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	114.1 pcf	114.8 pcf	115.0 pcf
9. BULK SPECIFIC GRAVITY	1.8	1.8	1.8

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-02-SB-001-30
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	8087_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	206.44	g
3. WT WET SOIL + TARE	359.50	g
4. WT DRY SOIL + TARE	330.47	g
5. WT WATER, Ww	29.03	g
6. WT DRY SOIL, Ws	124.03	g
7. ASTM MOISTURE CONTENT, W	23.41	%
8. EPA MOISTURE CONTENT, W	18.97	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	PARRIS ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-02-SS-007-01
TESTING DATE:	22 SEPTEMBER 1998
TESTED BY:	DG
TRACKING CODE:	8026_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	196.23	g
3. WT WET SOIL + TARE	318.94	g
4. WT DRY SOIL + TARE	308.83	g
5. WT WATER, Ww	10.11	g
6. WT DRY SOIL, Ws	112.60	g
7. ASTM MOISTURE CONTENT, W	8.98	%
8. EPA MOISTURE CONTENT, W	8.24	%

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-02-SB-01-01
Sample Location: PAI-02-SB-01
Sampled By: SP, SB, @
C.O.C. No.: 002291

[ ] 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: 7/22/98 Time: 1547 Method: Grab Monitor Reading (ppm): NA	0-1	BLK	F. SAND, moist

COMPOSITE SAMPLE DATA:

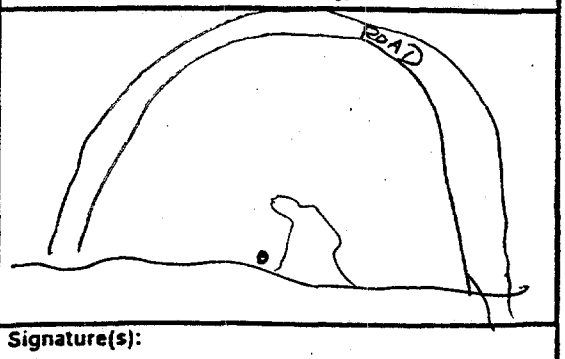
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 Encore Samplers	✓	
TCL SVOC	1-16oz	✓	
TAL METALS			
CYANIDE			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

A-53

SOIL & SEDIMENT SAMPLE LOG SHEET

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

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

Sample ID No.: ~~PAI-02-SB00~~ PAI-02-SB01
Sample Location: ~~PAI-02-SB01~~
Sampled By: GG
C.O.C. No.: ~~07954~~ 2249
DJO 8/2/00

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 7/11/99 Time: 11:15 Method: Spot Spoon Monitor Reading (ppm): 0	30-32	Grn	F/Co Sand w/Tr. Clay (Wet)

COMPOSITE SAMPLE DATA:

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

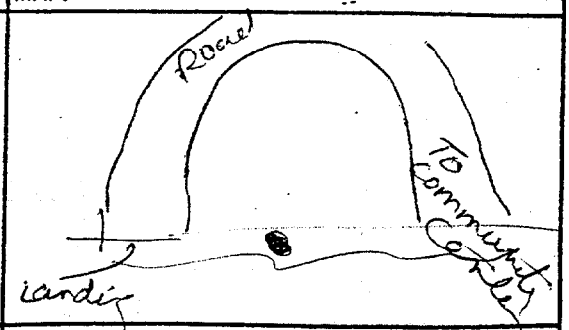
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~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	Shelby, Bags	✓	

OBSERVATIONS / NOTES:

Shelby Tube sample
ID. PAI-02-SB-01-36
(36-38FT)
no soil Classification performed

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

A-7

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.: PAI-02-SW-01-00 ~~PAI-02-SW-001-00~~
Sample Location: PAI-02-SW01
Sampled By: Skip Barton / Seth Palepka
C.O.C. No.: 2068 / ~~2069~~
DJO 8/2/00

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

SAMPLING DATA:

Date: 7/23/98 - 7/24/98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1045	Visual	Standard	µS/cm	Degrees C	NTU	mg/l	%	NA
Depth: ~~NA~~ surface	brwn	7.43	46.3	30.1	119	7.52	3.02	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

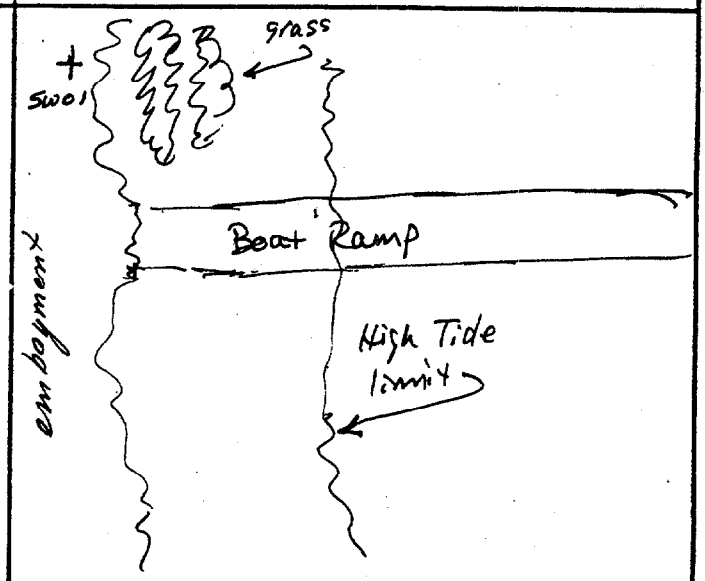
Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
Hex Chromium		1000 plastic	1
TOC	H_2SO_4	1000 plastic	1
pH		1000 plastic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

OBSERVATIONS / NOTES:

*Total Metals & Dissolved Metals collected on 7/24/98 @ 1153

* ~~Cyanide~~ (SB) collected on 7/23/98 @ 1210 Hex Chrom.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton Seth Palepka

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-02-SW-02 ~~PAI-02-SW-002-00~~
Sample Location: PAI-02-SW02
Sampled By: Skip Barton / Seth Pelepko
C.O.C. No.: 2268 / ~~2267~~
DP 8/2/00

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

SAMPLING DATA:

Date: 7/23-24/98	Color Visual	pH Standard	S.C. µS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Time: 1110								
Depth: surface								
Method: Grab	brown	7.40	46.2	30.4	13	7.38	3.02	

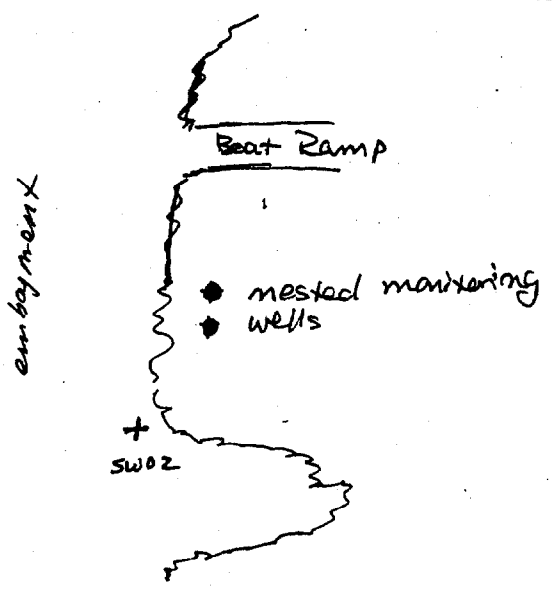
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
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:

* Hex. Cr collected on 7/23/98 @ 1204
* Total, Diss. Metals & Cyanide collected on 7/24/98 @ 1147

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton, Seth Pelepko

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-02-SW-03-00 ~~PAI-02-SW-003-00~~
Sample Location: PAI-02-SW03
Sampled By: Skip Barton Seth Palepka
C.O.C. No.: 2269

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

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

SAMPLING DATA:

Date: 7/24/98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1116	Visual	Standard	µS/cm	Degrees C	NTU	mg/l	%	NA
Depth: surface	brown tinge	7.35	46.6	29.3	12	8.14	3.05	
Method: Grab								

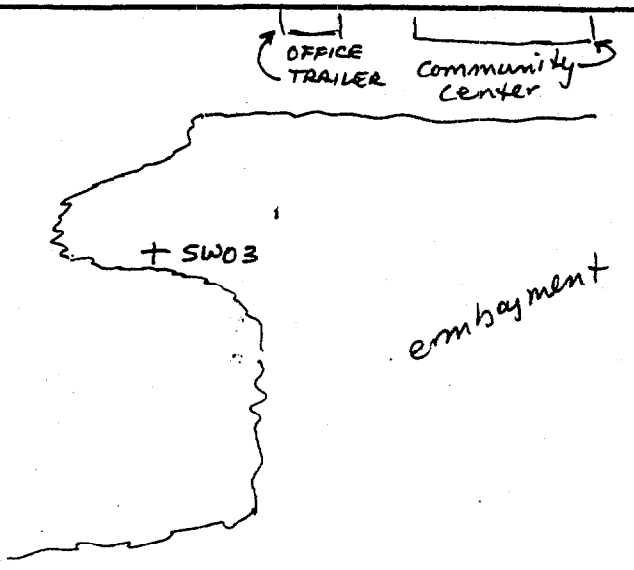
SAMPLE COLLECTION INFORMATION:

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:

Hex. Cr sample collected @ 1203

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton Seth Palepka

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-02-SW-04-00 ~~PAI-02-SW-004-00~~
Sample Location: ~~PAI-02-SW04~~
Sampled By: ~~Shyl Barton~~ Seth Palepka
C.O.C. No.: ~~7/23-24/98~~ 02268

DJO 8/2/00

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

SAMPLING DATA:

Date: 7/23-24/98 Time: 1130	Color Visual	pH Standard	S.C. µS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: surface Method: Grab	brown tinge	7.28	46.8	31.2	115	7.47	3.05	

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:

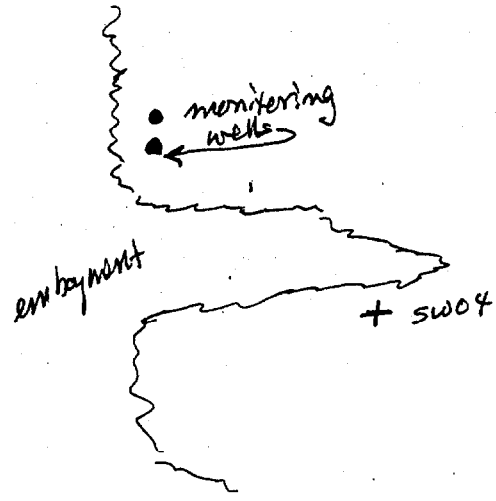
Hex. Cr sample collected on 7/23/98 @ 1207

~~Total, Dis~~ Total Metals, Dissolved Metals, & Cyanide samples collected on 7/24/98 @ 1138

Secchi Disk Reading: 2.0'

SP 08-12-98

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shyl Barton Seth Palepka

A-8

SEDIMENT SAMPLE LOG SHEETS

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-02-SD-01-01 ~~PAI-02-SD-001-01~~
Sample Location: PAI-02-SD01
Sampled By: SB SP
C.O.C. No.: 022168/2279

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 7/23/98 Time: 1449 Method: Grab Monitor Reading (ppm):	0 - 0.5'	dk gray	0-3" silty sediment atop coarse sand/shell base

COMPOSITE SAMPLE DATA:

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

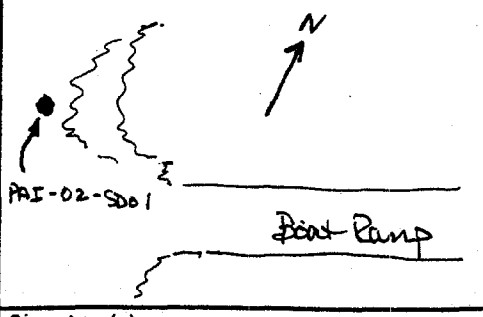
SAMPLE COLLECTION INFORMATION:

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		
* GRAIN SIZE, BULK DENSITY	(1) 1-QUART BAGGIE	✓	

OBSERVATIONS / NOTES:

* collected by SP on 090998 at 1600.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Steve Barton Seth Polaydon

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-02-SD-02-01 ~~PAI-02-SD-002-01~~
Sample Location: PAI-02-SD02
Sampled By: SB SP
C.O.C. No.: 02268/2279

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 7/23/98 Time: 1527 Method: Grab Monitor Reading (ppm): NA	0-0.5	black	0-4" silty sediment w/ clay atop a coarse sand/oyster shell base

COMPOSITE SAMPLE DATA:

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

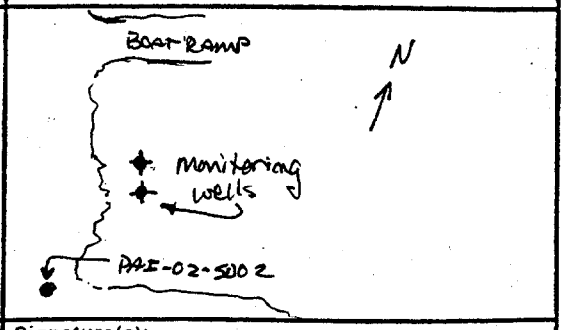
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1 6oz	✓	
TAL METALS (TOTAL)	1 6oz	✓	
CYANIDE	1 6oz	✓	
TCL PESTICIDES / PCBs	1 6oz	✓	
TOC	1 6oz	✓	
pH	1 6oz	✓	
HEXAVALENT CHROMIUM	1 6oz	✓	
* GRAIN SIZE, BULK DENSITY	(1) 1-quart baggie	✓	

OBSERVATIONS / NOTES:

* collected by SP on 090998 at 1544

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Parton Seth Polaski

A-60

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-02-SD-02-02 ~~PAI-02-SD-002-02~~
Sample Location: PAI-02-SD02
Sampled By: SB SP
C.O.C. No.: 02268

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 7/23/98 Time: 1527 Method: Grab Monitor Reading (ppm): NA	0.5'-1.0'	brown/white	coarse sand / oyster shell frags.

COMPOSITE SAMPLE DATA:

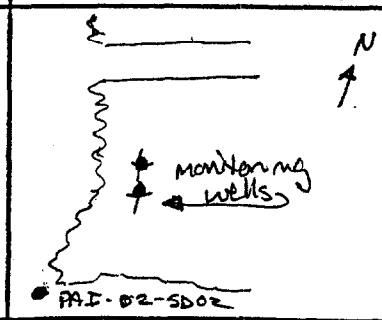
	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	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.:

Signature(s): Skip Bartert Seth Palepu

A-61

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-02-SD-03-01 ~~PAI-02-SD-003-01~~
Sample Location: SWMU 2
Sampled By: SB SP
C.O.C. No.: 02291/2279

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 7/22/98 Time: 1645 Method: Grab Monitor Reading (ppm):	0-0.5'	black	thin layer of silty sand over coarse sand / oyster shell frag base, v. moist

COMPOSITE SAMPLE DATA:

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

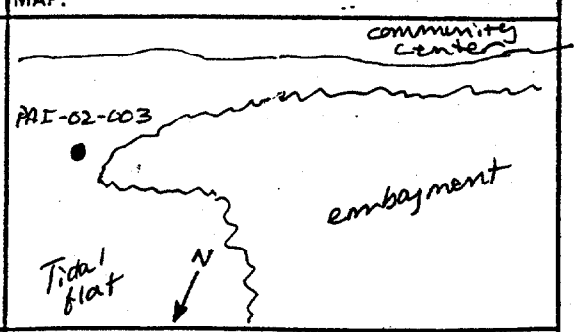
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1602	✓	
TAL METALS (TOTAL)	1602	✓	
CYANIDE	1602	✓	
TCL PESTICIDES / PCBs	1602	✓	
TOC	1602	✓	
pH	1602	✓	
HEXAVALENT CHROMIUM	1602	✓	
*GRAIN SIZE, BULK DENSITY	(1) 1-quart baggie	✓	

OBSERVATIONS / NOTES:

*collected by SP on 090998 at 1525.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Baxter, Seth Palopoli

A-62

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-02-SD-004-01 ~~PAI-02-SD-004-01~~
Sample Location: SWMU 2
Sampled By: SB SP
C.O.C. No.: 02291/2279

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

GRAB SAMPLE DATA:

Date: 7/22/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1612	0 - 0.5'	black	silty SAND, ~~some~~ trace clay; v. moist
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

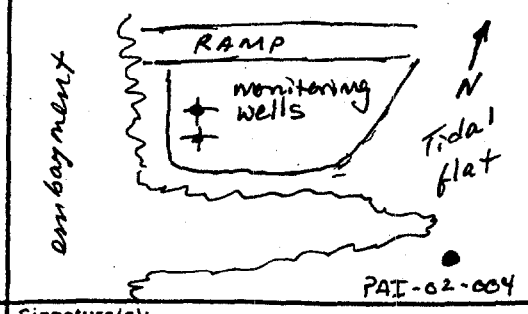
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1602	✓	
TAL METALS (TOTAL)	1602	✓	
CYANIDE	1602	✓	
TCL PESTICIDES / PCBs	1602	✓	
TOC	1602	✓	
pH	1602	✓	
HEXAVALENT CHROMIUM	1602	✓	
*GRAIN SIZE, BULK DENSITY	(1) 1-quart baggie	✓	

OBSERVATIONS / NOTES:

* collected by SP on 090998 @ 1550

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton, Seth Polegan

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI-15-SD-01-0 ~~PAI-15-SD-001-0~~
Sample Location: PAI-15-SD-01
Sampled By: GG, JL
C.O.C. No.: 00273

- [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:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/15	10:12	0-0.5'	Tan & Blk	F Sandy Silt
Method: SS SS Trowel	10:13	0-0.5'	Tan & Blk	F Sand
	10:14	0-0.5'	Blk	F Sand
Monitor Readings	10:15	0-0.5'	Tan & Blk	F Sand
(Range in ppm):	10:16	0-0.5'	Blk	F Sandy Silt
NA				

SAMPLE COLLECTION INFORMATION:

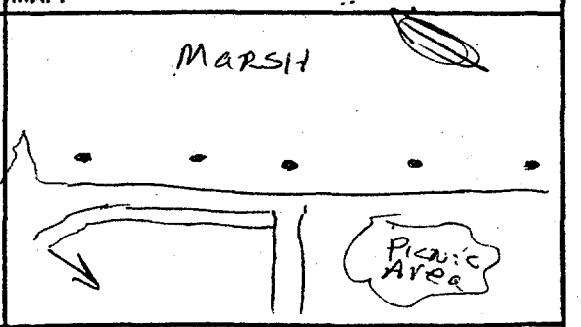
Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]		
TCL SVOCs	[redacted]	✓	
TAL METALS (TOTAL)	[redacted]	✓	
[redacted]	[redacted] 1-16oz	✓	
TCL PESTICIDES / PCBs	[redacted]	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		

OBSERVATIONS / NOTES:

Elliot's Beach

10:16 Sample Time used for analysis.

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-15-SD-02-0 ~~PAI-15-SD-002-0~~
Sample Location: PAI-15-SD-02
Sampled By: GG, JL
C.O.C. No.: 00273

[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:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date: 6/15	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	1054	0-0.5'	Brn	F Sand
Method: SS Bowl	1056	0-0.5'	Blk & Brn	F Sand
SS Trowel	1059	0-0.5'	Tan	Silty F. Sand
Monitor Readings	1100	0-0.5'	Black	F SAND
(Range in ppm):	11:01	0-0.5'	Blk & Tan	Clay F Sand

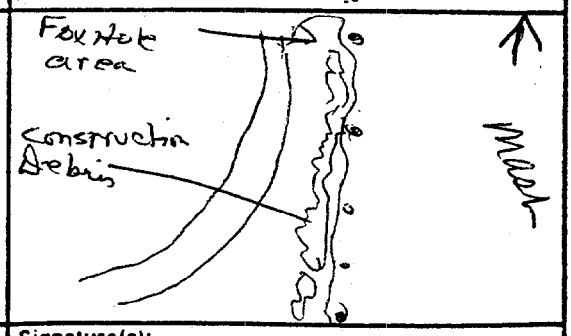
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]		
TCL SVOCs	~~[illegible]~~	✓	
TAL METALS (TOTAL)	~~[illegible]~~	✓	
[redacted]	~~[illegible]~~ 1-16oz		
TCL PESTICIDES / PCBs	~~[illegible]~~	✓	
[redacted]	~~[illegible]~~		
[redacted]	~~[illegible]~~		
[redacted]	~~[illegible]~~		

OBSERVATIONS / NOTES:

Elliot's Beach, Past wide cleared area near Fox Holes and construction debris.
11:01 sample time used for composite

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-15-SD-03-01 ~~PAI-15-SD-03~~
Sample Location: PAI-15-SD03
Sampled By: GOTL
C.O.C. No.: 2254 DO 8/2/00

[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:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

Date 6/15/98	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	1915	0-0.5'	Blk	Clayey F Sand moist
Method: SS Trowel	1920	0-0.5'	Br-Grey	Clayey F Sand "
	1924	0-0.5'	Blk	Clayey F Sand "
Monitor Readings	1926	0-0.5'	Blk	F S. Silt "
(Range in ppm):	1920	0-0.5'	Blk	F Sandy Clay "
NA				

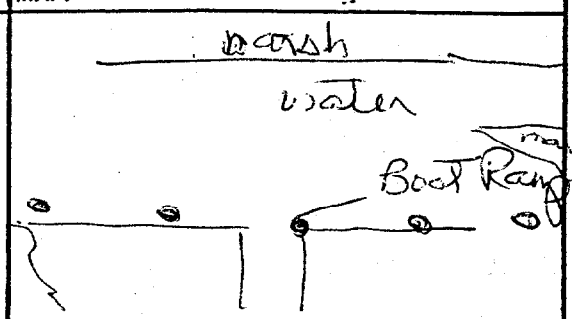
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]	[redacted]	[redacted]
TCL SVOCs	[redacted]	✓	
TAL METALS (TOTAL)	[redacted]	✓	
[redacted]	[redacted]		
TCL PESTICIDES / PCBs	[redacted]	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		

OBSERVATIONS / NOTES:

Elliot Beach Boat Ramp

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-66

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI-15-SD-03-01
Sample Location: PAI-15-SD03
Sampled By: GGTL
C.O.C. No.:

[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:			
Time:			
Method:			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date 6/15/98	1915	0-0.5'	Blk	Clayey F Sand moist
Method: SS Trowel	1920	0-0.5'	Br-Grey	Clayey F Sand "
	1924	0-0.5'	Blk	Clayey F Sand "
Monitor Readings	1926	0-0.5'	Blk	F Sand Silt "
(Range in ppm):	1920	0-0.5'	Blk	F Sandy Clay "
NA				

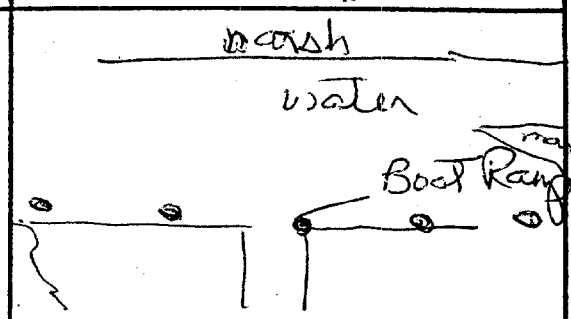
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]	[redacted]	[redacted]
TCL SVOCs	[redacted]	✓	
TAL METALS (TOTAL)	[redacted]	✓	
[redacted]	[redacted]		
TCL PESTICIDES / PCBs	[redacted]	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		

OBSERVATIONS / NOTES:

Elliot Beach Boat Ramp

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

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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-02-SS-01-01
Sample Location: PAI-02-SS-01
Sampled By: RLM/EJH
C.O.C. No.: 1309 DJO 8/2/00

[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: 063098	0-1'	lt. br.	fn.-med. gr. sd., dry
Time: 1310			
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	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
HEXAVALENT CHROMIUM	16 oz	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Eric J. Hanson

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SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI-02-SS-02-01 ~~PAI-02-SS-002-01~~
Sample Location: SWMU2
Sampled By: SB SP
C.O.C. No.: 02291

[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: 072298 Time: 1000 Method: Grab Monitor Reading (ppm): NA	0-1'	lt brown	fine-med. grnd. sand, 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	NA	
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP: See Figure 7-7

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [illegible] Seth Polopka

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI-02-SS-03-01 ~~PAI-02-SS-003-01~~
Sample Location: SWMU 2
Sampled By: SB SP
C.O.C. No.: 02291

[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: 072298 Time: 1135 Method: Grab Monitor Reading (ppm): NA	0-1'	brown & lt gray	fine to med. grnd. sand, 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~~	NA	
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		

OBSERVATIONS / NOTES:

MAP: See Figure 7-7

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Steve Barton, Seth Pelopson

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-02-SS-004-01~~ PAI-02-SS-004-01
Sample Location: PAI-02-SS04
Sampled By: SB SD
C.O.C. No.: 02291

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

GRAB SAMPLE DATA:

Date: 072298	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1455	0-1'	lt. brown	fine-med. grnd sand, moist
Method: Grab			
Monitor Reading (ppm): NA			

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	NA	
~~pH~~	16 oz	NA	
~~HEXAVALENT CHROMIUM~~	16 oz	NA	

OBSERVATIONS / NOTES:

MAP: See Figure 7-7

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Steve Barton, Seth Pelegrino

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI-02-SS-05-01 ~~PAI-02-SS-005-01~~
Sample Location: ~~SA~~ SWMU 2
Sampled By: ~~SB~~ SP
C.O.C. No.: 02291

- [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: 072298 Time: 0905 Method: Grab Monitor Reading (ppm): NA	0-1'	lt. gray & tan	fine-med. sand, 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~~	N	
~~pH~~	~~16 oz~~	N	
~~HEXAVALENT CHROMIUM~~	~~16 oz~~	N	

OBSERVATIONS / NOTES:

MAP: see Figure 7-7

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Barton Seth Pelopsa

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI-02-SS-06-01 ~~PAI-02-SS-06-01~~
Sample Location: PARRIS ISLAND
Sampled By: RLM/EJH
C.O.C. No.: 02254

[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: 06 30 98 Time: ~1250 Method: GRAB Monitor Reading (ppm):	0-1'	Hi. br.	fn.-med. gr. 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	✓	
~~[illegible]~~	~~[illegible]~~		
~~[illegible]~~	~~[illegible]~~		
HEXAVALENT CHROMIUM	16 oz	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Eric J. Hanson RLM

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SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI-02-SS-07-01 ~~PAI-02-SS-007-01~~
Sample Location: SWMU 2
Sampled By: SB SP
C.O.C. No.: 02291

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

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

GRAB SAMPLE DATA:

Date: 072298	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1046	0-1'	lt brown to buff	fine to med. grnd. sand, moist
Method: Grab			
Monitor Reading (ppm): NA			

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~~		
* Geotech: GRAIN SIZE, BULK DENSITY, ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, POROSITY	(1) 1-quart baggie	✓	

OBSERVATIONS / NOTES:

* Collected by SP on 090998 at 1455.

MAP:

See Figure 7-7

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Jeff Barton Seth Palpa

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI-0255-08-01 PAI0255008C1
Sample Location: PARRIS ISLAND
Sampled By: RLMIEJM
C.O.C. No.: 2254

[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: 063098 Time: 1305 Method: GRAB Monitor Reading (ppm):	0-1'	H.br.	fn-med gr. sd., dry.

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	✓	
~~[illegible]~~	~~[illegible]~~		
~~[illegible]~~	~~[illegible]~~		
HEXAVALENT CHROMIUM	16 oz	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

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PAI-15-SS-01-01
GG

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: ~~PAI-15-SS-001~~ 01
Sample Location: PAI-15-SS04
Sampled By: GG
C.O.C. No.: 00272

- [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: 6/14/98 Time: 1033 Method: SS Tydowl Monitor Reading (ppm):	0-1.0'	Brn & Blk	F Sand w/ Tr Silt & Shell Fragments

COMPOSITE SAMPLE DATA:

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

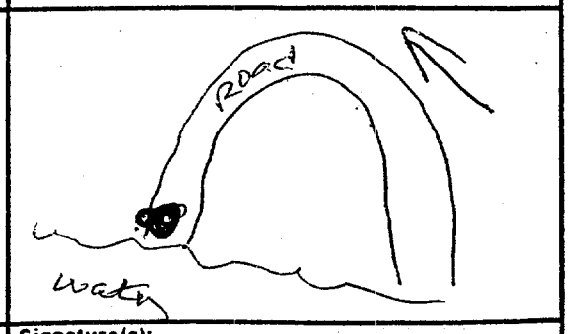
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL VOC's~~	~~5 5 Core Samples~~		
~~TCL SVOC's~~	~~16~~		
~~TAL METALS (Total)~~	~~16~~		
~~CYANIDE~~	~~16 oz~~		
TCL ~~[illegible]~~ PCBs	16 oz		
~~TOC~~	~~16 oz~~		
~~pH~~	~~16 oz~~		
~~HEXAVALENT CHROMIUM~~	~~16 oz~~		
LEAD			

1-16oz

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-15-SS-0020~~ PAI-15-SS-0201
Sample Location: PAI-15-SS02
Sampled By: GC
C.O.C. No.: 00272

[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: 6/14/98	0-1.0'	D. Brn	F Sand
Time: 1043			
Method: SS Trowel			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

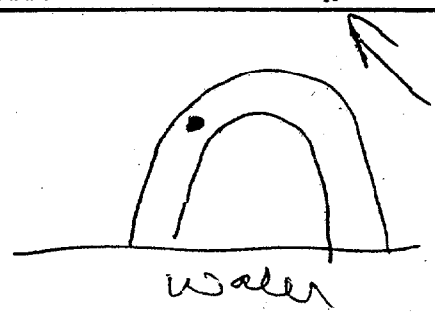
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL~~ VOC's	~~5 EnCore Samplers~~		
~~TAL SVOCs~~	~~4 oz~~		
~~TAL Metals (Total)~~	~~4 oz~~		
~~Cyanide~~	~~4 oz~~		
TCL ~~Pesticides~~ / PCBs	16 oz		
~~TPH~~	~~16 oz~~		
~~Pest~~	~~4 oz~~	16 oz	✓
~~Hexavalent Chromium~~	~~4 oz~~		
LEAD			

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

Sample ID No.: ~~PAI-15-SS-003-01~~ PAI-15-SS-003-01 GG
Sample Location: PAI-15-SS03
Sampled By: GG
C.O.C. No.: 00272

[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: 6/14/98	0-1.0'	D. Brn Brn	1/8" F Sand (upper surface) F Sand
Time: 1051			
Method: SS Trowel			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

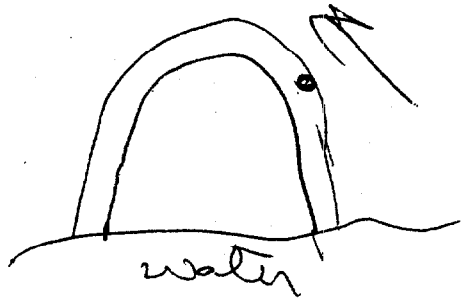
	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL VOCs~~	~~[illegible]~~		
~~TCL SVOCs~~	~~[illegible]~~		
~~TAL Metals (Total)~~	~~[illegible]~~		
~~Cyanide~~	~~[illegible]~~		
TCL ~~[illegible]~~ PCBs	16 oz		
~~TPH~~	~~[illegible]~~		
~~[illegible]~~	~~[illegible]~~ 1-16oz		
~~[illegible] Chromium~~	~~[illegible]~~		
LEAD			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [illegible]

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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-15-SS-004-01 ~~PAI-15-SS-004-01~~
Sample Location: PAI-15-SS04
Sampled By: GG
C.O.C. No.: 00272

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 6/14/98	0-6"	Brn	F Sand
Time: 1057		D. Brn	1/2" on surface
Method: SS Trowel			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

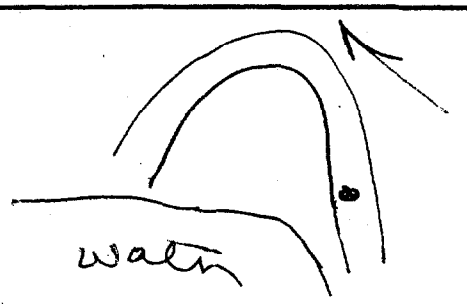
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL SVOC's~~	~~5 EnCore Samples~~		
~~TCL VOCs~~	~~#~~		
~~TAL Metals (Total)~~	~~#~~		
~~Cyanide~~	~~#~~		
TCL ~~Pesticides~~ / PCBs	16 oz	✓	
~~TOC~~	~~#~~	1-16oz	
~~pH~~	~~#~~		
~~Hexavalent Chromium~~	~~#~~	✓	
LEAD			

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-15-SS-005~~ PAI-15-SS-05-01 SG
Sample Location: PAI-15-SS05
Sampled By: GG
C.O.C. No.: 00272

[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: 6/14/98 Time: 0929 Method: GS Trowel Monitor Reading (ppm): NA	0-~~0.5~~ 1.0'	BRN & BLK	F SAND

COMPOSITE SAMPLE DATA:

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

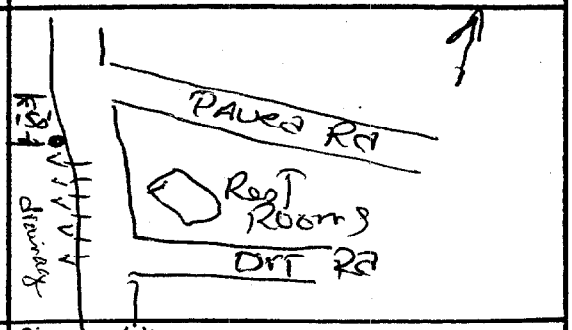
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL VOA~~	~~5 Encore Samplers~~		
~~TAL Metals~~	~~"~~		
~~SVOC TCLP (SPLP)~~	~~"~~		
~~Cyanide~~	~~"~~		
TCL ~~Pesticides~~ / PCBs	16 oz		
~~TPH~~	~~"~~	1-16oz	
~~OH~~	~~"~~		
~~Hexavalent Chromium~~	~~"~~		
LEAD			

OBSERVATIONS / NOTES:

Low area off side of Road.
Too much gravel to Take in Road.
ROAD Slopes To west

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-15-SS-06-01 GC
Sample Location: PAI-15-SS06
Sampled By: SG
C.O.C. No.: 00272

[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: 6/24/98 Time: 0954 Method: SS Trowel Monitor Reading (ppm): NA	0-1.0'	Tan	F Sand w/TR. Silt & Gravel

COMPOSITE SAMPLE DATA:

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

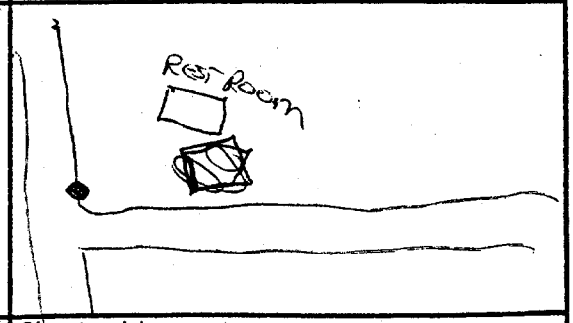
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]	✓	
[redacted]	[redacted]	—	
[redacted] (TCLP)	[redacted]	—	
[redacted]	[redacted]	—	
TCL [redacted] PCBs	16 oz	✓	
[redacted]	[redacted]	—	
[redacted]	[redacted]	—	
[redacted]	[redacted]	—	
LEAD		✓	

OBSERVATIONS / NOTES:

moved from Location in Front of BLDG(↑) to Location shown. Lowest area near Location

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): G Gunter

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SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: ~~PAI-15-SS-007-01~~ PAI-15-SS-007-01 66
Sample Location: PAI-15-SS07
Sampled By: GG
C.O.C. No.: 00272

[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: 6/14/98 Time: 0940 Method: SS Trowel Monitor Reading (ppm): NA	0-1.0'	Brn & BLK	F Sand

COMPOSITE SAMPLE DATA:

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

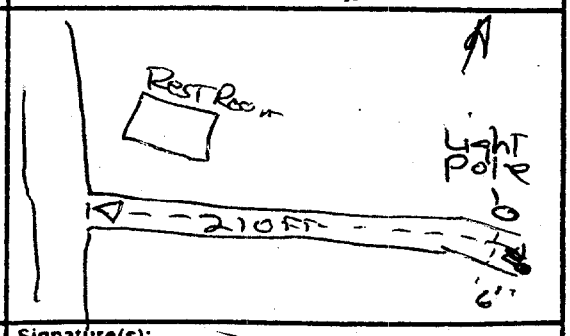
SAMPLE COLLECTION INFORMATIONS:

Analysis	Container Requirements	Collected	Other
~~TCL VOCs~~	~~[illegible]~~		
~~TCL SVOCs~~	~~[illegible]~~		
~~TAL Metals (TOTAL)~~	~~[illegible]~~		
~~Cyanide~~	~~[illegible]~~		
TCL ~~[illegible]~~ PCBs	16 oz		
~~TPH~~	~~[illegible]~~	1-1607	—
~~pH~~	~~[illegible]~~		
~~Hexavalent Chromium~~	~~[illegible]~~		
LEAD			

OBSERVATIONS / NOTES:

Site added by D Brayack & AFT Sanford
Road is lowest area near location.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): G. Gentry

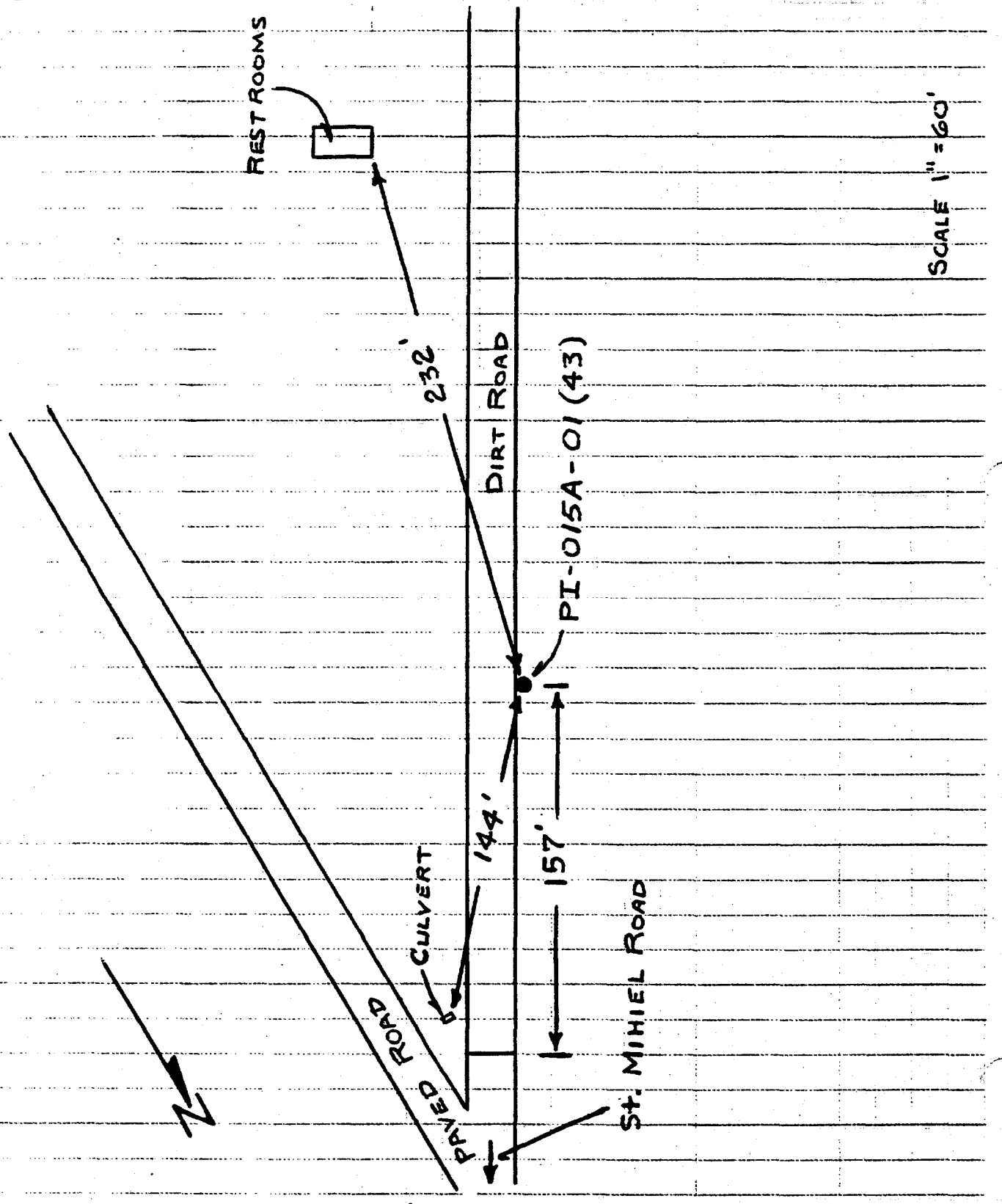
CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
PARRIS ISLAND, MCRD	7115 CTO-0009

SUBJECT: SITE 15A - POTENTIAL PCB-OIL SPRAY DIRT ROAD (Eliot Bea

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE

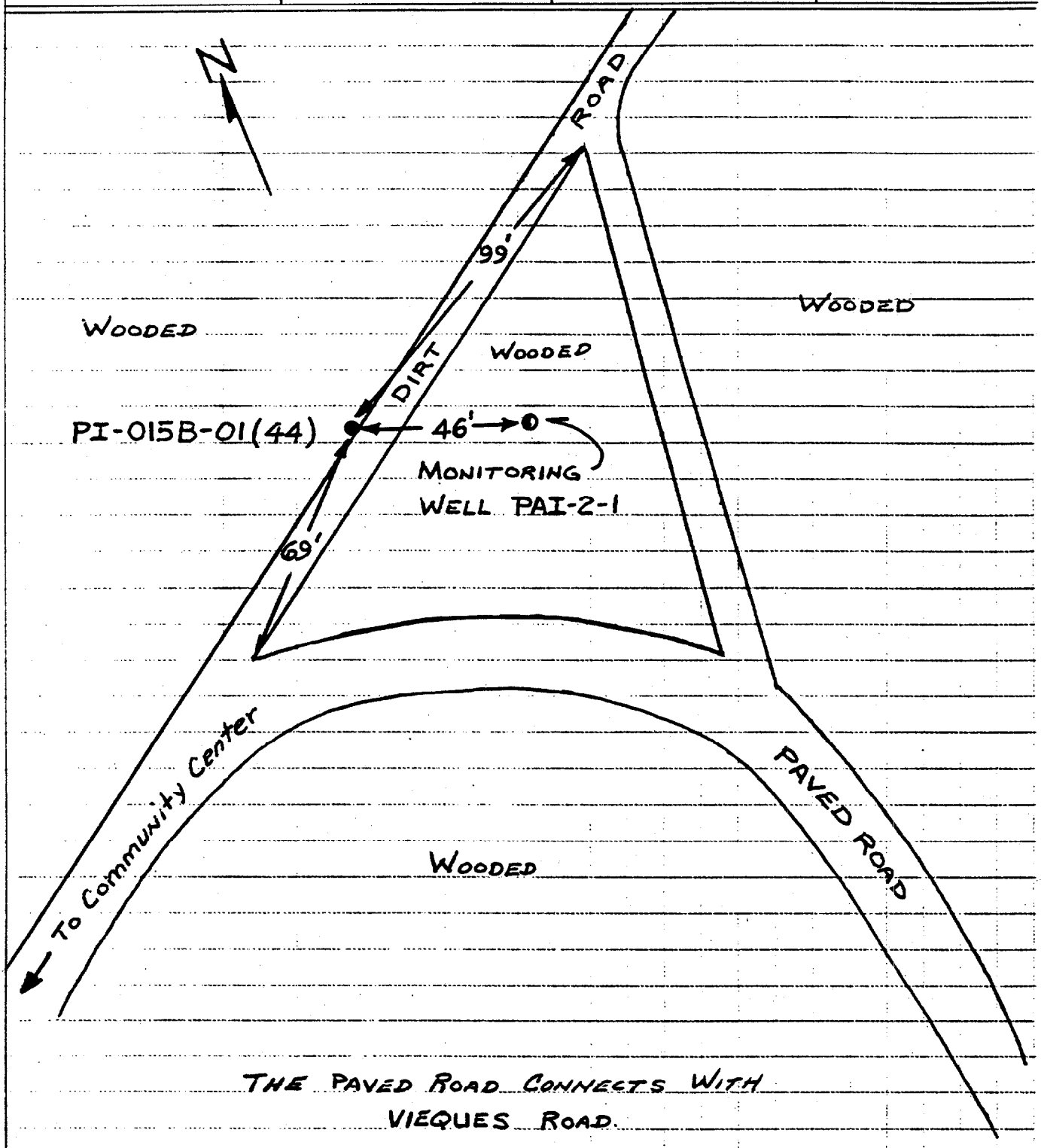


CLIENT	JOB NUMBER
PARRIS ISLAND, MCRD	7115 CTO-0009

SUBJECT: SITE 15B - POTENTIAL PCB AREA - OIL SPRAYED DIRT ROAD

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE



THE PAVED ROAD CONNECTS WITH VIEQUES ROAD.

SCALE 1" = 40'

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GROUNDWATER SAMPLE LOG SHEETS

GROUNDWATER SAMPLE LOG SHEET

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

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

Sample ID No.: ~~PAI 02-GW-01-01~~ PAI2-GW1-01
Sample Location: ~~PAI 02-GW01~~ PAI2-MI
Sampled By: SP
C.O.C. No.: 2247
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 080798	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1634	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: low flow	clear	4.92	0.171	22.0	0	6.72	0	

PURGE DATA:

Date: 080798	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow purge	Initial	5.44	0.210	21.7	122	9.31	0	
Monitor Reading (ppm):	1	4.53	0.221	21.0	9	7.86	0	
Well Casing Diameter & Material	2	4.63	0.189	21.3	3	4.47	0	
Type: 2" PVC	3							
Total Well Depth (TD): 29.82								
Static Water Level (WL): 16.53								
One Casing Volume (gal/L): 2.19								
Start Purge (hrs): 1437								
End Purge (hrs): 1629								
Total Purge Time (min): 112								
Total Vol. Purged (gal/L): 5.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	40 mL glass (4)	✓
TCL SVOCs	–	1000 mL Amber (2)	✓
TCL Pest. / PCBs	–	1000 mL Amber (2)	✓
TAL Total Metals / Hardness	HNO_3	1000 mL plastic (1)	✓
TAL Dissolved Metals	HNO_3	1000 mL plastic (1)	✓
CN	NaOH	500 mL plastic (1)	✓
TOC	H_2SO_4	125 mL Amber (1)	✓
NO_3 / NO_2	H_2SO_4	1000 mL plastic (1)	✓
~~Hexavalent~~ TDS, TSS, Cl, F, SO_4	–	1000 mL plastic (1)	✓

SP 08-08-98

OBSERVATIONS / NOTES:

NOTE: MONITORING WELLS PURGED IN ACCORDANCE WITH LOW FLOW SAMPLING METHODS.

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Seth Pelopso

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LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: 7394

WELL I.D.: PAI-02-GW-001-01
DATE: 080798

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
	1437	18.26	450	21.7	5.44	0.210	9.31	0	122	Pump rate fluctuation
	1442	18.46	250	21.1	4.64	0.244	8.28	0	93	Values in flow column
	1447	18.57	250	21.4	4.52	0.219	7.15	0	44	represent approximations
	1452	18.71	250	21.4	4.42	0.225	6.91	0	25	
	1457	18.64	175	21.7	4.40	0.210	8.20	0	17	
	1502	18.65	175	21.4	4.49	0.208	9.73	0	9	
Volume	1507	18.7	175	21.0	4.53	0.221	7.86	0	9	
	1512	18.56	175	21.4	4.62	0.213	8.97	0	8	
	1517	18.54	175	21.6	4.66	0.200	9.36	0	8	
	1522	18.54	175	21.7	4.63	0.198	7.87	0	8	
	1527	18.49	175	21.5	4.61	0.193	8.26	0	7	
	1532	18.54	175	21.5	4.57	0.193	8.76	0	6 SP 080748	
	1537	18.47	175	21.6	4.57	0.192	7.49	0	4	
	1542	18.54	175	21.4	4.53	0.192	6.25	0	3	
	1547	18.54	175	21.4	4.56	0.190	8.01	0	4	
	1552	18.54	175	21.4	4.58	0.192	6.30	0	3	notable discrepancy between
Volumes	1557	18.40	175	21.3	4.63	0.184	4.47	0	3	static WL and present
	1604	18.26	150	21.8	4.81	0.180	7.41	0	1	WL - tried decreasing
	1609	18.17	150	22.1	4.84	0.178	6.27	0	1	flow rate to minimum
	1614	18.04	150	22.0	4.95	0.172	5.73	0	1	to see if water level
	1619	18.02	150	22.0	4.91	0.174	8.22	0	0	would rebound.
18 G	1624	18.02	150	22.0	4.90	0.184	7.42	0	0	
	1629	18.01	150	22.0	4.92	0.171	6.72	0	0	
	1634									Sample

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SIGNATURE(S) Seth Palopka

GROUNDWATER SAMPLE LOG SHEET

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

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

Sample ID No.: PAI2-GW2-01
Sample Location: ~~PAI-02-GW-002~~ PAI2-MW2
Sampled By: SP
C.O.C. No.: 2211
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA: DJS 8/12/00

Date: 091598 and 082998	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1310	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: low flow	clear	4.82	0.132	22.9	0	10.24	0.00	–

PURGE DATA:

Date: 091598	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow	Initial	4.38	0.221	22.5	0	–	0.00	–
Monitor Reading (ppm): –	1	4.72	0.140	22.0	0	5.37	0.00	–
Well Casing Diameter & Material	2	4.82	0.132	22.9	0	10.24	0.00	–
Type: 2" PVC	3							
Total Well Depth (TD): 30.08'								
Static Water Level (WL): 17.88'								
One Casing Volume (gal/L): 2.013								
Start Purge (hrs): 1055								
End Purge (hrs): 1259								
Total Purge Time (min): 124								
Total Vol. Purged (gal/L): 4.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appendix IX VOCs	HCl	(4) 40 ml glass	✓
Appendix IX SVOCs	–	(2) 1 L Amber	✓
Appendix IX Herbicides	–	(2) 1 L Amber	✓

OBSERVATIONS / NOTES:

TD and WL measurements referenced to top of PVC casing.

Screened Interval Volume Calculation: (30.08' - 17.88') * 0.165 = 2.013 gallons

NOTE: MONITORING WELLS PURGED IN ACCORDANCE WITH LOW FLOW SAMPLING METHODS.

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

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

WELL ID.: PAI-02-GW-002-01
DATE: 09/15/98

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
1059	18.18	130	4.38	0.221	0*	–	22.5	0.00	*Turbidity below detection limit (<10)
1104	18.18	130	4.55	0.155	0	5.38	22.1	0.00	
1109	18.18	130	4.57	0.148	0	8.84	22.1	0.00	
1114	18.18	130	4.58	0.145	0	7.41	22.1	0.00	
1119	18.16	130	4.61	0.143	0	6.73	22.3	0.00	
1124	18.19	130	4.63	0.144	0	7.74	22.0	0.00	
1129	18.20	130	4.64	0.145	0	6.14	22.0	0.00	
1134	18.13	130	4.65	0.143	0	7.69	22.1	0.00	
1139	18.16	130	4.67	0.143	0	6.47	22.0	0.00	
1144	18.15	130	4.69	0.142	0	6.52	22.2	0.00	
1149	18.17	130	4.71	0.141	0	6.85	22.0	0.00	
1154	18.17	130	4.72	0.140	0	5.37	22.0	0.00	
1159	18.16	130	4.75	0.139	0	6.25	22.3	0.00	
1204	18.15	130	4.75	0.137	0	6.28	22.5	0.00	
1209	18.18	130	4.77	0.135	0	6.48	22.1	0.00	
1214	18.17	130	4.78	0.135	0	6.60	22.2	0.00	
1219	18.17	130	4.78	0.133	0	6.31	22.2	0.00	
1224	18.11	130	4.80	0.133	0	5.85	22.9	0.00	
1229	18.13	130	4.81	0.132	0	6.23	22.8	0.00	
1234	18.16	130	4.82	0.131	0	8.77	22.6	0.00	
1239	18.16	130	4.81	0.132	0	9.64	22.7	0.00	
1244	18.15	130	4.82	0.133	0	7.54	23.0	0.00	
1249	18.15	130	4.82	0.131	0	10.11	23.0	0.00	
1254	18.17	130	4.83	0.132	0	10.04	22.8	0.00	
1259	18.13	130	4.82	0.132	0	10.24	22.4	0.00	
1310	Sample								

Volume

Volumes

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SIGNATURE(S): Seth Polydor

GROUNDWATER SAMPLE LOG SHEET

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

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

Sample ID No.: PAI2-GW2-01 ~~PAI-02-GW-003-01~~
Sample Location: ~~PAI-02-GW02~~ PAI2-MW
Sampled By: SP
C.O.C. No.: 2274
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA: DTC 8/25/98

Date: 082498 and 091598	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1750	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: low flow	clear	4.74	0.162	22.0	0	3.78	0	–

PURGE DATA:

Date: 082498	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow	Initial	4.73	0.180	22.7	14	3.91	0	–
Monitor Reading (ppm):	1	4.65	0.168	21.9	0	–	0	–
Well Casing Diameter & Material	2	4.73	0.162	22.0	0	3.94	0	–
Type: 2" PVC	3							
Total Well Depth (TD): 30.09'								
Static Water Level (WL): 17.64'								
One Casing Volume (gal/L): 2.05								
Start Purge (hrs): 1550								
End Purge (hrs): 1737								
Total Purge Time (min): 107								
Total Vol. Purged (gal/L): 4.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	(4) 40 mL	✓
TCL SVOCs	–	(2) 1 L Amber	✓
TCL Pest. /PCBs	–	(2) 1 L Amber	✓
TAL Total Metals, Hardness	HNO_3	(1) 1 L plastic	✓
TAL Dissolved Metals	HNO_3	(1) 1 L plastic	✓
TAL CN	NaOH	(1) 500 mL plastic	✓
NO_3/NO_2	H_2SO_4	(1) 1L plastic	✓
TOC	H_2SO_4	(1) 125 mL Amber	✓
TDS, TSS, Cl, F, SO4	–	(1) 1 L plastic	✓
Cr (VI)	–	(1) 1 L plastic	✓

OBSERVATIONS / NOTES:

- TD and WL measurements made from top of PVC casing.
- Volume calculation = (30.09' - 17.64') * 0.165 = 2.05 gallons

NOTE: MONITORING WELLS PURGED IN ACCORDANCE WITH LOW FLOW SAMPLING METHODS.

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Seth [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD PARRIS ISLAND
PROJECT NUMBER: 7394

WELL I.D.: PAI-02-GW-002-01
DATE: 082498

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
	1552	17.91	170	22.7	4.73	0.180	3.91	0	14	
	1557	17.79	100	22.6	4.71	0.160	5.08	0	0 *	* below detection limit
	1602	17.88	150	22.6	4.53	0.187	2.25	0	0	
	1607	17.88	150	22.4	4.63	0.165	5.08	0	0	
	1612	17.87	180	22.2	4.44	0.175	4.40	0	0	
	1617	17.87	180	22.0	4.61	0.163	5.14	0	0	
	1627	17.89	180	22.3	4.43	0.188	0.71	0	0	
	1632	17.87	180	22.6	4.42	0.263	8.75	0.01	0	
	1637	17.88	180	22.0	4.62	0.167	1.14	0	0	
1 Volume	1642	17.88	180	21.9	4.65	0.168	–	0	0	
	1647	17.88	180	22.0	4.66	0.167	4.91	0	0	
	1652	17.88	180	~~22.4~~ 22.1	4.68	0.165	5.05	0	0	
	1657	17.89	180	22.0	4.67	0.166	3.38	0	0	
	1702	17.88	180	22.1	4.69	0.164	3.04	0	0	
	1707	17.89	180	21.8	4.69	0.164	3.29	0	0	
	1712	17.88	180	21.8	4.70	0.164	2.60	0	0	
	1717	17.86	180	22.0	4.70	0.163	5.11	0	0	
	1722	17.86	180	21.9	4.71	0.163	2.68	0	0	
	1727	17.85	180	21.9	4.71	0.163	3.51	0	0	
2 Volumes	1732	17.85	180	22.0	4.73	0.162	3.94	0	0	
	1737	17.86	180	22.0	4.74	0.162	3.78	0	0	

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SIGN. URE(S) Seth Palmer

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GROUNDWATER SAMPLE LOG SHEET

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

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

Sample ID No.: PAI2-GW3-01 ~~PAI-02-GW-003-01~~
Sample Location: ~~PAI-02-GW03~~ PAI2-
Sampled By: GG
C.O.C. No.: 2243
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 8/7/98	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Time: 1700								
Method: Low Flow	Clear	5.40	7.62	23.2	5	1.87	0.41	

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 8/7/98								
Method: Low Flow	Initial	5.22	7.37	22.6	177	3.25	0.47	
Monitor Reading (ppm): NA	1	5.44	6.02	22.8	11	3.87	0.35	
Well Casing Diameter & Material	2	5.40	7.62	23.2	5	1.87	0.41	
Type: 2" SCH40 PVC	3							
TOC Total Well Depth (TD): 28.25								
TOC Static Water Level (WL): 15.14								
One Casing Volume (gal/L): 2.2								
Start Purge (hrs): 1444								
End Purge (hrs): 1645								
Total Purge Time (min): 121								
Total Vol. Purged (gal/L): 4.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	16 - 40mL VOA	✓
TCL SVOCs	–	8 - 1LA	✓
TCL Pest/PCBs	–	6 - 1LA	✓
TAL Total Metals, Hardness	HNO3	3 - 1LP	✓
TAL Dissolved Metals	HNO3	3 - 1LP	✓
NO3/NO2	H2SO4	3 - 1LP	✓
TDS, TSS, Cl, F, SO4	–	3 - 1LP	✓
TAL Cyanide	NAOH	3 - 1LP	✓
TOC	H2SO4	4 - 125mLA	✓

28.25
15.14
13.11
x .145
2.2

OBSERVATIONS / NOTES:

NOTE: MONITORING WELLS PURGED IN ACCORDANCE WITH LOW FLOW SAMPLING METHODS.

Circle if Applicable:
(MS/MSD) Duplicate ID No.: PAI-02-GW-003-01D

Signature(s):

LOW FLOW PURGE DATA SHEET

well PAI-02-MW03

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

WELL I.D.: PAI-02-GW003-01
DATE: 8/19/98

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1444	15.14	200	22.6	5.22	7.37	3.25	0.47	177	initial
1451	15.64	200	22.2	5.30	7.16	4.52	0.38	77	
1456	15.62	170	22.1	5.38	7.24	2.20	0.39	64	Pump cuts off - low flow
1502	15.54	170	22.3	5.33	5.73	4.09	0.30	31	this note.
1507	15.54	170	21.9	5.31	5.73	4.29	0.30	27	
1511	15.54	170	22.4	5.38	5.04	5.00	0.26	23	
1516	15.54	170	22.5	5.42	4.60	2.76	0.23	20	
1521	15.54	170	22.9	5.38	4.74	2.63	0.24	16	
1525	15.54	170	22.8	5.52	3.60	4.26	0.18	15	-- pump stopped, last
1530	15.42	170	22.7	5.38	5.20	3.12	0.26	19	reading - switched
1534	15.65	150	21.7	5.38	6.02	2.20	0.32	13	to Car Battery
1540	15.55	150	22.6	5.40	6.70	2.47	0.36	10	
1546	15.54	150	22.5	5.43	6.57	2.20	0.35	12	
1551	15.54	150	22.5	5.41	6.55	4.37	0.35	12	
1556	15.54	150	22.8	5.44	6.62	3.87	0.35	11	VOI
1602	15.54	150	22.6	5.41	6.67	2.46	0.35	10	
1607	15.54	150	22.4	5.49	6.80	4.19	0.36	9	
1612	15.54	150	23.0	5.43	6.74	2.49	0.36	9	
1617	15.54	150	23.0	5.44	6.97	2.53	0.37	9	
1622	15.54	150	23.3	5.47	7.03	3.30	0.38	8	
1627	15.54	150	23.6	5.44	7.18	2.81	0.38	7	
1631	15.54	150	23.4	5.49	7.41	3.62	0.40	7	
1635	15.54	150	23.4	5.39	7.65	2.00	0.41	7	
1640	15.54	150	23.3	5.41	7.66	2.21	0.41	6	
1645	15.54	150	23.2	5.40	7.62	1.87	0.41	5	
1700									

SIGNATURE(S) [signature]

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GROUNDWATER SAMPLE LOG SHEET

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

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

Sample ID No.: PAI-02-GW-04-01
Sample Location: ~~PAI-02-GW04~~ PAI-02-M
Sampled By: SP
C.O.C. No.: 2296
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 08-20-98 / Time: 1505 / Method: low flow	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	clear	6.82	35.2	28.1	1	6.27	2.24	—

PURGE DATA:

Date: 08-20-98	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow	Initial	6.37	34.8	27.6	24	6.07	2.21	—
Monitor Reading (ppm):	1	6.80	34.8	27.3	3	4.59	2.21	—
Well Casing Diameter & Material	2	6.82	35.2	28.1	1	6.27	2.24	—
Type: 2" PVC	3							
Total Well Depth (TD): 16.40'								
Static Water Level (WL): 5.88'								
One Casing Volume (gal/L): 1.74								
Start Purge (hrs): 1313								
End Purge (hrs): 1455								
Total Purge Time (min): 102								
Total Vol. Purged (gal/L): 4.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	(4) 40 mL	✓
TCL SVOCs	—	(2) 1 L Amber	✓
TCL Pest./PCBs	—	(2) 1 L Amber	✓
TAL Total Metals, Hardness	HNO_3	(1) 1 L plastic	✓
TAL Dissolved Metals	HNO_3	(1) 1 L plastic	✓
TAL CN	NaOH	(1) 500 mL plastic	✓
NO_3/NO_2	H_2SO_4	(1) 1 L plastic	✓
TOC	H_2SO_4	(1) 125 mL Amber	✓
TDS, TSS, Cl, F, SO_4	—	(1) 1 L plastic	✓
Cr (VI)	—	(1) 1 L plastic	✓

OBSERVATIONS / NOTES:

TD and WL measured from top of PVC casing.

Screened Interval Volume: (16.40' - 5.88') * 0.165 = 1.74 gallons

NOTE: MONITORING WELLS PURGED IN ACCORDANCE WITH LOW FLOW SAMPLING METHODS.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	Seth Pilepko

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LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: 7394

WELL I.D.: PAI-02-GW-004-01
DATE: 08-20-98

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
	1315	6.10	490	27.6	6.37	34.8	6.07	2.21	24	
	1320	6.05	125	27.1	6.52	34.9	1.48	2.21	23	
	1325	6.05	125	27.3	6.64	34.7	3.48	2.20	15	
	1330	6.09	125	27.3	6.65	34.6	3.29	2.19	12	
	1335	6.06	125	27.4	6.68	34.6	4.16	2.19	18	
	1340	6.09	125	27.4	6.69	34.7	3.98	2.20	11	
	1345	6.09	125	27.5	6.78	34.8	5.86	2.21	6	
	1350	6.09	125	27.4	6.80	34.8	4.59	2.21	6	
	1355	6.09	125	27.3	6.82	34.8	5.19	2.21	5	
1 Volume	~~1400~~ 1400	6.09	125	27.3	6.80	34.8	4.59	2.21	3	
	1405	6.09	125	27.6	6.80	35.0	6.03	2.21	2	
	1410	6.09	125	27.6	6.81	34.9	4.95	2.21	2	
	1415	6.09	125	27.7	6.81	34.9	4.13	2.22	1	
	1420	6.11	125	27.5	6.80	34.9	3.66	2.21	1	water level drawing down
	1425	6.12	125	27.6	6.83	34.9	5.96	2.22	1	slightly - possibly due
	1430	6.13	125	27.7	6.82	35.0	5.38	2.22	1	to tidal influence
	1435	6.16	125	27.6	6.82	35.0	6.47	2.23	1	
	1440	6.13	100	27.9	6.83	35.0	4.00	2.22	0	
	1445	6.14	100	28.0	6.82	35.1	5.55	2.24	1	
	1450	6.15	100	27.9	6.81	35.1	5.37	2.23	1	
2 Volumes	1455	6.17	100	28.1	6.82	35.2	6.27	2.24	1	
	1505	sample								

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SIGNATURE(S) Seth Pilapski

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-02-GW-05-01
Sample Location: ~~PAI-02-GW05~~ PAI-02-MW
Sampled By: SP
C.O.C. No.: 2298
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: 08-19-98								
Time: 1440								
Method: low flow	clear	591	1.66	25.2	4	2.93	0.07	–

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 08-19-98								
Method: low flow	Initial	5.73	1.88	26.1	20	1.87	0.09	–
Monitor Reading (ppm):	1	6.16	1.61	25.1	6	2.49	0.07	–
Well Casing Diameter & Material	2	5.61	1.67	26.6	149	3.00	0.07	–
Type: 2" PVC	3	5.91	1.66	24.9	13	3.36	0.07	–
Total Well Depth (TD): 39.37'								
Static Water Level (WL): 8.76'								
One ~~Casing~~ Screened Interval Volume (gal/L): 1.16								
Start Purge (hrs): 1217								
End Purge (hrs): 1425								
Total Purge Time (min): 128								
Total Vol. Purged (gal/L): 4.1								

SP 08-19-98

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	(4) 40 mL	✓
TCL SVOCs	–	(2) 1 L Amber	✓
TCL Pest. / PCBs	–	(2) 1 L Amber	✓
TAL Total Metals, Hardness	HNO_3	(1) 1 L Plastic	✓
TAL Dissolved Metals	HNO_3	(1) 1 L plastic	✓
NO_2 / NO_3	H_2SO_4	(1) 1 L plastic	✓
TDS, TSS, Cl, F, SO_4	–	(1) 1 L plastic	✓
Cr (VI)	–	(1) 1 L plastic	✓
TAL CN	NaOH	(1) 500 mL plastic	✓
TOC	H_2SO_4	(1) 125 mL Amber	✓

OBSERVATIONS / NOTES:

TD and WL measured from top of PVC casing.
Entire Screened interval submerged, volume calculation is as follows:
(5' screen + 2' sand) * 0.165 = 1.16 gallons

NOTE: MONITORING WELLS PURGED IN ACCORDANCE WITH LOW FLOW SAMPLING METHODS.

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	Seth Palestro

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: 7394

WELL I.D.: PAI-02-GW-005-01
DATE: 08-19-98

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
	1220	9.21	150	26.1	5.73	1.88	1.87	0.09	20	
	1226	9.29	150	25.6	5.81	1.62	2.64	0.07	16	
	1231	9.33	120	25.5	5.92	1.62	2.39	0.07	10	
	1236	9.36	120	25.5	6.09	1.63	3.59	0.07	8	
	1241	9.41	120	25.3	6.11	1.61	2.75	0.07	5	
	1246	9.44	120	25.3	6.18	1.62	3.33	0.07	4	
1 Volume	1251	9.44	100	25.1	6.16	1.61	2.49	0.07	6	
	1256	9.49	100	25.2	6.16	1.62	2.20	0.07	8	
	1301	9.51	100	25.3	6.17	1.62	2.25	0.07	5	pump kept stalling @
	1306	9.55	120	25.0	6.21	1.61	2.60	0.07	35	Q=100mL/min
	1311	9.58	120	25.0	6.19	1.61	2.74	0.07	26	
	1316	9.59	120	25.0	6.21	1.62	2.92	0.07	11	Horiba
	1321	9.61	120	25.0	6.17	1.61	2.23	0.07	83	meter fluctuating (sporadic)
2 Volumes	1335	9.66	120	26.6	5.61	1.67	3.00	0.07	149	w/r/t Turbidity since
	1345	9.67	150	26.3	5.94	1.66	4.57	0.07	42	1306 - appears to
	1350	9.68	120	25.4	6.00	1.66	4.40	0.07	55	be malfunctioning →
	1355	9.70	120	25.2	6.05	1.66	3.30	0.07	79	recalibrate at 1326
	1400	9.71	120	24.9	5.90	1.65	3.40	0.07	~~39~~ 19	
	1405	9.73	120	24.7	5.79	1.66	3.33	0.07	28	neither Horiba will
Volumes	1410	9.73	120	24.9	5.91	1.66	3.36	0.07	13	calibrate w/r/t D.O.
	1416	9.74	120	24.9	5.92	1.66	2.47	0.07	5	
	1420	9.74	120	24.9	5.95	1.66	2.58	0.07	5	1342 - no return from
	1425	9.72	120	25.2	5.91	1.66	2.93	0.07	4	pump
	1440	Sample								1344 - pump working again

Error w/r/t D.O. - calibrate other Horiba (500002) - n

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SIGNATURE(S) Scott Pelopko

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GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: MCRD Parris Is., SC
Project No.: 7394

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

Sample ID No.: PAI-02-GW-05-01 ~~PAI-02-GW-05-01~~
Sample Location: ~~Site 2~~ PAI-02-MW-05
Sampled By: M. Dennington
C.O.C. No.: 2211
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 9/15/98	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Time: 1120								
Method: Pump/Tubing	Clear	8.10	1.57	23.7	0	NA	0.07	—

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 9/15/98	Initial	5.79	1.57	23.9	0	NA	0.07	—
Method: Pump Peristaltic	1	8.29	1.56	23.5	0	NA	0.07	—
Monitor Reading (ppm): NS	2	8.25	1.57	23.9	0	NA	0.07	—
Well Casing Diameter & Material	~~3~~							
Type: PVC 2-inch Ø								
Total Well Depth (TD): 39.30								
Static Water Level (WL): 8.67								
One Casing Volume(gal/L): ~~39.30~~ 1.14 gal								
Start Purge (hrs): 1025								
End Purge (hrs): 1120								
Total Purge Time (min): 55								
Total Vol. Purged (gal/L): 2.5-3.0								

7' x .163 gal/ft 2" well

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
Appdx. IX SVOCs	—	1 l Amber glass	2
Appdx IX Herbicides	—	1 l Amber glass	2
Appdx IX VOCs	HCl	40 ml glass/septum cap	4
		TOTAL	8

OBSERVATIONS / NOTES:

NOTE: MONITORING WELLS PURGED IN ACCORDANCE WITH LOW FLOW SAMPLING METHODS.

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

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LOW FLOW PURGE DATA SHEET

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

WELL ID.: PAI 6W
DATE: 9/15/98 start @ 10:10

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
1035	9.25	~150 ml/min	5.79	1.57	0	—	23.9	0.07	Pump is barely pumping.
1041	9.31	~100 ml/min	8.29	1.52	0	—	23.3	0.07	Pump barely rotating
1045	9.30	100 ml/min	8.34	1.56	0	—	23.4	0.07	PR = 500 ml/5 min (100 ml/min)
1050	9.33	100 ml/min	8.29	1.56	0	—	23.5	0.07	Pump barely moving
1055	9.37	100 ml/min	6.38	1.56	0	—	23.7	0.07	Pump intermittently stopping
1100	9.39	100 ml/min.	7.85	1.56	0	—	23.7	0.07	due to very slow rotation.)
1105	9.42	100 ml/min	8.00	1.57	0	—	23.9	0.07	Same as above
1110	9.46	100 ml/min	8.25	1.57	0	—	23.9	0.07	Same as above
1115	9.46	100 ml/min	8.33	1.57	0	—	23.6	0.07	Same as above
1120	9.42	100 ml/min	8.10	1.57	0	—	23.7	0.07	Same as above

SIGNATURE(S): [signature]

PAGE ___ **OF** ___

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CHAIN OF CUSTODY RECORDS

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.

02254

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Eric J. Hamm, R.A. Madsen, P.G.

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs (BOLD=5)	TCL SVOCs	MTL METALS (TOTAL)	CYANIDE	TCL PEST/PCBs	HEX CR	REMARKS
	06/30/98	1310		✓	PAI025S00101	6	✓	✓	✓	✓	✓	✓	
	06/30/98	1250		✓	PAI025S00601	6	✓	✓	✓	✓	✓	✓	
	06/30/98	1315		✓	PAI025S00801	6	✓	✓	✓	✓	✓	✓	
					Trip Blank	2	✓	✓	✓	✓	✓	✓	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. Madsen	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):	DATE / TIME:	REMARKS:	
		R. H. [illegible]	7.1.98 1130		

Order No. 70440 (0693)

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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	TCL SVOC 1000 mL AMBER	TAL METALS + HNO3 1000 mL PLASTIC	~~[illegible]~~ CN + NaOH 250 mL PLASTIC	TCL PESTICIDES 1 L AMBER	Hex Cr 1 L PLASTIC	REMARKS
	06/30/98	15 00		✓	PAS02RB01	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]	07/01/98 12:2		

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02249

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7803

SITE NAME: JERICHO ISLAND

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	NATURAL MOISTURE	GRAIN SIZE	ATTERBERG LIMITS	BULK DENSITY	POROSITY, SP. GRAVITY	VERTICAL CONDUCTIVITY	REMARKS
1	7/15/98	0730		X	PAI-10-SB-005-02	1	✓	✓	✓				
2	7/15/98	1115		X	PAI-10-SB-005-24	1	✓	✓	✓	✓	✓		
3	7/14/98	1110		X	PAI-10-SB-004-00	1	✓	✓	✓	✓	✓		
4	7/14/98	1100		X	PAI-10-SB-004-02	1	✓	✓	✓				
5	7/13/98	1030		X	PAI-10-SB-003-02	1	✓	✓	✓				
6	7/13/98	11:15		X	PAI-10-SB-003-30	1	✓	✓	✓	✓	✓		
7	7/11/98	10:30		X	PAI-02-SB-001-30	1	✓	✓	✓	✓	✓		
8	7/10/98	0830		X	PAI-03-SB-003-10	1	✓	✓	✓				
9	7/10/98	0900		X	PAI-03-SB-003-12	1	✓	✓	✓	✓	✓		
10	7/8/98	1700		X	PAI-03-SB-002-24	1	✓	✓	✓	✓	✓		
11	7/8/98	1900		X	PAI-03-SB-002-04	1	✓	✓	✓				
12	7/11/98	1200		X	PAI-02-SB-001-36	1						✓	Shelby Tube
13	7/9/98	0830		X	PAI-03-SB-002-28	1						✓	Shelby Tube
					Parris Island								

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	7-16-98 1600	[signature]			
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: Please Contact Jason Brown @ 1-412-921-8401 w/ Questions	

Order No. 70440

101-4

02279

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Scott Pelopler

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Grain Size	Bulk Density	Atterberg Limits	Natural Moisture Content	Porosity	Specific Gravity	REMARKS
	9-9-98	1455		✓	PAI-02-SS-007-01	1	✓	✓	✓	✓	✓	✓	
	9-9-98	1525		✓	PAI-02-SD-003-01	1	✓	✓					
	9-9-98	1544		✓	PAI-02-SD-002-01	1	✓	✓					
	9-9-98	1550		✓	PAI-02-SD-004-01	1	✓	✓					
	9-9-98	1600		✓	PAI-02-SB-001-01	1	✓	✓					

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RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Nikki [illegible]	9/14/98 1700				
RELINQUISHED BY (SIGNATURE): FedEx	DATE / TIME: 9/15 1015	RECEIVED BY (SIGNATURE): Daniel [illegible]	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)

CHAIN OF CUSTODY RECORD

02291

13

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): Skip Barton, Scott Pelaplo

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs ENCORE(S)	TCL SVOCs 1602	TAL METALS TCN 1602	TCL PEST/PCB 1602	TOC + PH 1602	HEX CR. 1602	REMARKS
	0722 98	0905		✓	PAI-02-~~005~~ SS-005-01	6	✓	✓	✓	✓			
	0722 98	1000		✓	PAI-02-SS-002-01	6	✓	✓	✓	✓			
	0722 98	1046		✓	PAI-02-SS-007-01	6	✓	✓	✓	✓	✓		
	0722 98	1135		✓	PAI-02-SS-003-01	6	✓	✓	✓	✓			
	0722 98	1455		✓	PAI-02-SS-004-01	6	✓	✓	✓	✓			
	0722 98	1543		✓	PAI-02-SB-001-01	6	✓	✓	✓	✓			
	0722 98	1612		✓	PAI-02-SD-004-01	6	✓	✓	✓	✓	✓	✓	
	0722 98	1645		✓	PAI-02-SD-003-01	6	✓	✓	✓	✓	✓	✓	

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RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Skip Barton	072298 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):	DATE / TIME:	REMARKS:	
		[illegible]	7/23/98 1440		

Order No. 70440 (0693)

10 seal 3.8° T.B not listed

U2268

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Island

SAMPLERS (SIGNATURE): Shuff Barton

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	Pest/PCBs	Total Metals	Cyanide	Hex Cr.	TOC	pH	REMARKS
	7/22/98	1045		✓	PAI-02-SW-001-00	12	3	2	2	1	1	1	1	1	H_2O - Hex Cr. sample collected @ 1210
	7/22/98	1110		✓	PAI-02-SW-002-00	11	3	2	2	1		1	1	1	H_2O - Hex Cr. sample collected @ 1204
	7/22/98	1130		✓	PAI-02-SW-004-00	11	3	2	2	1		1	1	1	H_2O - Hex Cr. sample collected @ 1207
	7/22/98	1445		✓	PAI-02-SD-001-01	6	5	✓	✓	✓	✓	✓	✓	✓	sediment - 5 encore
	7/22/98	1527		✓	PAI-02-SD-002-01	6	5	✓	✓	✓	✓	✓	✓	✓	for VOCs; 1 16oz
	7/22/98	1541		✓	PAI-02-SD-002-02	6	5	✓	✓	✓	✓		✓	✓	glass for all other
															analyses
					Trip Blank										
					Temp Blank										

A-104

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Shuff Barton	7/22/98 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:	
		R. Hence	7.24.98 1350		

Order No. 70440 (0693)

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Island

SAMPLERS (SIGNATURE): Steve Bruton, Seth Pelgr

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	Pest/PCBs	Total Metals	Diss. Metals	Cyanide	NO3/NO2	TOC	pH	REMARKS
	7/24/98	1116		✓	PAI-02-SW-~~003~~ 001-00	13	3	2	2	1	1	1	1	1	1	VOCs 3 50ml
	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 @ 1023
	7/24/98	1135		✓	PAI-02-SW-004-00	3				1	1	1				
	7/24/98	1338		✓	PAI-01-SB-005-04	1								✓	✓	
	7/24/98	1430		✓	PAI-01-SB-002-04	1								✓	✓	
	7/24/98	1440		✓	PAI-01-SB-003-04	1								✓	✓	
A-18																
					Trip Blank											
					Temp Blank											

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Steve Bruton	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. Hewe	7-25-98 14:10	Seal 56404 5.9 5.9	

Order No. 70440 (0693)

980818 3

0224

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Pilopla

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest/PCBs	TAL Total Metals Hardness	TAL Diss. Metals	TAL CN	TOC	NO_3 / NO_2	TDS, TSS, Cl, F, SO_4	REMARKS
1,2)	8/17/98	1634		✓	PAI-02-GW-001-01	14	4	2	2	1	1	1	1	1	1	
3)				✓	trip blank	2	2									
				✓	temperature blank	1	1									

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE): Seth Pilopla	DATE / TIME: 8/17/98 1734	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-106

CHAIN OF CUSTODY RECORD

9808182

02243

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Pelopter

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest HCBs	TAL Total Metals, Hardness	TAL Dissolved Metals	TAL CN	TOC	NO3/NO2	TDS, TSS, Cl, F, SO4	REMARKS
1/2	8/7/98	1700		✓	PAI-02-GW-003-01	35	12	6	4	2	2	2	3	2	2	MS-inorganics MS/MSD-organics
3/4	8/7/98	1700		✓	PAI-02-GW-003-01D	14	4	2	2	1	1	1	1	1	1	duplicate
5				✓	trip blank	2	2									
				✓	temperature blank	3	3									

A-107

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Seth Pelopter	8/8/98 1221				
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:	
		April Smith	8/8/98 8:45		

Order No. 70440 (0

CHAIN OF CUSTODY RECORD

7808331

02208

PROJECT NO.: 7394 / 7803

SITE NAME: MCRD Parris Island

SAMPLERS (SIGNATURE): H Henley · Seth Palopoli

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL PEST/PCBs	TAL 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:	
		Jim A Smith	8/13/98 8:35		

Order No. 70440 (0693)

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CHAIN OF CUSTODY RECORD

868577

02298

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Pelosko

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCS	TCL SVOCS	TCL Pest./PCBs	TAL Total Metals, Hardness	TAL Dissolved Metals	TAL CN	NO3/NO2	TDS, TSS, Cl, F, SO4	TOC	Cr (VI)	REMARKS
1, 2	8/19/98	1440		✓	PAI-02-GW-005-01	15	4	2	2	1	1	1	1	1	1	1	
3)					trip blank	2	2										
					temperature blank	1											

P-8

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth Pelosko	8/19/98 1715				
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	8/20/98 8:40		

Order No. 70440 (0693)

CHAIN OF CUSTODY RECORD

9408551

02296

PROJECT NO.: 7394

SITE NAME: MCRD Parris Island

SAMPLERS (SIGNATURE): Seth Pelopso

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest./PCBs	TAL Total Metals, Hardness	TAL Dissolved Metals	TAL CN	NO3/NO2	TOC	TDS, TSS, Cl, FSO4	Cr(VI)	REMARKS
	8/20/98	1505		✓	PAI-02-GW-004-01	15	4	2	2	1	1	1	1	1	1	1	

2

A-110

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth Pelopso	8/20/98 1622				
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]	8/21/98 0915		

Order No. 70440 (0693)

CHAIN OF CUSTODY RECORD

4808620

02274

PROJECT NO.: 7394

SITE NAME: PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Pelgler

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest/PCBs	TAL Tot. metals/Hexavalent	TAL Diss. metals	TAL CN	TDS, TSS, Cl, F, SO4	TOC	Cr (VI)	NO3 NO2	REMARKS
1,2)	8/24/98	1750		✓	PAI-02-GW-002-01	15	4	2	2	1	1	1	1	1	1	1	
3)					trip blank	2	2										
					temperature blank	2											

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth Pelgler	8/24/98 1829				
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	8/25/98 8:45		

Order No. 70440 (0693)

A-111

9809292

02288

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Pelepko

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)	TDS, TSS	Reactivity	REMARKS
	9/11/98	1150	✓		PAI-01-IDW-S	6		1	1	1	1			1		1	*
	9/11/98	1237	✓		PAI-02-IDW-S	6		1	1	1	1			1		1	*
	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						

2 1 6

A-112

25

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth Pelepko	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)

#4809521

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, TAVS/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)

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' OF CUSTODY RECORD

9809414

02211

12

NO.: 7394

SITE NAME: MCRD Parris Island. (Site 2)

S (SIGNATURE): [illegible]

DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CON-TAINERS	Appdx. IX VOCs	Appdx. IX SVOCs	Appdx. IX Herbicides				REMARKS
9/15/98	1310		✓	PAI-02-GW-002-01	8	4	2	2				
9/15/98	1120		✓	PAI-02-GW-005-01	8	4	2	2				
9/15/98				Trip Blanks (TB)	2	—	—	—	—	—	▷	Refer to Contract for Specifications
9/15/98				Temperature Blank	1	—	—	—	—			

IISHED BY (SIGNATURE): [illegible]	DATE / TIME: 9/15/98 1358	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
IISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
IISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): [illegible]	DATE / TIME: 9/16/98 9:[illegible]	REMARKS:	

A-114

Cooler 34 — 00272 — 009

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 Petro						REMARKS
1	6/14/98	1033		X	PAI-15-SS-001-01	1	✓	✓						
2	6/14/98	1043		X	PAI-15-SS-002-01	1	✓	✓						
3	6/14/98	1051		X	PAI-15-SS-003-01	1	✓	✓						
4	6/14/98	1057		X	PAI-15-SS-004-01	1	✓	✓						
5	6/14/98	0929		X	PAI-15-SS-005-01	1	✓	✓						
6	6/14/98	0934		X	PAI-15-SS-006-01	1	✓	✓						
7	6/14/98	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]	6/15/98 834				
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-115

00274

010

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

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):	DATE / TIME:	REMARKS: 20	
		P. Bulb	6/16/98 1055	Seal 56316	

Order No. 70440 (0693)

A-116

00213

008

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD-Parris Island

SAMPLERS (SIGNATURE): J Riffy, J 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~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~			
		1530		✓	PAI15RB02	5	✓	✓	✓	✓			Rinse Blank.

1800

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
J Hunter	6/15/98 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:	
		R. Hewes	6/16/98 12:15		

Order No. 70440 (0693)

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CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD Parris Is.

SAMPLERS (SIGNATURE): [signature] 6/17/98 [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC + HCl 40 ml.	TSS/VOC 1000 ml Amber	TAL Metals + HNO3 1000 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	Hex Cr. 1000 ml. Plastic	TCL PCB	REMARKS: Nat. Sulfide 16oz	TCL Pest/PCB 16oz	TAL Metals 16oz
	06/16/98	15:30		✓	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	19:20	✓		PAI15SD00301	1										✓	✓	✓	✓

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	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):	DATE / TIME:	REMARKS:	
		[signature]	6/17/98 11:40	seal 56320 56314 5.9 (9.5 10.0 8.4)	

Order No. 70440 (0693)

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CHAIN OF CUSTODY RECORD

COPY - ORIGINAL ON FILE
SDG # 55636 ETR # 55418

000003

PROJECT NO.: 7115 CTO-0009
SITE NAME: PARRIS ISLAND, MCRD
SAMPLERS (SIGNATURE): Terry Rigsby

STATION NO.	DATE 95	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOLATILES 40ML VIALS W/HCL	TCL VOLATILES 4oz JAR	SEMIVOLATILES PESTICIDE/PCBS 16oz JAR	TAL METALS & CYANIDE 16oz JAR			REMARKS
T02	12/13	0700		X	PI-T02-121395	2	2						TRIP BLANK
SITE 8B		0730		X	PI-008B-01(31)	3	–	1	1	1			
SITE 27		0753		X	PI-027-01(46)	3	–	1	1	1			
"		0806		X	PI-027-02(47)	3	–	1	1	1			
SITE 14		0830		X	PI-014-03(42)	3	–	1	1	1			
SITE 21		0919		X	PI-021-01(45)	3	–	1	1	1			
SITE 13		0955		X	PI-013-01(38)	3	–	1	1	1			
"		1010		X	PI-013-02(39)	3	–	1	1	1			
SITE 8A		1035		X	~~PI-008B~~ (TR) PI-008A-01(30)	3	–	1	1	1			
SITE 5		1100		X	PI-005-01(28)	3	–	1	1	1			
"		1115		X	PI-005-02(29)	3	–	1	1	1			
SITE 15B		1130		X	PI-015B-01(44)	3	–	1	1	1			
SITE 15A		1207		X	PI-015A-01(43)	3	–	1	1	1			
D01		0000		X	PI-D01-121395	3	–	1	1	1			

TEMPERATURE BLANKS IN EACH COOLER

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Terry Rigsby	12/13/95 1630	FEDERAL EXPRESS			
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: SHIPPED to INCHCAPE FOR ANALYSIS AB# 2259721284	
		Maureen	12/14/95 1630		

Order No. 70440 (0693)

A-119

02229

99106244

15

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: PARRIS Island

SAMPLERS (SIGNATURE): James [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC's	TAL metals, TCL PAH's, TCL PCB's, Pest.	TCL SVOC's				REMARKS
TP-11	10/5/99	1110		X	PAI-02-SB-11-02	4	3	1					3-Encores 1-~~8oz~~ Clear Glass
TP-2A		1445		X	PAI-02-SB-02A-02	4	3	1					
TP-10		1520		X	PAI-02-SB-10-07	4	3	1					
Trip Blank				X	Trip Blank & Temp. Blank	2	2						

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[illegible]	10/5/99 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: RESULTS TO DAVE Brazek 1-412-921-8375	
		[illegible]	10/6/99 1415		

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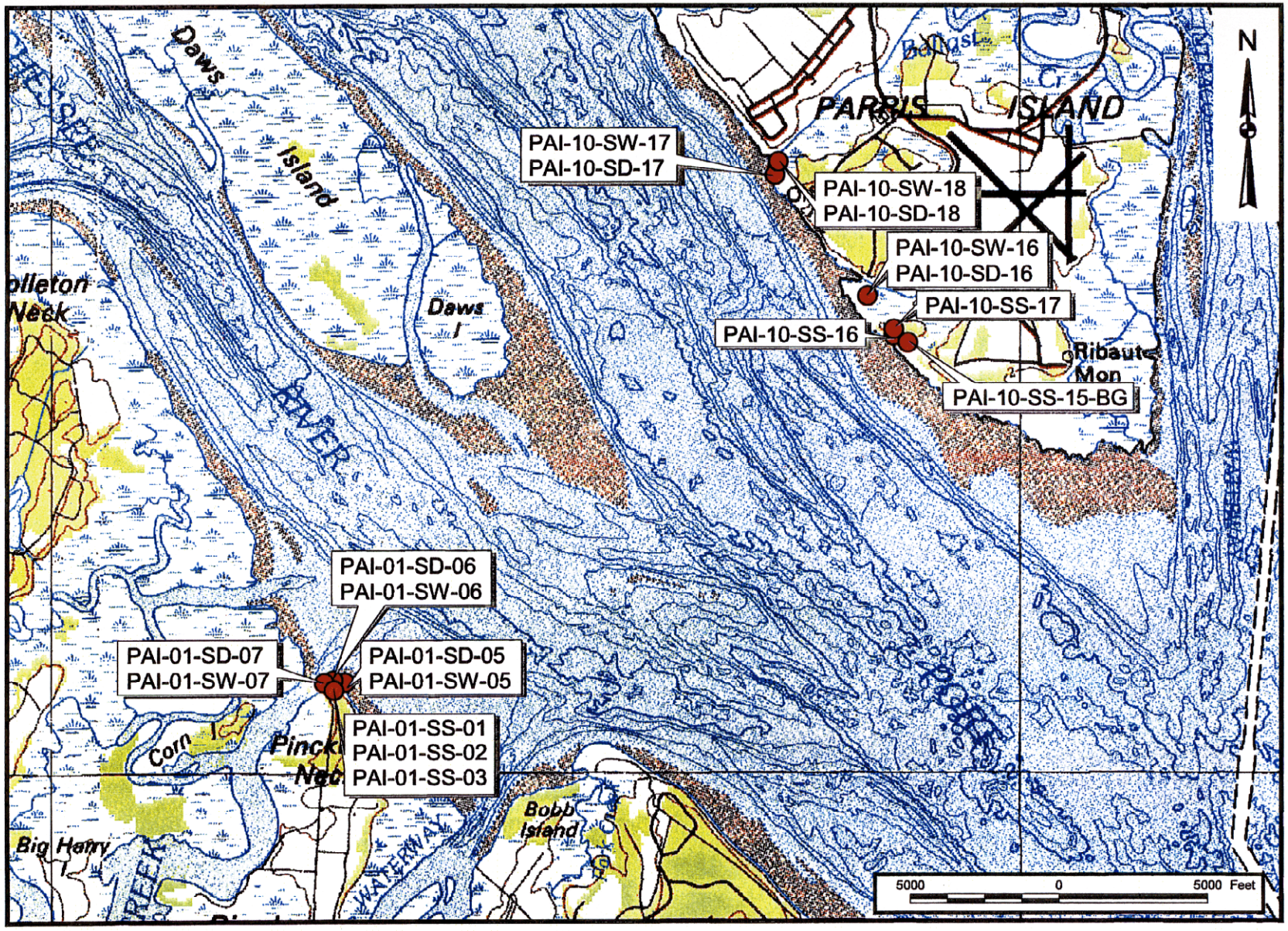
BACKGROUND SAMPLE DESCRIPTION, LOCATIONS, AND SUPPORTING COLLECTION DATA

BACKGROUND SAMPLE DESCRIPTION
PARRIS AND PINCKNEY ISLANDS
MCRD PARRIS ISLAND, SOUTH CAROLINA

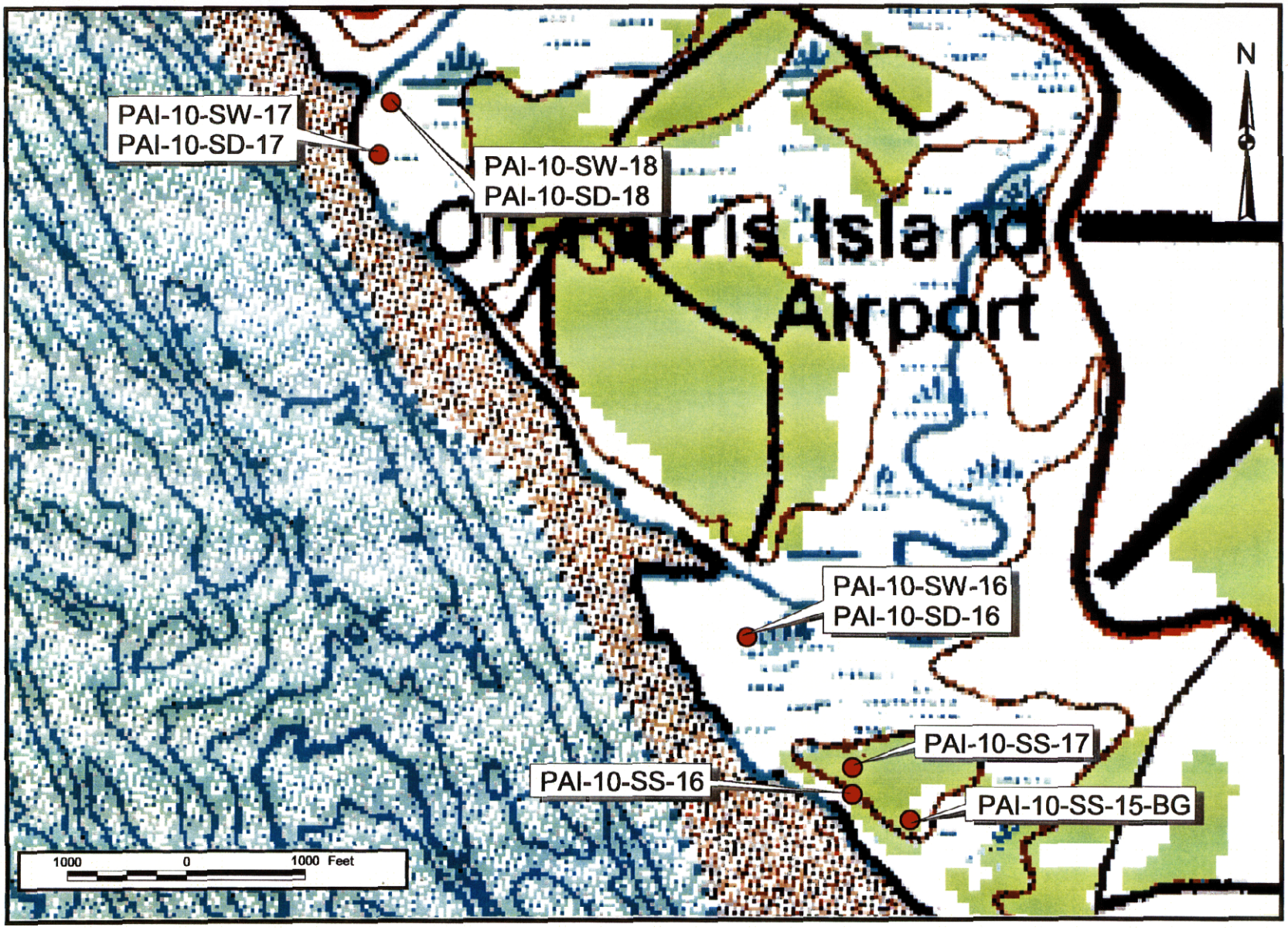
Sample Location	Sample Description
Surface Water	
PAI-01-SW-05*	Saline surface water sample collected on the northern edge of Pinckney Island at a submerged low tide elevation point.
PAI-01-SW-06*	Saline surface water sample collected in an intertidal area approximately 50 ft west of PAI-01-SW-05.
PAI-01-SW-07*	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.

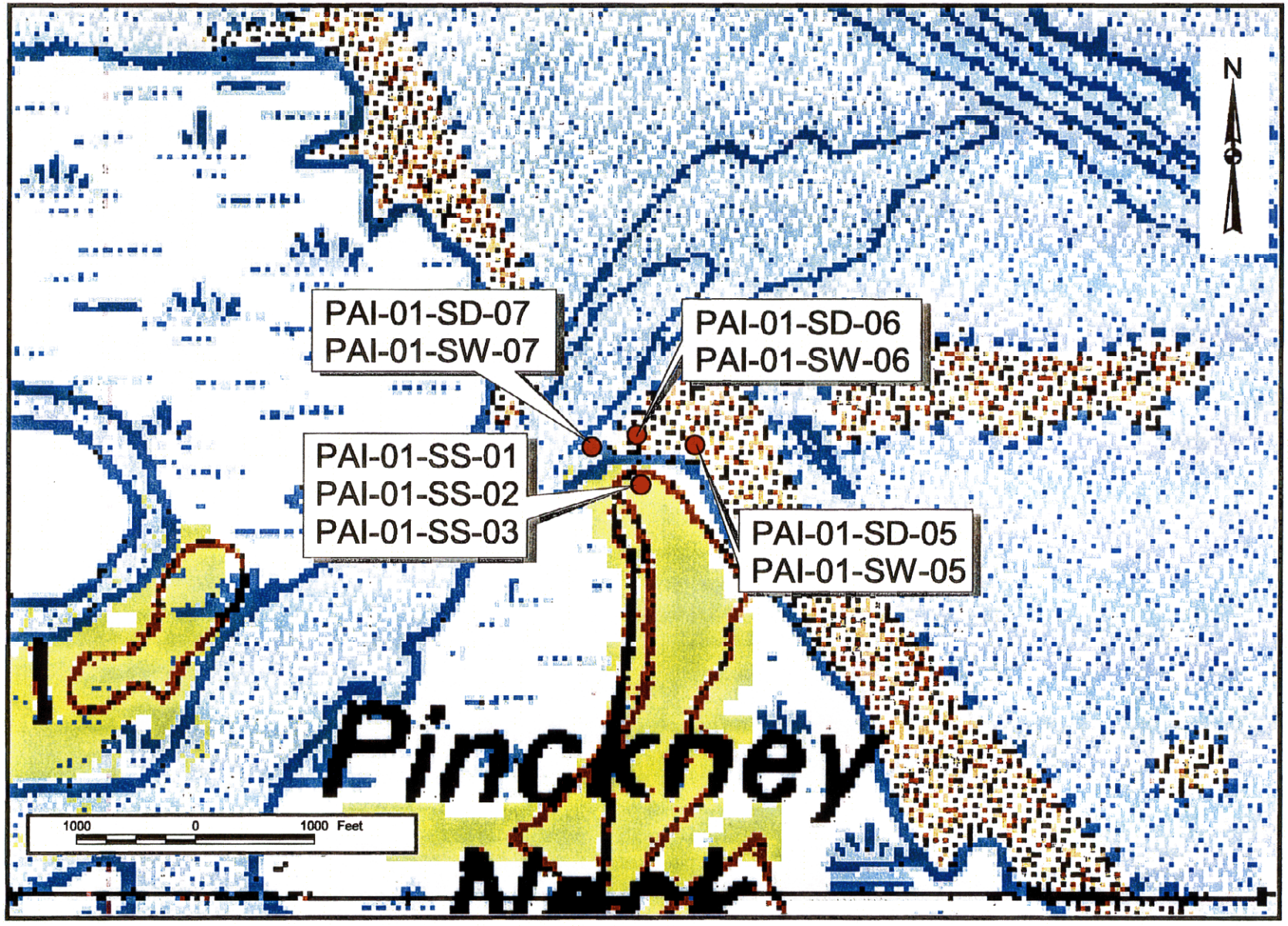
* Sample locations selected with input from the United States Fish and Wildlife Service. Additional description of samples and locations are provided on sample log sheets.



A-122

170 M87Y


PAI-10-SW-17
PAI-10-SD-17
PAI-10-SW-18
PAI-10-SD-18
Ohio River 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


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
Pinckney
1000 0 1000 Feet

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Sample ID	Closest potential source of anthropogenic contamination
PAI-10-SS-15, PAI-10-SS-16, PAI-10-SS-17, PAI-10-SD-16 and PAI-10-SW-16	The MCRD Parris Island golf course located approximately 2,000 to 2,500 feet east of the samples.
PAI-10-SD-17, PAI-10-SW-17, PAI-10-SD-18, PAI-10-SW-18	An industrialized portion of the Depot, located approximately 1,500 feet north of the samples.
Samples collected at Pinckney Island	Pinckney Island is a nature reserve with no development within the vicinity of the background samples. The closest source of contamination is a road that is over 1,000 feet away from the samples.

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.: 01306

- [ ] 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	

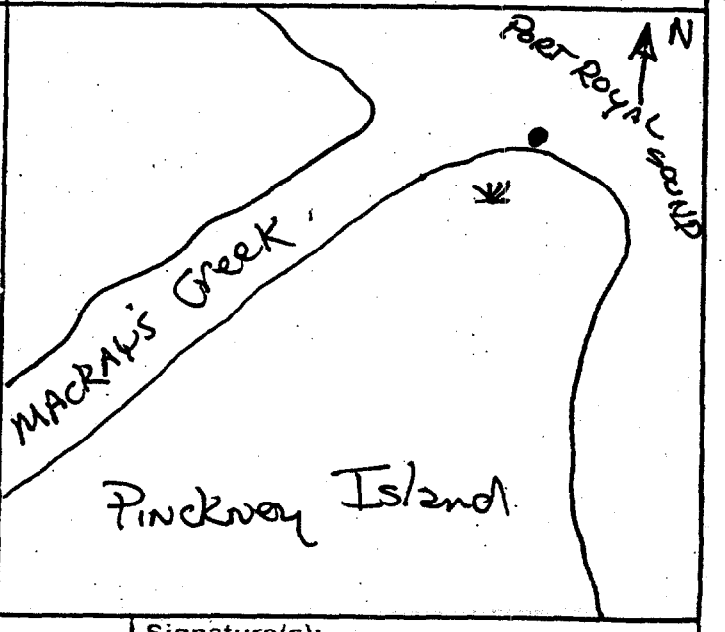
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (mL)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	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

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

Sample ID No.: PAI01 SW06
Sample Location: Pinckney Is.
Sampled By: RLM/JFL
C.O.C. No.: 01306

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	

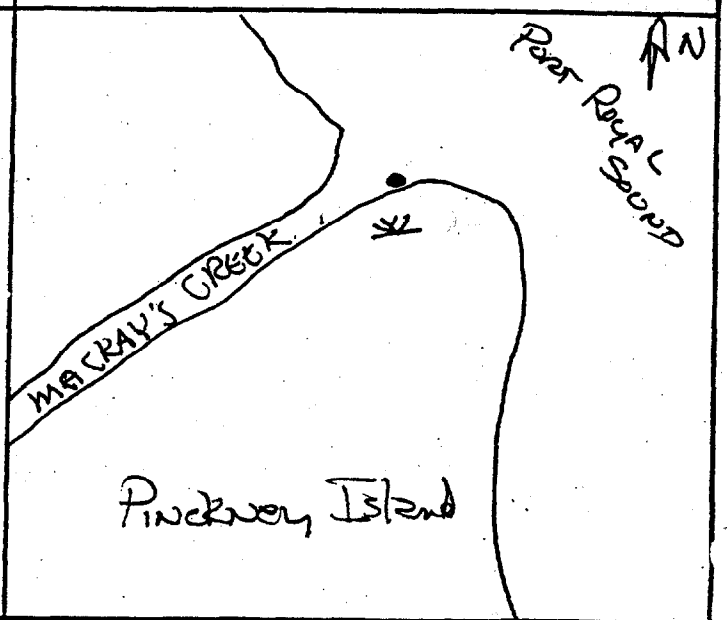
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals, Hardness	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.: 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:

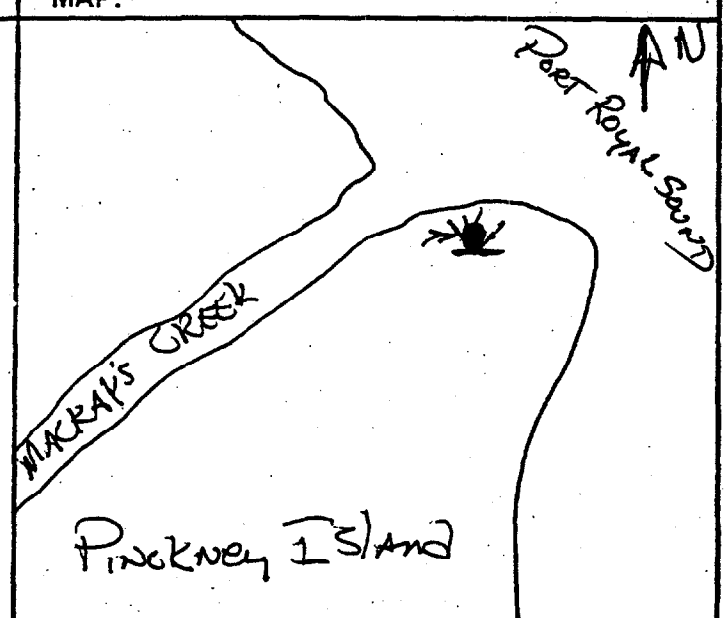
Date: / Time: / Depth: / Method:	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Grab		6.8	38.0	31	18	11.4	24	

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.: 7803

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

Sample ID No.: PAI-10-SW-16-01
Sample Location: PAI-10-SW16
Sampled By: Skip Barton
C.O.C. No.: 2280

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

SAMPLING DATA:

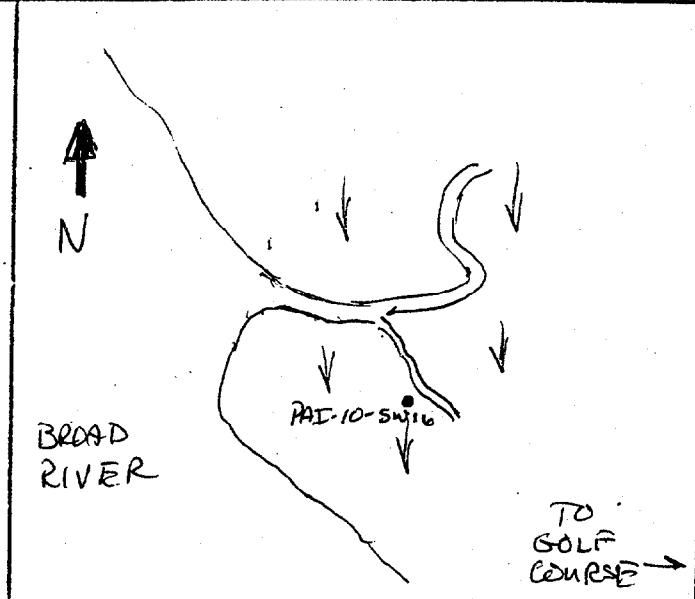
Date: 09/09/98	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Time: 1242								
Depth: surface	cloudy	6.72	44.3	27.4	7	3.25	2.87	secci disk 0.75 ft.
Method: Grab								

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

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

Sample ID No.: PAI-10-SW-17-01
Sample Location: PAI-10-SW17
Sampled By: Shy Barton
C.O.C. No.: 2250

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

SAMPLING DATA:

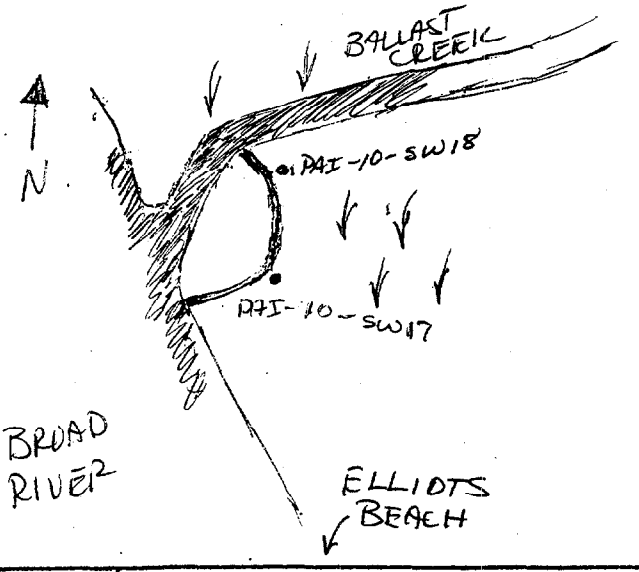
	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 09 10 98	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Time: 1421								
Depth: Surface	Clear	7.65	44.7	28.7	-9	4.64	2.91	Secci disk 1.35 ft
Method: Grab								

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): Shy Barton

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 1803

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

Sample ID No.: PAI-10-SW-18-01
Sample Location: PAI-10-SW18
Sampled By: Skip Barton
C.O.C. No.: 2250

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

SAMPLING DATA:

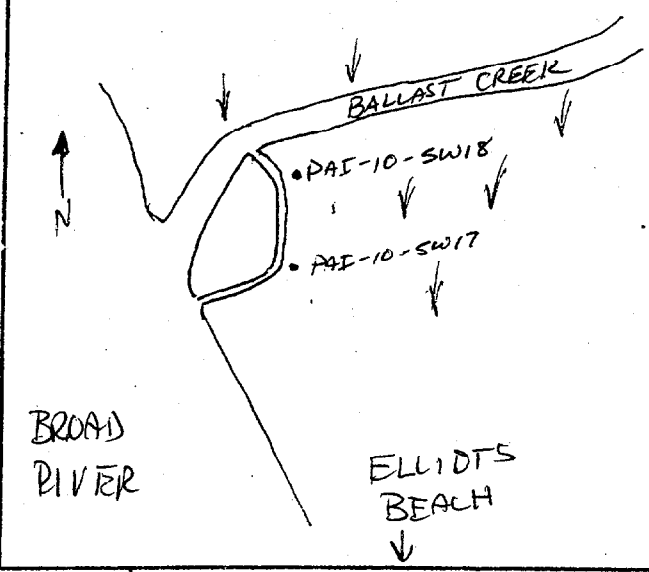
Date: / Time:	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: / Method: Grab	Cloudy	7.51	44.5	28.4	23	3.79	2.91	secci disk 0.25 ft.

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	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

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 SP05
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:

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

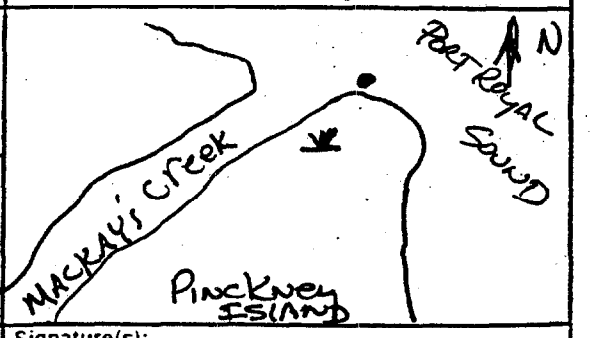
SAMPLE COLLECTION INFORMATION:

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:

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: RJM / 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):				

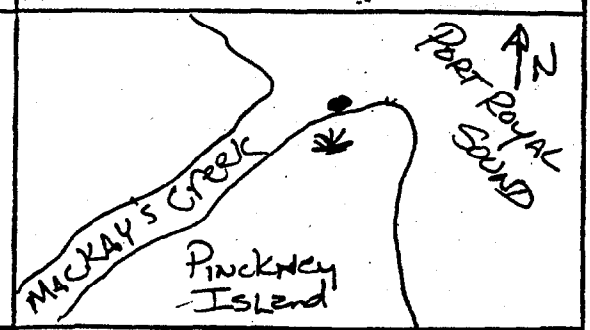
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL 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):

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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.: PAI01SD07
Sample Location: Pinckney Isl.
Sampled By: RLM/JEL
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):				

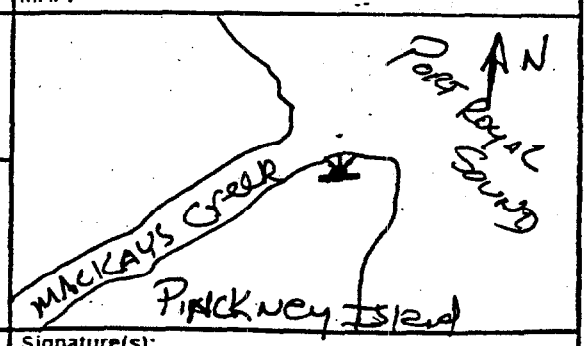
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	1 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

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 ~~PAI-10-SD-016-0~~
Sample Location: PAI-10-SD16
Sampled By: Skip Baxton
C.O.C. No.: 2080

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

GRAB SAMPLE DATA:

Date: 090998	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1527	0-0.5 ft.	drk. gray	silty clay, v. moist
Method: GRAB			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

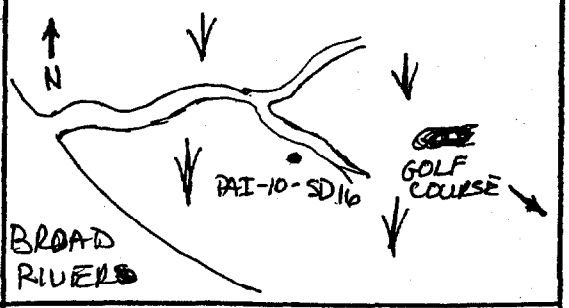
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	5	
TCL SVOCs	16oz	TOTAL OF 3	
TAL METALS (TOTAL)	16oz	16 OZ JARS	
CYANIDE	16oz		
TCL PESTICIDES / PCBs	16oz		
TOC	16 oz		
pH	16oz		
~~HEXAVALENT CHROMIUM~~	~~16oz~~		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES COLLECTED @ 0900 on 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Baxton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD - Jericho Island
Project No.: 7803

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

Sample ID No.: ~~PAI-10-SD-06-01A~~ PAI-10-SD-06-01A
Sample Location: PAI-10-SD06
Sampled By: GG, RD
C.O.C. No.: ~~2273~~ 2212

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): NA	0. -0.5 FT	dark Gray	Silty Clay, v. moist

COMPOSITE SAMPLE DATA:

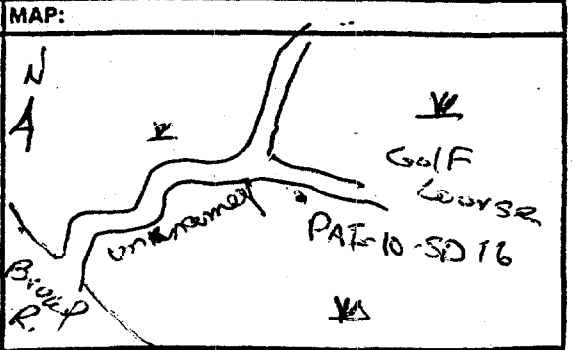
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH - SW846-8310	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: [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:			
Method: Grab	0-0.5 ft.	dk. gray/ black	clay mud, saturated
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

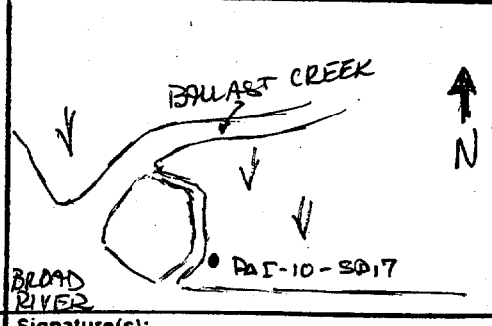
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	16oz	Total of 3	
TAL METALS (TOTAL)	16oz	16oz jars	
CYANIDE	16oz		
TCL PESTICIDES / PCBS	16oz		
TOC	16oz		
pH	16oz		
~~HEXAVALENT CHROMIUM~~	~~16oz~~		

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): [illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD - Jericho Island
Project No.: 7803

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

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

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:

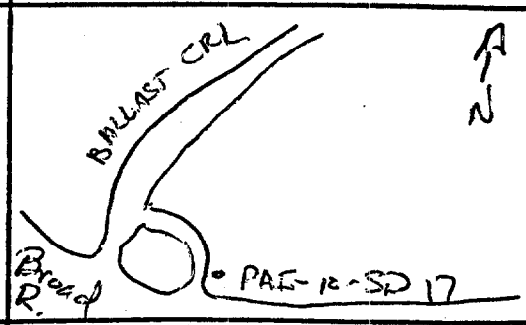
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH - SW 846 - 8310	1 - 8 oz	✓	

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-018-0~~
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	dk. 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):				

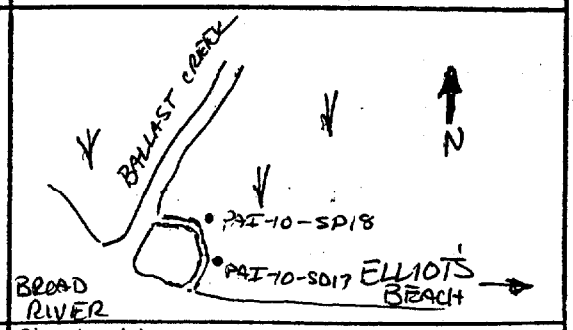
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	5	
TCL SVOCs	16oz	Total of 3	
TAL METALS (TOTAL)	16oz	16 oz Jars	
CYANIDE	16oz		
TCL PESTICIDES / PCBs	16oz		
TOC	16 oz		
pH	16oz		
~~HEXAVALENT CHROMIUM~~	~~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-18-01A ~~PAI-10-SD-018-01A~~
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	0-0.5 Ft	dark Gray	Clay mud, Saturated
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

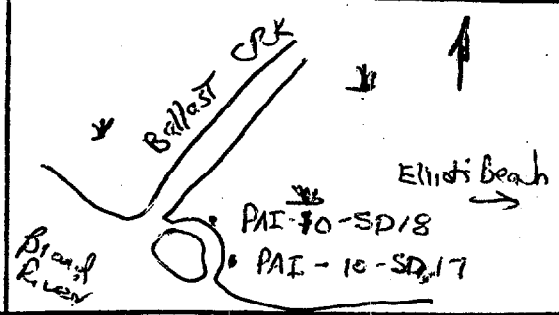
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH SW846-8310	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

Sample ID No.: PAI01SS0010
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.	fw.-med. sd., dry

COMPOSITE SAMPLE DATA:

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

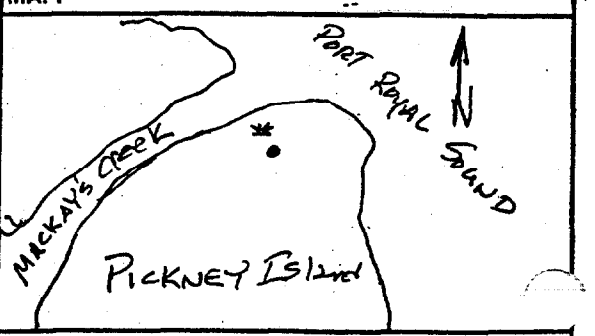
SAMPLE COLLECTION INFORMATION:

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 - 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):				

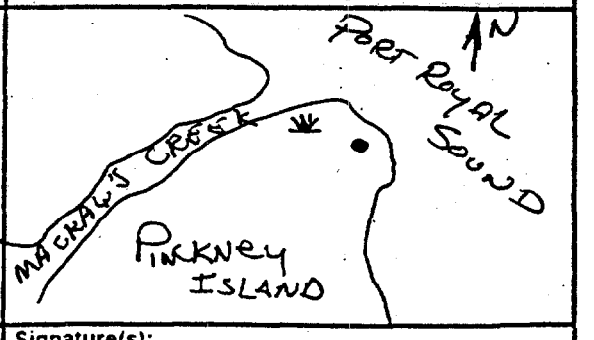
SAMPLE COLLECTION INFORMATION:

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.: PAI015500301
Sample Location: Pinckney Is.
Sampled By: RLM LIFL
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'	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):				

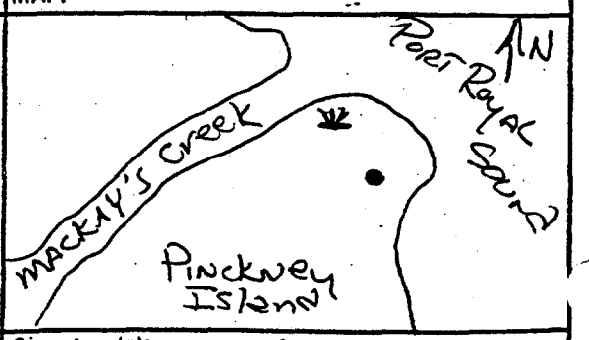
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL 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:

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.: ~~7344~~ 7803

Sample ID No.: ~~PAI-10-SS-015-01~~ PAI-10-SS-15-01 BG
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:

Date: 090998	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1419	0-1 ft.	lt. gray	v. 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):				

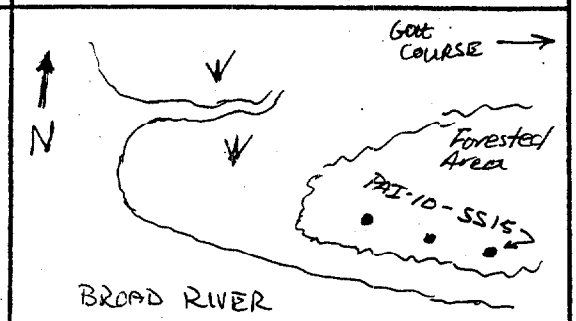
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	16 oz	Total of 3	
TAL METALS (TOTAL) AVS/SOM	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 @ ~~1444~~ 0813 ON 091098 SB 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):				

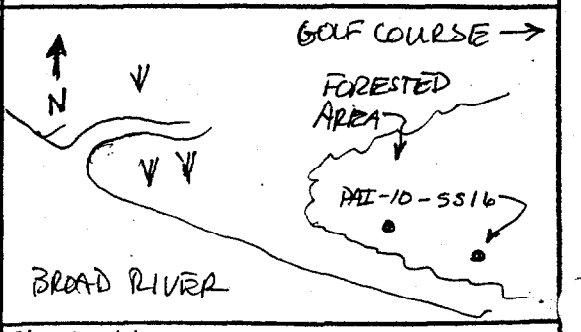
SAMPLE COLLECTION INFORMATION:

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 GC
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	sicty 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):				

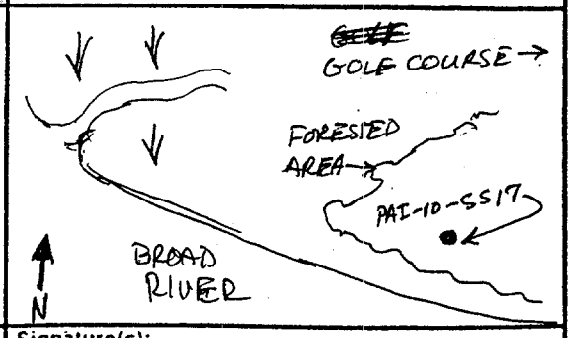
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.s	5 ENCORE SAMPLES	5	
TCL SVOCs	16 oz	TOTAL OF 3	
TAL METALS (TOTAL) A/S/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

00263

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 Encores (5)	TCL SVOC 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	RM	✓	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:	REMARKS:	
			6/6/98 1145	2.8°C (10.4, 11.3, 6.1) 563247, no seal	

Order No. 70440 (0693)

D-17

01306

29

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: Pine Knob Island

SAMPLERS (SIGNATURE): [signature] [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC + HCl 40 ml.	TCL SVOC 1000 ml. amber	TAL Metals + HNO3 Hardness	TAL Metals + HNO3 Filtered 1000 ml. plastic	TCL Pest + H2SO4 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): [signature]	DATE / TIME: 5/28/98 1420	REMARKS:	

Order No. 70440 (0693)

56356, 56304, 56360

A-148

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 Aroms (5)	TCL SVOC (6oz)	TAL Metals + CN (6oz)	TCL Pest/PCB (6oz)	TOC, pH (6oz)		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):	DATE / TIME:	REMARKS:	
		[signature]	5/28/98 1420		

56352, 56304, 56360 (12.9, 1.6, 7.3)(8.4, 7.0, , 6.0°C

A-149

02212

CHAIN OF CUSTODY RECORD

9816-118

PROJECT NO.: 7803

SITE NAME: Jericho Federal

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH 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	1450		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):
[signature]	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):	DATE / TIME:	REMARKS:	
		[signature]	12/16/98 8:40	Questions to Dave Brauck CETTA Tech - Pittsburgh 412-921-8375	

Order No. 70440 (0693)

A-156

CHAIN OF CUSTODY RECORD

9809265

02280

PROJECT NO.: 7803

SITE NAME: MCRD Parris Island, SC

SAMPLERS (SIGNATURE): Shep Barton

STATION NO.	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
1)	9/9/98	1419		✓	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):
Shep 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):	DATE / TIME:	REMARKS:	
		Joan A Smith	9/11/98 8:50	for soil & sediment samples 16oz jars were collected on 9/9/98, encores on 9/10/98 due to holding time constraints.	

Order No. 70440 (0693)

A-151

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-02
MW-05(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) Date Started: 7/12/98
36.0 ft. Date Completed: 7/12/98

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
8.0 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 ☐ 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-152

US NAVAL HOSPITAL
PSNR
PORT ROYAL ISLAND
Doggie Island
Jericho Island
Scout Island
ANCHERS
CREEK
Horse Creek
MARINE RECRUIT
BALBOA
WAKE
Short
Trailer Park
PAI-10-MW-01(S)/PAI-10-MW-02(D)
PAI-10-MW-03(S)/PAI-10-MW-04(D)
PAI-10-MW-05(S)
PAI-10-MW-06(D)
PAI-10-MW-09(S)/PAI-10-MW-10(D)
PAI-10-MW-11(S)
PAI-10-MW-12(D)
PAI-10-MW-07(S)
PAI-10-MW-08(D)
PAI-10-MW-13(S)
PAI-10-MW-14(D)
PAI-02-MW-04(S)
PAI-02-MW-05(D)
PAI-03-MW-04(S)
PAI-03-MW-03(S)
PAI-03-MW-01(S)
PAI-03-MW-02(D)
2 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-02 MW-04(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) 13.9 ft. Date Started: 7/12/98 Date Completed: 7/12/98

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 3.9 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: 13.9 ft. and 3.9 ft. NOTE: MULTIPLE SCREENS
____ ft. and ____ ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
8.0 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 14.0 ft. to 2.0 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 HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

US NAVAL HOSPITAL
USNR
PORT ROYAL ISLAND
Doggie Island
Jericho Island
Scout Island
ARCHERS
Horse
MARINE RECRUIT
PAT-10-MW-01(S)/PAT-10-MW-02(D)
PAT-10-MW-03(S)/PAT-10-MW-04(D)
PAT-10-MW-05(S)
PAT-10-MW-06(D)
PAT-10-MW-09(S)/PAT-10-MW-10(D)
PAT-10-MW-11(S)
PAT-10-MW-12(D)
PAT-10-MW-07(S)
PAT-10-MW-08(D)
PAT-10-MW-13(S)
PAT-10-MW-14(D)
PAT-02-MW-04(S)
PAT-02-MW-05(D)
PAT-03-MW-04(S)
PAT-03-MW-03(D)
PAT-03-MW-01(S)
PAT-03-MW-02(D)
2 of 2

A-14

TEST PIT LOG SHEETS

TEST PIT LOG

Page ___ of ___

Tetra Tech NUS, Inc.

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Swmu 2

TEST PIT No.: PAI 02-TP-01
DATE: 10/4/99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1		Top Soil (Organics - Roots)	SP	Brn F Sand	0	0
1-2.5		Brn F Sand	SP		0	0
2.5-6		Gray F Sand	SP	H_2O @ 2.5 Ft	2.2	0

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PAI-02-TP-02

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Swmu 2

TEST PIT No.: TP-02
DATE: 10-4-99
GEOLOGIST: ROD Hall

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1.0'		Br. fine sand w/ roots	SP			
1.0'-4.0'		Grayish Br. f. sand	SP			
		Moist @ 2.5 Wet @ 3.0'				
		~~Organics~~ FID Reading = 14 ppm				
		Sulfur odor →				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Page ___ of ___

Tetra Tech NUS, Inc.

PAI-02-TP-02A

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: SWMU 2

TEST PIT No.: TP-02A
DATE: 10-4-99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-10"		Br. fine Sand w/ Roots	SP			
10"-4.0'		Gray & Br. f. Sand	SP			
		Moist @ 2.5' Wet @ 3.0'				
		~~Organics~~ JOEN PID Reading = 54 ppm				
		Sulfur Odor →				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS: Test Pit location directly Adjacent to PAI-02-TP-02 Test Pit. Pit dug to collect sample in area where sulfur odor was present. Same Soil Types.

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PAI-02-TP-03

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Swamp 2

TEST PIT No.: TP-03
DATE: 10-4-99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-10"		0-10" Dk. F. Sand w/Roots	SP			
10"-5'		10"-5.0 Gray & Br. F. sand.	SP			
		Moist @ 4.0' Wet @ 5.0'				
		2 ppm				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Page ___ of ___

Tetra Tech NUS, Inc.

PAI-02-TP-04

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Swamp 2

TEST PIT No.: TP-04
DATE: 10-4-99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-8"		0-8" Light Br. f. sand w/roots	SP			
8"-4.5		8"-4.5' Light Gray f. sand	SP			
		Moist @ ~~4.0~~ 3.5				
		Wet @ 4.0'				
		0 ppm				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Page ___ of ___

Tetra Tech NUS, Inc.

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Swamp 2

TEST PIT No.: PAI-02-TP05
DATE: 10-4-99
GEOLOGIST: Rob Nix

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-8"		8" Top Soil / Organics	SP	Brn F Sand		
8"-18"		10" Brn F Sand	SP			
18"-5'		18" to 5FT F to Med	SP			
		Sand Tan & Gray		moist		
		water @ ~4.0 FT				
		open				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Site 2

TEST PIT No.: PAI-02-TP-06
DATE: 10-5-99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1'		Br. F. sand (Topsoil)	SP			
1-5		Br. to Gray F. sand	SP			
		Wet @ 2.5'. No stains				
		seen in Pit		FID=0 ppm		

TEST PIT CROSS SECTION AND / OR PLAN VIEW

~~Photo 1 of TP-06 Diagonal of Pit w/ Backhoe in Background~~

~~Photo 2 of TP-06 Lengthwise~~

~~Photo 3 of TP-06 Being Backfilled~~

DJO
8/2/00

REMARKS:

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Swimy 2

TEST PIT No.: PAI-02-TP-07
DATE: 10-5-99
GEOLOGIST: Rob Ittl

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-12"		Top Soil. Br. F. Sand.	SP			
12"-5'		Br. & Gray F. Sand.	SP			
		wet at 2½ feet		PID=0.0 ppm		
		No stains or garbage				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Swamp 2

TEST PIT No.: PAI-02-TP-08
DATE: 10-5-99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-8"		Top Soil	SP	Fined Sand organic		
8"-1.5'		Ex F. sand	SP			
1.5'-5'		Gray & Br. F. Sand.	SP	PID = 1.6 ppm		
		Water @ 4.0'		PID = 0.3 ppm		
		Total Depth 5				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Summerville

TEST PIT No.: PAI-02-~~SB~~ TP-09
DATE: 6-5-99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1'		Br. F. Sand	SP			
1'-5'		Gray & Br F. Sand. Wet @ 4.0'. No staining or Trash.	SP			
				PID=0ppm		

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PAI-02-TP-10 DJO 8/2/00

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: SWMU 2

TEST PIT No.: ~~PAI-02-SB-10-07~~
DATE: 10-5-99
GEOLOGIST: Rob Hall

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-.5		Br. F Sand.	SP			
.5'-5.'		Gray & Br. F. Sand.	SP			
5'-8.5		Lt. Br. F. Sand. Wet @ 8.0'	SP			
				PID = 0ppm		
		No staining or Trash				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Swma 2

TEST PIT No.: PAI 02-TP-11
DATE: 10-5-99
GEOLOGIST: Rob Tazzi

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	BZ (ppm)
0-0.6	/	Bc. F. sand. (Top soil)	SP			
0.6-5	/	Gray/o. Bc. F. sand.	SP			
		10-5 to T.D.		PID=0ppm		

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Page ___ of ___

Tetra Tech NUS, Inc.

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: SWMU 2

TEST PIT No.: PAI-02-TP-12
DATE: 10-5-99
GEOLOGIST: Rob Hall

DJO 8/2/00

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1'		Yellow F. Sand	SP			
1'-5'		Gray & Tan F. Sand	SP			
		Water @ 4.5'				
		No Staining or Trash		PID=0ppm		

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: ~~SA~~ SWMU2

TEST PIT No.: PAI-02-TP 13
DATE: 10-5-99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-.5'		Brown f. sand (Top Soil)	Sp	w/Organics		
.5-6'		Gray & Br. F. sand	Sp			
		wet @ 5.0'				
		No Staining or Trash		PID=0 ppm		

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Page ___ of ___

Tetra Tech NUS, Inc.

PROJECT NAME: Parris Island
PROJECT NUMBER: 7344
LOCATION: SWMU2

TEST PIT No.: PAI-02-TP-14
DATE: 10-5-99
GEOLOGIST: Rob/Alex

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-1.5'		Brown F Sand (Top Soil)	SP	w/organics		
1.5-8'		Gray & Br. F. Sand	SP			
		Water @ ~6.5'-7.0'				
				PID=0ppm		
		No staining or Trash.				

TEST PIT CROSS SECTION AND / OR PLAN VIEW

REMARKS:

PHOTO LOG:

TEST PIT LOG

Page ___ of ___

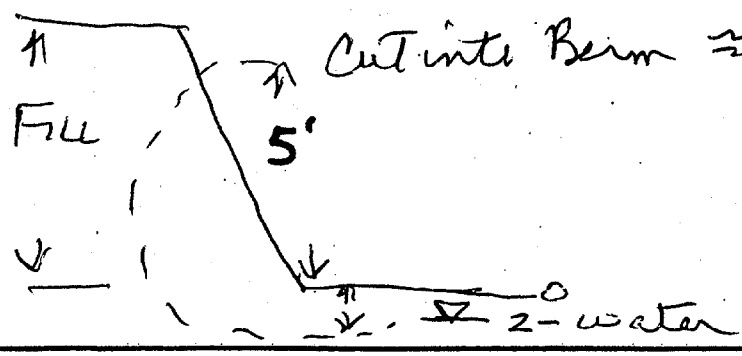
Tetra Tech NUS, Inc.

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Dump 2

TEST PIT No.: PAI-02-TP-15
DATE: 10-5-99
GEOLOGIST: Rob Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-3'		Gray & Br. Fine Sand.	SP	w/ Organic		
		Water ~ 2.0 - Fill				
		No Staining or Trash.		PID = 0 ppm		
		3 Ft Deep from base of				
		Berm. 8 Ft Total				

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS:

PHOTO LOG:

TEST PIT LOG

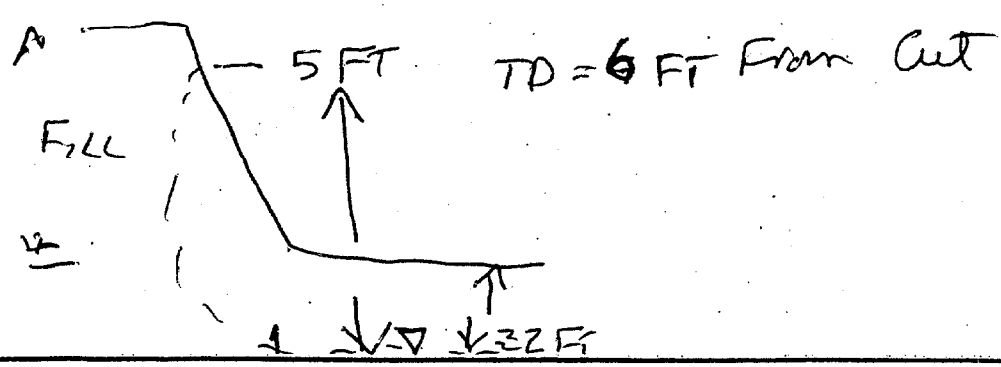
Tetra Tech NUS, Inc.

Page ___ of ___

PROJECT NAME: Parris Island
PROJECT NUMBER: 7394
LOCATION: Stream 2
TEST PIT No.: PHI-02-TP-16
DATE: 10/5/99
GEOLOGIST: [illegible]

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	PID/FID READING: BZ (ppm)
0-4'		Br. F. Sand - Fill	SP	w/organics		
4-6'		Gray F. Sand. Water 5.0'	SP			
		Fill to 3 FT.				
		No Staining or Trash.				
				PID=0ppm		

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS:

PHOTO LOG:

A-15

TEST PIT SAMPLE LOG SHEETS

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island
Project No.: 1394

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

Sample ID No.: PAI-02-SB-02A-02
Sample Location: PAI-02 P-02A
Sampled By: Rob Hill
C.O.C. No.: 02229

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-5-99 Time: 1445 Method: Monitor Reading (ppm):	2.0'	Gray	Fine Sand.

COMPOSITE SAMPLE DATA:

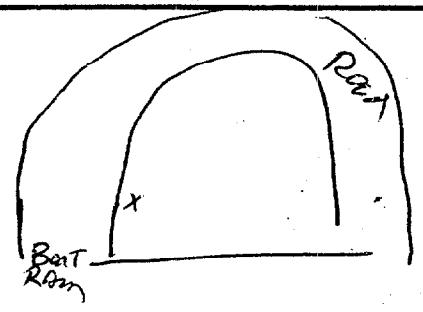
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	3- ENCORES	✓	
TCL SVOCS			
TAL Metals	1-16oz G.	✓	
TCL Pest/PCBs			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-171

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: Parris Island
Project No.: 7394

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

Sample ID No.: PAI-02-SB-10-07
Sample Location: PAI-02-TP-07
Sampled By: JRID
C.O.C. No.: 02229

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

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 10-5-99 Time: 1520 Method: Monitor Reading (ppm): 0	7.0'	Gray	Fine Sand.

COMPOSITE SAMPLE DATA:

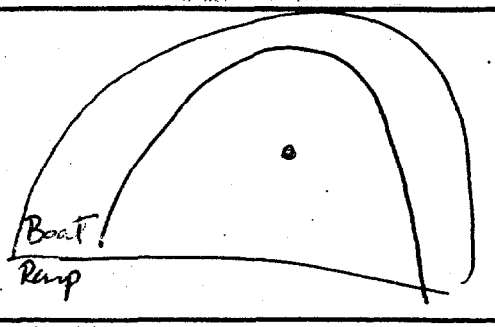
	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	3-Encores	✓	
TCL SVOCs			
TCL Pest/PCBs	1-16oz	✓	
TAL metals			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Rob Hill by GG.

A-172

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: SWMU 2
Project No.: 7394

Sample ID No.: ~~PAI-02-SB-11-02-S~~ PAI-02-SB-11-02
Sample Location: PAI-02-TP-11
Sampled By: Rob Hill
C.O.C. No.: 02229

[] 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: 10-5-99 Time: 1110 Method: Grab Monitor Reading (ppm): 0	2.0'-3.0'	Gray & Brown	Fine sand.

COMPOSITE SAMPLE DATA:

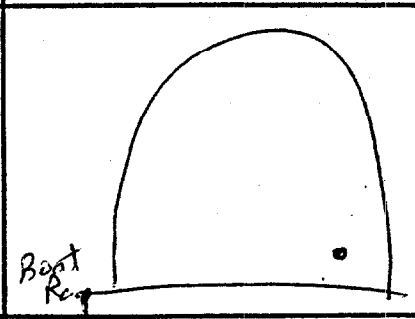
	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date:				
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC's / SVOC's	3X Encore	10-5-99	
TAL Metals, TCL/Pest/PCB's/PAHs	1X 8 oz Clear Glass	"	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Rob Hill

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-2-MW 01 (S)		RISING HEAD TEST	
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB	APPROVED BY	DATE

$$K = r^2 \frac{\ln L/R}{2 L T_0}$$

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 = 13.29 FT
T_0 = Time For Water Level to Rise or Fall to 37% of initial Change — T_0 = 2.4 min

$$K = r^2 \frac{\ln L/R}{2 L T_0} = (0.083 FT)^2 \frac{\ln\left(\frac{13.29 FT}{0.083 FT}\right)}{2(13.29 FT)(2.4 min)}$$

$$= 5.48 \times 10^{-4} \text{ ft/min}$$

$$5.48 \times 10^{-4} \text{ ft/min} \times 1440 \text{ min/day} = 0.789 \text{ ft/day}$$

$$0.789 \text{ ft/day} \times 3.528 \times 10^{-4} \frac{\text{cm/sec}}{\text{ft/day}} = 2.78 \times 10^{-4} \text{ cm/sec}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 2) WELL/BORING NO.: PAT2-MW16

PROJECT NO.: 7394 GEOLOGIST: Mark Dannington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: TEST NO.: 7/Step 1

STATIC WATER LEVEL (Depth/Elevation): 16.51/TWD=29.80/LWC=13.29 DATE: 8/22/98

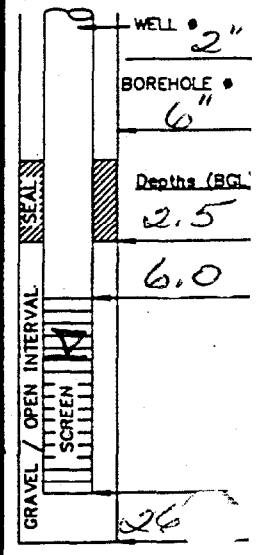
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED: GG

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 2 OF 2

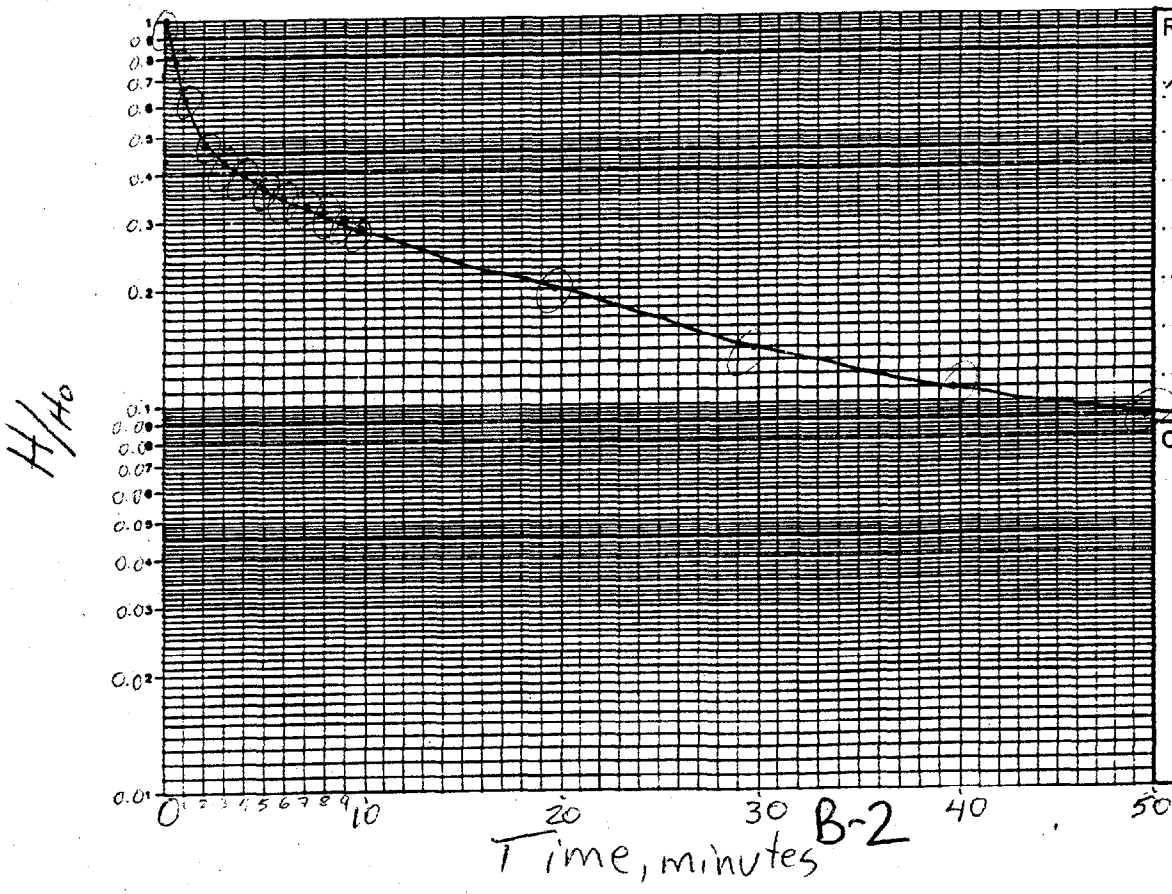
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.467	1	19.82	0.502	0.20
0.5	1.958	0.79	29.82	0.356	0.14
1.02	1.545	0.63	39.82	0.267	0.11
2.02	1.195	0.48	49.82	0.222	0.09
3.02	1.065	0.43			
4.02	0.979	0.40			
5.02	0.915	0.37			
6.02	0.865	0.35			
7.02	0.826	0.33			
8.02	0.788	0.32			
9.02	0.750	0.30			
9.82	0.725	0.29			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

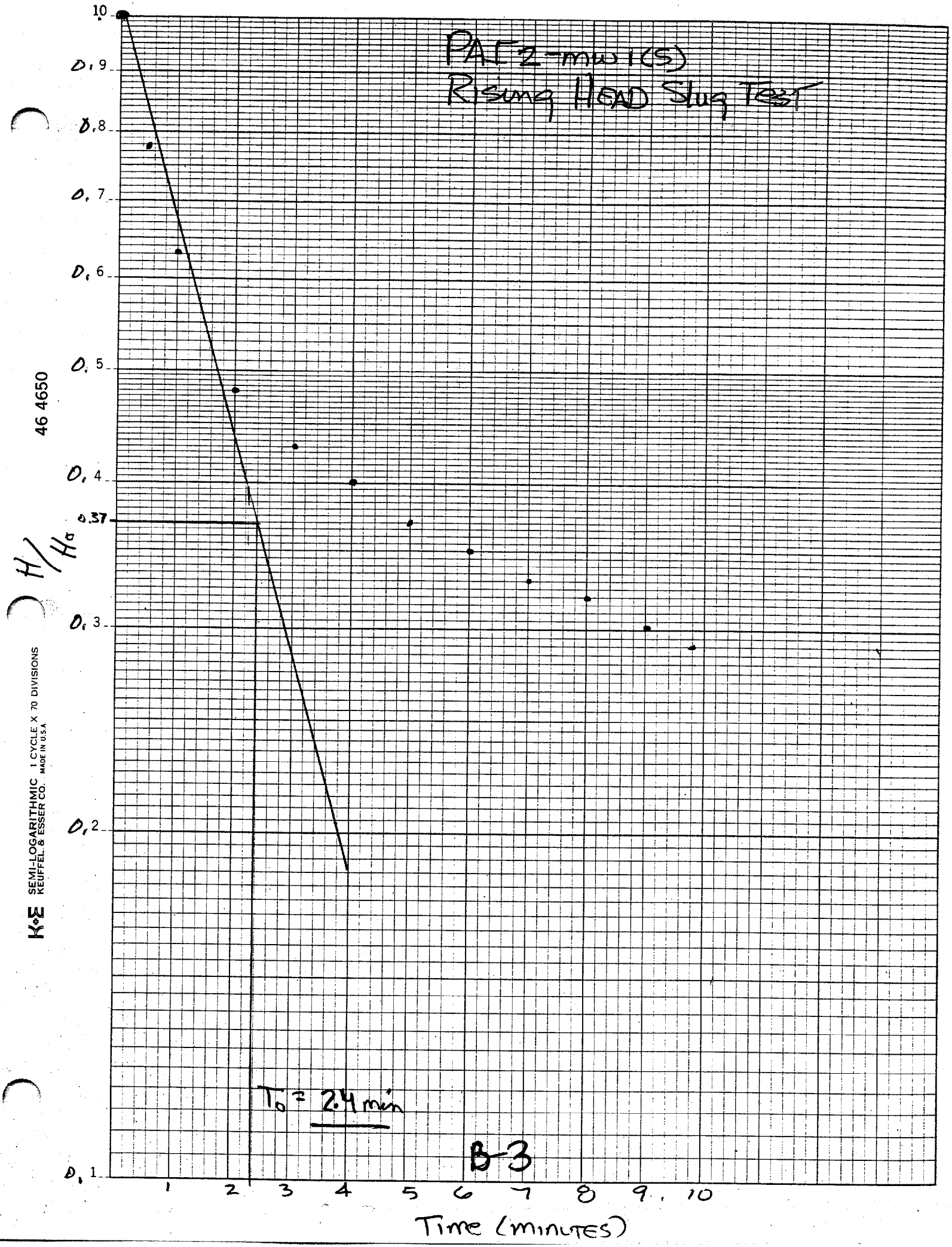


REMARKS:

KD = 12.80

CALCS, SKETCH MAPS, ETC.:

B-2


PAE-2-MW-1(S)
Rising Head Slug Test
10
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
H/Ho
1
2
3
4
5
6
7
8
9
10
Time (minutes)
To = 2.4 min
B-3
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

~~PAI2 [illegible]~~ PAI2-MW1(S)
TEST 7, STEP 1
SLUG OUT (RISE)

SE1000C
Environmental Logger
08/22 15:08

Unit# 00145 Test 7

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00001
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 08/22 10:30:50

Elapsed Time	INPUT 1
0.0000	1.240
0.0033	0.381
0.0066	1.530
0.0100	2.162
0.0133	2.791
0.0166	2.066
0.0200	3.319
0.0233	2.327
0.0266	2.931
0.0300	2.530
0.0333	2.747
0.0366	2.632
0.0400	2.670
0.0433	2.645
0.0466	2.613
0.0500	2.558
0.0533	2.632
0.0566	2.632
0.0600	2.626
0.0633	2.639
0.0666	2.569
0.0700	2.645
0.0733	2.702
0.0766	2.715
0.0800	2.715
0.0833	2.677
0.0866	2.588
0.0900	2.600
0.0933	2.550
0.0966	2.581
0.1000	2.543
0.1033	2.543
0.1066	2.537
0.1100	2.543
0.1133	2.543
0.1166	2.550
0.1200	2.537

PAI 2-MW1(S)

~~PAI~~

Test 7 Step 1

Slug Out (Rising Head Test)

	0.1233	2.537
	0.1266	2.524
	0.1300	2.511
	0.1333	2.511
	0.1366	2.505
	0.1400	2.518
	0.1433	2.505
	0.1466	2.505
	0.1500	2.499
	0.1533	2.492
	0.1566	2.486
	0.1600	2.486
	0.1633	2.467
	0.1666	2.441
	0.1700	2.461
	0.1733	2.467
	0.1766	2.467
	0.1800	2.467
0	0.1833	2.467 $= T_0$
	0.1866	2.454
	0.1900	2.454
	0.1933	2.378
	0.1966	2.448
	0.2000	2.435
	0.2033	2.435
	0.2066	2.429
	0.2100	2.429
	0.2133	2.429
	0.2166	2.416
	0.2200	2.416
	0.2233	2.410
	0.2266	2.403
	0.2300	2.403
	0.2333	2.397
	0.2366	2.397
	0.2400	2.391
	0.2433	2.391
	0.2466	2.384
	0.2500	2.384
	0.2533	2.378
	0.2566	2.378
	0.2600	2.372
	0.2633	2.365
	0.2666	2.365
	0.2700	2.359
	0.2733	2.359
	0.2766	2.359
	0.2800	2.352
0.1	0.2833	2.346
	0.2866	2.346
	0.2900	2.340
	0.2933	2.340
	0.2966	2.340
	0.3000	2.333
	0.3033	2.333
	0.3066	2.321
	0.3100	2.314
	0.3133	2.314
	0.3166	2.314
	0.3200	2.308

PAF2-MW1(S)
Test 7 Step 1
Slug Out (Rising Head Test)

	0.3233	2.308
	0.3266	2.305
	0.3300	2.302
	0.3333	2.302
	0.3500	2.283
	0.3666	2.263
0.2 –	0.3833	2.244
	0.4000	2.232
	0.4166	2.213
	0.4333	2.194
	0.4500	2.174
	0.4666	2.158
0.3 –	0.4833	2.143
	0.5000	2.130
	0.5166	2.124
	0.5333	2.098
	0.5500	2.070
	0.5666	2.066
0.4 –	0.5833	2.054
	0.6000	2.041
	0.6166	2.022
	0.6333	2.009
	0.6500	1.990
	0.6666	1.977
0.5 –	0.6833	1.958
	0.7000	1.946
	0.7166	1.933
	0.7333	1.920
	0.7500	1.901
	0.7666	1.895
0.6 –	0.7833	1.882
	0.8000	1.869
	0.8166	1.857
	0.8333	1.837
	0.8500	1.825
	0.8666	1.806
0.7 –	0.8833	1.790
	0.9000	1.787
	0.9166	1.774
	0.9333	1.755
	0.9500	1.748
	0.9666	1.720
0.8 –	0.9833	1.717
	1.0000	1.704
1.02 –	1.2000	1.545
	1.4000	1.437
	1.6000	1.354
	1.8000	1.291
	2.0000	1.233
2.02 –	2.2000	1.195
	2.4000	1.157
	2.6000	1.125
	2.8000	1.094
	3.0000	1.068
3.02 –	3.2000	1.055
	3.4000	1.043
	3.6000	1.024
	3.8000	1.005
	4.0000	0.992
4.02 –	4.2000	0.979

PAI 2-mw (5)
Test 7 Step 1
Slug out (Rising Head Test)

	4.4000	0.960
	4.6000	0.947
	4.8000	0.935
	5.0000	0.928
5.02 -	5.2000	0.915
	5.4000	0.909
	5.6000	0.890
	5.8000	0.884
	6.0000	0.871
6.02 -	6.2000	0.865
	6.4000	0.858
	6.6000	0.852
	6.8000	0.839
	7.0000	0.833
7.02 -	7.2000	0.826
	7.4000	0.814
	7.6000	0.801
	7.8000	0.801
	8.0000	0.795
8.02 -	8.2000	0.788
	8.4000	0.776
	8.6000	0.776
	8.8000	0.769
	9.0000	0.756
9.02 -	9.2000	0.750
	9.4000	0.750
	9.6000	0.737
	9.8000	0.725
9.82 -	10.0000	0.725
	12.0000	0.674
	14.0000	0.623
	16.0000	0.585
	18.0000	0.547
19.82 -	20.0000	0.502
	22.0000	0.464
	24.0000	0.438
	26.0000	0.413
	28.0000	0.381
29.82 -	30.0000	0.356
	32.0000	0.343
	34.0000	0.318
	36.0000	0.292
	38.0000	0.279
39.82 -	40.0000	0.267
	42.0000	0.260
	44.0000	0.241
	46.0000	0.241
	48.0000	0.229
49.82 -	50.0000	0.222
	52.0000	0.209
	54.0000	0.209
	56.0000	0.209
	58.0000	0.203
59.82 -	60.0000	0.203
	62.0000	0.203
	64.0000	0.190

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI2-MW2(S) RISING 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 = 0.083 FT
R = Radius of Well Screen — R = 0.083 FT
L = Length of Well Screen — L = 12.49
T_0 = Time For Water Level to Rise or Fall To 37% of initial Change — T_0 = 1.6 min.

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,Ft)^2 \ln 12.49\,Ft/0.083\,Ft}{2(12.49)(1.6)}$$

$$= 8.64 \times 10^{-4}\ Ft/min$$

$$8.64 \times 10^{-4}\ Ft/min \times 1440\ min/day = 1.24\ Ft/day$$

$$1.24\ Ft/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{Ft/day} = \underline{4.37 \times 10^{-4}\ cm/sec}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Island, SC (Site 2) WELL/BORING NO.: PAI2-MW26

PROJECT NO.: 7394 GEOLOGIST: Mark Damington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: TEST NO.: 6/Step 1

STATIC WATER LEVEL (Depth/Elevation): 17.53/TWD=30.02/LWC=12.49 DATE: 8/22/98

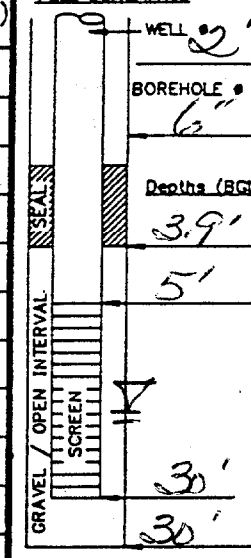
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED: GG

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 2 OF 2

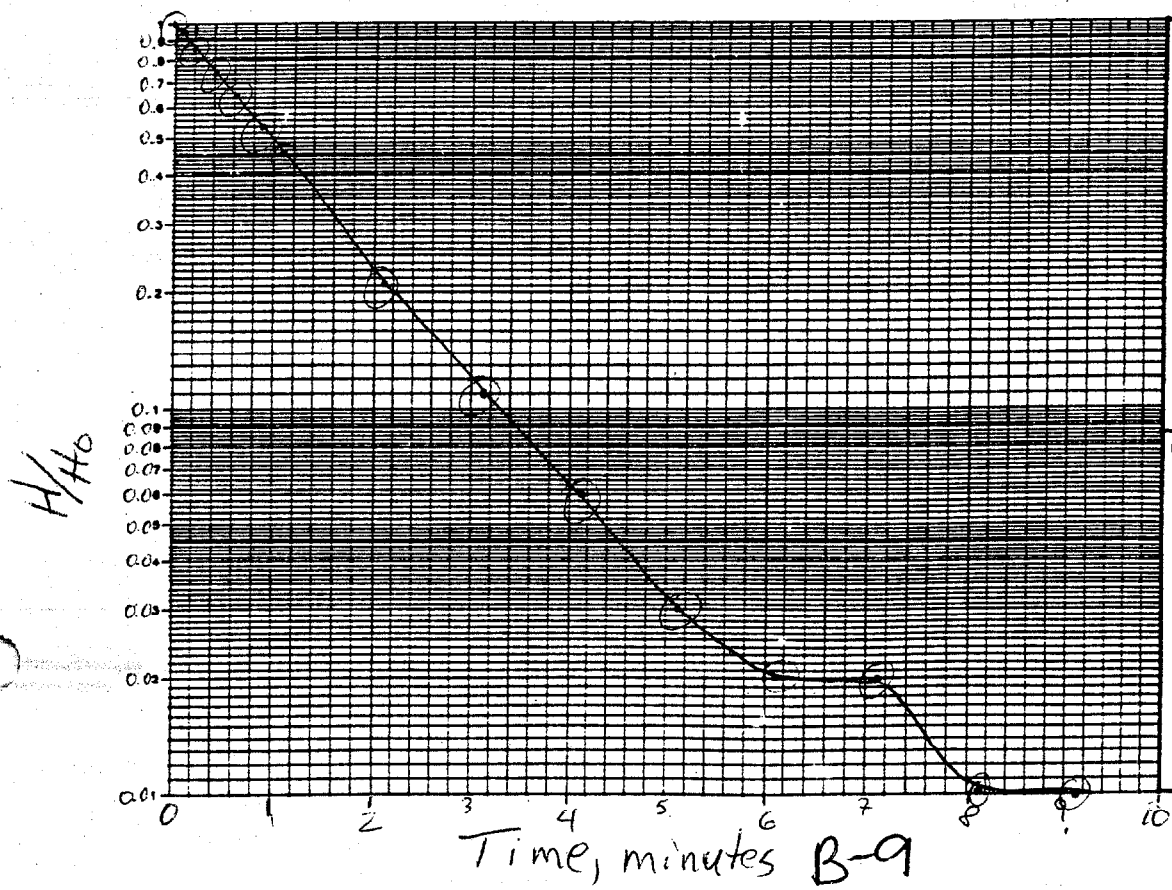
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.206	1	7.09	0.038	0.027
0.1	2.047	0.93	8.09	0.031	0.014
0.2	1.907	0.86	9.09	0.025	0.011
0.4	1.653	0.75			
0.6	1.437	0.65			
0.89	1.138	0.52			
1.09	0.985	0.45			
2.09	0.464	0.21			
3.09	0.235	0.11			
4.09	0.133	0.06			
5.09	0.076	0.03			
6.09	0.044	0.02			

WELL SCHEMATIC



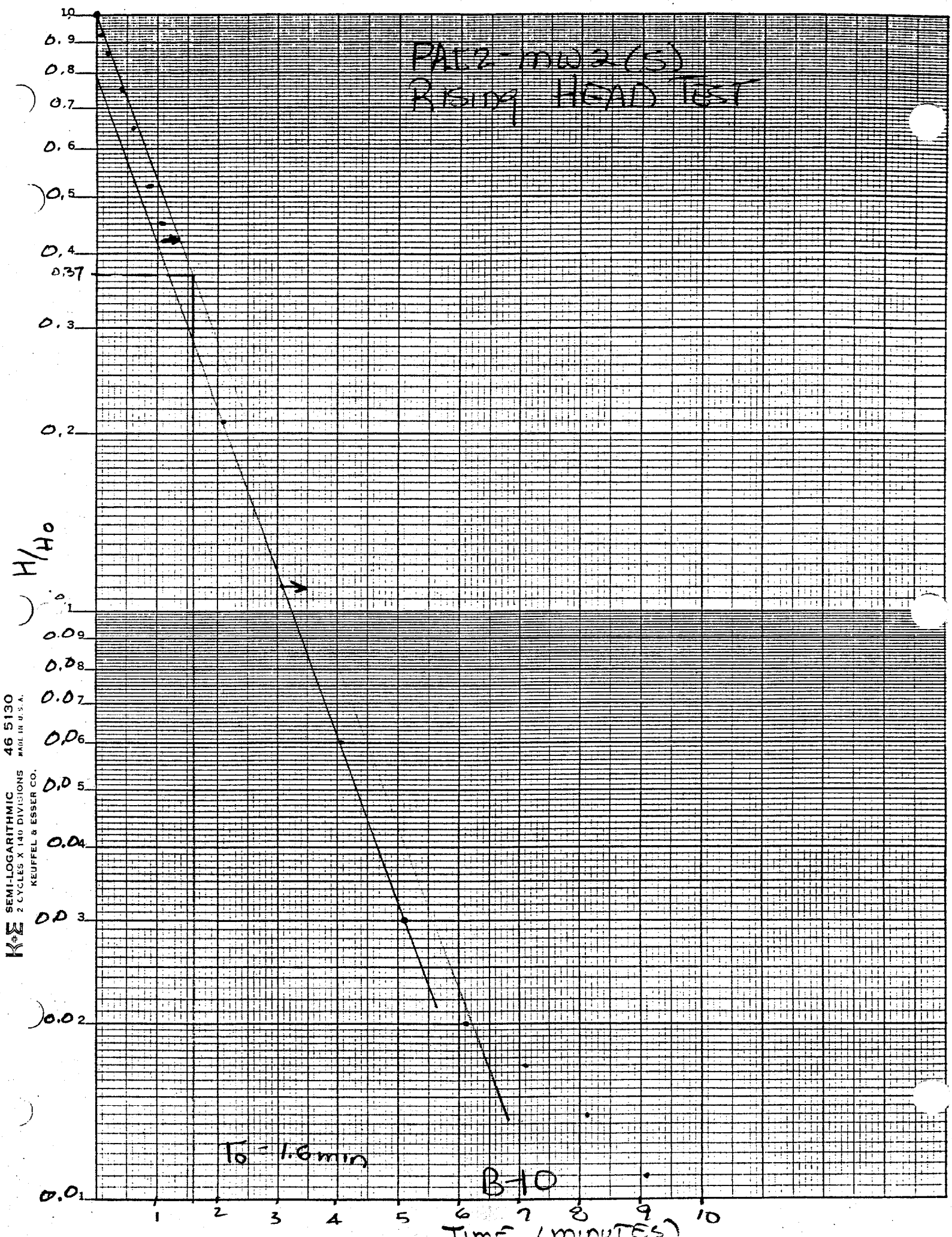
▽ Indicate SWL Depth on Drawing



REMARKS:

XD = 12.18

CALCS, SKETCH MAPS, ETC.:


PAL2-MW2(S)
RISING HEAD 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
7
8
9
10
TIME (MINUTES)
To = 1.6 min
B-10
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

~~PAI2 GW2~~ PAI 2-MW2(S)
TEST 6, STEP 1
SLUG OUT (RISE)

SE10000
Environmental Logger
08/22 14:57

Unit# 00145 Test 6

Setups:	INPUT 1
Type	Level (F)
Mode	TUC
I.D.	00002
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 08/22 08:46:30

Elapsed Time	INPUT 1
0.0000	2.162
0.0033	0.547
0.0066	1.302
0.0100	1.958
0.0133	2.378
0.0166	2.251
0.0200	3.128
0.0233	2.842
0.0266	2.707
0.0300	2.734
0.0333	2.727
0.0366	2.695
0.0400	2.715
0.0433	2.695
0.0466	2.740
0.0500	2.683
0.0533	2.675
0.0566	2.664
0.0600	2.664
0.0633	2.625
0.0666	2.626
0.0700	2.651
0.0733	2.676
0.0766	2.689
0.0800	2.969
0.0833	2.816
0.0866	2.069
0.0900	2.791
0.0933	3.140
0.0966	2.562
0.1000	2.549
0.1033	2.556
0.1066	2.543
0.1100	2.537
0.1133	2.537
0.1166	2.511
0.1200	2.511

PAI2-MW 2(S)

Test 6 Step 1
Slug Out (Rising Head Test)

0.1233	2.511
0.1266	2.492
0.1300	2.492
0.1333	2.486
0.1366	2.492
0.1400	2.486
0.1433	2.473
0.1466	2.473
0.1500	2.460
0.1533	2.454
0.1566	2.448
0.1600	2.441
0.1633	2.441
0.1666	2.435
0.1700	2.422
0.1733	2.416
0.1766	2.422
0.1800	2.403
0.1833	2.403
0.1866	2.390
0.1900	2.390
0.1933	2.384
0.1966	2.378
0.2000	2.378
0.2033	2.371
0.2066	2.365
0.2100	2.359
0.2133	2.352
0.2166	2.346
0.2200	2.346
0.2233	2.340
0.2266	2.333
0.2300	2.333
0.2333	2.320
0.2366	2.333
0.2400	2.308
0.2433	2.308
0.2466	2.301
0.2500	2.301
0.2533	2.295
0.2566	2.289
0.2600	2.276
0.2633	2.276
0.2666	2.276
0.2700	2.263
0.2733	2.257
0.2766	2.257
0.2800	2.251
0.2833	2.251
0.2866	2.244
0.2900	2.231
0.2933	2.225
0.2966	2.225
0.3000	2.218
0.3033	2.212
0.3066	2.212
0.3100	2.200 To
0.3133	2.206
0.3166	2.193
0.3200	2.187

PAF 2-mw 2(S)

Test 6 Step 1
Slug Out (Rising Head Test)

	0.3233	2.193
	0.3266	2.181
	0.3300	2.174
	0.3333	2.174
	0.3500	2.149
	0.3666	2.130
	0.3833	2.098
	0.4000	2.079
0.1 -	0.4166	2.047
	0.4333	2.022
	0.4500	2.009
	0.4666	1.977
	0.4833	1.952
	0.5000	1.933
0.2 -	0.5166	1.907
	0.5333	1.888
	0.5500	1.863
	0.5666	1.844
	0.5833	1.818
	0.6000	1.799
0.3 -	0.6166	1.780
	0.6333	1.755
	0.6500	1.742
	0.6666	1.717
	0.6833	1.691
	0.7000	1.678
0.4 -	0.7166	1.653
	0.7333	1.640
	0.7500	1.615
	0.7666	1.602
	0.7833	1.577
	0.8000	1.564
0.5 -	0.8166	1.545
	0.8333	1.532
	0.8500	1.513
	0.8666	1.494
	0.8833	1.475
	0.9000	1.462
0.6 -	0.9166	1.437
	0.9333	1.424
	0.9500	1.411
	0.9666	1.386
	0.9833	1.367
	1.0000	1.361
0.89 -	1.2000	1.138
1.09 -	1.4000	0.955
	1.6000	0.845
	1.8000	0.731
	2.0000	0.629
	2.2000	0.547
2.09 -	2.4000	0.464
	2.6000	0.394
	2.8000	0.340
	3.0000	0.305
	3.2000	0.267
3.09 -	3.4000	0.235
	3.6000	0.210
	3.8000	0.184
	4.0000	0.165
	4.2000	0.140

PAI2-MW 2(S)

Test 6 Step 1
Slug Out (Rising Head Test)

4.09- 4.4000	0.133
4.6000	0.120
4.8000	0.101
5.0000	0.101
5.2000	0.089
5.09- 5.4000	0.076
5.6000	0.076
5.8000	0.070
6.0000	0.057
6.2000	0.051
6.09- 6.4000	0.044
6.6000	0.044
6.8000	0.038
7.0000	0.044
7.2000	0.031
7.09- 7.4000	0.038
7.6000	0.031
7.8000	0.031
8.0000	0.031
8.2000	0.025
8.09- 8.4000	0.031
8.6000	0.019
8.8000	0.025
9.0000	0.025
9.2000	0.019
9.09- 9.4000	0.025
9.6000	0.025
9.8000	0.019
10.0000	0.019
12.0000	0.019
14.0000	0.012
16.0000	0.006
18.0000	0.012

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI 2-MW 3(S) Rising Head Test			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/19/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln L/R}{2 L T_0}$$

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 = 13.47 Ft
T_0 = Time For water Level to Rise or Fall to 37% of initial Charge — T_0 = 3.3 min

$$K = \frac{r^2 \ln L/R}{2 L T_0} = \frac{(0.083\ Ft)^2 \ln 13.47\ Ft / 0.083\ Ft}{2\,(13.47\ Ft)(3.3\ min)}$$

$$= 3.9 \times 10^{-4}\ Ft/min$$

$$3.9 \times 10^{-4}\ Ft/min \times 1440\ min/day = 0.568\ Ft/day$$

$$0.568\ Ft/day \times \frac{3.528 \times 10^{-4}\ Cm/sec}{Ft/day} = 2.00 \times 10^{-4}\ Cm/Sec.$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 2) WELL/BORING NO.: PIA2-mw3(S

PROJECT NO.: 7394 GEOLOGIST: Mark Damington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: TEST NO.: 5 Step 1

STATIC WATER LEVEL (Depth/Elevation): 14.78/TWD=28.25/LWC=13.47 DATE: 8/22/98

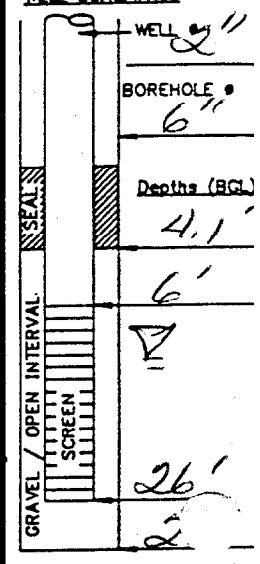
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED: GG

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 2 OF 2

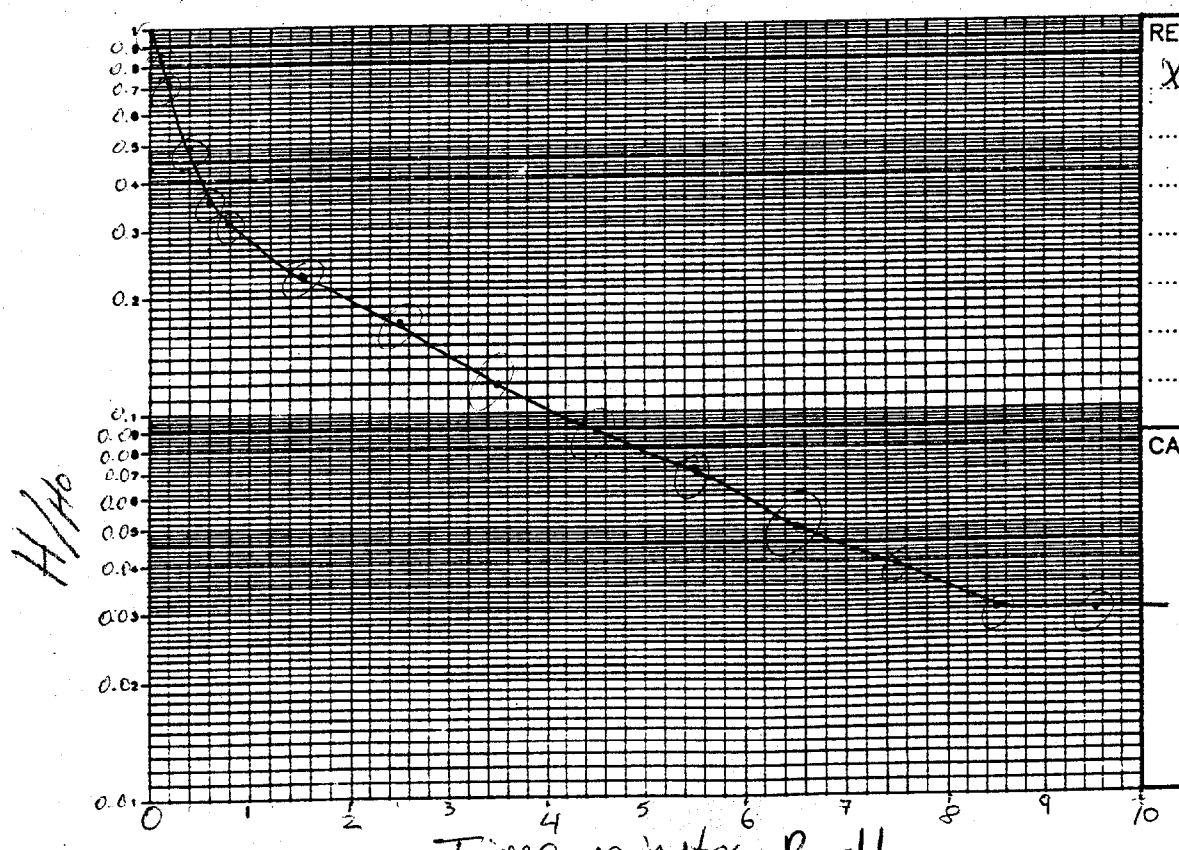
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.492	1	7.52	0.108	0.043
0.1	2.105	0.84	8.52	0.082	0.033
0.2	1.787	0.72	9.52	0.063	0.025
0.4	1.221	0.49			
0.6	0.928	0.37			
0.8	0.795	0.32			
1.52	0.572	0.23			
2.52	0.413	0.17			
3.52	0.311	0.12			
4.52	0.235	0.09			
5.52	0.178	0.07			
6.52	0.127	0.05			

WELL SCHEMATIC



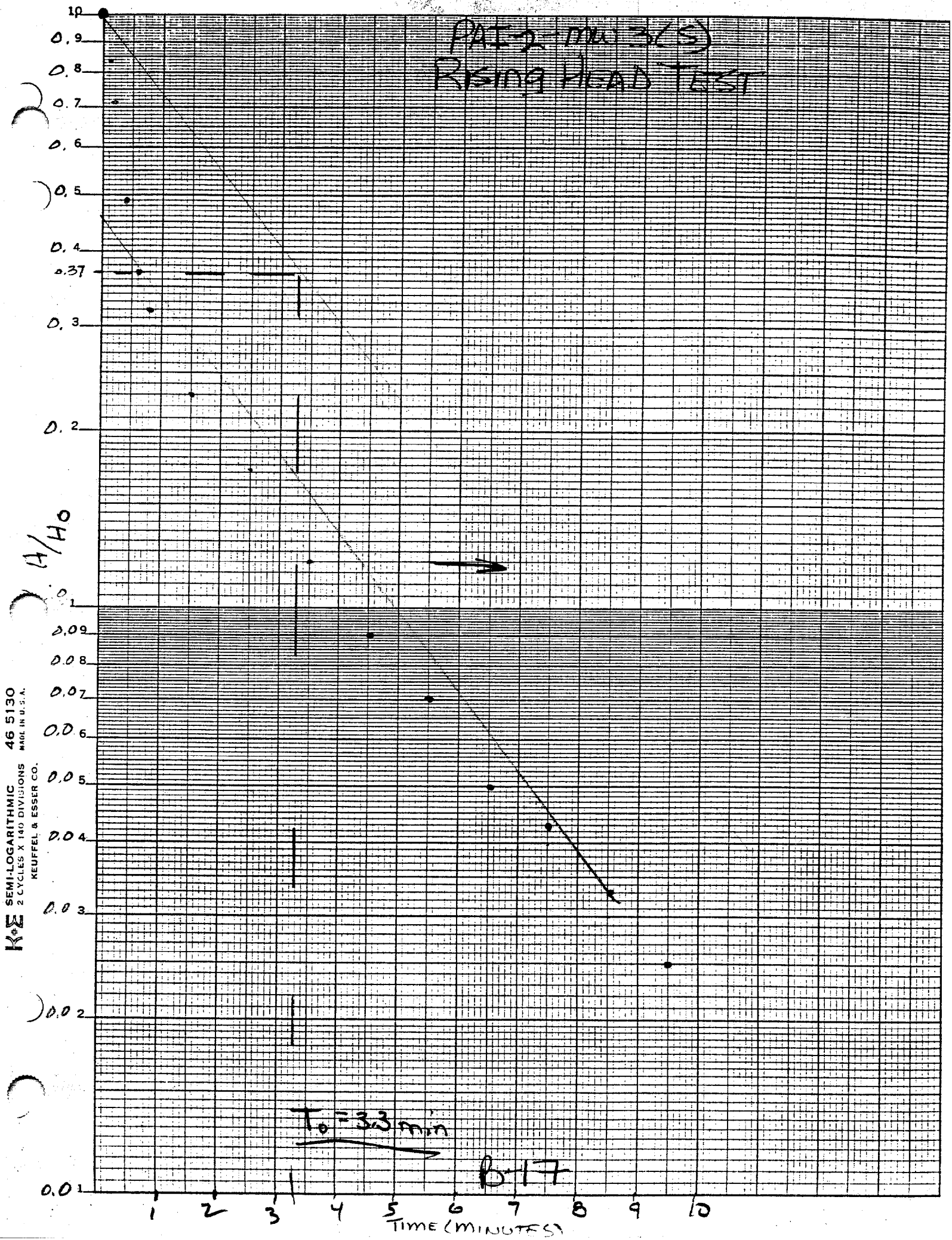
▽ Indicate SWL Depth on Drawing



REMARKS:

XD 12.84

CALCS, SKETCH MAPS, ETC.:


PAE-2-MW 3(S)
RISING HEAD 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
7
8
9
10
TIME (MINUTES)
To = 3.3 min
B-17
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

PAI-2-GW3
TEST 5, STEP 1
SLUG OUT, ~~[illegible]~~ RISE

SE1000C
Environmental Logger
08/22 14:44

Unit# 00145 Test 5

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00003
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 08/22 07:03:26

Elapsed Time	INPUT 1
0.0000	-0.080
0.0033	1.577
0.0066	3.223
0.0100	1.437
0.0133	2.734
0.0166	3.065
0.0200	2.823
0.0233	2.728
0.0266	2.606
0.0300	2.689
0.0333	2.700
0.0366	2.664
0.0400	2.683
0.0433	2.581
0.0466	2.658
0.0500	2.626
0.0533	2.613
0.0566	2.575
0.0600	2.492
0.0633	2.543
0.0666	2.613
0.0700	2.734
0.0733	2.416
0.0766	2.454
0.0800	2.492 I_0
0.0833	2.473
0.0866	2.448
0.0900	2.435
0.0933	2.410
0.0966	2.397
0.1000	2.384
0.1033	2.372
0.1066	2.365
0.1100	2.359
0.1133	2.359
0.1166	2.327
0.1200	2.314

PAI2-MW3(S)
~~PAI-02-MW Ø3~~
Test 5 Step 1
Slug Out (Rising Head Test)

	0.1233	2.308
	0.1266	2.280
	0.1300	2.283
	0.1333	2.276
	0.1366	2.270
	0.1400	2.251
	0.1433	2.238
	0.1466	2.232
	0.1500	2.206
	0.1533	2.200
	0.1566	2.194
	0.1600	2.175
	0.1633	2.168
	0.1666	2.155
	0.1700	2.143
	0.1733	2.136
	0.1766	2.124
0.10 –	0.1800	2.105
	0.1833	2.105
	0.1866	2.086
	0.1900	2.086
	0.1933	2.060
	0.1966	2.060
	0.2000	2.047
	0.2033	2.035
	0.2066	2.022
	0.2100	2.015
	0.2133	1.990
	0.2166	1.990
	0.2200	1.984
	0.2233	1.965
	0.2266	1.958
	0.2300	1.946
	0.2333	1.933
	0.2366	1.927
	0.2400	1.914
	0.2433	1.901
	0.2466	1.895
	0.2500	1.882
	0.2533	1.876
	0.2566	1.863
	0.2600	1.850
	0.2633	1.838
	0.2666	1.831
	0.2700	1.818
	0.2733	1.818
	0.2766	1.799
0.2 –	0.2800	1.787
	0.2833	1.780
	0.2866	1.774
	0.2900	1.755
	0.2933	1.742
	0.2966	1.736
	0.3000	1.723
	0.3033	1.717
	0.3066	1.710
	0.3100	1.698
	0.3133	1.691
	0.3166	1.672
	0.3200	1.666

PAI2 - MW3(S)
~~PAI-02-MW03~~
Test 5 Step 1
Slug Out (Rising Head Test)

	0.3233	1.659
	0.3266	1.647
	0.3300	1.640
	0.3333	1.628
	0.3500	1.577
	0.3666	1.526
0.3 -	0.3833	1.488
	0.4000	1.431
	0.4166	1.386
	0.4333	1.348
	0.4500	1.303
	0.4666	1.265
0.4 -	0.4833	1.221
	0.5000	1.189
	0.5166	1.151
	0.5333	1.119
	0.5500	1.094
	0.5666	1.068
0.5 -	0.5833	1.043
	0.6000	1.024
	0.6166	0.998
	0.6333	0.979
	0.6500	0.960
	0.6666	0.947
0.6 -	0.6833	0.928
	0.7000	0.909
	0.7166	0.896
	0.7333	0.877
	0.7500	0.877
	0.7666	0.865
0.7 -	0.7833	0.858
	0.8000	0.846
	0.8166	0.833
	0.8333	0.820
	0.8500	0.807
	0.8666	0.801
0.8 -	0.8833	0.795
	0.9000	0.788
	0.9166	0.776
	0.9333	0.763
	0.9500	0.763
	0.9666	0.756
0.9 -	0.9833	0.750
	1.0000	0.737
	1.2000	0.661
	1.4000	0.617
1.52 -	1.6000	0.572
	1.8000	0.534
	2.0000	0.502
	2.2000	0.477
	2.4000	0.445
2.52 -	2.6000	0.413
	2.8000	0.388
	3.0000	0.375
	3.2000	0.356
	3.4000	0.330
3.52 -	3.6000	0.311
	3.8000	0.292
	4.0000	0.273
	4.2000	0.273

PAI2-MW3(S)
~~PAI-02-MW03~~

Test 5 Step 1
Slugout (Rising Head Test)

	4.4000	0.248
4.52 –	4.6000	0.235
	4.8000	0.229
	5.0000	0.209
	5.2000	0.197
	5.4000	0.184
5.52 –	5.6000	0.178
	5.8000	0.165
	6.0000	0.152
	6.2000	0.152
	6.4000	0.140
6.52 –	6.6000	0.127
	6.8000	0.127
	7.0000	0.114
	7.2000	0.114
	7.4000	0.108
7.52 –	7.6000	0.108
	7.8000	0.095
	8.0000	0.095
	8.2000	0.089
	8.4000	0.082
8.52 –	8.6000	0.082
	8.8000	0.070
	9.0000	0.070
	9.2000	0.070
	9.4000	0.063
9.52 –	9.6000	0.063
	9.8000	0.057
	10.0000	0.050
11.92 –	12.0000	0.044
	14.0000	0.025
15.92 –	16.0000	0.031
	18.0000	0.025
19.92 –	20.0000	0.019
	22.0000	0.012
23.92 –	24.0000	0.019
–	26.0000	0.019

END

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-02-MW-04(S) 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 = 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 = 1.15 min.

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,FT)^2 \ln 10\,FT/0.083\,FT}{2(10\,FT)(1.15\,min)}$$

$$= 1.43 \times 10^{-3}\ Ft/min$$

$$1.43 \times 10^{-3}\ Ft/min \times 1440\ min/day = 2.07\ Ft/day$$

$$2.07\ Ft/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{Ft/day} = \underline{7.30 \times 10^{-4}\ cm/sec}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 2) WELL/BORING NO.: PAI-02-mw-0

PROJECT NO.: 7394 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft TEST NO.: 1/step 2

STATIC WATER LEVEL (Depth/Elevation): 5.33/TWD=16.41/LWC=11.08 DATE: 8/24/98

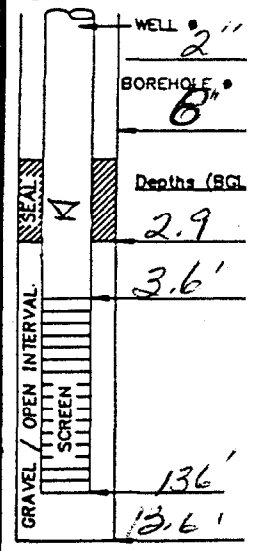
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) CHECKED: G.C.

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) PAGE 1 OF 2

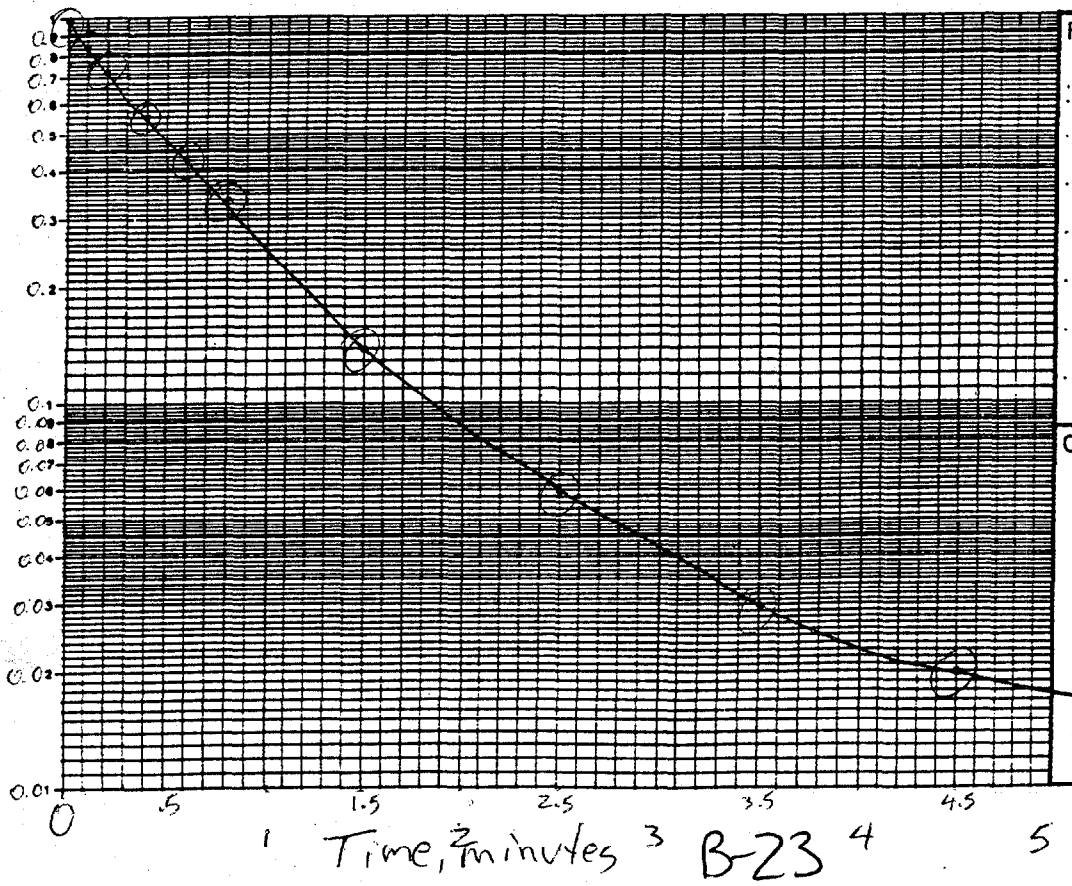
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	-1.888	1			
0.1	-1.602	0.85			
0.2	-1.386	0.73			
0.4	-1.055	0.56			
0.6	-0.807	0.43			
0.8	-0.635	0.34			
1.5	-0.273	0.14			
2.5	-0.108	0.06			
3.5	-0.057	0.03			
4.5	-0.038	0.02			
~~5.5~~	~~-0.038~~				
~~6.5~~	~~-0.031~~				

WELL SCHEMATIC



Indicate SWL Depth on Drawing

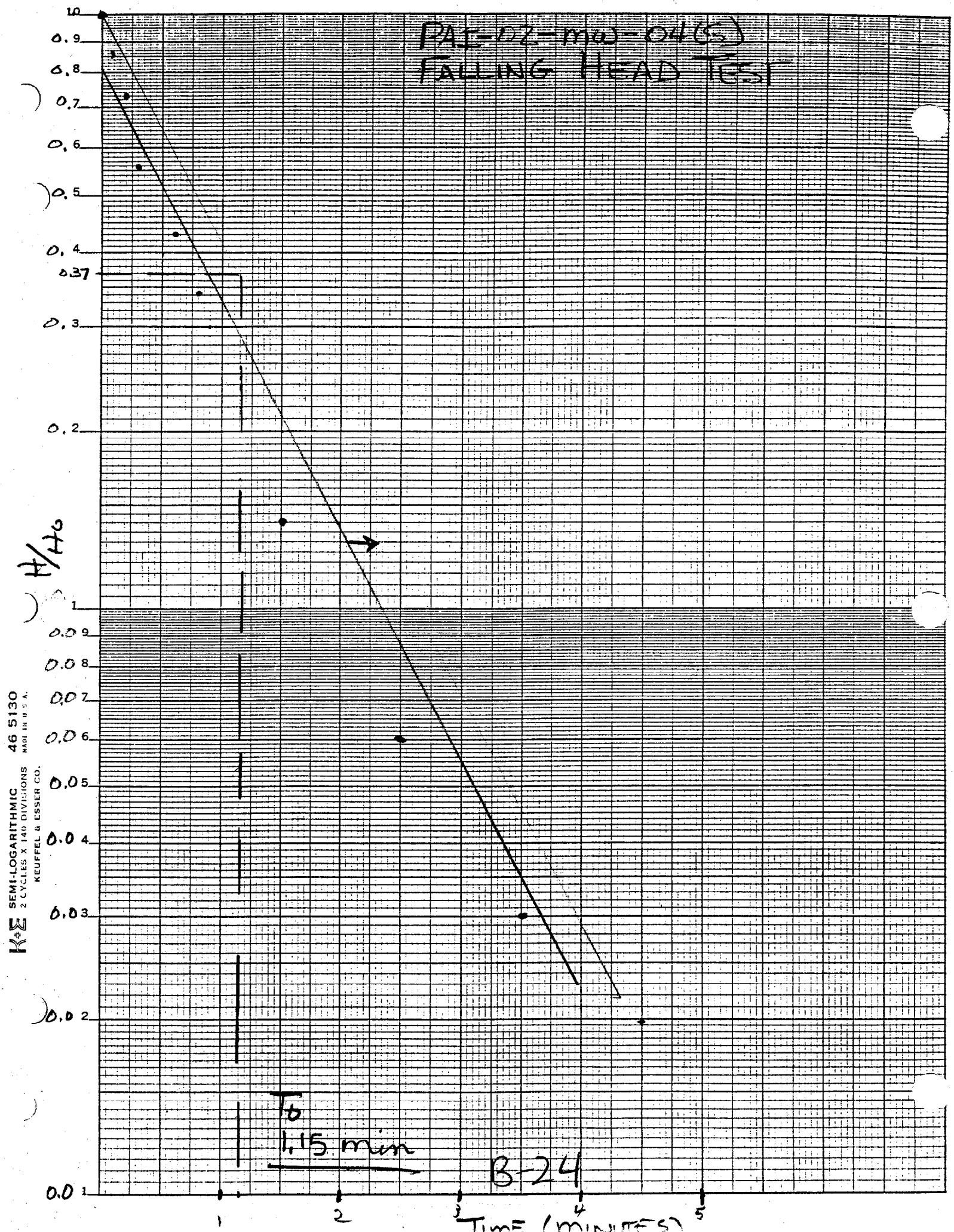


REMARKS:

YD = 10.69

CALCS, SKETCH MAPS, ETC.:

B-23


PA-02-MW-04(S)
FALLING HEAD TEST
h/h0
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T0
1.15 min
B-24
1
2
3
4
5
TIME (MINUTES)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

~~PAI2 DWA~~ PAI-02-MW-04(S)
TEST 1, STEP 2
SLUG IN (FALL)

SE1000C
Environmental Logger
08/24 16:06

Unit# 00145 Test 1

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 2 08/24 10:55:41

Elapsed Time	INPUT 1
0.0000	-0.025
0.0033	-0.222
0.0066	-0.830
0.0100	-1.278
0.0133	-1.704
0.0166	-1.856
0.0200	-1.774
0.0233	-2.302
0.0266	-2.051
0.0300	-3.250
0.0333	-3.161
0.0366	-2.454
0.0400	-1.500
0.0433	-1.074
0.0466	-1.138
0.0500	-1.787
0.0533	-2.276
0.0566	-2.416
0.0600	-2.079
0.0633	-1.882
0.0666	-1.847
0.0700	-1.780
0.0733	-1.858
0.0766	-2.054
0.0800	-2.009
0.0833	-1.901
0.0866	-1.825
0.0900	-1.837
0.0933	-1.876
0.0966	-1.888 T_0
0.1000	-1.876
0.1033	-1.831
0.1066	-1.818
0.1100	-1.818
0.1133	-1.818
0.1166	-1.806
0.1200	-1.793

PAI-02-MW-04 (S)
Test 1, Step 2
Slug In (Falling Head Test)

	0.1233	-1.780
	0.1266	-1.774
	0.1300	-1.761
	0.1333	-1.755
	0.1366	-1.748
	0.1400	-1.742
	0.1433	-1.729
	0.1466	-1.717
	0.1500	-1.710
	0.1533	-1.704
	0.1566	-1.691
	0.1600	-1.685
	0.1633	-1.678
	0.1666	-1.672
	0.1700	-1.659
	0.1733	-1.653
	0.1766	-1.647
	0.1800	-1.634
	0.1833	-1.628
	0.1866	-1.621
	0.1900	-1.621
	0.1933	-1.602
0.1 -	0.1966	-1.602
	0.2000	-1.596
	0.2033	-1.577
	0.2066	-1.577
	0.2100	-1.584
	0.2133	-1.564
	0.2166	-1.551
	0.2200	-1.545
	0.2233	-1.538
	0.2266	-1.532
	0.2300	-1.519
	0.2333	-1.513
	0.2366	-1.513
	0.2400	-1.507
	0.2433	-1.500
	0.2466	-1.481
	0.2500	-1.481
	0.2533	-1.475
	0.2566	-1.462
	0.2600	-1.462
	0.2633	-1.456
	0.2666	-1.449
	0.2700	-1.437
	0.2733	-1.430
	0.2766	-1.430
	0.2800	-1.418
	0.2833	-1.418
	0.2866	-1.411
	0.2900	-1.405
	0.2933	-1.399
0.2 -	0.2966	-1.386
	0.3000	-1.386
	0.3033	-1.379
	0.3066	-1.373
	0.3100	-1.367
	0.3133	-1.360
	0.3166	-1.354
	0.3200	-1.354

PAI-02-MW-04(S)
Test 1 Step 2
Slug In (Falling Head Test)

	0.3233	-1.348
	0.3266	-1.335
	0.3300	-1.329
	0.3333	-1.322
	0.3500	-1.297
	0.3666	-1.250
	0.3833	-1.233
0.3	-0.4000	-1.208
	0.4166	-1.176
	0.4333	-1.150
	0.4500	-1.125
	0.4666	-1.100
	0.4833	-1.081
0.4	-0.5000	-1.055
	0.5166	-1.030
	0.5333	-0.998
	0.5500	-0.985
	0.5666	-0.960
	0.5833	-0.947
0.5	-0.6000	-0.915
	0.6166	-0.909
	0.6333	-0.883
	0.6500	-0.864
	0.6666	-0.845
	0.6833	-0.826
0.6	-0.7000	-0.807
	0.7166	-0.794
	0.7333	-0.775
	0.7500	-0.763
	0.7666	-0.744
	0.7833	-0.731
0.7	-0.8000	-0.718
	0.8166	-0.699
	0.8333	-0.693
	0.8500	-0.667
	0.8666	-0.654
	0.8833	-0.642
0.8	-0.9000	-0.635
	0.9166	-0.623
	0.9333	-0.610
	0.9500	-0.597
	0.9666	-0.585
	0.9833	-0.585
0.90	-1.0000	-0.585
	1.2000	-0.419
	1.4000	-0.337
1.50	-1.6000	-0.273
	1.8000	-0.222
	2.0000	-0.184
	2.2000	-0.152
	2.4000	-0.127
2.50	-2.6000	-0.108
	2.8000	-0.089
	3.0000	-0.082
	3.2000	-0.070
	3.4000	-0.070
3.50	-3.6000	-0.057
	3.8000	-0.057
	4.0000	-0.044
	4.2000	-0.044

PAI-02-MW04(S)
Test 1 Step 2
Slug In (Falling Head Test)

	4.4000	-0.044
4.50	4.6000	-0.038
	4.8000	-0.044
	5.0000	-0.044
	5.2000	-0.038
	5.4000	-0.031
5.50	5.6000	-0.038
	5.8000	-0.038
	6.0000	-0.038
	6.2000	-0.031
	6.4000	-0.031
6.50	6.6000	-0.031
	6.8000	-0.038
	7.0000	-0.038
	7.2000	-0.025
	7.4000	-0.025
7.50	7.6000	-0.031
	7.8000	-0.031
	8.0000	-0.031
	8.2000	-0.031
	8.4000	-0.031
8.50	8.6000	-0.025
	8.8000	-0.025
	9.0000	-0.031
	9.2000	-0.025
	9.4000	-0.025
9.50	9.6000	-0.031
	9.8000	-0.025
9.90	10.0000	-0.031
	12.0000	-0.012
	14.0000	-0.012
	16.0000	-0.006
	18.0000	0.000
	20.0000	-0.006

END

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-02-MW-04(S) Rising Head Test			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/19/99	APPROVED BY	DATE

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 min.

$$K = \frac{r^2 \ln L/R}{2 L T_0} = \frac{(0.083\ Ft)^2 \ln 10^{FT}/0.083\ FT}{2(10\ FT)(0.62\ min)}$$

$$= 2.66 \times 10^{-3}\ Ft/min$$

$$2.66 \times 10^{-3}\ Ft/min \times 1440\ min/day = 3.83\ Ft/day$$

$$3.83\ Ft/day \times 3.528 \times 10^{-4} \frac{cm/sec}{Ft/day} = \underline{1.35 \times 10^{-3}\ cm/sec}$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 2) WELL/BORING NO.: PAI-02-MW-04

PROJECT NO.: 7394 GEOLOGIST: Mark Damington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft TEST NO.: 1/Step 1

STATIC WATER LEVEL (Depth/Elevation): 5.33/TWD=16.41/LWC=11.08 DATE: 8/24/98

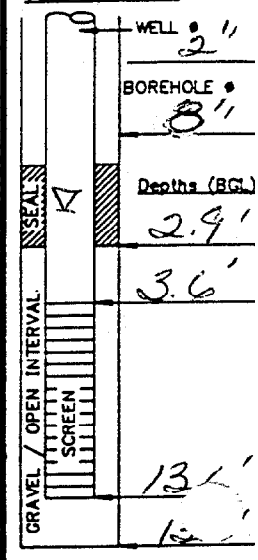
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED: GC

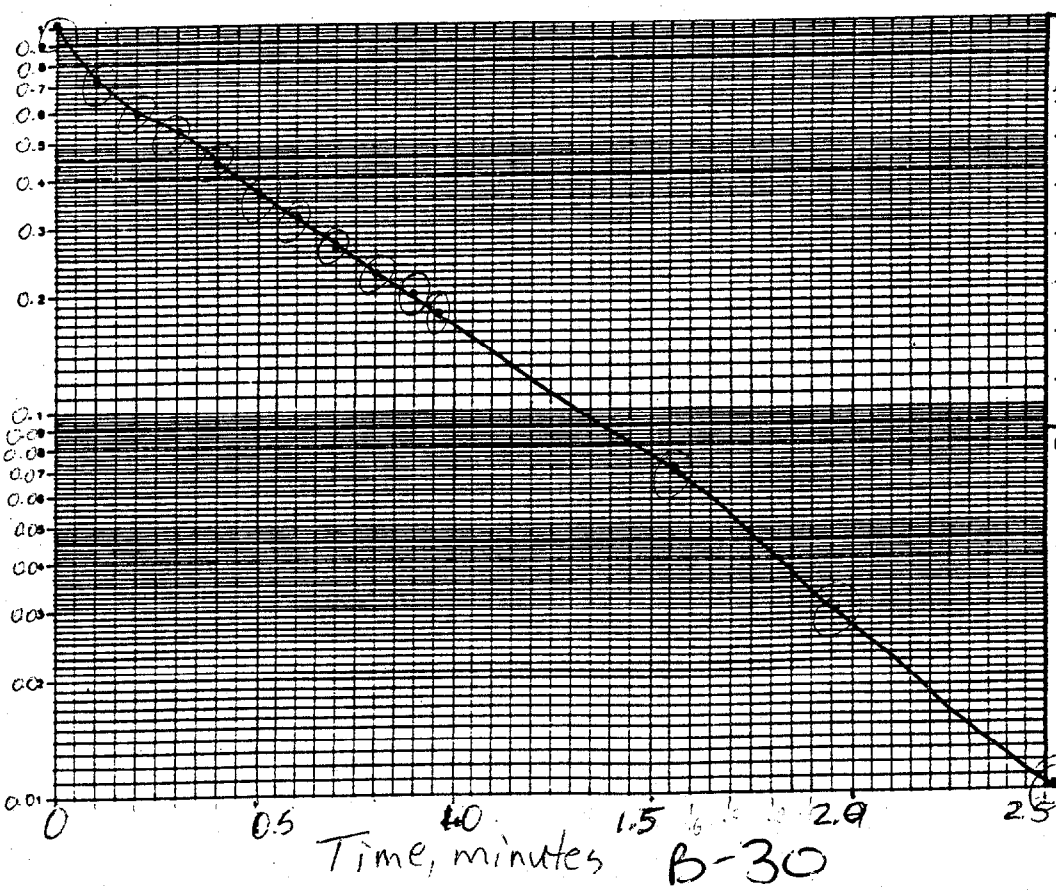
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) PAGE 2 OF 2

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	2.529	1	1.96	0.082	0.03
0.1	1.811	0.72	2.56	0.025	0.01
0.2	1.514	0.60	2.96	0.006	0.002
0.3	1.303	0.52			
0.4	1.106	0.44			
0.5	0.940	0.37			
0.6	0.800	0.32			
0.7	0.686	0.27			
0.8	0.591	0.23			
0.9	0.508	0.20			
0.96	0.457	0.18			
1.56	0.171	0.07			

WELL SCHEMATIC

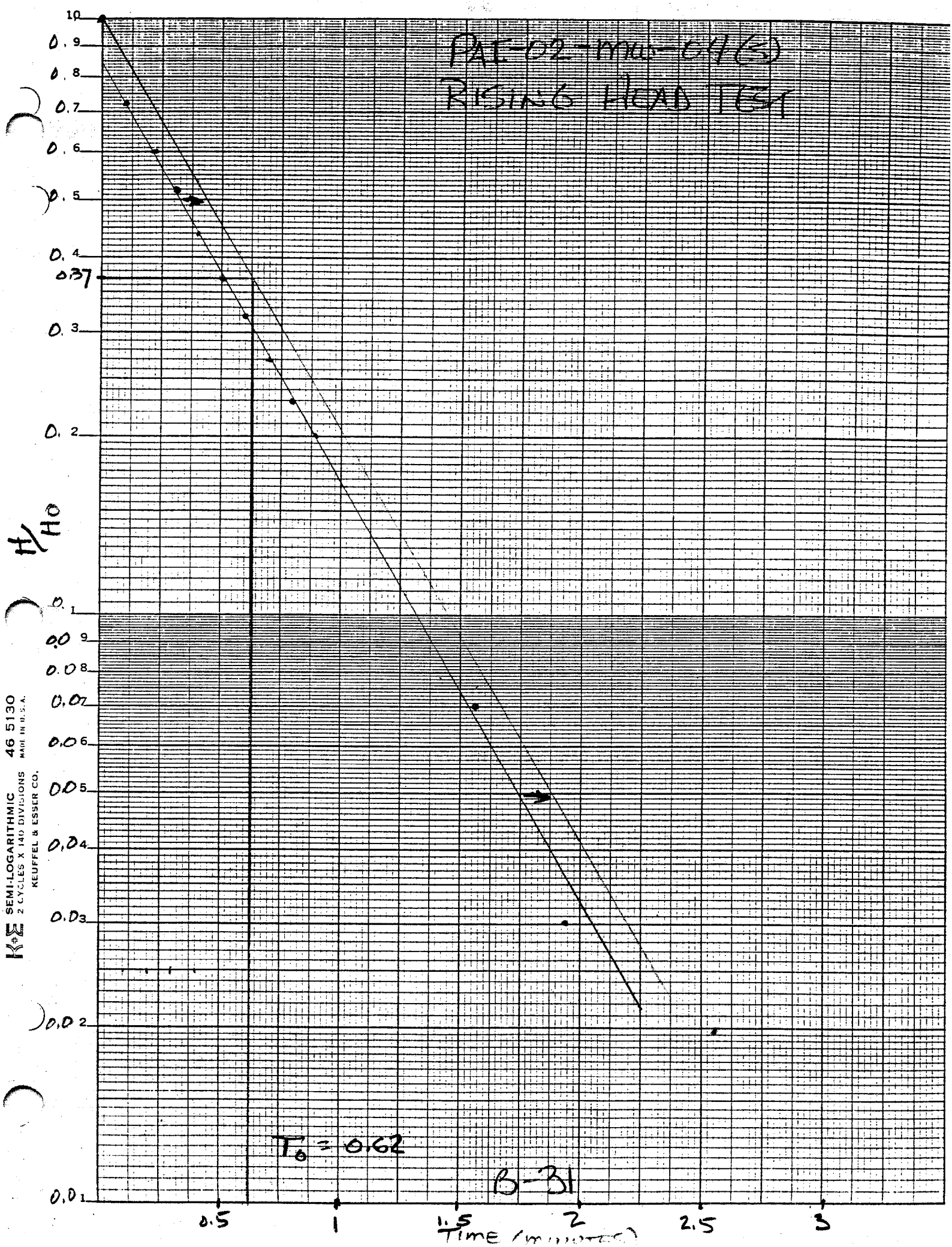




REMARKS:

XD 10.69

CALCS, SKETCH MAPS, ETC.:


PAT-02-MW-04(S)
RISING HEAD TEST
H/Ho
10
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
0.5
1
1.5
2
2.5
3
TIME (minutes)
T0 = 0.62
B-31
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

~~RAEP-0014~~
TEST 1, STEP 1
SLUG OUT, RAGE

SE1000C
Environmental Logger
08/24 16:03

Unit# 00145 Test 1

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 1 08/24 10:40:53

Elapsed Time	INPUT 1
0.0000	-0.057
0.0033	0.362
0.0066	2.567
0.0100	3.215
0.0133	0.756
0.0166	1.296
0.0200	2.008
0.0233	2.644
0.0266	2.701
0.0300	2.580
0.0333	2.339
0.0366	2.529 · T_0
0.0400	2.326
0.0433	2.288
0.0466	2.288
0.0500	2.256
0.0533	2.231
0.0566	2.205
0.0600	2.173
0.0633	2.161
0.0666	2.142
0.0700	2.116
0.0733	2.103
0.0766	2.078
0.0800	2.065
0.0833	2.053
0.0866	2.034
0.0900	2.015
0.0933	1.995
0.0966	1.980
0.1000	1.964
0.1033	1.951
0.1066	1.938
0.1100	1.919
0.1133	1.906
0.1166	1.894
0.1200	1.881

PAI-02-MW-04(S)
Test 1 Step 1
Slug Out (Rising Head Test)

	0.1233	1.868
	0.1266	1.849
	0.1300	1.837
	0.1333	1.830
0.1 -	0.1366	1.811
	0.1400	1.805
	0.1433	1.792
	0.1466	1.779
	0.1500	1.767
	0.1533	1.754
	0.1566	1.741
	0.1600	1.735
	0.1633	1.722
	0.1666	1.716
	0.1700	1.703
	0.1733	1.690
	0.1766	1.684
	0.1800	1.671
	0.1833	1.659
	0.1866	1.652
	0.1900	1.646
	0.1933	1.627
	0.1966	1.620
	0.2000	1.614
	0.2033	1.601
	0.2066	1.595
	0.2100	1.582
	0.2133	1.582
	0.2166	1.570
	0.2200	1.557
	0.2233	1.551
	0.2266	1.538
	0.2300	1.531
	0.2333	1.525
0.2 -	0.2366	1.519
	0.2400	1.506
	0.2433	1.500
	0.2466	1.487
	0.2500	1.487
	0.2533	1.474
	0.2566	1.474
	0.2600	1.462
	0.2633	1.455
	0.2666	1.449
	0.2700	1.436
	0.2733	1.436
	0.2766	1.423
	0.2800	1.417
	0.2833	1.411
	0.2866	1.404
	0.2900	1.392
	0.2933	1.392
	0.2966	1.379
	0.3000	1.373
	0.3033	1.373
	0.3066	1.360
	0.3100	1.354
	0.3133	1.347
	0.3166	1.341
	0.3200	1.334

PAI-02-MW-04(S)
Test 1 Step 1
Slug Out (Rising Head Test)

	0.3233	1.328
	0.3266	1.322
	0.3300	1.315
0.3	0.3333	1.303
	0.3500	1.271
	0.3666	1.239
	0.3833	1.207
	0.4000	1.169
	0.4166	1.137
0.4	0.4333	1.106
	0.4500	1.080
	0.4666	1.055
	0.4833	1.017
	0.5000	0.991
	0.5166	0.972
0.5	0.5333	0.940
	0.5500	0.915
	0.5666	0.883
	0.5833	0.870
	0.6000	0.845
	0.6166	0.826
0.6	0.6333	0.800
	0.6500	0.781
	0.6666	0.762
	0.6833	0.737
	0.7000	0.724
	0.7166	0.705
0.7	0.7333	0.686
	0.7500	0.667
	0.7666	0.648
	0.7833	0.635
	0.8000	0.623
	0.8166	0.603
0.8	0.8333	0.591
	0.8500	0.578
	0.8666	0.559
	0.8833	0.553
	0.9000	0.540
	0.9166	0.521
0.9	0.9333	0.508
	0.9500	0.495
	0.9666	0.483
	0.9833	0.470
0.96	1.0000	0.457
	1.2000	0.324
	1.4000	0.235
1.56	1.6000	0.171
	1.8000	0.127
1.96	2.0000	0.082
	2.2000	0.057
	2.4000	0.044
2.56	2.6000	0.025
	2.8000	0.012
2.96	3.0000	0.006
	3.2000	-0.006
	3.4000	-0.012
	3.6000	-0.019
	3.8000	-0.025
	4.0000	-0.031
	4.2000	-0.025

4.4000	-0.031
4.6000	-0.038
4.8000	-0.031
5.0000	-0.038
5.2000	-0.044
5.4000	-0.038
5.6000	-0.044
5.8000	-0.044
6.0000	-0.038
6.2000	-0.038
6.4000	-0.044
6.6000	-0.038
6.8000	-0.044
7.0000	-0.044
7.2000	-0.050
7.4000	-0.044
7.6000	-0.050
7.8000	-0.044
8.0000	-0.050
8.2000	-0.050
8.4000	-0.044
8.6000	-0.044
8.8000	-0.044
9.0000	-0.044
9.2000	-0.038
9.4000	-0.044
9.6000	-0.044
9.8000	-0.044
10.0000	-0.044
12.0000	-0.038
14.0000	-0.044

END

PAI-02-MW-04(S)
TEST 1 Step 1
Slug Out (Rising Head Test)

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE _____ OF _____

CLIENT		JOB NUMBER 7394	
SUBJECT PAI-02-MW-05(D) Rising Head Slug Test			
BASED ON HORUSLEV		DRAWING NUMBER	
BY GG	CHECKED BY RMB	APPROVED BY	DATE

$$K = r^2 \frac{\ln L/R}{2LT_0}$$

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 = 1.65 min

$$K = r^2 \frac{\ln L/R}{2LT_0} = (0.083)^2 \frac{\ln (5FT/0.083FT)}{2(5FT)(1.65\ min)}$$

$$= 1.71 \times 10^{-3}\ Ft/min$$

1.71×10^{-3} Ft/min x 1440 min/day = <u>2.46 Ft/day</u>

2.46 Ft/day x 3.528×10^{-4} cm/sec / Ft/day = <u>8.69×10^{-4} cm/sec</u>

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 2) WELL/BORING NO.: PAI-02-mw2

PROJECT NO.: 7394 GEOLOGIST: Mark Damington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 5 ft TEST NO.: 3/step 3

STATIC WATER LEVEL (Depth/Elevation): 8.80 / TWD=39.37 / LWC=30.57 DATE: 8/21/98

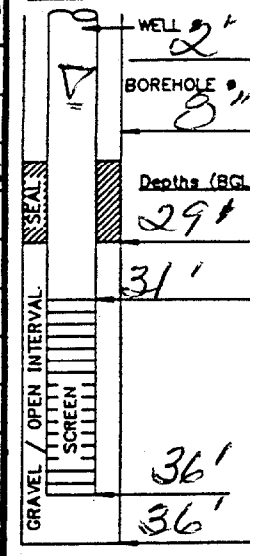
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft) PAGE 2 OF 2

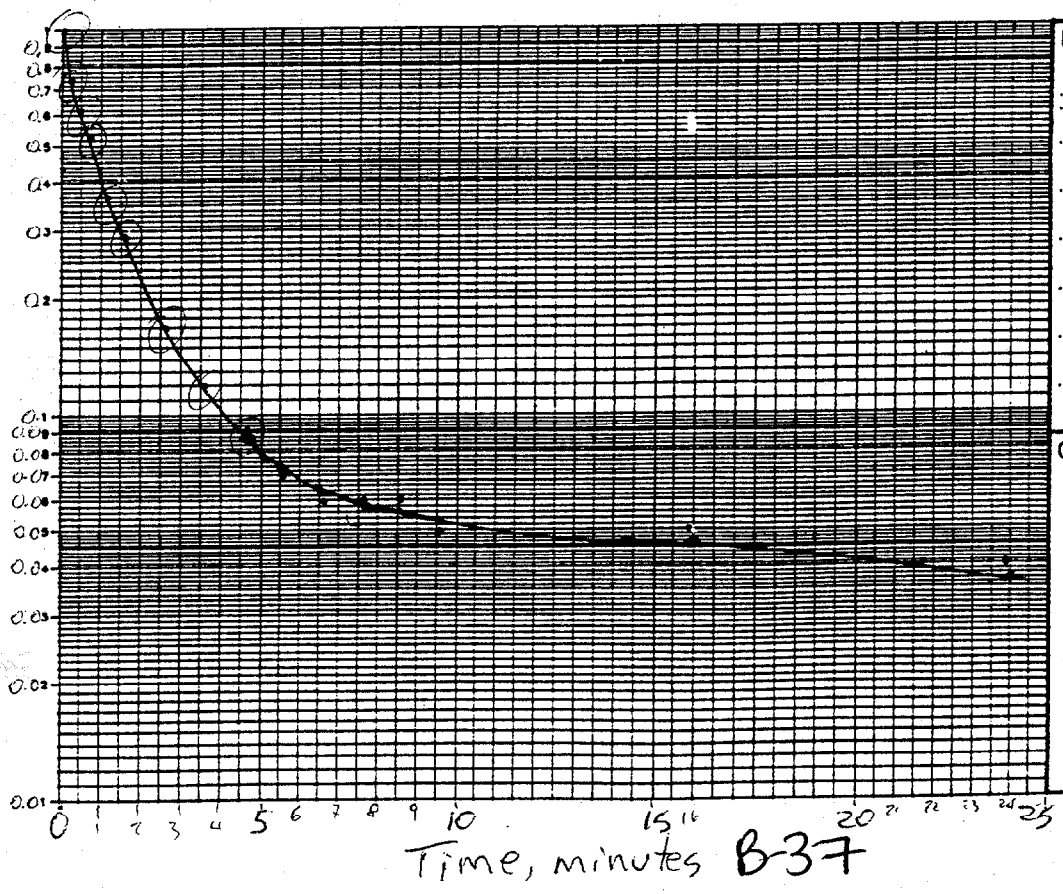
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.783	1	7.54	0.159	0.057
~~0.3~~	~~2.483~~	—	8.54	0.159	0.057
0.31	2.056	0.74	9.54	0.147	0.053
0.51	1.730	0.62	15.94	0.127	0.046
0.71	1.468	0.53	23.94	0.102	0.037
1.14	1.034	0.37			
1.54	0.804	0.29			
2.54	0.466	0.17			
3.54	0.325	0.12			
4.54	0.242	0.087			
5.54	0.204	0.073			
6.54	0.178	0.064			

WELL SCHEMATIC



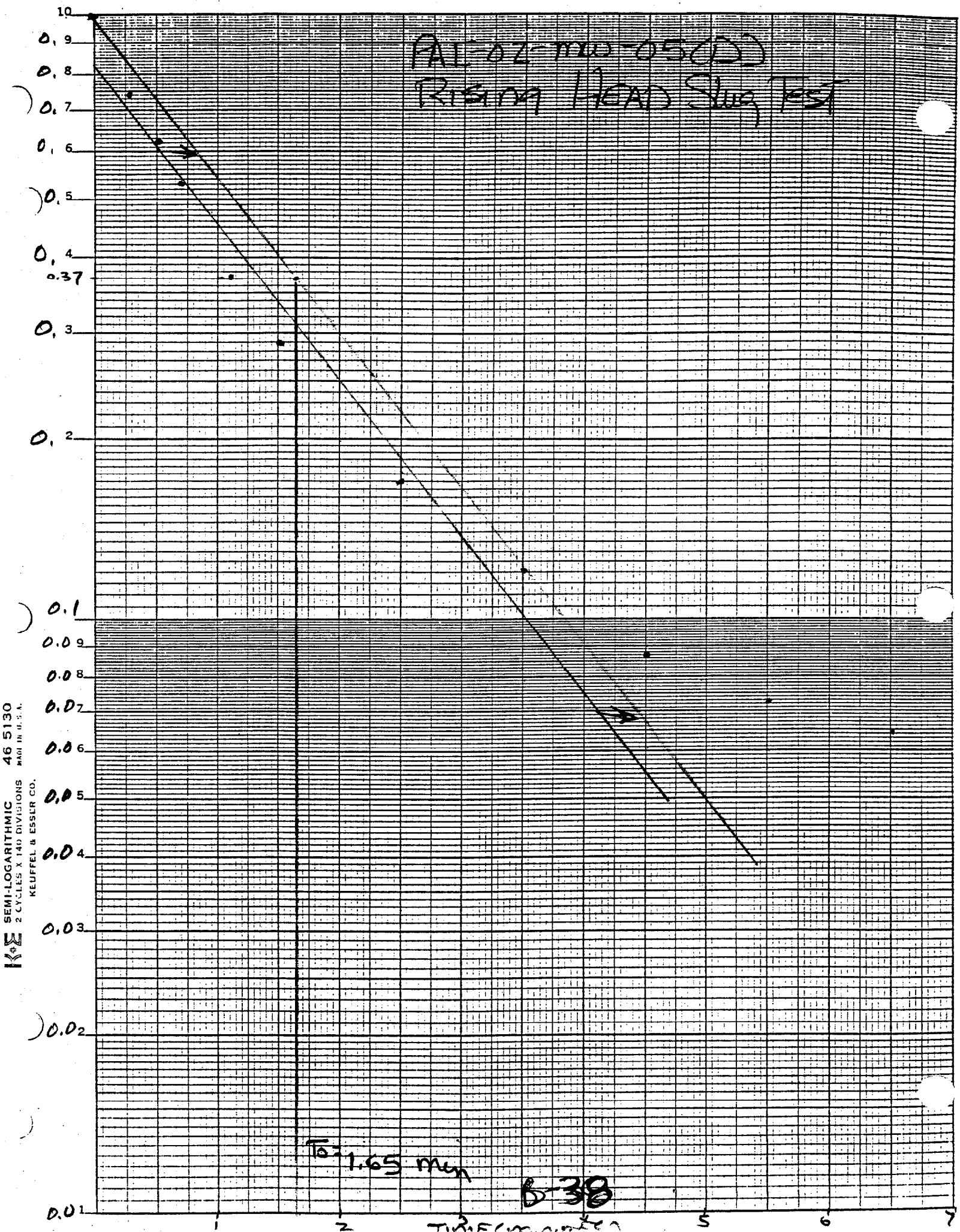
▽ Indicate SWL Depth on Drawing



REMARKS: XD = 29.88

CALCS, SKETCH MAPS, ETC.:

B-37


AL-02-MW-05(DD)
RISING HEAD SLUG TEST
10
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
5
6
7
To = 1.65 min
B-38
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.

~~PAI-2-GW5-MW005~~ PAI-02-MW-05(D)

Test 3, Step 3
Slug Out (Rise)

Rising Head Slug Test

SE10000
Environmental Logger
08/22 14:28

Unit# 00145 Test 3

Setups:	INPUT 1
Type	Level (F)
Mode	TOU
I.D.	00005
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 3 08/21 14:44:20

Elapsed Time	INPUT 1
0.0000	3.038
0.0033	1.507
0.0066	0.613
0.0100	2.751
0.0133	3.888
0.0166	3.051
0.0200	2.730
0.0233	2.968
0.0266	2.962
0.0300	2.873
0.0333	2.885
0.0366	2.892
0.0400	2.866
0.0433	2.853
0.0466	2.822
0.0500	2.841
0.0533	2.771
0.0566	2.783 T_0
0.0600	2.771
0.0633	2.757
0.0666	2.745
0.0700	2.732
0.0733	2.726
0.0766	2.707
0.0800	2.700
0.0833	2.688
0.0866	2.681
0.0900	2.668
0.0933	2.662
0.0966	2.649
0.1000	2.637
0.1033	2.630
0.1066	2.617
0.1100	2.611
0.1133	2.598
0.1166	2.586
0.1200	2.579

PAI-02-MW05(D)
Test 3 Step 3
Slug Out (Rising Head Tes

	0.1233	2.566
	0.1266	2.560
	0.1300	2.553
	0.1333	2.541
	0.1366	2.534
	0.1400	2.528
	0.1433	2.515
	0.1466	2.509
	0.1500	2.496
	0.1533	2.490
0.1 –	0.1566	2.483
	0.1600	2.477
	0.1633	2.470
	0.1666	2.458
	0.1700	2.451
	0.1733	2.439
	0.1766	2.432
	0.1800	2.426
	0.1833	2.419
	0.1866	2.413
	0.1900	2.407
	0.1933	2.400
	0.1966	2.387
	0.2000	2.381
	0.2033	2.375
	0.2066	2.368
	0.2100	2.362
	0.2133	2.349
	0.2166	2.343
	0.2200	2.336
	0.2233	2.330
	0.2266	2.324
	0.2300	2.317
	0.2333	2.311
	0.2366	2.298
	0.2400	2.298
	0.2433	2.285
	0.2466	2.285
	0.2500	2.279
	0.2533	2.266
0.2 –	0.2566	2.266
	0.2600	2.253
	0.2633	2.253
	0.2666	2.247
	0.2700	2.234
	0.2733	2.228
	0.2766	2.222
	0.2800	2.215
	0.2833	2.209
	0.2866	2.202
	0.2900	2.196
	0.2933	2.190
	0.2966	2.183
	0.3000	2.183
	0.3033	2.171
	0.3066	2.171
	0.3100	2.164
	0.3133	2.158
	0.3166	2.151
	0.3200	2.145

PAF-02-mw05(D)
Test 3 Step 3
Slug Out (Rising Head Test)

	0.3233	2.138
	0.3266	2.132
	0.3300	2.126
	0.3333	2.120
	0.3500	2.087
0.31 –	0.3666	2.056
	0.3833	2.024
	0.4000	1.992
	0.4166	1.966
	0.4333	1.934
	0.4500	1.909
0.41 –	0.4666	1.883
	0.4833	1.851
	0.5000	1.826
	0.5166	1.800
	0.5333	1.775
	0.5500	1.749
0.51 –	0.5666	1.730
	0.5833	1.705
	0.6000	1.679
	0.6166	1.660
	0.6333	1.634
	0.6500	1.615
0.61 –	0.6666	1.590
	0.6833	1.570
	0.7000	1.551
	0.7166	1.526
	0.7333	1.513
	0.7500	1.487
0.71 –	0.7666	1.468
	0.7833	1.449
	0.8000	1.436
	0.8166	1.417
	0.8333	1.392
	0.8500	1.379
0.81 –	0.8666	1.360
	0.8833	1.347
	0.9000	1.328
	0.9166	1.315
	0.9333	1.296
	0.9500	1.283
0.91 –	0.9666	1.264
	0.9833	1.251
	1.0000	1.238
1.14 –	1.2000	1.034
	1.4000	0.907
1.54 –	1.6000	0.804
	1.8000	0.708
	2.0000	0.632
	2.2000	0.568
	2.4000	0.510
2.54 –	2.6000	0.466
	2.8000	0.428
	3.0000	0.395
	3.2000	0.370
	3.4000	0.344
3.54 –	3.6000	0.325
	3.8000	0.300
	4.0000	0.287
	4.2000	0.268

PAI-02 - MW-05(D)
Test 3 Step 3
Slug Out (Rising Head Test)

	4.4000	0.255
4.54 -	4.6000	0.242
	4.8000	0.230
	5.0000	0.223
	5.2000	0.217
	5.4000	0.210
5.54 -	5.6000	0.204
	5.8000	0.198
	6.0000	0.191
	6.2000	0.185
	6.4000	0.185
6.54 -	6.6000	0.178
	6.8000	0.172
	7.0000	0.172
	7.2000	0.165
	7.4000	0.165
7.54 -	7.6000	0.159
	7.8000	0.159
	8.0000	0.153
	8.2000	0.159
	8.4000	0.159
8.54 -	8.6000	0.159
	8.8000	0.153
	9.0000	0.153
	9.2000	0.147
	9.4000	0.147
9.54 -	9.6000	0.147
	9.8000	0.140
	10.0000	0.140
	12.0000	0.134
	14.0000	0.127
15.94 -	16.0000	0.127
	18.0000	0.121
	20.0000	0.114
	22.0000	0.108
23.94 -	24.0000	0.102
	- 26.0000	0.095

END

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE____ OF____

CLIENT		JOB NUMBER 7394	
SUBJECT PAF-02-MW-05(D) FALLING HEAD SLUG TEST			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB	APPROVED BY	DATE

$$K = r^2 \frac{\ln L/R}{2LT_0}$$

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 Charge. — T_0 = 1.1 min.

$$K = r^2 \frac{\ln L/R}{2LT_0} = (0.083\,Ft)^2 \frac{\ln(5Ft/0.083Ft)}{2(5Ft)(1.1min)}$$

$$= 2.57 \times 10^{-3}\ Ft/min$$

2.57×10^{-3} Ft/min $\times$ 1440 min/day = 3.7 Ft/day

3.7 Ft/day $\times$ 3.528×10^{-4} cm/sec = 1.3×10^{-3} cm/sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island, SC (Site 2) WELL/BORING NO.: PAI 02-MW05

PROJECT NO.: 7394 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 5 ft. TEST NO.: 3/slug

STATIC WATER LEVEL (Depth/Elevation): 8.80 / TWD=39.37 / LWC=30.57 DATE: 08/21/98

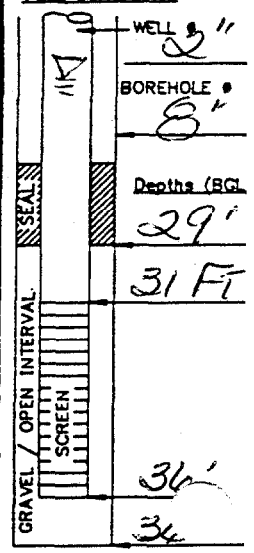
TEST TYPE (Rising/Falling/Constant Head): Falling (Slug in) CHECKED: GG

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 1 OF 2

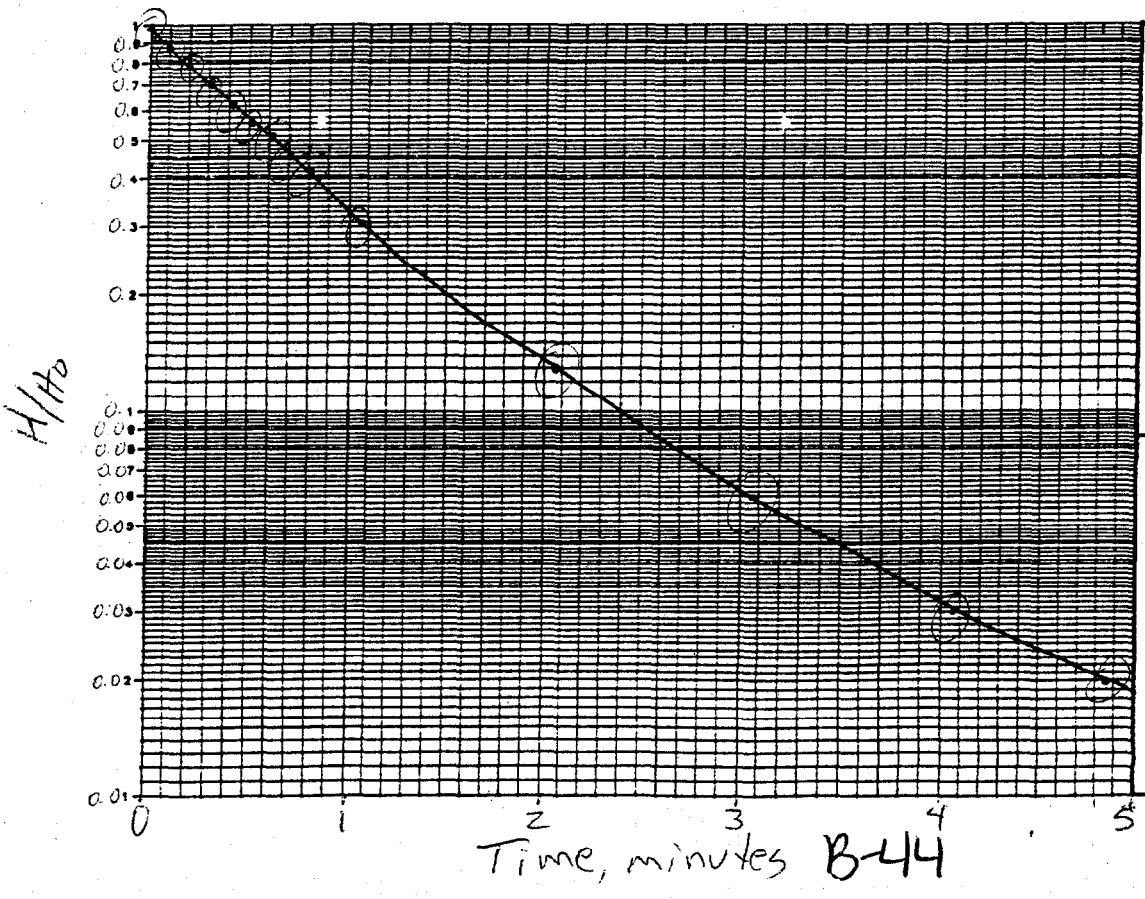
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	-2.306	1	4.07	-0.070	0.03
0.1	-2.031	0.88	4.87	-0.044	0.02
0.2	-1.820	0.79			
0.31	-1.616	0.70			
0.41	-1.443	0.63			
0.51	-1.296	0.56			
0.61	-1.168	0.51			
0.71	-1.054	0.46			
0.81	-0.958	0.42			
1.07	-0.709	0.31			
2.07	-0.300	0.13			
3.07	-0.140	0.061			

WELL SCHEMATIC



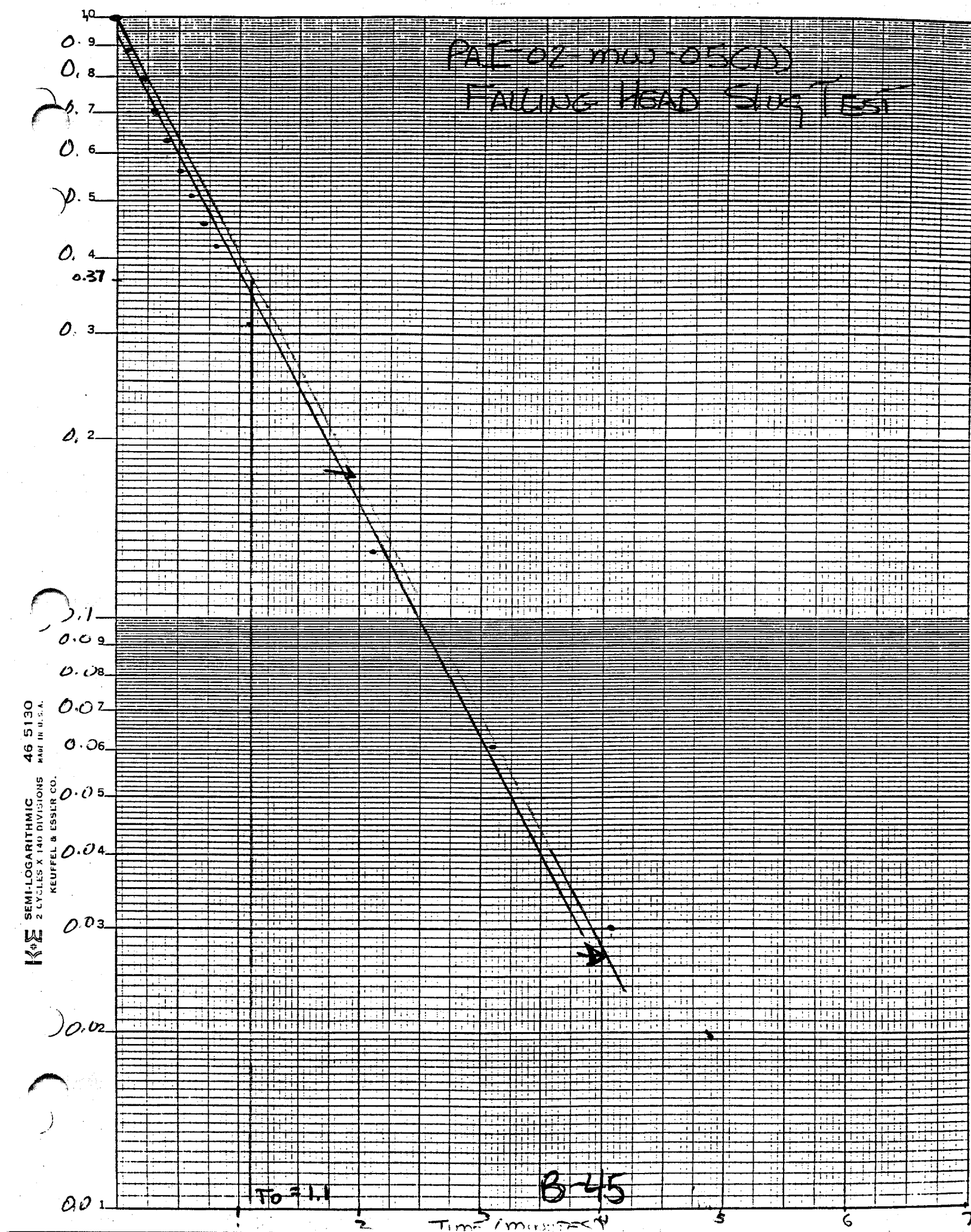
Indicate SWL Depth on Drawing



REMARKS:

XD = 29.88

CALCS, SKETCH MAPS, ETC.:


PAL-02-MW-05(D)
FALLING HEAD SLUG TEST
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
To = 1.1
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-45

~~RAI 2-GW5~~ PAL-02-11MW (OSCD)
Test 3, Step 0
Slug In (Fall)

Falling Head Slug Test

SE10000
Environmental Logger
08/22 14:20

Unit# 00145 Test 3

Setups:	INPUT 1
Type	Level (F)
Mode	100
I.D.	00005
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/21 13:52:56

Elapsed Time	INPUT 1
0.0000	-0.012
0.0033	-0.012
0.0066	-1.386
0.0100	-2.337
0.0133	-2.836
0.0166	-2.913
0.0200	-2.970
0.0233	-3.092
0.0266	-3.124
0.0300	-2.970
0.0333	-2.887
0.0366	-2.836
0.0400	-2.836
0.0433	-2.536
0.0466	-2.037
0.0500	-1.743
0.0533	-2.165
0.0566	-2.625
0.0600	-2.747
0.0633	-2.670
0.0666	-2.529
0.0700	-2.434
0.0733	-2.414
0.0766	-2.434
0.0800	-2.446
0.0833	-2.434
0.0866	-2.414
0.0900	-2.402
0.0933	-2.380
0.0966	-2.376
0.1000	-2.370
0.1033	-2.357
0.1066	-2.344
0.1100	-2.331
0.1133	-2.325
0.1166	-2.312

PAI-02-mw05(D)
Test 3 Step Ø
Slug In (Falling Head Test)

	0.1233	-2.293
0	0.1266	-2.305 · T_0
	0.1300	-2.274
	0.1333	-2.261
	0.1366	-2.255
	0.1400	-2.248
	0.1433	-2.242
	0.1466	-2.229
	0.1500	-2.216
	0.1533	-2.203
	0.1566	-2.197
	0.1600	-2.191
	0.1633	-2.184
	0.1666	-2.178
	0.1700	-2.165
	0.1733	-2.159
	0.1766	-2.152
	0.1800	-2.140
	0.1833	-2.133
	0.1866	-2.127
	0.1900	-2.120
	0.1933	-2.107
	0.1966	-2.101
	0.2000	-2.095
	0.2033	-2.082
	0.2066	-2.076
	0.2100	-2.069
	0.2133	-2.063
	0.2166	-2.056
	0.2200	-2.044
	0.2233	-2.044
0.1	-0.2266	-2.031
	0.2300	-2.018
	0.2333	-2.018
	0.2366	-2.005
	0.2400	-2.005
	0.2433	-1.992
	0.2466	-1.986
	0.2500	-1.973
	0.2533	-1.973
	0.2566	-1.967
	0.2600	-1.954
	0.2633	-1.948
	0.2666	-1.942
	0.2700	-1.935
	0.2733	-1.929
	0.2766	-1.922
	0.2800	-1.916
	0.2833	-1.909
	0.2866	-1.903
	0.2900	-1.897
	0.2933	-1.890
	0.2966	-1.884
	0.3000	-1.878
	0.3033	-1.865
	0.3066	-1.858
	0.3100	-1.852
	0.3133	-1.852
	0.3166	-1.839

PAI-02-MW05(D)
Test 3 Step Ø
Slug In (Falling Head Test)

	0.3233	-1.826
0.2	-0.3266	-1.820
	0.3300	-1.814
	0.3333	-1.807
	0.3500	-1.775
	0.3666	-1.743
	0.3833	-1.712
	0.4000	-1.679
	0.4166	-1.647
0.31	-0.4333	-1.616
	0.4500	-1.584
	0.4666	-1.558
	0.4833	-1.526
	0.5000	-1.501
	0.5166	-1.475
0.41	-0.5333	-1.443
	0.5500	-1.418
	0.5666	-1.392
	0.5833	-1.373
	0.6000	-1.347
	0.6166	-1.322
0.51	-0.6333	-1.296
	0.6500	-1.277
	0.6666	-1.258
	0.6833	-1.232
	0.7000	-1.213
	0.7166	-1.188
0.61	-0.7333	-1.168
	0.7500	-1.149
	0.7666	-1.130
	0.7833	-1.111
	0.8000	-1.092
	0.8166	-1.073
0.71	-0.8333	-1.054
	0.8500	-1.041
	0.8666	-1.021
	0.8833	-1.002
	0.9000	-0.983
	0.9166	-0.970
0.81	-0.9333	-0.958
	0.9500	-0.945
	0.9666	-0.926
	0.9833	-0.913
	1.0000	-0.900
1.07	-1.2000	-0.709
	1.4000	-0.503
	1.6000	-0.491
	1.8000	-0.415
	2.0000	-0.351
2.07	-2.2000	-0.300
	2.4000	-0.255
	2.6000	-0.217
	2.8000	-0.185
	3.0000	-0.150
3.07	-3.2000	-0.140
	3.4000	-0.121
	3.6000	-0.108
	3.8000	-0.080
	4.0000	-0.076
4.07		

PAF-02-MW05(D)
Test 3 Step Ø
Slug In (Falling Head Test)

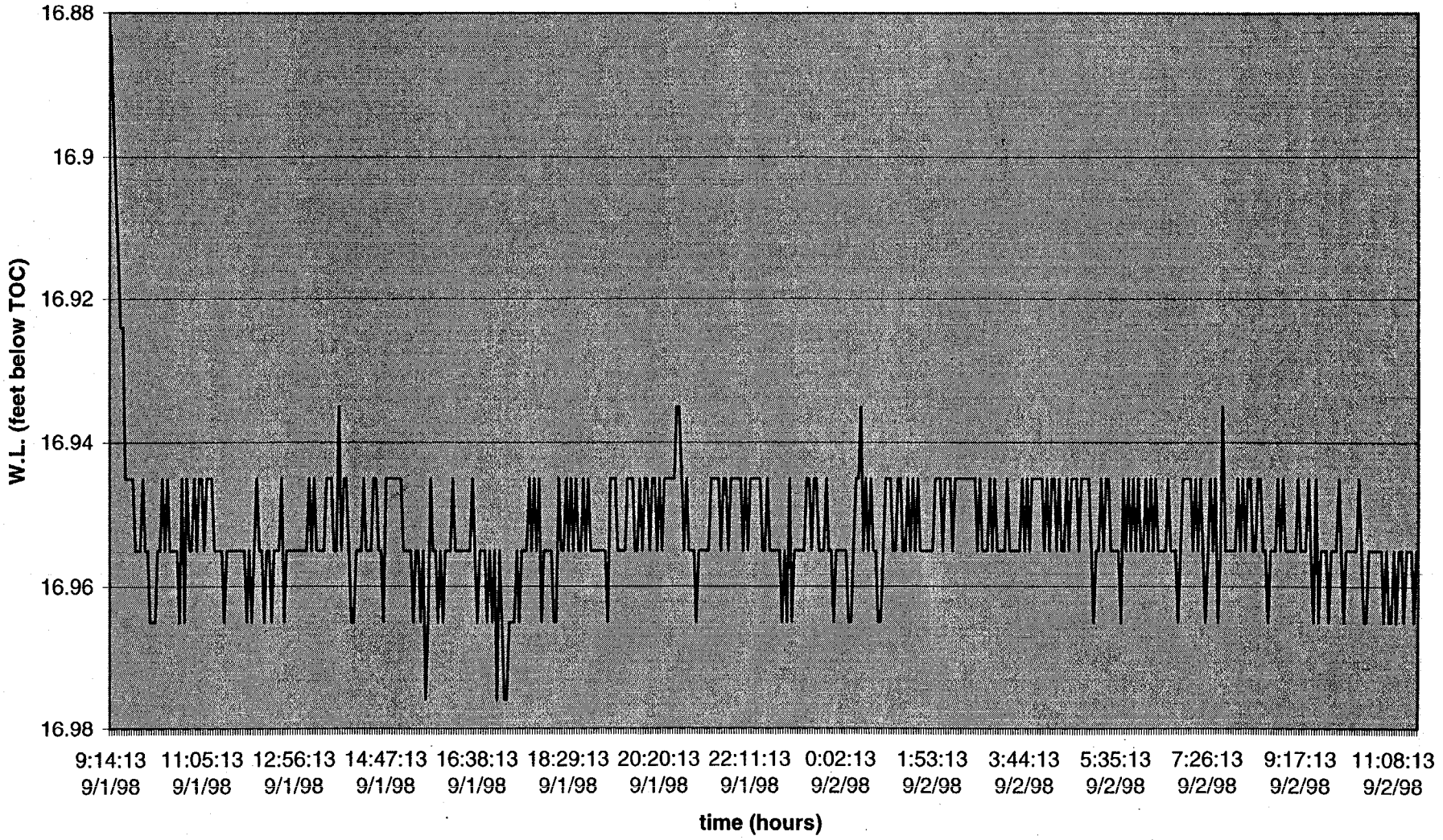
	4.4000	-0.057
	4.6000	-0.051
	4.8000	-0.044
4.87	5.0000	-0.044
5.07	5.2000	-0.038
	5.4000	-0.025
	5.6000	-0.019
	5.8000	-0.012
	6.0000	-0.012
6.07	6.2000	-0.006
	6.4000	-0.006
	6.6000	0.000
	6.8000	0.000
	7.0000	0.000
	7.2000	0.006
	7.4000	0.012
	7.6000	0.012
	7.8000	0.012
	8.0000	0.018
	8.2000	0.018
	8.4000	0.025
	8.6000	0.025
	8.8000	0.025
	9.0000	0.025
	9.2000	0.031
	9.4000	0.031
	9.6000	0.031
	9.8000	0.031
	10.0000	0.038
	12.0000	0.051
	14.0000	0.070

END

B-2

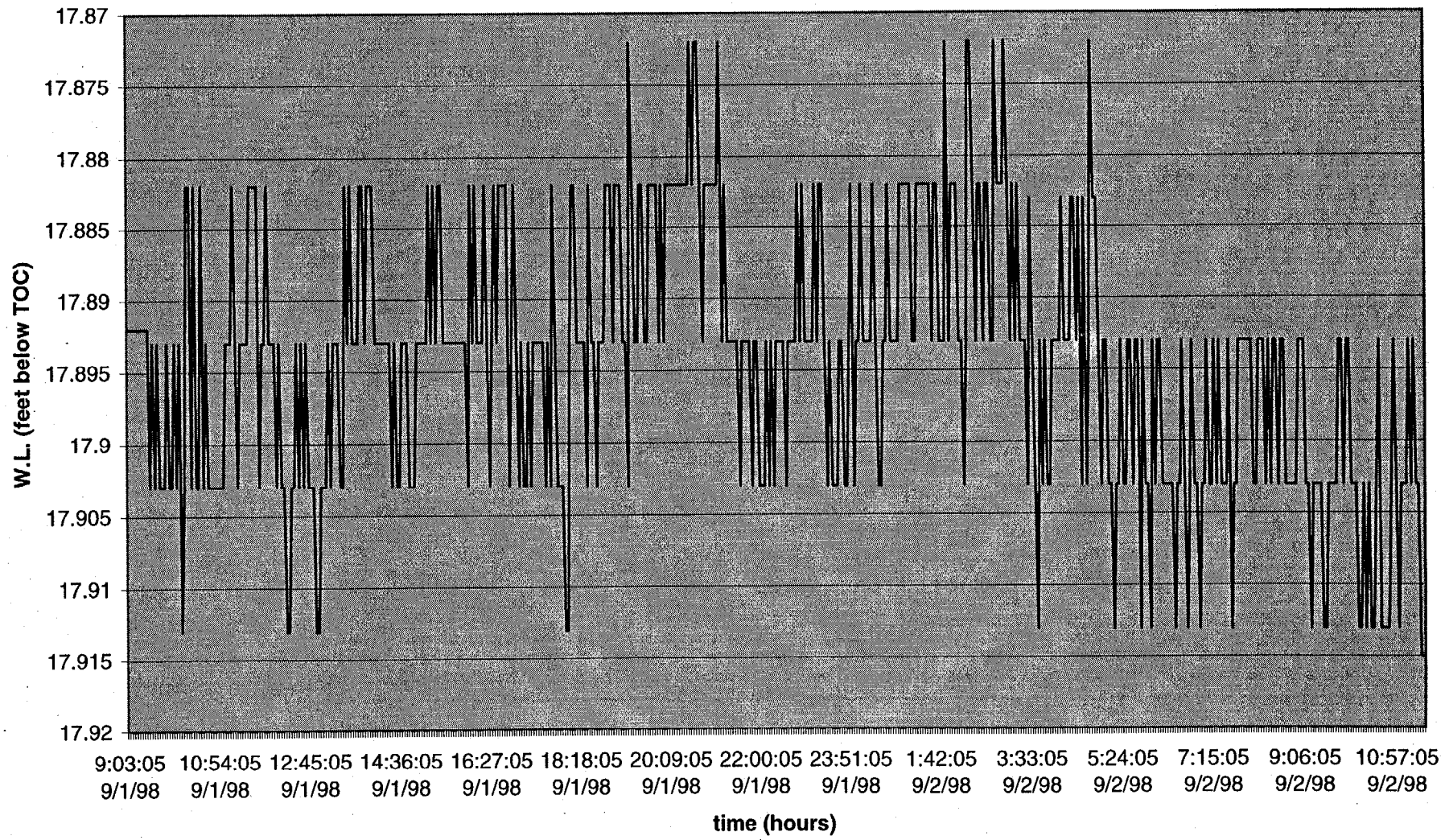
TIDAL STUDY RESULTS

Tidal Study Conducted at Site 2 on September 1 - 2, 1998
Water Level as a Function of Time for PAI2-MW1(S)

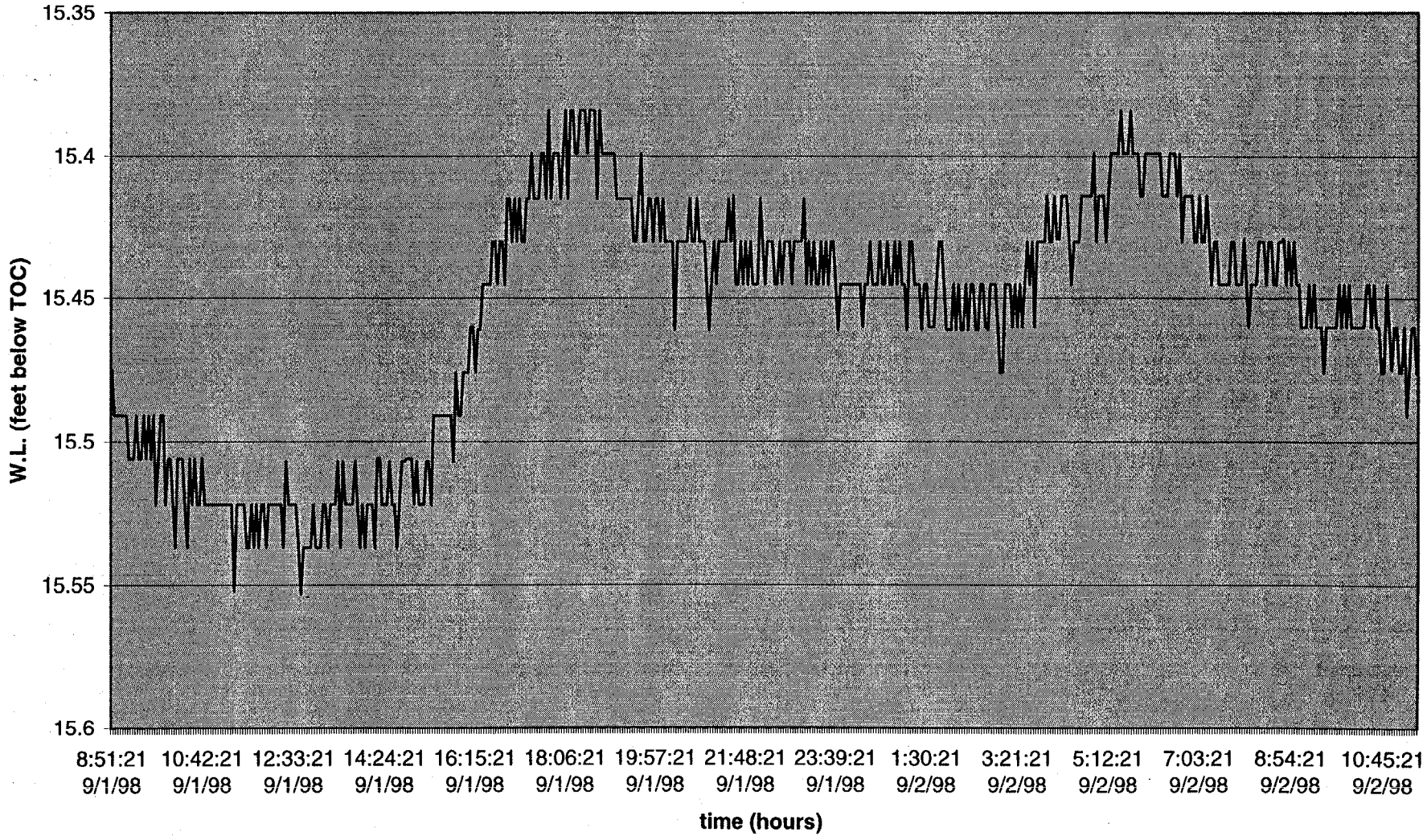


B-50

Tidal Study Conducted at Site 2 on September 1 - 2, 1998
Water Level as a Function of Time for PAI2-MW2(S)



Tidal Study Conducted at Site 2 on September 1 - 2, 1998
Water Level as a Function of Time for PAI2-MW3(S)



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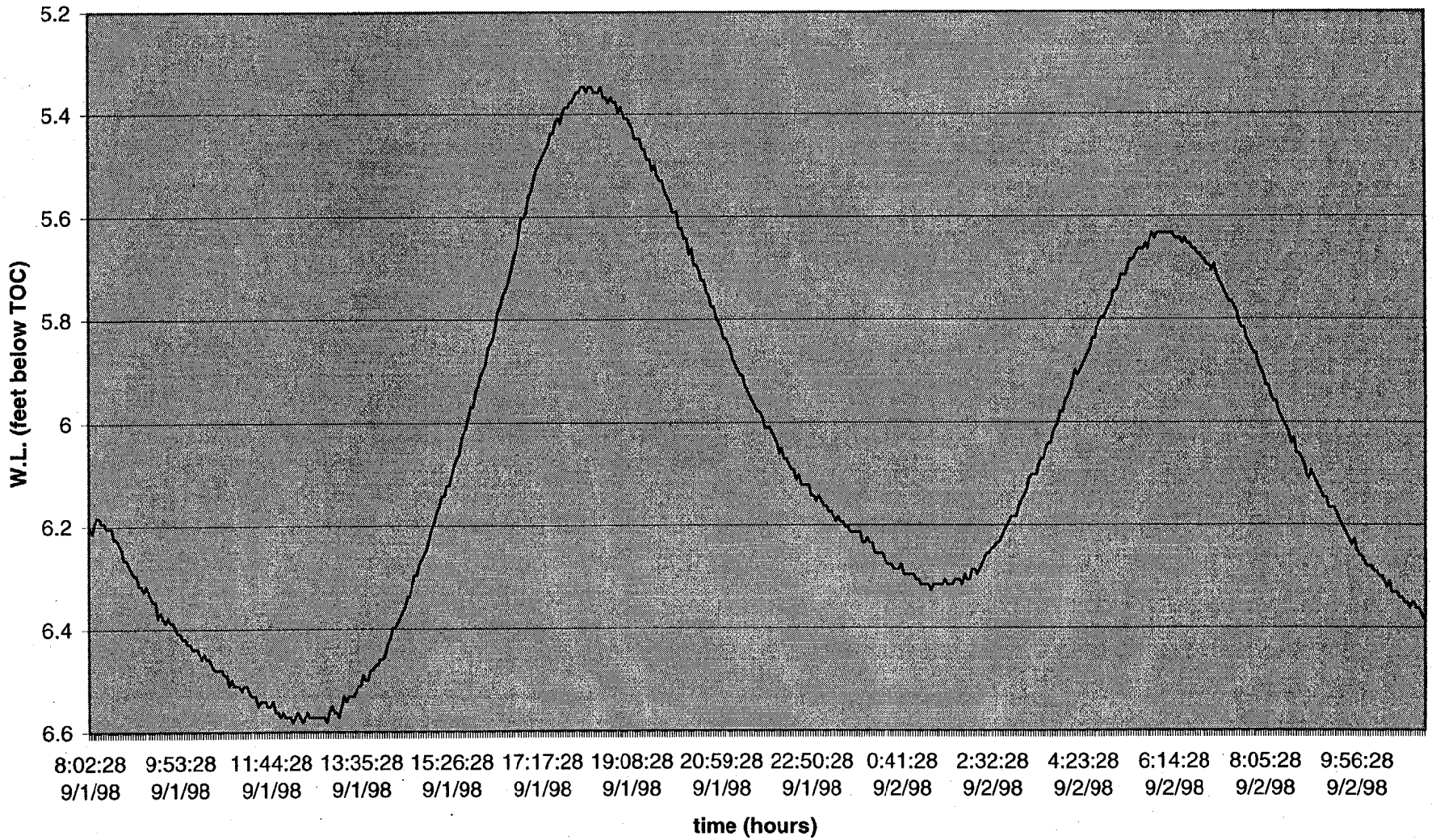
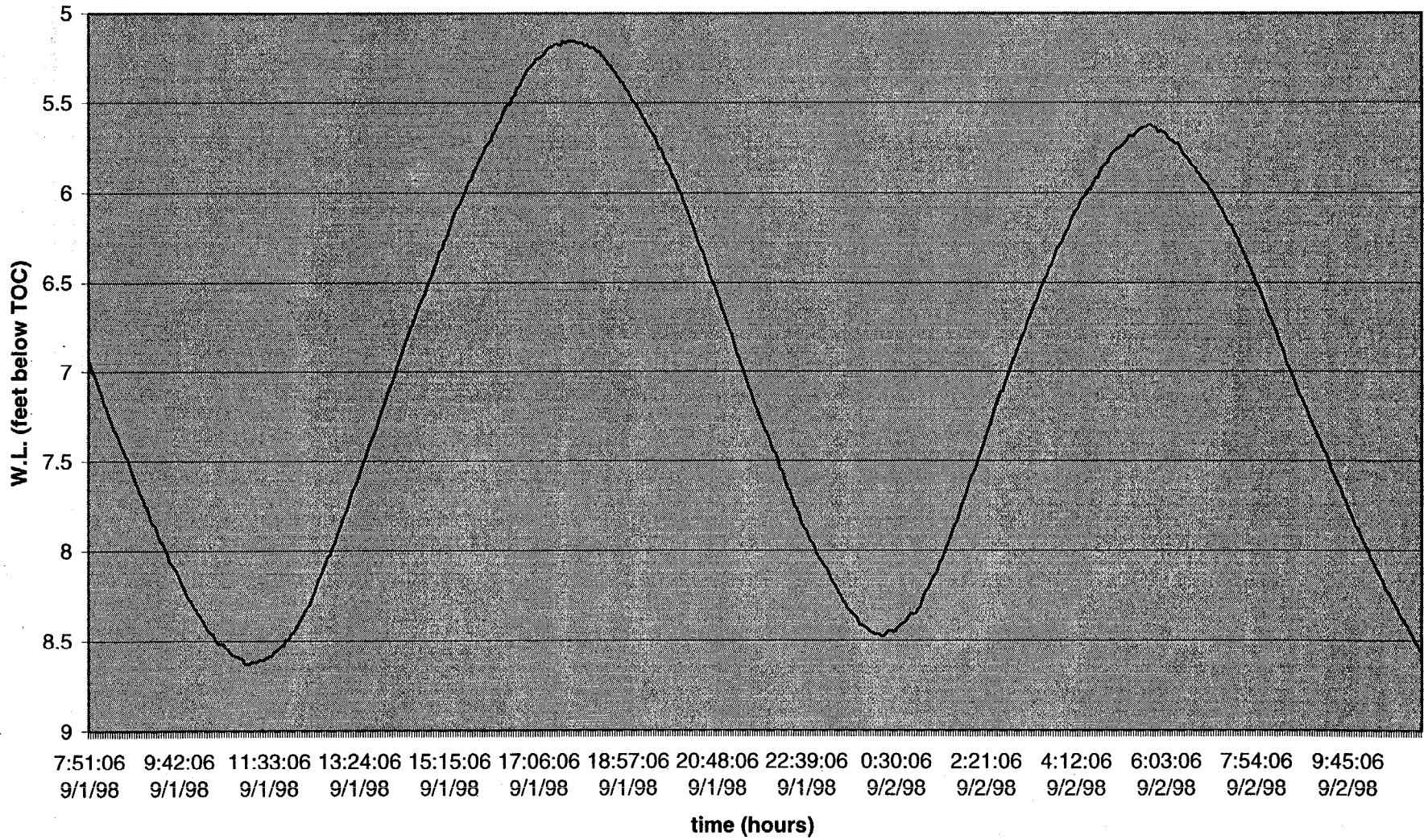
Tidal Study Conducted at Site 2 on September 1 - 2, 1998
Water Level as a Function of TIme for PAI-02-MW-04(S)



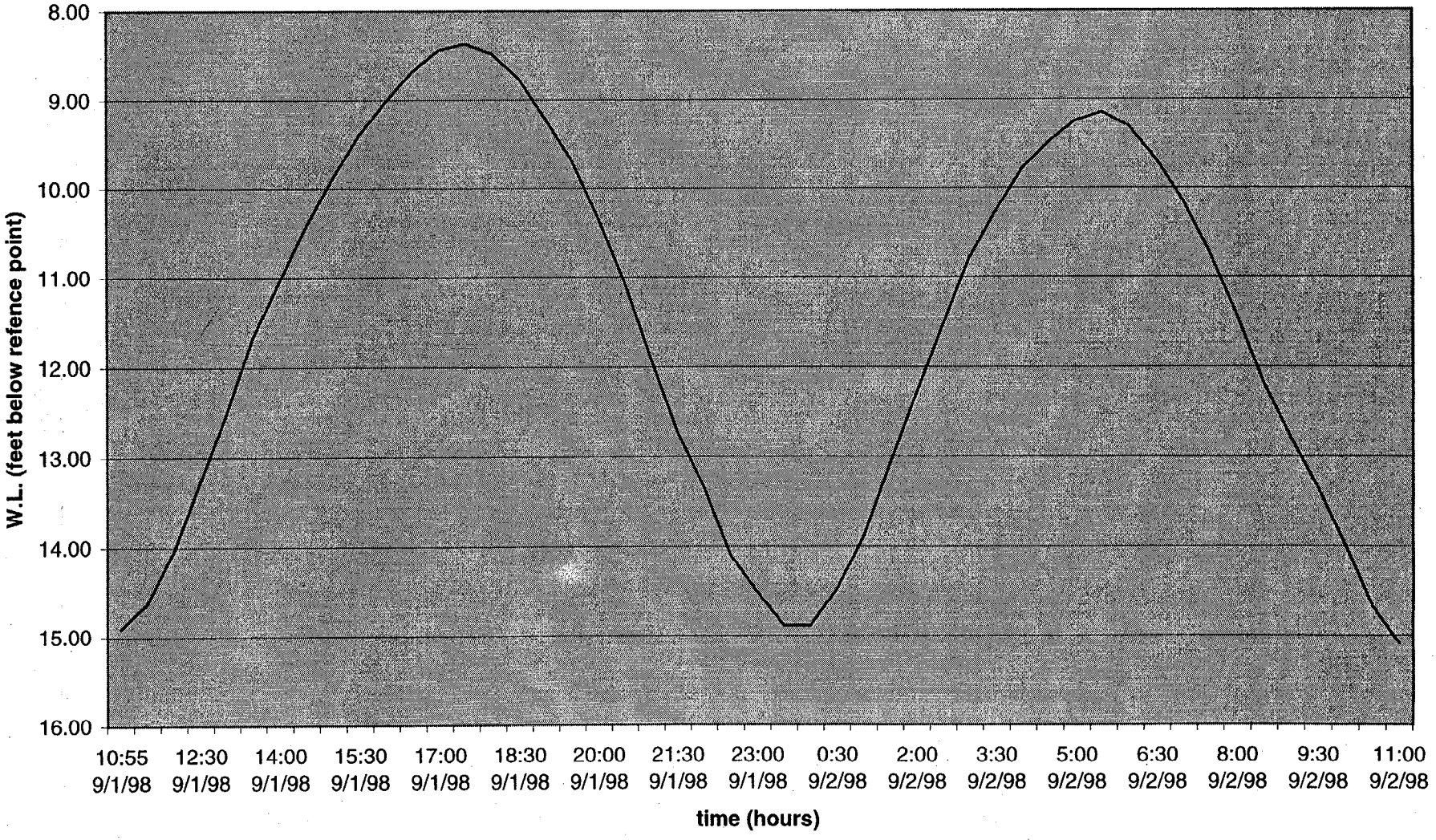
B-53

Tidal Study Conducted at Site 2 on September 1 - 2, 1998
Water Level as a Function of Time for PAI-02-MW-05(D)

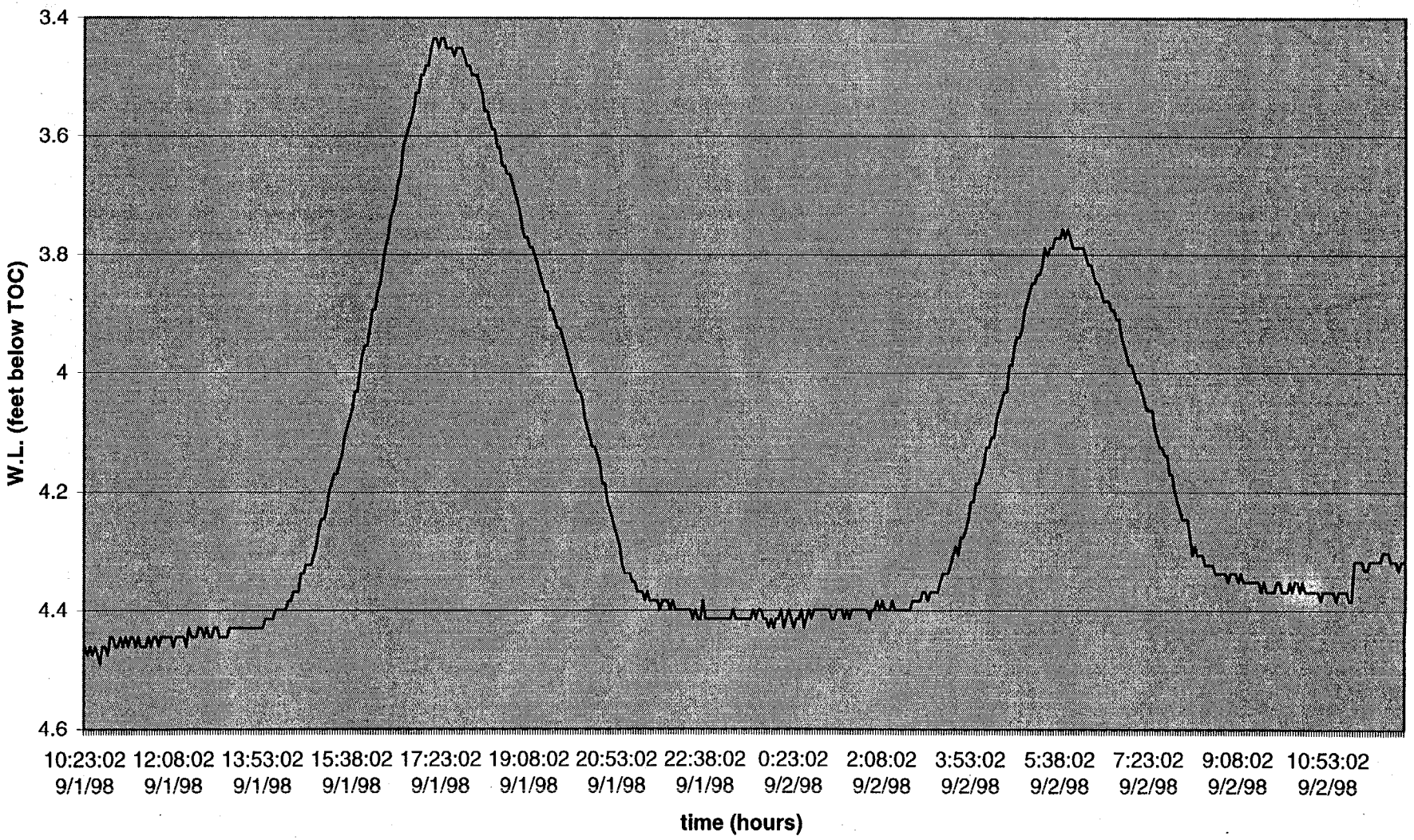


B-54

Tidal Study Conducted at Site 2 on September 1 - 2, 1998
Water Level Measurements as a Function of Time for Control Point at Archer's Creek Bridge



Tidal Study Conducted at Site 2 on September 1 - 2, 1998
Water Level as a Function of Time for Control Well PAI-01-MW-06(D)



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APPENDIX C

ANALYTICAL DATA

C-1 BACKGROUND DATA
C-2 SEDIMENT
C-3 GROUNDWATER
C-4 SURFACE WATER
C-5 SURFACE SOIL
C-6 TEST PIT SAMPLE DATA

C-1

BACKGROUND DATA

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	

C-1

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	

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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	

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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	

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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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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)							
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	

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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	

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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	

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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	

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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	

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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	

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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	

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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	

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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	

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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	

C-16

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	

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TETRA TECH NUS, INC. **CALCULATION WORKSHEET** PAGE ____ OF ____

CLIENT MCRD Parris Island		JOB NUMBER 7394	
SUBJECT Example Background Calculation			
BASED ON Background sample raw data (Appendix C-1)		DRAWING NUMBER	
BY JJB	CHECKED BY JJB	APPROVED BY	DATE 8-3-00

Purpose: To calculate concentrations that are representative of background conditions in surface soil, sediment, & surface water at MCRD Parris Island. Background sampling locations are discussed in App. A-12.

Approach: Two times the average background concentration will be used to represent background conditions per U.S. EPA Region 4 protocol.

Assumptions: For non-detected values, 1/2 the detection limit will be used.

Calculation: For beryllium in surface soil

Sample	Analytical Result
PAI-01-SS-01-01	0.02 U
PAI-01-SS-02-01	0.02
PAI-01-SS-03-01	0.06
PAI-10-SS-15-01	0.11 U
PAI-10-SS-16-01	0.11 U
PAI-10-SS-17-01	0.17 U

Avg Back. = [(0.02 + 0.11 + 0.11 + 0.17)*1/2 + 0.02 + 0.06] / 6
= 0.0475

2 x Back = (2)(0.0475) = $\boxed{0.095}$

SUMMARY OF BACKGROUND CONCENTRATIONS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	Surface Soil	Sediment	Surface Water Filtered	Surface Water Unfiltered
Organics	(µg/kg)	(µg/kg)	(µg/l)	(µg/l)
4-Methyl-2-pentanone	7.3	26		
2-Butanone		22		
Acetone	267			
Chloromethane				0.68
Carbon Disulfide		9.2		
Toluene	5.7	9.7		
Xylenes				1
Bis(2-ethylhexyl) phthalate		421		45
Fluorene	646			
Indeno(1,2,3-cd)pyrene		518		2.6
Beta-BHC		7.1		
Inorganics	(mg/kg)	(mg/kg)	(µg/l)	(µg/l)
Aluminum	7270	24200		3100
Arsenic	1.4	12	4.3	5.1
Barium	24	28	256	38
Beryllium	0.095	0.98		
Cadmium		0.28		
Calcium	766	4000	650000	637000
Chromium	6.2	35.2	20	22.5
Cobalt	0.36	2.6		
Copper	1.5	10	13	7
Iron	3920	21500	48	2090
Lead	12.5	21	11	
Magnesium	515	6400	1900000	1900000
Manganese	129	186	18	53
Mercury	0.11	0.09		
Nickel	1.8	6		
Potassium	313	3200	890000	830000
Selenium	0.29			
Sodium	241	19000	15900000	16000000
Thallium	0.098	0.41		
Vanadium	9.5	50	15	18
Zinc	9.7	45	66	11

Background concentration is calculated as 2 times the average background concentration.

For chemicals in which at least one detection was noted, the average was calculated using 1/2 the detection limit for non detected chemicals.

Blank: indicates that the chemical was not detected in any sample, and therefore an average could not be calculated.

Chemicals not detected in the background data set were not presented in this table. They include antimony, silver, and most organic compounds.

C-2

SEDIMENT

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
SITE 02
SEDIMENT DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SD-001-01	PAI-02-SD-002-01	PAI-02-SD-002-02	PAI-02-SD-003-01	PAI-02-SD-004-01	/ /	/ /
COLLECTION DATE:	07/23/98	07/23/98	07/23/98	07/22/98	07/22/98		
LOCATION:	PAI-02-SD-001	PAI-02-SD-002	PAI-02-SD-002	PAI-02-SD-003	PAI-02-SD-004		
SAMPLE DEPTH:	0 - 0.5'	0 - 0.5'	0.5 - 1.0'	0 - 0.5'	0 - 0.5'		
VOLATILES (µg/kg)							
1,1,1-TRICHLOROETHANE	7 U	8 U	6 U	6 U	6 U		
1,1,2,2-TETRACHLOROETHANE	7 U	8 U	6 U	6 U	6 U		
1,1,2-TRICHLOROETHANE	7 U	8 U	6 U	6 U	6 U		
1,1-DICHLOROETHANE	7 U	8 U	6 U	6 U	6 U		
1,1-DICHLOROETHENE	7 U	8 U	6 U	6 U	6 U		
1,2-DICHLOROBENZENE	470 U	500 U	460 UJ	460 U	420 U		
1,2-DICHLOROETHANE	7 U	8 U	6 U	6 U	6 U		
1,2-DICHLOROETHENE (TOTAL)	7 U	8 U	6 U	6 U	6 U		
1,2-DICHLOROPROPANE	7 U	8 U	6 U	6 U	6 U		
1,3-DICHLOROBENZENE	470 U	500 U	460 UJ	460 U	420 U		
1,4-DICHLOROBENZENE	470 U	500 U	460 UJ	460 U	420 U		
2-BUTANONE	7 U	8 U	6 U	6 U	6 U		
2-HEXANONE	7 U	8 U	6 U	6 U	6 U		
4-METHYL-2-PENTANONE	7 U	8 U	6 U	6 U	6 U		
ACETONE	7 UR	8 UR	96 U	6 UR	6 UR		
BENZENE	7 U	8 U	6 U	6 U	6 U		
BROMODICHLOROMETHANE	7 U	8 U	6 U	6 U	6 U		
BROMOFORM	7 U	8 U	6 U	6 U	6 U		
BROMOMETHANE	7 U	8 U	6 U	6 U	6 U		
CARBON DISULFIDE	7 U	8 U	6 U	6 U	6 U		
CARBON TETRACHLORIDE	7 U	8 U	6 U	6 U	6 U		
CHLOROBENZENE	7 U	8 U	6 U	6 U	6 U		
CHLOROETHANE	7 U	8 U	6 U	6 U	6 U		
CHLOROFORM	7 U	8 U	6 U	4 J	5 J		
CHLOROMETHANE	7 U	8 U	6 U	6 U	6 U		
CIS-1,3-DICHLOROPROPENE	7 U	8 U	6 U	6 U	6 U		
DIBROMOCHLOROMETHANE	7 U	8 U	6 U	6 U	6 U		
ETHYLBENZENE	7 U	8 U	6 U	6 U	6 U		
METHYLENE CHLORIDE	7 U	8 U	6 U	6 U	9 U		
STYRENE	7 U	8 U	6 U	6 U	6 U		
TETRACHLOROETHENE	7 U	8 U	6 U	6 U	6 U		

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PARRIS ISLAND
SITE 02
SEDIMENT DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SD-001-01	PAI-02-SD-002-01	PAI-02-SD-002-02	PAI-02-SD-003-01	PAI-02-SD-004-01	/ /	/ /
COLLECTION DATE:	07/23/98	07/23/98	07/23/98	07/22/98	07/22/98		
LOCATION:	PAI-02-SD-001	PAI-02-SD-002	PAI-02-SD-002	PAI-02-SD-003	PAI-02-SD-004		
SAMPLE DEPTH:	0 - 0.5'	0 - 0.5'	0.5 - 1.0'	0 - 0.5'	0 - 0.5'		
VOLATILES (µg/kg)							
TOLUENE	7 U	8 U	6 U	6 U	6 U		
TRANS-1,3-DICHLOROPROPENE	7 U	8 U	6 U	6 U	6 U		
TRICHLOROETHENE	7 U	8 U	6 U	6 U	6 U		
VINYL CHLORIDE	7 U	8 U	6 U	6 U	6 U		
XYLENES, TOTAL	7 U	8 U	6 U	6 U	6 U		
SEMIVOLATILES (µg/kg)							
1,2,4-TRICHLOROBENZENE	470 U	500 U	460 UJ	460 U	420 U		
2,2'-OXYBIS(1-CHLOROPROPANE)	470 U	500 U	460 UJ	460 U	420 U		
2,4,5-TRICHLOROPHENOL	2400 U	2500 U	2300 U	2300 U	2100 U		
2,4,6-TRICHLOROPHENOL	470 U	500 U	460 U	460 U	420 U		
2,4-DICHLOROPHENOL	470 U	500 U	460 U	460 U	420 U		
2,4-DIMETHYLPHENOL	470 U	500 U	460 U	460 U	420 U		
2,4-DINITROPHENOL	2400 U	2500 U	2300 U	2300 U	2100 U		
2,4-DINITROTOLUENE	470 U	500 U	460 UJ	460 U	420 U		
2,6-DINITROTOLUENE	470 U	500 U	460 UJ	460 U	420 U		
2-CHLORONAPHTHALENE	470 U	500 U	460 UJ	460 U	420 U		
2-CHLOROPHENOL	470 U	500 U	460 U	460 U	420 U		
2-METHYLNAPHTHALENE	470 U	500 U	460 UJ	460 U	420 U		
2-METHYLPHENOL	470 U	500 U	460 U	460 U	420 U		
2-NITROANILINE	2400 U	2500 U	2300 UJ	2300 U	2100 U		
2-NITROPHENOL	470 U	500 U	460 U	460 U	420 U		
3,3'-DICHLOROBENZIDINE	940 U	1000 U	930 UJ	910 U	840 U		
3-NITROANILINE	2400 U	2500 U	2300 UJ	2300 U	2100 U		
4,6-DINITRO-2-METHYLPHENOL	2400 U	2500 U	2300 U	2300 U	2100 U		
4-BROMOPHENYL PHENYL ETHER	470 U	500 U	460 UJ	460 U	420 U		
4-CHLORO-3-METHYLPHENOL	940 U	1000 U	930 U	910 U	840 U		
4-CHLOROANILINE	940 U	1000 U	930 UJ	910 U	840 U		
4-CHLOROPHENYL PHENYL ETHER	470 U	500 U	460 UJ	460 U	420 U		
4-METHYLPHENOL	470 U	500 U	460 U	460 U	420 U		
4-NITROANILINE	2400 U	2500 U	2300 UJ	2300 U	2100 U		
4-NITROPHENOL	2400 U	2500 U	2300 U	2300 U	2100 U		

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PARRIS ISLAND
SITE 02
SEDIMENT DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SD-001-01	PAI-02-SD-002-01	PAI-02-SD-002-02	PAI-02-SD-003-01	PAI-02-SD-004-01	/ /	/ /
COLLECTION DATE:	07/23/98	07/23/98	07/23/98	07/22/98	07/22/98		
LOCATION:	PAI-02-SD-001	PAI-02-SD-002	PAI-02-SD-002	PAI-02-SD-003	PAI-02-SD-004		
SAMPLE DEPTH:	0 - 0.5'	0 - 0.5'	0.5 - 1.0'	0 - 0.5'	0 - 0.5'		
SEMIVOLATILES (µg/kg)							
ACENAPHTHENE	580 U	620 U	230 U	120 UR	200 U		
ACENAPHTHYLENE	290 U	310 U	120 U	58 UR	100 U		
ANTHRACENE	12 U	12 U	4.7 U	2.3 UR	4.1 U		
BENZO(A)ANTHRACENE	29 U	31 U	12 U	5.8 UR	8.2 J		
BENZO(A)PYRENE	29 U	31 U	7.3	5.8 UR	12		
BENZO(B)FLUORANTHENE	12 U	12 U	5.6	2.3 UR	18		
BENZO(G,H,I)PERYLENE	47 U	50 U	19 U	9.2 UR	16 U		
BENZO(K)FLUORANTHENE	12 U	12 U	4.7 U	2.3 UR	8		
BIS(2-CHLOROETHOXY)METHANE	470 U	500 U	460 UJ	460 U	420 U		
BIS(2-CHLOROETHYL)ETHER	470 U	500 U	460 UJ	460 U	420 U		
BIS(2-ETHYLHEXYL)PHTHALATE	470 U	500 U	460 UJ	460 U	420 U		
BUTYLBENZYL PHTHALATE	470 U	500 U	460 UJ	460 U	420 U		
CARBAZOLE	470 U	500 U	460 UJ	460 U	420 U		
CHRYSENE	29 U	31 U	11 J	5.8 UR	21		
DI-N-BUTYL PHTHALATE	470 U	500 U	460 UJ	460 U	420 U		
DI-N-OCTYL PHTHALATE	470 U	500 U	460 UJ	460 U	420 U		
DIBENZO(A,H)ANTHRACENE	120 U	120 U	47 U	23 UR	41 U		
DIBENZOFURAN	470 U	500 U	460 UJ	460 U	420 U		
DIETHYL PHTHALATE	470 U	500 U	460 UJ	460 U	420 U		
DIMETHYL PHTHALATE	470 U	500 U	460 UJ	460 U	420 U		
FLUORANTHENE	29 U	31 U	12 U	5.8 UR	38		
FLUORENE	58 U	62 U	23 U	12 UR	20 U		
HEXACHLOROBENZENE	470 U	500 U	460 UJ	460 U	420 U		
HEXACHLOROBUTADIENE	470 U	500 U	460 UJ	460 U	420 U		
HEXACHLOROCYCLOPENTADIENE	470 U	500 U	460 UJ	460 U	420 U		
HEXACHLOROETHANE	470 U	500 U	460 UJ	460 U	420 U		
INDENO(1,2,3-CD)PYRENE	29 U	31 U	7 J	5.8 UR	12		
ISOPHORONE	470 U	500 U	460 UJ	460 U	420 U		
N-NITROSO-DI-N-PROPYLAMINE	470 U	500 U	460 UJ	460 U	420 U		
N-NITROSODIPHENYLAMINE	470 U	500 U	460 UJ	460 U	420 U		
NAPHTHALENE	290 U	310 U	120 U	58 UR	100 U		

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PARRIS ISLAND
SITE 02
SEDIMENT DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SD-001-01	PAI-02-SD-002-01	PAI-02-SD-002-02	PAI-02-SD-003-01	PAI-02-SD-004-01	/ /	/ /
COLLECTION DATE:	07/23/98	07/23/98	07/23/98	07/22/98	07/22/98		
LOCATION:	PAI-02-SD-001	PAI-02-SD-002	PAI-02-SD-002	PAI-02-SD-003	PAI-02-SD-004		
SAMPLE DEPTH:	0 - 0.5'	0 - 0.5'	0.5 - 1.0'	0 - 0.5'	0 - 0.5'		
SEMIVOLATILES (µg/kg)							
NITROBENZENE	470 U	500 U	460 UJ	460 U	420 U		
PENTACHLOROPHENOL	2400 U	2500 U	2300 U	2300 U	2100 U		
PHENANTHRENE	23 U	25 U	8 J	4.6 UR	11		
PHENOL	470 U	500 U	460 U	460 U	420 U		
PYRENE	58 U	62 U	23 U	12 UR	30		
PESTICIDES/PCBs (µg/kg)							
4,4'-DDD	24 U	25 U	23 U	23 U	2.1 U		
4,4'-DDE	24 U	25 U	23 U	23 U	2.1 U		
4,4'-DDT	24 U	25 U	23 U	23 U	2.1 U		
ALDRIN	12 U	13 U	12 U	11 U	1 U		
ALPHA-BHC	12 U	13 U	12 U	11 U	1 U		
ALPHA-CHLORDANE	12 U	13 U	12 U	11 U	1 U		
AROCLOR-1016	57 U	61 U	56 U	55 U	51 U		
AROCLOR-1221	57 U	61 U	56 U	55 U	51 U		
AROCLOR-1232	57 U	61 U	56 U	55 U	51 U		
AROCLOR-1242	57 U	61 U	56 U	55 U	51 U		
AROCLOR-1248	57 U	61 U	56 U	55 U	51 U		
AROCLOR-1254	110 U	120 U	110 U	110 U	100 U		
AROCLOR-1260	110 U	120 U	110 U	110 U	100 U		
BETA-BHC	12 U	13 U	12 U	11 U	1 U		
DELTA-BHC	12 U	13 U	12 U	11 U	1 U		
DIELDRIN	24 U	25 U	23 U	23 U	2.1 U		
ENDOSULFAN I	12 U	13 U	12 U	11 U	1 U		
ENDOSULFAN II	24 U	25 U	23 U	23 U	2.1 U		
ENDOSULFAN SULFATE	24 U	25 U	23 U	23 U	2.1 U		
ENDRIN	24 U	25 U	23 U	23 U	2.1 U		
ENDRIN ALDEHYDE	24 U	25 U	23 U	23 U	2.1 U		
ENDRIN KETONE	24 U	25 U	23 U	23 U	2.1 U		
GAMMA-BHC (LINDANE)	12 U	13 U	12 U	11 U	1 U		
GAMMA-CHLORDANE	12 U	13 U	12 U	11 U	1 U		
HEPTACHLOR	12 U	13 U	12 U	11 U	1 U		

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PARRIS ISLAND
SITE 02
SEDIMENT DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SD-001-01	PAI-02-SD-002-01	PAI-02-SD-002-02	PAI-02-SD-003-01	PAI-02-SD-004-01	/ /	/ /
COLLECTION DATE:	07/23/98	07/23/98	07/23/98	07/22/98	07/22/98		
LOCATION:	PAI-02-SD-001	PAI-02-SD-002	PAI-02-SD-002	PAI-02-SD-003	PAI-02-SD-004		
SAMPLE DEPTH:	0 - 0.5'	0 - 0.5'	0.5 - 1.0'	0 - 0.5'	0 - 0.5'		
PESTICIDES/PCBs (µg/kg)							
HEPTACHLOR EPOXIDE	12 U	13 U	12 U	11 U	1 U		
METHOXYCHLOR	120 U	130 U	120 U	110 U	10 U		
TOXAPHENE	240 U	250 U	230 U	230 U	21 U		
INORGANICS (mg/kg)							
ALUMINUM	5420	5010	5560	3360	3140		
ANTIMONY	0.28 U	0.22 U	0.2 U	0.2 U	0.18 U		
ARSENIC	2.1	1.3	1.7	0.79	1.7		
BARIUM	7.9	7.9	7.9	4.9	6		
BERYLLIUM	0.33 U	0.33 U	0.3 U	0.19 U	0.2 U		
CADMIUM	0.04 U	0.04 U	0.03 U	0.03 U	0.03 U		
CALCIUM	1530	1680	685	32800	362		
CHROMIUM	10.1	9.2	9.3	6.6	5.9		
COBALT	0.88 U	0.77 U	0.74 U	0.52	0.35		
COPPER	3.2	2.8	2.9	1.9	1.2		
CYANIDE	0.62 U	0.77 U	0.68 U	0.66 U	0.62 U		
IRON	5390	4120	4270	2650	2690		
LEAD	7.1	6.6	7.1	4.6	3.2		
MAGNESIUM	1760	2380	1290	1160	777		
MANGANESE	44.9	30.4	26	22.7	52.4		
MERCURY	0.04 U	0.03 U	0.04	0.03 U	0.02 U		
NICKEL	2.1	1.9	2	1.2	0.82		
POTASSIUM	976	1010	844	706	426		
SELENIUM	0.42	0.26	0.37	0.4	0.23		
SILVER	0.08 U	0.08 U	0.08 U	0.08 U	0.07 U		
SODIUM	5550	6650	3870	4150	2770		
THALLIUM	0.37 U	0.37 U	0.35 U	0.35 U	0.32 U		
VANADIUM	12.8	11.5	11.7	7.8	6.1		
ZINC	12.6	10.9	11.2	6.7 U	4.4 U		
MISCELLANEOUS PARAMETERS (mg/kg)							
HEXAVALENT CHROMIUM		1.6		1 U	1.1		
TOTAL ORGANIC CARBON (%)	0.97	1.6	1	0.86	0.36		

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PARRIS ISLAND
SITE 02
SEDIMENT DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SD-001-01	PAI-02-SD-002-01	PAI-02-SD-002-02	PAI-02-SD-003-01	PAI-02-SD-004-01	/ /	/ /
COLLECTION DATE:	07/23/98	07/23/98	07/23/98	07/22/98	07/22/98		
LOCATION:	PAI-02-SD-001	PAI-02-SD-002	PAI-02-SD-002	PAI-02-SD-003	PAI-02-SD-004		
SAMPLE DEPTH:	0 - 0.5'	0 - 0.5'	0.5 - 1.0'	0 - 0.5'	0 - 0.5'		
GENERAL CHEMISTRY (unitless)							
PH	7.6	8.7	7.6	7.9	7.1		

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PARRIS ISLAND
SITE 15
SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-15-SD-001-01	PAI-15-SD-002-01	PAI-15-SD-003-01	/ /	/ /	/ /	/ /
COLLECTION DATE:	06/15/98	06/15/98	06/15/98				
LOCATION:	PAI-15-SD-01	PAI-15-SD-02	PAI-15-SD-03				
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'				
SEMIVOLATILES (µg/kg)							
1,2,4-TRICHLOROBENZENE	440 U	480 U	660 U				
1,2-DICHLOROBENZENE	440 U	480 U	660 U				
1,3-DICHLOROBENZENE	440 U	480 U	660 U				
1,4-DICHLOROBENZENE	440 U	480 U	660 U				
2,2'-OXYBIS(1-CHLOROPROPANE)	440 U	480 U	660 U				
2,4,5-TRICHLOROPHENOL	2200 U	2400 U	3300 U				
2,4,6-TRICHLOROPHENOL	440 U	480 U	660 U				
2,4-DICHLOROPHENOL	440 U	480 U	660 U				
2,4-DIMETHYLPHENOL	440 U	480 U	660 U				
2,4-DINITROPHENOL	2200 U	2400 U	3300 U				
2,4-DINITROTOLUENE	440 U	480 U	660 U				
2,6-DINITROTOLUENE	440 U	480 U	660 U				
2-CHLORONAPHTHALENE	440 U	480 U	660 U				
2-CHLOROPHENOL	440 U	480 U	660 U				
2-METHYLNAPHTHALENE	440 U	480 U	660 U				
2-METHYLPHENOL	440 U	480 U	660 U				
2-NITROANILINE	2200 U	2400 U	3300 U				
2-NITROPHENOL	440 U	480 U	660 U				
3,3'-DICHLOROBENZIDINE	890 U	960 U	1300 U				
3-NITROANILINE	2200 U	2400 U	3300 U				
4,6-DINITRO-2-METHYLPHENOL	2200 U	2400 U	3300 U				
4-BROMOPHENYL PHENYL ETHER	440 U	480 U	660 U				
4-CHLORO-3-METHYLPHENOL	890 U	960 U	1300 U				
4-CHLOROANILINE	890 U	960 U	1300 U				
4-CHLOROPHENYL PHENYL ETHER	440 U	480 U	660 U				
4-METHYLPHENOL	440 U	480 U	660 U				
4-NITROANILINE	2200 U	2400 U	3300 U				
4-NITROPHENOL	2200 U	2400 U	3300 U				
ACENAPHTHENE	220 U	120 U	170 U				
ACENAPHTHYLENE	110 U	60 U	84 U				
ANTHRACENE	4.4 U	2.4 U	3.4 U				

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PARRIS ISLAND
SITE 15
SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-15-SD-001-01	PAI-15-SD-002-01	PAI-15-SD-003-01	/ /	/ /	/ /	/ /
COLLECTION DATE:	06/15/98	06/15/98	06/15/98				
LOCATION:	PAI-15-SD-01	PAI-15-SD-02	PAI-15-SD-03				
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'				
SEMIVOLATILES (µg/kg)							
BENZO(A)ANTHRACENE	11 U	6 U	15				
BENZO(A)PYRENE	11 U	6 U	12				
BENZO(B)FLUORANTHENE	4.4 U	3.8	33				
BENZO(G,H,I)PERYLENE	18 U	9.5 U	13				
BENZO(K)FLUORANTHENE	4.4 U	2.4 U	12				
BIS(2-CHLOROETHOXY)METHANE	440 U	480 U	660 U				
BIS(2-CHLOROETHYL)ETHER	440 U	480 U	660 U				
BIS(2-ETHYLHEXYL)PHTHALATE	440 U	280 J	660 U				
BUTYLBENZYL PHTHALATE	440 U	480 U	660 U				
CARBAZOLE	440 U	480 U	660 U				
CHRYSENE	11 J	15	28				
DI-N-BUTYL PHTHALATE	440 U	480 U	660 U				
DI-N-OCTYL PHTHALATE	440 U	480 U	660 U				
DIBENZO(A,H)ANTHRACENE	44 U	24 U	34 U				
DIBENZOFURAN	440 U	480 U	660 U				
DIETHYL PHTHALATE	440 U	480 U	660 U				
DIMETHYL PHTHALATE	440 U	480 U	660 U				
FLUORANTHENE	11 U	9.3	34				
FLUORENE	22 U	13	17 U				
HEXACHLOROBENZENE	440 U	480 U	660 U				
HEXACHLOROBUTADIENE	440 U	480 U	660 U				
HEXACHLOROCYCLOPENTADIENE	440 U	480 U	660 U				
HEXACHLOROETHANE	440 U	480 U	660 U				
INDENO(1,2,3-CD)PYRENE	11 U	46	13				
ISOPHORONE	440 U	480 U	660 U				
N-NITROSO-DI-N-PROPYLAMINE	440 U	480 U	660 U				
N-NITROSODIPHENYLAMINE	440 U	480 U	660 U				
NAPHTHALENE	110 U	60 U	84 U				
NITROBENZENE	440 U	480 U	660 U				
PENTACHLOROPHENOL	2200 U	2400 U	3300 U				
PHENANTHRENE	8.8 U	14	8.1				

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PARRIS ISLAND
SITE 15
SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-15-SD-001-01	PAI-15-SD-002-01	PAI-15-SD-003-01	/ /	/ /	/ /	/ /
COLLECTION DATE:	06/15/98	06/15/98	06/15/98				
LOCATION:	PAI-15-SD-01	PAI-15-SD-02	PAI-15-SD-03				
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'				
SEMIVOLATILES (µg/kg)							
PHENOL	440 U	480 U	660 U				
PYRENE	22 U	12 U	28				
PESTICIDES/PCBs (µg/kg)							
4,4'-DDD	22 U	24 U	33 U				
4,4'-DDE	22 U	24 U	33 U				
4,4'-DDT	22 U	24 U	33 U				
ALDRIN	11 U	12 U	17 U				
ALPHA-BHC	11 U	12 U	17 U				
ALPHA-CHLORDANE	11 U	12 U	17 U				
AROCLOR-1016	11 U	12 U	17 U				
AROCLOR-1221	11 U	12 U	17 U				
AROCLOR-1232	11 U	12 U	17 U				
AROCLOR-1242	11 U	12 U	17 U				
AROCLOR-1248	11 U	12 U	17 U				
AROCLOR-1254	11 U	12 U	17 U				
AROCLOR-1260	11 U	12 U	17 U				
BETA-BHC	11 U	12 U	17 U				
DELTA-BHC	11 U	12 U	17 U				
DIELDRIN	22 U	24 U	33 U				
ENDOSULFAN I	11 U	12 U	17 U				
ENDOSULFAN II	22 U	24 U	33 U				
ENDOSULFAN SULFATE	22 U	24 U	33 U				
ENDRIN	22 U	24 U	33 U				
ENDRIN ALDEHYDE	22 U	24 U	33 U				
ENDRIN KETONE	22 U	24 U	33 U				
GAMMA-BHC (LINDANE)	11 U	12 U	17 U				
GAMMA-CHLORDANE	11 U	12 U	17 U				
HEPTACHLOR	11 U	12 U	17 U				
HEPTACHLOR EPOXIDE	11 U	12 U	17 U				
METHOXYCHLOR	110 U	120 U	170 U				
TOXAPHENE	220 U	240 U	330 U				

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PARRIS ISLAND
SITE 15
SEDIMENT - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-15-SD-001-01	PAI-15-SD-002-01	PAI-15-SD-003-01	/ /	/ /	/ /	/ /
COLLECTION DATE:	06/15/98	06/15/98	06/15/98				
LOCATION:	PAI-15-SD-01	PAI-15-SD-02	PAI-15-SD-03				
SAMPLE DEPTH:	0.0 - 0.5'	0.0 - 0.5'	0.0 - 0.5'				
INORGANICS (mg/kg)							
ALUMINUM	648	4710	15500				
ANTIMONY	0.18 U	0.2	0.29 U				
ARSENIC	0.3	4.6	6.5				
BARIUM	1.9	6.6	19.4				
BERYLLIUM	0.06 U	0.21 U	0.71				
CADMIUM	0.03 U	0.03 U	0.16				
CALCIUM	346	758	5550				
CHROMIUM	2	8.1	27.8				
COBALT	0.06 U	0.69	3.1				
COPPER	0.58 U	4	8.7				
CYANIDE	0.62 U	0.67 UJ	0.87 UJ				
IRON	604	3860	14700				
LEAD	2.7	8.8	11.3				
MAGNESIUM	370	1290	4220				
MANGANESE	5.3	31.7	113				
MERCURY	0.03 U	0.03 U	0.04 U				
NICKEL	0.11 U	1.5	6.5				
POTASSIUM	205	697	2560				
SELENIUM	0.18 U	0.39 U	1 U				
SILVER	0.06 U	0.07 U	0.1 U				
SODIUM	2040	3760	10200				
THALLIUM	0.17 U	0.18 U	0.27 U				
VANADIUM	2.3	11.4	37.4				
ZINC	1.9 U	12.9	32.3				

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GROUNDWATER

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.

A blank indicates that the sample was not analyzed for that parameter.

PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
VOLATILES (µg/L)							
1,1,1,2-TETRACHLOROETHANE		1 U				1 U	
1,1,1-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U	
1,1,2,2-TETRACHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U	
1,1,2-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U	
1,1-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U	
1,1-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U	
1,2,3-TRICHLOROPROPANE		1 U				1 U	
1,2-DIBROMO-3-CHLOROPROPANE		1 U				1 U	
1,2-DIBROMOETHANE		1 U				1 U	
1,2-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-DICHLOROETHANE	1 U	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 U	
1,2-DICHLOROPROPANE	1 U	1 U	1 U	1 U	1 U	1 U	
1,3-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U	
1,4-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U	
1,4-DIOXANE		100 U				100 U	
2-BUTANONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	
2-HEXANONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR	
4-METHYL-2-PENTANONE	5 UR	5 U	5 UR	5 UR	5 UR	5 U	
ACETONE	5 UR	5 UR	5 U	5 U	3.3 J	1.8 J	
ACETONITRILE		40 U				40 U	
ACROLEIN		5 UR				5 UR	
ACRYLONITRILE		1 UR				1 UR	
ALLYL CHLORIDE		1 U				1 U	
BENZENE	1 U	1 U	1 U	1 U	1 U	1 U	
BROMODICHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U	
BROMOFORM	1 U	1 U	1 U	1 U	1 U	1 U	
BROMOMETHANE	1 U	1 U	1 U	1 U	1 U	1 U	

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PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002 and 09/15/98	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
VOLATILES (µg/L)							
CARBON DISULFIDE	1 U	1 U	1 U	1 U	1 U	4	
CARBON TETRACHLORIDE	1 U	1 U	1 U	1 U	1 U	1 U	
CHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U	
CHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U	
CHLOROFORM	1 U	2.9	1 U	1 U	1 U	1 U	
CHLOROMETHANE	1 U	1 U	0.2 J	1 U	1 U	1 U	
CHLOROPRENE		1 U				1 U	
CIS-1,2-DICHLOROETHENE		1 U				1 U	
CIS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U	
DIBROMOCHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U	
DIBROMOMETHANE		1 U				1 U	
DICHLORODIFLUOROMETHANE		1 U				1 U	
ETHYL METHACRYLATE		1 U				1 U	
ETHYLBENZENE	1 U	1 U	1 U	1 U	1 U	1 U	
IODOMETHANE		1 U				1 U	
ISOBUTYL ALCOHOL		40 U				40 U	
METHACRYLONITRILE		1 UR				1 UR	
METHYL METHACRYLATE		1 UR				1 UR	
METHYLENE CHLORIDE	2 U	1 U	2 U	2 U	2 U	1 U	
PENTACHLOROETHANE		10 U				10 U	
PROPIONITRILE		40 U				40 U	
STYRENE	1 U	1 U	1 U	1 U	1 U	1 U	
TETRACHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U	
TOLUENE	1 U	1 U	1 U	1 U	1 U	1 U	
TRANS-1,2-DICHLOROETHENE		1 U				1 U	
TRANS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U	
TRANS-1,4-DICHLORO-2-BUTENE		5 U				5 U	
TRICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U	

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PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002 and 09/15/98	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
VOLATILES (µg/L)							
TRICHLOROFLUOROMETHANE		1 U				1 U	
VINYL ACETATE		1 U				1 U	
VINYL CHLORIDE	0.3 U	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	1 U	1 U	
SEMIVOLATILES (µg/L)							
1,2,4,5-TETRACHLOROBENZENE		10 U				10 U	
1,2,4-TRICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-DIPHENYLHYDRAZINE		5 U			5 U	5 U	
1,3,5-TRINITROBENZENE		10 U				10 U	
1,3-DINITROBENZENE		10 U				10 U	
1,4-NAPHTHOQUINONE		10 U				10 U	
1-NAPHTHYLAMINE		10 U				10 U	
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U	5 U	5 U	5 U	5 U	
2,3,4,6-TETRACHLOROPHENOL		10 U				10 U	
2,4,5-TRICHLOROPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
2,4,6-TRICHLOROPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
2,4-DICHLOROPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
2,4-DIMETHYLPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
2,4-DINITROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	
2,4-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U	5 U	
2,6-DICHLOROPHENOL		10 U				10 U	
2,6-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U	5 U	
2-ACETYLAMINOFLUORENE		10 U				10 U	
2-CHLORONAPHTHALENE	5 U	5 U	5 U	5 U	5 U	5 U	
2-CHLOROPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
2-METHYLNAPHTHALENE	5 U	5 U	5 U	5 U	5 U	5 U	
2-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
2-NAPHTHYLAMINE		10 U				10 U	

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PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002 and 09/15/98	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
SEMIVOLATILES (µg/L)							
2-NITROANILINE	5 U	5 U	5 U	5 U	5 U	5 U	
2-NITROPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
2-PICOLINE		10 U				10 U	
3,3'-DICHLOROBENZIDINE	5 U	5 U	5 U	5 U	5 U	5 U	
3,3'-DIMETHYLBENZIDINE		10 U				10 U	
3-METHYLCHOLANTHRENE		10 U				10 U	
3-NITROANILINE	5 U	5 U	5 U	5 U	5 U	5 U	
4,6-DINITRO-2-METHYLPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	
4-AMINOBIPHENYL		10 U				10 U	
4-BROMOPHENYL PHENYL ETHER	5 U	5 U	5 U	5 U	5 U	5 U	
4-CHLORO-3-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
4-CHLOROANILINE	5 U	5 U	5 U	5 U	5 U	5 U	
4-CHLOROPHENYL PHENYL ETHER	5 U	5 U	5 U	5 U	5 U	5 U	
4-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
4-NITROANILINE	5 U	5 U	5 U	5 U	5 U	5 U	
4-NITROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	
4-NITROQUINOLINE-1-OXIDE		10 UR				10 UR	
5-NITRO-O-TOLUIDINE		10 UR				10 UR	
7,12-DIMETHYLBENZ(A)ANTHRACENE		10 U				10 U	
A,A-DIMETHYLPHENETHYLAMINE		10 U				10 U	
ACENAPHTHENE	5 U	5 U	5 U	5 U	5 U	5 U	
ACENAPHTHYLENE	5 U	5 U	5 U	5 U	5 U	5 U	
ACETOPHENONE		10 U				10 U	
ANILINE		5 U			5 U	5 U	
ANTHRACENE	5 U	5 U	5 U	5 U	5 U	5 U	
ARAMITE		10 U				10 U	
BENZO(A)ANTHRACENE	5 U	5 U	5 U	5 U	5 U	5 U	
BENZO(A)PYRENE	5 U	5 U	5 U	5 U	5 U	5 U	

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PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002 and 09/15/98	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
SEMIVOLATILES (µg/L)							
BENZO(B)FLUORANTHENE	5 U	5 U	5 U	5 U	5 U	5 U	
BENZO(G,H,I)PERYLENE	5 U	5 U	5 U	5 U	5 U	5 U	
BENZO(K)FLUORANTHENE	5 U	5 U	5 U	5 U	5 U	5 U	
BENZOIC ACID		25 U			25 U	25 U	
BENZYL ALCOHOL		5 U			5 U	5 U	
BIS(2-CHLOROETHOXY)METHANE	5 U	5 U	5 U	5 U	5 U	5 U	
BIS(2-CHLOROETHYL)ETHER	5 U	5 U	5 U	5 U	5 U	5 U	
BIS(2-ETHYLHEXYL)PHTHALATE	1 J	1 J	5 U	5 U	1 J	1 J	
BUTYLBENZYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 U	
CARBAZOLE	5 U	5 U	5 U	5 U	5 U	5 U	
CHLOROBENZILATE		10 U				10 U	
CHRYSENE	5 U	5 U	5 U	5 U	5 U	5 U	
DI-N-BUTYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 U	
DI-N-OCTYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 U	
DIALLATE		10 U				10 U	
DIBENZO(A,H)ANTHRACENE	5 U	5 U	5 U	5 U	5 U	5 U	
DIBENZOFURAN	5 U	5 U	5 U	5 U	5 U	5 U	
DIETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	1 J	
DIMETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 U	
DIPHENYLAMINE		10 U				10 U	
ETHYL METHANESULFONATE		10 U				10 U	
FLUORANTHENE	5 U	5 U	5 U	5 U	5 U	5 U	
FLUORENE	5 U	5 U	5 U	5 U	5 U	5 U	
HEXACHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U	
HEXACHLOROBUTADIENE	5 U	5 U	5 U	5 U	5 U	5 U	
HEXACHLOROCYCLOPENTADIENE	5 U	5 U	5 U	5 U	5 U	5 U	
HEXACHLOROETHANE	5 U	5 U	5 U	5 U	5 U	5 U	
HEXACHLOROPHENE		0.5 U				0.5 U	

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PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002 and 09/15/98	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
SEMIVOLATILES (µg/L)							
HEXACHLOROPROPENE		10 U				10 U	
INDENO(1,2,3-CD)PYRENE	5 U	5 U	5 U	5 U	5 U	5 U	
ISODRIN		10 U				10 U	
ISOPHORONE	5 U	5 U	5 U	5 U	5 U	5 U	
ISOSAFROLE		10 U				10 U	
METHAPYRILENE		10 U				10 U	
METHYL METHANESULFONATE		10 U				10 U	
N-NITROSO-DI-N-BUTYLAMINE		10 U				10 U	
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U	5 U	5 U	5 U	5 U	
N-NITROSODIETHYLAMINE		10 U				10 U	
N-NITROSODIPHENYLAMINE	5 U	5 U	5 U	5 U	5 U	5 U	
N-NITROSOMETHYLETHYLAMINE		10 U				10 U	
N-NITROSOMORPHOLINE		10 U				10 U	
N-NITROSOPIPERIDINE		10 U				10 U	
N-NITROSOPYRROLIDINE		10 U				10 U	
NAPHTHALENE	5 U	5 U	5 U	5 U	5 U	5 U	
NITROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U	
O,O,O-TRIETHYLPHOSPHOROTHIOAT		10 U				10 U	
O-TOLUIDINE		10 U				10 U	
P-DIMETHYLAMINOAZOBENZENE		10 U				10 U	
P-PHENYLENEDIAMINE		10 U				10 U	
PENTACHLOROBENZENE		10 U				10 U	
PENTACHLORONITROBENZENE		10 U				10 U	
PENTACHLOROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U	
PHENACETIN		10 U				10 U	
PHENANTHRENE	5 U	5 U	5 U	5 U	5 U	5 U	
PHENOL	5 U	5 U	5 U	5 U	5 U	5 U	
PRONAMIDE		10 U				10 U	

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PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002 cnd 01/15/98	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
SEMIVOLATILES (µg/L)							
PYRENE	5 U	5 U	5 U	5 U	5 U	5 U	
SAFROLE		10 U				10 U	
PESTICIDES/PCBs (µg/L)							
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.1 U	
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.1 U	
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.1 U	
ALDRIN	0.05 U	0.050 U	0.05 U	0.051 U	0.050 U	0.050 U	
ALPHA-BHC	0.05 U	0.050 U	0.05 U	0.051 U	0.050 U	0.050 U	
ALPHA-CHLORDANE	0.05 U	0.050 U	0.05 U	0.051 U	0.050 U	0.050 U	
AROCLOR-1016	1 U	1.0 U	1 U	1 U	1.0 U	1.0 U	
AROCLOR-1221	2 U	2.0 U	2 U	2 U	2.0 U	2.0 U	
AROCLOR-1232	1 U	1.0 U	1 U	1 U	1.0 U	1.0 U	
AROCLOR-1242	1 U	1.0 U	1 U	1 U	1.0 U	1.0 U	
AROCLOR-1248	1 U	1.0 U	1 U	1 U	1.0 U	1.0 U	
AROCLOR-1254	1 U	1.0 U	1 U	1 U	1.0 U	1.0 U	
AROCLOR-1260	1 U	1.0 U	1 U	1 U	1.0 U	1.0 U	
BETA-BHC	0.05 U	0.05 U	0.05 U	0.051 U	0.050 U	0.05 U	
CHLORDANE		0.5 U				0.5 U	
DELTA-BHC	0.05 U	0.050 U	0.05 U	0.051 U	0.050 U	0.050 U	
DIELDRIN	0.1 U	0.10 U	0.1 U	0.1 U	0.10 U	0.10 U	
ENDOSULFAN I	0.05 U	0.05 U	0.05 U	0.051 U	0.050 U	0.05 U	
ENDOSULFAN II	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.1 U	
ENDOSULFAN SULFATE	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.1 U	
ENDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.1 U	
ENDRIN ALDEHYDE	0.1 U	0.1 U	0.1 U	0.1 U	0.10 U	0.1 U	
ENDRIN KETONE	0.1 U	0.10 U	0.1 U	0.1 U	0.10 U	0.10 U	
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U	0.051 U	0.050 U	0.05 U	
GAMMA-CHLORDANE	0.05 U	0.050 U	0.05 U	0.051 U	0.050 U	0.050 U	

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PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002 and 07/15/98	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
PESTICIDES/PCBs (µg/L)							
HEPTACHLOR	0.05 U	0.05 U	0.05 U	0.051 U	0.050 U	0.05 U	
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U	0.051 U	0.050 U	0.05 U	
METHOXYCHLOR	0.5 U	0.50 U	0.5 U	0.51 U	0.50 U	0.50 U	
TOXAPHENE	5 U	5 U	5 U	5.1 U	5.0 U	5 U	
HERBICIDES (µg/L)							
2,4,5-T		0.03999 U				0.03999 U	
2,4,5-TP (SILVEX)		0.03999 U				0.03999 U	
2,4-D		0.05 U				0.05 U	
DIMETHOATE		10 U				10 U	
DINOSEB		0.07999 U				0.07999 U	
DISULFOTON		10 U				10 U	
ETHYL PARATHION		10 U				10 U	
METHYL PARATHION		10 U				10 U	
PHORATE		10 U				10 U	
SULFOTEP		10 U				10 U	
THIONAZIN		10 U				10 U	
INORGANICS (µg/L)							
ALUMINUM	1010	277	160 U	298	22.0 U	79.5 U	
ANTIMONY	19 U	19.0 U	19 U	19 U	19.0 U	19.0 U	
ARSENIC	1.5	1.1	1	1.7	1.0	0.90 U	
BARIUM	62.1	33.7	146	150	83.5	40.0	
BERYLLIUM	0.4 U	0.20 U	0.2 U	0.3 U	0.20 U	0.20 U	
CADMIUM	2 U	2.0 U	2 U	2 U	2.0 U	2.0 U	
CALCIUM	9050	6370	110000	118000	281000	112000	
CHROMIUM	6.4 U	6.4 U	6.4 U	7.2	11.9 U	9.2 U	
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
COPPER	28.8	2.6 U	2.6 U	2.6 U	2.6 U	5.2	
CYANIDE	20 U	20 U	20 U	20 U	20 U	20 U	

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PARRIS ISLAND

SITE 02

UNFILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01 08/24/98 PAI-02-GW-002 cind 09/15/98	PAI-02-GW-003-01 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01 08/19/98 PAI-02-GW-005	/ /
INORGANICS (µg/L)							
IRON	1290	780	4270	4850	439	8370	
LEAD	1.1 U	5.5 U	1.1 U	1.1 U	5.5 U	5.5 U	
MAGNESIUM	4030	2580	190000	215000	778000	31800	
MANGANESE	148	37.0	104	108	100	187	
MERCURY	0.1 U	0.20 U	0.1 U	0.1 U	0.20 U	0.20 U	
NICKEL	9.2 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	
POTASSIUM	558 U	400	45400	50000	245000	6470	
SELENIUM	0.7 U	3.5 U	0.7 U	0.7 U	3.5 U	3.5 U	
SILVER	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	
SODIUM	25500	18100	1430000	1580000	5990000	142000	
THALLIUM	1.8 U	18.0	1.8 U	1.8 U	18.0	18.0 U	
TIN		1000 UJ				1000 UJ	
VANADIUM	2.6 U	2.7 U	7.3 U	6.3 U	6.7 U	3.2 U	
ZINC	33.4 U	13.3	13.5 U	14 U	4.1 U	5.5	
MISCELLANEOUS PARAMETERS (mg/L)							
CHLORIDE	50	36.0	3200	3100	12000	500	
FLUORIDE	0.4	0.30	20	20	26.0	0.60	
HARDNESS as CaCO3	48	30.0	1400	1200	4200	500	
HEXAVALENT CHROMIUM		0.005 UJ			0.005 U	0.005 U	
NITRATE/NITRITE, AS N	0.02	6.8 J	0.05 U	0.05 U	0.02 U	0.01 U	
SULFATE	25	13.0	430	410	1500	5.0	
TOTAL DISSOLVED SOLIDS	130	110	5900	5900	23000	1300	
TOTAL ORGANIC CARBON	1	1.8	4.4	4.2	8.1	1.0 U	
TOTAL SUSPENDED SOLIDS	12	2.0	21	16	59.0	9.0	

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PARRIS ISLAND

SITE 02

FILTERED GROUNDWATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-GW-001-01-F 08/07/98 PAI-02-GW-001	PAI-02-GW-002-01-F 08/24/98 PAI-02-GW-002	PAI-02-GW-003-01-F 08/07/98 PAI-02-MW-03	PAI-02-GW-003-01D-F 08/07/98 PAI-02-MW-03	PAI-02-GW-004-01-F 08/20/98 PAI-02-GW-004	PAI-02-GW-005-01-F 08/19/98 PAI-02-GW-005	/ /
INORGANICS (µg/L)							
ALUMINUM	512	195	64.5 U	56.3 U	22 U	22 U	
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U	
ARSENIC	0.9 U	1.2	0.9 U	0.9 U	1.1	0.9 U	
BARIUM	233	197	178	166	243	227	
BERYLLIUM	0.3 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
CADMIUM	2 U	2 U	2 U	2 U	2 U	2 U	
CALCIUM	9050	6670	104000	110000	276000	108000	
CHROMIUM	6.4 U	6.4 U	6.4 U	6.8	15.2 U	9.1 U	
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
COPPER	22.9	2.6 U	2.6 U	2.6 U	3.9	2.6 U	
IRON	448	731	3720	4130	405	7980	
LEAD	1.1 U	5.5 U	1.1 U	1.1 U	5.5 U	5.5 U	
MAGNESIUM	3750	2520	168000	188000	772000	31400	
MANGANESE	142	35.5	100	106	98.3	181	
MERCURY	0.13 U	0.2 U	0.1 U	0.1 U	0.2 U	0.2 U	
NICKEL	11.1 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	
POTASSIUM	682 U	602	41800	45300	238000	6280	
SELENIUM	0.7 U	3.5 U	0.7 U	0.7 U	3.5 U	3.5 U	
SILVER	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	
SODIUM	28700	21200	1250000	1340000	5970000	144000	
THALLIUM	1.8 U	18 U	1.8 U	1.8 U	18	18 U	
VANADIUM	2.7 U	2.6 U	6.5 U	7.5 U	7.9 U	2.6 U	
ZINC	113	94.7	28.6 U	20.9 U	13.4	73.9	

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SURFACE WATER

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

SITE 02

FILTERED SURFACE WATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-SW-001-00-F 07/24/98 PAI-02-SW-001	PAI-02-SW-002-00-F 07/24/98 PAI-02-SW-002	PAI-02-SW-003-00-F 07/24/98 PAI-02-SW-003	PAI-02-SW-004-00-F 07/24/98 PAI-02-SW-004	/ /	/ /	/ /
INORGANICS (µg/L)							
ALUMINUM	53.4 U	73.1 U	95.2 U	125 U			
ANTIMONY	1.8 U	1.8 U	1.8 U	1.8 U			
ARSENIC	3.5	5.9	2.1 U	2.1 U			
BARIUM	18.1	233	20.4	20.2			
BERYLLIUM	0.20 U	0.20 U	0.20 U	0.20 U			
CADMIUM	0.30 U	0.70 U	0.30 U	0.30 UJ			
CALCIUM	282000 J	316000	312000	264000 J			
CHROMIUM	0.80 U	0.80 U	0.80 U	0.80 U			
COBALT	0.77	0.67	0.40 U	0.40 U			
COPPER	0.60 U	0.60 U	0.60 U	0.60 U			
IRON	12.5 U	73.6 U	12.5 U	12.5 U			
LEAD	8.5 U	8.5 U	8.5 U	8.5 U			
MAGNESIUM	881000	998000	985000	857000			
MANGANESE	8.9 U	10.0 U	7.8 U	11.6 U			
MERCURY	0.10 U	0.10 U	0.10 U	0.10 U			
NICKEL	1.1 U	2.6 U	0.60 U	0.60 U			
POTASSIUM	581000	679000	623000	589000			
SELENIUM	2.2 U	2.2 U	2.2 U	2.2 U			
SILVER	0.93	0.82	0.70 U	0.70 U			
SODIUM	8120000	9200000	8690000	8170000			
THALLIUM	3.1 U	3.1 U	3.1 U	3.1 U			
VANADIUM	1.6 U	2.4 U	1.8 U	0.63 U			
ZINC	4.1	52.8	4.5	5.1			

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SITE 02

UNFILTERED SURFACE WATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-SW-001-00 07/23/98 PAI-02-SW-001	PAI-02-SW-002-00 07/23/98 PAI-02-SW-002	PAI-02-SW-003-00 07/24/98 PAI-02-SW-003	PAI-02-SW-004-00 07/23/98 PAI-02-SW-004	/ /	/ /	/ /
VOLATILES (µg/L)							
1,1,1-TRICHLOROETHANE	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			
1,1,2-TRICHLOROETHANE	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			
1,1-DICHLOROETHENE	0.5 U	0.5 U	0.5 U	0.5 U			
1,2-DICHLOROBENZENE	10 U	10 U	10 U	10 U			
1,2-DICHLOROETHANE	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			
1,2-DICHLOROPROPANE	0.5 U	0.5 U	0.5 U	0.5 U			
1,3-DICHLOROBENZENE	10 U	10 U	10 U	10 U			
1,4-DICHLOROBENZENE	10 U	10 U	10 U	10 U			
2-BUTANONE	2 UR	2 UR	2 UR	2 UR			
2-HEXANONE	2 U	2 U	2 U	2 U			
4-METHYL-2-PENTANONE	2 U	2 U	2 U	2 U			
ACETONE	0.6 J	0.8 J	2 UR	2 UR			
BENZENE	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			
BROMOFORM	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			
CARBON DISULFIDE	2 U	2 U	2 U	2 U			
CARBON TETRACHLORIDE	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			
CHLOROETHANE	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			
CHLOROMETHANE	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			
DIBROMOCHLOROMETHANE	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			

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SITE 02

UNFILTERED SURFACE WATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-SW-001-00 07/23/98 PAI-02-SW-001	PAI-02-SW-002-00 07/23/98 PAI-02-SW-002	PAI-02-SW-003-00 07/24/98 PAI-02-SW-003	PAI-02-SW-004-00 07/23/98 PAI-02-SW-004	/ /	/ /	/ /
VOLATILES (µg/L)							
METHYLENE CHLORIDE	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			
TETRACHLOROETHENE	0.5 U	0.3 J	0.5 U	0.5 U			
TOLUENE	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			
TRICHLOROETHENE	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			
XYLENES, TOTAL	0.5 U	0.5 U	0.5 U	0.5 U			
SEMIVOLATILES (µg/L)							
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U	10 U			
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U	10 U	10 U	10 U			
2,4,5-TRICHLOROPHENOL	50 U	50 U	48 U	51 U			
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	10 U			
2,4-DICHLOROPHENOL	10 U	10 U	10 U	10 U			
2,4-DIMETHYLPHENOL	10 U	10 U	10 U	10 U			
2,4-DINITROPHENOL	50 U	50 U	48 U	51 U			
2,4-DINITROTOLUENE	10 U	10 U	10 U	10 U			
2,6-DINITROTOLUENE	10 U	10 U	10 U	10 U			
2-CHLORONAPHTHALENE	10 U	10 U	10 U	10 U			
2-CHLOROPHENOL	10 U	10 U	10 U	10 U			
2-METHYLNAPHTHALENE	10 U	10 U	10 U	10 U			
2-METHYLPHENOL	10 U	10 U	10 U	10 U			
2-NITROANILINE	50 U	50 U	48 U	51 U			
2-NITROPHENOL	10 U	10 U	10 U	10 U			
3,3'-DICHLOROBENZIDINE	20 U	20 U	19 U	20 U			
3-NITROANILINE	50 U	50 U	48 U	51 U			
4,6-DINITRO-2-METHYLPHENOL	50 U	50 U	48 U	51 U			
4-BROMOPHENYL PHENYL ETHER	10 U	10 U	10 U	10 U			

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SITE 02

UNFILTERED SURFACE WATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-SW-001-00 07/23/98 PAI-02-SW-001	PAI-02-SW-002-00 07/23/98 PAI-02-SW-002	PAI-02-SW-003-00 07/24/98 PAI-02-SW-003	PAI-02-SW-004-00 07/23/98 PAI-02-SW-004	/ /	/ /	/ /
SEMIVOLATILES (µg/L)							
4-CHLORO-3-METHYLPHENOL	20 U	20 U	19 U	20 U			
4-CHLOROANILINE	20 U	20 U	19 U	20 U			
4-CHLOROPHENYL PHENYL ETHER	10 U	10 U	10 U	10 U			
4-METHYLPHENOL	10 U	10 U	10 U	10 U			
4-NITROANILINE	50 U	50 U	48 U	51 U			
4-NITROPHENOL	50 U	50 U	48 U	51 U			
ACENAPHTHENE	2.5 U	2.4 U	2.4 U	2.4 U			
ACENAPHTHYLENE	1.2 U	1.2 U	1.2 U	1.2 U			
ANTHRACENE	0.05 U	0.049 U	0.048 U	0.048 U			
BENZO(A)ANTHRACENE	0.12 U	0.12 U	0.12 U	0.12 U			
BENZO(A)PYRENE	0.12 U	0.12 U	0.12 U	0.12 U			
BENZO(B)FLUORANTHENE	0.05 U	0.049 U	0.048 U	0.048 U			
BENZO(G,H,I)PERYLENE	0.2 U	0.2 U	0.19 U	0.19 U			
BENZO(K)FLUORANTHENE	0.05 U	0.149 U	0.048 U	0.048 U			
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U	10 U	10 U			
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U	10 U			
BIS(2-ETHYLHEXYL)PHTHALATE	77	10 U	10 U	14			
BUTYLBENZYL PHTHALATE	10 U	10 U	10 U	10 U			
CARBAZOLE	10 U	10 U	10 U	10 U			
CHRYSENE	0.12 U	0.12 U	0.12 U	0.12 U			
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U	10 U			
DI-N-OCTYL PHTHALATE	10 U	10 U	10 U	10 U			
DIBENZO(A,H)ANTHRACENE	0.5 U	0.49 U	0.48 U	0.48 U			
DIBENZOFURAN	10 U	10 U	10 U	10 U			
DIETHYL PHTHALATE	10 U	10 U	10 U	10 U			
DIMETHYL PHTHALATE	10 U	10 U	10 U	10 U			
FLUORANTHENE	0.12 U	0.12 U	0.12 U	0.12 U			
FLUORENE	0.25 U	0.24 U	0.24 U	0.24 U			

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PARRIS ISLAND

SITE 02

UNFILTERED SURFACE WATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-SW-001-00 07/23/98 PAI-02-SW-001	PAI-02-SW-002-00 07/23/98 PAI-02-SW-002	PAI-02-SW-003-00 07/24/98 PAI-02-SW-003	PAI-02-SW-004-00 07/23/98 PAI-02-SW-004	/ /	/ /	/ /
SEMIVOLATILES (µg/L)							
HEXACHLOROBENZENE	10 U	10 U	10 U	10 U			
HEXACHLOROBUTADIENE	10 U	10 U	10 U	10 U			
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	10 U	10 U			
HEXACHLOROETHANE	10 U	10 U	10 U	10 U			
INDENO(1,2,3-CD)PYRENE	0.12 U	0.12 U	0.12 U	0.12 U			
ISOPHORONE	10 U	10 U	10 U	10 U			
N-NITROSO-DI-N-PROPYLAMINE	10 U	10 U	10 U	10 U			
N-NITROSODIPHENYLAMINE	10 U	10 U	10 U	10 U			
NAPHTHALENE	1.2 U	1.2 U	1.2 U	1.2 U			
NITROBENZENE	10 U	10 U	10 U	10 U			
PENTACHLOROPHENOL	50 U	50 U	48 U	51 U			
PHENANTHRENE	0.074 J	0.098 U	0.097 U	0.16			
PHENOL	10 U	10 U	10 U	10 U			
PYRENE	0.25 U	0.24 U	0.24 U	0.24 U			
PESTICIDES/PCBs (µg/L)							
4,4'-DDD	0.049 U	0.050 U	0.050 U	0.048 U			
4,4'-DDE	0.049 U	0.050 U	0.050 U	0.048 U			
4,4'-DDT	0.049 U	0.050 U	0.050 U	0.048 U			
ALDRIN	0.024 U	0.025 U	0.025 U	0.024 U			
ALPHA-BHC	0.024 U	0.025 U	0.025 U	0.024 U			
ALPHA-CHLORDANE	0.024 U	0.025 U	0.025 U	0.024 U			
AROCLOR-1016	0.49 U	0.50 U	0.50 U	0.48 U			
AROCLOR-1221	0.49 U	0.50 U	0.50 U	0.48 U			
AROCLOR-1232	0.49 U	0.50 U	0.50 U	0.48 U			
AROCLOR-1242	0.49 U	0.50 U	0.50 U	0.48 U			
AROCLOR-1248	0.49 U	0.50 U	0.50 U	0.48 U			
AROCLOR-1254	0.98 U	0.99 U	0.99 U	0.97 U			
AROCLOR-1260	0.98 U	0.99 U	0.99 U	0.97 U			

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PARRIS ISLAND

SITE 02

UNFILTERED SURFACE WATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-SW-001-00 07/23/98 PAI-02-SW-001	PAI-02-SW-002-00 07/23/98 PAI-02-SW-002	PAI-02-SW-003-00 07/24/98 PAI-02-SW-003	PAI-02-SW-004-00 07/23/98 PAI-02-SW-004	/ /	/ /	/ /
PESTICIDES/PCBs (µg/L)							
BETA-BHC	0.024 U	0.025 U	0.025 U	0.024 U			
DELTA-BHC	0.024 U	0.025 U	0.025 U	0.024 U			
DIELDRIN	0.049 U	0.050 U	0.050 U	0.048 U			
ENDOSULFAN I	0.024 U	0.025 U	0.025 U	0.024 U			
ENDOSULFAN II	0.049 U	0.050 U	0.050 U	0.048 U			
ENDOSULFAN SULFATE	0.078	0.050 U	0.040 J	0.048 U			
ENDRIN	0.049 U	0.050 U	0.050 U	0.048 U			
ENDRIN ALDEHYDE	0.049 U	0.050 U	0.050 U	0.048 U			
ENDRIN KETONE	0.049 U	0.050 U	0.050 U	0.048 U			
GAMMA-BHC (LINDANE)	0.024 U	0.025 U	0.025 U	0.024 U			
GAMMA-CHLORDANE	0.024 U	0.025 U	0.025 U	0.024 U			
HEPTACHLOR	0.024 U	0.025 U	0.025 U	0.024 U			
HEPTACHLOR EPOXIDE	0.024 U	0.025 U	0.025 U	0.024 U			
METHOXYCHLOR	0.24 U	0.25 U	0.25 U	0.24 U			
TOXAPHENE	0.49 U	0.50 U	0.50 U	0.48 U			
INORGANICS (µg/L)							
ALUMINUM	1250	1850	477 U	1030			
ANTIMONY	1.8 U	1.8 U	2.2 U	2.8			
ARSENIC	4.4	2.9	2.1 U	2.1 U			
BARIUM	20.9	21.1	19.0	21.4			
BERYLLIUM	0.20 U	0.20 U	0.20 U	0.20 U			
CADMIUM	0.42 U	0.41 U	0.30 U	0.30 UJ			
CALCIUM	303000 J	300000	285000	268000 J			
CHROMIUM	0.80 U	0.80 U	0.80 U	0.80 U			
COBALT	1.1	0.89	0.40 U	0.40 U			
COPPER	0.60 U	0.60 U	0.60 U	0.60 U			
CYANIDE	10.0 U	10.0 U	10.0 U	10.0 U			
IRON	836	1220	210 U	417			

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PARRIS ISLAND

SITE 02

UNFILTERED SURFACE WATER DATA - ANALYTICAL DATABASE

SAMPLE NUMBER: COLLECTION DATE: LOCATION:	PAI-02-SW-001-00 07/23/98 PAI-02-SW-001	PAI-02-SW-002-00 07/23/98 PAI-02-SW-002	PAI-02-SW-003-00 07/24/98 PAI-02-SW-003	PAI-02-SW-004-00 07/23/98 PAI-02-SW-004	/ /	/ /	/ /
INORGANICS (µg/L)							
LEAD	8.5 U	8.5 U	8.5 U	8.5 U			
MAGNESIUM	948000	950000	916000	859000			
MANGANESE	34.7	33.4 U	17.4 U	31.6			
MERCURY	0.10 U	0.10 U	0.10 U	0.10 U			
NICKEL	1.6 U	1.6 U	0.60 U	0.60 U			
POTASSIUM	642000	591000	566000	591000			
SELENIUM	2.2 U	2.2 U	2.2 U	2.2 U			
SILVER	0.70 U	0.72	0.70 U	0.70 U			
SODIUM	8610000	8300000	7930000	8220000			
THALLIUM	3.1 U	3.1 U	3.1 U	3.1 U			
VANADIUM	4.2 U	5.0 U	1.5 U	0.82 U			
ZINC	7.2	7.3	4.4	10.4			
MISCELLANEOUS PARAMETERS (mg/L)							
HEXAVALENT CHROMIUM	0.02 U	0.02 U	0.02 U	0.02 U			
TOTAL ORGANIC CARBON	3.0	2.9	3.2	3.1			
GENERAL CHEMISTRY (unitless)							
PH	7.8	7.6	8.2	7.8			

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SURFACE SOIL

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
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-001-01	PAI-02-SS-002-01	PAI-02-SS-003-01	PAI-02-SS-004-01	PAI-02-SS-005-01	PAI-02-SS-006-01	PAI-02-SS-007-01
COLLECTION DATE:	06/30/98	07/22/98	07/22/98	07/22/98	07/22/98	06/30/98	07/22/98
LOCATION:	PAI-02-SS-001	PAI-02-SS-002	PAI-02-SS-003	PAI-02-SS-004	PAI-02-SS-005	PAI-02-SS-006	PAI-02-SS-007
SAMPLE DEPTH:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
VOLATILES (µg/kg)							
1,1,1-TRICHLOROETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
1,1,2,2-TETRACHLOROETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
1,1,2-TRICHLOROETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
1,1-DICHLOROETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
1,1-DICHLOROETHENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
1,2-DICHLOROBENZENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
1,2-DICHLOROETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
1,2-DICHLOROETHENE (TOTAL)	7 U	6 U	6 U	6 U	6 U	8 U	6 U
1,2-DICHLOROPROPANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
1,3-DICHLOROBENZENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
1,4-DICHLOROBENZENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2-BUTANONE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
2-HEXANONE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
4-METHYL-2-PENTANONE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
ACETONE	7 UR	20 U	29 U	160 U	22 U	18 J	29 U
BENZENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
BROMODICHLOROMETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
BROMOFORM	7 U	6 U	6 U	6 U	6 U	8 U	6 U
BROMOMETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
CARBON DISULFIDE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
CARBON TETRACHLORIDE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
CHLOROBENZENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
CHLOROETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
CHLOROFORM	7 U	6 J	5 J	18	7	8 U	4 J
CHLOROMETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
CIS-1,3-DICHLOROPROPENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
DIBROMOCHLOROMETHANE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
ETHYLBENZENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
METHYLENE CHLORIDE	7 U	6 U	6 U	6 U	6 U	8 U	8 U
STYRENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
TETRACHLOROETHENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-001-01	PAI-02-SS-002-01	PAI-02-SS-003-01	PAI-02-SS-004-01	PAI-02-SS-005-01	PAI-02-SS-006-01	PAI-02-SS-007-01
COLLECTION DATE:	06/30/98	07/22/98	07/22/98	07/22/98	07/22/98	06/30/98	07/22/98
LOCATION:	PAI-02-SS-001	PAI-02-SS-002	PAI-02-SS-003	PAI-02-SS-004	PAI-02-SS-005	PAI-02-SS-006	PAI-02-SS-007
SAMPLE DEPTH:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
VOLATILES (µg/kg)							
TOLUENE	3 J	6 U	6 U	6 U	6 U	8 U	6 U
TRANS-1,3-DICHLOROPROPENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
TRICHLOROETHENE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
VINYL CHLORIDE	7 U	6 U	6 U	6 U	6 U	8 U	6 U
XYLENES, TOTAL	7 U	6 U	6 U	6 U	6 U	8 U	6 U
SEMIVOLATILES (µg/kg)							
1,2,4-TRICHLOROBENZENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2,2'-OXYBIS(1-CHLOROPROPANE)	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2,4,5-TRICHLOROPHENOL	2000 U	1800 U	1700 U	1700 U	1800 U	2200 U	1800 U
2,4,6-TRICHLOROPHENOL	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2,4-DICHLOROPHENOL	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2,4-DIMETHYLPHENOL	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2,4-DINITROPHENOL	2000 U	1800 U	1700 U	1700 U	1800 U	2200 U	1800 U
2,4-DINITROTOLUENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2,6-DINITROTOLUENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2-CHLORONAPHTHALENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2-CHLOROPHENOL	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2-METHYLNAPHTHALENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2-METHYLPHENOL	390 U	360 U	350 U	340 U	370 U	440 U	360 U
2-NITROANILINE	2000 U	1800 U	1700 U	1700 U	1800 U	2200 U	1800 U
2-NITROPHENOL	390 U	360 U	350 U	340 U	370 U	440 U	360 U
3,3'-DICHLOROBENZIDINE	790 U	730 U	700 U	690 U	740 U	870 U	730 U
3-NITROANILINE	2000 U	1800 U	1700 U	1700 U	1800 U	2200 U	1800 U
4,6-DINITRO-2-METHYLPHENOL	2000 U	1800 U	1700 U	1700 U	1800 U	2200 U	1800 U
4-BROMOPHENYL PHENYL ETHER	390 U	360 U	350 U	340 U	370 U	440 U	360 U
4-CHLORO-3-METHYLPHENOL	790 U	730 U	700 U	690 U	740 U	870 U	730 U
4-CHLOROANILINE	790 U	730 U	700 U	690 U	740 U	870 U	730 U
4-CHLOROPHENYL PHENYL ETHER	390 U	360 U	350 U	340 U	370 U	440 U	360 U
4-METHYLPHENOL	390 U	360 U	350 U	340 U	370 U	440 U	360 U
4-NITROANILINE	2000 U	1800 U	1700 U	1700 U	1800 U	2200 U	1800 U
4-NITROPHENOL	2000 U	1800 U	1700 U	1700 U	1800 U	2200 U	1800 U

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-001-01	PAI-02-SS-002-01	PAI-02-SS-003-01	PAI-02-SS-004-01	PAI-02-SS-005-01	PAI-02-SS-006-01	PAI-02-SS-007-01
COLLECTION DATE:	06/30/98	07/22/98	07/22/98	07/22/98	07/22/98	06/30/98	07/22/98
LOCATION:	PAI-02-SS-001	PAI-02-SS-002	PAI-02-SS-003	PAI-02-SS-004	PAI-02-SS-005	PAI-02-SS-006	PAI-02-SS-007
SAMPLE DEPTH:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
SEMIVOLATILES (µg/kg)							
ACENAPHTHENE	99 U	91 U	85 U	86 U	90 U	1100 U	90 U
ACENAPHTHYLENE	49 U	46 U	43 U	43 U	45 U	550 U	45 U
ANTHRACENE	2 U	1.3 J	1.7 U	1.7 U	1.8 U	22 U	1.8 U
BENZO(A)ANTHRACENE	4.9 U	4.6 U	4.3 U	4.3 U	4.5 U	55 U	4.5 U
BENZO(A)PYRENE	4.9 U	4.6 U	4.3 U	4.3 U	4.5 U	55 U	4.5 U
BENZO(B)FLUORANTHENE	1.6 J	0.91 J	1.7 U	1.2 J	1.8 U	22 U	2.3
BENZO(G,H,I)PERYLENE	7.9 U	7.3 U	6.8 U	6.9 U	7.2 U	88 U	7.2 U
BENZO(K)FLUORANTHENE	2 U	1.8 U	1.7 U	1.7 U	1.8 U	22 U	1.8 U
BIS(2-CHLOROETHOXY)METHANE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
BIS(2-CHLOROETHYL)ETHER	390 U	360 U	350 U	340 U	370 U	440 U	360 U
BIS(2-ETHYLHEXYL)PHTHALATE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
BUTYLBENZYL PHTHALATE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
CARBAZOLE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
CHRYSENE	4.9 U	4.6 U	4.3 U	4.3 U	4.5 U	55 U	2.9 J
DI-N-BUTYL PHTHALATE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
DI-N-OCTYL PHTHALATE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
DIBENZO(A,H)ANTHRACENE	20 U	18 U	17 U	17 U	18 U	220 U	18 U
DIBENZOFURAN	390 U	360 U	350 U	340 U	370 U	440 U	360 U
DIETHYL PHTHALATE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
DIMETHYL PHTHALATE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
FLUORANTHENE	7.7	4.6 U	4.3 U	4.3 U	4.5 U	55 U	4.7 J
FLUORENE	9.9 U	9.1 U	8.5 U	8.6 U	9 U	110 U	9 U
HEXACHLOROBENZENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
HEXACHLOROBUTADIENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
HEXACHLOROCYCLOPENTADIENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
HEXACHLOROETHANE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
INDENO(1,2,3-CD)PYRENE	4.9 U	4.6 U	4.3 U	4.3 U	4.5 U	55 U	4.5 U
ISOPHORONE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
N-NITROSO-DI-N-PROPYLAMINE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
N-NITROSODIPHENYLAMINE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
NAPHTHALENE	49 U	46 U	43 U	43 U	45 U	550 U	45 U

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-001-01	PAI-02-SS-002-01	PAI-02-SS-003-01	PAI-02-SS-004-01	PAI-02-SS-005-01	PAI-02-SS-006-01	PAI-02-SS-007-01
COLLECTION DATE:	06/30/98	07/22/98	07/22/98	07/22/98	07/22/98	06/30/98	07/22/98
LOCATION:	PAI-02-SS-001	PAI-02-SS-002	PAI-02-SS-003	PAI-02-SS-004	PAI-02-SS-005	PAI-02-SS-006	PAI-02-SS-007
SAMPLE DEPTH:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
SEMIVOLATILES (µg/kg)							
NITROBENZENE	390 U	360 U	350 U	340 U	370 U	440 U	360 U
PENTACHLOROPHENOL	2000 U	1800 U	1700 U	1700 U	1800 U	2200 U	1800 U
PHENANTHRENE	3.2 J	3.3 J	3.4 J	21	3.6 U	41 J	14
PHENOL	390 U	360 U	350 U	340 U	370 U	440 U	360 U
PYRENE	9.9 U	9.1 U	8.5 U	8.6 U	9 U	110 U	9 U
PESTICIDES/PCBs (µg/kg)							
4,4'-DDD	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
4,4'-DDE	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
4,4'-DDT	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
ALDRIN	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
ALPHA-BHC	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
ALPHA-CHLORDANE	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
AROCLOR-1016	9.8 U	44 U	42 U	42 U	44 U	11 U	44 U
AROCLOR-1221	9.8 U	44 U	42 U	42 U	44 U	11 U	44 U
AROCLOR-1232	9.8 U	44 U	42 U	42 U	44 U	11 U	44 U
AROCLOR-1242	9.8 U	44 U	42 U	42 U	44 U	11 U	44 U
AROCLOR-1248	9.8 U	44 U	42 U	42 U	44 U	11 U	44 U
AROCLOR-1254	9.8 U	88 U	84 U	83 U	87 U	11 U	88 U
AROCLOR-1260	9.8 U	88 U	84 U	83 U	87 U	11 U	88 U
BETA-BHC	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
DELTA-BHC	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
DIELDRIN	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
ENDOSULFAN I	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
ENDOSULFAN II	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
ENDOSULFAN SULFATE	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
ENDRIN	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
ENDRIN ALDEHYDE	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
ENDRIN KETONE	9.8 U	1.8 U	1.7 U	1.7 U	1.8 U	11 U	18 U
GAMMA-BHC (LINDANE)	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
GAMMA-CHLORDANE	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
HEPTACHLOR	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-001-01	PAI-02-SS-002-01	PAI-02-SS-003-01	PAI-02-SS-004-01	PAI-02-SS-005-01	PAI-02-SS-006-01	PAI-02-SS-007-01
COLLECTION DATE:	06/30/98	07/22/98	07/22/98	07/22/98	07/22/98	06/30/98	07/22/98
LOCATION:	PAI-02-SS-001	PAI-02-SS-002	PAI-02-SS-003	PAI-02-SS-004	PAI-02-SS-005	PAI-02-SS-006	PAI-02-SS-007
SAMPLE DEPTH:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
PESTICIDES/PCBs (µg/kg)							
HEPTACHLOR EPOXIDE	4.9 U	0.91 U	0.87 U	0.86 U	0.91 U	5.5 U	9.2 U
METHOXYCHLOR	49 U	9.1 U	8.7 U	8.6 U	9.1 U	55 U	92 U
TOXAPHENE	98 U	18 U	17 U	17 U	18 U	110 U	180 U
INORGANICS (mg/kg)							
ALUMINUM	2260	2810	2730	4290	2290	2140	1710
ANTIMONY	0.17	0.16 U	0.15 U	0.15 U	0.2 U	0.2 U	1.3 U
ARSENIC	0.2 U	0.18 U	0.18	0.9	0.19	0.23 U	1
BARIUM	4.7	12	4.4	11.7	8.3	9.7	4.8
BERYLLIUM	0.08 U	0.11 U	0.1 U	0.17 U	0.11 U	0.09 U	0.15 U
CADMIUM	0.03 U	0.03 U	0.03 U	0.02 U	0.03 U	0.03 U	0.03 U
CALCIUM	256	66.6	53.1	93.3	175	477	58.1
CHROMIUM	3.5	4.9	4.9	6.5	4	4.5	7.5
COBALT	0.04 U	0.05	0.07	0.19	0.08	0.04 U	0.03
COPPER	0.69 U	0.75 U	0.61 U	1.1	1.7	0.48 U	0.6 U
CYANIDE	0.5 U	0.53 U	0.51 U	0.48 U	0.56 U	0.66 U	0.46 U
IRON	708	382	437	1930	513	511	600
LEAD	4.6 U	1.7	2.8	5.7	3	5.2 U	5.2
MAGNESIUM	236 U	81.7	53.4	174	84.5	130 U	53.1
MANGANESE	5.9	1.8 U	8.7	58.1	3.6 U	4.8	7.4
MERCURY	0.05	0.02 U	0.03	0.05	0.03 U	0.05	0.03 U
NICKEL	0.28 U	0.15 U	0.41 U	1.2	0.13 U	0.1 U	0.14 U
POTASSIUM	87.5 U	53 U	47.8 U	87.8	102	74.1 U	49 U
SELENIUM	0.21 U	0.19 U	0.19 U	0.18	0.2 U	0.24 U	0.19 U
SILVER	0.07 U	0.06 U	0.06 U	0.06 U	0.06 U	0.08 U	0.06 U
SODIUM	606 U	189	709	1510	548	432 U	2100
THALLIUM	0.3 U	0.27 U	0.26 U	0.25 U	0.28 U	0.34 U	0.26 U
VANADIUM	1.7	1.4	1.6	4.1	1.8	1.8	2.7
ZINC	2.3	1.9 U	0.92 U	3.2 U	1.3 U	1.3	1.5 U
MISCELLANEOUS PARAMETERS (mg/kg)							
HEXAVALENT CHROMIUM	0.96 U					1.1 U	
TOTAL ORGANIC CARBON (%)							0.35

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-001-01	PAI-02-SS-002-01	PAI-02-SS-003-01	PAI-02-SS-004-01	PAI-02-SS-005-01	PAI-02-SS-006-01	PAI-02-SS-007-01
COLLECTION DATE:	06/30/98	07/22/98	07/22/98	07/22/98	07/22/98	06/30/98	07/22/98
LOCATION:	PAI-02-SS-001	PAI-02-SS-002	PAI-02-SS-003	PAI-02-SS-004	PAI-02-SS-005	PAI-02-SS-006	PAI-02-SS-007
SAMPLE DEPTH:	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'	0 - 1'
GENERAL CHEMISTRY (unitless)							
PH							4.8

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-008-01	/ /	/ /	/ /	/ /	/ /	/ /
COLLECTION DATE:	06/30/98						
LOCATION:	PAI-02-SS-008						
SAMPLE DEPTH:	0 - 1'						
VOLATILES (µg/kg)							
1,1,1-TRICHLOROETHANE	8 U						
1,1,2,2-TETRACHLOROETHANE	8 U						
1,1,2-TRICHLOROETHANE	8 U						
1,1-DICHLOROETHANE	8 U						
1,1-DICHLOROETHENE	8 U						
1,2-DICHLOROBENZENE	370 U						
1,2-DICHLOROETHANE	8 U						
1,2-DICHLOROETHENE (TOTAL)	8 U						
1,2-DICHLOROPROPANE	8 U						
1,3-DICHLOROBENZENE	370 U						
1,4-DICHLOROBENZENE	370 U						
2-BUTANONE	8 U						
2-HEXANONE	8 U						
4-METHYL-2-PENTANONE	8 U						
ACETONE	170 J						
BENZENE	8 U						
BROMODICHLOROMETHANE	8 U						
BROMOFORM	8 U						
BROMOMETHANE	8 U						
CARBON DISULFIDE	8 U						
CARBON TETRACHLORIDE	8 U						
CHLOROBENZENE	8 U						
CHLOROETHANE	8 U						
CHLOROFORM	2 J						
CHLOROMETHANE	8 U						
CIS-1,3-DICHLOROPROPENE	8 U						
DIBROMOCHLOROMETHANE	8 U						
ETHYLBENZENE	8 U						
METHYLENE CHLORIDE	8 U						
STYRENE	8 U						
TETRACHLOROETHENE	8 U						

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-008-01						
COLLECTION DATE:	06/30/98	/ /	/ /	/ /	/ /	/ /	/ /
LOCATION:	PAI-02-SS-008						
SAMPLE DEPTH:	0 - 1'						
VOLATILES (µg/kg)							
TOLUENE	8 U						
TRANS-1,3-DICHLOROPROPENE	8 U						
TRICHLOROETHENE	8 U						
VINYL CHLORIDE	8 U						
XYLENES, TOTAL	8 U						
SEMIVOLATILES (µg/kg)							
1,2,4-TRICHLOROBENZENE	370 U						
2,2'-OXYBIS(1-CHLOROPROPANE)	370 U						
2,4,5-TRICHLOROPHENOL	1800 U						
2,4,6-TRICHLOROPHENOL	370 U						
2,4-DICHLOROPHENOL	370 U						
2,4-DIMETHYLPHENOL	370 U						
2,4-DINITROPHENOL	1800 U						
2,4-DINITROTOLUENE	370 U						
2,6-DINITROTOLUENE	370 U						
2-CHLORONAPHTHALENE	370 U						
2-CHLOROPHENOL	370 U						
2-METHYLNAPHTHALENE	370 U						
2-METHYLPHENOL	370 U						
2-NITROANILINE	1800 U						
2-NITROPHENOL	370 U						
3,3'-DICHLOROBENZIDINE	740 U						
3-NITROANILINE	1800 U						
4,6-DINITRO-2-METHYLPHENOL	1800 U						
4-BROMOPHENYL PHENYL ETHER	370 U						
4-CHLORO-3-METHYLPHENOL	740 U						
4-CHLOROANILINE	740 U						
4-CHLOROPHENYL PHENYL ETHER	370 U						
4-METHYLPHENOL	370 U						
4-NITROANILINE	1800 U						
4-NITROPHENOL	1800 U						

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-008-01						
COLLECTION DATE:	06/30/98	/ /	/ /	/ /	/ /	/ /	/ /
LOCATION:	PAI-02-SS-008						
SAMPLE DEPTH:	0 - 1'						
SEMIVOLATILES (µg/kg)							
ACENAPHTHENE	180 U						
ACENAPHTHYLENE	91 U						
ANTHRACENE	3.6 U						
BENZO(A)ANTHRACENE	9.1 U						
BENZO(A)PYRENE	9.1 U						
BENZO(B)FLUORANTHENE	3.6 U						
BENZO(G,H,I)PERYLENE	14 U						
BENZO(K)FLUORANTHENE	3.6 U						
BIS(2-CHLOROETHOXY)METHANE	370 U						
BIS(2-CHLOROETHYL)ETHER	370 U						
BIS(2-ETHYLHEXYL)PHTHALATE	370 U						
BUTYLBENZYL PHTHALATE	370 U						
CARBAZOLE	370 U						
CHRYSENE	9.1 U						
DI-N-BUTYL PHTHALATE	370 U						
DI-N-OCTYL PHTHALATE	370 U						
DIBENZO(A,H)ANTHRACENE	36 U						
DIBENZOFURAN	370 U						
DIETHYL PHTHALATE	370 U						
DIMETHYL PHTHALATE	370 U						
FLUORANTHENE	9.1 U						
FLUORENE	18 U						
HEXACHLOROBENZENE	370 U						
HEXACHLOROBUTADIENE	370 U						
HEXACHLOROCYCLOPENTADIENE	370 U						
HEXACHLOROETHANE	370 U						
INDENO(1,2,3-CD)PYRENE	4.7 J						
ISOPHORONE	370 U						
N-NITROSO-DI-N-PROPYLAMINE	370 U						
N-NITROSODIPHENYLAMINE	370 U						
NAPHTHALENE	91 U						

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-008-01						
COLLECTION DATE:	06/30/98	/ /	/ /	/ /	/ /	/ /	/ /
LOCATION:	PAI-02-SS-008						
SAMPLE DEPTH:	0 - 1'						
SEMIVOLATILES (µg/kg)							
NITROBENZENE	370 U						
PENTACHLOROPHENOL	1800 U						
PHENANTHRENE	7.3 U						
PHENOL	370 U						
PYRENE	18 U						
PESTICIDES/PCBs (µg/kg)							
4,4'-DDD	9.3 U						
4,4'-DDE	9.3 U						
4,4'-DDT	9.3 U						
ALDRIN	4.6 U						
ALPHA-BHC	4.6 U						
ALPHA-CHLORDANE	4.6 U						
AROCLOR-1016	9.3 U						
AROCLOR-1221	9.3 U						
AROCLOR-1232	9.3 U						
AROCLOR-1242	9.3 U						
AROCLOR-1248	9.3 U						
AROCLOR-1254	9.3 U						
AROCLOR-1260	9.3 U						
BETA-BHC	4.6 U						
DELTA-BHC	4.6 U						
DIELDRIN	9.3 U						
ENDOSULFAN I	4.6 U						
ENDOSULFAN II	9.3 U						
ENDOSULFAN SULFATE	9.3 U						
ENDRIN	9.3 U						
ENDRIN ALDEHYDE	9.3 U						
ENDRIN KETONE	9.3 U						
GAMMA-BHC (LINDANE)	4.6 U						
GAMMA-CHLORDANE	4.6 U						
HEPTACHLOR	4.6 U						

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PARRIS ISLAND
SITE 02
SURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SS-008-01						
COLLECTION DATE:	06/30/98	/ /	/ /	/ /	/ /	/ /	/ /
LOCATION:	PAI-02-SS-008						
SAMPLE DEPTH:	0 - 1'						
PESTICIDES/PCBs (µg/kg)							
HEPTACHLOR EPOXIDE	4.6 U						
METHOXYCHLOR	46 U						
TOXAPHENE	93 U						
INORGANICS (mg/kg)							
ALUMINUM	2160						
ANTIMONY	0.16 U						
ARSENIC	0.19 U						
BARIUM	8.6						
BERYLLIUM	0.1 U						
CADMIUM	0.03 U						
CALCIUM	47.3 U						
CHROMIUM	4.8						
COBALT	0.04 U						
COPPER	0.36 U						
CYANIDE	0.55 U						
IRON	465						
LEAD	2.6 U						
MAGNESIUM	63.7 U						
MANGANESE	2.6						
MERCURY	0.03						
NICKEL	0.05 U						
POTASSIUM	51.1 U						
SELENIUM	0.2 U						
SILVER	0.06 U						
SODIUM	690						
THALLIUM	0.28 U						
VANADIUM	1.6						
ZINC	1.2						
MISCELLANEOUS PARAMETERS (mg/kg)							
HEXAVALENT CHROMIUM	0.89 U						

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PARRIS ISLAND
SITE 02
SUBSURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SB-001-01	PAI-02-SB-001-30	/ /	/ /	/ /	/ /	/ /
COLLECTION DATE:	07/22/98	07/11/98					
LOCATION:	PAI-02-MW-05A	PAI-02-MW-05A					
SAMPLE DEPTH:	1 - 3'	28 - 30'					
VOLATILES (µg/kg)							
1,1,1-TRICHLOROETHANE	6 U						
1,1,2,2-TETRACHLOROETHANE	6 U						
1,1,2-TRICHLOROETHANE	6 U						
1,1-DICHLOROETHANE	6 U						
1,1-DICHLOROETHENE	6 U						
1,2-DICHLOROBENZENE	370 U						
1,2-DICHLOROETHANE	6 U						
1,2-DICHLOROETHENE (TOTAL)	6 U						
1,2-DICHLOROPROPANE	6 U						
1,3-DICHLOROBENZENE	370 U						
1,4-DICHLOROBENZENE	370 U						
2-BUTANONE	6 U						
2-HEXANONE	6 U						
4-METHYL-2-PENTANONE	6 U						
ACETONE	6 UR						
BENZENE	6 U						
BROMODICHLOROMETHANE	6 U						
BROMOFORM	6 U						
BROMOMETHANE	6 U						
CARBON DISULFIDE	6 U						
CARBON TETRACHLORIDE	6 U						
CHLOROBENZENE	6 U						
CHLOROETHANE	6 U						
CHLOROFORM	10						
CHLOROMETHANE	6 U						
CIS-1,3-DICHLOROPROPENE	6 U						
DIBROMOCHLOROMETHANE	6 U						
ETHYLBENZENE	6 U						
METHYLENE CHLORIDE	8 U						
STYRENE	6 U						
TETRACHLOROETHENE	6 U						

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PARRIS ISLAND
SITE 02
SUBSURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SB-001-01	PAI-02-SB-001-30	/ /	/ /	/ /	/ /	/ /
COLLECTION DATE:	07/22/98	07/11/98					
LOCATION:	PAI-02-MW-05A	PAI-02-MW-05A					
SAMPLE DEPTH:	1 - 3'	28 - 30'					
VOLATILES (µg/kg)							
TOLUENE	6 U						
TRANS-1,3-DICHLOROPROPENE	6 U						
TRICHLOROETHENE	6 U						
VINYL CHLORIDE	6 U						
XYLENES, TOTAL	6 U						
SEMIVOLATILES (µg/kg)							
1,2,4-TRICHLOROBENZENE	370 U						
2,2'-OXYBIS(1-CHLOROPROPANE)	370 U						
2,4,5-TRICHLOROPHENOL	1800 U						
2,4,6-TRICHLOROPHENOL	370 U						
2,4-DICHLOROPHENOL	370 U						
2,4-DIMETHYLPHENOL	370 U						
2,4-DINITROPHENOL	1800 U						
2,4-DINITROTOLUENE	370 U						
2,6-DINITROTOLUENE	370 U						
2-CHLORONAPHTHALENE	370 U						
2-CHLOROPHENOL	370 U						
2-METHYLNAPHTHALENE	370 U						
2-METHYLPHENOL	370 U						
2-NITROANILINE	1800 U						
2-NITROPHENOL	370 U						
3,3'-DICHLOROBENZIDINE	730 U						
3-NITROANILINE	1800 U						
4,6-DINITRO-2-METHYLPHENOL	1800 U						
4-BROMOPHENYL PHENYL ETHER	370 U						
4-CHLORO-3-METHYLPHENOL	730 U						
4-CHLOROANILINE	730 U						
4-CHLOROPHENYL PHENYL ETHER	370 U						
4-METHYLPHENOL	370 U						
4-NITROANILINE	1800 U						
4-NITROPHENOL	1800 U						

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PARRIS ISLAND
SITE 02
SUBSURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SB-001-01	PAI-02-SB-001-30	/ /	/ /	/ /	/ /	/ /
COLLECTION DATE:	07/22/98	07/11/98					
LOCATION:	PAI-02-MW-05A	PAI-02-MW-05A					
SAMPLE DEPTH:	1 - 3'	28 - 30'					
SEMIVOLATILES (µg/kg)							
ACENAPHTHENE	180 U						
ACENAPHTHYLENE	91 U						
ANTHRACENE	3.6 U						
BENZO(A)ANTHRACENE	9.1 U						
BENZO(A)PYRENE	9.1 U						
BENZO(B)FLUORANTHENE	3.8 J						
BENZO(G,H,I)PERYLENE	14 U						
BENZO(K)FLUORANTHENE	3.6 U						
BIS(2-CHLOROETHOXY)METHANE	370 U						
BIS(2-CHLOROETHYL)ETHER	370 U						
BIS(2-ETHYLHEXYL)PHTHALATE	370 U						
BUTYLBENZYL PHTHALATE	370 U						
CARBAZOLE	370 U						
CHRYSENE	7.1 J						
DI-N-BUTYL PHTHALATE	370 U						
DI-N-OCTYL PHTHALATE	370 U						
DIBENZO(A,H)ANTHRACENE	36 U						
DIBENZOFURAN	370 U						
DIETHYL PHTHALATE	370 U						
DIMETHYL PHTHALATE	370 U						
FLUORANTHENE	13						
FLUORENE	18 U						
HEXACHLOROBENZENE	370 U						
HEXACHLOROBUTADIENE	370 U						
HEXACHLOROCYCLOPENTADIENE	370 U						
HEXACHLOROETHANE	370 U						
INDENO(1,2,3-CD)PYRENE	14						
ISOPHORONE	370 U						
N-NITROSO-DI-N-PROPYLAMINE	370 U						
N-NITROSODIPHENYLAMINE	370 U						
NAPHTHALENE	91 U						

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PARRIS ISLAND
SITE 02
SUBSURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SB-001-01	PAI-02-SB-001-30	/ /	/ /	/ /	/ /	/ /
COLLECTION DATE:	07/22/98	07/11/98					
LOCATION:	PAI-02-MW-05A	PAI-02-MW-05A					
SAMPLE DEPTH:	1 - 3'	28 - 30'					
SEMIVOLATILES (µg/kg)							
NITROBENZENE	370 U						
PENTACHLOROPHENOL	1800 U						
PHENANTHRENE	140						
PHENOL	370 U						
PYRENE	18 U						
PESTICIDES/PCBs (µg/kg)							
4,4'-DDD	18 U						
4,4'-DDE	18 U						
4,4'-DDT	18 U						
ALDRIN	9.2 U						
ALPHA-BHC	9.2 U						
ALPHA-CHLORDANE	9.2 U						
AROCLOR-1016	44 U						
AROCLOR-1221	44 U						
AROCLOR-1232	44 U						
AROCLOR-1242	44 U						
AROCLOR-1248	44 U						
AROCLOR-1254	88 U						
AROCLOR-1260	88 U						
BETA-BHC	9.2 U						
DELTA-BHC	9.2 U						
DIELDRIN	18 U						
ENDOSULFAN I	9.2 U						
ENDOSULFAN II	18 U						
ENDOSULFAN SULFATE	18 U						
ENDRIN	18 U						
ENDRIN ALDEHYDE	18 U						
ENDRIN KETONE	18 U						
GAMMA-BHC (LINDANE)	9.2 U						
GAMMA-CHLORDANE	9.2 U						
HEPTACHLOR	9.2 U						

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PARRIS ISLAND
SITE 02
SUBSURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SB-001-01	PAI-02-SB-001-30	/ /	/ /	/ /	/ /	/ /
COLLECTION DATE:	07/22/98	07/11/98					
LOCATION:	PAI-02-MW-05A	PAI-02-MW-05A					
SAMPLE DEPTH:	1 - 3'	28 - 30'					
PESTICIDES/PCBs (µg/kg)							
HEPTACHLOR EPOXIDE	9.2 U						
METHOXYCHLOR	92 U						
TOXAPHENE	180 U						
INORGANICS (mg/kg)							
ALUMINUM	2920						
ANTIMONY	0.16 U						
ARSENIC	0.38						
BARIUM	8.5						
BERYLLIUM	0.15 U						
CADMIUM	0.03 U						
CALCIUM	636						
CHROMIUM	4.7						
COBALT	0.08 U						
COPPER	1.8						
CYANIDE	0.53 U						
IRON	1220						
LEAD	8.5						
MAGNESIUM	371						
MANGANESE	80.1						
MERCURY	0.03						
NICKEL	0.44 U						
POTASSIUM	150						
SELENIUM	0.2 U						
SILVER	0.06 U						
SODIUM	1360						
THALLIUM	0.28 U						
VANADIUM	2.6						
ZINC	12.8						
MISCELLANEOUS PARAMETERS (%)							
TOTAL ORGANIC CARBON (%)		0.16					
GENERAL CHEMISTRY (unitless)							

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PARRIS ISLAND
SITE 02
SUBSURFACE SOIL DATA - ANALYTICAL DATABASE

SAMPLE NUMBER:	PAI-02-SB-001-01	PAI-02-SB-001-30					
COLLECTION DATE:	07/22/98	07/11/98	/ /	/ /	/ /	/ /	/ /
LOCATION:	PAI-02-MW-05A	PAI-02-MW-05A					
SAMPLE DEPTH:	1 - 3'	28 - 30'					
GENERAL CHEMISTRY (unitless)							
PH		7.2					

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PARRIS ISLAND
SITE 15
SURFACE SOIL - ANALYTICAL DATABASE

SAMPLE NUMBER:	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
COLLECTION DATE:	06/14/98	06/14/98	06/14/98	06/14/98	06/14/98	06/14/98	06/14/98
LOCATION:	PAI-15-SS-01	PAI-15-SS-02	PAI-15-SS-03	PAI-15-SS-04	PAI-15-SS-05	PAI-15-SS-06	PAI-15-SS-07
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'	0.0 - 1.0'
PESTICIDES/PCBs (µg/kg)							
AROCLOR-1016	8.8 U	9 U	8.8 U	9 U	9.4 U	9 U	9.2 U
AROCLOR-1221	8.8 U	9 U	8.8 U	9 U	9.4 U	9 U	9.2 U
AROCLOR-1232	8.8 U	9 U	8.8 U	9 U	9.4 U	9 U	9.2 U
AROCLOR-1242	8.8 U	9 U	8.8 U	9 U	9.4 U	9 U	9.2 U
AROCLOR-1248	8.8 U	9 U	8.8 U	9 U	9.4 U	9 U	9.2 U
AROCLOR-1254	8.8 U	9 U	8.8 U	9 U	9.4 U	9 U	9.2 U
AROCLOR-1260	8.8 U	9 U	8.8 U	9 U	9.4 U	9 U	9.2 U
INORGANICS (mg/kg)							
LEAD	4.3	4.5	7.3	11	9.9	4	18.4

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CTO084 - PARRIS ISLAND
SOIL DATA
INCHVT
SDG: 55680

SAMPLE NUMBER:	PI-014-03(42)			PI-015A-01(43)			PI-015B-01(44)			PI-021-01(45)		
SAMPLE DATE:	12/13/95			12/13/95			12/13/95			12/13/95		
LABORATORY ID:	281855			281856			281857			281858		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	63.0 %			86.0 %			83.0 %			48.0 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
VOLATILES												
1,1,1-TRICHLOROETHANE	16	U		12	U		11	U		22	U	
1,1,2,2-TETRACHLOROETHANE	16	U		12	U		11	U		22	U	
1,1,2-TRICHLOROETHANE	16	U		12	U		11	U		22	U	
1,1-DICHLOROETHANE	16	U		12	U		11	U		22	U	
1,1-DICHLOROETHENE	16	U		12	U		11	U		22	U	
1,2-DICHLOROETHANE	16	U		12	U		11	U		22	U	
1,2-DICHLOROETHENE (TOTAL)	16	U		12	U		11	U		22	U	
1,2-DICHLOROPROPANE	16	U		12	U		11	U		22	U	
2-BUTANONE	16	U	B	12	U		11	U		22	U	
2-HEXANONE	16	U		12	U		11	U		22	U	
4-METHYL-2-PENTANONE	16	U		12	U		11	U		22	U	
ACETONE	16	U	A	12	U	A	11	U	A	22	U	A
BENZENE	16	U		12	U		11	U		22	U	
BROMODICHLOROMETHANE	16	U		12	U		11	U		22	U	
BROMOFORM	16	U		12	U		11	U		22	U	
BROMOMETHANE	16	U		12	U		11	U		22	U	
CARBON DISULFIDE	16	U		12	U		11	U		3	J	P
CARBON TETRACHLORIDE	16	U		12	U		4	J	P	22	U	
CHLOROBENZENE	16	U		12	U		11	U		22	U	
CHLOROETHANE	16	U		12	U		11	U		22	U	
CHLOROFORM	16	U		3	J	P	7	J	P	22	U	
CHLOROMETHANE	16	U		12	U		11	U		22	U	
CIS-1,3-DICHLOROPROPENE	16	U		12	U		11	U		22	U	
DIBROMOCHLOROMETHANE	16	U		12	U		11	U		22	U	
ETHYLBENZENE	16	U		12	U		11	U		22	U	
METHYLENE CHLORIDE	16	U		12	U		11	U		22	U	
STYRENE	16	U		12	U		11	U		22	U	
TETRACHLOROETHENE	16	U		12	U		11	U		22	U	
TOLUENE	16	U		12	U		11	U		22	U	
TRANS-1,3-DICHLOROPROPENE	16	U		12	U		11	U		22	U	
TRICHLOROETHENE	16	U		12	U		11	U		22	U	
VINYL CHLORIDE	16	U		12	U		11	U		22	U	
XYLENES, TOTAL	16	U		12	U		11	U		22		

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CTO084 - PARRIS ISLAND
SOIL DATA
INCHVT
SDG: 55680

SAMPLE NUMBER:	PI-014-03(42)	PI-015A-01(43)	PI-015B-01(44)	PI-021-01(45)
SAMPLE DATE:	12/13/95	12/13/95	12/13/95	12/13/95
LABORATORY ID:	281855	281856	281857	281858
QC_TYPE:	NORMAL	NORMAL	NORMAL	NORMAL
% SOLIDS:	63.0 %	86.0 %	83.0 %	48.0 %
UNITS:	UG/KG	UG/KG	UG/KG	UG/KG
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
SEMIVOLATILES												
1,2,4-TRICHLOROBENZENE	5200	U		380	U		390	U		690	U	
1,2-DICHLOROBENZENE	5200	U		380	U		390	U		690	U	
1,3-DICHLOROBENZENE	5200	U		380	U		390	U		690	U	
1,4-DICHLOROBENZENE	5200	U		380	U		390	U		690	U	
2,2'-OXYBIS(1-CHLOROPROPANE)	5200	U		380	U		390	U		690	U	
2,4,5-TRICHLOROPHENOL	13000	U		960	U		990	U		1700	U	
2,4,6-TRICHLOROPHENOL	5200	U		380	U		390	U		690	U	
2,4-DICHLOROPHENOL	5200	U		380	U		390	U		690	U	
2,4-DIMETHYLPHENOL	5200	U		380	U		390	U		690	U	
2,4-DINITROPHENOL	13000	U		960	U		990	U		1700	U	
2,4-DINITROTOLUENE	5200	U		380	U		390	U		690	U	
2,6-DINITROTOLUENE	5200	U		380	U		390	U		690	U	
2-CHLORONAPHTHALENE	5200	U		380	U		390	U		690	U	
2-CHLOROPHENOL	5200	U		380	U		390	U		690	U	
2-METHYLNAPHTHALENE	5200	U		380	U		390	U		690	U	
2-METHYLPHENOL	5200	U		380	U		390	U		690	U	
2-NITROANILINE	13000	U		960	U		990	U		1700	U	
2-NITROPHENOL	5200	U		380	U		390	U		690	U	
3,3'-DICHLOROBENZIDINE	5200	U		380	U		390	U		690	U	
3-NITROANILINE	13000	U		960	U		990	U		1700	U	
4,6-DINITRO-2-METHYLPHENOL	13000	U		960	U		990	U		1700	U	
4-BROMOPHENYL PHENYL ETHER	5200	U		380	U		390	U		690	U	
4-CHLORO-3-METHYLPHENOL	5200	U		380	U		390	U		690	U	
4-CHLOROANILINE	5200	U		380	U		390	U		690	U	
4-CHLOROPHENYL PHENYL ETHER	5200	U		380	U		390	U		690	U	
4-METHYLPHENOL	5200	U		380	U		390	U		690	U	
4-NITROANILINE	13000	U		960	U		990	U		1700	U	
4-NITROPHENOL	13000	U		960	U		990	U		1700	U	
ACENAPHTHENE	5200	U		380	U		390	U		690	U	
ACENAPHTHYLENE	5200	U		380	U		390	U		690	U	
ANTHRACENE	5200	U		380	U		390	U		690	U	
BENZO(A)ANTHRACENE	5200	U		380	U		390	U		160	J	P
BENZO(A)PYRENE	5200	U		380	U		390	U		140	J	P
BENZO(B)FLUORANTHENE	5200	U		380	U		390	U		360	J	P

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CTO084 - PARRIS ISLAND
SOIL DATA
INCHVT
SDG: 55680

SAMPLE NUMBER:	PI-014-03(42)			PI-015A-01(43)			PI-015B-01(44)			PI-021-01(45)		
SAMPLE DATE:	12/13/95			12/13/95			12/13/95			12/13/95		
LABORATORY ID:	281855			281856			281857			281858		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	63.0 %			86.0 %			83.0 %			48.0 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
SEMIVOLATILES												
BENZO(G,H,I)PERYLENE	5200	U		380	U		390	U		53	J	P
BENZO(K)FLUORANTHENE	5200	U		380	U		390	U		690	U	
BIS(2-CHLOROETHOXY)METHANE	5200	U		380	U		390	U		690	U	
BIS(2-CHLOROETHYL)ETHER	5200	U		380	U		390	U		690	U	
BIS(2-ETHYLHEXYL)PHTHALATE	27000			380	U		390	U		690	U	
BUTYLBENZYL PHTHALATE	5200	U		380	U		390	U		690	U	
CARBAZOLE	5200	U		380	U		390	U		690	U	
CHRYSENE	5200	U		380	U		390	U		280	J	P
DI-N-BUTYL PHTHALATE	5200	U		380	U	A	390	U	A	690	U	A
DI-N-OCTYL PHTHALATE	5200	U		380	U		390	U		690	U	
DIBENZO(A,H)ANTHRACENE	5200	U		380	U		390	U		690	U	
DIBENZOFURAN	5200	U		380	U		390	U		690	U	
DIETHYL PHTHALATE	5200	U		380	U		390	U		690	U	
DIMETHYL PHTHALATE	5200	U		380	U		390	U		690	U	
FLUORANTHENE	5200	U		380	U		390	U		160	J	P
FLUORENE	5200	U		380	U		390	U		690	U	
HEXACHLOROBENZENE	5200	U		380	U		390	U		690	U	
HEXACHLOROBUTADIENE	5200	U		380	U		390	U		690	U	
HEXACHLOROCYCLOPENTADIENE	5200	U		380	U		390	U		690	U	
HEXACHLOROETHANE	5200	U		380	U		390	U		690	U	
INDENO(1,2,3-CD)PYRENE	5200	U		380	U		390	U		100	J	P
ISOPHORONE	5200	U		380	U		390	U		690	U	
N-NITROSO-DI-N-PROPYLAMINE	5200	U		380	U		390	U		690	U	
N-NITROSODIPHENYLAMINE	5200	U		380	U		390	U		690	U	
NAPHTHALENE	5200	U		380	U		390	U		690	U	
NITROBENZENE	5200	U		380	U		390	U		690	U	
PENTACHLOROPHENOL	13000	U		960	U		990	U		1700	U	
PHENANTHRENE	5200	U		380	U		390	U		37	J	P
PHENOL	5200	U		380	U		390	U		690	U	
PYRENE	5200	U		380	U		390	U		270	J	P

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CTO084 - PARRIS ISLAND
SOIL DATA
INCHVT
SDG: 55680

SAMPLE NUMBER:	PI-014-03(42)			PI-015A-01(43)			PI-015B-01(44)			PI-021-01(45)		
SAMPLE DATE:	12/13/95			12/13/95			12/13/95			12/13/95		
LABORATORY ID:	281855			281856			281857			281858		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	63.0 %			86.0 %			83.0 %			48.0 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
PESTICIDES/PCBs												
4,4'-DDD	42	U	A	3.8	U		4	U		6.9	U	
4,4'-DDE	17	U	A	9.2	U	A	34			6.9	U	
4,4'-DDT	18	J	H	3	J	P	52			6.9	U	
ALDRIN	2.7	UJ	H	2	U		2.1	U		3.5	U	
ALPHA-BHC	2.7	UJ	H	2	U		2.1	U		3.5	U	
ALPHA-CHLORDANE	21	J	H	2	U		2.1	U	A	3.5	U	
AROCLOR-1016	52	UJ	H	38	U		40	U		69	U	
AROCLOR-1221	110	UJ	H	78	U		82	U		140	U	
AROCLOR-1232	52	UJ	H	38	U		40	U		69	U	
AROCLOR-1242	52	UJ	H	38	U		40	U		69	U	
AROCLOR-1248	52	UJ	H	38	U		40	U		69	U	
AROCLOR-1254	52	UJ	H	38	U		24	J	P	69	U	
AROCLOR-1260	52	UJ	H	38	U		40	U		69	U	
BETA-BHC	2.7	U	A	2	U		2.1	U	A	3.5	U	
DELTA-BHC	2.7	UJ	H	2	U		2.1	U		3.5	U	
DIELDRIN	5.2	UJ	H	3.8	U		4	U		6.9	U	
ENDOSULFAN I	2.7	U	A	2	U		2.1	U	A	3.5	U	A
ENDOSULFAN II	5.2	UJ	H	3.8	U		4	U		6.9	U	
ENDOSULFAN SULFATE	5.2	UJ	H	3.8	U		4	U		6.9	U	
ENDRIN	5.2	U	H	3.8	U		4	U		6.9	U	
ENDRIN ALDEHYDE	23	U	A	3.8	U		4	U		6.9	U	
ENDRIN KETONE	5.2	UJ	A	3.8	U		4	U		6.9	U	
GAMMA-BHC (LINDANE)	2.7	UJ	H	2	U		2.1	U		3.5	U	
GAMMA-CHLORDANE	25	U	A	2	U		2.1	U		3.5	U	
HEPTACHLOR	2.7	UJ	H	2	U		2.1	U		3.5	U	
HEPTACHLOR EPOXIDE	2.7	UJ	H	2	U		2.1	U		3.5	U	
METHOXYCHLOR	27	UJ	H	20	U		21	U		35	U	
TOXAPHENE	270	UJ	H	200	U		210	U		350	U	

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CTO009 - PARRIS ISLAND
SOIL DATA
INCHVT
SDG: 55680

SAMPLE NUMBER:	PI-014-03(42)			PI-015A-01(43)			PI-015B-01(44)			PI-021-01(45)		
SAMPLE DATE:	12/13/95			12/13/95			12/13/95			12/13/95		
LABORATORY ID:	281855			281856			281857			281858		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	~~63.0~~ % 62.6			~~86.0~~ % 85.7			~~83.0~~ % 82.5			~~48.0~~ % 47.7		
UNITS:	MG/KG			MG/KG			MG/KG			MG/KG		
FIELD DUPLICATE OF:												
	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
INORGANICS												
ALUMINUM	2170			2100			4470			8160		
ANTIMONY	0.52	U		0.58	U		0.59	U		0.94	U	
ARSENIC	1.6			5.3			0.82			4.1		
BARIUM	9.9			7.5			17.7			12.6		
BERYLLIUM	0.12	U	A	0.21	U	A	0.15	U	A	0.44	U	A
CADMIUM	0.23			0.43			0.11			0.15		
CALCIUM	767			206000			2740			1450		
CHROMIUM	35			6.2			4.3			14.6		
COBALT	0.70			1.6			0.56			2.0		
COPPER	16.4			3.2			6.0			7.6		
CYANIDE	0.67	U		0.56	U		0.60	U		0.93	U	
IRON	2460			5620			3100			8820		
LEAD	135			4.0			15.0			53.0		
MAGNESIUM	321			2260			310			3400		
MANGANESE	20.8			113			178			63.0		
MERCURY	0.04	U		0.03	U		0.07	U	A	0.03	U	A
NICKEL	1.5			6.1			1.9			4.3		
POTASSIUM	202			522			138			1870		
SELENIUM	0.45	U		0.51	U		0.52	U		0.82	U	
SILVER	0.14	U		0.16	U		0.16	U		0.26	U	
SODIUM	61.8			78.2			44.0	U		12800		
THALLIUM	0.47	U		0.53	U		0.54	U		0.86	U	
VANADIUM	6.1			5.7			6.4			21.7		
ZINC	519			18.2			17.8			41.1		

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C-6

TEST PIT SAMPLE DATA

Paris Island
Test Pit Samples
Analytical Results

order	01	02	03	
aoc	SITE_02	SITE_02	SITE_02	
site	SITE_02	SITE_02	SITE_02	
location	TEST PIT	TEST PIT	TEST PIT	
matrix	SB	SB	SB	
nsample	PAI-02-SB-02A-02	PAI-02-SB-10-07	PAI-02-SB-11-02	
sample	PAI-02-SB-02A-02	PAI-02-SB-10-07	PAI-02-SB-11-02	
sacode	NORMAL	NORMAL	NORMAL	
sample_dat	05-Oct-99	05-Oct-99	05-Oct-99	
cto_proj	020	020	020	
proj_manag	Brayack, D.	Brayack, D.	Brayack, D.	
sort	**c_01**	**c_02**	**c_03**	**count**
Volatile Organics (ug/kg)				
1,1,1-TRICHLOROETHANE	6 U	6 U	9 U	3
1,1,2,2-TETRACHLOROETHANE	6 U	6 U	9 U	3
1,1,2-TRICHLOROETHANE	6 U	6 U	9 U	3
1,1-DICHLOROETHANE	6 U	6 U	9 U	3
1,1-DICHLOROETHENE	6 U	6 U	9 U	3
1,2-DICHLOROETHANE	6 U	6 U	9 U	3
1,2-DICHLOROETHENE (TOTAL)	6 U	6 U	9 U	3
1,2-DICHLOROPROPANE	6 U	6 U	9 U	3
2-BUTANONE	6 UR	6 UR	9 UR	3
2-HEXANONE	6 U	6 U	9 U	3
4-METHYL-2-PENTANONE	6 U	6 U	9 U	3
ACETONE	6 UR	6 UR	9 UR	3
BENZENE	6 U	6 U	9 U	3
BROMODICHLOROMETHANE	6 U	6 U	9 U	3
BROMOFORM	6 U	6 U	9 U	3
BROMOMETHANE	6 U	6 U	9 U	3
CARBON DISULFIDE	6 U	6 U	9 U	3
CARBON TETRACHLORIDE	6 U	6 U	9 U	3
CHLOROBENZENE	6 U	6 U	9 U	3
CHLOROETHANE	6 U	6 U	9 U	3
CHLOROFORM	6 U	6 U	9 U	3
CHLOROMETHANE	6 U	6 U	9 U	3
CIS-1,3-DICHLOROPROPENE	6 U	6 U	9 U	3
DIBROMOCHLOROMETHANE	6 U	6 U	9 U	3
ETHYLBENZENE	6 U	6 U	9 U	3
METHYLENE CHLORIDE	9	9	9 U	3
STYRENE	6 U	6 U	9 U	3
TETRACHLOROETHENE	6 U	6 U	9 U	3
TOLUENE	6 U	6 U	9 U	3
TRANS-1,3-DICHLOROPROPENE	6 U	6 U	9 U	3
TRICHLOROETHENE	6 U	6 U	9 U	3
VINYL CHLORIDE	6 U	6 U	9 U	3
XYLENES, TOTAL	6 U	6 U	9 U	3
Semivolatile Organics (ug/kg)				
1,2,4-TRICHLOROBENZENE	380 U	350 U	400 U	3
1,2-DICHLOROBENZENE	380 U	350 U	400 U	3
1,3-DICHLOROBENZENE	380 U	350 U	400 U	3
1,4-DICHLOROBENZENE	380 U	350 U	400 U	3
2,2'-OXYBIS(1-CHLOROPROPANE)	380 U	350 U	400 U	3
2,4,5-TRICHLOROPHENOL	1900 U	1700 U	2000 U	3
2,4,6-TRICHLOROPHENOL	380 U	350 U	400 U	3
2,4-DICHLOROPHENOL	380 U	350 U	400 U	3
2,4-DIMETHYLPHENOL	380 U	350 U	400 U	3
2,4-DINITROPHENOL	1900 U	1700 U	2000 U	3
2,4-DINITROTOLUENE	380 U	350 U	400 U	3
2,6-DINITROTOLUENE	380 U	350 U	400 U	3
2-CHLORONAPHTHALENE	380 U	350 U	400 U	3
2-CHLOROPHENOL	380 U	350 U	400 U	3
2-METHYLNAPHTHALENE	380 U	350 U	400 U	3
2-METHYLPHENOL	380 U	350 U	400 U	3
2-NITROANILINE	1900 U	1700 U	2000 U	3
2-NITROPHENOL	380 U	350 U	400 U	3
3,3'-DICHLOROBENZIDINE	770 U	700 U	790 U	3
3-NITROANILINE	1900 U	1700 U	2000 U	3
4,6-DINITRO-2-METHYLPHENOL	1900 U	1700 U	2000 U	3
4-BROMOPHENYL PHENYL ETHER	380 U	350 U	400 U	3
4-CHLORO-3-METHYLPHENOL	380 U	350 U	400 U	3
4-CHLOROANILINE	380 U	350 U	400 U	3
4-CHLOROPHENYL PHENYL ETHER	380 U	350 U	400 U	3
4-METHYLPHENOL	380 U	350 U	400 U	3

from s2_sam.dbf
from s2_res.dbf
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Paris Island
Test Pit Samples
Analytical Results

order	01	02	03	
aoc	SITE_02	SITE_02	SITE_02	
site	SITE_02	SITE_02	SITE_02	
location	TEST PIT	TEST PIT	TEST PIT	
matrix	SB	SB	SB	
nsample	PAI-02-SB-02A-02	PAI-02-SB-10-07	PAI-02-SB-11-02	
sample	PAI-02-SB-02A-02	PAI-02-SB-10-07	PAI-02-SB-11-02	
sacode	NORMAL	NORMAL	NORMAL	
sample_dat	05-Oct-99	05-Oct-99	05-Oct-99	
cto_proj	020	020	020	
proj_manag	Brayack, D.	Brayack, D.	Brayack, D.	
sort	**c_01**	**c_02**	**c_03**	**count**
4-NITROANILINE	1900 U	1700 U	2000 U	3
4-NITROPHENOL	1900 U	1700 U	2000 U	3
ACENAPHTHENE	380 U	350 U	400 U	3
ACENAPHTHYLENE	380 U	350 U	400 U	3
ANTHRACENE	380 U	350 U	400 U	3
BENZO(A)ANTHRACENE	380 U	350 U	400 U	3
BENZO(A)PYRENE	380 U	350 U	400 U	3
BENZO(B)FLUORANTHENE	380 U	350 U	400 U	3
BENZO(G,H,I)PERYLENE	380 U	350 U	400 U	3
BENZO(K)FLUORANTHENE	380 U	350 U	400 U	3
BIS(2-CHLOROETHOXY)METHANE	380 U	350 U	400 U	3
BIS(2-CHLOROETHYL)ETHER	380 U	350 U	400 U	3
BIS(2-ETHYLHEXYL)PHTHALATE	380 U	350 U	400 U	3
BUTYLBENZYL PHTHALATE	380 U	350 U	400 U	3
CARBAZOLE	380 U	350 U	400 U	3
CHRYSENE	380 U	350 U	400 U	3
DI-N-BUTYL PHTHALATE	380 U	350 U	400 U	3
DI-N-OCTYL PHTHALATE	380 U	350 U	400 U	3
DIBENZO(A,H)ANTHRACENE	380 U	350 U	400 U	3
DIBENZOFURAN	380 U	350 U	400 U	3
DIETHYL PHTHALATE	380 U	350 U	400 U	3
DIMETHYL PHTHALATE	380 U	350 U	400 U	3
FLUORANTHENE	380 U	350 U	400 U	3
FLUORENE	380 U	350 U	400 U	3
HEXACHLOROBENZENE	380 U	350 U	400 U	3
HEXACHLOROBUTADIENE	380 U	350 U	400 U	3
HEXACHLOROCYCLOPENTADIENE	380 U	350 U	400 U	3
HEXACHLOROETHANE	380 U	350 U	400 U	3
INDENO(1,2,3-CD)PYRENE	380 U	350 U	400 U	3
ISOPHORONE	380 U	350 U	400 U	3
N-NITROSO-DI-N-PROPYLAMINE	380 U	350 U	400 U	3
N-NITROSODIPHENYLAMINE	380 U	350 U	400 U	3
NAPHTHALENE	380 U	350 U	400 U	3
NITROBENZENE	380 U	350 U	400 U	3
PENTACHLOROPHENOL	1900 U	1700 U	2000 U	3
PHENANTHRENE	380 U	350 U	400 U	3
PHENOL	380 U	350 U	400 U	3
PYRENE	380 U	350 U	400 U	3
Pesticides/PCBs (ug/kg)				
4,4'-DDD	19 U	17 U	19 U	3
4,4'-DDE	19 U	17 U	19 U	3
4,4'-DDT	19 U	17 U	19 U	3
ALDRIN	9.5 U	8.7 U	9.7 U	3
ALPHA CHLORDANE	9.5 U	8.7 U	9.7 U	3
ALPHA-BHC	9.5 U	8.7 U	9.7 U	3
AROCLOR-1016	9.5 U	8.7 U	9.7 U	3
AROCLOR-1221	9.5 U	8.7 U	9.7 U	3
AROCLOR-1232	9.5 U	8.7 U	9.7 U	3
AROCLOR-1242	9.5 U	8.7 U	9.7 U	3
AROCLOR-1248	9.5 U	8.7 U	9.7 U	3
AROCLOR-1254	9.5 U	8.7 U	9.7 U	3
AROCLOR-1260	9.5 U	8.7 U	9.7 U	3
BETA-BHC	9.5 U	8.7 U	9.7 U	3
DELTA-BHC	9.5 U	8.7 U	9.7 U	3
DIELDRIN	19 U	17 U	19 U	3
ENDOSULFAN I	9.5 U	8.7 U	9.7 U	3
ENDOSULFAN II	19 U	17 U	19 U	3
ENDOSULFAN SULFATE	19 U	17 U	19 U	3
ENDRIN	19 U	17 U	19 U	3
ENDRIN ALDEHYDE	19 U	17 U	19 U	3
ENDRIN KETONE	19 U	17 U	19 U	3

from s2_sam.dbf
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Paris Island
Test Pit Samples
Analytical Results

order	01	02	03	
aoc	SITE_02	SITE_02	SITE_02	
site	SITE_02	SITE_02	SITE_02	
location	TEST PIT	TEST PIT	TEST PIT	
matrix	SB	SB	SB	
nsample	PAI-02-SB-02A-02	PAI-02-SB-10-07	PAI-02-SB-11-02	
sample	PAI-02-SB-02A-02	PAI-02-SB-10-07	PAI-02-SB-11-02	
sacode	NORMAL	NORMAL	NORMAL	
sample_dat	05-Oct-99	05-Oct-99	05-Oct-99	
cto_proj	020	020	020	
proj_manag	Brayack, D.	Brayack, D.	Brayack, D.	
sort	**c_01**	**c_02**	**c_03**	**count**
GAMMA-BHC (LINDANE)	9.5 U	8.7 U	9.7 U	3
GAMMA-CHLORDANE	9.5 U	8.7 U	9.7 U	3
HEPTACHLOR	9.5 U	8.7 U	9.7 U	3
HEPTACHLOR EPOXIDE	9.5 U	8.7 U	9.7 U	3
METHOXYCHLOR	95 U	87 U	97 U	3
TOXAPHENE	190 U	170 U	190 U	3
inorganics (mg/kg)				
ALUMINUM	1250	2860	2270	3
ANTIMONY	0.42 U	0.42 U	0.44 U	3
ARSENIC	0.36 U	0.36 U	0.38 U	3
BARIUM	8.1	4	11.4	3
BERYLLIUM	0.19 U	0.19 U	0.19 U	3
CADMIUM	0.04 U	0.04 U	0.04 U	3
CALCIUM	150	43.4 U	64.3	3
CHROMIUM	2.5	5.6	4.5	3
COBALT	0.08 U	0.08 U	0.09 U	3
COPPER	0.48	0.21	0.53	3
IRON	337	296	265	3
LEAD	0.99	3.1	1.1	3
MAGNESIUM	90.9	28.3 U	57.7	3
MANGANESE	1.4 U	4.2	1.5 U	3
MERCURY	0.02 U	0.02 U	0.02 U	3
NICKEL	0.13 U	0.13 U	0.14 U	3
POTASSIUM	41.9	29.2	40.1	3
SELENIUM	0.33 U	0.33 U	0.35 U	3
SILVER	0.07 U	0.07 U	0.08 U	3
SODIUM	12.6 U	12.6 U	13.3 U	3
THALLIUM	0.42 U	0.42 U	0.44 U	3
VANADIUM	0.87 U	1.6 U	1.1 U	3
ZINC	1.5	1.2	1.4	3

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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 field sampling and laboratory analysis performed by Tetra Tech NUS at SWMUs 2 and 15. 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 is provided in Section 3.0.

1.0 DATA QUALITY OBJECTIVES

A detailed discussion of the DQOs for the 1998 field sampling is provided in the Quality Assurance section of the MCRD Parris Island Work Plan (Tetra Tech NUS, March 1999) 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 2 and 15, 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 analytical data is defined as 75 to 125 percent (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 analytical data for SWMUs 2 and 15 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 sampling event for SWMUs 2 and 15 is 98.6% (i.e., 100 chemical analytical results out of a total of 7099 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 which 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 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 SWMUs 2 and 15 analytical data is provided in Appendix C, Chain of Custody (COCs).

3.0 DATA VALIDATION

All samples collected as part of the 1998 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 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 which 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 which 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 analytical data for SWMUs 2 and 15 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 sampling effort for SWMUs 2 and 15 is provided in the remainder of this section. All validated analytical results are presented in Appendix C.

3.3.1 Organic Analyses

Methylene chloride and acetone were identified as laboratory blank contaminants. Acetone was identified as a field blank contaminant. 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 calibrations. 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.

Positive and nondetected results in some samples were rejected due to gross technical noncompliance with calibration criteria (i.e., relative response factors < 0.050). Acetone was the most frequently affected

compound. Primarily, aqueous matrices were affected by the noncompliances. Refer to Table 1 for a listing of the affected samples and compounds.

Nondetected results for polynuclear aromatic compounds (PAHs) were rejected in sediment sample PAI-02-SD-03-01 due to gross technical noncompliance with surrogate recovery (i.e., percent recovery < 10%.)

None of the organic analytical results for aqueous or solid samples collected at SWMUs 2 and 15 during the 1998 sampling effort were qualified due to matrix spike (MS) noncompliance, laboratory control sample (LCS) noncompliance, field duplicate imprecision, holding time exceedance, 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 in field blanks associated with the surface soils: beryllium, calcium, lead, magnesium, potassium, and sodium. The detection limits of those results that were found to be attributable to blank contamination introduced during field sampling and/or laboratory analysis were raised during the validation process.

Inorganic sample results were typically qualified as estimated based on problems noted with calibration. Other than blank contamination, no qualifiers were assigned to waste water, aqueous quality control samples, subsurface soils, sediments, and surface soil analyses. Surface water and groundwater samples were qualified due to calibration noncompliances and blank contamination.

None of the inorganic analytical results collected at SWMUs 2 and 15 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, matrix spike noncompliances, and blank spike noncompliances.

3.3.3 Miscellaneous Analyses

Nitrate/Nitrite was identified in method blanks associated with groundwater analyses.

Hexavalent chromium and nitrate/nitrite results for sample PAI2-GW2-01 were qualified as estimated (uj and J, respectively) due to calibration noncompliances.

The nondetected results for cyanide in sediment samples PAI-15-SD-02-01 and PAI-15-SD-03-01 were qualified as estimated, UJ, due to holding time noncompliance.

No other qualifiers were applied to miscellaneous parameters analyzed for SWMUs 2 and 15. No miscellaneous analytical data was rejected.

All validated results for SWMUs 2 and 15 are presented in Appendix C (Data Base). This database is inclusive of all positive results (i.e.,1998 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-02-SS-01-01	SS	acetone
PAI-02-SD-01-01	SD	acetone
PAI-02-SD-02-01	SD	acetone
PAI-02-SD-03-01	SD	Acenaphthalene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h,)anthracene, fluoroanthene, fluorene, indeno(1,2,3-c,d)pyrene, naphthalene, phenathrene, pyrene, acetone
PAI-02-SD-04-01	SD	acetone
PAI-02-SB-01-01	SB	acetone
PAI-02-IDW-S	WW	acetone
PAI-02-RB-01	QC	2-butanone, acetone
PAI-02-SS-01-01	SS	acetone
PAI-02-GW-04-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-02-GW-05-01	GW	2-butanone, 2-hexanone, 4-nitroquinoline-1-oxide, 5-nitro-o-toluidine, acrolein, acrylonitrile, methacrylonitrile, methyl methacrylate
PAI2-GW1-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI2-GW2-01	GW	2-butanone, 2-hexanone, acetone, 4-nitroquinoline-1-oxide, 5-nitro-o-toluidine, acrolein, acrylonitrile, methacrylonitrile, methyl methacrylate
PAI2-GW3-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI2-GW3-01-D	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone

D-2

DATA VALIDATION LETTERS

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.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

C-49-08-8-080

TO:	D. BRAYACK	DATE:	AUGUST 18, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE / REV 1

SUBJECT: **MISCELLANEOUS DATA VALIDATION - PH AND TOC**
CTO 020 - MCRD PARRIS, ISLAND
SDG - U07492

SAMPLES: 6/ Soil /

PAI-02-SB-001-30	PAI-03-SB-002-24	PAI-03-SB-003-12
PAI-10-SB-003-34	PAI-10-SB-004-08	PAI-10-SB-005-26

Overview

The sample set for CTO 020, MCRD Parris, Island, SDG U07492, consists of six(6) soil environmental sample.

The samples were analyzed for pH and Total Organic Carbon (TOC) . The samples were collected by Tetra Tech, NUS between July 11 and July 15, 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 EPA 150.1 Method. The TOC analyses were conducted using SW-846 9060 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

Field sample PAI-02-SB-001-30 was labeled incorrectly. RECRA Labnet corrected the field sample label from PAI-03-SB-001-30 to PAI-02-SB-001-30. This correction was noted on the Sample Discrepancy Report (included within Appendix C), but was not noted on the Case Narrative.

D-8

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 U07492

Table 1 - RECOMMENDATION SUMMARY

pH
TOC

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.

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**

MR. DAVID BRAYACK DATE: OCTOBER 22 , 1998

FROM: L.W.SUMANSKY COPIES: DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS, TOTAL AND DISSOLVED, CHLORIDE, CYANIDE, CHROMIUM +6, FLUORIDE, HARDNESS AS $CaCO_3$, NITRATE + NITRITE AS N, SULFATE, TDS, TOC, TSS

PARRIS ISLAND

SDG TTP07

SAMPLES: 14/ Aqueous

PAI – 02 – GW – 001 – 01	PAI – 02 – GW – 001 – 01E
PAI – 02 – GW – 003 – 01	PAI – 02 – GW – 003 – 01F
PAI – 02 – GW – 003 – 01D	PAI – 02 – GW – 003 – 01D – F
PAI – 03 – GW – 001 – 01	PAI – 03 – GW – 001 – 01F
PAI – 03 – GW – 003 – 01	PAI – 03 – GW – 003 – 01F
PAI – 03 – GW – 004 – 01	PAI – 03 – GW – 004 – 01F
PAI – 10 – SW – 011 – 00	PAI – 10 – SW – 011 – 00F

OVERVIEW

The sample set for Parris Island, SDG TTP07consists of fourteen (14) aqueous environmental samples, seven of which were filtered and are designated as "F". All samples were analyzed for TAL metals. The unfiltered samples, were also analyzed for chloride, cyanide, hexavalent chromium, fluoride, hardness as $CaCO_3$, nitrate + nitrite as N, sulfate, total dissolved solids (TDS), total suspended solids (TSS), and total organic carbon (TOC).

The samples were collected by Tetra Tech NUS on August 5,6,7,and 8, 1998. Analyses were performed byLaucks Testing Laboratories, Seattle, Wash. All analyses were conducted using SW-846 Methods. For metals the methods were 6010B, 7000A, and 9021A. The remaining analytes were determined by the following methods:

Chloride	EPA 300.0
Cyanide	SW 9012
Chromium, hexavalent	SW 7196
Fluoride	EPA 300.0
Hardness as $CaCO_3$	EPA 130.2
Nitrate + Nitrite as N	EPA 353.2
Sulfate	EPA 300.0
Total Dissolved Solids (TDS)	EPA 160.1
Total Suspended Solids (TSS)	EPA 160.2
Total Organic Carbon (TOC)	SW9060 Mod.

The data contained in this SDG were validated with regard to the following parameters:

- * Holding times
- * Data completeness
- Laboratory blank analysis
- * Initial/continuing calibrations
- Matrix Spike results
- * 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.

The attached Table I 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: TAL metals

Analyte	Maximum Concentration	Action Level (Aqueous)
Aluminum	38.2 ug/L	191.0 ug/L
Barium	1.4ug/L	7.0 ug/L
Beryllium	0.3 ug/L	1.5 ug/L
Calcium	48.6 ug/L	243.0 ug/L
Iron(1)	36.9 ug/L	184.5 ug/L
Magnesium	34.8 ug/L	174.0 ug/L
Manganese(1)	3.2 ug/L	16.0 ug/L
Mercury(1)	0.1 ug/L	0.5 ug/L
Nickel	5.6 ug/L	28.0 ug/L
Potassium(1)	142.9 ug/L	714.5 ug/L
Selenium	2.0 ug/L	10.0 ug/L
Silver	4.3 ug/L	21.5 ug/L
Sodium(1)	69.1 ug/L	345.5 ug/L
Vanadium	3.4 ug/L	17.0 ug/L
Zinc(1)	8.9 ug/L	44.5 ug/L

(1) Maximum concentration found in an 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 consideration when evaluating for blank contamination. Positive results less than the action level for aluminum, beryllium, mercury, iron, nickel, potassium, selenium, vanadium and zinc were qualified "U", undetected. No action was taken for the remaining analytes since the results were either greater than the action level or were nondetects.

The Matrix Spike (MS) Percent Recovery (%R) for selenium was less than 75% quality control limit. Positive results were qualified "J", estimated and nondetects were qualified "UJ", estimated.

The Matrix Spike (MS) Percent Recovery (%R) for hexavalent chromium was less than 30%. No qualifiers were applied, however, as the Case Narrarive stated that reducing compounds were present in the sample. This factor precludes the recovery of any spike added as hexavalent chromium.

Miscellaneous Inorganic Analytes.

All data quality parameters were met.

Notes

The sample IDs on Form I's were incomplete for metals. The Form I's have been amended for completeness.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: The Matrix Spike Recovery, (%R), for selenium was less than 75% quality control limit.

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 Documentat

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentat

PARRIS ISLAND

SDG TTP07

TABLE 1 – RECOMMENDATION SUMMARY

Aluminum	A[1]	
Antimony		
Arsenic		
Barium		
Beryllium		
Cadmium	A[1]	
Calcium		
Chromium		
Cobalt		
Copper		
Iron	A[1]	
Lead		
Magnesium		
Manganese		
Mercury	A[1]	
Nickel	A[1]	
Potassium	A[1]	
Selenium	A[1]	J[1]
Silver		
Sodium		
Thallium		
Vanadium	A[1]	
Zinc	A[1]	
Chromium +6		

If the field is left blank, the qualifier is A – Accept all 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 and nondetects as estimated, "J" and "UJ", as a result of MS noncompliance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

TO: MR. DAVID BRAYACK **DATE:** OCTOBER 28, 1998

FROM: L.W.SUMANSKY **COPIES:** DV FILE

SUBJECT: ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB
PARRIS ISLAND
SDG TTP07

SAMPLES: 7/ Aqueous

PAI – 02 – GW – 001 – 01
PAI – 02 – GW – 003 – 01
PAI – 02 – GW – 003 – 01D
PAI – 03 – GW – 001 – 01
PAI – 03 – GW – 003 – 01
PAI – 03 – GW – 004 – 01
PAI – 10 – SW – 011 – 00

4/ Aqueous Trip Blanks
TB – 080698
TB – 080798
TB – 080898
TB – 081098

OVERVIEW

The sample set for Parris Island, SDG TTP07 consists of seven (7) aqueous environmental samples and four (4) trip blanks, All samples were analyzed for Target Compound List (TCL) volatile organic compounds. The samples were also analyzed for semivolatile organic compounds, organochlorine pesticides and polychlorinated biphenyls (PCBs)

The samples were collected on August 6,7,8, and 10, 1998. Analyses were performed by LaucksTesting Laboratories, Seattle, Wash. All analyses were conducted using SW – 846, Methods 8260B, 8270 C, and 8081A/8082 analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

- * Holding times
- * Data completeness
- Laboratory blank analysis
- 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

The following contaminants were detected in the Trip Blanks at the maximum concentrations shown:

Samples Affected: All

Analyte	Maximum Concentration	Action Level Aqueous
Acetone	3.9 ug/L	39 ug/L
2– Butanone	1.9 ug/L	19 ug/L
Methylene chloride	1.1 ug/L	11 ug/L

An action level of 10X the maximum contaminant level has been used to evaluate sample data for blank contamination as all three analytes are common laboratory contaminants. Sample aliquot size and dilution factors were taken into consideration when evaluating for blank contamination. Positive results less than the action level for the analytes have been qualified as nondetected "U".

The initial and/or continuing calibration relative response factors (RRFs) fell below the 0.05 quality control limit for acetone, 2– butanone, 2– hexanone and 4– methyl– 2– pentanone. Nondetected results were qualified as rejected, "UR". Positive results in the trip blanks were qualified "J", estimated .

Semivolatile

All data quality parameters were met in this fraction.

Several transcription errors were noted between the Form 1s and the electronic data. The Form 1s were amended by the reviewer to match the electronic data forms.

Pesticides/PCBs

All data quality parameters were met for these fractions

Notes

In both the volatile and semivolatile fractions, several qualifier designations "J", estimated ,were given the qualifier code "P" designation as the results reported were less than CRQL for organics.

EXECUTIVE SUMMARY

The analytes acetone, methylene chloride and 2– butanone were found in the trip blanks. Acetone, 2– butanone, 2– hexanone and 4– methyl– 2– pentanone failed to meet the 0.05 RRF quality control limit.

Other Factors Affecting Data Quality: None

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 Document

PARRIS ISLAND

SDG TTP07

TABLE 1 – RECOMMENDATION SUMMARY

	VOA			SVOA	PEST/PCBs
PAI – 02 – GW – 001 – 01	R^1			J^1	
PAI – 02 – GW – 003 – 01	R^1	A^1	J^1		
PAI – 02 – GW – 003 – 01D	R^1	A^1			
PAI – 03 – GW – 001 – 01	R^1		J^1	J^1	
PAI – 03 – GW – 003 – 01	R^1		J^1	J^1	
PAI – 03 – GW – 004 – 01	R^1	A^1	J^1	J^1	
PAI – 10 – SW – 011 – 00	R^1			J^1	
TB – 080698	R^1		J^1		
TB – 080798	R^1		J^1		
TB – 080898	R^1		J^1		
TB – 081098	R^1		J		

If the field is left blank, the qualifier is A – Accept all data

A^1 – Accept data but qualify results less than the blank action level for acetone as nondetected "U".

R^1 – Reject data but qualify nondetected results, as applicable, for acetone, 2– butanone, 2– hexanone, and 4– methyl – 2– pentanone as rejected, "R", due to initial and and/or continuing calibration RRFs less than 0.05.

J^1 – Accept data but qualify positive results below the reporting limit as estimated "J".

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-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[1]	
Antimony		
Arsenic		
Barium		
Beryllium	A[1]	
Cadmium		
Calcium		
Chromium		
Cobalt		
Copper		
Iron	A[1]	
Lead	A[1]	
Magnesium		
Manganese		
Mercury		
Nickel		
Potassium		
Selenium	A[1]	
Silver	A[1]	
Sodium		
Thallium		J[1]
Vanadium		
Zinc	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 nondetected results as estimated, "UJ", as a result of calibration noncompliance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-10-8-241

TO:	D. BRAYACK	DATE:	OCTOBER 30, 1998
FROM:	TERRI L. SOLOMON	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS, TOTAL ORGANIC CARBON, CYANIDE, HEXAVALENT CHROMIUM, pH
CTO 020 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – U07629

SAMPLES: 6/Aqueous/

PAI-02-SW-002-00	PAI-02-SW-002-00-F	PAI-02-SW-003-00	PAI-02-SW-003-00-F
PAI-02-SW-001-00	PAI-02-SW-004-00		

11/Soil/

PAI-02-SB-001-00	PAI-02-SD-001-01	PAI-02-SD-002-01	PAI-02-SD-002-02
PAI-02-SD-003-01	PAI-02-SD-004-01	PAI-02-SS-002-01	PAI-02-SS-003-01
PAI-02-SS-004-01	PAI-02-SS-005-01	PAI-02-SS-007-01	

Overview

The sample set for MCRD Parris Island, SDG U07629, consists of six (6) aqueous and eleven (11) soil environmenta samples. No field duplicate pairs were included within this SDG.

Samples PAI-02-SW-002-00 and PAI-02-SW-003-00 were analyzed foe TAL metals, cyanide, hexavalent chromium, tota organic carbon and pH. Samples PAI-02-SW-002-00-F and PAI-02-SW-003-00-F were analyzed for dissolved TA metals. The soil samples were analyzed for TAL metals and cyanide. Sample PAI-02-SW-001-00 was analyzed fo cyanide, hexavalent chromium, pH and total organic carbon. Samples PAI-02-SD-002-01, PAI-02-SD-003-01 and PAI-02 SD-004-01 were analyzed for hexavalent chromium. Samples PAI-02-SD-001-01, PAI-02-SD-002-01, PAI-02-SD-002-02 PAI-02-SD-003-01, PAI-02-SD-004-01 and PAI-02-SS-007-01 were analyzed for total organic carbon and pH. Sampl PAI-02-SW-004-00 was analyzed for hexavalent chromium, pH and total organic carbon. The samples were collected b Tetra Tech NUS on July 22, 23 and 24, 1998 and analyzed by Recra Labnet - Chicago under Naval Facilities Engineerin Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals, cyanide, hexavalent chromiur and total organic carbon (aqueous) analyses were analyzed using SW-846 methodologies. Total organic carbon (soi analyses were conducted using the Walkley-Black method. PH analyses were conducted using EPA method 150.1 CLP-like deliverable was provided.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
  • Laboratory Blank Analyses
  • Matrix Spike Results
* • Detection Limits

* - All quality control criteria were met for this parameter.

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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)	Action Level (soil)
aluminum	128.3 ug/L	641.5 ug/L	64.15 mg/kg
antimony	3.1 ug/L	15.5 ug/L	1.55 mg/kg
barium	1.3 ug/L	6.5 ug/L	0.65 mg/kg
beryllium	1.2 ug/L	NA	0.60 mg/kg
beryllium(1)	1.540 ug/L	7.7 ug/L	NA
cadmium	0.4 ug/L	2.0 ug/L	0.2 mg/kg
calcium	62.1 ug/L	310.5 ug/L	31.05 mg/kg
copper	1.8 ug/L	9.0 ug/L	NA
copper(2)	0.169 mg/kg	NA	0.845 mg/kg
iron	72.3 ug/L	361.5 ug/L	36.15 mg/kg
lead	2.9 ug/L	14.5 ug/L	1.45 mg/kg
magnesium	49.6 ug/L	248 ug/L	24.8 mg/kg
manganese	8.3 ug/L	41.5 ug/L	4.15 mg/kg
nickel	1.3 ug/L	6.5 ug/L	0.65 mg/kg
potassium	124.8 ug/L	624 ug/L	NA
potassium(2)	12.838 mg/kg	NA	64.19 mg/kg
sodium	377.4 ug/L	1887 ug/L	188.7 mg/kg
thallium	4.3 ug/L	21.5 ug/L	2.15 mg/kg
vanadium	3.0 ug/L	15.0 ug/L	1.5 mg/kg
zinc(2)	1.375 mg/kg	NA	6.875 mg/kg

Samples affected: All

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, cadmium, copper, manganese, nickel, potassium, vanadium and zinc 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 percent recovery for lead affecting the aqueous matrix was < 30% quality control limit. The nondetected results reported for lead were qualified as rejected, "UR".

Notes – None.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory / preparation blanks.

Other Factors Affecting Data Quality: The MS %R for lead affecting the aqueous matrix was < 30% 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 U07629

TABLE 1 - RECOMMENDATION SUMMARY

aluminum	A[1]		nickel	A[1]
antimony	A[1]		potassium	A[1]
arsenic			selenium	
barium			silver	
beryllium	A[1]		sodium	
cadmium	A[1]		thallium	
calcium			vanadium	A[1]
chromium			zinc	A[1]
cobalt				
copper	A[1]		pH	
iron			cyanide	
lead		R[1]	hexavalent chromium	
magnesium			TOC	
manganese	A[1]			
mercury				

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.

R[1] - Reject nondetected results, "UR", as a result of extremely low MS %R.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

TO: MR. DAVID BRAYACK

DATE: NOVEMBER 3, 1998

FROM: LINDA KARSONOVICH

COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION- VOA/SVOA/PAH/PEST/PCB
PARRIS ISLAND
SDG U07629

SAMPLES: 7/Aqueous/

PAI-02-SW-001-00
PAI-02-SW-002-00
PAI-02-SW-003-00
PAI-02-SW-004-00
TB-072298
TB-072398
TB-072498

11/Solid/

PAI-02-SB-001-00
PAI-02-SD-001-01
PAI-02-SD-002-01
PAI-02-SD-002-02
PAI-02-SD-003-01
PAI-02-SD-004-01
PAI-02-SS-002-01
PAI-02-SS-003-01
PAI-02-SS-004-01
PAI-02-SS-005-01
PAI-02-SS-007-01

OVERVIEW

The sample set for Parris Island, SDG U07629 consists of three (3) aqueous field quality control blanks, four (4) aqueous environmental samples, 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, polynuclear aromatic hydrocarbons (PAH), organochlorine pesticides, and polychlorinated biphenyls (PCBs).

The samples were collected by Tetra Tech NUS on July 22-24th, 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
- 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 and 2-butanone. Nondetected results were qualified as rejected, UR, in the aqueous samples.

Continuing calibration RRFs fell below the 0.05 quality control limit for 2-hexanone and 4-methyl-2-pentanone. Nondetected results were qualified as rejected, UR, in sample TB-072498.

Initial and/or continuing calibration RRFs fell below the 0.05 quality control limit for acetone. Nondetected results for were qualified as rejected, UR, and positive results were qualified as estimated, J, 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	34 µg/Kg	340 µg/Kg
Methylene chloride	3 µg/Kg	30 µg/Kg
Methylene chloride*	0.7 µg/L	7 µg/L and 7 µg/Kg

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.

Semivolatile

Surrogate recovery for nitrobenzene-d5 and 2-fluorobiphenyl fell below the lower quality control limit in sample PAI-02-SD-002-02. Nondetected base/neutral results were qualified as estimated, UJ.

Polynuclear Aromatic Hydrocarbons

Surrogate recovery fell below 10% in sample PAI-SD-003-01. Nondetected results were qualified as rejected, UR.

Samples required dilutions of 2X to 5X due to matrix interference. This accounts for the elevated detection limits reported for some samples.

Pesticides

Several samples were analyzed at a 10X dilution due to matrix interferences. This accounts for the elevated reporting limits.

PCBs

All 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.

Numerous transcription errors were noted on the electronic data. Corrections were made by the reviewer.

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 10% for one sample in the PAH fraction. Methylene chloride and acetone were detected in the field and laboratory method blanks.

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

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

PARRIS ISLAND

SDG U07629

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA			SVOA	PAH	PEST	PCB
PAI-02-SW-001-00		R^{2}	$J^{1,2}$		J^{2}		
PAI-02-SW-002-00		R^{2}	$J^{1,2}$				
PAI-02-SW-003-00		$R^{1,2}$				J^{2}	
PAI-02-SW-004-00		$R^{1,2}$					
TB-072298		$R^{1,2}$					
TB-072398		$R^{1,2}$					
TB-072498		$R^{1,2,3,4}$					
PAI-02-SB-001-00	A^{2}	R^{1}			J^{2}		
PAI-02-SD-001-01		R^{1}					
PAI-02-SD-002-01		R^{1}					
PAI-02-SD-002-02	A^{1}			J^{3}	J^{2}		
PAI-02-SD-003-01	A^{2}	R^{1}	J^{2}		R^{5}		
PAI-02-SD-004-01	A^{2}	R^{1}	J^{2}		J^{2}		
PAI-02-SS-002-01	$A^{1,2}$		J^{2}		J^{2}		
PAI-02-SS-003-01	$A^{1,2}$		J^{2}		J^{2}		
PAI-02-SS-004-01	$A^{1,2}$				J^{2}		
PAI-02-SS-005-01	$A^{1,2}$						
PAI-02-SS-007-01	$A^{1,2}$		J^{2}		J^{2}		

If the field is left blank, the qualifier is A - Accept all data.

A^{1} - Accept data, but qualify positive results for acetone as nondetected, U, due to blank contamination.

A^{2} - Accept data, but qualify positive results for methylene chloride as nondetected, U, due to blank contamination.

R^{1} - Reject data, qualify nondetected results for acetone as rejected, UR, due to initial and/or continuing calibration RRFs less than 0.05.

R^{2} - Reject data, qualify nondetected results for 2-butanone as rejected, UR, due to initial and/or continuing calibration RRFs less than 0.05.

R^{3} - Reject data, qualify nondetected results for 2-hexanone as rejected, UR, due to initial and/or continuing calibration RRFs less than 0.05.

R^{4} - Reject data, qualify nondetected results for 4-methyl-2-pentanone as rejected, UR, due to initial and/or continuing calibration RRFs less than 0.05.

R^{5} - Reject data, qualify nondetected results as rejected, UR, due to surrogate recovery less than 10%.

J^{1} - Accept data, but qualify positive results for acetone as estimated, J, due to initial and/or continuing calibration RRFs less than 0.05.

J^2 - Accept data, but qualify positive results below the CRQL as estimated, J, due to uncertainty near the detection limit.

J^3 - Accept data, but qualify nondetected results as estimated, UJ, due to surrogate recovery below the quality control limit.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

TO:	**MR. DAVID BRAYACK**	**DATES:**	**NOVEMBER 4, 1998**
FROM:	**L.W.SUMANSKY**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB/HERBICIDES**
PARRIS ISLAND
SDG TTP18

SAMPLES: 2/ Aqueous

PAI – 02 – GW – 002 – 01
PAI – 02 – GW – 005 – 01

1/ Aqueous Trip Blank
TB – 091598

OVERVIEW

The sample set for Parris Island, SDG TTP18 consists of two (2) aqueous environmental samples and one (1) trip blank. All samples were analyzed for Appendix IX volatile organic and semivolatile organic compounds, pesticides, polychlorinated biphenyls (PCBs) and herbicides. The samples were collected on September 18, 1998. Analyses were performed by Laucks Testing Laboratories, Seattle, Wash. All analyses were conducted using SW – 846, Methods 8260B, 8270 C, 8081A/8082, 8151A, and 8015B analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

- * Holding times
- Data completeness
- Laboratory blank analysis
- 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
The Trip Blank was not analyzed for acetonitrile, propionitrile, isobutyl alcohol and 1,4– dioxane.
The following contaminants were detected in the Trip Blank at the maximum concentrations shown:

Samples Affected: All

Analyte	Maximum Concentration	Action Level Aqueous
Chloromethane	0.3 ug/L	1.5 ug/L
Methylene chloride	3.1 ug/L	31.0 ug/L

An action level of 10X the maximum contaminant level has been used to evaluate sample data for blank contamination of methylene chloride , a common laboratory contaminant. An action level of 5x was used for chloromethane for evaluating the sample data. Positive results less than the action level for chloromethane and methylene chloride have been qualified as "U", nondetected. Sample aliquot size and dilution factors were taken into consideration when evaluating for blank contamination.

The initial and/or continuing calibration relative response factors (RRFs) fell below the 0.05 quality control limit for acetone, 2– butanone, 2– hexanone, acrolein, acrylonitrile , methacrylonitrile and methyl methacrylate. Nondetected results were qualified as rejected, "UR". Positive results in the trip blanks were qualified "J", estimated .

A transcription error was noted between the Form 1 and the electronic data. The Form 1 was amended by the reviewer to match the electronic data.

Semivolatile

The initial and/or continuing relative response factor, (RRF), fell below the 0.05 quality control limit for 4– nitroquinoline– 1– oxide. Nondetected results were qualified as rejected"UR".

Pesticides/PCBs

All data quality parameters were met for these fractions

Herbicides

All data quality parameters were met for this fraction.

EXECUTIVE SUMMARY

In the volatile compounds fraction, chloromethane and methylene chloride were found in the Trip Blank. Acetone, 2– butanone, 2– hexanone, acrolein, acrylonitrile, methacrylonitrile and methyl methacrylate failed to meet the 0.05 RRF quality control limit.

In the semi – volatile fraction, 4– nitroquinoline– 1– oxide failed to meet the 0.05 RRF quality control limit.

Other Factors Affecting Data Quality: None

R^1–Reject data; qualify nondetected results for acetone, 2– butanone, 2– hexanone, acrolein, meth–acrylonitrile, and methyl methacrylate as rejected "UR", due to initial and/or continuing calibration RRFs below 0.05 quality control limits.

R^2 – Reject data; qualify nondetects for 4– nitroquinoline – 1– oxide as rejected a result of initial and/or continuing calibration RRF's below 0.05 quality control limits.

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:	D. BRAYACK	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

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.

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

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).

D-60

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.

D-65

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-11-08-037

TO:	D. BRAYACK	DATE:	NOVEMBER 23, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS, DISSOLVED TAL METALS AND MISCELLANOUS PARAMETERS
CTO 020 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – TTP12

SAMPLES: 6/ Aqueous /

PAI-02-GW-002-01	PAI-02-GW-002-01-F
PAI-02-GW-004-01	PAI-02-GW-004-01-F
PAI-02-GW-005-01	PAI-02-GW-005-01-F

Overview

The sample set for CTO 020, MCRD Parris, SDG TTP12, consists of six (6) 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. Samples PAI-02-GW-002-01, PAI-02-GW-004-01 and PAI-02-SW-005-01 were analyzed for Chloride, Cyanide, Fluoride, Hardness, Hexavalent Chromium, Nitrate/Nitrite, Sulfate, Total Dissolved Solids (TDS), Total Organic Carbon (TOC) and Total Suspended Solids (TSS). The samples were collected by Tetra Tech NUS on August 19, 20 and 24, 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. Hexavalent Chromium analyses were conducted using SW846 method 7196.

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

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- 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

A Initial Calibration Verification (ICV) Percent Recovery (%R) for Hexavalent Chromium analyses affecting sample PAI-02-GW-002- was <90% quality control limit. The nondetected result reported for Hexavalent Chromium in the affected sample was qualified as estimated, "UJ".

The ICV %R for Nitrate/Nitrite analyses was >110% quality control limit. The positive results reported for Nitrate/Nitrite analyses 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)
Aluminum	26.0µg/L	130µg/L
Barium	2.0µg/L	10.0µg/L
Calcium	28.4µg/L	142µg/L
Chromium	8.9µg/L	44.5µg/L
Magnesium	29.3µg/L	146.5µg/L
Selenium	0.8µg/L	4.0µg/L
Vanadium	4.2µg/L	21.0µg/L
Nitrate/Nitrite	0.02mg/L	0.10mg/L
TDS(1)	3.0µg/L	15 mg/L

(1) - Maximum concentration present in a 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 were determining blank contamination. Positive results < the action level for aluminum, chromium, vanadium and Nitrate/Nitrite 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 Contract Required Detection Limit (CRDL) Percent Recovery (%R) for silver was outside the 80-120% quality control limit. However, no validation actions were required per Regional guidance.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. A ICV for Hexavalent Chromium analyses was <90% quality control limit. The ICV for Nitrate/Nitrite analyses was >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 Island
SDG TTP12

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A[1]	Magnesium		
Antimony		Selenium		
Arsenic		Silver		
Barium		Sodium		
Beryllium		Thallium		
Cadmium		Vanadium	A[1]	
Calcium		Zinc		
Chromium	A[1]	Chloride		
Cobalt		Fluoride		
Copper		Hardness		
Cyanide		Nitrate/Nitrite	A[1]	J[1]
Iron		Sulfate		
Lead		TDS		
Magnesium		TOC		
Manganese		TSS		
Mercury		Hexavalent Chromium		J[1]
Nickel				

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 calibration noncompliance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-08-038

TO:	D. BRAYACK	DATE:	NOVEMBER 23, 1998
FROM:	GRETCHEN PHIPPS	COPIES:	DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TIN
CTO 020 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – TTP18

SAMPLES: 2 / Aqueous /

PAI-02-GW-002-01 PAI-02-GW-005-01

Overview

The sample set for CTO 020, MCRD Parris Island, SDG TTP18, consists of two (2) aqueous environmental samples.

All samples were analyzed for tin. The samples were collected by Tetra Tech NUS on September 15, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Tin analyses were conducted using SW 846 method 7870. Tin analyses were conducted on a Flame 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

The Initial Calibration Verification (ICV) Percent Recovery (%R) for tin was <90% quality control limit. The nondetected results reported for tin were qualified as estimated, "UJ".

Notes

The reporting limit used by Laucks Testing Laboratories for tin ran on a Flame AA is 1000µg/L.

Executive Summary

Laboratory Performance: The ICV for tin 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 TTP18

Table 1 - RECOMMENDATION SUMMARY

Tin	A[1]

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify nondetected results as estimated, "UJ", as a result of calibration noncompliances.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-09-8-106

TO:	**D. BRAYACK**	**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:

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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 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**

PITT-09-8-101

TO:	**D. BRAYACK**	**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-09-8-089

TO:	**D. BRAYACK**	**DATE:**	**DECEMBER 8, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS, DISSOLVED TAL METALS, AND CYANIDE**
CTO 020 - MCRD PARRIS ISLAND
SDG - U07662

SAMPLES: 4/Aqueous/

PAI-02-SW-001-00	PAI-02-SW-001-00-F
PAI-02-SW-004-00	PAI-02-SW-004-00-F

Overview

The sample set for CTO 020 MCRD Parris Island, SDG U07662, consists of four (4) aqueous environmental samples.

All samples, with the exception of those designated -F, were analyzed for Target Analyte List (TAL) metals. The samples designated -F were analyzed for dissolved TAL metals. Sample PAI-02-SW-004-00 was analyzed for Cyanide. 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 mercury, were conducted according to SW-846 Method 6010A. 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 mercury were conducted using the Inductively Coupled Plasma (ICP) methodologies. 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:

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Calibration Verifications

Continuing Calibration Verification (CCV) Percent Recoveries (%R's) for cadmium and calcium affecting all samples were <90% quality control limit. The nondetected results reported for cadmium were qualified as estimated, "UJ". The positive results reported for calcium 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: All

Analyte	Maximum Concentration	Action Level (Aqueous)
aluminum	128.3µg/L	641.5µg/L
barium	1.3µg/L	6.5µg/L
beryllium[1]	1.540µg/L	7.7µg/L
cadmium	0.4µg/L	2µg/L
calcium	62.1µg/L	310.5µg/L
iron[1]	42.650µg/L	213.25µg/L
lead	29µg/L	145µg/L
magnesium	49.6µg/L	248µg/L
manganese	2.4µg/L	12µg/L
nickel	1.3µg/L	6.5µg/L
potassium	122.1µg/L	610.5µg/L
sodium	377.4µg/L	1887µg/L
vanadium	3.0µg/L	15.0µg/L
thallium	4.3µg/L	21.5µg/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. Sample aliquot and dilution factors were taken into account when determining blank contamination. Positive results < the action level for aluminum, cadmium, manganese, nickel and vanadium 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

CCV %R's for cobalt, potassium and sodium were outside the 90-110% quality control limit. However, no validation was required as these CCV did not affect the samples in this SDG .

The Contract Required Detection Limits (CRDL) Percent Recoveries (%Rs) for beryllium and iron were outside the 80-120% quality control limit. However, no validation actions were required per regional guidance.

MCRD Parris Island
SDG U07662

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A[1]		Magnesium	
Antimony			Manganese	A[1]
Arsenic			Mercury	
Barium			Nickel	A[1]
Beryllium			Potassium	
Cadmium	A[1]	J[1]	Selenium	
Calcium		J[1]	Silver	
Chromium			Sodium	
Cobalt			Thallium	
Copper			Vanadium	A[1]
Iron			Zinc	
Lead			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 positive and nondetected results as estimated, "J" and "UJ", respectively, due to calibration verification noncompliance.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-11-8-030

TO:	**DAVE BRAYACK**	**DATE:**	**DECEMBER 10, 1998**
FROM:	**JUSTIN ORBICH**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB**
CTO 020, MCRD PARRIS ISLAND
SDG TTP12

SAMPLES: 5/Aqueous

PAI-02-GW-002-01	PAI-02-GW-004-01
PAI-02-GW-005-01	TB980819
TB980825	

OVERVIEW

The sample set for CTO 020, SDG TTP12, MCRD Parris Island consists of five (5) aqueous environmental samples, which includes two (2) trip blanks (designated TB). 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. There were no field duplicate pairs in this SDG.

The samples were collected on August 19, 20, and 24, 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.

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 continuing calibration analysis 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).

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
Methylene chloride[1]	3.4µg/L	34.0µg/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.

Sample aliquots and dilution factors were taken into consideration during the application of all action levels. No action was warranted due to the nondetected results. It should be noted that field quality control blanks were not qualified for field control blank contamination.

SEMI-VOLATILE FRACTION

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 3**

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)..

Other Issues Affecting Data Quality: Methylene chloride was detected as blank contamination in the field quality control blank.

MEMO TO: **DAVE BRAYACK**
DATE: **DECEMBER 10, 1998 – PAGE 4**

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 5**

MCRD PARRIS ISLAND
SDG TTP12

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PEST/PCB
PAI-02-GW-002-01	R^1	J^1	
PAI-02-GW-004-01	J^2 R^1	J^1	
PAI-02-GW-005-01	J^2 R^1	J^1	
TB980819	R^1		
TB980825	R^1		

If the field is blank, the qualifier is A, accept all data.

R^1 - Reject, (UR), nondetected results for initial and continuing calibration RRFs less than 0.05 for acetone, 2-butanone, 2-hexanone, and 4-methyl-2-pentanone.

J^1 - Accept data, but qualify those compounds with positive results less than the CRQL as estimated (J).

J^2 - Accept data, but qualify as estimated, (J), positive results for initial and continuing calibration RRFs less than 0.05 for acetone.

MEMO TO: **DAVE BRAYACK**
DATE: **DECEMBER 10, 1998 – PAGE 6**

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-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.

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**

PITT09-8-059

TO:	**D. BRAYACK**	**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

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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

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.

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

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

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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-01-9-181

TO:	**D. BRAYACK**	**DATE:**	**MARCH 5, 1999**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS**
CTO 009 - PARRIS ISLAND
SDG - 55680

SAMPLES: 10/Soils/

PI-012-01(35)	PI-012-02(36)	PI-012-03(37)
PI-013-02(39)	PI-014-03(42)	PI-015A-01(43)
PI-015B-01(44)	PI-021-01(45)	PI-027-01(46)
PI-027-02(47)		

1/Aqueous/

PI-R03-121495

Overview

The sample set for CTO 009, Parris Island, SDG 55680, consists of ten (10) soil environmental samples and one (1) rinsate blank (PI-R03-121495).

The samples were analyzed for Target Analyte List (TAL) metals and cyanide. The samples were collected by Tetra Tech NUS on December 13 and 14, 1995 and analyzed by Inchape Testing Service Environmental Laboratories. Metals analyses were conducted using ILM03.0 methodologies.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
• Laboratory / Rinsate 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 / Rinsate Blank Analyses:

The following contaminants were found in the laboratory / rinsate 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 entitles "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 Control Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Parris Island
SDG 55680

Table 1 - RECOMMENDATION SUMMARY

Aluminum	
Antimony	
Arsenic	
Barium	
Beryllium	A[1]
Cadmium	
Calcium	
Chromium	
Cobalt	
Copper	
Cyanide	
Iron	
Lead	
Magnesium	
Manganese	
Mercury	A[1]
Nickel	
Potassium	
Selenium	
Silver	
Sodium	
Thallium	
Vanadium	
Zinc	

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify result less than the blank action level as nondetected, "U".

PITT-11-8-065

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-02-9-043

TO: D. BRAYACK

DATE: APRIL 13, 1999

FROM: DANA PIETO

CC: DV FILE
REVISION I

SUBJECT: ORGANIC DATA VALIDATION – TCL VOAs, SVOAs, & PEST/PCBs
CTO 084, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG 55680

SAMPLES: Soils\VOC\SVOC\PEST\PCB:

PI-012-01(35)	PI-012-02(36)	PI-012-03(37)
PI-013-02(39)	PI-014-03(42)	PI-015A-01(43)
PI-015B-01(44)	PI-021-01(45)	PI-027-01(46)
PI-027-02(47)		

Waters\VOC:

PI-R03-121495 PI-T03-121495

Waters\SVOC\PEST\PCB:

PI-R03-121495

The sample set for the CTO 084, MCRD Parris Island, South Carolina, SDG 55680, consists of ten soil environmental samples, one rinse blank (designated R), and one trip blank (designated T). The environmental samples and the rinse blank were analyzed for Target Compound List (TCL) volatile, semivolatile, and pesticide/PCB organic compounds. The trip blank was analyzed for TCL volatile organic compounds only.

The samples were collected by Tetra Tech NUS on December 13 and 14, 1995, and analyzed by Inchcape Testing Services. The volatile, semivolatile, and pesticide/PCB compounds were analyzed under Naval Facilities Engineering Service Center (NFESC). All sample analyses were conducted using the Contract Laboratory Program (CLP) Statement of work (SOW) OLM03.0 analytical and reporting protocols.

The data were evaluated according to the following parameters:

* • Holding times

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MEMO TO: D. BRAYACK
DATE: APRIL 13, 1999

* • Initial and continuing calibrations
• Laboratory and field blank analyses
* • Quantitative results

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below.

Volatiles

All positive results reported at concentrations less than the Contract Required Quantitation Limit (CRQL) were qualified as estimated, (J).

The following volatile compounds were detected in the laboratory method and/or field quality control blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level	Soil Action Level
Acetone	3.0 µg/L	30 µg/L	—
Acetone	10 µg/kg	—	100 µg/kg
2-Butanone*	2.0 µg/L	—	20 µg/kg

*Maximum concentration found in the field quality control blank.

Samples Affected: All.

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for acetone and 2-butanone reported at concentrations below the detection limit were replaced with revised detection limits and qualified as nondetects, (U). Positive results for acetone reported at concentrations above the detection limit were qualified as nondetects, (U). It should be noted that field quality control blanks are not qualified for field quality control blank contamination.

Semivolatiles

All positive results reported at concentrations less than the CRQL were qualified as estimated, (J).

The following semivolatile compounds were detected in the laboratory method blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level	Solid Action Level
Bis(2-ethylhexyl)phthalate	120 µg/kg	—	1200 µg/kg
Di-n-butylphthalate	80 µg/kg	—	800 µg/kg

MEMO TO: D. BRAYACK
DATE: APRIL 13, 1999

Samples Affected: All

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for bis(2-ethylhexyl)phthalate and di-n-butylphthalate reported at concentrations below the detection limit were replaced with the revised detection limits and qualified as nondetects, (U). Positive results for bis(2-ethylhexyl)phthalate and di-n-butylphthalate reported at concentrations above the detection limit were qualified as nondetects, (U).

It should be noted that for purposes of quantitation, it was not possible for the laboratory to chromatographically separate benzo[b] and benzo[k] fluoranthene in samples PI-012-03(37), PI-021-01(45), PI-027-01(46), and PI-027-02(47). Therefore, the analytical results are reported as benzo[b]fluoranthene.

Sample PI-012-01(35) was analyzed at a 3.3x dilution.

Sample PI-012-03(37) was analyzed at a 1.2x dilution.

Sample PI-014-03(42) was analyzed at a 10x dilution.

Pesticides

All positive results reported at concentrations less than the CRQL were qualified as estimated, (J).

The following pesticide/PCB compounds were detected in the laboratory method and/or instrument blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Solid Action Level
Endosulfan I[1]	0.092 µg/L	15.3 µg/kg
alpha-Chlordane[1]	0.084 µg/L	13.986 µg/kg
beta-BHC[1]	0.20 µg/L	33.3 µg/kg
Endosulfan II[1]	0.14 µg/L	23.31 µg/kg
Endosulfan sulfate[1]	0.071 µg/L	11.82 µg/kg
4,4'-DDE[1]	0.084 µg/L	13.986 µg/kg
Heptachlor epoxide[1]	0.046 µg/L	7.59 µg/kg
gamma-Chlordane[1]	0.097 µg/L	16.15 µg/kg
4,4'-DDD[1]	0.16 µg/L	26.64 µg/kg
Endrin aldehyde[1]	0.24 µg/L	39.96 µg/kg

[1]Maximum concentration found in the instrument blank.

Samples Affected: All

Sample aliquot, dilution factors, and percent solids were taken into consideration during the application of the action level. Positive results for Endosulfan I, alpha-Chlordane, beta-BHC, gamma-Chlordane, and 4,4'-DDD reported at concentrations below the detection limit were replaced

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with the revised detection limits and qualified as nondetects, (U). Positive results for Endosulfan I, alpha-Chlordane, beta-BHC, 4,4'-DDE, gamma-Chlordane, and 4,4'-DDD reported at concentrations above the detection limit were qualified as nondetects, (U).

The laboratory states that Aroclor 1262 was identified in the pesticide/PCB method blank, yet the results were reported as Aroclor 1260. No action is warranted for this noncompliance because the associated samples did not contain any positive results.

The surrogate percent recovery (%R) fell below 10% for tetrachloro-m-xylene and decachlorobiphenyl on both columns in sample PI-014-03(42). The sample was reanalyzed and the surrogates fell below the lower quality control limit, however they were greater than 10%, so the reanalysis was used for validation purposes. The reanalyzed sample was extracted outside of holding time, therefore, nondetected results were qualified as estimated, (UJ).

The identification summary percent difference (%D) between columns exceeded 100% for 4,4'-DDT and Dieldrin and exceeded the 25% quality control limit for Endrin in sample PI-012-01(35). Positive results for 4,4'-DDT and Dieldrin were rejected (R). Positive results for Endrin were qualified as estimated, (J).

The identification summary %D exceeded 100% for Heptachlor in sample PI-012-03(37). Positive results were rejected, (R).

Aroclor 1254 exceeded the linear calibration range of the instrument in sample PI-012-01-(35). This sample was diluted 50-fold and reanalyzed. The dilution result for this compound only was transposed over to the original sample results and used in validation of this SDG.

Sample PI-012-01(35) was analyzed at a 15x dilution.

Sample PI-027-01(46) was analyzed at a 10x dilution.

Executive Summary

Laboratory Performance: The pesticide surrogate %R fell below 10% for tetrachloro-m-xylene and decachlorobiphenyl on both columns in sample PI-014-03(42). The pesticide identification summary exceeded 100% for 4,4'-DDT, Dieldrin, and Heptachlor and exceeded the 25% quality control limit for Endrin. Acetone was detected in the volatile laboratory method blanks. Bis(2-ethylhexyl)phthalate and di-n-butylphthalate were detected in the semivolatile laboratory method blanks. Aroclor 1260 was detected in the pesticide/PCB laboratory method blanks. Endosulfan I, alpha-Chlordane, beta-BHC, Endosulfan II, Endosulfan sulfate, 4,4'-DDE, Heptachlor epoxide, gamma-Chlordane, 4,4'-DDD, and Endrin aldehyde were detected in the pesticide/PCB instrument blanks.

Other Factors Affecting Data Quality: 2-Butanone was detected in the volatile field quality control blanks.

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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

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.
UJ	-	Nondetected result is considered to be estimated as a result of technical noncompliances.
R	-	Positive value is rejected as a result of a technical noncompliance.

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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-11-9-086

TO:	**D. BRAYACK**	**DATE:**	**NOVEMBER 19, 1999**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOLATILES, SEMIVOLATILES, PESTICIDES/PCBS AND PAHS**
CTO 020 - MCRD PARRIS ISLAND
SDG – U10244

SAMPLES: 5/Soil/

PAI-02-SB-02A-02 PAI-02-SB-10-07
PAI-02-SB-11-02 PAI-13C-SS-03-01
PAI-13C-SS-DU03-01

3/Sediment/

PAI-05-SD-03-01 PAI-21-SD-02-01
PAI-21-SD-DU02

2/Aqueous/

TB-100599 TB-100699

Overview

The sample set for CTO 020, Parris Island, SDG U10244, consists of eight (8) soil/sediment environmental samples and two (2) rinsate blanks (TB-100599 and TB-100699). Two (2) field duplicate pairs (PAI-13C-SS-03-01 / PAI-13C-SS-DU03-01 and PAI-21-SD-02-01 / PAI-21-SD-DU02) were included within this SDG.

All samples, with exception to samples PAI-21-SD-02-01and PAI-21-SD-DU02 were analyzed for target compound list (TCL) volatile organics. All soil/sediment samples, with exception to sample PAI-21-SD-DU02, were analyzed for TCL semivolatile organics. All soil samples were analyzed for pesticides and PCBs. Samples PAI-21-SD-02-01 and PAI-21-SD-DU02 were analyzed for polynuclear aromatic hydrocarbons (PAHs). The samples were collected by Tetra Tech NUS on October 5 and 6, 1999 and analyzed by Severn Trent Laboratories Chicago. Volatile analyses were conducted using SW 846 method 8260B. Semivolatile analyses were conducted using SW 846 method 8270C. Pesticide analyses were conducted using SW 846 method 8081A. PCB analyses were conducted using SW 846 method 8082. PAH analyses were conducted using SW 846 method 8310.

The data was evaluated based on the following parameters:

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* • Data Completeness
* • Holding Times
  • Initial/Continuing Calibrations
  • Laboratory Method / Field Quality Control Blanks
  • Field Duplicate Results
* • Internal Standard Results
* • Detection Limits

* - All quality control criteria were met for this parameter.

Initial/Continuing Calibrations

The initial calibrations RRFs for acetone and 2-butanone affecting the soil/sediment samples were <0.05. The nondetected results reported for acetone and 2-butanone in the affected samples were qualified as rejected, "UR".

The initial calibrations RRFs for acetone, 2-butanone and 2-hexanone affecting the aqueous samples were <0.05. The nondetected results reported for acetone, 2-butanone and 2-hexanone were qualified as rejected, "UR".

Field Quality Control Blanks

1,2-Dichloroethene was present in TB-100599 at a concentration of 0.6µg/L. However, all results reported for 1,2-dichloroethene were nondetected. Therefore, no validation action was required.

Field Duplicate Results

Field duplicate imprecision (>50%) was noted for 4,4-DDT in field duplicate pair PAI-13C-SS-03-01 / PAI-13C-SS-DU03-01. The positive and nondetected results reported for 4,4-DDT in the affected duplicate pair were qualified as estimated, "J" and "UJ", respectively.

Field duplicate imprecision (>50%) was noted for acenaphthene, benzo(b)flouranthene and pyrene in field duplicate pair PAI-21-SD-02-01 / PAI-21-SD-DU02. The positive results reported for the above listed compounds in the affected duplicate pair were qualified as estimated, "J".

Notes

1,4-Dioxane was not requested for analysis. However, the laboratory reported 1,4-dioxane on the Form 1. It was removed from the electronic spreadsheets.

Several tentatively identified compounds (TICs) were reported with the semivolatile samples and blanks.

Pesticide analyses were conducted at a 10X dilution.

Methylene chloride was present in several samples. It was not detected in the blanks. The raw data for the blanks was reviewed and methylene chloride was not present. This compound was not qualified since it was not present in any method or field quality control blanks. However, it is suspected to be a laboratory contaminant.

The Percent Solids in sample PAI-05-SD-03-01 were <30%. Therefore, the reporting limits were elevated. The nondetected results reported for sample PAI-05-SD-03-01 were qualified as estimated, "UJ".

Samples 13C-SS-03-01 and 13-SS-DU03-01 were reanalyzed due to low internal standard recoveries. The reanalyses also had low internal standard recoveries. The original sample results were used for validation purposes for sample 13SS-DU03-01. The reanalyzed sample results were used for validation purposes for sample 13-SS-03-001 due to the presence of methylene chloride in the original sample results.

Positive results less than the contract required quanitation limits (CRQLs) were qualified as estimated, "J".

Executive Summary

Laboratory Performance: RRFs for acetone, 2-butanone and 2-hexanone were <0.05.

Other Factors Affecting Data Quality: Field duplicate imprecision was noted for several compounds.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Organic Review", February 1994 and the NFESC document entitles "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 Control Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX E

SUPPORTING INFORMATION FOR HUMAN HEALTH RISK ASSESSMENT

E.1 Sample Calculations
E.2 RAGS Part D Tables
E.3 Supporting Information
E.4 Toxicological Profiles for Chemicals of Concern
E.5 Screening Levels for Essential Nutrients
E.6 COPC Screening Using EPA Region IX PRGs

APPENDIX E.1

SAMPLE CALCULATIONS

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: March 24, 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:

If $t_{event} < t^*$, then: $DA_{event} = (2K_p)(C_{sw})(CF)\left(\sqrt{\frac{6\tau t_{event}}{\pi}}\right)$

If $t_{event} > t^*$, then: $DA_{event} = (K_p)(C_{sw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B}{1+B}\right)\right)$

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:		DATE: March 24, 1999

EXAMPLE CALCULATION OF DAevent for Chloroform

ASSUMPTIONS:

Kp = 8.9E-03 cm/hr
Cw = 2.9E-3 mg/L
tevent = 8 hr/event
CF = 1.0E-03 L/cm^3
τ = 4.7E-01 hour/event
t* = 1.1 hour/event
B = 9.3E-03

If $t_{event} < t^*$, then : $DA_{event} = (2\,K_p)\,(C_{sw})\,(CF)\left(\sqrt{\frac{6\,\tau\,t_{event}}{\pi}}\right)$

If $t_{event} > t^*$, then: $DA_{event} = (K_p)(C_{sw})(CF)\left(\frac{t_{event}}{1+B} + 2\,\tau\left(\frac{1+3\,B}{1+B}\right)\right)$

tevent > t*, therefore,

DAevent = (8.9E-03 cm/hr)(2.9E-03 mg/L)(1E-03 L/cm^3) x
8 hours/(1 + 9.3E-03) + 2(4.7E-01)(1 + 3 x 9.3E-3)/(1 + 9.3E-03)

DAevent = 2.29E-7 mg/cm^2-event

RISK CALCULATIONS

ASSUMPTIONS:

A = 2,490 cm^2/day
EV = 1 event/day
ED = 1 years
EF = 250 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: T. Jupin		DATE: March 24, 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 $(mg/kg\text{-}day)^{-1}$

$$DADc = \frac{2.29E\text{-}07\ mg/cm^2\text{-event} \times 2{,}490\ cm^2 \times 1\ event/day \times 250\ days/year \times 1\ years}{70\ kg \times 25{,}550\ days}$$

DADc = 7.98E-8 mg/kg-day

Cancer Risk (ILCR) = 7.98E-8 mg/kg-day x 3.1E-02 $(mg/kg\text{-}day)^{-1}$

ILCR = 2.5E-9

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)

$$DADnc = \frac{2.29E\text{-}09\ mg/cm^2\text{-event} \times 2{,}490\ cm^2 \times 1\ event/day \times 250\ days/year \times 1years}{70\ kg \times 365\ days}$$

DADnc = 5.59E-06 mg/kg-day

Hazard Quotient (HQ) = 5.59E-06 mg/kg-day / 2.0E-03 mg/kg-day

HQ = 2.8E-03

CALCULATION WORKSHEET

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	**CHECKED BY:** T-Jupin		**DATE:** March 24, 1999

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface water by a construction worker.

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	=	77 ug/L (bis(2-ethylhexyl)phthalate)
CRsw	=	0.01 L/day
CF	=	0.001 mg/ug
ET	=	8
EF	=	250 days/year
ED	=	1 years
BW	=	70 kg
ATc	=	25,550 days (70 x 365 days) - carcinogenic
ATnc	=	365 days (ED x 365 days) - noncarcinogenic
CSFo	=	1.4E-02 $(mg/kg\text{-}day)^{-1}$
RfDo	=	2.0E-02 mg/kg-day

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER CONSTRUCTION WORKER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY:		DATE: March 24, 1999

EXAMPLE CARCINOGENIC CALCULATION:

$$IEXc = \frac{77\ ug/L \times 0.001\ mg/ug \times 0.01\ L/hour \times 8\ hours/day\ 250\ days/year \times 1\ year}{70\ kg \times 25{,}550\ days}$$

IEXc = 8.61E-7 mg/kg-day

ILCR = 8.61E-7 mg/kg-day x 1.4E-02 $(mg/kg\text{-}day)^{-1}$ = Incremental Lifetime Cancer Risk

ILCR = 1.20E-8

EXAMPLE NONCARCINOGENIC CALCULATION:

$$IEXnc = \frac{77\ ug/L \times 0.001\ mg/ug \times 0.01\ L/hour \times 8\ hours/day\ 21\ days/year \times 1\ year}{70\ kg \times 365\ days}$$

IEXnc = 6.03E-5 mg/kg-day

HQ = 6.03 E-5 mg/kg-day / 2.0E-02 (mg/kg-day) = Hazard Quotient

HQ = 3.0E-03

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF CONTAMINATED SHELLFISH RECREATIONAL USER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: J. Jupin		DATE: April 15, 1999

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from ingestion of contaminated shellfish by a recreational user.

EQUATION:

IEX(mg/kg-day) = (Cf x IR x EF x ED x Fi x CF)/(BW x AT)

Where:

IEX	=	estimated exposure intake (mg/kg-day)
Cf	=	exposure point concentration in shellfish (mg/kg)
IR	=	fish 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:

Cf	=	0.0034 mg/kg (Benzo(a)pyrene equivalents for carcinogenic exposures)
Cf	=	1.6 mg/kg (Chromium VI for noncarcinogenic exposures)
IR	=	0.014 kg/meal
EF	=	240 days/year
ED	=	30 year
Fi	=	1.0
ATc	=	25,550 days (70 x 365 days) - carcinogenic
ATnc	=	2,190 days (ED x 365 days) - noncarcinogenic
CSFo	=	7.3E+00 $(mg/kg\text{-}day)^{-1}$ (Benzo(a)pyrene)
RfDo	=	3.0E-03 mg/kg-day (Chromium VI)

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		JOB NUMBER: 7394	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INGESTION OF CONTAMINATED FISH RECREATIONAL USER			
BASED ON: USEPA, DEC. 1989			
BY: R. Jupin	CHECKED BY: T. Jackson		DATE: April 15, 1999

EXAMPLE CARCINOGENIC CALCULATION:

$$IEXc = \frac{0.0034 \text{ mg/kg} \times 0.014 \text{ (kg/meal)} \times 240 \text{ meals/year} \times 30 \text{ year} \times 1.0}{70 \text{ kg} \times 25{,}550 \text{ days}}$$

IEXc = 1.9E-07 mg/kg-day

ILCR = 1.9E-07 mg/kg-day x 7.3E+00 $(\text{mg/kg-day})^{-1}$ = Incremental Lifetime Cancer Risk

ILCR = 1.4E-06

EXAMPLE NONCARCINOGENIC CALCULATION:

$$IEXnc = \frac{1.6 \text{ mg/kg} \times 0.014 \text{(kg/meal)} \times 240 \text{ meals/year} \times 30 \text{ year} \times 1.0}{70 \text{ kg} \times 10{,}950 \text{ days}}$$

IEXnc = 2.1E-04 mg/kg-day

HQ = 2.1E-04 mg/kg-day / 3.0E-03 (mg/kg-day) = Hazard Quotient

HQ = 7.0E-02

APPENDIX E.2

RAGS PART D TABLES

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
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 Sites 2 and 15.
				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 Sites 2 and 15.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Access to site is restricted
				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.
				Recreational User	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Recreational users do not have signifcant contact with surface soil at the site.
					Adult	Ingestion Dermal	On-Site On-Site	None None	Recreational users do not have signifcant contact with surface soil at the site.
	Air	Surface Soil	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 Sites 2 and 15.
				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 Sites 2 and 15.
				Trespassers	Adolescents	Inhalation	On-site	None	Access to base is restricted.
				Residents	Child	Inhalation	On-Site	Quant	Site may be residential in the future.
					Adult	Inhalation	On-Site	Quant	Site may be residential in the future.
				Recreational User	Adolescents	Inhalation	On-site	None	Recreational users do not have signifcant contact with surface soil at the site.
					Adult	Inhalation	On-site	None	Recreational users do not have signifcant contact with surface soil at the site.
	Subsurface Soil	Subsurface Soil	Subsurface Soil	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Construction workers may have contact with soil during excavation activities.
				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.
	Air	Subsurface Soil	Subsurface Soil	Construction Workers	Adult	Inhalation	On-site	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Residents	Child	Inhalation	On-Site	Quant	Site may be residential in the future.
					Adult	Inhalation	On-Site	Quant	Site may be residential in the future.

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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 base. Construction workers may contact groundwater during excavation activities.
				Full-time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	No full-time employees at Sites 2 and 15.
				Maintenance Workers	Adult	Ingestion Dermal	On-Site On-Site	None None	Groundwater is not used as a potable water supply at the base.
				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 base is restricted.
				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.
				Recreational User	Adolescents	Ingestion Dermal	On-Site On-Site	None None	Recreational users are not exposed to groundwater.
					Adult	Ingestion Dermal	On-Site On-Site	None None	Recreational users are not exposed to groundwater.
	Groundwater	Air	Shallow Aquifer	Construction Workers	Adult	Inhalation	On-site	None	Groundwater is not used as a potable water supply at the base.
				Full-time Employees	Adult	Inhalation	On-site	None	No full-time employees at Sites 2 and 15.
				Maintenance Workers	Adult	Inhalation	On-site	None	Groundwater is not used as a potable water supply at the Sites 2 and 15.
				Military Personnel	Adult	Inhalation	On-Site	None	Sites 2 and 15 is not used by military personnel.
				Trespassers	Adolescents	Inhalation	On-Site	None	Access to base is restricted.
				Residents	Child	Inhalation	On-Site	Quant	Site may be residential in the future.
					Adult	Inhalation	On-Site	Quant	Site may be residential in the future.
				Recreational User	Adolescents	Inhalation	On-Site	None	Recreational users are not exposed to groundwater.
					Adult	Inhalation	On-Site	None	Recreational users are not exposed to groundwater.
	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 Sites 2 and 15.
				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	None None	Access to base is restricted.

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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	Residents	Child	Ingestion	On-Site	Quant	Site may be residential in the future.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Site may be residential in the future.
						Dermal	On-Site	Quant	
				Recreational User	Adolescents	Ingestion	On-Site	None	Exposures to surface water will neglect exposures to sediment.
						Dermal	On-Site	None	
					Adult	Ingestion	On-Site	None	Exposures to surface water will neglect exposures to sediment.
						Dermal	On-Site	None	
	Surface Water	Surface Water	Surface Water	Construction Workers	Adult	Ingestion	On-Site	Quant	Construction workers may contact surface water during construction activities.
						Dermal	On-Site	Quant	
				Full-time Employees	Adult	Ingestion	On-Site	None	No full-time employees at Sites 2 and 15.
						Dermal	On-Site	None	
				Maintenance Workers	Adult	Ingestion	On-Site	None	Maintenance workers do not contact surface water.
						Dermal	On-Site	None	
				Military Personnel	Adult	Ingestion	On-Site	None	Site is not used by military personnel.
						Dermal	On-Site	None	
				Trespassers	Adolescents	Ingestion	On-Site	None	Access to base is restricted.
						Dermal	On-Site	None	
				Residents	Child	Ingestion	On-Site	Quant	Site may be residential in the future.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Site may be residential in the future.
						Dermal	On-Site	Quant	
				Recreational User	Adolescents	Ingestion	On-Site	Quant	Recreational users may contact surface water while wading.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Recreational users may contact surface water while wading.
						Dermal	On-Site	Quant	
	Surface Water	Surface Water	Fish	Recreational User	Adult	Ingestion	On-Site	Quant	Recreational user may harvest shellfish in off-site surface water.

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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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 Organic Compounds																
67-64-1	Acetone	0.018	J	0.17	J	mg/kg	PAI-02-SS-008-01	2/7	0.02 - 0.16	0.17	N/A	780	N	N/A	N/A	16	BSL
67-66-3	Chloroform	0.002	J	0.018		mg/kg	PAI-02-SS-004-01	6/8	0.007 - 0.008	0.018	N/A	100	C	N/A	N/A	0.6	BSL
108-88-3	Toluene	0.003	J	0.003	J	mg/kg	PAI-02-SS-001-01	1/8	0.006 - 0.008	0.003	N/A	1600	N	N/A	N/A	12	BSL
	Semivolatile Organic Compounds																
120-12-7	Anthracene	0.0013	J	0.0013		mg/kg	PAI-02-SS-002-01	1/8	0.0017 - 0.022	0.0013	N/A	2300	N	N/A	N/A	12000	BSL
205-99-2	Benzo(b)fluoranthene	0.0009		0.0023		mg/kg	PAI-02-SS-007-01	4/8	0.0017 - 0.022	0.0023	N/A	0.87	C	N/A	N/A	5	BSL
218-01-9	Chrysene	0.0029	J	0.0029	J	mg/kg	PAI-02-SS-007-01	1/8	0.0043 - 0.055	0.0029	N/A	87	C	N/A	N/A	160	BSL
206-44-0	Fluoranthene	0.0047	J	0.0077		mg/kg	PAI-02-SS-001-01	2/8	0.0043 - 0.055	0.0077	N/A	310	N	N/A	N/A	4300	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.0047	J	0.0047	J	mg/kg	PAI-02-SS-008-01	1/8	0.0043 - 0.055	0.0047	N/A	0.87	C	N/A	N/A	14	BSL
85-01-8	Phenanthrene	0.0032	J	0.041	J	mg/kg	PAI-02-SS-006-01	6/8	0.0036 - 0.0073	0.041	N/A	160 (7)	N	N/A	N/A	N/A	BSL
	Inorganics																
7429-90-5	Aluminum	1710		4290		mg/kg	PAI-02-SS-004-01	8/8	N/A	4290	7270	7800	N	N/A	N/A	N/A	BSL, BKG
7440-36-0	Antimony	0.17		0.17		mg/kg	PAI-02-SS-001-01	1/8	0.15 - 1.3	0.17	N/A	3.1	N	N/A	N/A	5	BSL
7440-38-2	Arsenic	0.18		1		mg/kg	PAI-02-SS-007-01	4/8	0.18 - 0.23	1	1.4	0.43	C	N/A	N/A	29	BKG
7440-39-3	Barium	4.4		12		mg/kg	PAI-02-SS-002-01	8/8	N/A	12	24	550	N	N/A	N/A	1600	BSL, BKG
7440-70-2	Calcium	53.1		477		mg/kg	PAI-02-SS-006-01	7/8	47.3	477	766	N/A		N/A	N/A	N/A	NUT, BKG
7440-47-3	Chromium VI	3.5		7.5		mg/kg	PAI-02-SS-007-01	8/8	N/A	7.5	6.2	23	N	N/A	N/A	38	BSL
7440-48-4	Cobalt	0.03		0.19		mg/kg	PAI-02-SS-004-01	5/8	0.04	0.19	0.36	470	N	N/A	N/A	N/A	BSL , BKG
7440-50-8	Copper	1.1		1.7		mg/kg	PAI-02-SS-005-01	2/8	0.36 - 0.75	1.7	1.5	310	N	N/A	N/A	N/A	BSL
7439-89-6	Iron	382		1930		mg/kg	PAI-02-SS-004-01	8/8	N/A	1930	3920	2300	N	N/A	N/A	N/A	BSL, BKG
7439-92-1	Lead	1.7		5.7		mg/kg	PAI-02-SS-004-01	5/8	2.6 - 5.2	5.7	12.5	400 (8)		N/A	N/A	N/A	BSL, BKG
7439-96-5	Magnesium	53.1		174		mg/kg	PAI-02-SS-004-01	5/8	63.7 - 236	174	515	N/A		N/A	N/A	N/A	NUT, BKG
7439-96-5	Manganese	2.6		58.1		mg/kg	PAI-02-SS-004-01	6/8	1.8 - 3.6	58.1	129	160	N	N/A	N/A	N/A	BSL, BKG
7487-94-7	Mercury	0.03		0.05		mg/kg	PAI-02-SS-006-01, PAI-02-SS-004-01, PAI-02-SS-001-01	5/8	0.02 - 0.03	0.05	0.11	2.3 (9)	N	N/A	N/A	2	BSL, BKG
7440-02-0	Nickel	1.2		1.2		mg/kg	PAI-02-SS-004-01	1/8	0.05 - 0.41	1.2	1.8	160	N	N/A	N/A	130	BSL, BKG
7440-09-7	Potassium	87.8		102		mg/kg	PAI-02-SS-005-01	2/8	47.8 - 87.5	102	313	N/A		N/A	N/A	N/A	NUT, BKG
7782-49-2	Selenium	0.18		0.18		mg/kg	PAI-02-SS-004-01	1/8	0.19 - 0.24	0.18	0.29	39	N	N/A	N/A	5	BSL, BKG
7440-23-5	Sodium	189		2100		mg/kg	PAI-02-SS-007-01	6/8	432 - 606	2100	241	N/A		N/A	N/A	N/A	NUT
7440-62-2	Vanadium	1.4		4.1		mg/kg	PAI-02-SS-004-01	8/8	N/A	4.1	4.8	55	N	N/A	N/A	6000	BSL, BKG
7440-66-6	Zinc	1.2		2.3		mg/kg	PAI-02-SS-001-01	3/8	0.92 - 3.2	2.3	4.9	2300	N	N/A	N/A	12000	BSL, BKG

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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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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) Background value for inorganics is two times the mean concentration.

(3) USEPA Region III Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 0.1)

(4) USEPA Soil Screening Level Guidance: Technical Background Document. May 1996.

(5) USEPA Soil Screening Level Guidance: Technical Background Document. May 1996. (Based on a DAF [Dilutional Attenuation Factor] of 20)

(6) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(7) No value available therefore the value for naphthalene is used based on similar chemical/toxicological characteristics.

(8) OSWER screening level.

(9) Value for mercuric chloride.

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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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 Organic Compounds															
67-64-1	Acetone	0.018	J	0.17	J	mg/kg	PAI-02-SS-008-01	2/7	0.02 - 0.16	0.17	N/A	100000 sat	N/A	N/A	No	BSL
67-66-3	Chloroform	0.002	J	0.018		mg/kg	PAI-02-SS-004-01	6/8	0.007 - 0.008	0.018	N/A	0.3 C	N/A	N/A	No	BSL
108-88-3	Toluene	0.003	J	0.003	J	mg/kg	PAI-02-SS-001-01	1/8	0.006 - 0.008	0.003	N/A	650 sat	N/A	N/A	No	BSL
	Semivolatile Organic Compounds															
120-12-7	Anthracene	0.0013	J	0.0013		mg/kg	PAI-02-SS-002-01	1/8	0.0017 - 0.022	0.0013	N/A	N/A	N/A	N/A	No	NTX
205-99-2	Benzo(b)fluoranthene	0.0009		0.0023		mg/kg	PAI-02-SS-007-01	4/8	0.0017 - 0.022	0.0023	N/A	N/A	N/A	N/A	No	NTX
218-01-9	Chrysene	0.0029	J	0.0029	J	mg/kg	PAI-02-SS-007-01	1/8	0.0043 - 0.055	0.0029	N/A	N/A	N/A	N/A	No	NTX
206-44-0	Fluoranthene	0.0047	J	0.0077		mg/kg	PAI-02-SS-001-01	2/8	0.0043 - 0.055	0.0077	N/A	N/A	N/A	N/A	No	NTX
193-39-5	Indeno(1,2,3-cd)pyrene	0.0047	J	0.0047	J	mg/kg	PAI-02-SS-008-01	1/8	0.0043 - 0.055	0.0047	N/A	N/A	N/A	N/A	No	NTX
85-01-8	Phenanthrene	0.0032	J	0.041	J	mg/kg	PAI-02-SS-006-01	6/8	0.0036 - 0.0073	0.041	N/A	N/A	N/A	N/A	No	NTX
	Inorganics															
7429-90-5	Aluminum	1710		4290		mg/kg	PAI-02-SS-004-01	8/8	N/A	4290	7270	N/A	N/A	N/A	No	BKG
7440-36-0	Antimony	0.17		0.17		mg/kg	PAI-02-SS-001-01	1/8	0.15 - 1.3	0.17	N/A	N/A	N/A	N/A	No	NTX
7440-38-2	Arsenic	0.18		1		mg/kg	PAI-02-SS-007-01	4/8	0.18 - 0.23	1	1.40	750 C	N/A	N/A	No	BSL, BKG
7440-39-3	Barium	4.4		12		mg/kg	PAI-02-SS-002-01	8/8	N/A	12	24.0	690000 N	N/A	N/A	No	BSL, BKG
7440-70-2	Calcium	53.1		477		mg/kg	PAI-02-SS-006-01	7/8	47.3	477	766	N/A	N/A	N/A	No	NUT, BKG
7440-47-3	Chromium VI	3.5		7.5		mg/kg	PAI-02-SS-007-01	8/8	N/A	7.5	6.20	270 N	N/A	N/A	No	BSL
7440-48-4	Cobalt	0.03		0.19		mg/kg	PAI-02-SS-004-01	5/8	0.04	0.19	0.360	N/A	N/A	N/A	No	BKG
7440-50-8	Copper	1.1		1.7		mg/kg	PAI-02-SS-005-01	2/8	0.36 - 0.75	1.7	1.50	N/A	N/A	N/A	No	NTX
7439-89-6	Iron	382		1930		mg/kg	PAI-02-SS-004-01	8/8	N/A	1930	3920	N/A	N/A	N/A	No	BKG
7439-92-1	Lead	1.7		5.7		mg/kg	PAI-02-SS-004-01	5/8	2.6 - 5.2	5.7	12.5	N/A	N/A	N/A	No	NTX
7439-96-5	Magnesium	53.1		174		mg/kg	PAI-02-SS-004-01	5/8	63.7 - 236	174	515	N/A	N/A	N/A	No	BKG
7439-96-5	Manganese	2.6		58.1		mg/kg	PAI-02-SS-004-01	6/8	1.8 - 3.6	58.1	129	N/A	N/A	N/A	No	BKG
7487-94-7	Mercury	0.03		0.05		mg/kg	PAI-02-SS-006-01, PAI-02-SS-004-01, PAI-02-SS-001-01	5/8	0.02 - 0.03	0.05	0.11	10	N/A	N/A	No	BSL, BKG
7440-02-0	Nickel	1.2		1.2		mg/kg	PAI-02-SS-004-01	1/8	0.05 - 0.41	1.2	1.8	13000 N	N/A	N/A	No	BSL, BKG
7440-09-7	Potassium	87.8		102		mg/kg	PAI-02-SS-005-01	2/8	47.8 - 87.5	102	313	N/A	N/A	N/A	No	NUT, BKG
7782-49-2	Selenium	0.18		0.18		mg/kg	PAI-02-SS-004-01	1/8	0.19 - 0.24	0.18	0.29	N/A	N/A	N/A	No	BKG
7440-23-5	Sodium	189		2100		mg/kg	PAI-02-SS-007-01	6/8	432 - 606	2100	241	N/A	N/A	N/A	No	NUT
7440-62-2	Vanadium	1.4		4.1		mg/kg	PAI-02-SS-004-01	8/8	N/A	4.1	4.8	N/A	N/A	N/A	No	BKG
7440-66-6	Zinc	1.2		2.3		mg/kg	PAI-02-SS-001-01	3/8	0.92 - 3.2	2.3	4.9	N/A	N/A	N/A	No	BKG

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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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (1)	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection

Notes:

(1) Minimum/maximum detected concentration.

(2) Background value for inorganics is two times the mean concentration.

(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

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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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 Organic Compounds															
67-64-1	Acetone	0.018	J	0.17	J	mg/kg	PAI-02-SS-008-01	2/7	0.02 - 0.16	0.17	N/A	16 N	N/A	N/A	No	BSL
67-66-3	Chloroform	0.002	J	0.018		mg/kg	PAI-02-SS-004-01	6/8	0.007 - 0.008	0.018	N/A	0.6	N/A	N/A	No	BSL
108-88-3	Toluene	0.003	J	0.003	J	mg/kg	PAI-02-SS-001-01	1/8	0.006 - 0.008	0.003	N/A	12	N/A	N/A	No	BSL
	Semivolatile Organic Compounds															
120-12-7	Anthracene	0.0013	J	0.0013		mg/kg	PAI-02-SS-002-01	1/8	0.0017 - 0.022	0.0013	N/A	12000 N	N/A	N/A	No	BSL
205-99-2	Benzo(b)fluoranthene	0.0009		0.0023		mg/kg	PAI-02-SS-007-01	4/8	0.0017 - 0.022	0.0023	N/A	5 C	N/A	N/A	No	BSL
218-01-9	Chrysene	0.0029	J	0.0029	J	mg/kg	PAI-02-SS-007-01	1/8	0.0043 - 0.055	0.0029	N/A	160 C	N/A	N/A	No	BSL
206-44-0	Fluoranthene	0.0047	J	0.0077		mg/kg	PAI-02-SS-001-01	2/8	0.0043 - 0.055	0.0077	N/A	4300 N	N/A	N/A	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.0047	J	0.0047	J	mg/kg	PAI-02-SS-008-01	1/8	0.0043 - 0.055	0.0047	N/A	14 C	N/A	N/A	No	BSL
85-01-8	Phenanthrene	0.0032	J	0.041	J	mg/kg	PAI-02-SS-006-01	6/8	0.0036 - 0.0073	0.041	N/A	N/A	N/A	N/A	No	NTX
	Inorganics															
7429-90-5	Aluminum	1710		4290		mg/kg	PAI-02-SS-004-01	8/8	N/A	4290	7270	N/A	N/A	N/A	No	BKG
7440-36-0	Antimony	0.17		0.17		mg/kg	PAI-02-SS-001-01	1/8	0.15 - 1.3	0.17	N/A	5	N/A	N/A	No	BSL
7440-38-2	Arsenic	0.18		1		mg/kg	PAI-02-SS-007-01	4/8	0.18 - 0.23	1	1.40	29	N/A	N/A	No	BSL, BKG
7440-39-3	Barium	4.4		12		mg/kg	PAI-02-SS-002-01	8/8	N/A	12	24.0	1600	N/A	N/A	No	BSL, BKG
7440-70-2	Calcium	53.1		477		mg/kg	PAI-02-SS-006-01	7/8	47.3	477	766	N/A	N/A	N/A	No	NUT
7440-47-3	Chromium VI	3.5		7.5		mg/kg	PAI-02-SS-007-01	8/8	N/A	7.5	6.20	38	N/A	N/A	No	BSL
7440-48-4	Cobalt	0.03		0.19		mg/kg	PAI-02-SS-004-01	5/8	0.04	0.19	0.360	N/A	N/A	N/A	No	BKG
7440-50-8	Copper	1.1		1.7		mg/kg	PAI-02-SS-005-01	2/8	0.36 - 0.75	1.7	1.50	N/A	N/A	N/A	No	NTX
7439-89-6	Iron	382		1930		mg/kg	PAI-02-SS-004-01	8/8	N/A	1930	3920	N/A	N/A	N/A	No	BKG
7439-92-1	Lead	1.7		5.7		mg/kg	PAI-02-SS-004-01	5/8	2.6 - 5.2	5.7	12.5	N/A	N/A	N/A	No	BKG
7439-96-5	Magnesium	53.1		174		mg/kg	PAI-02-SS-004-01	5/8	63.7 - 236	174	515	N/A	N/A	N/A	No	NUT, BKG
7439-96-5	Manganese	2.6		58.1		mg/kg	PAI-02-SS-004-01	6/8	1.8 - 3.6	58.1	129	N/A	N/A	N/A	No	BKG
7487-94-7	Mercury	0.03		0.05		mg/kg	PAI-02-SS-006-01, PAI-02-SS-004-01, PAI-02-SS-001-01	5/8	0.02 - 0.03	0.05	0.11	2	N/A	N/A	No	BSL, BKG
7440-02-0	Nickel	1.2		1.2		mg/kg	PAI-02-SS-004-01	1/8	0.05 - 0.41	1.2	1.8	130	N/A	N/A	No	BSL, BKG
7440-09-7	Potassium	87.8		102		mg/kg	PAI-02-SS-005-01	2/8	47.8 - 87.5	102	313	N/A	N/A	N/A	No	NUT, BKG
7782-49-2	Selenium	0.18		0.18		mg/kg	PAI-02-SS-004-01	1/8	0.19 - 0.24	0.18	0.29	5	N/A	N/A	No	BSL, BKG
7440-23-5	Sodium	189		2100		mg/kg	PAI-02-SS-007-01	6/8	432 - 606	2100	241	N/A	N/A	N/A	No	NUT
7440-62-2	Vanadium	1.4		4.1		mg/kg	PAI-02-SS-004-01	8/8	N/A	4.1	4.8	6000 N	N/A	N/A	No	BSL, BKG
7440-66-6	Zinc	1.2		2.3		mg/kg	PAI-02-SS-001-01	3/8	0.92 - 3.2	2.3	4.9	12000 N	N/A	N/A	No	BSL, BKG

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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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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) Background value for inorganics is two times the mean concentration.

(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 the value for naphthalene is used based on similar chemical/toxicological characteristics.

(6) OSWER screening level.

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 15 - Dirt Roads

CAS Number	Chemical	Minimum (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)
	PCBs															
11097-69-1	Aroclor-1254 1996 Data	0.024	J	0.024	J	mg/kg	015B	1/2	0.038 - 0.082	0.024	N/A	0.32 C	N/A	N/A	No	BSL
	Metals															
7439-92-1	Lead 1996 Data	4		15		mg/kg	015B	2/2	N/A	15	12.5	400 (5)	N/A	N/A	No	BSL
7439-92-1	Lead 1998 Data	4		18.4		mg/kg	PAI-15-SS-07-01	7/7	N/A	18.4	12.5	400 (5)	N/A	N/A	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) Background value for inorganics is two times the mean concentration.

(3) USEPA Region III Risk-Based Concentration Table, April 13, 2000. (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) OSWER screening level.

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 2.5

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 15 - Dirt Roads

CAS Number	Chemical	Minimum (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)
	PCBs															
11097-69-1	Aroclor-1254 1996 Data	0.024	J	0.024	J	mg/kg	015B	1/2	0.038 - 0.082	0.024	N/A	N/A	N/A	N/A	No	NTX
	Metals															
7439-92-1	Lead 1996 Data	4		15		mg/kg	015B	2/2	N/A	15	12.5	N/A	N/A	N/A	No	NTX
7439-92-1	Lead 1998 Data	4		18.4		mg/kg	PAI-15-SS-07-01	7/7	N/A	18.4	12.5	N/A	N/A	N/A	No	NTX

Notes:

(1) Minimum/maximum detected concentration.

(2) Background value for inorganics is two times the mean concentration.

(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

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 15 - Dirt Roads

CAS Number	Chemical	Minimum (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)
	PCBs															
11097-69-1	Aroclor-1254 1996 Data	0.024	J	0.024	J	mg/kg	015B	1/2	0.038 - 0.082	0.024	N/A	N/A	N/A	N/A	No	NTX
	Metals															
7439-92-1	Lead 1996 Data	4		15		mg/kg	015B	2/2	N/A	15	12.5	N/A	N/A	N/A	No	NTX
7439-92-1	Lead 1998 Data	4		18.4		mg/kg	PAI-15-SS-07-01	7/7	N/A	18.4	12.5	N/A	N/A	N/A	No	NTX

Notes:

(1) Minimum/maximum detected concentration.

(2) Background value for inorganics is two times the mean concentration.

(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)

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 2.7

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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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 Organic Compounds																
67-66-3	Chloroform	0.004	J	0.005	J	mg/kg	PAI-02-SD-004-01	2/5	0.006 - 0.008	0.005	N/A	100	C	N/A	N/A	No	BSL
	Semivolatile Organic Compounds																
56-55-3	Benzo(a)anthracene	0.0082	J	0.0082	J	mg/kg	PAI-02-SD-004-01	1/4	0.012 - 0.031	0.0082	N/A	0.87	C	N/A	N/A	No	BSL
50-32-8	Benzo(a)pyrene	0.0073		0.012		mg/kg	PAI-02-SD-004-01	2/4	0.029 - 0.031	0.012	N/A	0.087	C	N/A	N/A	No	BSL
205-99-2	Benzo(b)fluoranthene	0.0056		0.018		mg/kg	PAI-02-SD-004-01	2/4	0.012	0.018	N/A	0.87	C	N/A	N/A	No	BSL
207-08-9	Benzo(k)fluoranthene	0.008		0.008		mg/kg	PAI-02-SD-004-01	1/4	0.0047 - 0.012	0.008	N/A	8.7	C	N/A	N/A	No	BSL
218-01-9	Chrysene	0.011	J	0.021		mg/kg	PAI-02-SD-004-01	2/4	0.029 - 0.031	0.021	N/A	87	C	N/A	N/A	No	BSL
206-44-0	Fluoranthene	0.038		0.038		mg/kg	PAI-02-SD-004-01	1/4	0.012 - 0.031	0.038	N/A	310	N	N/A	N/A	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.007	J	0.012		mg/kg	PAI-02-SD-004-01	2/4	0.029 - 0.031	0.012	N/A	0.87	C	N/A	N/A	No	BSL
85-01-8	Phenanthrene	0.008	J	0.011		mg/kg	PAI-02-SD-004-01	2/4	0.023 - 0.025	0.011	N/A	160 (5)	N	N/A	N/A	No	BSL
129-00-0	Pyrene	0.03		0.03		mg/kg	PAI-02-SD-004-01	1/4	0.023 - 0.062	0.03	N/A	230	N	N/A	N/A	No	BSL
	Inorganics																
7429-90-5	Aluminum	3140		5560		mg/kg	PAI-02-SD-002-02	5/5	N/A	5560	24284	7800	N	N/A	N/A	No	BSL, BKG
7440-38-2	Arsenic	0.79		2.1		mg/kg	PAI-02-SD-001-01	5/5	N/A	2.1	12.2	0.43	C	N/A	N/A	No	BKG
7440-39-3	Barium	4.9		7.9		mg/kg	PAI-02-SD-002-02, PAI-02-SD-002-01, PAI-02-SD-001-01	5/5	N/A	7.9	28.0	550	N	N/A	N/A	No	BSL, BKG
7440-70-2	Calcium	362		32800		mg/kg	PAI-02-SD-003-01	5/5	N/A	32800	4002	N/A		N/A	N/A	No	NUT
7440-47-3	Chromium	5.9		10.1		mg/kg	PAI-02-SD-001-01	5/5	N/A	10.1	35.2	12000 (6)	N	N/A	N/A	No	BSL, BKG
1854-02-99	Hexavalent Chromium	1.1		1.6		mg/kg	PAI-02-SD-002-01	2/3	1	1.6	N/A	23	N	N/A	N/A	No	BSL
7440-48-4	Cobalt	0.35		0.52		mg/kg	PAI-02-SD-003-01	2/5	0.74 - 0.88	0.52	2.63	470	N	N/A	N/A	No	BSL, BKG
7440-50-8	Copper	1.2		3.2		mg/kg	PAI-02-SD-001-01	5/5	N/A	3.2	10.1	310	N	N/A	N/A	No	BSL, BKG
7439-89-6	Iron	2650		5390		mg/kg	PAI-02-SD-001-01	5/5	N/A	5390	21450	2300	N	N/A	N/A	No	BKG
7439-92-1	Lead	3.2		7.1		mg/kg	PAI-02-SD-002-02, PAI-02-SD-001-01	5/5	N/A	7.1	20.6	400 (7)		N/A	N/A	No	BSL, BKG
7439-96-5	Magnesium	777		2380		mg/kg	PAI-02-SD-002-01	5/5	N/A	2380	6437	N/A		N/A	N/A	No	NUT, BKG
7439-96-5	Manganese	22.7		52.4		mg/kg	PAI-02-SD-004-01	5/5	N/A	52.4	185.7	160	N	N/A	N/A	No	BSL, BKG
7487-94-7	Mercury	0.04		0.04		mg/kg	PAI-02-SD-002-02	1/5	0.02 - 0.04	0.04	0.090	2.3 (8)	N	N/A	N/A	No	BSL, BKG
7440-02-0	Nickel	0.82		2.1		mg/kg	PAI-02-SD-001-01	5/5	N/A	2.1	5.95	160	N	N/A	N/A	No	BSL, BKG
7440-09-7	Potassium	426		1010		mg/kg	PAI-02-SD-002-01	5/5	N/A	1010	3190	N/A		N/A	N/A	No	NUT, BKG
7782-49-2	Selenium	0.23		0.42		mg/kg	PAI-02-SD-001-01	5/5	N/A	0.42	N/A	39	N	N/A	N/A	No	BSL
7440-23-5	Sodium	2770		6650		mg/kg	PAI-02-SD-002-01	5/5	N/A	6650	19110	N/A		N/A	N/A	No	NUT
7440-62-2	Vanadium	6.1		12.8		mg/kg	PAI-02-SD-001-01	5/5	N/A	12.8	49.6	55	N	N/A	N/A	No	NUT, BKG
7440-66-6	Zinc	10.9		12.6		mg/kg	PAI-02-SD-001-01	3/5	4.4 - 6.7	12.6	45.0	2300	N	N/A	N/A	No	BSL, BKG

TABLE 2.7

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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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) Background value for inorganics is two times the mean concentration.

(3) USEPA Region III Risk-Based Concentration Table, April 13, 2000. (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 the value for naphthalene is used based on similar chemical/toxicological characteristics.

(6) No hexavalent chromium was detected therefore total chromium is evalauted as trivalent chromium.

(7) OSWER screening level.

(8) Value for mercuric chloride.

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 2.8

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 15 - Dirt Roads

CAS Number	Chemical	Minimum (1)	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	US EPA (3) REGION III RBC		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Semivolatile Organic Compounds																
56-55-3	Benzo(a)anthracene	0.015		0.015		ug/kg	PAI-15-SD-03-01	1/3	0.006 - 0.011	0.015	N/A	870	C	N/A	N/A	No	BSL
50-32-8	Benzo(a)pyrene	0.012		0.012		ug/kg	PAI-15-SD-03-01	1/3	0.006 - 0.011	0.012	N/A	87	C	N/A	N/A	No	BSL
205-99-2	Benzo(b)fluoranthene	0.0038		0.033		ug/kg	PAI-15-SD-03-01	2/3	0.0044	0.033	N/A	870	C	N/A	N/A	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.013		0.013		ug/kg	PAI-15-SD-03-01	1/3	0.0095 - 0.018	0.013	N/A	160000 (5)		N/A	N/A	No	BSL
207-08-9	Benzo(k)fluoranthene	0.012		0.012		ug/kg	PAI-15-SD-03-01	1/3	0.0024 - 0.0044	0.012	N/A	8700	C	N/A	N/A	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	0.28		0.28		ug/kg	PAI-15-SD-02-01	1/3	0.44 - 0.66	0.28	N/A	46000	C	N/A	N/A	No	BSL
218-01-9	Chrysene	0.011	J	0.028		ug/kg	PAI-15-SD-03-01	3/3	N/A	0.028	N/A	87000	C	N/A	N/A	No	BSL
206-44-0	Fluoranthene	0.0093		0.034		ug/kg	PAI-15-SD-03-01	2/3	0.011	0.034	N/A	310000	N	N/A	N/A	No	BSL
86-73-7	Fluorene	0.013		0.013		ug/kg	PAI-15-SD-02-01	1/3	0.017 - 0.022	0.013	N/A	310000	N	N/A	N/A	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.013		0.046		ug/kg	PAI-15-SD-02-01	2/3	0.011	0.046	N/A	870	C	N/A	N/A	No	BSL
85-01-8	Phenanthrene	0.0081		0.014		ug/kg	PAI-15-SD-02-01	2/3	0.0088	0.014	N/A	160000 (5)	N	N/A	N/A	No	BSL
129-00-0	Pyrene	0.028		0.028		ug/kg	PAI-15-SD-03-01	1/3	0.012 - 0.022	0.028	N/A	230000	N	N/A	N/A	No	BSL
	Inorganics																
7429-90-5	Aluminum	648		15500		mg/kg	PAI-15-SD-03-01	3/3	N/A	15500	24284	7800	N	N/A	N/A	No	BKG
7440-36-0	Antimony	0.2		0.2		mg/kg	PAI-15-SD-02-01	1/3	0.18 - 0.29	0.2	N/A	3.1	N	N/A	N/A	No	BSL
7440-38-2	Arsenic	0.3		6.5		mg/kg	PAI-15-SD-03-01	3/3	N/A	6.5	12.22	0.43	C	N/A	N/A	No	BKG
7440-39-3	Barium	1.9		19.4		mg/kg	PAI-15-SD-03-01	3/3	N/A	19.4	28.0	550	N	N/A	N/A	No	BSL, BKG
7440-41-7	Beryllium	0.71		0.71		mg/kg	PAI-15-SD-03-01	1/3	0.06 - 0.21	0.71	0.977	16	N	N/A	N/A	No	BSL, BKG
7440-43-9	Cadmium	0.16		0.16		mg/kg	PAI-15-SD-03-01	1/3	0.03	0.16	0.278	3.9	N	N/A	N/A	No	BSL, BKG
7440-70-2	Calcium	346		5550		mg/kg	PAI-15-SD-03-01	3/3	N/A	5550	4002	N/A		N/A	N/A	No	NUT
7440-47-3	Chromium	2		27.8		mg/kg	PAI-15-SD-03-01	3/3	N/A	27.8	35.2	12000 (6)	N	N/A	N/A	No	BSL, BKG
7440-48-4	Cobalt	0.69		3.1		mg/kg	PAI-15-SD-03-01	2/3	0.06	3.1	2.63	470	N	N/A	N/A	No	BSL
7440-50-8	Copper	4		8.7		mg/kg	PAI-15-SD-03-01	2/3	0.58	8.7	10.1	310	N	N/A	N/A	No	BSL, BKG
7439-89-6	Iron	604		14700		mg/kg	PAI-15-SD-03-01	3/3	N/A	14700	21450	2300	N	N/A	N/A	No	BKG
7439-92-1	Lead	2.7		11.3		mg/kg	PAI-15-SD-03-01	3/3	N/A	11.3	20.6	400 (7)		N/A	N/A	No	BSL, BKG
7439-96-5	Magnesium	370		4220		mg/kg	PAI-15-SD-03-01	3/3	N/A	4220	6437	N/A		N/A	N/A	No	NUT, BKG
7439-96-5	Manganese	5.3		113		mg/kg	PAI-15-SD-03-01	3/3	N/A	113	186	160	N	N/A	N/A	No	BSL, BKG
7440-02-0	Nickel	1.5		6.5		mg/kg	PAI-15-SD-03-01	2/3	0.11	6.5	5.95	160	N	N/A	N/A	No	BSL
7440-09-7	Potassium	205		2560		mg/kg	PAI-15-SD-03-01	3/3	N/A	2560	3190	N/A		N/A	N/A	No	NUT, BKG
7440-23-5	Sodium	2040		10200		mg/kg	PAI-15-SD-03-01	3/3	N/A	10200	19110	N/A		N/A	N/A	No	NUT, BKG
7440-62-2	Vanadium	2.3		37.4		mg/kg	PAI-15-SD-03-01	3/3	N/A	37.4	49.6	55	N	N/A	N/A	No	BSL, BKG
7440-66-6	Zinc	12.9		32.3		mg/kg	PAI-15-SD-03-01	2/3	1.9	32.3	45.0	2300	N	N/A	N/A	No	BSL, BKG

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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: Sediment
Exposure Medium: Sediment
Exposure Point: Site 15 - Dirt Roads

CAS Number	Chemical	Minimum (1)	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	US EPA (3) REGION III RBC	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection

Notes:

(1) Minimum/maximum detected concentration.

(2) Background value for inorganics is two times the mean concentration.

(3) USEPA Region III Risk-Based Concentration Table, April 13, 2000. (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 the value for naphthalene is used based on similar chemical/toxicological characteristics.

(6) No hexavalent chromium was detected therefore total chromium is evalauted as trivalent chromium.

(7) *OSWER screening level.*

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 2.9

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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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 Organic Compounds																
67-64-1	Acetone	1.8	J	3.3	J	ug/L	PAI-02-GW-04-01	2/3	5	3.3	N/A	370	N	N/A	N/A	No	BSL
75-15-0	Carbon Disulfide	4		4		ug/L	PAI-02-GW-05-01	1/5	1	4	N/A	100	N	N/A	N/A	No	BSL
67-66-3	Chloroform	2.9		2.9		ug/L	PAI-02-GW-02-01	1/5	1	2.9	N/A	0.15	C	80 (5)	MCL	Yes	ASL
74-87-3	Chloromethane	0.35		0.35		ug/L	PAI-02-GW-03-01-AVG	1/5	1	0.35	N/A	1.5	C	N/A	N/A	No	BSL
	Semivolatile Organic Compounds																
117-81-7	Bis(2-Ethylhexyl)phthalate	1	J	1	J	ug/L	PAI-02-GW-01-01, PAI-02-GW-02-01, PAI-02-GW-04-01, PAI-02-GW-05-01	3/5	5	1	N/A	4.8	C	6	MCL	No	BSL
84-66-2	Diethyl Phthalate	1	J	1	J	ug/L	PAI-02-GW-05-01	1/5	5	1	N/A	2900	N	N/A	N/A	No	BSL
	Inorganics - Unfiltered																
7429-90-5	Aluminum	189		1010		ug/L	PAI-02-GW-01-01	3/5	22 - 79.5	1010	N/A	3700	N	50 To 200	SMCL	No	BSL
7440-38-2	Arsenic	1.1		1.5		ug/L	PAI-02-GW-01-01	4/5	0.9	1.5	N/A	0.045	C	50	MCL	Yes	ASL
7440-39-3	Barium	33.7		148		ug/L	PAI-02-GW-03-01-AVG	5/5	N/A	148	N/A	260	N	2000	MCL	No	BSL
7440-70-2	Calcium	6370		114000		ug/L	PAI-02-GW-03-01-AVG	5/5	N/A	114000	N/A	N/A		N/A	N/A	No	NUT
7440-47-3	Chromium	5.2		5.2		ug/L	PAI-02-GW-03-01-AVG	1/5	6.4 - 11.9	5.2	N/A	5500	N	100	MCL	No	BSL
7440-50-8	Copper	5.2		28.8		ug/L	PAI-02-GW-01-01	2/5	2.6	28.8	N/A	150	N	1000	SMCL	No	BSL
7439-89-6	Iron	439		8370		ug/L	PAI-02-GW-05-01	5/5	N/A	8370	N/A	1100	N	300	SMCL	Yes	ASL
7439-96-5	Magnesium	2580		778000		ug/L	PAI-02-GW-04-01	5/5	N/A	778000	N/A	N/A		N/A	N/A	No	NUT
7439-96-5	Manganese	37		187		ug/L	PAI-02-GW-05-01	5/5	N/A	187	N/A	73	N	50	SMCL	Yes	ASL
7440-09-7	Potassium	400		245000		ug/L	PAI-02-GW-04-01	4/5	558	245000	N/A	N/A		N/A	N/A	No	NUT
7440-23-5	Sodium	18100		5990000		ug/L	PAI-02-GW-04-01	5/5	N/A	5990000	N/A	N/A		N/A	N/A	No	NUT
7440-28-0	Thallium	18		18		ug/L	PAI-02-GW-02-01	2/5	1.8 - 18	18	N/A	0.26	N	2	MCL	Yes	ASL
7440-66-6	Zinc	5.5		13.3		ug/L	PAI-02-GW-02-01	2/4	4.1 - 33.4	13.3	N/A	1100	N	5000	SMCL	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) Background value for inorganics is two times the mean concentration.

(3) USEPA Region III Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 0.1)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) Value is for total trihalomethanes.

Shading indicates chemical was 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
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

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TABLE 2.10

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 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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)	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organic Compounds													
67-64-1	Acetone	0.6	J	0.8	J	ug/L	PAI-02-SW-002-00	2/2	N/A	0.8	N/A	370 (5) N	No	BSL
127-18-4	Tetrachloroethene	0.3	J	0.3	J	ug/L	PAI-02-SW-002-00	1/4	0.5	0.3	N/A	0.8	No	BSL
	Semivolatile Organic Compounds													
117-81-7	Bis(2-Ethylhexyl)phthalate	14		77		ug/L	PAI-02-SW-001-00	2/4	10	77	44.8	1.8	Yes	ASL
85-01-8	Phenanthrene	0.074	J	0.16		ug/L	PAI-02-SW-004-00	2/4	0.097 - 0.098	0.16	N/A	73 (5,6) N	No	BSL
	Pesticides													
	Endosulfan Sulfate	0.04	J	0.078		ug/L	PAI-02-SW-001-00	2/4	0.048 - 0.05	0.078	N/A	110	No	BSL
	Inorganics - unfiltered													
7429-90-5	Aluminum	1030		1850		ug/L	PAI-02-SW-002-00	3/4	477	1850	3113	3700 (5) N	No	BSL, BKG
7440-36-0	Antimony	2.8		2.8		ug/L	PAI-02-SW-004-00	1/4	1.8 - 2.2	2.8	N/A	14.0	No	BSL
7440-38-2	Arsenic	2.9		4.4		ug/L	PAI-02-SW-001-00	2/4	2.1	4.4	5.13	0.018	No	BKG
7440-39-3	Barium	19		21.4		ug/L	PAI-02-SW-004-00	4/4	N/A	21.4	38.4	1000	No	BSL, BKG
7440-70-2	Calcium	268000	J	303000	J	ug/L	PAI-02-SW-001-00	4/4	N/A	303000	637000	N/A		NUT, BKG
7440-48-4	Cobalt	0.89		1.1		ug/L	PAI-02-SW-001-00	2/4	0.4	1.1	N/A	220 (5) N	No	BSL
7439-92-1	Iron	417		1220		ug/L	PAI-02-SW-002-00	3/4	210	1220	2091	300	No	BKG
7439-96-5	Magnesium	859000		950000		ug/L	PAI-02-SW-002-00	4/4	N/A	950000	1918667	N/A		NUT, BKG
7439-96-5	Manganese	31.6		34.7		ug/L	PAI-02-SW-001-00	2/4	17.4 - 33.4	34.7	53.1	50	No	BSK, BKG
7440-09-7	Potassium	566000		642000		ug/L	PAI-02-SW-001-00	4/4	N/A	642000	831333	N/A		NUT, BKG
7440-22-4	Silver	0.72		0.72		ug/L	PAI-02-SW-002-00	1/4	0.7	0.72	N/A	18 (5) N	No	BSL
7440-23-5	Sodium	7930000		8610000		ug/L	PAI-02-SW-001-00	4/4	N/A	8610000	16226667	N/A		NUT, BKG
7440-66-6	Zinc	4.4		10.4		ug/L	PAI-02-SW-004-00	4/4	N/A	10.4	10.6	9100	No	BSL, BKG

Notes:

(1) Minimum/maximum detected concentration.

(2) Background value for inorganics is two times the mean concentration.

(3) Criteria as published in FR 63:68354-68364 unless otherwise noted.

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: *No Toxicity Information (NTX)*
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) Water quality criteria not available EPA Region III RBC for tap water ingestion used (Cancer benchmark value = 1E-6, HI = 0.1).

(6) No value available therefore the value for naphthalene is used based on similar chemical/toxicological characteristics.

Shading indicates chemical was 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 Consider
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

TABLE 2.11

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Site 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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 Organic Compounds																
75-09-2	Methylene Chloride	0.009		0.009		mg/kg	PAI-02-SB-02A-02 PAI-02-SB-10-07	2/3	0.009	0.009	N/A	85	C	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	1250		2860		mg/kg	PAI-02-SB-10-07	3/3	N/A	2860	7270	7800	N	NA	NA	No	BSL, BKG
7440-39-3	Barium	4		11.4		mg/kg	PAI-02-SB-11-02	3/3	N/A	11.4	23.6	550	N	NA	NA	No	BSL, BKG
7440-70-2	Calcium	64.3		150		mg/kg	PAI-02-SB-02A-02	2/3	43.4	150	766	N/A		NA	NA	No	NUT, BKG
7440-47-3	Chromium	2.5		5.6		mg/kg	PAI-02-SB-10-07	3/3	N/A	5.6	6.23	23 (5)	N	NA	NA	No	BSL, BKG
7440-50-8	Copper	0.21		0.53		mg/kg	PAI-02-SB-11-02	3/3	N/A	0.53	1.52	310	N	NA	NA	No	BSL, BKG
7439-89-6	Iron	265		337		mg/kg	PAI-02-SB-02A-02	3/3	N/A	337	3920	2300	N	NA	NA	No	BSL, BKG
7439-92-1	Lead	0.99		3.1		mg/kg	PAI-02-SB-10-07	3/3	N/A	3.1	12.5	400 (6)		NA	NA	No	BSL, BKG
7439-96-5	Magnesium	57.7		90.9		mg/kg	PAI-02-SB-02A-02	2/3	28.3	90.9	515	N/A		NA	NA	No	NUT, BKG
7439-96-5	Manganese	4.2		4.2		mg/kg	PAI-02-SB-10-07	1/3	1.4 - 1.5	4.2	129	160	N	NA	NA	No	BSL, BKG
7440-09-7	Potassium	29.2		41.9		mg/kg	PAI-02-SB-02A-02	3/3	N/A	41.9	313	N/A		NA	NA	No	NUT, BKG
7440-66-6	Zinc	1.2		1.5		mg/kg	PAI-02-SB-02A-02	3/3	N/A	1.5	9.70	2300	N	NA	NA	No	BSL, BKG

Notes:

(1) Minimum/maximum detected concentration.

(2) Background values presented for inorganics is two times the mean concentration.

(3) USEPA Region III Risk-Based Concentration Table, April 13, 2000. (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) The valence state of chromium was not deteremined in the analysis therefore

(6) OSWER screening level.

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 2.12

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Site 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (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 Organic Compounds															
75-09-2	Methylene Chloride	0.009		0.009		mg/kg	PAI-02-SB-02A-02 PAI-02-SB-10-07	2/3	0.009	0.009	N/A	13 C	NA	NA	No	BSL
	Inorganics															
7429-90-5	Aluminum	1250		2860		mg/kg	PAI-02-SB-10-07	3/3	N/A	2860	7270	N/A	NA	NA	No	BSL, BKG
7440-39-3	Barium	4		11.4		mg/kg	PAI-02-SB-11-02	3/3	N/A	11.4	23.6	690000 N	NA	NA	No	BSL, BKG
7440-70-2	Calcium	64.3		150		mg/kg	PAI-02-SB-02A-02	2/3	43.4	150	766	N/A	NA	NA	No	NUT, BKG
7440-47-3	Chromium	2.5		5.6		mg/kg	PAI-02-SB-10-07	3/3	N/A	5.6	6.23	270 C	NA	NA	No	BSL, BKG
7440-50-8	Copper	0.21		0.53		mg/kg	PAI-02-SB-11-02	3/3	N/A	0.53	1.52	N/A	NA	NA	No	BSL, BKG
7439-89-6	Iron	265		337		mg/kg	PAI-02-SB-02A-02	3/3	N/A	337	3920	N/A	NA	NA	No	BSL, BKG
7439-92-1	Lead	0.99		3.1		mg/kg	PAI-02-SB-10-07	3/3	N/A	3.1	12.5	N/A	NA	NA	No	BSL, BKG
7439-96-5	Magnesium	57.7		90.9		mg/kg	PAI-02-SB-02A-02	2/3	28.3	90.9	515	N/A	NA	NA	No	NUT, BKG
7439-96-5	Manganese	4.2		4.2		mg/kg	PAI-02-SB-10-07	1/3	1.4 - 1.5	4.2	129	N/A	NA	NA	No	BSL, BKG
7440-09-7	Potassium	29.2		41.9		mg/kg	PAI-02-SB-02A-02	3/3	N/A	41.9	313	N/A	NA	NA	No	NUT, BKG
7440-66-6	Zinc	1.2		1.5		mg/kg	PAI-02-SB-02A-02	3/3	N/A	1.5	9.70	N/A	NA	NA	No	BSL, BKG

Notes:

(1) Minimum/maximum detected concentration.

(2) Background values presented for inorganics is two times the mean concentration.

(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

TABLE 2.13

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Site 2 - Borrow Pit Landfill

CAS Number	Chemical	Minimum (1)	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	US EPA (3) SSL Soil to Groundwater		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatile Organic Compounds																
75-09-2	Methylene Chloride	0.009		0.009		mg/kg	PAI-02-SB-02A-02 PAI-02-SB-10-07	2/3	0.009	0.009	N/A	85	C	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	1250		2860		mg/kg	PAI-02-SB-10-07	3/3	N/A	2860	7270	7800	N	NA	NA	No	BSL, BKG
7440-39-3	Barium	4		11.4		mg/kg	PAI-02-SB-11-02	3/3	N/A	11.4	23.6	550	N	NA	NA	No	BSL, BKG
7440-70-2	Calcium	64.3		150		mg/kg	PAI-02-SB-02A-02	2/3	43.4	150	766	N/A		NA	NA	No	NUT, BKG
7440-47-3	Chromium	2.5		5.6		mg/kg	PAI-02-SB-10-07	3/3	N/A	5.6	6.23	23 (7)	N	NA	NA	No	BSL, BKG
7440-50-8	Copper	0.21		0.53		mg/kg	PAI-02-SB-11-02	3/3	N/A	0.53	1.52	310	N	NA	NA	No	BSL, BKG
7439-89-6	Iron	265		337		mg/kg	PAI-02-SB-02A-02	3/3	N/A	337	3920	2300	N	NA	NA	No	BSL, BKG
7439-92-1	Lead	0.99		3.1		mg/kg	PAI-02-SB-10-07	3/3	N/A	3.1	12.5	400 (8)		NA	NA	No	BSL, BKG
7439-96-5	Magnesium	57.7		90.9		mg/kg	PAI-02-SB-02A-02	2/3	28.3	90.9	515	N/A		NA	NA	No	NUT, BKG
7439-96-5	Manganese	4.2		4.2		mg/kg	PAI-02-SB-10-07	1/3	1.4 - 1.5	4.2	129	160	N	NA	NA	No	BSL, BKG
7440-09-7	Potassium	29.2		41.9		mg/kg	PAI-02-SB-02A-02	3/3	N/A	41.9	313	N/A		NA	NA	No	NUT, BKG
7440-66-6	Zinc	1.2		1.5		mg/kg	PAI-02-SB-02A-02	3/3	N/A	1.5	9.70	2300	N	NA	NA	No	BSL, BKG

Notes:

(1) Minimum/maximum detected concentration.

(2) Background values presented for inorganics is two times the mean concentration.

(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)

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 3.1

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit Landfill

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal	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	2.9	(1)	2.9		ug/L	2.9	Max	(1)	N/A	N/A	N/A
Arsenic	ug/L	1.32	(1)	1.5		ug/L	1.5	Max	(1)	N/A	N/A	N/A
Iron	ug/L	3750	(1)	8370		ug/L	8370	Max	(1)	N/A	N/A	N/A
Manganese	ug/L	120	(1)	187		ug/L	187	Max	(1)	N/A	N/A	N/A
Thallium	ug/L	18	(1)	18		ug/L	18	Max	(1)	N/A	N/A	N/A

Notes:

(1) - Not enough samples to calculate an UCL or to perform the Shapiro-Wilk W Test.

TABLE 3.2

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 2 - Borrow Pit Landfill

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal	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
Bis(2-ethylhexyl)phthalate	ug/L	45.5	(1)	77		ug/L	77	Max	(1)	N/A	N/A	N/A
Arsenic	ug/L	3.65	(1)	5.9		ug/L	5.9	Max	(1)	N/A	N/A	N/A

Notes:

(1) - Not enough samples to calculate an UCL or to perform the Shapiro-Wilk W Test.

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TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition		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	(1)	N/A	N/A	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	2490	(2)	N/A	N/A	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(2)	N/A	N/A	
	ET	Exposure Time	hours/event	8	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	days/year	250	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	1	(2)	N/A	N/A	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	N/A	N/A	

Notes:

(1) - Refer to supporting text in Section 6.2.

(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.

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 4.2

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 2 - Borrow Pit Landfill
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition		RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Table 3.2	See Table 3.2	N/A	N/A	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1995	N/A	N/A	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	ug/mg	0.001	- -	N/A	N/A	
	ET	Exposure Time	hours/event	8	(1)	N/A	N/A	
	EF	Exposure Frequency	events/year	250	EPA, 1995	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	DAevent	Absorbed dose per event	mg/cm2-event	See Text	(2)	N/A	N/A	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	2490	(1)	N/A	N/A	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	N/A	N/A	
	ET	Exposure Time	hours/event	8	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	days/year	250	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	1	(1)	N/A	N/A	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	N/A	N/A	

Notes:

(1) - Professional judgement.

(2) - Refer to supporting text in Section 6.2.

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 4.3

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 2 - Borrow Pit Landfill
Receptor Population: Adolescent Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition		RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Table 3.2	See Table 3.2	N/A	N/A	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1995	N/A	N/A	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	ug/mg	0.001	- -	N/A	N/A	
	ET	Exposure Time	hours/event	2.6	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	events/year	45	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	10	EPA, 1995	N/A	N/A	
	BW	Body Weight	kg	45	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	3650	EPA, 1989	N/A	N/A	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	(2)	N/A	N/A	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	5700	(1)	N/A	N/A	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	N/A	N/A	
	ET	Exposure Time	hours/event	2.6	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	days/year	45	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	10	EPA, 1995	N/A	N/A	See text for calculation of DAevent.
	BW	Body Weight	kg	45	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	3,650	EPA, 1989	N/A	N/A	

Notes:

(1) - Professional judgement.

(2) - Refer to supporting text.

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 4.4

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 2 - Borrow Pit Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition		RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Table 3.2	See Table 3.2	N/A	N/A	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1995	N/A	N/A	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CF	Conversion factor	ug/mg	0.001	- -	N/A	N/A	
	ET	Exposure Time	hours/event	2.6	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	events/year	45	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	6	EPA, 1995	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	2190	EPA, 1989	N/A	N/A	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	(2)	N/A	N/A	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	5700	(1)	N/A	N/A	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	N/A	N/A	
	ET	Exposure Time	hours/event	2.6	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	days/year	45	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	6	EPA, 1995	N/A	N/A	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	EPA, 1989	N/A	N/A	

Notes:

(1) - Professional judgement.

(2) - Refer to supporting text.

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.

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TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Shellfish
Exposure Point: Site 2 - Borrow Pit Landfill
Receptor Population: Adult Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition		RME 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	NA	NA	Intake (mg/kg/day) =
	IR	Fish/shellfish ingestion rate	kg/day	0.014	EPA, 1997	NA	NA	$\frac{Cfish \times IR \times FI \times EF \times ED}{BW \times AT}$
	FI	Fraction ingested from source	unitless	1	EPA, 1995	NA	NA	
	EF	Exposure Frequency	day/year	240	(1)	NA	NA	
	ED	Exposure Duration	years	30	EPA, 1995	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	10950	EPA, 1989	NA	NA	

Notes:

(1) - Length of shellfish harvesting season.

Sources:

U.S. EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

U.S. EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

U.S. EPA Region 4, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

U.S. EPA, 1997. Exposure Factors Handbook. Volume 2.

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit Landfill
Receptor Population: Child Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition		RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Table 3.1	See Table 3.1	N/A	N/A	Intake (mg/kg/day) =
	IR	Ingestion Rate	L/day	1	EPA, 1995	N/A	N/A	$\frac{CW \times IR \times CF \times EF \times ED}{BW \times AT}$
		Conversion factor	ug/mg	0.001	- -	N/A	N/A	
	EF	Exposure Frequency	events/year	350	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	6	EPA, 1995	N/A	N/A	
	BW	Body Weight	kg	15	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	2190	EPA, 1989	N/A	N/A	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	N/A	N/A	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	6600	EPA, 1997	N/A	N/A	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	EPA, 1997	N/A	N/A	
	ET	Exposure Time	hours/event	0.25	EPA, 1997	N/A	N/A	
	EF	Exposure Frequency	days/year	350	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	6	EPA, 1995	N/A	N/A	See text for calculation of DAevent.
	BW	Body Weight	kg	15	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	N/A	N/A	

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 4.7

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 2 - Borrow Pit Landfill
Receptor Population: Child Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition		RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Table 3.2	See Table 3.2	N/A	N/A	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.05	EPA, 1995	N/A	N/A	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
		Conversion factor	ug/mg	0.001	- -	N/A	N/A	
	ET	Exposure Time	hours/event	2.6	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	events/year	45	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	6	EPA, 1995	N/A	N/A	
	BW	Body Weight	kg	15	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	2190	EPA, 1989	N/A	N/A	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	N/A	N/A	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	2000	(1)	N/A	N/A	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	N/A	N/A	
	ET	Exposure Time	hours/event	2.6	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	days/year	45	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	6	EPA, 1995	N/A	N/A	See text for calculation of DAevent.
	BW	Body Weight	kg	15	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	N/A	N/A	

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 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit Landfill
Receptor Population: Adult Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition		RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Table 3.1	See Table 3.1	N/A	N/A	Intake (mg/kg/day) =
	IR	Ingestion Rate	L/day	2	EPA, 1995	N/A	N/A	$\frac{CW \times IR \times CF \times EF \times ED}{BW \times AT}$
		Conversion factor	ug/mg	0.001	- -	N/A	N/A	
	EF	Exposure Frequency	events/year	350	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	24	EPA, 1995	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	8760	EPA, 1989	N/A	N/A	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	N/A	N/A	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	18000	EPA, 1997	N/A	N/A	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	EPA, 1997	N/A	N/A	
	ET	Exposure Time	hours/event	0.25	EPA, 1997	N/A	N/A	
	EF	Exposure Frequency	days/year	350	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	24	EPA, 1995	N/A	N/A	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	N/A	N/A	

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 4.9

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 2 - Borrow Pit Landfill
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition		RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	See Table 3.2	See Table 3.2	N/A	N/A	Intake (mg/kg/day) =
	CR	Contact Rate	L/hour	0.01	EPA, 1995	N/A	N/A	$\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
		Conversion factor	ug/mg	0.001	- -	N/A	N/A	
	ET	Exposure Time	hours/event	2.6	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	events/year	45	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	24	EPA, 1995	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	8760	EPA, 1989	N/A	N/A	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	N/A	N/A	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	5700	(1)	N/A	N/A	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(1)	N/A	N/A	
	ET	Exposure Time	hours/event	2.6	EPA, 1989	N/A	N/A	
	EF	Exposure Frequency	days/year	45	EPA, 1995	N/A	N/A	
	ED	Exposure Duration	years	24	EPA, 1995	N/A	N/A	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	EPA, 1989	N/A	N/A	

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 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)
VOCs										
Chloroform	Chronic	1.0E-02	mg/kg/day	20%	2.0E-03	mg/kg/day	Liver	1000	IRIS	07/28/00
SVOCs										
Bis(2-ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg/day	19%	3.8E-03	mg/kg/day	Liver	1000	IRIS	07/28/00
Inorganics										
Arsenic	Chronic	3.0E-04	mg/kg/day	41%	1.2E-04	mg/kg/day	Skin	3	IRIS	07/28/00
Iron	Chronic	3.0E-01	mg/kg/day	15%	4.5E-02	mg/kg/day	Liver	N/A	EPAIII	04/13/00
Manganese	Chronic	2.0E-02	mg/kg/day	4%	8.0E-04	mg/kg/day	CNS	1	IRIS	07/28/00
Thallium	Chronic	7.0E-05	mg/kg/day	15%	1.1E-05	mg/kg/day	Liver, Blood	N/A	EPAIII	04/13/00

Notes;

(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.

N/A = Not Applicable

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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)
VOCs							
Chloroform	6.1E-03	20%	3.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	07/28/00
SVOCs							
Bis(2-ethylhexyl)phthalate	1.4E-02	19%	7.4E-02	$(mg/kg/day)^{-1}$	B2	IRIS	07/28/00
Inorganics							
Arsenic	1.5E+00	41%	3.7E+00	$(mg/kg/day)^{-1}$	A	IRIS	07/28/00
Iron	N/A	15%	N/A	$(mg/kg/day)^{-1}$	N/A	N/A	N/A
Manganese	N/A	4%	N/A	$(mg/kg/day)^{-1}$	D	N/A	N/A
Thallium	N/A	15%	N/A	$(mg/kg/day)^{-1}$	N/A	N/A	N/A

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, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.

EPA Group:

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

Weight of Evidence:

Known/Likely

Cannot be Determined

Not Likely

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TABLE 7.1
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit 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	2.9	ug/L	2.9	ug/L	M	4.3E-06	mg/kg/day	2.0E-03	mg/kg/day	N/A	N/A	2.1E-03
	Arsenic	1.5	ug/L	1.5	ug/L	M	2.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.4E-03
	Iron	8370	ug/L	8370	ug/L	M	1.6E-03	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	3.6E-02
	Manganese	187	ug/L	187	ug/L	M	3.6E-05	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	4.6E-02
	Thallium	18	ug/L	18	ug/L	M	3.5E-06	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	3.3E-01
	(Total)												4.2E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.2E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.2
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 2 - Borrow Pit 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	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	6.0E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.0E-03
	(Total)												3.0E-03
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	1.7E-03	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	4.5E-01
	(Total)												4.5E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.5E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.3
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 2 - Borrow Pit Landfill
Receptor Population: Adolescent 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	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	5.5E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.7E-04
	(Total)												2.7E-04
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	4.2E-04	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.1E-01
	(Total)												1.1E-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 7.4
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 2 - Borrow Pit 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	77	ug/L	77	ug/L	M	3.5E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.8E-04
	(Total)												1.8E-04
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	4.0E-04	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.1E-01
	(Total)												1.1E-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 7.5
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Shellfish
Exposure Point: Site 2 - Borrow Pit 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	Benzo(a)pyrene equivalents	0.003	mg/kg	0.003	mg/kg	M	4.5E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	- -
	Chromium VI	1.6	mg/kg	1.6	mg/kg	M	2.1E-04	mg/kg/day	3.0E-03	mg/kg/day	N/A	N/A	7.1E-02
	(Total)												7.1E-02
												Total Hazard Index Across All Exposure Routes/Pathways	7.1E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.6
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit Landfill
Receptor Population: Child Resident
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	Chloroform	2.9	ug/L	2.9	ug/L	M	1.9E-04	mg/kg/day	1.0E-02	mg/kg/day	N/A	N/A	1.9E-02
	Arsenic	1.5	ug/L	1.5	ug/L	M	9.6E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	3.2E-01
	Iron	8370	ug/L	8370	ug/L	M	5.4E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.8E+00
	Manganese	187	ug/L	187	ug/L	M	1.2E-02	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	6.0E-01
	Thallium	18	ug/L	18	ug/L	M	1.2E-03	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.6E+01
													1.9E+01
Dermal	Chloroform	2.9	ug/L	2.9	ug/L	M	1.9E-04	mg/kg/day	1.0E-02	mg/kg/day	N/A	N/A	1.9E-02
	Arsenic	1.5	ug/L	1.5	ug/L	M	1.6E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.3E-03
	Iron	8370	ug/L	8370	ug/L	M	8.8E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	2.0E-02
	Manganese	187	ug/L	187	ug/L	M	2.0E-05	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	2.5E-02
	Thallium	18	ug/L	18	ug/L	M	1.9E-06	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	1.8E-01
	(Total)												2.4E-01
												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 7.7
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 2 - Borrow Pit Landfill
Receptor Population: Child Resident
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	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	8.2E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	4.1E-03
	(Total)												4.1E-03
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	6.6E-04	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.7E-01
	(Total)												1.7E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.8E-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: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit Landfill
Receptor Population: Adult Resident
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	Chloroform	2.9	ug/L	2.9	ug/L	M	7.9E-05	mg/kg/day	1.0E-02	mg/kg/day	N/A	N/A	7.9E-03
	Arsenic	1.5	ug/L	1.5	ug/L	M	4.1E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.4E-01
	Iron	8370	ug/L	8370	ug/L	M	2.3E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	7.6E-01
	Manganese	187	ug/L	187	ug/L	M	5.1E-03	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.6E-01
	Thallium	18	ug/L	18	ug/L	M	4.9E-04	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	7.0E+00
													8.2E+00
Dermal	Chloroform	2.9	ug/L	2.9	ug/L	M	7.9E-05	mg/kg/day	1.0E-02	mg/kg/day	N/A	N/A	7.9E-03
	Arsenic	1.5	ug/L	1.5	ug/L	M	9.2E-08	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	7.5E-04
	Iron	8370	ug/L	8370	ug/L	M	5.2E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.1E-02
	Manganese	187	ug/L	187	ug/L	M	1.2E-05	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	1.4E-02
	Thallium	18	ug/L	18	ug/L	M	1.1E-06	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	1.1E-01
	(Total)												1.4E-01
												Total Hazard Index Across All Exposure Routes/Pathways	8.4E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.9
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 2 - Borrow Pit Landfill
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	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	3.5E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.8E-04
	(Total)												1.8E-04
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	4.0E-04	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.1E-01
	(Total)												1.1E-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 8.1
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit 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	2.9	ug/L	2.9	ug/L	M	6.1E-08	mg/kg/day	3.1E-02	(mg/kg/day) $^{-1}$	1.9E-09
	Arsenic	1.5	ug/L	1.5	ug/L	M	4.2E-09	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.5E-08
	Iron	8370	ug/L	8370	ug/L	M	2.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Manganese	187	ug/L	187	ug/L	M	5.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Thallium	18	ug/L	18	ug/L	M	5.0E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.7E-08
										Total Risk Across All Exposure Routes/Pathways	1.7E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.2
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 2 - Borrow Pit 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	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	8.6E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	1.2E-08
	(Total)										1.2E-08
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	2.4E-05	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	1.8E-06
	(Total)										1.8E-06
										Total Risk Across All Exposure Routes/Pathways	1.8E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.3
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 2 - Borrow Pit Landfill
Receptor Population: Adolescent 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	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	7.8E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	1.1E-08
	(Total)										1.1E-08
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	6.0E-05	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	4.4E-06
	(Total)										4.4E-06
										Total Risk Across All Exposure Routes/Pathways	4.4E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.4
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 2 - Borrow Pit 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	77	ug/L	77	ug/L	M	3.0E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	4.2E-09
	(Total)										4.2E-09
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	3.5E-05	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	2.6E-06
	(Total)										2.6E-06
										Total Risk Across All Exposure Routes/Pathways	2.6E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.5
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCAS CHERRY POINT, NORTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Shellfish
Exposure Point: Site 2 - Borrow Pit 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	Benzo(a)pyrene equivalents	0.003	mg/kg	0.003	mg/kg	M	1.9E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.4E-06
	Chromium VI	1.6	mg/kg	1.6	mg/kg	M	9.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.4E-06
										Total Risk Across All Exposure Routes/Pathways	1.4E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.6
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit Landfill
Receptor Population: Child Resident
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	Chloroform	2.9	ug/L	2.9	ug/L	M	1.6E-05	mg/kg/day	6.1E-03	(mg/kg/day) $^{-1}$	9.7E-08
	Arsenic	1.5	ug/L	1.5	ug/L	M	8.2E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.2E-05
	Iron	8370	ug/L	8370	ug/L	M	4.6E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Manganese	187	ug/L	187	ug/L	M	1.0E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Thallium	18	ug/L	18	ug/L	M	9.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
											1.2E-05
Dermal	Chloroform	2.9	ug/L	2.9	ug/L	M	1.6E-05	mg/kg/day	6.1E-03	(mg/kg/day) $^{-1}$	9.7E-08
	Arsenic	1.5	ug/L	1.5	ug/L	M	1.4E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	5.0E-08
	Iron	8370	ug/L	8370	ug/L	M	7.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Manganese	187	ug/L	187	ug/L	M	1.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Thallium	18	ug/L	18	ug/L	M	1.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										1.5E-07
										Total Risk Across All Exposure Routes/Pathways	1.3E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.7
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 2 - Borrow Pit Landfill
Receptor Population: Child Resident
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	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	7.1E-06	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	9.9E-08
	(Total)										9.9E-08
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	5.7E-05	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	4.2E-06
	(Total)										4.2E-06
										Total Risk Across All Exposure Routes/Pathways	4.3E-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: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 2 - Borrow Pit Landfill
Receptor Population: Adult Resident
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	Chloroform	2.9	ug/L	2.9	ug/L	M	2.7E-05	mg/kg/day	6.1E-03	(mg/kg/day) $^{-1}$	1.7E-07
	Arsenic	1.5	ug/L	1.5	ug/L	M	1.4E-05	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.1E-05
	Iron	8370	ug/L	8370	ug/L	M	7.9E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Manganese	187	ug/L	187	ug/L	M	1.8E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Thallium	18	ug/L	18	ug/L	M	1.7E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
											2.1E-05
Dermal	Chloroform	2.9	ug/L	2.9	ug/L	M	2.7E-05	mg/kg/day	6.1E-03	(mg/kg/day) $^{-1}$	1.7E-07
	Arsenic	1.5	ug/L	1.5	ug/L	M	3.2E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.2E-07
	Iron	8370	ug/L	8370	ug/L	M	1.8E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Manganese	187	ug/L	187	ug/L	M	4.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	Thallium	18	ug/L	18	ug/L	M	3.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	- -
	(Total)										2.8E-07
										Total Risk Across All Exposure Routes/Pathways	2.2E-05

(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 2 - Borrow Pit Landfill
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	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	1.2E-06	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	1.7E-08
	(Total)										1.7E-08
Dermal	Bis(2-ethylhexyl)phthalate	77	ug/L	77	ug/L	M	1.4E-04	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	1.0E-05
	(Total)										1.0E-05
										Total Risk Across All Exposure Routes/Pathways	1.0E-05

(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
Groundwater	Groundwater	Site 2 - Borrow Pit Landfill	Chloroform	--	--	1.9E-09	1.9E-09	Chloroform	Liver	--	--	2.1E-03	2.1E-03
			Arsenic	--	--	1.5E-08	1.5E-08	Arsenic	Skin	--	--	2.4E-03	2.4E-03
			Iron	--	--	--	--	Iron	Liver	--	--	3.6E-02	3.6E-02
			Manganese	--	--	--	--	Manganese	CNS	--	--	4.6E-02	4.6E-02
			Thallium	--	--	--	--	Thallium	Liver, Blood	--	--	3.3E-01	3.3E-01
			(Total)	--	--	1.7E-08	1.7E-08	(Total)		--	--	4.2E-01	4.2E-01
Surface Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	1.2E-08	--	1.8E-06	1.8E-06	Bis(2-ethylhexyl)phthalate	Liver	3.0E-03	--	4.5E-01	4.5E-01
			(Total)	1.2E-08	--	1.8E-06	1.8E-06	(Total)		3.0E-03	--	4.5E-01	4.5E-01

Total Risk Across Groundwater	1.7E-08
Total Risk Across Surface Water	1.8E-06
Total Risk Across All Media and All Exposure Routes	1.8E-06

Total Hazard Index Across All Media and All Exposure Routes	8.7E-01

Total Skin HI	2.4E-03
Total Liver HI	8.3E-01
Total CNS HI	4.6E-02
Total Blood HI	3.3E-01

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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: Current/Future
Receptor Population: Adolescent 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 Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	1.1E-08	- -	4.4E-06	4.4E-06	Bis(2-ethylhexyl)phthalate	Liver	2.7E-04	- -	1.1E-01	1.1E-01
			(Total)	1.1E-08	- -	4.4E-06	4.4E-06	(Total)		2.7E-04	- -	1.1E-01	1.1E-01
			Total Risk Across Surface Water				4.4E-06	Total Hazard Index Across All Media and All Exposure Routes					1.1E-01
			Total Risk Across All Media and All Exposure Routes				4.4E-06						

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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: 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	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	4.2E-09	- -	2.6E-06	2.6E-06	Bis(2-ethylhexyl)phthalate	Liver	1.8E-04	- -	1.1E-01	1.1E-01
			(Total)	4.2E-09	- -	2.6E-06	2.6E-06	(Total)		1.8E-04	- -	1.1E-01	1.1E-01
Surface Water	Shellfish	Site 2 - Borrow Pit Landfill	Benzo(a)pyrene equivalents	1.4E-06	- -	- -	1.4E-06	Benzo(a)pyrene equivalents	NA	NA	- -	- -	- -
			Chromium VI	- -	- -	- -	- -	Chromium VI	None Reported	7.1E-02	- -	- -	7.1E-02
			(Total)	1.4E-06	- -	- -	1.4E-06	(Total)		7.1E-02	- -	- -	7.1E-02

Total Risk Across Surface Water	2.6E-06
Total Risk Across Fish Tissue	1.4E-06
Total Risk Across All Media and All Exposure Routes	4.0E-06

Total Hazard Index Across All Media and All Exposure Routes	1.8E-01
Total Liver HI	1.1E-01
Total None Reported	7.1E-02

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TABLE 9.4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Child Resident
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
Groundwater	Groundwater	Site 2 - Borrow Pit Landfill	Chloroform	9.7E-08	9.7E-08	- -	1.9E-07	Chloroform	Liver	1.9E-02	1.9E-02	- -	3.7E-02
			Arsenic	1.2E-05	- -	5.0E-08	1.2E-05	Arsenic	Skin	3.2E-01	- -	1.3E-03	3.2E-01
			Iron	- -	- -	- -	- -	Iron	Liver	1.8E+00	- -	2.0E-02	1.8E+00
			Manganese	- -	- -	- -	- -	Manganese	CNS	6.0E-01	- -	2.5E-02	6.2E-01
			Thallium	- -	- -	- -	- -	Thallium	Liver, Blood	1.6E+01	- -	1.8E-01	1.7E+01
			(Total)	1.2E-05	9.7E-08	5.0E-08	1.3E-05	(Total)		1.9E+01	1.9E-02	2.3E-01	1.9E+01
Surface Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	9.9E-08	- -	4.2E-06	4.3E-06	Bis(2-ethylhexyl)phthalate	Liver	4.1E-03	- -	1.7E-01	1.8E-01
			(Total)	9.9E-08	- -	4.2E-06	4.3E-06	(Total)		4.1E-03	- -	1.7E-01	1.8E-01

Total Risk Across Groundwater	1.3E-05
Total Risk Across Surface Water	4.3E-06
Total Risk Across All Media and All Exposure Routes	1.7E-05

Total Hazard Index Across All Media and All Exposure Routes	2.0E+01
Total Skin HI	3.2E-01
Total Liver HI	1.9E+01
Total CNS HI	6.2E-01
Total Blood HI	1.7E+01

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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: Current/Future
Receptor Population: Adult Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			
				Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Site 2 - Borrow Pit Landfill	Chloroform	1.7E-07	1.7E-07	- -	3.3E-07
			Arsenic	2.1E-05	- -	1.2E-07	2.1E-05
			Iron	- -	- -	- -	- -
			Manganese	- -	- -	- -	- -
			Thallium	- -	- -	- -	- -
			(Total)	2.1E-05	1.7E-07	1.2E-07	2.2E-05
Surface Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	1.7E-08	- -	1.0E-05	1.0E-05
			(Total)	1.7E-08	- -	1.0E-05	1.0E-05

Total Risk Across Groundwater	2.2E-05
Total Risk Across Surface Water	1.0E-05
Total Risk Across All Media and All Exposure Routes	3.2E-05

Chemical	Non-Carcinogenic Hazard Quotient				
	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Chloroform	Liver	7.9E-03	7.9E-03	- -	1.6E-02
Arsenic	Skin	1.4E-01	- -	7.5E-04	1.4E-01
Iron	Liver	7.6E-01	- -	1.1E-02	7.8E-01
Manganese	CNS	2.6E-01	- -	1.4E-02	2.7E-01
Thallium	Liver, Blood	7.0E+00	- -	1.1E-01	7.2E+00
(Total)		8.2E+00	7.9E-03	1.3E-01	8.4E+00
Bis(2-ethylhexyl)phthalate	Liver	1.8E-04	- -	1.1E-01	1.1E-01
(Total)		1.8E-04	- -	1.1E-01	1.1E-01

Total Hazard Index Across All Media and All Exposure Routes	8.5E+00

Total Skin HI	1.4E-01
Total Liver HI	7.3E+00
Total CNS HI	2.7E-01
Total Blood HI	7.2E+00

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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: Current/Future
Receptor Population: Lifetime Resident
Receptor Age: Child/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
Groundwater	Groundwater	Site 2 - Borrow Pit Landfill	Chloroform	2.6E-07	2.6E-07	--	5.3E-07	Chloroform	Liver	--	--	--	--
			Arsenic	3.3E-05	--	1.7E-07	3.4E-05	Arsenic	Skin	--	--	--	--
			Iron	--	--	--	--	Iron	Liver	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			Thallium	--	--	--	--	Thallium	Liver, Blood	--	--	--	--
			(Total)	3.4E-05	2.6E-07	1.7E-07	3.4E-05	(Total)		--	--	--	--
Surface Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	1.2E-07	--	1.4E-05	1.4E-05	Bis(2-ethylhexyl)phthalate	Liver	--	--	--	--
			(Total)	1.2E-07	--	1.4E-05	1.4E-05	(Total)		--	--	--	--
						Total Risk Across Groundwater	3.4E-05	Total Hazard Index Across All Media and All Exposure Routes					--
						Total Risk Across Surface Water	1.4E-05						
						Total Risk Across All Media and All Exposure Routes	4.9E-05						

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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
Groundwater	Groundwater	Site 2 - Borrow Pit Landfill	Chloroform	--	--	1.9E-09	1.9E-09	Chloroform	Liver	--	--	2.1E-03	2.1E-03
			Arsenic	--	--	1.5E-08	1.5E-08	Arsenic	Skin	--	--	2.4E-03	2.4E-03
			Iron	--	--	--	--	Iron	Liver	--	--	3.6E-02	3.6E-02
			Manganese	--	--	--	--	Manganese	CNS	--	--	4.6E-02	4.6E-02
			Thallium	--	--	--	--	Thallium	Liver, Blood	--	--	3.3E-01	3.3E-01
			(Total)	--	--	1.7E-08	1.7E-08	(Total)		--	--	4.2E-01	4.2E-01
Surface Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	1.2E-08	--	1.8E-06	1.8E-06	Bis(2-ethylhexyl)phthalate	Liver	3.0E-03	--	4.5E-01	4.5E-01
			(Total)	1.2E-08	--	1.8E-06	1.8E-06	(Total)		3.0E-03	--	4.5E-01	4.5E-01

Total Risk Across Groundwater	1.7E-08
Total Risk Across Surface Water	1.8E-06
Total Risk Across All Media and All Exposure Routes	1.8E-06
Total Hazard Index Across All Media and All Exposure Routes	8.7E-01
Total Skin HI	2.4E-03
Total Liver HI	8.3E-01
Total CNS HI	4.6E-02
Total Blood HI	3.3E-01

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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: Current/Future
Receptor Population: Adolescent 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 Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	1.1E-08	- -	4.4E-06	4.4E-06	Bis(2-ethylhexyl)phthalate	Liver	2.7E-04	- -	1.1E-01	1.1E-01
			(Total)	1.1E-08	- -	4.4E-06	4.4E-06	(Total)		2.7E-04	- -	1.1E-01	1.1E-01
						Total Risk Across Surface Water	4.4E-06					Total Hazard Index Across All Media and All Exposure Routes	1.1E-01
						Total Risk Across All Media and All Exposure Routes	4.4E-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: 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	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	4.2E-09	- -	2.6E-06	2.6E-06	Bis(2-ethylhexyl)phthalate	Liver	1.8E-04	- -	1.1E-01	1.1E-01
			(Total)	4.2E-09	- -	2.6E-06	2.6E-06	(Total)		1.8E-04	- -	1.1E-01	1.1E-01
Surface Water	Shellfish	Site 2 - Borrow Pit Landfill	Benzo(a)pyrene equivalents	1.4E-06	- -	- -	1.4E-06	Benzo(a)pyrene equivalents	NA	NA	- -	- -	- -
			Chromium VI	- -	- -	- -	- -	Chromium VI	None Reported	7.1E-02	- -	- -	7.1E-02
			(Total)	1.4E-06	- -	- -	1.4E-06	(Total)		7.1E-02	- -	- -	7.1E-02

Total Risk Across Surface Water	2.6E-06
Total Risk Across Fish Tissue	1.4E-06
Total Risk Across All Media and All Exposure Routes	2.6E-06

Total Hazard Index Across All Media and All Exposure Routes	1.8E-01
Total Liver HI	1.1E-01
Total None Reported	7.1E-02

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TABLE 10.4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Child Resident
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
Groundwater	Groundwater	Site 2 - Borrow Pit Landfill	Arsenic	1.2E-05	- -	5.0E-08	1.2E-05	Arsenic	Skin	3.2E-01	- -	1.3E-03	3.2E-01
			Iron	- -	- -	- -	- -	Iron	Liver	1.8E+00	- -	2.0E-02	1.8E+00
			Thallium	- -	- -	- -	- -	Thallium	Liver, Blood	1.6E+01	- -	1.8E-01	1.7E+01
			(Total)	1.2E-05	- -	5.0E-08	1.2E-05	(Total)		1.9E+01	- -	2.0E-01	1.9E+01
Surface Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	9.9E-08	- -	4.2E-06	4.3E-06	Bis(2-ethylhexyl)phthalate	Liver	4.1E-03	- -	1.7E-01	1.8E-01
			(Total)	9.9E-08	- -	4.2E-06	4.3E-06	(Total)		4.1E-03	- -	1.7E-01	1.8E-01
						Total Risk Across Groundwater	1.2E-05					Total Hazard Index Across All Media and All Exposure Routes	1.9E+01
						Total Risk Across Surface Water	4.3E-06						
						Total Risk Across All Media and All Exposure Routes	1.7E-05						

Total Skin HI	3.2E-01
Total Liver HI	1.9E+01
Total Blood HI	1.7E+01

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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: Current/Future
Receptor Population: Adult Resident
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
Groundwater	Groundwater	Site 2 - Borrow Pit Landfill	Arsenic	2.1E-05	--	1.2E-07	2.1E-05	Arsenic	Skin	1.4E-01	--	7.5E-04	1.4E-01
			Thallium	--	--	--	--	Thallium	Liver, Blood	7.0E+00	--	1.1E-01	7.2E+00
			(Total)	2.1E-05	--	1.2E-07	2.1E-05	(Total)		7.2E+00	--	1.1E-01	7.3E+00
Surface Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	1.7E-08	--	1.0E-05	1.0E-05	Bis(2-ethylhexyl)phthalate	Liver	1.8E-04	--	1.1E-01	1.1E-01
			(Total)	1.7E-08	--	1.0E-05	1.0E-05	(Total)		1.8E-04	--	1.1E-01	1.1E-01

Total Risk Across Groundwater	2.1E-05
Total Risk Across Surface Water	1.0E-05
Total Risk Across All Media and All Exposure Routes	3.1E-05

Total Hazard Index Across All Media and All Exposure Routes	7.4E+00
Total Skin HI	1.4E-01
Total Liver HI	7.3E+00
Total Blood HI	7.2E+00

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TABLE 10.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Lifetime Resident
Receptor Age: Child/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
Groundwater	Groundwater	Site 2 - Borrow Pit Landfill	Arsenic	3.3E-05	--	1.7E-07	3.4E-05	Arsenic	Skin	--	--	--	--
			Iron	--	--	--	--	Iron	Liver	--	--	--	--
			Thallium	--	--	--	--	Thallium	Liver, Blood	--	--	--	--
			(Total)	3.3E-05	--	1.7E-07	3.4E-05	(Total)		--	--	--	--
Surface Water	Surface Water	Site 2 - Borrow Pit Landfill	Bis(2-ethylhexyl)phthalate	1.2E-07	--	1.4E-05	1.4E-05	Bis(2-ethylhexyl)phthalate	Liver	--	--	--	--
			(Total)	1.2E-07	--	1.4E-05	1.4E-05	(Total)		--	--	--	--
						Total Risk Across Groundwater	3.4E-05					Total Hazard Index Across All Media and All Exposure Routes	--
						Total Risk Across Surface Water	1.4E-05						
						Total Risk Across All Media and All Exposure Routes	4.8E-05						

APPENDIX E.3

SUPPORTING INFORMATION

EPA Region III RBC Table
April 13, 2000

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SUBJECT: Risk-Based Concentration Table **DATE:** 4/13/2000

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, 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 (Reference Concentrations) 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, dermal contact, and other pathways not included in the RBCs are not expected to be significant;

4. The exposure scenarios and assumptions used in the RBC table are appropriate for the site;

5. The fixed risk levels used in the RBC table are appropriate for the site; and

6. Risk to ecological receptors is not expected to be significant;

the RBCs would probably be protective as no-action levels or cleanup goals. However, to the extent that a site deviates from this description, as most do, the RBCs would not necessarily be appropriate.

To summarize, the Table should generally not be used to set cleanup or no-action levels at CERCLA sites or RCRA Corrective Action sites, to substitute for EPA guidance for preparing baseline risk assessments, or to determine if a waste is hazardous under RCRA.

SPECIAL NOTES

The RBC Table was originally developed by Roy L. Smith, Ph.D., for use by risk assessors in the Region III Superfund program. Dr. Smith is no longer with Region III, and the Table continues to evolve. You may notice some modifications of formatting and conventions used in the Table.

For instance, besides formatting, the following changes are noteworthy:

C 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.

C Certain outdated and withdrawn numbers have been removed from the Table.

C 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.

C 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.

C 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 eighteen 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" is in accordance with RAGS Part B: chemicals with Henry's Law constants greater than 1E-5 <u>and</u> 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.

- 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. However, for generic use in Region III, the table now contains soil-to-groundwater SSLs in accordance with the new guidance. For more information, see the Region III memo on SSLs, or consult the national SSL guidance directly (<u>Soil Screening Guidance: User's Guide</u>, April 1996, Publication 9355.4-23; and <u>Soil Screening Guidance: Technical Background Document</u>, May 1996; EPA/540/R-95/128).

FREQUENTLY ASKED QUESTIONS

To help you better understand the RBC Table, here are answers to our most often-asked questions:

1. How can the age-adjusted inhalation factor (11.66) be less than the inhalation rate for either a child (12) or an adult (20)?

   Age-adjusted factors are not intake rates, but rather partial calculations which have different units from intake rates. (Therefore, they are not directly comparable.) The fact that these partial calculations have values similar to intake rates is really coincidental, an artifact of the similar magnitude of years of exposure and time-averaged body weight.

2. For manganese, IRIS shows an oral RfD of 0.14 mg/kg/day, but the RBC Table uses 2E-2 mg/kg/day. Why?

The IRIS RfD includes manganese from all sources, including diet. The explanatory text in IRIS recommends using a modifying factor of 3 when calculating risks associated with non-food sources, and the Table follows this recommendation. IRIS also recommends subtracting dietary exposure (default assumption in this case 5 mg). Thus, the IRIS RfD has been lowered by a factor of 2 x 3, or 6. The Table now reflects manganese RBCs for both "food" and "non-food" (most environmental) sources.

3. What is the source of the child's inhalation rate of 12 m^3/day?

The calculation comes from basic physiology. It's a scaling of the mass-specific 20 m^3/day rate for adults from a body mass of 70 kg to 15 kg, using the 2/3 power of mass, as follows:

Ircm = mass-specific child inhalation rate (m^3/kg/day)
Irc = child inhalation rate (m^3/day)

20 m^3/day / 70 kg = 0.286 m^3/kg/day (mass-specific adult inhalation rate)

0.286 m^3/kg/day x ($70^{0.67}$) = (Ircm) x ($15^{0.67}$)

Ircm = 0.803 m^3/kg/day

Irc = Ircm x 15 kg = 0.803 m^3/kg/day x 15 kg = 12.04 m^3/day

4. Can the oral RfDs in the RBC Table be applied to dermal exposure?

Not directly. Oral RfDs are usually based on administered dose and therefore tacitly include a GI absorption factor. Thus, any use of oral RfDs in dermal risk calculations should involve removing this absorption factor. Consult the Risk Assessment Guidance for Superfund, Part A, Appendix A, for further details on how to do this.

5. The exposure variables table in the RBC background document lists the averaging time for non-carcinogens as "ED*365." What does that mean?

ED is exposure duration, in years, and * is the computer-ese symbol for multiplication. Multiplying ED by 365 simply converts the duration to days. In fact, the ED term is included in both the numerator and denominator of the RBC algorithms for non-cancer risk, canceling it altogether. See RAGS for more information.

6. Why is inorganic lead not included in the RBC Table?

EPA has no consensus RfD or CSF for inorganic lead, so it is not possible to calculate

RBCs as we have done for other chemicals. EPA considers lead to be a special case because of the difficulty in identifying the classic "threshold" needed to develop an RfD.

EPA therefore evaluates lead exposure by using blood-lead modeling, such as the Integrated Exposure-Uptake Biokinetic Model (IEUBK). The EPA Office of Solid Waste has also released a detailed directive on risk assessment and cleanup of residential soil lead. The directive recommends that soil lead levels less than 400 mg/kg are generally safe for residential use. Above that level, the document suggests collecting data and modeling blood-lead levels with the IEUBK model. For the purposes of screening, therefore, 400 mg/kg is recommended for residential soils. For water, we suggest 15 ug/l (the EPA Action Level in water), and for air, the National Ambient Air Quality Standard.

7. Where did the CSFs for carcinogenic PAHs come from?

The PAH CSFs are all calculated relative to benzo[a]pyrene, which has an IRIS slope factor. The relative factors for the other PAHs can be found in "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons," Final Draft, ECAO-CIN-842 (March, 1993).

8. May I please have a copy of a previous RBC Table?

We do not distribute outdated copies of the RBC Table. Each new version of the Table supersedes all previous versions.

9. Please elaborate on the meaning of the "W" source code in the Table.

The "W" code means that a RfD or CSF is currently not present on either IRIS or HEAST, but that it was once present on either IRIS or HEAST and was removed. Such withdrawal usually indicates that consensus on the number no longer exists among EPA scientists, but not that EPA believes the contaminant to be unimportant.

Withdrawn numbers are shown in the Table because we still need to deal with these contaminants during the long delays before replacement numbers are ready. For the purpose of screening, a "W" value is similar to a provisional value in that neither value has achieved Agency consensus. The "W" code should serve as a clear warning that before making any serious decision involving that contaminant, you will need to develop an interim value based on current scientific understanding.

If you are assessing risks at a site where a major contaminant is coded "W," consider working with your Region EPA risk assessor to develop a current toxicity constant. If the site is being studied under CERCLA, the EPA-NCEA Regional Technical Support group may be able to assist.

10. Can I get copies of supporting documents for interim toxicity constants which are coded "E" in the RBC Table?

Unfortunately, Region 3 does not have a complete set of supporting documents. The EPA-NCEA Superfund Technical Support Center prepares these interim toxicity constants in response to site-specific requests from Regional risk assessors, and sends the documentation only to the requestor. The RBC Tables contain only the latest interim values that we've either requested or have otherwise received. NCEA maintains the master data base of these chemicals, but will not release documentation of provisional values unless they are recent. Furthermore, since NCEA's Superfund Technical Support Center is mainly for the support of Superfund, it usually cannot develop new criteria unless authorized to do so for a specific Superfund project.

If an "E"-coded contaminant is a chemical of potential concern at your site, we urge you to work with the EPA Regional risk assessor assigned to the project in order to develop or obtain documentation for provisional values. EPA Region 3 furnishes documents only when needed to support Regional risk assessments or recommendations.

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., Toxicologist
revised 4/12/99 by Jennifer Hubbard, Toxicologist

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	Symboll
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, unless NCEA indicated a newer provisional value was superior to an older HEAST value. 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} and a molecular weight less than 200 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 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	Soil Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
ACETALDEHYDE	75-07-0			2.57E-03 I	7.7E-03 I	y	1.6E+00 C	8.1E-01 C				3.8E-04	7.7E-03 C
ACETOCHLOR	34256-82-1	2E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N		
ACETONE	67-64-1	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	1.2E-01	2.5E+00 N
ACETONITRILE	75-05-8			1.7E-02 I		y	1.2E+02 N	6.2E+01 N				2.9E-02	5.8E-01 N
ACETOPHENONE	98-86-2	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	1.1E-05	2.2E-04 N
ACROLEIN	107-02-8	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	1.0E-05	2.0E-04 N
ACRYLAMIDE	79-06-1	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	3.7E-06	7.4E-05 C
ACRYLONITRILE	107-13-1	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	7.4E-06	1.5E-04 C
ALACHLOR	15972-60-8	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	3.5E-04	7.0E-03 C
ALAR	1596-84-5	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	116-06-3	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N	1.0E-02	2.1E-01 N
ALDICARB SULFONE	1646-88-4	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N	7.5E-03	1.5E-01 N
ALDRIN	309-00-2	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	3.8E-04	7.7E-03 C
ALUMINUM	7429-90-5	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	504-24-5	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	7664-41-7			2.86E-02 I		y	2.1E+02 N	1.0E+02 N					
ANILINE	62-53-3	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 I	6.8E-03	1.4E-01 C
ANTIMONY	7440-36-0	4.00E-04 I					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N	6.6E-01	1.3E+01 N
ANTIMONY PENTOXIDE	1314-60-9	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	1332-81-6	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	1309-64-4	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	7440-38-2	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	1.3E-03	2.6E-02 C
ARSINE	7784-42-1			1.40E-05 I		y	1.0E-01 N	5.1E-02 N					
ASSURE	76578-14-8	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	1912-24-9	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	4.4E-04	8.8E-03 C
AZOBENZENE	103-33-3		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	1.8E-03	3.5E-02 C
BARIUM	7440-39-3	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	1.1E+02	2.1E+03 N
BAYGON	114-26-1	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	68359-37-5	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	25057-89-0	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	100-52-7	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	71-43-2	3.00E-03 E	5.5E-02 I	1.70E-03 E	2.90E-02 I	y	3.2E-01 C	2.2E-01 C	5.7E-02 C	1.0E+02 C	1.2E+01 C	9.0E-05	1.8E-03 C
BENZENETHIOL	108-98-5	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	92-87-5	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	65-85-0	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	100-51-6	3.00E-01 H					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N	4.4E+00	8.8E+01 N
BENZYL CHLORIDE	100-44-7		0.17 I			y	6.2E-02 C	3.7E-02 C	1.9E-02 C	3.4E+01 C	3.8E+00 C	1.9E-05	3.7E-04 C
BERYLLIUM	7440-41-7	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	5.8E+01	1.2E+03 N
BIPHENYL	92-52-4	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	4.8E+00	9.6E+01 N
BIS(2-CHLOROETHYL)ETHER	111-44-4		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	2.2E-06	4.4E-05 C
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	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	8.4E-05	1.7E-03 C
BIS(CHLOROMETHYL)ETHER	542-88-1		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	9.7E-09	1.9E-07 C
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	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	1.4E+02	2.9E+03 C
BORON	7440-42-8	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	75-27-4	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	5.4E-05	1.1E-03 C
BROMOETHENE	593-60-2			8.6E-04 I	1.10E-01 H	y	1.1E-01 C	5.7E-02 C				5.4E-05	1.1E-03 C
BROMOFORM	75-25-2	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	2.0E-01	4.1E+00 C
BROMOMETHANE	74-83-9	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	2.1E-03	4.1E-02 N
BROMOPHOS	2104-96-3	5.00E-03 H					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N		
1,3-BUTADIENE	106-99-0				1.80E+00 H	y	7.0E-03 C	3.5E-03 C				3.9E-06	7.8E-05 C
1-BUTANOL	71-36-3	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N	7.8E-01	1.6E+01 N
BUTYLBENZYLPHTHALATE	85-68-7	2.00E-01 I					7.3E+03 N	7.3E+02 N	2.7E+02 N	4.1E+05 N	1.6E+04 N	8.4E+02	1.7E+04 N
BUTYLATE	2008-41-5	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N		
**N-BUTYLBENZENE	104-51-8	4.00E-02 E				y	2.4E+02 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N		
**SEC-BUTYLBENZENE	135-98-8	4.00E-02 E				y	2.4E+02 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N		
**TERT-BUTYLBENZENE	98-06-6	4.00E-02 E				y	2.4E+02 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N		

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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 1 = 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	Soil Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
CADMIUM-WATER	7440-43-9	5.00E-04 I		5.7E-05 E	6.30E+00 I		1.8E+01 N	9.9E-04 C	6.8E-01 N	1.0E+03 N	3.9E+01 N	1.4E+00	2.7E+01 N
CADMIUM-FOOD	7440-43-9	1.00E-03 I		5.7E-05 E	6.30E+00 I		3.7E+01 N	9.9E-04 C	1.4E+00 N	2.0E+03 N	7.8E+01 N	2.7E+00	5.5E+01 N
CAPROLACTAM	105-60-2	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	63-25-2	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N	1.5E+00	3.0E+01 N
CARBON DISULFIDE	75-15-0	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	9.5E-01	1.9E+01 N
CARBON TETRACHLORIDE	56-23-5	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	1.1E-04	2.1E-03 C
CARBOSULFAN	55285-14-8	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	75-87-6	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	118-75-2		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	57-74-9	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	4.6E-02	9.2E-01 C
CHLORINE	7782-50-5	1.00E-01 I		5.7E-05 E		y	4.2E-01 N	2.1E-01 N	1.4E+02 N	2.0E+05 N	7.8E+03 N		
CHLORINE DIOXIDE	10049-04-4			5.70E-05 I		y	4.2E-01 N	2.1E-01 N					
CHLOROACETIC ACID	79-11-8	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	106-47-8	4.00E-03 I					1.5E+02 N	1.5E+01 N	5.4E+00 N	8.2E+03 N	3.1E+02 N	4.8E-02	9.7E-01 N
CHLOROBENZENE	108-90-7	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	4.0E-02	8.0E-01 N
CHLOROBENZILATE	510-15-6	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	1.3E-03	2.7E-02 C
P-CHLOROBENZOIC ACID	74-11-3	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	126-99-8	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	6.0E-03	1.2E-01 N
1-CHLOROBUTANE	109-69-3	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	1.0E+00	2.0E+01 N
1-CHLORO-1,1-DIFLUOROETHANE	75-68-3			1.40E+01 I		y	1.0E+05 N	5.1E+04 N				7.0E+01	1.4E+03 N
CHLORODIFLUOROMETHANE	75-45-6			1.40E+01 I		y	1.0E+05 N	5.1E+04 N				7.0E+01	1.4E+03 N
CHLOROETHANE	75-00-3	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	9.6E-04	1.9E-02 C
CHLOROFORM	67-66-3	1.00E-02 I	6.10E-03 I	8.6E-05 E	8.10E-02 I	y	1.5E-01 C !	7.7E-02 C !	5.2E-01 C	9.4E+02 C	1.0E+02 C !	4.5E-05	8.9E-04 C
CHLOROMETHANE	74-87-3		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	5.2E-04	1.0E-02 C
4-CHLORO-2-METHYLANILINE	95-69-2		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	91-58-7	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	1.6E+00	3.2E+01 N
O-CHLORONITROBENZENE	88-73-3		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	100-00-5		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	95-57-8	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	75-29-6			2.90E-02 H		y	2.1E+02 N	1.1E+02 N				6.6E-02	1.3E+00 N
O-CHLOROTOLUENE	95-49-8	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	6.5E-02	1.3E+00 N
CHLORPYRIFOS	2921-88-2	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N	3.2E+00	6.3E+01 N
CHLORPYRIFOS-METHYL	5598-13-0	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	16065-83-1	1.50E+00 I					5.5E+04 N	5.5E+03 N	2.0E+03 N	3.1E+06 N	1.2E+05 N	9.9E+07	2.0E+09 N
CHROMIUM VI	18540-29-9	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	2.1E+00	4.2E+01 N
COBALT	7440-48-4	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)	8007-45-2				2.2 I			2.8E-03 C					
COPPER	7440-50-8	4.00E-02 H					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N	5.3E+02	1.1E+04 N
CROTONALDEHYDE	123-73-9		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	1.5E-05	3.1E-04 C
CUMENE	98-82-8	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	3.2E+00	6.4E+01 N
CYANIDE (FREE)	57-12-5	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N	7.4E+00	1.5E+02 N
CALCIUM CYANIDE	592-01-8	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	544-92-3	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	21725-46-2	2.00E-03 H	8.40E-01 H				8.0E-02 C	7.5E-03 C	3.8E-03 C	6.8E+00 C	7.6E-01 C	2.6E-05	5.3E-04 C
CYANOGEN	460-19-5	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	506-68-3	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	506-77-4	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	74-90-8	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	1.1E-01	2.2E+00 N
POTASSIUM CYANIDE	151-50-8	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	506-61-6	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	506-64-9	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N	3.1E+01	6.2E+02 N
SODIUM CYANIDE	143-33-9	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		5.00E-02 E					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N		
ZINC CYANIDE	557-21-1	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N	1.1E+02	2.3E+03 N
CYCLOHEXANONE	108-94-1	5.00E+00 I					1.8E+05 N	1.8E+04 N	6.8E+03 N	1.0E+07 N	3.9E+05 N	6.1E+01	1.2E+03 N
CYHALOTHRIN/KARATE	68085-85-8	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	52315-07-8	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 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	Soil Residential mg/kg	Region III SSLs, Soil, for groundwater migration: DAF 1 mg/kg	DAF 20 mg/kg
DACTHAL	1861-32-1	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	75-99-0	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N	3.5E-01	7.1E+00 N
DDD	72-54-8		2.40E-01 I				2.8E-01 C	2.6E-02 C	1.3E-02 C	2.4E+01 C	2.7E+00 C	5.6E-01	1.1E+01 C
DDE	72-55-9		3.40E-01 I				2.0E-01 C	1.8E-02 C	9.3E-03 C	1.7E+01 C	1.9E+00 C	1.8E+00	3.5E+01 C
DDT	50-29-3	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	5.8E-02	1.2E+00 C
DIAZINON	333-41-5	9.00E-04 H					3.3E+01 N	3.3E+00 N	1.2E+00 N	1.8E+03 N	7.0E+01 N	2.1E-02	4.3E-01 N
DIBENZOFURAN	132-64-9	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	3.8E-01	7.7E+00 N
1,4-DIBROMOBENZENE	106-37-6	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	124-48-1	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	4.1E-05	8.3E-04 C
1,2-DIBROMO-3-CHLOROPROPANE	96-12-8		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	4.4E-05	8.7E-04 C
1,2-DIBROMOETHANE	106-93-4		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	4.3E-07	8.5E-06 C
DIBUTYLPHTHALATE	84-74-2	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N	2.5E+02	5.0E+03 N
DICAMBA	1918-00-9	3.00E-02 I					1.1E+03 N	1.1E+02 N	4.1E+01 N	6.1E+04 N	2.3E+03 N	2.2E-01	4.5E+00 N
1,2-DICHLOROBENZENE	95-50-1	9.00E-02 I				y	5.5E+02 N	3.3E+02 N	1.2E+02 N	1.8E+05 N	7.0E+03 N	4.6E-01	9.3E+00 N
1,3-DICHLOROBENZENE	541-73-1	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	4.4E-03	8.7E-02 N
1,4-DICHLOROBENZENE	106-46-7	3.00E-02 E	2.40E-02 H	2.29E-01 I	2.2E-02 E	y	4.7E-01 C	2.8E-01 C	1.3E-01 C	2.4E+02 C	2.7E+01 C	3.6E-04	7.1E-03 C
3,3'-DICHLOROBENZIDINE	91-94-1		4.50E-01 I				1.5E-01 C	1.4E-02 C	7.0E-03 C	1.3E+01 C	1.4E+00 C	2.5E-04	4.9E-03 C
1,4-DICHLORO-2-BUTENE	764-41-0				9.30E+00 H	y	1.3E-03 C	6.7E-04 C				4.0E-07	8.0E-06 C
DICHLORODIFLUOROMETHANE	75-71-8	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	5.5E-01	1.1E+01 N
1,1-DICHLOROETHANE	75-34-3	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	2.3E-01	4.5E+00 N
1,2-DICHLOROETHANE	107-06-2	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	5.2E-05	1.0E-03 C
1,1-DICHLOROETHENE	75-35-4	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	1.8E-05	3.6E-04 C
CIS-1,2-DICHLOROETHENE	156-59-2	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	1.7E-02	3.5E-01 N
TRANS-1,2-DICHLOROETHENE	156-60-5	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	4.1E-02	8.2E-01 N
TOTAL 1,2-DICHLOROETHENE	540-59-0	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	1.9E-02	3.7E-01 N
2,4-DICHLOROPHENOL	120-83-2	3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N	6.0E-02	1.2E+00 N
2,4-D	94-75-7	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N	4.5E-01	9.0E+00 N
4-(2,4-DICHLOROPHENOXY)BUTYRIC ACID	94-82-6	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	78-87-5		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	1.0E-04	2.1E-03 C
2,3-DICHLOROPROPANOL	616-23-9	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	542-75-6	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	2.7E-05	5.5E-04 C
DICHLORVOS	62-73-7	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	5.5E-05	1.1E-03 C
DICOFOL	115-32-2		4.4E-01 W				1.5E-01 C	1.4E-02 C	7.2E-03 C	1.3E+01 C	1.5E+00 C	9.3E-04	1.9E-02 C
DICYCLOPENTADIENE	77-73-6	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	60-57-1	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	1.1E-04	2.2E-03 C
DIESEL EMISSIONS				1.40E-03 I				5.1E+00 N					
DIETHYLPHTHALATE	84-66-2	8.00E-01 I					2.9E+04 N	2.9E+03 N	1.1E+03 N	1.6E+06 N	6.3E+04 N	2.3E+01	4.5E+02 N
DIETHYLENE GLYCOL, MONOBUTYL ETHER	112-34-5			5.70E-03 H				2.1E+01 N					
DIETHYLENE GLYCOL, MONOETHYL ETHER	111-90-0	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	103-23-1	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	56-53-1		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)	43222-48-6	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	75-37-6			1.10E+01 I		y	8.0E+04 N	4.0E+04 N					
DIISOPROPYL METHYLPHOSPHONATE (DIMP)	1445-75-6	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	119-90-4		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	124-40-3			5.70E-06 W		y	4.2E-02 N	2.1E-02 N				8.5E-06	1.7E-04 N
2,4-DIMETHYLANILINE HYDROCHLORIDE	21436-96-4		5.80E-01 H				1.2E-01 C	1.1E-02 C	5.4E-03 C	9.9E+00 C	1.1E+00 C		
2,4-DIMETHYLANILINE	95-68-1		7.50E-01 H				8.9E-02 C	8.3E-03 C	4.2E-03 C	7.6E+00 C	8.5E-01 C		
N,N-DIMETHYLANILINE	121-69-7	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	119-93-7		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	57-14-7		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	540-73-8		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	105-67-9	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N	3.4E-01	6.7E+00 N
2,6-DIMETHYLPHENOL	576-26-1	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	95-65-8	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	131-11-3	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	528-29-0	4.00E-04 H					1.5E+01 N	1.5E+00 N	5.4E-01 N	8.2E+02 N	3.1E+01 N		

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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	Soil Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
1,3-DINITROBENZENE	99-65-0	1.00E-04 I					3.7E+00 N	3.7E-01 N	1.4E-01 N	2.0E+02 N	7.8E+00 N	1.8E-03	3.7E-02 N
1,4-DINITROBENZENE	100-25-4	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	131-89-5	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	534-52-1	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	51-28-5	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N		
DINITROTOLUENE MIX			6.80E-01 I				9.8E-02 C	9.2E-03 C	4.6E-03 C	8.4E+00 C	9.4E-01 C		
2,4-DINITROTOLUENE	121-14-2	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N	2.9E-02	5.7E-01 N
2,6-DINITROTOLUENE	606-20-2	1.00E-03 H					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N	1.2E-02	2.5E-01 N
DINOSEB	88-85-7	1.00E-03 I					3.7E+01 N	3.7E+00 N	1.4E+00 N	2.0E+03 N	7.8E+01 N	8.7E-03	1.7E-01 N
DIOCTYLPHTHALATE	117-84-0	2.00E-02 H					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N	1.2E+05	2.4E+06 N
1,4-DIOXANE	123-91-1		1.10E-02 I				6.1E+00 C	5.7E-01 C	2.9E-01 C	5.2E+02 C	5.8E+01 C	1.3E-03	2.6E-02 C
DIPHENYLAMINE	122-39-4	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N	1.3E+00	2.5E+01 N
1,2-DIPHENYLHYDRAZINE	122-66-7		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	1.3E-04	2.5E-03 C
DIQUAT	85-00-7	2.20E-03 I					8.0E+01 N	8.0E+00 N	3.0E+00 N	4.5E+03 N	1.7E+02 N	1.7E-02	3.3E-01 N
DISULFOTON	298-04-4	4.00E-05 I					1.5E+00 N	1.5E-01 N	5.4E-02 N	8.2E+01 N	3.1E+00 N	3.2E-03	6.4E-02 N
1,4-DITHIANE	505-29-3	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	330-54-1	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N	5.8E-02	1.2E+00 N
ENDOSULFAN	115-29-7	6.00E-03 I					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N	9.8E-01	2.0E+01 N
ENDRIN	72-20-8	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N	2.7E-01	5.4E+00 N
**EPICHLOROHYDRIN	106-89-8	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 !	5.8E+02 C !	6.5E+01 C !	4.2E-04	8.4E-03 N
ETHION	563-12-2	5.00E-04 I					1.8E+01 N	1.8E+00 N	6.8E-01 N	1.0E+03 N	3.9E+01 N	3.2E-01	6.4E+00 N
2-ETHOXYETHANOL	110-80-5	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	3.3E+00	6.5E+01 N
ETHYL ACETATE	141-78-6	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	1.7E+00	3.5E+01 N
ETHYLBENZENE	100-41-4	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	7.5E-01	1.5E+01 N
ETHYLENE DIAMINE	107-15-3	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	107-21-1	2.00E+00 I					7.3E+04 N	7.3E+03 N	2.7E+03 N	4.1E+06 N	1.6E+05 N	1.5E+01	3.0E+02 N
**ETHYLENE GLYCOL, MONOBUTYL ETHER	111-76-2	5.00E-01 I		3.70E+00 I			1.8E+04 N	1.4E+04 N	6.8E+02 N	1.0E+06 N	3.9E+04 N		
ETHYLENE OXIDE	75-21-8		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	4.8E-06	9.5E-05 C
ETHYLENE THIOUREA	96-45-7	8.00E-05 I	1.1E-01 H				6.1E-01 C !	5.7E-02 C !	2.9E-02 C !	5.2E+01 C !	5.8E+00 C !		
ETHYL ETHER	60-29-7	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	4.2E-01	8.5E+00 N
ETHYL METHACRYLATE	97-63-2	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	1.0E+00	2.1E+01 N
FENAMIPHOS	22224-92-6	2.50E-04 I					9.1E+00 N	9.1E-01 N	3.4E-01 N	5.1E+02 N	2.0E+01 N	7.8E-03	1.6E-01 N
FLUOMETURON	2164-17-2	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	7782-41-4	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	72178-02-0		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	944-22-9	2.00E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+02 N	1.8E-01	3.5E+00 N
FORMALDEHYDE	50-00-0	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	1.5E+00	3.0E+01 N
FORMIC ACID	64-18-6	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	110-00-9	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	1.5E-03	3.0E-02 N
FURAZOLIDONE	67-45-8		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	98-01-1	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	2.3E-02	4.6E-01 N
GLYCIDALDEHYDE	765-34-4	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	1071-83-6	1.00E-01 I					3.7E+03 N	3.7E+02 N	1.4E+02 N	2.0E+05 N	7.8E+03 N	2.6E+01	5.3E+02 N
HEPTACHLOR	76-44-8	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	4.2E-02	8.4E-01 C
HEPTACHLOR EPOXIDE	1024-57-3	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	1.2E-03	2.5E-02 C
HEXABROMOBENZENE	87-82-1	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	118-74-1	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	2.6E-03	5.2E-02 C
HEXACHLOROBUTADIENE	87-68-3	2.00E-04 H	7.80E-02 I		7.80E-02 I		8.6E-01 C !	8.0E-02 C !	4.0E-02 C !	7.3E+01 C !	8.2E+00 C !	9.2E-02	1.8E+00 C
ALPHA-HCH	319-84-6		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	4.5E-05	8.9E-04 C
BETA-HCH	319-85-7		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	1.6E-04	3.1E-03 C
GAMMA-HCH (LINDANE)	58-89-9	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	2.2E-04	4.3E-03 C
TECHNICAL HCH	608-73-1		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	77-47-4	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	1.0E+02	2.0E+03 N
HEXACHLORODIBENZODIOXIN MIX	19408-74-3		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	67-72-1	1.00E-03 I	1.40E-02 I		1.40E-02 I		4.8E+00 C !	4.5E-01 C !	2.3E-01 C !	4.1E+02 C !	4.6E+01 C !	1.8E-02	3.6E-01 C
HEXACHLOROPHENE	70-30-4	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N	1.0E+02	2.0E+03 N
1,6-HEXAMETHYLENE DIISOCYANATE	822-06-0			2.90E-06 I				1.1E-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 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	Soil Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
HEXANE	110-54-3	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	6.9E-01	1.4E+01 N
2-HEXANONE	591-78-6	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	51235-04-2	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	2691-41-0	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	302-01-2		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	7647-01-0			5.70E-03 I				2.1E+01 N					
HYDROGEN SULFIDE	7783-06-4	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	123-31-9	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	7439-89-6	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	78-83-1	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	5.9E-01	1.2E+01 N
ISOPHORONE	78-59-1	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	2.1E-02	4.1E-01 C
ISOPROPALIN	33820-53-0	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	1832-54-8	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	78-00-2	1.00E-07 I					3.7E-03 N	3.7E-04 N	1.4E-04 N	2.0E-01 N	7.8E-03 N	4.6E-05	9.2E-04 N
LITHIUM	7439-93-2	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	121-75-5	2.00E-02 I					7.3E+02 N	7.3E+01 N	2.7E+01 N	4.1E+04 N	1.6E+03 N	4.0E-01	8.1E+00 N
MALEIC ANHYDRIDE	108-31-6	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	7439-96-5	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	4.8E+01	9.5E+02 N
MANGANESE-FOOD	7439-96-5	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	3.3E+02	6.7E+03 N
MEPHOSFOLAN	950-10-7	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	24307-26-4	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	7487-94-7	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)	7439-97-6			8.60E-05 I				3.1E-01 N					
METHYLMERCURY	22967-92-6	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	126-98-7	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	2.1E-04	4.2E-03 N
METHANOL	67-56-1	5.00E-01 I					1.8E+04 N	1.8E+03 N	6.8E+02 N	1.0E+06 N	3.9E+04 N	3.8E+00	7.5E+01 N
METHIDATHION	950-37-8	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	72-43-5	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N	1.5E+01	3.1E+02 N
METHYL ACETATE	79-20-9	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	1.2E+00	2.5E+01 N
METHYL ACRYLATE	96-33-3	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	5.0E-01	1.0E+01 N
2-METHYLANILINE	95-53-4		2.40E-01 H				2.8E-01 C	2.6E-02 C	1.3E-02 C	2.4E+01 C	2.7E+00 C	2.8E-04	5.7E-03 C
4-(2-METHYL-4-CHLOROPHENOXY) BUTYRIC ACID	94-81-5	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)	94-74-6	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 (	93-65-2	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	108-87-2			8.60E-01 H		y	6.3E+03 N	3.1E+03 N					
METHYLENE BROMIDE	74-95-3	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	1.5E-02	3.0E-01 N
METHYLENE CHLORIDE	75-09-2	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	9.5E-04	1.9E-02 C
4,4'-METHYLENE BIS(2-CHLOROANILINE)	101-14-4	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	101-61-1		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	101-68-8			1.7E-04 I				6.2E-01 N					
METHYL ETHYL KETONE (2-BUTANONE)	78-93-3	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	4.0E-01	7.9E+00 N
METHYL HYDRAZINE	60-34-4		1.10E+00 W				6.1E-02 C	5.7E-03 C	2.9E-03 C	5.2E+00 C	5.8E-01 C		
METHYL ISOBUTYL KETONE (4-METHYL-2-PENTANON	108-10-1	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	6.5E-02	1.3E+00 N
METHYL METHACRYLATE	80-62-6	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	3.2E-01	6.5E+00 N
2-METHYL-5-NITROANILINE	99-55-8		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	298-00-0	2.50E-04 I					9.1E+00 N	9.1E-01 N	3.4E-01 N	5.1E+02 N	2.0E+01 N	4.3E-03	8.5E-02 N
2-METHYLPHENOL	95-48-7	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	108-39-4	5.00E-02 I					1.6E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N		
4-METHYLPHENOL	106-44-5	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	25013-15-4	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	5.1E-02	1.0E+00 N
ALPHA-METHYLSTYRENE	98-83-9	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	4.0E-01	7.9E+00 N
METHYL TERT-BUTYL ETHER	1634-04-4			8.57E-01 I		y	6.3E+03 N	3.1E+03 N				1.4E+00	2.8E+01 N
METOLACHLOR (DUAL)	51218-45-2	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	2385-85-5	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	7439-98-7	5E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N		
MONOCHLORAMINE	10599-90-3	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	300-76-5	2E-03 I					7.3E+01 N	7.3E+00 N	2.7E+00 N	4.1E+03 N	1.6E+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 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	Soil Residential mg/kg	Region III SSLs: Soil, for groundwater migration DAF 1 mg/kg	DAF 20 mg/kg
NICKEL REFINERY DUST					8.4E-01 I			7.5E-03 C					
NICKEL	7440-02-0	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	14797-55-8	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	10102-43-9	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	14797-65-0	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	88-74-4			5.70E-05 H				2.1E-01 N					
NITROBENZENE	98-95-3	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	1.2E-03	2.3E-02 N
NITROFURANTOIN	67-20-9	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	59-87-0		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	10102-44-0	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	55-63-0		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	100-02-7	8.00E-03 E					2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N	8.7E-02	1.7E+00 N
2-NITROPROPANE	79-46-9			5.70E-03 I	9.40E+00 H	y	1.3E-03 C	6.7E-04 C				3.2E-07	6.4E-06 C
N-NITROSO-DI-N-BUTYLAMINE	924-16-3		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	1.4E-06	2.7E-05 C
N-NITROSODIETHANOLAMINE	1116-54-7		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	55-18-5		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	1.1E-07	2.3E-06 C
N-NITROSODIMETHYLAMINE	62-75-9		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	2.8E-07	5.7E-06 C
N-NITROSODIPHENYLAMINE	86-30-6		4.90E-03 I				1.4E+01 C	1.3E+00 C	6.4E-01 C	1.2E+03 C	1.3E+02 C	3.8E-02	7.6E-01 C
N-NITROSODIPROPYLAMINE	621-64-7		7.00E+00 I				9.6E-03 C	8.9E-04 C	4.5E-04 C	8.2E-01 C	9.1E-02 C	2.4E-06	4.7E-05 C
N-NITROSO-N-ETHYLUREA	759-73-9		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	10595-95-6		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	930-55-2		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	99-08-1	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	88-72-2	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	99-99-0	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	85509-19-9	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	19044-88-3	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	19666-30-9	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	23135-22-0	2.50E-02 I					9.1E+02 N	9.1E+01 N	3.4E+01 N	5.1E+04 N	2.0E+03 N	1.9E-01	3.8E+00 N
OXYFLUORFEN	42874-03-3	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	1910-42-5	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	56-38-2	6.00E-03 H					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N	5.0E-01	1.0E+01 N
PENTACHLOROBENZENE	608-93-5	8.00E-04 I					2.9E+01 N	2.9E+00 N	1.1E+00 N	1.6E+03 N	6.3E+01 N	1.0E+00	2.0E+01 N
PENTACHLORONITROBENZENE	82-68-8	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	4.1E-03	8.2E-02 C
PENTACHLOROPHENOL	87-86-5	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	52645-53-1	5.00E-02 I					1.8E+03 N	1.8E+02 N	6.8E+01 N	1.0E+05 N	3.9E+03 N	1.2E+02	2.4E+03 N
PHENOL	108-95-2	6.00E-01 I					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N	6.7E+00	1.3E+02 N
M-PHENYLENEDIAMINE	108-45-2	6.00E-03 I					2.2E+02 N	2.2E+01 N	8.1E+00 N	1.2E+04 N	4.7E+02 N	4.9E-02	9.6E-01 N
O-PHENYLENEDIAMINE	95-54-5		4.70E-02 H				1.4E+00 C	1.3E-01 C	6.7E-02 C	1.2E+02 C	1.4E+01 C		
P-PHENYLENEDIAMINE	106-50-3	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	90-43-7		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	7803-51-2	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	7664-38-2			2.90E-03 I				1.1E+01 N					
PHOSPHORUS (WHITE)	7723-14-0	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	100-21-0	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	85-44-9	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	2.6E+01	5.2E+02 N
POLYBROMINATED BIPHENYLS		7.00E-06 H	8.90E+00 H				7.5E-03 C	7.0E-04 C	3.5E-04 C	6.4E-01 C	7.2E-02 C !		
POLYCHLORINATED BIPHENYLS	1336-36-3		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	2.1E-02	4.1E-01 C
AROCLOR-1016	12674-11-2	7.00E-05 I	7.00E-02 I		7.00E-02 I		9.6E-01 C !	8.9E-02 C !	4.5E-02 C !	8.2E+01 C !	5.5E+00 N	2.1E-01	4.2E+00 C
AROCLOR-1221	11104-28-2		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	11141-16-5		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	53469-21-9		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	12672-29-6		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	11097-69-1	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 !	5.4E-02	1.1E+00 C
AROCLOR-1260	11096-82-5		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	61788-33-8		4.50E+00 E				1.5E-02 C	1.4E-03 C	7.0E-04 C	1.3E+00 C	1.4E-01 C		

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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	Soil Residential mg/kg	Region III SSLs, Soil, for groundwater migration: DAF 1 mg/kg	DAF 20 mg/kg
POLYNUCLEAR AROMATIC HYDROCARBONS:											0.0E+00		
ACENAPHTHENE	83-32-9	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	5.2E+00	1.0E+02 N
ANTHRACENE	120-12-7	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	2.3E+01	4.7E+02 N
BENZ[A]ANTHRACENE	56-55-3		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C	7.3E-02	1.5E+00 C
BENZO[B]FLUORANTHENE	205-99-2		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C	2.3E-01	4.5E+00 C
BENZO[K]FLUORANTHENE	207-08-9		7.30E-02 E				9.2E-01 C	8.6E-02 C	4.3E-02 C	7.8E+01 C	8.7E+00 C	2.3E+00	4.5E+01 C
BENZO[A]PYRENE	50-32-8		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	1.9E-02	3.7E-01 C
CARBAZOLE	86-74-8		2.00E-02 H				3.3E+00 C	3.1E-01 C	1.6E-01 C	2.9E+02 C	3.2E+01 C	2.3E-02	4.7E-01 C
CHRYSENE	218-01-9		7.30E-03 E				9.2E+00 C	8.6E-01 C	4.3E-01 C	7.8E+02 C	8.7E+01 C	7.3E+00	1.5E+02 C
DIBENZ[A,H]ANTHRACENE	53-70-3		7.30E+00 E				9.2E-03 C	8.6E-04 C	4.3E-04 C	7.8E-01 C	8.7E-02 C	7.0E-02	1.4E+00 C
DIBENZOFURAN	132-64-9	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	3.8E-01	7.7E+00 N
FLUORANTHENE	206-44-0	4.00E-02 I					1.5E+03 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N	3.1E+02	6.3E+03 N
FLUORENE	86-73-7	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	6.8E+00	1.4E+02 N
INDENO[1,2,3-C,D]PYRENE	193-39-5		7.30E-01 E				9.2E-02 C	8.6E-03 C	4.3E-03 C	7.8E+00 C	8.7E-01 C	6.4E-01	1.3E+01 C
2-METHYLNAPHTHALENE	91-57-6	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	1.1E+00	2.2E+01 N
NAPHTHALENE	91-20-3	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	7.7E-03	1.5E-01 N
PYRENE	129-00-0	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	3.4E+01	6.8E+02 N
PROMETON	1610-18-0	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	7287-19-6	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	1918-16-7	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	709-98-8	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	2312-35-8	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	103-65-1	4.00E-02 E				y	2.4E+02 N	1.5E+02 N	5.4E+01 N	8.2E+04 N	3.1E+03 N	1.4E+00	2.8E+01 N
PROPYLENE GLYCOL	57-55-6	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	52125-53-8	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	107-98-2	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	81335-77-5	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	110-86-1	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	91-22-5		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	121-82-4	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	10453-86-8	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	299-84-3	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	83-79-4	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	7783-00-8	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.6E+00 N	1.0E+04 N	3.9E+02 N		
SELENIUM	7782-49-2	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N	9.5E-01	1.9E+01 N
SILVER	7440-22-4	5.00E-03 I					1.8E+02 N	1.8E+01 N	6.8E+00 N	1.0E+04 N	3.9E+02 N	1.6E+00	3.1E+01 N
SIMAZINE	122-34-9	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	1.7E-04	3.3E-03 C
SODIUM AZIDE	26628-22-8	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	148-18-5	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	7440-24-6	6.00E-01 I					2.2E+04 N	2.2E+03 N	8.1E+02 N	1.2E+06 N	4.7E+04 N	7.7E+02	1.5E+04 N
STRYCHNINE	57-24-9	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N	8.3E-03	1.7E-01 N
STYRENE	100-42-5	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	2.9E+00	5.7E+01 N
2,3,7,8-TETRACHLORODIBENZODIOXIN	1746-01-6		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	4.3E-07	8.6E-06 C
1,2,4,5-TETRACHLOROBENZENE	95-94-3	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N	3.3E-02	6.6E-01 N
1,1,1,2-TETRACHLOROETHANE	630-20-6	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	2.0E-04	4.0E-03 C
1,1,2,2-TETRACHLOROETHANE	79-34-5	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	3.4E-05	6.8E-04 C
TETRACHLOROETHENE	127-18-4	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	2.4E-03	4.8E-02 C
2,3,4,6-TETRACHLOROPHENOL	58-90-2	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	5216-25-1		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	811-97-2			2.29E+01 I		y	1.7E+05 N	8.4E+04 N					
TETRAHYDROFURAN	109-99-9	2.00E-01 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	479-45-8	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	1314-32-5	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	7440-28-0	7.00E-05 O					2.6E+00 N	2.6E-01 N	9.5E-02 N	1.4E+02 N	5.5E+00 N	1.8E-01	3.6E+00 N
THALLIUM ACETATE	563-68-8	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	6533-73-9	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	7791-12-0	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	10102-45-1	9.00E-05 I					3.3E+00 N	3.3E-01 N	1.2E-01 N	1.8E+02 N	7.0E+00 N		

Sources: I = IRIS H = HEAST A = HEAST Alternate W = Withdrawn from IRIS or HEAST
E = EPA-NCEA provisional value O = other

Basis: C = Carcinogenic effects N = Noncarcinogenic effects ! = RBC at HI of 0.1 < RBC-c

Chemical	CAS	RfDo mg/kg/d	CSFo 1/mg/kg/d	RfDi mg/kg/d	CSFi 1/mg/kg/d	VOC	Risk-based concentrations: Tap water ug/l	Ambient air ug/m3	Fish mg/kg	Soil Industrial mg/kg	Soil Residential mg/kg	Region III SSLs: Soil, for groundwater migration: DAF 1 mg/kg	DAF 20 mg/kg
THALLIUM SULFATE (2:1)	7446-18-6	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	28249-77-6	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	7440-31-5	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	7440-32-6	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	13463-67-7	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	108-88-3	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	4.4E-01	8.8E+00 N
TOLUENE-2,4-DIAMINE	95-80-7		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	95-70-5	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	823-40-5	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	106-49-0		1.90E-01 H				3.5E-01 C	3.3E-02 C	1.7E-02 C	3.0E+01 C	3.4E+00 C	3.0E-04	5.9E-03 C
TOXAPHENE	8001-35-2		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	3.1E-02	6.3E-01 C
1,2,4-TRIBROMOBENZENE	615-54-3	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	56-35-9	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	634-93-5		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	120-82-1	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	3.8E-01	7.5E+00 N
**1,1,1-TRICHLOROETHANE	71-55-6	2.80E-01 E		6.30E-01 E		y	3.2E+03 N	2.3E+03 N	3.8E+02 N	5.7E+05 N	2.2E+04 N	3.0E+00	6.0E+01 N
1,1,2-TRICHLOROETHANE	79-00-5	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	3.9E-05	7.8E-04 C
TRICHLOROETHENE	79-01-6	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 !	7.7E-04	1.5E-02 C
TRICHLOROFLUOROMETHANE	75-69-4	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	1.1E+00	2.3E+01 N
2,4,5-TRICHLOROPHENOL	95-95-4	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	88-06-2		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	93-76-5	1.00E-02 I					3.7E+02 N	3.7E+01 N	1.4E+01 N	2.0E+04 N	7.8E+02 N	9.8E-02	2.0E+00 N
2-(2,4,5-TRICHLOROPHENOXY)PROPIONIC ACID	93-72-1	8.00E-03 I					2.9E+02 N	2.9E+01 N	1.1E+01 N	1.6E+04 N	6.3E+02 N	1.1E+00	2.1E+01 N
1,1,2-TRICHLOROPROPANE	598-77-6	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	1.2E-02	2.5E-01 N
**1,2,3-TRICHLOROPROPANE	96-18-4	6.00E-03 I	2.00E+00 E	1.4E-03 E		y	5.3E-03 C	3.1E-03 C	1.6E-03 C	2.9E+00 C	3.2E-01 C	1.8E-06	3.6E-05 C
1,2,3-TRICHLOROPROPENE	96-19-5	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	1.2E-02	2.5E-01 N
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	76-13-1	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	1.2E+02	2.3E+03 N
1,2,4-TRIMETHYLBENZENE	95-63-6	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	108-67-8	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	512-56-1		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	99-35-4	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	118-96-7	5.00E-04 I	3.00E-02 I				2.2E+00 C !	2.1E-01 C !	1.1E-01 C !	1.9E+02 C !	2.1E+01 C !		
URANIUM (SOLUBLE SALTS)		3.00E-03 I					1.1E+02 N	1.1E+01 N	4.1E+00 N	6.1E+03 N	2.3E+02 N		
VANADIUM	7440-62-2	7.00E-03 H					2.6E+02 N	2.6E+01 N	9.5E+00 N	1.4E+04 N	5.5E+02 N	2.6E+02	5.1E+03 N
VANADIUM PENTOXIDE	1314-62-1	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	16785-81-2	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	50471-44-8	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	108-05-4	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	8.7E-02	1.7E+00 N
VINYL CHLORIDE	75-01-4		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	7.9E-06	1.6E-04 C
WARFARIN	81-81-2	3.00E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N	2.2E-02	4.4E-01 N
M-XYLENE	108-38-3	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	1.3E+01	2.5E+02 N
O-XYLENE	95-47-6	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	1.1E+01	2.3E+02 N
P-XYLENE	106-42-3					y							
XYLENES	1330-20-7	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	8.5E+00	1.7E+02 N
ZINC	7440-66-6	3.00E-01 I					1.1E+04 N	1.1E+03 N	4.1E+02 N	6.1E+05 N	2.3E+04 N	6.8E+02	1.4E+04 N
ZINC PHOSPHIDE	1314-84-7	3E-04 I					1.1E+01 N	1.1E+00 N	4.1E-01 N	6.1E+02 N	2.3E+01 N		
ZINEB	12122-67-7	5E-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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Drinking Water Regulations and Health Advisories
October 1996

DRINKING WATER REGULATIONS

AND HEALTH ADVISORIES

by

Office of Water
U.S. Environmental Protection Agency
Washington, D.C.

October 1996

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These regulations and health advisory tables are revised approximately every 6 months by EPA's Office of Water. The tables may also be accessed on the Internet in the near future. The tables may be accessed from the Office of Science and Technology home page at:

http://www.epa.gov/OST.

Although no permanent mailing list is kept, copies may be ordered free of charge from the:

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The Health Advisories available and their ERIC order numbers are included at the end of this publication. For further information regarding the Drinking Water Regulations and Health Advisories, call Barbara Corcoran in EPA's Office of Water at (202) 260-1332.

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

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	5	5	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.

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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	
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

; a "Database Deficiency Report has been published.

* Current MCL "A HA will not be developed due to insufficient data'

\+ 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 classification from D to C, thus justifying the use of an additional 10-fold safety factor for the lifetime HA.

E-99

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	2.6	-	-	-	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.

E-180

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	8	8	8	30	0.08	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
Endothall	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

E-101

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

E-102

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	-	C
2,4,5-T	L	-	-	F	0.8	0.8	0.8	1	0.01	0.35	0.07	-	D
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

E-103

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.

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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	
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	0.6	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 remanded

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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	
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	0.0005	-	-
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 enforceable regulations governing these concerns. To be safe, check your State's drinking water rules.

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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
December 10, 1998

NATIONAL RECOMMENDED WATER QUALITY CRITERIA FOR PRIORITY TOXIC POLLUTANTS

Priority pollutant	CAS No.	Freshwater		Saltwater		Human health for consumption of:		FR cite/source
		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	Water + organism (µg/L)	Organism only (µg/L)	
1 Antimony	7440360					14 [B,Z]	4300 [B]	57 FR 60848
2 Arsenic	7440382	340 [A,D,K]	150 [A,D,K]	69 [A,D,bb]	36 [A,D,bb]			62 FR 42160
						0.018 [C,M,S]	0.14 [C,M,S]	57 FR 60848
3 Beryllium	7440417					[J,Z]	[J]	62 FR 42160
4 Cadmium	7440439	4.3 [D,E,K]	2.2 [D,E,K]	42 [D,bb]	9.3 [D,bb]	[J,Z]	[J]	62 FR 42160
5a Chromium III	16065831	570 [D,E,K]	74 [D,E,K]					EPA 820/B–96–001
						[J,Z Total]	[J]	62 FR 42160
5b Chromium VI	18540299	16 [D,K]	11 [D,K]	1,100 [D,bb]	50 [D,bb]	[J,Z Total]	[J]	62 FR 42160
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]		62 FR 42160
7 Lead	7439921	65 [D,E,bb,gg]	2.5 [D,E,bb,gg]	210 [D,bb]	8.1 [D,bb]	[J]	[J]	62 FR 42160
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]	62 FR 42160
9 Nickel	7440020	470 [D,E,K]	52 [D,E,K]	74 [D,bb]	8.2 [D,bb]	610 [B]	4,600 [B]	62 FR 42160
10 Selenium	7782492	[L,R,T]	5.0 [T]	290 [D,bb,dd]	71 [D,bb,dd]			62 FR 42160
						170 [Z]	11,000	IRIS 09/01/91
11 Silver	7440224	3.4 [D,E,G]		1.9 [D,G]				62 FR 42160
12 Thallium	7440280					1.7 [B]	6.3 [B]	57 FR 60848
13 Zinc	7440666	120 [D,E,K]	120 [D,E,K]	90 [D,bb]	81 [D,bb]			62 FR 42160
						9,100 [U]	69,000 [U]	IRIS 10/01/92
14 Cyanide	57125	22 [K,Q]	5.2 [K,Q]					EPA 820/B–96–001
				1 [Q,bb]	1 [Q,bb]	700 [B,Z]	220,000 [B,H]	57 FR 60848
15 Asbestos	1332214					7 million fibers/L [I]		57 FR 60848
16 2, 3, 7, 8-TCDD Dioxin	1746016					1.3E–8 [C]	1.4E–8 [C]	62 FR 42160
17 Acrolein	107028					320	780	57 FR 60848
18 Acrylonitrile	107131					0.059 [B,C]	0.66 [B,C]	57 FR 60848
19 Benzene	71432					1.2 [B,C]	71 [B,C]	62 FR 42160
20 Bromoform	75252					4.3 [B,C]	360 [B,C]	62 FR 42160
21 Carbon Tetrachloride	56235					0.25 [B,C]	4.4 [B,C]	57 FR 60848
22 Chlorobenzene	108907					680 [B,Z]	21,000 [B,H]	57 FR 60848
23 Chlorodibromomethane	124481					0.41 [B,C]	34 [B,C]	62 FR 42160
24 Chloroethane	75003							
25 2-Chloroethylvinyl Ether	110758							
26 Chloroform	67663					5.7 [B,C]	470 [B,C]	62 FR 42160
27 Dichlorobromomethane	75274					0.56 [B,C]	46 [B,C]	62 FR 42160
28 1,1-Dichloroethane	75343							
29 1,2-Dichloroethane	107062					0.38 [B,C]	99 [B,C]	57 FR 60848
30 1,1-Dichloroethylene	75354					0.057 [B,C]	3.2 [B,C]	57 FR 60848
31 1,2-Dichloropropane	78875					0.52 [B,C]	39 [B,C]	62 FR 42160
32 1,3-Dichloropropene	542756					10 [B]	1,700 [B]	57 FR 60848
33 Ethylbenzene	100414					3,100 [B,Z]	29,000 [B]	62 FR 42160
34 Methyl Bromide	74839					48 [B]	4000 [B]	62 FR 42160
35 Methyl Chloride	74873					[J]	[J]	62 FR 42160
36 Methylene Chloride	75092					4.7 [B,C]	1600 [B,C]	62 FR 42160
37 1,1,2,2-Tetrachloroethane	79345					0.17 [B,C]	11 [B,C]	57 FR 60848
38 Tetrachloroethylene	127184					0.8 [C]	8.85 [C]	57 FR 60848
39 Toluene	108883					6,800 [B,Z]	200,000 [B]	62 FR 42160
40 1,2-Trans-Dichloroethylene	156605					700 [B,Z]	140,000 [B]	62 FR 42160
41 1,1,1-Trichloroethane	71556					[J,Z]	[J]	62 FR 42160
42 1,1,2-Trichloroethane	79005					0.60 [B,C]	42 [B,C]	57 FR 60848
43 Trichloroethylene	79016					2.7 [C]	81 [C]	57 FR 60848
44 Vinyl Chloride	75014					2.0 [C]	525 [C]	57 FR 60848
45 2-Chlorophenol	95578					120 [B,U]	400 [B,U]	62 FR 42160
46 2,4-Dichlorophenol	120832					93 [B,U]	790 [B,U]	57 FR 60848
47 2,4-Dimethylphenol	105679					540 [B,U]	2,300 [B,U]	62 FR 42160
48 2-Methyl-4,6-Dinitrophenol	534521					13.4	765	57 FR 60848
49 2,4-Dinitrophenol	51285					70 [B]	14,000 [B]	57 FR 60848
50 2-Nitrophenol	88755							
51 4-Nitrophenol	100027							
52 3-Methyl-4-Chlorophenol	59507					[U]	[U]	

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NATIONAL RECOMMENDED WATER QUALITY CRITERIA FOR PRIORITY TOXIC POLLUTANTS—Continued

	Priority pollutant	CAS No.	Freshwater		Saltwater		Human health for consumption of:		FR cite/source
			CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	Water + organism (µg/L)	Organism only (µg/L)	
53	Pentachlorophenol	87865	19[F,K]	15[F,K]	13[bb]	7.9[bb]	0.28[B,C]	8.2[B,C,H]	62 FR 42160
54	Phenol	108952					21,000[B,U]		62 FR 42160
								4,600,000[B,H,U]	57 FR 60848
55	2,4,6-Trichlorophenol	88062					2.1[B,C,U]	6.5[B,C]	62 FR 42160
56	Acenaphthene	83329					1,200[B,U]	2,700[B,U]	62 FR 42160
57	Acenaphthylene	208968							
58	Anthracene	120127					9,600[B]	110,000[B]	62 FR 42160
59	Benzidine	92875					0.00012[B,C]	0.00054[B,C]	57 FR 60848
60	BenzoaAnthracene	56553					0.0044[B,C]	0.049[B,C]	62 FR 42160
61	BenzoaPyrene	50328					0.0044[B,C]	0.049[B,C]	62 FR 42160
62	BenzobFluoranthene	205992					0.0044[B,C]	0.049[B,C]	62 FR 42160
63	BenzoghiPerylene	191242							
64	BenzokFluoranthene	207089					0.0044[B,C]	0.049[B,C]	62 FR 42160
65	Bis2-ChloroethoxyMethane	111911							
66	Bis2-ChloroethylEther	111444					0.031[B,C]	1.4[B,C]	57 FR 60848
67	Bis2-ChloroisopropylEther	39638329					1,400[B]		62 FR 42160
								170,000[B]	57 FR 60848
68	Bis2-EthylhexylPhthalate[X]	117817					1.8[B,C]	5.9[B,C]	57 FR 60848
69	4-Bromophenyl Phenyl Ether	101553							
70	Butylbenzyl Phthalate[W]	85687					3,000[B]	5,200[B]	62 FR 42160
71	2-Chloronaphthalene	91587					1,700[B]	4,300[B]	62 FR 42160
72	4-Chlorophenyl Phenyl Ether	7005723							
73	Chrysene	218019					0.0044[B,C]	0.049[B,C]	62 FR 42160
74	Dibenzoa,hAnthracene	53703					0.0044[B,C]	0.049[B,C]	62 FR 42160
75	1,2-Dichlorobenzene	95501					2,700[B,Z]	17,000[B]	62 FR 42160
76	1,3-Dichlorobenzene	541731					400	2,600	62 FR 42160
77	1,4-Dichlorobenzene	106467					400[Z]	2,600	62 FR 42160
78	3,3′-Dichlorobenzidine	91941					0.04[B,C]	0.077[B,C]	57 FR 60848
79	Diethyl Phthalate[W]	84662					23,000[B]	120,000[B]	57 FR 60848
80	Dimethyl Phthalate[W]	131113					313,000	2,900,000	57 FR 60848
81	Di-n-Butyl Phthalate[W]	84742					2,700[B]	12,000[B]	57 FR 60848
82	2,4-Dinitrotoluene	121142					0.11[C]	9.1[C]	57 FR 60848
83	2,6-Dinitrotoluene	606202							
84	Di-n-Octyl Phthalate	117840							
85	1,2-Diphenylhydrazine	122667					0.040[B,C]	0.54[B,C]	57 FR 60848
86	Fluoranthene	206440					300[B]	370[B]	62 FR 42160
87	Fluorene	86737					1,300[B]	14,000[B]	62 FR 42160
88	Hexachlorobenzene	118741					0.00075[B,C]	0.00077[B,C]	62 FR 42160
89	Hexachlorobutadiene	87683					0.44[B,C]	50[B,C]	57 FR 60848
90	Hexachlorocyclopentadiene	77474					240[B,U,Z]	17,000[B,H,U]	57 FR 60848
91	Hexachloroethane	67721					1.9[B,C]	8.9[B,C]	57 FR 60848
92	Ideno 1,2,3-cdPyrene	193395					0.0044[B,C]	0.049[B,C]	62 FR 42160
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]	57 FR 60848
96	N-Nitrosodimethylamine	62759					0.00069[B,C]	8.1[B,C]	57 FR 60848
97	N-Nitrosodi-n-Propylamine	621647					0.005[B,C]	1.4[B,C]	62 FR 42160
98	N-Nitrosodiphenylamine	86306					5.0[B,C]	16[B,C]	57 FR 60848
99	Phenanthrene	85018							
100	Pyrene	129000					960[B]	11,000[B]	62 FR 42160
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]	62 FR 42160
103	alpha-BHC	319846					0.0039[B,C]	0.013[B,C]	62 FR 42160
104	beta-BHC	319857					0.014[B,C]	0.046[B,C]	62 FR 42160
105	gamma-BHC (Lindane)	58899	0.95[K]		0.16[G]		0.019[C]	0.063[C]	62 FR 42160
106	delta-BHC	319868							
107	Chlordane	57749	2.4[G]	0.0043[G,aa]	0.09[G]	0.004[G,aa]			62 FR 42160
							0.0021[B,C]	0.0022[B,C]	IRIS 02/07/98

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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]	62 FR 42160
109	4,4′-DDE	72559					0.00059 [B,C]	0.00059 [B,C]	62 FR 42160
110	4,4′-DDD	72548					0.00083 [B,C]	0.00084 [B,C]	62 FR 42160
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]	62 FR 42160
112	alpha-Endosulfan	959988	0.22 [G,Y]	0.056 [G,Y]	0.034 [G,Y]	0.0087 [G,Y]	110 [B]	240 [B]	62 FR 42160
113	beta-Endosulfan	33213659	0.22 [G,Y]	0.056 [G,Y]	0.034 [G,Y]	0.0087 [G,Y]	110 [B]	240 [B]	62 FR 42160
114	Endosulfan Sulfate	1031078					110 [B]	240 [B]	62 FR 42160
115	Endrin	72208	0.086 [K]	0.036 [K,O]	0.037 [G]	0.0023 [G,aa]	0.76 [B]	0.81 [B,H]	62 FR 42160
116	Endrin Aldehyde	7421934					0.76 [B]	0.81 [B,H]	62 FR 42160
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]	62 FR 42160
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]	62 FR 42160
119	Polychlorinated Biphenyls PCBs			0.014 [N,aa]		0.03 [N,aa]			62 FR 42160
							0.00017 [B,C,P]	0.00017 [B,C,P]	63 FR 16182
120	Toxaphene	8001352	0.73	0.0002 [aa]	0.21	0.0002 [aa]	0.00073 [B,C]	0.00075 [B,C]	62 FR 42160

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, mall code RC4100, Washington, DC 20460; and 40 CFR § 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: CMD=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–96–011, September 1996). This value was derived using the GLI Guidelines (60 FR 15393–15399, March 23, 1995; 40 CFR 132 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 (61 FR 58444–58449, 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.

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[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 (60FR 15393–15399, 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 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 400/5–84–028), 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 µg/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 criteria was derived.

NATIONAL RECOMMENDED WATER QUALITY CRITERIA FOR NON PRIORITY POLLUTANTS

Non priority pollutant	CAS No.	Freshwater		Saltwater		Human health for consumption of:		FR cite/source
		CMC (µg/L)	CCC (µg/L)	CMC (µg/L)	CCC (µg/L)	Water + organism (µg/L)	Organism only (µg/L)	
1 Alkalinity			20000[F]					Gold Book
2 Aluminum pH 6.5–9.0	7429905	750[G,I]	87[G,I,L]					53 FR 33178
3 Ammonia	7664417	FRESHWATER CRITERIA ARE pH DEPENDENT—SEE DOCUMENT						EPA822–R–98–008
		SALTWATER CRITERIA ARE pH AND TEMPERATURE DEPENDENT[D]						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]					53 FR 19028
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,H]		0.1[F,H]			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,H]		0.01[F,H]			Gold Book
18 Hardness		NARRATIVE STATEMENT—SEE DOCUMENT						Gold Book
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,H]					Gold Book
22 Manganese	7439965					50[A]	100[A]	Gold Book
23 Methoxychlor	72435		0.03[F,H]		0.03[F,H]	100[A,C]		Gold Book
24 Mirex	2385855		0.001[F,H]		0.001[F,H]			Gold Book
25 Nitrates	14797558					10,000[A]		Gold Book
26 Nitrosamines						0.0008	1.24	

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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
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,H]		2.0[F,H]			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]			62 FR 42554
45	Trichlorophenol,2,4,5-	95954					2,600[B,E]	9,800[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 40 CFR 141 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).

[H] 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 (60 FR 15393–15399, 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.

[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 (60 FR 15393–15399, March 23, 1995; 40 CFR 132 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 (62 FR 42554, 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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Dermal Permeability Constants

EPA/600/8-91/011B
January 1992
Interim Report

DERMAL EXPOSURE ASSESSMENT: PRINCIPLES AND APPLICATIONS

Exposure Assessment Group
Office of Health and Environmental Assessment
U.S. Environmental Protection Agency
Washington, D.C. 20460

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Table 5-8. K_p, τ, t^*, and B for Common Pollutants

Chemical	CAS No.	Measured Kp (cm/hr)	Estimated Kp (cm/hr)	τ (hr)	t^* (hr)	B
ORGANICS:						
Acetaldehyde	75070		7.2e-04	1.6e-01	3.9e-01	6.0e-05
Acetamide	60355		1.1e-04	2.0e-01	4.8e-01	5.5e-06
Acetylaminofluorene, 2-	53963		1.7e-02	2.0e+00	7.7e+00	1.7e-01
Acrolein	107028		7.4e-04	1.9e-01	4.6e-01	7.9e-05
Acrylamide	79061		2.4e-04	2.4e-01	5.7e-01	2.1e-05
Acrylonitrile	107131		1.4e-03	1.8e-01	4.4e-01	1.8e-04
Aldrin	309002		1.6e-03	1.5e+01	3.6e+01	1.0e-01
Allyl chloride	107051		7.0e-03	2.6e-01	6.2e-01	2.8e-03
Amino-2-methylanthraquinone, 1-	82280		6.6e-03	2.4e+00	5.9e+00	6.3e-02
Aminoanthraquinone, 2-	117793		2.8e-03	2.0e+00	4.8e+00	1.4e-02
Aminoazobenzene, p-	60093		8.7e-03	1.4e+00	3.3e+00	4.2e-02
Aminoazotoluene, o-	97563		4.9e-02	2.1e+00	1.6e+01	8.3e-01
Aminobiphenyl, 4-	92671		1.7e-02	9.4e-01	2.3e+00	6.3e-02
Aniline	62533	4.1e-02	2.2e-03	3.2e-01	7.8e-01	7.9e-04
Anisidine, o-	90040		1.7e-03	6.7e-01	1.6e+00	1.5e-03
Auramine	492808		1.5e-02	3.7e+00	2.1e+01	3.5e-01
Benzene	71432	1.1e-01	2.1e-02	2.6e-01	6.3e-01	1.3e-02
Benzidine	92875		1.3e-03	1.2e+00	2.8e+00	2.2e-03
Benzo-a-anthracene	56553		8.1e-01	2.2e+00	1.0e+01	4.6e+01
Benzo-a-pyrene	50328		1.2e+00	2.9e+00	1.4e+01	1.3e+02
Benzo-b-fluoranthene	205992		1.2e+00	3.0e+00	1.4e+01	1.3e+02
Benzoic acid	65850		7.3e-03	4.9e-01	1.2e+00	7.4e-03
Benzotrichloride	98077		1.5e-02	1.4e+00	3.2e+00	8.3e-02
Benzyl chloride	100447		1.4e-02	5.2e-01	1.2e+00	2.0e-02
Bis(2-chloroethyl)ether	111444		2.1e-03	6.5e-01	1.6e+00	1.9e-03

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Table 5-8. (continued)

Chemical	CAS No.	Measured Kp (cm/hr)	Estimated Kp (cm/hr)	τ (hr)	t* (hr)	B
Bromodichloromethane	75274		5.8e-03	8.7e-01	2.1e+00	1.2e-02
Bromoform	75252		2.6e-03	3.0e+00	7.3e+00	2.3e-02
Bromomethane	74839		3.5e-03	3.3e-01	8.0e-01	1.5e-03
Bromophenol, p-	106412	3.6e-02	1.3e-02	9.9e-01	2.4e+00	4.5e-02
Butadiene, 1,3-	106990		2.3e-02	1.9e-01	4.5e-01	9.8e-03
Butanediol, 2,3-	513859	5.0e-05	1.2e-04	3.1e-01	7.4e-01	1.2e-05
Butanol, n-	71363	2.5e-03	1.9e-03	2.5e-01	5.9e-01	4.5e-04
Butoxyethanol, 2-	111762	1.2e-02	1.4e-03	4.6e-01	1.1e+00	6.8e-04
Captan	133062		1.3e-03	5.9e+00	1.4e+01	2.2e-02
Carbon disulfide	75150	5.0e-01	2.4e-02	2.7e-01	6.5e-01	1.7e-02
Carbon tetrachloride	56235		2.2e-02	7.6e-01	1.8e+00	6.8e-02
Chlordane	57749		5.2e-02	2.8e+01	1.3e+02	3.5e+01
Chlordane (cis)	5103719		4.6e-02	2.8e+01	1.3e+02	3.0e+01
Chlordane (trans)	5103742		4.6e-02	2.8e+01	1.3e+02	3.0e+01
Chlorobenzene	108907		4.1e-02	4.3e-01	1.0e+00	6.9e-02
Chlorocresol	59507	5.0e-02	4.1e-02	6.5e-01	1.9e+00	1.3e-01
Chlorodibromomethane	124481		3.9e-03	1.6e+00	3.9e+00	1.7e-02
Chloroethane	75003		8.0e-03	2.2e-01	5.2e-01	2.7e-03
Chloroform	67663	1.3e-01	8.9e-03	4.7e-01	1.1e+00	9.3e-03
Chloromethane	74873		4.2e-03	1.8e-01	4.3e-01	8.1e-04
Chlorophenol, o-	95578	3.3e-02	1.1e-02	5.3e-01	1.3e+00	1.4e-02
Chlorophenol, p-	106489	3.6e-02	1.6e-02	5.3e-01	1.3e+00	2.5e-02
Chlorothalonil	1897456		2.5e-02	3.7e+00	2.8e+01	7.2e-01
Chloroxylenol		6.0e-02	3.0e-04	5.6e-01	1.3e+00	1.0e-04
Chrysene	218019		8.1e-01	2.2e+00	1.0e+01	4.6e+01
Cresidine, p-	120718		4.3e-03	6.0e-01	1.4e+00	4.7e-03
Cresol, m-	108394	1.5e-02	1.0e-02	4.0e-01	9.6e-01	9.1e-03

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Table 5-8. (continued)

Chemical	CAS No.	Measured Kp (cm/hr)	Estimated Kp (cm/hr)	τ (hr)	t* (hr)	B
Cresol, o-	95487	1.6e-02	1.0e-02	4.0e-01	9.6e-01	8.9e-03
Cresol, p-	106445	1.8e-02	1.0e-02	4.0e-01	9.6e-01	8.7e-03
DDD	72548		2.8e-01	7.8e+00	3.7e+01	6.3e+01
DDE	72559		2.4e-01	7.6e+00	3.6e+01	4.9e+01
DDT	50293		4.3e-01	1.3e+01	6.0e+01	2.3e+02
Decanol	112301	8.0e-02	1.7e-01	8.1e-01	5.6e+00	1.3e+00
Di-2-ethylhexyl phthalate	117817		3.3e-02	2.1e+01	1.0e+02	1.3e+01
Diaminoanisole, 2,4-	615054		2.3e-04	6.1e-01	1.5e+00	7.6e-05
Diaminotoluene	95807		6.0e-04	4.9e-01	1.2e+00	2.2e-04
Diaminotoluene, 2,4-	101804		3.3e-03	1.5e+00	3.5e+00	1.1e-02
Dibenzo(a,h)anthracene	53703		2.7e+00	4.4e+00	2.1e+01	6.9e+02
Dibutyl phthalate	84742		3.3e-02	4.3e+00	2.9e+01	1.3e+00
Dichlorobenzene, 1,2-	95501		6.1e-02	6.9e-01	3.2e+00	2.4e-01
Dichlorobenzene, 1,3-	541731		8.7e-02	6.9e-01	4.1e+00	4.0e-01
Dichlorobenzene, 1,4-	106467		6.2e-02	6.9e-01	3.3e+00	2.5e-01
Dichlorobenzidine, 3,3'	91941		1.7e-02	3.1e+00	1.7e+01	3.2e-01
Dichlorodifluoromethane	75718		1.2e-02	4.8e-01	1.1e+00	1.4e-02
Dichloroethane, 1,1-	75343		8.9e-03	3.5e-01	8.4e-01	6.2e-03
Dichloroethane, 1,2-	107062		5.3e-03	3.5e-01	8.4e-01	3.0e-03
Dichloroethylene, 1,1-	75354		1.6e-02	3.4e-01	8.2e-01	1.3e-02
Dichloroethylene, 1,2- (trans)	540590		1.0e-02	3.4e-01	8.2e-01	7.2e-03
Dichlorophenol, 2,4-	120832	6.0e-02	2.3e-02	8.6e-01	2.1e+00	8.3e-02
Dichloropropane, 1,2-	78875		1.0e-02	4.3e-01	1.0e+00	1.0e-02
Dichloropropene, 1,3-	542756		5.5e-03	4.2e-01	1.0e+00	4.0e-03
Dichlorvos	62737		9.5e-04	1.9e+00	4.7e+00	3.0e-03
Dieldrin	60571		1.6e-02	1.8e+01	9.4e+01	3.6e+00
Diepoxybutane	1464535		2.8e-05	2.9e-01	7.0e-01	1.4e-06

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Table 5-8. (continued)

Chemical	CAS No.	Measured Kp (cm/hr)	Estimated Kp (cm/hr)	τ (hr)	t* (hr)	B
Diethyl phthalate	84662		4.8e-03	2.0e+00	4.7e+00	3.0e-02
Diethyl sulfate	64675		1.4e-03	7.6e-01	1.8e+00	1.4e-03
Dimethoxybenzidine, 3,3'-	119904		1.0e-03	3.1e+00	7.5e+00	6.5e-03
Dimethyl phthalate	131113		1.6e-03	1.3e+00	3.2e+00	3.6e-03
Dimethyl sulfate	77781		2.2e-03	5.1e-01	1.2e+00	1.4e-03
Dimethylamine, n-nitroso-	62759		2.7e-04	2.5e-01	5.9e-01	2.7e-05
Dimethylaminoazobenzene, 4-	60117		1.4e-01	2.1e+00	1.0e+01	3.8e+00
Dimethylbenzidine, 3,3'-	119937		4.4e-03	1.7e+00	4.1e+00	2.2e-02
Dimethylcarbamyl chloride	79447		4.2e-04	4.0e-01	9.5e-01	1.0e-04
Dimethylhydrazine, 1,1-	57147		7.1e-05	2.0e-01	4.9e-01	3.2e-06
Dimethylphenol, 2,4-	105679	1.1e-01	1.5e-02	4.9e-01	1.2e+00	2.0e-02
Dimethylphenol, 3,4-	95658	4.0e-02	1.3e-02	4.9e-01	1.2e+00	1.7e-02
Dinitrophenol, 2,4-	51285	3.2e-03	1.8e-03	1.2e+00	2.8e+00	3.5e-03
Dinitrotoluene, 2,4-	121142		3.8e-03	1.1e+00	2.7e+00	9.5e-03
Dinitrotoluene, 2,6-	606202		2.5e-03	1.1e+00	2.7e+00	5.2e-03
Dioxane, 1,4-	123911	4.0e-04	3.6e-04	3.0e-01	7.2e-01	5.4e-05
Diphenylamine, n-nitroso-	86306		2.0e-02	1.4e+00	4.5e+00	1.3e-01
Diphenylhydrazine, 1,2-	122667		1.8e-02	1.2e+00	2.8e+00	8.7e-02
Dipropylamine, n-nitroso-	621647		2.8e-03	5.4e-01	1.3e+00	2.3e-03
Endrin	72208		1.6e-02	1.8e+01	9.4e+01	3.6e+00
Epichlorohydrin	106898		3.7e-04	3.2e-01	7.6e-01	6.2e-05
Ethanol	64175	8.0e-04	6.0e-04	1.7e-01	4.0e-01	4.9e-05
Ethanol, 2-(2-butoxyethoxy)-	112345		4.4e-05	8.5e-01	2.0e+00	1.2e-05
Ethanol, 2-(2-ethoxyethoxy)-	111900		2.5e-04	5.7e-01	1.4e+00	8.3e-05
Ethanol, 2-(2-methoxyethoxy)-	111773		1.8e-04	4.7e-01	1.1e+00	3.8e-05
Ethoxyethanol, 2-	110805	3.0e-04	4.6e-04	3.1e-01	7.4e-01	7.9e-05
Ethoxyethyl acetate, 2-	111159		8.6e-04	5.6e-01	1.3e+00	4.5e-04

Table 5-8. (continued)

Chemical	CAS No.	Measured Kp (cm/hr)	Estimated Kp (cm/hr)	τ (hr)	t* (hr)	B
Ethyl acrylate	140885		4.0e-03	3.6e-01	8.6e-01	2.1e-03
Ethyl carbamate	51796		4.3e-04	3.1e-01	7.3e-01	7.1e-05
Ethyl ether	60297	1.7e-02	2.9e-03	2.5e-01	5.9e-01	7.8e-04
Ethylbenzene	100414	1.0e+00	7.4e-02	3.9e-01	1.3e+00	1.4e-01
Ethylene oxide	75218		6.3e-04	1.6e-01	3.9e-01	5.0e-05
Ethylenedibromide	106934		3.3e-03	1.2e+00	2.9e+00	9.1e-03
Ethyleneimine	151564		1.7e-04	1.6e-01	3.8e-01	7.6e-06
Ethylenethiourea	96457		1.7e-04	3.4e-01	8.1e-01	2.2e-05
Ethylphenol, p-	123079	3.5e-02	1.4e-02	4.7e-01	1.1e+00	1.8e-02
Fluoranthene	206440		3.6e-01	1.5e+00	7.3e+00	8.9e+00
Formaldehyde	50000		2.2e-03	1.3e-01	3.2e-01	2.2e-04
Glycerol	56815	1.4e-04	2.9e-05	3.2e-01	7.7e-01	1.7e-06
Heptachlor	76448		1.1e-02	1.7e+01	9.4e+01	1.9e+00
Heptanol	111706	3.8e-02	1.9e-02	4.5e-01	1.1e+00	2.6e-02
Hexachlorobenzene	118741		2.1e-01	4.8e+00	2.3e+01	2.0e+01
Hexachlorobutadiene	87683		1.2e-01	3.4e+00	1.7e+01	6.0e+00
Hexachloroethane	67721		4.2e-02	2.4e+00	1.9e+01	8.5e-01
Hexamethylphosphoramide	680319		1.6e-04	1.1e+00	2.6e+00	1.1e-04
Hexanol	111273	3.0e-02	1.3e-02	3.7e-01	8.8e-01	1.1e-02
Hydrazine/Hydrazine sulfate	302012		4.1e-05	1.4e-01	3.3e-01	8.5e-07
Indeno(1,2,3-CD)pyrene	193395		1.9e+00	4.2e+00	2.0e+01	3.8e+02
Isophorone	78591		4.2e-03	6.1e-01	1.5e+00	4.7e-03
Lindane	58899		1.4e-02	5.2e+00	3.5e+01	5.2e-01
Mechlorethamine	51752		1.2e-03	7.8e-01	1.9e+00	1.2e-03
Methanol	67561	1.6e-03	3.5e-04	1.4e-01	3.3e-01	1.7e-05
Methoxyethanol, 2-	109864		1.9e-04	2.5e-01	6.1e-01	1.7e-05
Methoxypropan-2-ol, 1-	107982		4.0e-04	3.1e-01	7.4e-01	6.6e-05

Table 5-8. (continued)

Chemical	CAS No.	Measured Kp (cm/hr)	Estimated Kp (cm/hr)	τ (hr)	t* (hr)	B
Methyl ethyl ketone	78933	5.0e-03	1.1e-03	2.4e-01	5.8e-01	1.9e-04
Methyl hydroxybenzoate	99763	9.1e-03	5.2e-03	7.4e-01	1.8e+00	8.3e-03
Methyl iodide	74884		3.1e-03	6.4e-01	1.5e+00	3.2e-03
Methylaziridine, 2-	75558		3.2e-04	1.9e-01	4.7e-01	2.5e-05
Methylene bis(2-chloroaniline), 4,4'-	101144		2.8e-02	3.7e+00	3.0e+01	8.7e-01
Methylene bis(N,N'-dimethyl)aniline, 4,4'-	101611		1.3e-01	3.1e+00	1.5e+01	5.6e+00
Methylene chloride	75092		4.5e-03	2.9e-01	6.9e-01	1.8e-03
Methylenedianiline, 4,4'-	101779		1.6e-03	1.4e+00	3.4e+00	3.9e-03
Michler's ketone	90948		3.4e-02	3.8e+00	ERR	1.2e+00
Mustard Gas	505602		5.6e-03	8.2e-01	2.0e+00	1.1e-02
Naphthalene	91203		6.9e-02	5.3e-01	2.2e+00	2.0e-01
Naphthol, b-	135193	2.8e-02	2.6e-02	6.6e-01	1.6e+00	6.9e-02
Naphthylamine, 1-	134327		1.0e-02	6.5e-01	1.6e+00	1.8e-02
Naphthylamine, 2-	91598		1.1e-02	6.5e-01	1.6e+00	1.9e-02
Nitrilotriacetic acid	139139		9.7e-05	1.3e+00	3.1e+00	6.6e-05
Nitro-o-anisidine, 5-	99592		2.5e-03	7.5e-01	1.8e+00	2.9e-03
Nitrobiphenyl, 4-	92933		5.5e-02	1.4e+00	1.0e+01	5.9e-01
Nitrofen	1836755		3.0e-01	4.7e+00	2.2e+01	3.4e+01
Nitrophenol, 2-	88755	1.0e-01	5.0e-03	6.2e-01	1.5e+00	6.2e-03
Nitrophenol, 2-amino-4-	99570	7.0e-04	2.0e-03	7.6e-01	1.8e+00	2.3e-03
Nitrophenol, 3-	554847	5.6e-03	7.1e-03	6.2e-01	1.5e+00	1.0e-02
Nitrophenol, 4-	100027	5.6e-03	6.1e-03	6.2e-01	1.5e+00	8.1e-03
Nitrophenol, 4-amino-2-	119346	3.0e-03	1.1e-03	7.6e-01	1.8e+00	9.1e-04
Nitropropane, 2-	79469		1.0e-03	4.1e-01	9.8e-01	3.6e-04
Nitroso-di-n-butylamine, n-	924163		4.8e-03	8.1e-01	1.9e+00	8.3e-03
Nitroso-N-ethylurea, n-	759739		5.4e-04	4.5e-01	1.1e+00	1.7e-04

Table 5-8. (continued)

Chemical	CAS No.	Measured Kp (cm/hr)	Estimated Kp (cm/hr)	τ (hr)	t* (hr)	B
Nitroso-N-methylurea, n-	684935		4.3e-04	3.7e-01	8.9e-01	9.3e-05
Nitrosodiethanolamine, n-	1116547	5.0e-06	2.2e-05	5.7e-01	1.4e+00	2.6e-06
Nitrosodiethylamine, n-	55185		1.2e-03	3.0e-01	7.2e-01	3.0e-04
Nitrosodiphenylamine, p-	156105		3.6e-02	1.4e+00	7.6e+00	3.2e-01
Nitrosomethylvinylamine, n-	4549400		5.7e-04	2.9e-01	7.0e-01	9.9e-05
Nitrosomorpholine, n-	59892		1.8e-04	4.5e-01	1.1e+00	3.6e-05
Nitrosonornicotine, n-	16543558		1.7e-04	1.1e+00	2.5e+00	1.1e-04
Nitrosopiperidine, n-	100754		2.5e-05	1.2e+01	2.9e+01	2.3e-04
Nonanol	143088	6.0e-02	7.3e-02	6.6e-01	3.4e+00	2.9e-01
Octanol	111875	6.1e-02	3.9e-02	5.4e-01	1.3e+00	9.3e-02
Parathion	56382		1.7e-02	5.2e+00	3.8e+01	6.8e-01
PCB-chlorobiphenyl, 4-	2051629		1.3e+00	5.3e+00	2.5e+01	3.2e+02
PCB-hexachlorobiphenyl	26601649		7.1e-01	1.4e+01	6.6e+01	5.2e+02
Pentachloronitrobenzene	82688		5.9e-02	5.5e+00	2.8e+01	4.4e+00
Pentachlorophenol	87865		6.5e-01	3.7e+00	1.7e+01	7.2e+01
Pentanol	71410	6.0e-03	7.1e-03	3.0e-01	7.2e-01	3.6e-03
Pentanone, 4-methyl-2-	108101		3.3e-03	3.6e-01	8.6e-01	1.5e-03
Phenanthrene	85018		2.3e-01	1.1e+00	5.6e+00	2.9e+00
Phenol	108952	8.2e-03	5.5e-03	3.3e-01	7.9e-01	2.9e-03
Phenol, 4,6-dinitro-2-methyl-	534521		3.8e-03	1.4e+00	3.4e+00	1.3e-02
Propanol	71238	1.7e-03	1.3e-03	2.0e-01	4.9e-01	2.0e-04
Propiolactone, beta-	57578		3.3e-04	2.4e-01	5.8e-01	3.5e-05
Propylene oxide	75569		8.9e-04	2.0e-01	4.7e-01	1.1e-04
Resorcinol	108463	2.4e-04	1.5e-03	4.1e-01	9.9e-01	6.3e-04
Safrole	94597		1.5e-02	8.5e-01	2.0e+00	4.6e-02
Styrene	100425	6.7e-01	5.5e-02	3.8e-01	9.1e-01	8.9e-02
Styrene oxide	96093		4.9e-03	4.7e-01	1.1e+00	4.1e-03

Table 5-8. (continued)

Chemical	CAS No.	Measured Kp (cm/hr)	Estimated Kp (cm/hr)	τ (hr)	t* (hr)	B
TCDD	1746016		1.4e+00	8.1e+00	3.8e+01	6.3e+02
Tetrachlorethylene	127184	3.7e-01	4.8e-02	9.0e-01	4.3e+00	2.5e-01
Tetrachloroethane, 1,1,2,2-	79345		9.0e-03	9.2e-01	2.2e+00	2.5e-02
Thioacetamide	62555		2.1e-03	2.5e-01	6.0e-01	5.1e-04
Thiodianiline, 4,4'-	139651		2.5e-03	1.8e+00	4.4e+00	1.1e-02
Thiourea	62566	9.6e-05	1.4e-04	2.5e-01	6.1e-01	1.1e-05
Thymol	89838	5.3e-02	5.1e-02	7.2e-01	3.0e+00	2.0e-01
Toluene	108883	1.0e+00	4.5e-02	3.2e-01	7.7e-01	5.4e-02
Toluidine hydrochloride, o-	636215		2.1e-03	6.5e-01	1.6e+00	1.9e-03
Toluidine, o-	95534		3.7e-03	3.9e-01	9.4e-01	2.1e-03
Toxaphene	8001352		1.5e-02	2.9e+01	1.4e+02	6.6e+00
Trichlorobenzene, 1,2,4-	120821		1.0e-01	1.1e+00	9.3e+00	9.5e-01
Trichloroethane, 1,1,1-	71556		1.7e-02	5.7e-01	1.4e+00	3.1e-02
Trichloroethane, 1,1,2-	79005		8.4e-03	5.7e-01	1.4e+00	1.1e-02
Trichloroethylene	79016	2.3e-01	1.6e-02	5.5e-01	1.3e+00	2.6e-02
Trichlorofluoromethane	75694		1.7e-02	6.0e-01	1.4e+00	3.4e-02
Trichlorophenol, 2,4,6-	88062	5.9e-02	5.0e-02	1.4e+00	9.2e+00	4.9e-01
Tris(2,3-dibromopropyl)phosphate	126727		3.6e-04	1.6e+03	7.6e+03	9.5e+00
Tris(aziridinyl)-para-benzoquinone	68768		8.3e-06	2.3e+00	5.4e+00	4.6e-06
Urea	57136	1.2e-04	2.6e-05	2.0e-01	4.9e-01	7.8e-07
Vinyl bromide	593602		5.5e-03	3.9e-01	9.4e-01	3.7e-03
Vinyl chloride	75014		7.3e-03	2.1e-01	5.1e-01	2.3e-03
Water	7732185	1.5e-03	1.6e-04	1.1e-01	2.7e-01	4.2e-06
Xylene, m-	108383		8.0e-02	3.9e-01	1.4e+00	1.6e-01

APPENDIX E.4

TOXICOLOGICAL PROFILES FOR CHEMICALS OF CONCERN

E.4.1 ARSENIC

E.4.1.1 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 an 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.4.1.2 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 2000). 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). Occupations 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 (1999) 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.4.1.3 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 2000). Oral exposure to high levels in well water is associated with increased risk of skin cancer (Tseng 1977; EPA 2000). 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 (1999) 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 (1999) 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 2000), 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.4.2 BENZO(A)PYRENE (BAP)

E.4.2.1 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.4.2.2 Noncancer Toxicity

The oral RfD and inhalation RfC are not available at this time.

E.4.2.3 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 (1999) 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 7.3E+0 per mg/kg/day The cancer slope factor for inhalation is not available.

E.4.3 BIS(2-ETHYLHEXYL)PHTHALATE (DI[2-ETHYLHEXYL]PHTHALATE)

E.4.3.1 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 (1999) 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 (1999) 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.4.3.2 Carcinogenicity

The EPA (1999) 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 (1999).

E.4.4 CHLOROFORM

E.4.4.1 Noncancer Toxicity

Oral or inhalation exposure of animals to chloroform was associated with liver and kidney damage (ACGIH 1991; EPA 2000). 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 (1999) 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 2000). The EPA (1999) 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.4.4.2 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 2000). 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.4.5 CHROMIUM

E.4.5.1 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 2000). The NOEL of 5% Cr_2O_3 was the basis for a verified chronic oral RfD of 1.5 mg/kg/day (EPA 2000). 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 2000).

Acute oral exposure of humans to high doses of chromium (VI) induced neurological effects, GI hernorrhage 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 2000).

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 (1999).

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.4.5.2 Carcinogenicity

Data were not located regarding the carcinogenicity of chromium (III). The EPA (1999) 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.4.6 IRON

E.4.6.1 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 (1999) presents an oral RfD for iron of 0.3 mg/kg/day.

There are no toxicity values available for iron in EPA's Integrated Risk Information System (IRIS) database or Health Effects Assessment Summary Tables (HEAST). Iron is an essential nutrient and deriving a toxicity value for such chemicals poses a special problem in that the dose adversity curve is "U-shaped". Thus, the toxicity value must be protective against deficiency as well as toxicity. EPA's National Center for Environmental Assessment (NCEA) has derived a provisional reference dose (RfD) for iron using data obtained from the second National Health and Nutrition Examination Survey (NHANES II) database. The NHANES II data indicates that the average intakes of iron ranged from 0.15 to 0.27 mg/kg/day. These levels are sufficient to protect against iron deficiency and insufficient to cause the toxic effects of iron overload. Using the intake level of 0.27 mg/kg/day and dividing by an uncertainty factor of 1, NCEA derived a provisional RfD of 0.3 mg/kg/day for iron.

E.4.6.2 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.4.7 MANGANESE

E.4.7.1 Noncancer Toxicity

Manganese is nutritionally required in humans for normal growth and health (EPA, 1999). 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, 1999) based on drinking water. The EPA (1999) 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.4.7.2 Carcinogenicity

The EPA (1999) 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.4.8 THALLIUM

E.4.8.1 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 (1999) 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 (1999) presented a chronic oral RfD for thallium of 0.07 mg/kg/day.

E.4.8.2 Carcinogenicity

Thallium was classified as a cancer weight-of-evidence Group D substance (not classifiable as to carcinogenicity to humans) (EPA, 1999).

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APPENDIX E.5

SCREENING LEVELS FOR ESSENTIAL NUTRIENTS

SCREENING CRITERIA FOR ESSENTIAL NUTRIENTS
DERIVATION OF SURFACE SOIL AND GROUNDWATER SCREENING CONCENTRATIONS OF ESSENTIAL NUTRIENTS

Certain inorganics (calcium, magnesium, potassium, and sodium) that are present as naturally occurring constituents in soil and groundwater are required in limited intakes to maintain normal human physiological functions and are, therefore, considered essential nutrients. The Risk Assessment Guidance for Superfund (RAGS), Volume I, Part A, regarding the treatment of essential nutrients in selection of human health contaminants of potential concern (COPCs), states that essential nutrients need not be quantitatively evaluated in a public health risk assessment if they are (1) present at low concentrations (only slightly above background) and (2) toxic only at doses much higher than those which might be related to exposure at the site (USEPA, 1989). The focus of this section of the document is the technical approach for determining that an analyte is "toxic only at doses higher than those associated with exposures at the site" and a mechanism for making that determination by employing soil and groundwater screening concentrations. The screening concentrations are used to streamline the process and to eliminate the need to calculate essential nutrient doses as part of COPCs selection at every site. If the maximum concentration of an essential nutrient does not exceed the appropriate screening concentration shown below, the essential nutrient is considered nontoxic. Essential nutrients are not retained as COPCs if they are detected at concentrations that are either consistent with background or do not exceed the screening concentrations.

Currently, no published essential nutrient screening concentrations for use in risk assessment COPC selection are available. Therefore, surface soil and groundwater screening concentrations of essential nutrients have been derived that, when contacted in accordance with the exposure assumptions described below, are not expected to result in adverse health effects. The screening concentrations for groundwater and surface soil are presented in Table 1. The essential nutrient concentrations in surface sol and groundwater are to be compared directly to the nutrient screening concentrations for the purposes of COPC selection.

DOCUMENTATION OF SURFACE SOIL AND GROUNDWATER SCREENING CONCENTRATIONS

The essential nutrient toxicity screening concentrations were derived in two steps: first, a "nontoxic" dose was identified for each essential nutrient; second, the soil and groundwater concentrations associated with the "nontoxic" doses were calculated using standard residential exposure assumptions. The details of the derivation of the screening values are presented below.

Identification of Nontoxic Doses. The identification of doses which are not toxic is often accomplished by identifying reference doses (RfDs), which are published by USEPA. These RfDs represent doses, including a margin of safety, to which even sensitive subpopulations could be exposed for a lifetime without adverse noncarcinogenic effects. Because no RfDs for calcium, magnesium, potassium, or sodium are available in the Integrated Risk Information System (IRIS) (USEPA, 1999b) or the Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997a), other published nontoxic doses were sought out. Recommended Dietary Allowances (RDAs) prepared by the Food and Nutrition Board (FNB) of the National Research Council (NRC, 1989) have been selected here to represent nontoxic doses.

TABLE 1

ESSENTIAL NUTRIENT SCREENING CONCENTRATIONS FOR SURFACE SOIL AND GROUNDWATER

Essential Nutrient	Surface Soil Screening Concentration (mg/kg)	Groundwater Screening Concentration (μg/l)
Calcium	1,000,000(1)	1,055,398
Magnesium	460,468	118,807
Potassium	1,000,000(1)	297,016
Sodium	1,000,000(1)	396,022

1 Actual calculated screening concentration is greater than 1,000,000 milligrams per kilogram, indicating that this essential nutrient would not be present at toxic levels in surface soil.

Notes: As described below, screening concentrations for surface sol and groundwater represent conservative screening concentrations for other media. These surface soil and groundwater screening concentrations are used to screen sediment, subsurface soil, sludge, and surface water, respectively.

mg/kg = milligrams per kilogram.
μg/l = micrograms per liter

RDAs are defined by the FNB as "the levels of intake of essential nutrients that, on the basis of scientific knowledge, are judged by the Food and Nutrition Board to be adequate to meet the known nutrient needs of practically all healthy persons." It is assumed here that because the RDA represents a requirement for good nutrition, it also represents a dose that is nontoxic. Although some essential nutrients (arsenic for example) have been classified as carcinogens, none of the five nutrients discussed here have been classified as carcinogens. The available RDA data for calcium, magnesium, potassium, and sodium are presented in Table 2. From this data set, RDAs for children were preferentially selected to coincide with the child exposure scenario. RDAs were converted from units of milligrams per day to units of milligrams per kilogram per day by dividing the RDA by the child resident body weight of 15 kilograms (USEPA, 1991). Dermal RDAs were developed by adjusting the oral RDA to compensate for the oral absorption efficiency in a manner similar to that presented in Appendix A of RAGS, Volume I, Part A (USEPA, 1989).

TABLE 2

RECOMMENDED DIETARY ALLOWANCES[1]

Nutrient	RDA	Age (years)	Oral Absorption (Percent)	Typical Dietary Intake (mg/day)	Toxicity Threshold (mg/day)	Oral RDA (mg/kg/day)[2]	Dermal RDA (mg/kg/day)[3]
Calcium	800 (mg/day)	1 - 10	40	743 (average of all ages)	NA	53.3	21.2
	1,200 (mg/day)	11 - 24		1,179	NA		
	800 (mg/day)	>24		743 (average of all ages); 530 (women ages 35-50)	>2,500		
Magnesium	6 (mg/kg/day)	1 - 15	50	193 (age 1-5)	NA	6	3
	4.5 (mg/kg/day)	>15		207 - 329	NA		
Potassium	15 - 20 (mg/kg/day)	1 - 10	90	1,500	NA	15	13.5
	1,600 - 2,000 (mg/day)	>20		2,500	18,000 (hyperkalemia)		
Sodium	300 (mg/day)	2 - 5	90[4]	NA	NA	20	18
	500 (mg/day)	Adult		1,800 - 5,000	2,400 (Intake not to be exceeded)	20	18

1 All data are from the National Resource Council (1989).
2 Adjusted oral recommended daily allowance (RDA) calculated by dividing the RDA (milligrams per kilogram) by the bodyweight of a child ages 1 to 6 (15 kilogram) (USEPA, 1991); RDAs provided in milligrams per kilogram per day were modified.
3 Adjusted dermal RDA calculated by multiplying the oral RDA by the oral absorption efficiency (USEPA, 1989).
4 Oral absorption data not available; value for potassium used as a surrogate based on physio-chemical similarities.

Notes: RDA = recommended daily allowance.
mg/day = milligrams per day.
mg/kg = milligrams per kilogram.
mg/kg/day = milligrams per kilogram per day.

To derive screening concentrations that would be protective to the majority of the exposed population, the exposure assumptions for the most sensitive receptor (e.g., a child resident) were used. For groundwater, screening concentrations were based on ingestion of groundwater as drinking water. For surface soil, screening concentrations were based on ingestion of surface soil and dermal contact with surface soil. Child resident exposure to surface soil and groundwater used as drinking water is usually greater than or equal to oral and dermal exposure to media treated as soil and groundwater, respectively, for exposure assessment. Therefore, screening values for surface soil represent conservative screening values for sediment, subsurface soil, and sludge, and screening values for groundwater used as drinking water represent conservative screening values for surface water.

The calculated essential nutrient screening concentrations for surface soil and groundwater are presented in Table 1. These values represent the concentrations of individual essential nutrients in media that if contacted in accordance with the exposure parameters used to derive the screening concentration, it would theoretically results in the receptor receiving his or her recommended dietary allowance of an essential nutrient solely from the contacted media. For some nutrients, the calculated screening concentrations exceed 1,000,000 mg/kg (i.e., 100 percent). Such concentrations indicate that no concentration of nutrient in the particular medium would result in an intake that exceeds the RDA, given the exposure assumptions on which the screening value is based. Because these screening concentrations do not take into account the additivity of exposures between media (and other dietary intakes, including food), a receptor exposed to essential nutrients that are present in multiple media at the screening concentrations would, in essence, be receiving more than his or her recommended dietary allowance of nutrient. However, data provided in Table 2 indicate that the toxicity threshold for most essential nutrients is several times greater than the RDA; the RDA is not a toxicity threshold value. Therefore, these screening concentrations do not represent concentrations which, if exceeded, would necessarily result in deleterious effects.

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APPENDIX E.6

COPC SCREENING USING EPA REGION IX PRGS

TABLE E6-1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SURFACE SOIL
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

CAS Number	Chemical	Minimum[1] Concentration	Minimum Qualifier	Maximum[1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value[2]	US EPA Region III RBC[3]		US EPA Region IX PRGs[10]		US EPA[4] SSL Soil to Air		US EPA[5] SSL Soil to Groundwater		COPC Flag	Rationale for[6] Contaminant Deletion or Selection
Volatile Organic Compounds																					
67-64-1	Acetone	0.018	J	0.17	J	mg/kg	PAI-02-SS-08-01	2/7	0.02 - 0.16	0.17	N/A	780	N	157	N	100000	sat	16	N	No	BSL
67-66-3	Chloroform	0.002	J	0.018		mg/kg	PAI-02-SS-04-01	6/8	0.007 - 0.008	0.018	N/A	100	C	0.2	C	0.3	C	0.6		No	BSL
108-88-3	Toluene	0.003	J	0.003	J	mg/kg	PAI-02-SS-01-01	1/8	0.006 - 0.008	0.003	N/A	1600	N	52	sat	650	sat	12		No	BSL
Semivolatile Organic Compounds																					
120-12-7	Anthracene	0.0013	J	0.0013		mg/kg	PAI-02-SS-02-01	1/8	0.0017 - 0.022	0.0013	N/A	2300	N	2200	N	N/A		12000	N	No	BSL
205-99-2	Benzo(b)fluoranthene	0.0009		0.0023		mg/kg	PAI-02-SS-07-01	4/8	0.0017 - 0.022	0.0023	N/A	0.87	C	0.6	C	N/A		5	C	No	BSL
218-01-9	Chrysene	0.0029	J	0.0029	J	mg/kg	PAI-02-SS-07-01	1/8	0.0043 - 0.055	0.0029	N/A	87	C	62	C	N/A		160	C	No	BSL
206-44-0	Fluoranthene	0.0047	J	0.0077		mg/kg	PAI-02-SS-01-01	2/8	0.0043 - 0.055	0.0077	N/A	310	N	229	N	N/A		4300	N	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.0047	J	0.0047	J	mg/kg	PAI-02-SS-08-01	1/8	0.0043 - 0.055	0.0047	N/A	0.87	C	0.6	C	N/A		14	C	No	BSL
85-01-8	Phenanthrene	0.0032	J	0.041	J	mg/kg	PAI-02-SS-06-01	6/8	0.0036 - 0.0073	0.041	N/A	160[7]	N	5.6[7]	N	N/A		N/A		No	BSL
Inorganics																					
7429-90-5	Aluminum	1710		4290		mg/kg	PAI-02-SS-04-01	8/8	N/A	4290	7270	7800	N	7600	N	N/A		N/A		No	BSL, BKG
7440-36-0	Antimony	0.17		0.17		mg/kg	PAI-02-SS-01-01	1/8	0.15 - 1.3	0.17	N/A	3.1	N	3.1	N	N/A		5		No	BSL
7440-38-2	Arsenic	0.18		1		mg/kg	PAI-02-SS-07-01	4/8	0.18 - 0.23	1	1.4	0.43	C	0.39	C	750	C	29		No	BKG
7440-39-3	Barium	4.4		12		mg/kg	PAI-02-SS-02-01	8/8	N/A	12	24	550	N	538	N	690000	N	1600		No	BSL, BKG
7440-70-2	Calcium	53.1		477		mg/kg	PAI-02-SS-06-01	7/8	47.3	477	766	N/A		N/A		N/A		N/A		No	NUT, BKG
7440-47-3	Chromium VI	3.5		7.5		mg/kg	PAI-02-SS-07-01	8/8	N/A	7.5	6.2	23	N	30	C	270	N	38		No	BSL
7440-48-4	Cobalt	0.03		0.19		mg/kg	PAI-02-SS-04-01	5/8	0.04	0.19	0.36	470	N	470	N	N/A		N/A		No	BSL , BKG
7440-50-8	Copper	1.1		1.7		mg/kg	PAI-02-SS-05-01	2/8	0.36 - 0.75	1.7	1.5	310	N	290	N	N/A		N/A		No	BSL
7439-89-6	Iron	382		1930		mg/kg	PAI-02-SS-04-01	8/8	N/A	1930	3920	2300	N	2300	N	N/A		N/A		No	BSL, BKG
7439-92-1	Lead	1.7		5.7		mg/kg	PAI-02-SS-04-01	5/8	2.6 - 5.2	5.7	12.5	400[8]		400	N	N/A		N/A		No	BSL, BKG
7439-96-5	Magnesium	53.1		174		mg/kg	PAI-02-SS-04-01	5/8	63.7 - 236	174	515	N/A		N/A		N/A		N/A		No	NUT, BKG
7439-96-5	Manganese	2.6		58.1		mg/kg	PAI-02-SS-04-01	6/8	1.8 - 3.6	58.1	128	160	N	176	N	N/A		N/A		No	BSL, BKG
7487-94-7	Mercury	0.03		0.05		mg/kg	PAI-02-SS-06-01, PAI-02-SS-04-01, PAI-02-SS-01-01	5/8	0.02 - 0.03	0.05	0.11	2.3[9]	N	2.3	N	10		2		No	BSL, BKG
7440-02-0	Nickel	1.2		1.2		mg/kg	PAI-02-SS-04-01	1/8	0.05 - 0.41	1.2	1.8	160	N	156	N	13000	N	130		No	BSL, BKG
7440-09-07	Potassium	87.8		102		mg/kg	PAI-02-SS-05-01	2/8	47.8 - 87.5	102	313	N/A		N/A		N/A		N/A		No	NUT, BKG
7782-49-2	Selenium	0.18		0.18		mg/kg	PAI-02-SS-04-01	1/8	0.19 - 0.24	0.18	0.29	39	N	39	N	N/A		5		No	BSL, BKG
7440-23-5	Sodium	189		2100		mg/kg	PAI-02-SS-07-01	6/8	432 - 606	2100	241	N/A		N/A		N/A		N/A		No	NUT
7440-62-2	Vanadium	1.4		4.1		mg/kg	PAI-02-SS-04-01	8/8	N/A	4.1	4.8	55	N	55	N	N/A		6000	N	No	BSL, BKG
7440-66-6	Zinc	1.2		2.3		mg/kg	PAI-02-SS-01-01	3/8	0.92 - 9.2	2.3	4.9	2300	N	2300	N	N/A		12000	N	No	BSL, BKG

Notes:

1 Minimum/maximum detected concentration.

2 Background values presented for Inorganics is two times the mean concentration.

3 USEPA Region III Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 0.1)

4 USEPA Soil Screening Level Guidance: Technical Background Document. May 1996c

5 USEPA Soil Screening Level Guidance: Technical Background Document. May 1996. (Based on a DAF [Dilutional Attenuation Factor] of 20)

6 Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

7 No value available. Therefore value for naphthalene is used based on similar chemical/toxicological characteristics.

8 OSWER screening level.

9 Value for mercuric chloride.

10 USEPA Region IX Preliminary Remediation Goals, December 3, 1999

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 E6-2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SURFACE SOIL
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA

CAS Number	Chemical	Minimum[1] Concentration	Minimum Qualifier	Maximum[1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background[2] Value	US EPA[3] Region III RBC		US EPA Region IX PRGs[8]		US EPA[4] SSL Soil to Air	US EPA[5] SSL Soil to Groundwater	COPC Flag	Rationale for[6] Contaminant Deletion or Selection
PCBs																			
11097-69-1	Aroclor-1254 1996 Data	0.024	J	0.024	J	mg/kg	015B	1/2		0.024	N/A	0.3	C	0.2	C	N/A	N/A	No	BSL
Metals																			
7439-92-1	Lead 1996 Data	4		15		mg/kg	015B	2/2	N/A	15	12.5	400[7]		400	N	N/A	N/A	No	BSL
7439-92-1	Lead 1998 Data	4		18.4		mg/kg	PAI-15-SS-07-01	7/7	N/A	18.4	12.5	400[7]		400	N	N/A	N/A	No	BSL

Notes:

1 Minimum/maximum detected concentration.

2 Background value for inorganics is two times the mean concentration.

3 USEPA Region III Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 0.1)

4 USEPA Soil Screening Level Guidance: Technical Background Document. May 1996c.

5 USEPA Soil Screening Level Guidance: Technical Background Document. May 1996c. (Based on a DAF [Dilutional Attenuation Factor] of 20)

6 Rationale Codes Selection Reason:
Deletion Reason:

7 OSWER screening level.

8 USEPA Region IX Preliminary Remediation Goals, December 3, 1999.

Definitions:

N/A = Not Applicable

SQL = Sample Quantitation Limit

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J = Estimated Value

C = Carcinogenic

N = Non-Carcinogenic

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TABLE E6-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH GROUNDWATER
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

CAS Number	Chemical	Minimum[1] Concentration	Minimum Qualifier	Maximum[1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background[2] Value	Screening[3] Toxicity Value		US EPA Region IX PRGs[4]		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for[4] Contaminant Deletion or Selection
Volatile Organic Compounds																			
67-64-1	Acetone	1.8	J	3.3	J	µg/L	PAI-02-GW-04-01	2/3	5	3.3	N/A	61	N	61	N	N/A	N/A	No	BSL
75-15-0	Carbon Disulfide	4		4		µg/L	PAI-02-GW-05-01	1/5	1	4	N/A	100	N	104	N	N/A	N/A	No	BSL
67-66-3	Chloroform	2.9		2.9		µg/L	PAI2-GW2-01	1/5	1	2.9	N/A	0.15	C	0.165	C	80[6]	MCL	Yes	ASL
74-87-3	Chloromethane	0.35		0.35		µg/L	PAI2-GW3-01-AVG	1/5	1	0.35	N/A	2.1	C	2	C	N/A	N/A	No	BSL
Semivolatile Organic Compounds																			
117-81-7	Bis(2-Ethylhexyl)phthalate	1	J	1	J	µg/L	PAI2-GW1-01, PAI2-GW2-01, PAI-02-GW-04-01, PAI-02-GW-05-01	4/5	5	1	N/A	4.8	C	5	C	6	MCL	No	BSL
84-66-2	Diethyl Phthalate	1	J	1	J	µg/L	PAI-02-GW-05-01	1/5	5	1	N/A	2900	N	2900	N	N/A	N/A	No	BSL
Inorganics - Unfiltered																			
7429-90-5	Aluminum	189		1010		µg/L	PAI2-GW1-01	3/5	22 - 79.5	1010	N/A	3700	N	3650	N	50 To 200	SMCL	No	BSL
7440-38-2	Arsenic	1		1.5		µg/L	PAI-02-GW-01-01	4/5	0.9	1.5	N/A	0.045	C	0.045	C	50	MCL	Yes	ASL
7440-39-3	Barium	33.7		148		µg/L	PAI2-GW3-01-AVG	5/5	N/A	148	N/A	260	N	260	N	2000	MCL	No	BSL
7440-70-2	Calcium	6370		281000		µg/L	PAI-02-GW-04-01	5/5	N/A	281000	N/A	N/A		N/A		N/A	N/A	No	NUT
7440-47-3	Chromium	5.2		5.2		µg/L	PAI2-GW3-01-AVG	1/5	6.4 - 11.9	5.2	N/A	5500	N	5500	N	100	MCL	No	BSL
7440-50-8	Copper	5.2		28.8		µg/L	PAI2-GW1-01	2/5	2.6	28.8	N/A	150	N	136	N	1000	SMCL	No	BSL
7439-89-6	Iron	439		8370		µg/L	PAI-02-GW-05-01	5/5	N/A	8370	N/A	1100	N	1100	N	300	SMCL	Yes	ASL
7439-96-5	Magnesium	2580		778000		µg/L	PAI-02-GW-04-01	5/5	N/A	778000	N/A	N/A		N/A		N/A	N/A	No	NUT
7439-96-5	Manganese	37		187		µg/L	PAI-02-GW-05-01	5/5	N/A	187	N/A	73	N	88	N	50	SMCL	Yes	ASL
7400-09-7	Potassium	400		245000		µg/L	PAI-02-GW-04-01	4/5	558	245000	N/A	N/A		N/A		N/A	N/A	No	NUT
7440-23-5	Sodium	18100		5990000		µg/L	PAI-02-GW-04-01	5/5	N/A	5990000	N/A	N/A		N/A		N/A	N/A	No	NUT
7440-28-0	Thallium	18		18		µg/L µg/L	PAI2-GW2-01 PAI-02-GW-04-01	2/5	1.8 - 18	18	N/A	0.26	N	0.3[7]		2	MCL	Yes	ASL
7440-66-6	Zinc	5.5		13.3		µg/L	PAI2-GW2-01	2/5	4.1 - 33.4	13.3	N/A	1100	N	1100	N	5000	SMCL	No	BSL
Inorganics - Filtered																			
7429-90-5	Aluminum	195		512		µg/L	PAI2-GW1-01-F	2/5	22 - 60.4	512	N/A	3700	N	3700	N	50 To 200	SMCL	No	BSL
7440-38-2	Arsenic	1.1		1.2		µg/L	PAI2-GW2-01-F	2/5	0.9	1.2	N/A	0.045	C	0.045	C	50	MCL	Yes	ASL
7440-39-3	Barium	172		243		µg/L	PAI-02-GW-04-01-F	5/5	N/A	243	N/A	260	N	260	N	2000	MCL	No	BSL
7440-70-2	Calcium	6670		276000		µg/L	PAI-02-GW-04-01-F	5/5	N/A	276000	N/A	N/A		N/A		N/A	N/A	No	NUT
7440-47-3	Chromium	5		5		µg/L	PAI2-GW3-01-F-AVG	1/5	6.4 - 15.2	5	N/A	5500	N	5500	N	100	MCL	No	BSL
7440-50-8	Copper	3.9		22.9		µg/L	PAI2-GW1-01-F	2/5	2.6	22.9	N/A	150	N	136	N	1000	SMCL	No	BSL
7439-89-6	Iron	405		7980		µg/L	PAI-02-GW-05-01-F	5/5	N/A	7980	N/A	1100	N	1100	N	300	SMCL	Yes	ASL
7439-96-5	Magnesium	2520		772000		µg/L	PAI-02-GW-04-01-F	5/5	N/A	772000	N/A	N/A		N/A		N/A	N/A	No	NUT
7439-96-5	Manganese	35.5		181		µg/L	PAI-02-GW-05-01-F	5/5	N/A	181	N/A	73	N	88	N	50	SMCL	Yes	ASL
7440-09-7	Potassium	602		238000		µg/L	PAI-02-GW-04-01-F	4/5	682	238000	N/A	N/A		N/A		N/A	N/A	No	NUT
7440-23-5	Sodium	21200		5970000		µg/L	PAI-02-GW-04-01-F	5/5	N/A	5970000	N/A	N/A		N/A		N/A	N/A	No	NUT
7440-28-0	Thallium	18		18		µg/L	PAI-02-GW-04-01-F	1/5	1.8 - 18	18	N/A	0.26	N	0.3[7]		2	MCL	Yes	ASL
7440-66-6	Zinc	13.4		113		µg/L	PAI2-GW1-01-F	4/5	24.75	113	N/A	1100	N	1100	N	5000	SMCL	No	BSL

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TABLE E6-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH GROUNDWATER
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Notes:

1 Minimum/maximum detected concentration.

2 Background value for inorganics is two times the mean concentration.

3 USEPA Region III Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 0.1)

4 Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

5 Value is for total trihalomethanes.

6 USEPA Region IX Preliminary Remediation Goals, December 3, 1999.

7 Value is for thallic oxide

Shading indicates that a chemical was retained as a COPC.

Definitions:
N/A = Not Applicable
SQL = Sample Quantitation Limit
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
MCL = Federal Maximum Contaminant Level
SMCL = Secondary Maximum Contaminant Level
J = Estimated Value
C = Carcinogenic

TABLE E6-4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SEDIMENT
SITE 2 - BORROW PIT LANDFILL
MCRD PARIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

CAS Number	Chemical	Minimum[1] Concentration	Minimum Qualifier	Maximum[1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background[2] Value	Screening[3] Toxicity Value		US EPA Region IX PRGs[9]		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for[4] Contaminant Deletion or Selection
Volatile Organic Compounds																			
67-66-3	Chloroform	0.004	J	0.005	J	mg/kg	PAI-02-SD-04-01	2/5	0.006 - 0.008	0.005	N/A	100	C	0.2	C	N/A	N/A	No	BSL
Semivolatile Organic Compounds																			
56-55-3	Benzo(a)anthracene	0.0082	J	0.0082	J	mg/kg	PAI-02-SD-04-01	1/4	0.012 - 0.031	0.0082	N/A	0.87	C	0.6	C	N/A	N/A	No	BSL
50-32-8	Benzo(a)pyrene	0.0073		0.012		mg/kg	PAI-02-SD-04-01	2/4	0.029 - 0.031	0.012	N/A	0.087	C	0.06	C	N/A	N/A	No	BSL
205-99-2	Benzo(b)fluoranthene	0.0056		0.018		mg/kg	PAI-02-SD-04-01	2/4	0.012	0.018	N/A	0.87	C	0.6	C	N/A	N/A	No	BSL
207-08-9	Benzo(k)fluoranthene	0.008		0.008		mg/kg	PAI-02-SD-04-01	1/4	0.0047 - 0.012	0.008	N/A	8.7	C	6	C	N/A	N/A	No	BSL
218-01-9	Chrysene	0.011	J	0.021		mg/kg	PAI-02-SD-04-01	2/4	0.029 - 0.031	0.021	N/A	87	C	62	C	N/A	N/A	No	BSL
206-44-0	Fluoranthene	0.038		0.038		mg/kg	PAI-02-SD-04-01	1/4	0.012 - 0.031	0.038	N/A	310	N	229	N	N/A	N/A	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.007	J	0.012		mg/kg	PAI-02-SD-04-01	2/4	0.029 - 0.031	0.012	N/A	0.87	C	0.6	C	N/A	N/A	No	BSL
85-01-8	Phenanthrene	0.008	J	0.011		mg/kg	PAI-02-SD-04-01	2/4	0.023 - 0.025	0.011	N/A	160 (5)	N	5.6	N	N/A	N/A	No	BSL
129-00-0	Pyrene	0.03		0.03		mg/kg	PAI-02-SD-04-01	1/4	0.023 - 0.062	0.03	N/A	230	N	230	N	N/A	N/A	No	BSL
Inorganics																			
7429-90-5	Aluminum	3140		5560		mg/kg	PAI-02-SD-02-02	5/5	N/A	5560	24284	7800	N	7600	N	N/A	N/A	No	BSL, BKG
7440-38-2	Arsenic	0.79		2.1		mg/kg	PAI-02-SD-01-01	5/5	N/A	2.1	12.2	0.43	C	0.39	C	N/A	N/A	No	BKG
7440-39-3	Barium	4.9		7.9		mg/kg	PAI-02-SD-02-02, PAI-02-SD-02-01, PAI-02-SD-01-01	5/5	N/A	7.9	28.0	550	N	538	N	N/A	N/A	No	BSL, BKG
7440-70-2	Calcium	362		32800		mg/kg	PAI-02-SD-03-01	5/5	N/A	32800	4002	N/A		N/A		N/A	N/A	No	NUT
7440-47-3	Chromium	5.9		10.1		mg/kg	PAI-02-SD-01-01	5/5	N/A	10.1	35.2	12000[6]	N	10000	N	N/A	N/A	No	BSL, BKG
1854-02-99	Hexavalent Chromium	1.1		1.6		mg/kg	PAI-02-SD-02-01	2/3	1	1.6	N/A	23	N	30	C	N/A	N/A	No	BSL
7440-48-4	Cobalt	0.35		0.52		mg/kg	PAI-02-SD-03-01	2/5	0.74 - 0.88	0.52	2.63	470	N	470	N	N/A	N/A	No	BSL, BKG
7440-50-8	Copper	1.2		3.2		mg/kg	PAI-02-SD-01-01	5/5	N/A	3.2	10.1	310	N	290	N	N/A	N/A	No	BSL, BKG
7439-89-6	Iron	2650		5390		mg/kg	PAI-02-SD-01-01	5/5	N/A	5390	21450	2300	N	2300	N	N/A	N/A	No	BKG
7439-92-1	Lead	3.2		7.1		mg/kg	PAI-02-SD-02-02, PAI-02-SD-01-01	5/5	N/A	7.1	20.6	400[7]		400	N	N/A	N/A	No	BSL, BKG
7439-96-5	Magnesium	777		2380		mg/kg	PAI-02-SD-02-01	5/5	N/A	2380	6437	N/A		N/A		N/A	N/A	No	NUT, BKG
7439-96-5	Manganese	22.7		52.4		mg/kg	PAI-02-SD-04-01	5/5	N/A	52.4	185.7	160	N	176	N	N/A	N/A	No	BSL, BKG
7487-94-7	Mercury	0.04		0.04		mg/kg	PAI-02-SD-02-02	1/5	0.02 - 0.04	0.04	0.090	2.3[8]	N	2.3	N	N/A	N/A	No	BSL, BKG
7440-02-0	Nickel	0.82		2.1		mg/kg	PAI-02-SD-01-01	5/5	N/A	2.1	5.95	160	N	160	N	N/A	N/A	No	BSL, BKG
7440-09-7	Potassium	426		1010		mg/kg	PAI-02-SD-02-01	5/5	N/A	1010	3190	N/A		N/A		N/A	N/A	No	NUT
7782-49-2	Selenium	0.23		0.42		mg/kg	PAI-02-SD-01-01	5/5	N/A	0.42	N/A	39	N	39	N	N/A	N/A	No	BSL
7440-23-5	Sodium	2770		6650		mg/kg	PAI-02-SD-02-01	5/5	N/A	6650	19110	N/A		N/A		N/A	N/A	No	NUT
7440-62-2	Vanadium	6.1		12.8		mg/kg	PAI-02-SD-01-01	5/5	N/A	12.8	49.6	56	N	55	N	N/A	N/A	No	BSL, BKG
7440-66-6	Zinc	10.9		12.6		mg/kg	PAI-02-SD-01-01	3/5	4.4 - 5.7	12.6	45.0	2300	N	2300	N	N/A	N/A	No.	BSL, BKG

TABLE E6-4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SEDIMENT
SITE 2 - BORROW PIT LANDFILL
MCRD PARIS ISLAND, SOUTH CAROLINA

Notes:

1 Minimum/maximum detected concentration.

2 Background values presented for inorganics is two times the mean concentration.

3 USEPA Region III Risk-Based Concentration Table, April 13, 2000. (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 napthalene is used based on similar chemical/toxicological characteristics.

6 No hexavalent chromium detected. Therefore, total chromium is evaluated as trivalent chromium.

7 OSWER screening level.

8 Value for mercuric chloride.

9 USEPA Region IX Preliminary Remediation Goals, December 3, 1999.

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 E6-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SEDIMENT
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

CAS Number	Chemical	Minimum[1] Concentration	Minimum Qualifier	Maximum[1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background[2] Value	US EPA[3] Region III RBC		US EPA Region IX PRGs[3]		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for[4] Contaminant Deletion or Selection
Semivolatile Organic Compounds																			
56-55-3	Benzo(a)anthracene	0.015		0.015		mg/kg	PAI-15-SD-03-01	1/3	0.006 - 0.011	0.015	N/A	0.87	C	0.6	C	N/A	N/A	No	BSL
50-32-8	Benzo(a)pyrene	0.012		0.012		mg/kg	PAI-15-SD-03-01	1/3	0.006 - 0.011	0.012	N/A	0.087	C	0.06	C	N/A	N/A	No	BSL
205-99-2	Benzo(b)fluoranthene	0.0038		0.033		mg/kg	PAI-15-SD-03-01	2/3	0.0044	0.033	N/A	0.87	C	0.6	C	N/A	N/A	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.013		0.013		mg/kg	PAI-15-SD-03-01	1/3	0.0095 - 0.018	0.013	N/A	160[5]		5.6[5]	N	N/A	N/A	No	BSL
207-08-9	Benzo(k)fluoranthene	0.012		0.012		mg/kg	PAI-15-SD-03-01	1/3	0.0024 - 0.0044	0.012	N/A	8.7	C	6	C	N/A	N/A	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	0.28		0.28		mg/kg	PAI-15-SD-02-01	1/3	0.44 - 0.66	0.28	N/A	46	C	35	C	N/A	N/A	No	BSL
218-01-9	Chrysene	0.011	J	0.028		mg/kg	PAI-15-SD-03-01	3/3	N/A	0.028	N/A	87	C	62	C	N/A	N/A	No	BSL
206-44-0	Fluoranthene	0.0093		0.034		mg/kg	PAI-15-SD-03-01	2/3	0.011	0.034	N/A	310	N	230	N	N/A	N/A	No	BSL
86-73-7	Fluorene	0.013		0.013		mg/kg	PAI-15-SD-02-01	1/3	0.017 - 0.022	0.013	N/A	310	N	260	N	N/A	N/A	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.013		0.046		mg/kg	PAI-15-SD-02-01	2/3	0.011	0.046	N/A	0.87	C	0.6	C	N/A	N/A	No	BSL
85-01-8	Phenanthrene	0.0081		0.014		mg/kg	PAI-15-SD-02-01	2/3	0.0088	0.014	N/A	160[5]	N	5.6[5]	N	N/A	N/A	No	BSL
129-00-0	Pyrene	0.028		0.028		mg/kg	PAI-15-SD-03-01	1/3	0.012 - 0.022	0.028	N/A	230	N	230	N	N/A	N/A	No	BSL
Inorganics																			
7429-90-5	Aluminum	648		15500		mg/kg	PAI-15-SD-03-01	3/3	N/A	15500	24284	7800	N	7600	N	N/A	N/A	No	BKG
7440-36-0	Antimony	0.2		0.2		mg/kg	PAI-15-SD-02-01	1/3	0.18 - 0.29	0.2	N/A	3.1	N	3.1	N	N/A	N/A	No	BSL
7440-38-2	Arsenic	0.3		6.5		mg/kg	PAI-15-SD-03-01	3/3	N/A	6.5	12.22	0.43	C	0.39	C	N/A	N/A	No	BKG
7440-39-3	Barium	1.9		19.4		mg/kg	PAI-15-SD-03-01	3/3	N/A	19.4	28.0	550	N	540	N	N/A	N/A	No	BSL, BKG
7440-41-7	Beryllium	0.71		0.71		mg/kg	PAI-15-SD-03-01	1/3	0.06 - 0.21	0.71	0.977	16	N	15	N	N/A	N/A	No	BSL, BKG
7440-43-9	Cadmium	0.16		0.16		mg/kg	PAI-15-SD-03-01	1/3	0.03	0.16	0.278	3.9	N	3.7	N	N/A	N/A	No	BSL, BKG
7440-70-2	Calcium	346		5550		mg/kg	PAI-15-SD-03-01	3/3	N/A	5550	4002	N/A		N/A		N/A	N/A	No	NUT
7440-47-3	Chromium	2		27.8		mg/kg	PAI-15-SD-03-01	3/3	N/A	27.8	35.2	12000[6]	N	10000	N	N/A	N/A	No	BSL, BKG
7440-48-4	Cobalt	0.69		3.1		mg/kg	PAI-15-SD-03-01	2/3	0.06	3.1	2.63	470	N	470	N	N/A	N/A	No	BSL
7440-50-8	Copper	4		8.7		mg/kg	PAI-15-SD-03-01	2/3	0.58	8.7	10.1	310	N	290	N	N/A	N/A	No	BSL, BKG
7439-89-6	Iron	604		14700		mg/kg	PAI-15-SD-03-01	3/3	N/A	14700	21450	2300	N	2300	N	N/A	N/A	No	BKG
7439-92-1	Lead	2.7		11.3		mg/kg	PAI-15-SD-03-01	3/3	N/A	11.3	20.6	400[7]		400	N	N/A	N/A	No	BSL, BKG
7439-96-5	Magnesium	370		4220		mg/kg	PAI-15-SD-03-01	3/3	N/A	4220	6437	N/A		N/A		N/A	N/A	No	NUT, BKG
7439-96-5	Manganese	5.3		113		mg/kg	PAI-15-SD-03-01	3/3	N/A	113	186	160	N	176	N	N/A	N/A	No	BSL, BKG
7440-02-0	Nickel	1.5		6.5		mg/kg	PAI-15-SD-03-01	2/3	0.11	6.5	5.95	160	N	156	N	N/A	N/A	No	BSL
7440-09-7	Potassium	205		2560		mg/kg	PAI-15-SD-03-01	3/3	N/A	2560	3190	N/A		N/A		N/A	N/A	No	NUT, BKG
7440-23-5	Sodium	2040		10200		mg/kg	PAI-15-SD-03-01	3/3	N/A	10200	19110	N/A		N/A		N/A	N/A	No	NUT, BKG
7440-62-2	Vanadium	2.3		37.4		mg/kg	PAI-15-SD-03-01	3/3	N/A	37.4	49.6	55	N	55	N	N/A	N/A	No	BSL, BKG
7440-66-6	Zinc	12.9		32.3		mg/kg	PAI-15-SD-03-01	2/3	1.9	32.3	45.0	2300	N	2300	N	N/A	N/A	No	BSL, BKG

Notes:

1 Minimum/maximum detected concentration.

2 Background values presented for inorganics is two times the mean concentration.

3 USEPA Region III Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 0.1)

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

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TABLE E6-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SEDIMENT
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

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)

J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

5 No value available. Therefore, value for napthalene is used based on similar chemical/toxicological characteristics.

6 No hexavalent chromium detected. Therefore, total chromium is evaluated as trivalent chromium.

7 OSWER screening level.

8 USEPA Region IX Preliminary Remediation Goals, December 3, 1999.

TABLE E6-6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SUSUBRFACE SOIL
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background [2] Value	US EPA [3] Region III RBC		US EPA Region IX PRGs[10]		US EPA [4] SSL Soil to Air		US EPA [5] SSL Soil to Groundwater		COPC Flag	Rationale for [6] Contaminant Deletion or Selection
	Volatile Organic Compounds																				
75-09-2	Methylene Chloride	0.009		0.009		mg/kg	PAI-02-SB-02A-02 PAI-02-SB-10-07	2/3	0.009	0.009	N/A	85	C	9	C	13	C	0.02	C	No	BSL
	Inorganics																				
7429-90-5	Aluminum	1250		2860		mg/kg	PAI-02-SB-10-07	3/3	N/A	2860	7270	7800	N	7600	N	N/A		N/A		No	BSL, BKG
7440-39-3	Barium	4		11.4		mg/kg	PAI-02-SB-11-02	3/3	N/A	11.4	23.6	550	N	540	N	690000	N	1600		No	BSL, BKG
7440-70-2	Calcium	64.3		150		mg/kg	PAI-02-SB-02A-02	2/3	43.4	150	766	N/A		N/A		N/A		N/A		No	NUT, BKG
7440-47-3	Chromium	2.5		5.6		mg/kg	PAI-02-SB-10-07	3/3	N/A	5.6	6.23	23[7]	N	10000	N	270	C	38		No	BSL, BKG
7440-50-8	Copper	0.21		0.53		mg/kg	PAI-02-SB-11-02	3/3	N/A	0.53	1.52	310	N	290	N	N/A		N/A		No	BSL, BKG
7439-89-6	Iron	265		337		mg/kg	PAI-02-SB-02A-02	3/3	N/A	337	3920	2300	N	2300	N	N/A		N/A		No	BSL, BKG
7439-92-1	Lead	0.99		3.1		mg/kg	PAI-02-SB-10-07	3/3	N/A	3.1	12.5	400[8]		400	N	N/A		N/A		No	BSL, BKG
7439-96-5	Magnesium	57.7		90.9		mg/kg	PAI-02-SB-02A-02	2/3	28.3	90.9	515	N/A		N/A		N/A		N/A		No	NUT, BKG
7439-96-5	Manganese	4.2		4.2		mg/kg	PAI-02-SB-10-07	1/3	1.4 - 1.5	4.2	129	160	N	176	N	N/A		N/A		No	BSL, BKG
7440-09-7	Potassium	29.2		41.9		mg/kg	PAI-02-SB-02A-02	3/3	N/A	41.9	313	N/A		N/A		N/A		N/A		No	NUT, BKG
7440-66-6	Zinc	1.2		1.5		mg/kg	PAI-02-SB-02A-02	3/3	N/A	1.5	9.70	2300	N	2300	N	N/A		12000	N	No	BSL, BKG

Notes:

1 Minimum/maximum detected concentration.

2 Background values presented for inorganics is two times the mean concentration.

3 USEPA Region III Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 0.1)

4 USEPA Soil Screening Level Guidance: Technical Background Document. May 1996.

5 USEPA Soil Screening Level Guidance: Technical Background Document. May 1996. (Based on a DAF [Dilutional Attenuation Factor] of 20)

6 Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

7 The valence state of chromium was not deteremined in the analysis therefore

8 OSWER screening level.

9 Value for mercuric chloride.

10 USEPA Region IX Preliminary Remediation Goals, December 3, 1999.

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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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 REFERENCES

F-1

TABLES F-1 AND F-2, BIOACCUMULATION, BIOCONCENTRATION, AND BSAF

TABLE F-1
BIOACCUMULATION FACTORS
SITE 2 – BORROW PT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical	Bioaccumulation Factor		
	Terrestrial Invertebrate	Terrestrial Plant	Mammal
Metals and Inorganic Compounds			
Aluminum	0.053[a]	0.0008[b]	0.075[c]
Iron	0.038[a]	NA	NA
Vanadium	0.039[a]	0.0011[b]	0.13[c]

NA BAF not available

a- Sample et al., 1998.
b- Value from Baes et al. (1984) for leafy portions of plants multiplied by 0.2 to represent 80% water composition of plants.
c- Value derived from biotransfer factors (BTFs), presented in Baes et al. (1984) for uptake into cattle. BTF converted to BAF by multiplying food ingestion rate of 50 kg/day wet weight.

TABLE F-2
BIOCONCENTRATION FACTORS AND BIOTA SEDIMENT ACCUMULATION FACTORS
SITE 2 – BORROW PIT LANDFILL AND SITE 15 – DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical	Bioconcentration Factor	BSAF
Semivolatile Organic Compounds		
Bis(2ethylhexyl)phthalate	130[a]	1.0[b]
Pesticides/PCBs		
Endosulfan Sulfate	270[a]	1.80[c]
Metals and Inorganic Compounds		
Aluminum	95[d]	NA
Antimony	1.0[a]	NA
Barium	4[e]	NA
Beryllium	19[a]	NA
Chromium	16.0[a]	NA
Cobalt	300[e]	NA
Iron	2700[d]	NA
Manganese	373[f]	NA
Selenium	6[a]	NA
Silver	0.5[a]	NA
Vanadium	0.01[e]	NA

NA – BSAF not available.

a- USEPA, 1997. 304(a) Criteria – Toxic Substance Spreadsheet. Region 4, Water Quality Standards Section, Atlanta, GA, August.
b- EPA, 1997.
c- EPA, 1997. For endosulfan mixed isomers.
d- Geometric mean of BCFs obtained from AQUIRE (1994) and AWQC documents.
e- Barnthouse et al. (1988)
f- Jorgensen (1991)

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TOXICITY PROFILES FOR ECOLOGICAL COPCs

TOXICITY PROFILES
SITE 2/15
MCRD PARRIS ISLAND, SOUTH CAROLINA

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 posse 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, 1995a). 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.

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).

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, 1991). 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, 1991).

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).

Carbon Disulfide

Carbon disulfide is a natural product of anaerobic biodegradation and is released to the atmosphere from oceans and land masses (Howard, 1991). 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, 1991).

If released to soil, carbon disulfide will be primarily lost by volatilization (Howard, 1991). Carbon disulfide also will rapidly volatilize from water with an estimated 2.6 hr half-life based on a river model (Howard, 1991). Adsorption to the sediment will not be significant (Howard, 1991). Carbon disulfide is not expected to significantly bioconcentrate in aquatic organisms (Howard, 1991).

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.

Chloroform

Chloroform is a colorless, highly refractive, heavy, volatile liquid. It has a characteristic odor and a sweet taste. Chloroform is used in the manufacture of fluorocarbon plastics, as a solvent, fumigant, and insecticide, and in analytical chemistry (Hawley, 1987).

The majority of chloroform is released into the atmosphere. Release to water and soil will be lost to the environment through volatilization. Chloroform has the capability to be transported long distances through the atmosphere. In the gas-phase, it reacts with photochemically produced hydroxyl radicals.

Chloroform does not significantly adsorb to sediment. Also, it is not expected to bioconcentrate in aquatic organisms.

Chloroform is a carcinogen and can cause cell injury by inhibiting calcium ion export from the cytoplasm (Klaassen, 1996).

Toxicity reference values for birds and mammals were unavailable.

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).

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, 1989a).

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, 1989a).

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, 1989a).

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, 1989a).

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, 1989a).

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).

Endosulfan sulfate

Endosulfan sulfate is a metabolite of endosulfan, which is a pesticide (Verschueren, 1983). When endosulfan sulfate is released to soil, it is expected to not leach into groundwater because it binds to soil according to estimated Koc values (Spectrum, 1999b). In the aquatic environment, the chemical is expected to bind to sediments; therefore, bioconcentration is aquatic organisms is likely to occur (Spectrum, 1999).

The NOAEL for birds and mammals is 10 mg/kg/day and 0.15 mg/kg/day, respectively (Sample et al., 1996). The LOAEL for birds and mammals is 100 mg/kg/day and 1.5 mg/kg/day, respectively (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).

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, manganese cannot be degraded by environmental processes. 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, the concentrations and chemical form in which manganese can occur is affected by pH, cation exchange capacity, drainage, and other factors. 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).

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, 1989c).

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, 1989c).

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, 1989c).

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, 1989c).

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, 1989c).

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 birds and mammals.

Tetrachloroethylene (Tetrachloroethene)

Tetrachloroethylene (PCE) is a synthetic chlorinated hydrocarbon widely used for dry cleaning fabrics and metal-degreasing. It enters the environment mainly through evaporation, sludge and factory waste disposal, and storage leaks (ATSDR, 1995b). This chemical does not appear to accumulate in aquatic organisms. Accumulation in terrestrial plants is not known. It is readily absorbed following inhalation, oral exposure, and dermal exposure. Upon absorption, PCE is distributed to fatty tissues, with a half life of approximately 55 hours (ATSDR, 1995b).

The liver is the principal target organ in rodents (ATSDR, 1995b). LD50 values of 3,835 and 3,005 mg/kg were determined for male and female rats, respectively (Hayes et al., 1986). Increase in relative liver weights and peroxisomal proliferation were observed in mice after an oral dose of 1000 mg/kg/day (Goldsworthy and Popp, 1987). Renal effects are also common in rodents exposed to tetrachloroethylene, cancer effects have also been observed. PCE administered by gavage at 995 mg/kg/day was observed to promote type II altered foci in rat livers (Story et al., 1986). A NOAEL of 100 mg/kg was observed in rats for developmental effects (Nelson et al., 1980).

For mammals, the NOAEL and LOAEL are 1.4 mg/kg/day and 7 mg/kg/day, respectively (Sample et al., 1996). A NOAEL and LOAEL were unavailable for birds.

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 LOAEL for birds is 4.7 mg/kg/day (Hudson et al., 1984).

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, 1989b).

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, 1989b).

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, 1989b).

Zinc is actively accumulated in aquatic systems. However, biota appear to represent a minor sink for zinc compared with the sediments (ATSDR, 1989b). 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, 1989b).

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, 1989b).

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).

F-3

FOOD CHAIN MODELING CALCULATIONS

EXAMPLE CALCULATION OF HAZARD QUOTIENT
USING MAXIMUM CONCENTRATIONS OF ENDOSULFAN SULFATE
SITE 2 - RACCOON

(See Section 7.4.2.1 of text for definitions of terms in the two equations below).

Concentrations of organic compounds in food items of the raccoon were derived from sediment data using the following equation: $TBP = BSAF(C_s/f_{oc})f_l$.

BSAF for endosulfan sulfate = 1.80 (Table F-2)
C_s = 0.0125 mg/kg Note: Normally, C_s would simply be the maximum detected concentration in sediment. However, endosulfan sulfate was not detected in sediment, but it was a COPC in surface water (See Section 7 of text). Thus, it was included in the food chain modeling for aquatic receptors. As seen in Appendix C-2, the highest detection limit for endosulfan sulfate in "non-detect" sediment samples was 25 μg/kg. The concentration assumed in these calculations was one-half of this value, i.e. 0.0125 mg/kg.
f_{oc} = 0.958%.= 0.00958 (Section 7.4.2.1 of text)
f_l for crustaceans (assumed food of the raccoon) = 3.5% = 0.035 (Section 7.4.2.1 of text)

Using the above values, TBP = 1.80 * (0.0125/0.00958) * 0.035 = 0.08220 mg/kg. Thus, the predicted concentration of endosulfan sulfate in food items (i.e., prey) of the raccoon (C_{food}) = 0.0822 mg/kg.

The predicted dose (PD) for all representative receptors =
$[C_{sediment} * FI * SA * F) + (C_{water}\ W * FI) + (C_{food} * F * FA * FI)]/WR$

$C_{sediment}$ = 0.0125 mg/kg (see above discussion of C_s
FI = 100 percent = 1.0
SA = 9.4% = 0.094 (Table 7-2)
F = 0.856 kg/day (Table 7-2)
C_{water}= 0.000078 mg/kg(Table 7-3)
C_{food} = 0822 mg/kg (derivation shown above)
FA = 90.6% = 0.906 (Table 7-2)
WR = 3.99 kg (Table 7-2)

Using the above values,
PD = [(0.0125 mg/kg * 1.0 * 0.094 * 0.856 kg/day) + (0.000078 mg/kg * 0.171 kg/day * 1.0) + (0.0822 mg/kg * 0.856 kg/day * 0.906 * 1.0)] ÷ 3.99 kg

Thus, PD = (0.0010058 mg/day + 0.00001334 mg/day + 0.063749 mg/day) ÷ 3.99 kg = 0.016233 mg/kg/day

The mammalian NOAEL for endosulfan sulfate is 0.15 mg/kg/day (Table 7-1).
Thus, the HQ (based on the NOAEL) = 0.016233 mg/kg/day ÷ 0.15 mg/kg/day = 0.108.

FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.02525	0	0	0	0	NA	NA
PESTICIDES								
Endosulfan Sulfate	0.00971	0.00004175	0.06385	0.00111458	0	0	NA	NA
METALS AND INORGANICS								
Aluminum	4498	1.092125	4498	89.96	0	0	NA	NA
Antimony	0	0.001425	0	0	0	0	NA	NA
Barium	6.92	0.0206	6.92	0.1384	0	0	NA	NA
Chromium (hexavalent)	1.066667	0.4	1.066667	0.02133334	0	0	NA	NA
Cobalt	0.413	0.0005975	0.413	0.00826	0	0	NA	NA
Iron	3824	0.6445	3824	76.48	0	0	NA	NA
Manganese	35.28	0.022925	35.28	0.7056	0	0	NA	NA
Selenium	0.336	1.1	0.336	0.00672	0	0	NA	NA
Silver	0	0.0004425	0	0	0	0	NA	NA
Vanadium	9.98	0	9.98	0.1996	0	0	NA	NA

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.077	0	0	0	0	NA	NA
PESTICIDES								
Endosulfan Sulfate	0.0125	0.000078	0.0822	0.0014349	0	0	NA	NA
METALS AND INORGANICS								
Aluminum	5560	1.85	5560	111.2	0	0	NA	NA
Antimony	0	0.0028	0	0	0	0	NA	NA
Barium	7.9	0.0214	7.9	0.158	0	0	NA	NA
Chromium (hexavalent)	1.6	0.4	1.6	0.032	0	0	NA	NA
Cobalt	0.52	0.0011	0.52	0.0104	0	0	NA	NA
Iron	5390	1.22	5390	107.8	0	0	NA	NA
Manganese	52.4	0.0347	52.4	1.048	0	0	NA	NA
Selenium	0.42	1.1	0.42	0.0084	0	0	NA	NA
Silver	0	0.00072	0	0	0	0	NA	NA
Vanadium	12.8	0	12.8	0.256	0	0	NA	NA

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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 (No Data)
Sediment Ingestion Rate	0.0000000 kg/day (No Data)

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.02525	0	0	0	0	NA	NA
PESTICIDES								
Endosulfan Sulfate	0.00971	0.00004175	0.06385	0.00056318	0	0	NA	NA
METALS AND INORGANICS								
Aluminum	4498	1.092125	4498	260.884	0	0	NA	NA
Antimony	0	0.001425	0	0	0	0	NA	NA
Barium	6.92	0.0206	6.92	0.40136	0	0	NA	NA
Chromium (hexavalent)	1.066667	0.4	1.066667	0.06186669	0	0	NA	NA
Cobalt	0.413	0.0005975	0.413	0.023954	0	0	NA	NA
Iron	3824	0.6445	3824	221.792	0	0	NA	NA
Manganese	35.28	0.022925	35.28	2.04624	0	0	NA	NA
Selenium	0.336	1.1	0.336	0.019488	0	0	NA	NA
Silver	0	0.0004425	0	0	0	0	NA	NA
Vanadium	9.98	0	9.98	0.57884	0	0	NA	NA

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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 (No Data)
Sediment Ingestion Rate	0.0000000 kg/day (No Data)

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.077	0	0	0	0	NA	NA
PESTICIDES								
Endosulfan Sulfate	0.0125	0.000078	0.0822	0.000725	0	0	NA	NA
METALS AND INORGANICS								
Aluminum	5560	1.85	5560	322.48	0	0	NA	NA
Antimony	0	0.0028	0	0	0	0	NA	NA
Barium	7.9	0.0214	7.9	0.4582	0	0	NA	NA
Chromium (hexavalent)	1.6	0.4	1.6	0.0928	0	0	NA	NA
Cobalt	0.52	0.0011	0.52	0.03016	0	0	NA	NA
Iron	5390	1.22	5390	312.62	0	0	NA	NA
Manganese	52.4	0.0347	52.4	3.0392	0	0	NA	NA
Selenium	0.42	1.1	0.42	0.02436	0	0	NA	NA
Silver	0	0.00072	0	0	0	0	NA	NA
Vanadium	12.8	0	12.8	0.7424	0	0	NA	NA

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg	
Food Ingestion Rate	0.3120000 kg/day	1 Fish Fraction
Water Ingestion Rate	0.0000000 L/day	
Sediment Ingestion Rate	0.0000000 kg/day	

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0	0	0.000	1.1	11	0.00E+00	0.00E+00
PESTICIDES								
Endosulfan Sulfate	0.00971	0	0.020069	0.004	10	100	4.21E-04	4.21E-05
METALS AND INORGANICS								
Aluminum	4498	0	4498	944.398	109.7	1097	8.61E+00	8.61E-01
Antimony	0	0	0	0.000	0	0	NA	NA
Barium	6.92	0	6.92	1.453	20.8	41.7	6.99E-02	3.48E-02
Chromium (hexavalent)	1.066667	0	1.066667	0.224	0	0	NA	NA
Cobalt	0.413	0	0.413	0.087	1	10	8.67E-02	8.67E-03
Iron	3824	0	3824	802.886	100	1000	8.03E+00	8.03E-01
Manganese	35.28	0	35.28	7.407	977	9770	7.58E-03	7.58E-04
Selenium	0.336	0	0.336	0.071	0.4	0.8	1.76E-01	8.82E-02
Silver	0	0	0	0.000	0	0	NA	NA
Vanadium	9.98	0	9.98	2.095	11.4	114	1.84E-01	1.84E-02

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg	
Food Ingestion Rate	0.3120000 kg/day	1 Fish Fraction
Water Ingestion Rate	0.0000000 L/day	
Sediment Ingestion Rate	0.0000000 kg/day	

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.077	0	0	1.1	11	0.00E+00	0.00E+00
PESTICIDES								
Endosulfan Sulfate	0.0125	0	0.02584	0.00542536	10	100	5.43E-04	5.43E-05
METALS AND INORGANICS								
Aluminum	5560	0	5560	1167.3755	109.7	1097	1.06E+01	1.06E+00
Antimony	0	0	0	0	0	0	NA	NA
Barium	7.9	0	7.9	1.65868102	20.8	41.7	7.97E-02	3.98E-02
Chromium (hexavalent)	1.6	0	1.6	0.3359354	0	0	NA	NA
Cobalt	0.52	0	0.52	0.109179	1	10	1.09E-01	1.09E-02
Iron	5390	0	5390	1131.68237	100	1000	1.13E+01	1.13E+00
Manganese	52.4	0	52.4	11.0018843	977	9770	1.13E-02	1.13E-03
Selenium	0.42	0	0.42	0.08818304	0.4	0.8	2.20E-01	1.10E-01
Silver	0	0	0	0	0	0	NA	NA
Vanadium	12.8	0	12.8	2.68748318	11.4	114	2.36E-01	2.36E-02

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
HERON - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg		
Food Ingestion Rate	0.4010000 kg/day	% fish	1 Fish Fraction
Water Ingestion Rate	0.0800000 L/day		
Sediment Ingestion Rate	0.0000000 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.02525	0	0.001	1.1	11	8.24E-04	8.24E-05
PESTICIDES								
Endosulfan Sulfate	0.00971	0.00004175	0.06385	0.011	10	100	1.15E-03	1.15E-04
METALS AND INORGANICS								
Aluminum	4498	1.092125	4498	809.235	109.7	1097	7.38E+00	7.38E-01
Antimony	0	0.001425	0	0.000	0	0	NA	NA
Barium	6.92	0.0206	6.92	1.246	20.8	41.7	5.99E-02	2.99E-02
Chromium (hexavalent)	1.066667	0.4	1.066667	0.206	0	0	NA	NA
Cobalt	0.413	0.0005975	0.413	0.074	1	10	7.43E-02	7.43E-03
Iron	3824	0.6445	3824	687.966	100	1000	6.88E+00	6.88E-01
Manganese	35.28	0.022925	35.28	6.348	977	9770	6.50E-03	6.50E-04
Selenium	0.336	1.1	0.336	0.100	0.4	0.8	2.50E-01	1.25E-01
Silver	0	0.0004425	0	0.000	0	0	NA	NA
Vanadium	9.98	0	9.98	1.795	11.4	114	1.57E-01	1.57E-02

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
HERON - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000	kg
Food Ingestion Rate	0.4010000	kg/day
Water Ingestion Rate	0.0800000	L/day
Sediment Ingestion Rate	0.0000000	kg/day

1 Fish Fraction

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.077	0	0.00276357	1.1	11	2.51E-03	2.51E-04
PESTICIDES								
Endosulfan Sulfate	0.0125	0.000078	0.0822	0.01479069	10	100	1.48E-03	1.48E-04
METALS AND INORGANICS								
Aluminum	5560	1.85	5560	1000.31763	109.7	1097	9.12E+00	9.12E-01
Antimony	0	0.0028	0	0.00010049	0	0	NA	NA
Barium	7.9	0.0214	7.9	1.42198834	20.8	41.7	6.84E-02	3.41E-02
Chromium (hexavalent)	1.6	0.4	1.6	0.3021983	0	0	NA	NA
Cobalt	0.52	0.0011	0.52	0.09358816	1	10	9.36E-02	9.36E-03
Iron	5390	1.22	5390	969.711799	100	1000	9.70E+00	9.70E-01
Manganese	52.4	0.0347	52.4	9.42807358	977	9770	9.65E-03	9.65E-04
Selenium	0.42	1.1	0.42	0.11503813	0.4	0.8	2.88E-01	1.44E-01
Silver	0	0.00072	0	2.5841E-05	0	0	NA	NA
Vanadium	12.8	0	12.8	2.30273665	11.4	114	2.02E-01	2.02E-02

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
RACCOON - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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	0.1710000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.02525	0	0.001	18.3	183	5.91E-05	5.91E-06
PESTICIDES								
Endosulfan Sulfate	0.00971	0.00004175	0.06385	0.013	0.15	1.5	8.41E-02	8.41E-03
METALS AND INORGANICS								
Aluminum	4498	1.092125	4498	965.031	1.93	19.3	5.00E+02	5.00E+01
Antimony	0	0.001425	0	0.000	0.125	1.25	4.89E-04	4.89E-05
Barium	6.92	0.0206	6.92	1.485	5.1	51	2.91E-01	2.91E-02
Chromium (hexavalent)	1.066667	0.4	1.066667	0.246	3.28	13.14	7.50E-02	1.87E-02
Cobalt	0.413	0.0005975	0.413	0.089	1	10	8.86E-02	8.86E-03
Iron	3824	0.6445	3824	820.415	50	500	1.64E+01	1.64E+00
Manganese	35.28	0.022925	35.28	7.570	88	284	8.60E-02	2.67E-02
Selenium	0.336	1.1	0.336	0.119	0.2	0.33	5.96E-01	3.61E-01
Silver	0	0.0004425	0	0.000	1.8	18	1.05E-05	1.05E-06
Vanadium	9.98	0	9.98	2.141	0.21	2.1	1.02E+01	1.02E+00

a Calculated using Theorteical Bioaccumulation Potential equation.

FOOD CHAIN MODELING CALCULATION
RACCOON - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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	0.1710000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0	0.077	0	0.0033	18.3	183	1.80E-04	1.80E-05
PESTICIDES								
Endosulfan Sulfate	0.0125	0.000078	0.0822	0.01623263	0.15	1.5	1.08E-01	1.08E-02
METALS AND INORGANICS								
Aluminum	5560	1.85	5560	1192.90134	1.93	19.3	6.18E+02	6.18E+01
Antimony	0	0.0028	0	0.00012	0.125	1.25	9.60E-04	9.60E-05
Barium	7.9	0.0214	7.9	1.69575424	5.1	51	3.33E-01	3.33E-02
Chromium (hexavalent)	1.6	0.4	1.6	0.360401	3.28	13.14	1.10E-01	2.74E-02
Cobalt	0.52	0.0011	0.52	0.11160604	1	10	1.12E-01	1.12E-02
Iron	5390	1.22	5390	1156.40316	50	500	2.31E+01	2.31E+00
Manganese	52.4	0.0347	52.4	11.2431914	88	284	1.28E-01	3.96E-02
Selenium	0.42	1.1	0.42	0.13724812	0.2	0.33	6.86E-01	4.16E-01
Silver	0	0.00072	0	3.0857E-05	1.8	18	1.71E-05	1.71E-06
Vanadium	12.8	0	12.8	2.74606516	0.21	2.1	1.31E+01	1.31E+00

a Calculated using Theorteical Bioaccumulation Potential equation.

FOOD CHAIN MODELING CALCULATION
HAWK - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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)	Water Concentration (mg/L)	Predicted[a] Prey Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS								
Aluminum	2548.75	0	5.142103125	5.75E-01	109.7	1097	5.25E-03	5.25E-04
Iron	693.25	0	359.79675	4.03E+01	100	1000	4.03E-01	4.03E-02
Vanadium	2.0875	0	0.005441069	6.09E-04	11.4	114	5.34E-05	5.34E-06

a Value calculated by multiplying surface soil concentration by the mammal BAF for shrew and mouse and then averaging the values (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
HAWK - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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)	Water Concentration (mg/L)	Predicted[a] Prey Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS								
Aluminum	4290	0	8.655075	0.9685075	109.7	1097	8.83E-03	8.83E-04
Iron	1930	0	1001.67	112.087407	100	1000	1.12E+00	1.12E-01
Vanadium	4.1	0	0.01068665	0.00119584	11.4	114	1.05E-04	1.05E-05

a Value calculated by multiplying surface soil concentration by the mammal BAF for shrew and mouse and then averaging the values (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
FOX - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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)	Water Concentration (mg/L)	Predicted[a] Prey Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS								
Aluminum	2548.75	0	5.142103125	8.39E+00	1.93	19.3	4.35E+00	4.35E-01
Iron	693.25	0	359.79675	4.06E+01	50	500	8.12E-01	8.12E-02
Vanadium	2.0875	0	0.005441069	7.01E-03	0.21	2.1	3.34E-02	3.34E-03

a Value calculated by multiplying surface soil concentration by the mammal BAF for shrew and mouse and then averaging the values (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
FOX - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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)	Water Concentration (mg/L)	Predicted[a] Prey Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS								
Aluminum	4290	0	8.655075	14.1300885	1.93	19.3	7.32E+00	7.32E-01
Iron	1930	0	1001.67	112.974899	50	500	2.26E+00	2.26E-01
Vanadium	4.1	0	0.01068665	0.01376233	0.21	2.1	6.55E-02	6.55E-03

a Value calculated by multiplying surface soil concentration by the mammal BAF for shrew and mouse and then averaging the values (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
WOODCOCK - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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)	Water Concentration (mg/L)	Predicted[a] Earthworm Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS								
Aluminum	2548.75	1.092125	135.08375	298.751112	109.7	1097	2.72E+00	2.72E-01
Iron	693.25	0.6445	26.3435	74.3382434	100	1000	7.43E-01	7.43E-02
Vanadium	2.0875	0	0.0814125	0.22379153	11.4	114	1.96E-02	1.96E-03

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
WOODCOCK - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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)	Water Concentration (mg/L)	Predicted[a] Earthworm Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS								
Aluminum	4290	1.85	227.37	501.43297	109.7	1097	4.57E+00	4.57E-01
Iron	1930	1.22	73.34	205.572392	100	1000	2.06E+00	2.06E-01
Vanadium	4.1	0	0.1599	0.43954264	11.4	114	3.86E-02	3.86E-03

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
ROBIN - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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 Concentration (mg/L)	Predicted[a] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS								
Aluminum	2548.75	2.039	135.08375	157.049	109.7	1097	1.43E+00	1.43E-01
Iron	693.25	693.25	26.3435	410.459	100	1000	4.10E+00	4.10E-01
Vanadium	2.0875	0.00229625	0.0814125	0.120	11.4	114	1.05E-02	1.05E-03

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
ROBIN - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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 Concentration (mg/L)	Predicted[a] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS								
Aluminum	4290	3.432	227.37	264.341142	109.7	1097	2.41E+00	2.41E-01
Iron	1930	1930	73.34	1142.7123	100	1000	1.14E+01	1.14E+00
Vanadium	4.1	0.00451	0.1599	0.23535962	11.4	114	2.06E-02	2.06E-03

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
SHREW - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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	0.0052000 kg/day	0.1	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Predicted[a] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS							
Aluminum	2548.75	135.08375	201.186	1.93	19.3	1.04E+02	1.04E+01
Iron	693.25	26.3435	49.720	50	500	9.94E-01	9.94E-02
Vanadium	2.0875	0.0814125	0.151	0.21	2.1	7.18E-01	7.18E-02

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
SHREW - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
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	0.0052000 kg/day	0.1	Surface Soil Fraction

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Predicted[a] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
METALS AND INORGANICS							
Aluminum	4290	227.37	338.63223	1.93	19.3	1.75E+02	1.75E+01
Iron	1930	73.34	138.420473	50	500	2.77E+00	2.77E-01
Vanadium	4.1	0.1599	0.2960259	0.21	2.1	1.41E+00	1.41E-01

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
MOUSE - MAXIMUM CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Deer 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)	Water Concentration (mg/L)	Predicted[a] Vegetation Concentration (mg/kg)	Predicted[b] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS									
Aluminum	4290	0	3.432	227.37	2.47E+01	1.93	19.3	1.28E+01	1.28E+00
Iron	1930	0	1930	73.34	5.35E+02	50	500	1.07E+01	1.07E+00
Vanadium	4.1	0	0.00451	0.1599	2.40E-02	0.21	2.1	1.14E-01	1.14E-02

a Value calculated by multiplying surface soil concentration by the vegetation BAF (see Table F-1 for BAF values).
b Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
MOUSE - AVERAGE CONCENTRATION
SITE 2 - BORROW PIT LANDFILL
MCRD PARRIS ISLAND, SOUTH CAROLINA

Deer 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)	Water Concentration (mg/L)	Predicted[a] Vegetation Concentration (mg/kg)	Predicted[b] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
METALS AND INORGANICS									
Aluminum	2548.75	0	2.039	135.08375	1.47E+01	1.93	19.3	7.61E+00	7.61E-01
Iron	693.25	0	693.25	26.3435	1.92E+02	50	500	3.85E+00	3.85E-01
Vanadium	2.0875	0	0.00229625	0.0814125	1.22E-02	0.21	2.1	5.81E-02	5.81E-03

a Value calculated by multiplying surface soil concentration by the vegetation BAF (see Table F-1 for BAF values).
b Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
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)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.276667	0	1.010787578	0.01801339	0	0	NA	NA
METALS AND INORGANICS								
Aluminum	6952.666667	0	6952.666667	139.053333	0	0	NA	NA
Barium	9.3	0	9.3	0.186	0	0	NA	NA
Beryllium	0.281667	0	0.281667	0.00563334	0	0	NA	NA
Cobalt	1.273333	0	1.273333	0.02546666	0	0	NA	NA
Iron	6388	0	6388	127.76	0	0	NA	NA
Manganese	50	0	50	1	0	0	NA	NA
Vanadium	17.033333	0	17.033333	0.34066666	0	0	NA	NA

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
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)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.28	0	1.022964509	0.0182304	0	0	NA	NA
METALS AND INORGANICS								
Aluminum	155000	0	155000	3100	0	0	NA	NA
Barium	19.4	0	19.4	0.388	0	0	NA	NA
Beryllium	0.71	0	0.71	0.0142	0	0	NA	NA
Cobalt	3.1	0	3.1	0.062	0	0	NA	NA
Iron	14700	0	14700	294	0	0	NA	NA
Manganese	113	0	113	2.26	0	0	NA	NA
Vanadium	37.4	0	37.4	0.748	0	0	NA	NA

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
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 (No Data)
Sediment Ingestion Rate	0.0000000 kg/day (No Data)

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.276667	0	1.010787578	0.01604669	0	0	NA	NA
METALS AND INORGANICS								
Aluminum	6952.666667	0	6952.666667	403.254667	0	0	NA	NA
Barium	9.3	0	9.3	0.5394	0	0	NA	NA
Beryllium	0.281667	0	0.281667	0.01633669	0	0	NA	NA
Cobalt	1.273333	0	1.273333	0.07385331	0	0	NA	NA
Iron	6388	0	6388	370.504	0	0	NA	NA
Manganese	50	0	50	2.9	0	0	NA	NA
Vanadium	17.033333	0	17.033333	0.98793331	0	0	NA	NA

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
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 (No Data)
Sediment Ingestion Rate	0.0000000 kg/day (No Data)

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.28	0	1.022964509	0.01624	0	0	NA	NA
METALS AND INORGANICS								
Aluminum	155000	0	155000	8990	0	0	NA	NA
Barium	19.4	0	19.4	1.1252	0	0	NA	NA
Beryllium	0.71	0	0.71	0.04118	0	0	NA	NA
Cobalt	3.1	0	3.1	0.1798	0	0	NA	NA
Iron	14700	0	14700	852.6	0	0	NA	NA
Manganese	113	0	113	6.554	0	0	NA	NA
Vanadium	37.4	0	37.4	2.1692	0	0	NA	NA

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
HAWK - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
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)	Water Concentration (mg/L)	Predicted[a] Prey Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.00836	0	0.09403328	1.05E-02	0.18	1.8	5.85E-02	5.85E-03

a Value calculated by multiplying surface soil concentration by the mammal BAF for shrew and mouse and then averaging the values (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
HAWK - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
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)	Water Concentration (mg/L)	Predicted[a] Prey Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.024	0	0.269952	0.03020777	0.18	1.8	1.68E-01	1.68E-02

a Value calculated by multiplying surface soil concentration by the mammal BAF for shrew and mouse and then averaging the values (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
FOX - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
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)	Water Concentration (mg/L)	Predicted[a] Prey Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.00836	0	0.09403328	1.01E-02	0.068	0.68	1.48E-01	1.48E-02

a Value calculated by multiplying surface soil concentration by the mammal BAF for shrew and mouse and then averaging the values (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
FOX - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
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)	Water Concentration (mg/L)	Predicted[a] Prey Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.024	0	0.269952	0.02891977	0.068	0.68	4.25E-01	4.25E-02

a Value calculated by multiplying surface soil concentration by the mammal BAF for shrew and mouse and then averaging the values (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg	
Food Ingestion Rate	0.3120000 kg/day	1 Fish Fraction
Water Ingestion Rate	0.0000000 L/day	
Sediment Ingestion Rate	0.0000000 kg/day	

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.276667	0	0.317676096	0.067	1.1	11	6.06E-02	6.06E-03
METALS AND INORGANICS								
Aluminum	6952.666667	0	6952.666667	1459.779	109.7	1097	1.33E+01	1.33E+00
Barium	9.3	0	9.3	1.953	20.8	41.7	9.39E-02	4.68E-02
Beryllium	0.281667	0	0.281667	0.059	0	0	NA	NA
Cobalt	1.273333	0	1.273333	0.267	1	10	2.67E-01	2.67E-02
Iron	6388	0	6388	1341.222	100	1000	1.34E+01	1.34E+00
Manganese	50	0	50	10.498	977	9770	1.07E-02	1.07E-03
Vanadium	17.033333	0	17.033333	3.576	11.4	114	3.14E-01	3.14E-02

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.4860000 kg	
Food Ingestion Rate	0.3120000 kg/day	1 Fish Fraction
Water Ingestion Rate	0.0000000 L/day	
Sediment Ingestion Rate	0.0000000 kg/day	

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.28	0	0.321503132	0.06750268	1.1	11	6.14E-02	6.14E-03
METALS AND INORGANICS								
Aluminum	155000	0	155000	32543.7416	109.7	1097	2.97E+02	2.97E+01
Barium	19.4	0	19.4	4.07321669	20.8	41.7	1.96E-01	9.77E-02
Beryllium	0.71	0	0.71	0.14907133	0	0	NA	NA
Cobalt	3.1	0	3.1	0.65087483	1	10	6.51E-01	6.51E-02
Iron	14700	0	14700	3086.40646	100	1000	3.09E+01	3.09E+00
Manganese	113	0	113	23.7254374	977	9770	2.43E-02	2.43E-03
Vanadium	37.4	0	37.4	7.85248991	11.4	114	6.89E-01	6.89E-02

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
HERON - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg	
Food Ingestion Rate	0.4010000 kg/day	1 Fish Fraction
Water Ingestion Rate	0.0800000 L/day	
Sediment Ingestion Rate	0.0000000 kg/day	

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.276667	0	1.010787578	0.182	1.1	11	1.65E-01	1.65E-02
METALS AND INORGANICS								
Aluminum	6952.666667	0	6952.666667	1250.794	109.7	1097	1.14E+01	1.14E+00
Barium	9.3	0	9.3	1.673	20.8	41.7	8.04E-02	4.01E-02
Beryllium	0.281667	0	0.281667	0.051	0	0	NA	NA
Cobalt	1.273333	0	1.273333	0.229	1	10	2.29E-01	2.29E-02
Iron	6388	0	6388	1149.210	100	1000	1.15E+01	1.15E+00
Manganese	50	0	50	8.995	977	9770	9.21E-03	9.21E-04
Vanadium	17.033333	0	17.033333	3.064	11.4	114	2.69E-01	2.69E-02

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
HERON - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Great Blue Heron
(Conservative Inputs)

Body Weight	2.2290000 kg	
Food Ingestion Rate	0.4010000 kg/day	1 Fish Fraction
Water Ingestion Rate	0.0800000 L/day	
Sediment Ingestion Rate	0.0000000 kg/day	

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.28	0	1.022964509	0.18403265	1.1	11	1.67E-01	1.67E-02
METALS AND INORGANICS								
Aluminum	155000	0	155000	27884.7017	109.7	1097	2.54E+02	2.54E+01
Barium	19.4	0	19.4	3.49008524	20.8	41.7	1.68E-01	8.37E-02
Beryllium	0.71	0	0.71	0.12772992	0	0	NA	NA
Cobalt	3.1	0	3.1	0.55769403	1	10	5.58E-01	5.58E-02
Iron	14700	0	14700	2644.54913	100	1000	2.64E+01	2.64E+00
Manganese	113	0	113	20.328847	977	9770	2.08E-02	2.08E-03
Vanadium	37.4	0	37.4	6.72830866	11.4	114	5.90E-01	5.90E-02

a Calculated using Theorteical Bioaccumulation Potential equation.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
WOODCOCK - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
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)	Water Concentration (mg/L)	Predicted[a] Earthworm Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.00836	0	0.048488	0.03419204	0.18	1.8	1.90E-01	1.90E-02

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
WOODCOCK - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
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)	Water Concentration (mg/L)	Predicted[a] Earthworm Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.024	0	0.1392	0.09815898	0.18	1.8	5.45E-01	5.45E-02

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
ROBIN - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
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 Concentration (mg/L)	Predicted[a] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_h	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.00836	0.0010032	0.048488	0.016	0.18	1.8	8.92E-02	8.92E-03

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
ROBIN - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
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 Concentration (mg/L)	Predicted[a] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.024	0.00288	0.1392	0.04610235	0.18	1.8	2.56E-01	2.56E-02

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
RACCOON - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
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	0.1710000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.276667	0	1.010787578	0.202	18.3	183	1.10E-02	1.10E-03
METALS AND INORGANICS								
Aluminum	6952.666667	0	6952.666667	1491.600	1.93	19.3	7.73E+02	7.73E+01
Barium	9.3	0	9.3	1.995	5.1	51	3.91E-01	3.91E-02
Beryllium	0.281667	0	0.281667	0.060	0.66	6.6	9.16E-02	9.16E-03
Cobalt	1.273333	0	1.273333	0.273	1	10	2.73E-01	2.73E-02
Iron	6388	0	6388	1370.458	50	500	2.74E+01	2.74E+00
Manganese	50	0	50	10.727	88	284	1.22E-01	3.78E-02
Vanadium	17.033333	0	17.033333	3.654	0.21	2.1	1.74E+01	1.74E+00

a Calculated using Theorteical Bioaccumulation Potential equation.

FOOD CHAIN MODELING CALCULATION
RACCOON - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
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	0.1710000 L/day		
Sed Ingestion Rate	0.8560000 kg/day	0.094	Sediment Fraction

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Predicted Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
SEMIVOLATILE ORGANIC COMPOUNDS								
Bis(2-Ethylhexyl)phthalate	0.28	0	1.022964509	0.204480131	18.3	183	1.12E-02	1.12E-03
METALS AND INORGANICS								
Aluminum	155000	0	155000	33253.13283	1.93	19.3	1.72E+04	1.72E+03
Barium	19.4	0	19.4	4.162005013	5.1	51	8.16E-01	8.16E-02
Beryllium	0.71	0	0.71	0.152320802	0.66	6.6	2.31E-01	2.31E-02
Cobalt	3.1	0	3.1	0.665062657	1	10	6.65E-01	6.65E-02
Iron	14700	0	14700	3153.684211	50	500	6.31E+01	6.31E+00
Manganese	113	0	113	24.24260652	88	284	2.75E-01	8.54E-02
Vanadium	37.4	0	37.4	8.023659148	0.21	2.1	3.82E+01	3.82E+00

a Calculated using Theorteical Bioaccumulation Potential equation.

FOOD CHAIN MODELING CALCULATION
MOUSE - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Deer Mouse
(Conservative Inputs)

Body Weight	0.0310000 kg			
Food Ingestion Rate	0.0086000 kg/day	% Veg	0.98	Vegetation Fraction
Water Ingestion Rate	0.0000000 L/day			
Soil Ingestion Rate	0.0086000 kg/day	% SS	0.02	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Water Concentration (mg/L)	Predicted[a] Vegetation Concentration (mg/kg)	Predicted[b] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs									
Aroclor-1254	0.00836	0	0.0010032	0.048488	3.19E-04	0.068	0.68	4.69E-03	4.69E-04

a Value calculated by multiplying surface soil concentration by the vegetation BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
MOUSE - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Deer 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)	Water Concentration (mg/L)	Predicted[a] Vegetation Concentration (mg/kg)	Predicted[b] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs									
Aroclor-1254	0.024	0	0.00288	0.1392	9.16E-04	0.068	0.68	1.35E-02	1.35E-03

a Value calculated by multiplying surface soil concentration by the vegetation BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
SHREW - AVERAGE CONCENTRATION
SITE 15 - DIRT ROADS
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	0.0052000 kg/day	0.1	Surface Soil Fraction

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Water Concentration (mg/L)	Predicted[a] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.00836	0	0.048488	0.024	0.068	0.68	3.50E-01	3.50E-02

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

FOOD CHAIN MODELING CALCULATION
SHREW - MAXIMUM CONCENTRATION
SITE 15 - DIRT ROADS
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	0.0052000 kg/day	0.1	Surface Soil Fraction

Maximum Concentrations

ECOC	Soil Concentration (mg/kg)	Water Concentration (mg/L)	Predicted[a] Invertebrate Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ_n	LOAEL HQ_l
Pesticides/PCBs								
Aroclor-1254	0.024	0	0.1392	0.06823597	0.068	0.68	1.00E+00	1.00E-01

a Value calculated by multiplying surface soil concentration by the invertebrate BAF (see Table F-1 for BAF values).

F-4

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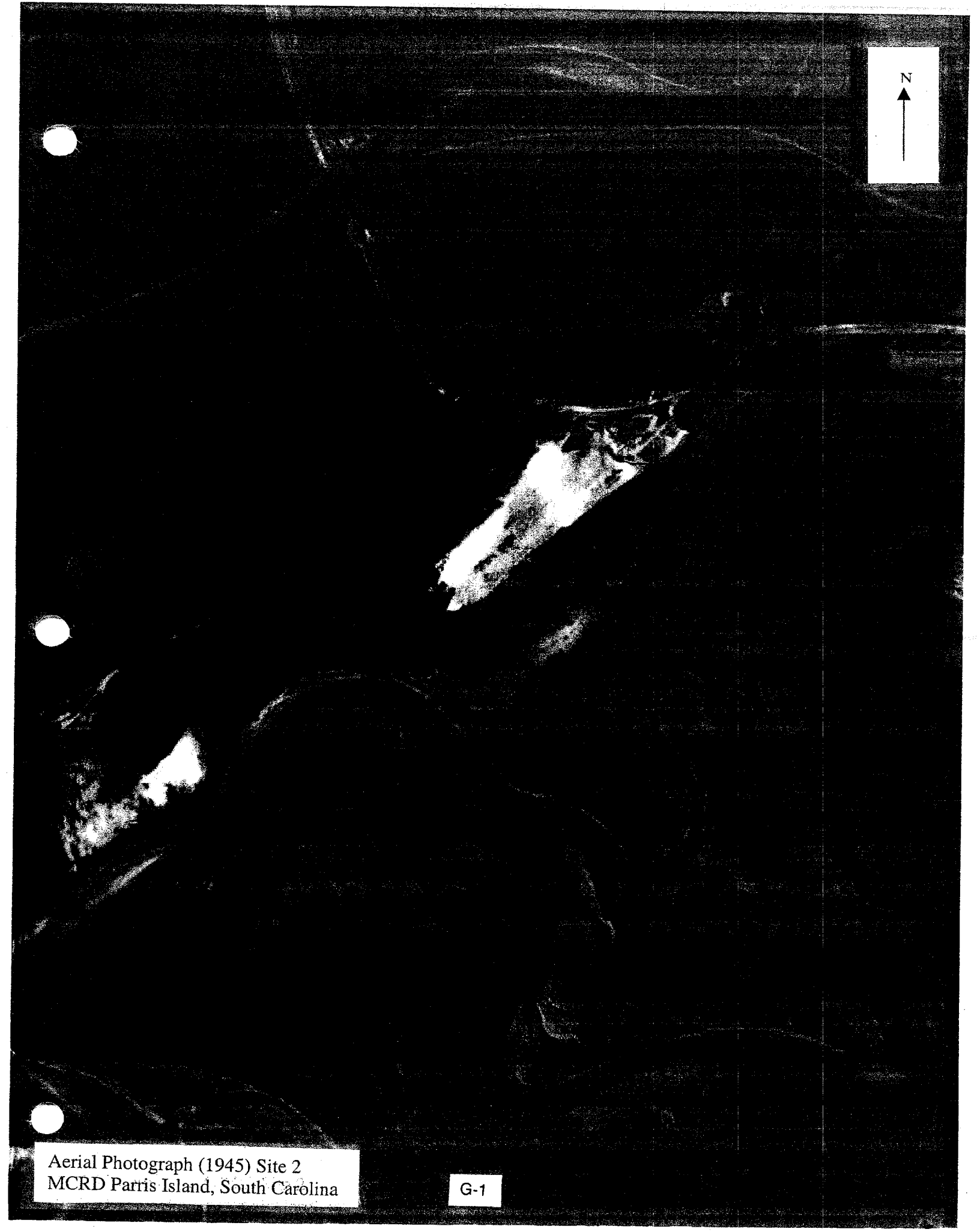
APPENDIX G

AERIAL PHOTOGRAPHS



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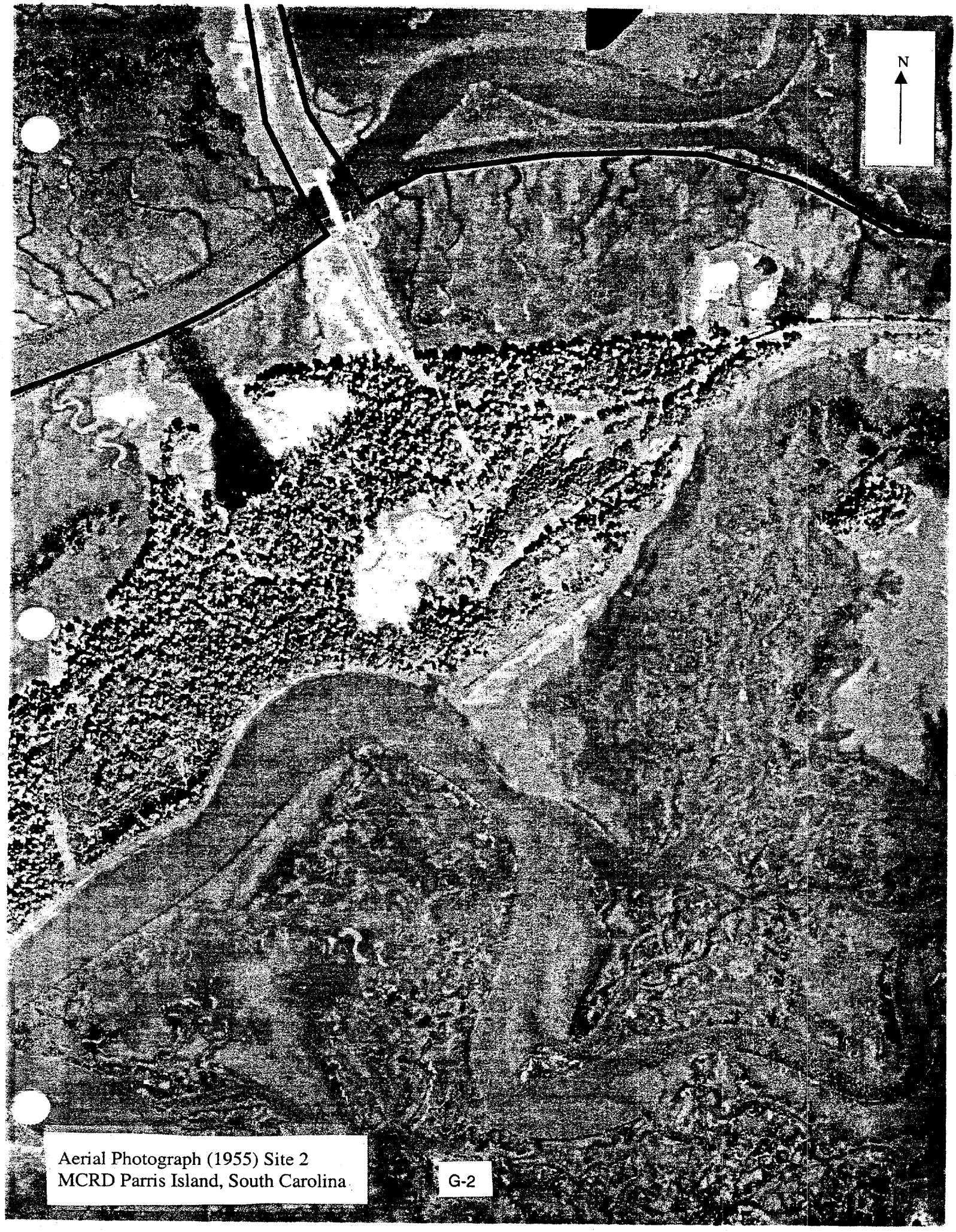
MCRD Parris Island, South Carolina



Aerial Photograph (1955) Site 2
MCRD Parris Island, South Carolina

Aerial Photograph (1965) Site 2
MCRD Parris Island, South Carolina

Aerial Photograph (1972) Site 2
MCRD Parris Island, South Carolina