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REMEDIAL INVESTIGATION/RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION FOR SITE 12 JERICHO ISLAND DISPOSAL AREA MCRD PARRIS ISLAND SC

10/1/2001

TETRA TECH NUS

ID 227

Remedial Investigation/ RCRA Facilities Investigation

for

Site 12/SWMU 10 – Jericho Island Disposal Area

Marine Corps Recruit Depot

Parris Island, South Carolina

U.S. EPA ID # SC6 170 022 762

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Southern Division Naval Facilities Engineering Command

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REMEDIAL INVESTIGATION/ RCRA FACILITIES INVESTIGATION

FOR
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA

MARINE CORPS RECRUIT DEPOT
PARRIS ISLAND, SOUTH CAROLINA
U.S. EPA ID #SC6 170 022 762

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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The geologic work described and professional opinions rendered in the RI/RFI Report for Site 12/SWMU 10 – Jericho Island Disposal Area at the Marine Corps Recruit Depot, South Carolina, were developed in accordance with commonly accepted procedures consistent with applicable standards of practice.

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ACRONYM LIST

ATSDR	Agency for Toxic Substances and Disease Registry
AVS/SEM	Acid Volatile Sulfide/Simultaneous Extracted Metals
AWQC	Ambient Water Quality Criteria
B&R	Brown and Root Environmental
BAF	Bioaccumulation Factor
BCF	Bioconcentration Factor
bgs	Below Ground Surface
BSAF	Biota Sediment Accumulation Factor
CCV	Continuing Calibration Verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	Contract Laboratory Program
CMS	Corrective Measures Study
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CSF	Cancer Slope Factor
CTO	Contract Task Order
DEHP	Diethyl Phthalate
DoN	Department of the Navy
DQO	Data Quality Objective
ERA	Ecological Risk Assessment
ER-L	Effects Range-Low
ER-M	Effects Range-Median
ESV	Ecological Screening Value
ET	Exposure Time
F	Filtered
FDA	Federal and Drug Administration
FDEP	Florida Department of Environmental Protection
FEMA	Federal Emergency Management Agency
FS	Feasibility Study
GPS	Global Positioning System
GW	Groundwater
HEAST	Health Effects Assessment Summary Tables
HI	Hazard Index

HQ	Hazard Quotient
IAS	Initial Assessment Study
ICR	Incremental Cancer Risk
ICV	Initial Calibration Verification
ID	Inner Diameter
IDW	Investigation Derived Waste
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	Incremental Lifetime Cancer Risk
IR	Installation Restoration
IRIS	Integrated Risk Information System
LCS	Laboratory Control Sample
LOAEL	Lowest-Observed-Adverse-Effect Level
MCRD	Marine Corps Recruit Depot
MDL	Method Detection Limit
µg/kg	Micrograms Per Kilogram
µg/l	Micrograms Per Liter
mg/kg	Milligrams Per Kilogram
mg/l	Milligrams Per Liter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
msl	Mean Sea Level
MW	Monitoring Well
NACIP	Naval Assessment and Control of Installation Pollutants
NAD 83	North American Datum 1983
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCEA	National Center for Environmental Assessment
NEESA	Naval Energy and Environmental Support Activity
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No-Observed-Adverse-Effect Level
NTU	Nephelometric Turbidity Unit
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Environmental Response
PA	Preliminary Assessment
PAH	Polynuclear Aromatic Hydrocarbon
PAI	Parris Island
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PCB	Polychlorinated Biphenyl

PEL	Probable Effects Level
PI	Parris Island
PID	Photoionization Detector
ppt	parts per trillion
PSI	Per Square Inch
QA/QC	Quality Assurance/Quality Control
QAP	Quality Assurance Plan
RAGS	Risk Assessment Gudiance for Superfund
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RDA	Recommended Daily Allowance
RFA	RCRA Facilities Assessment
RfC	Reference Concentration
RfD	Reference Dose
RFI	RCRA Facility Investigation
RGO	Remedial Goal Options
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RPD	Relative Percent Difference
SARA	Superfund Amendments and Reauthorization Act
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SD	Sediment
SI	Site Inspection
SMDP	Scientific/Management Decision Point
SOP	Standard Operating Procedure
SOUTHDIV	Southern Division
SQL	Sample Quantation Limit
SS	Surface Soil
SSL	Soil Screening Level
SVOC	Semivolatile Organic Compounds
SW	Surface Water
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TBP	Theoretical Bioaccumulation Potential
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure

TDS	Total Dissolved Solids
TEF	Toxicity Equivalence Factor
TEL	Threshold Effects Level
TOC	Total Organic Carbon
TP	Test Pit
TRV	Toxicity Reference Value
TSS	Total Suspended Solids
TtNUS	Tetra Tech NUS, Inc.
U.S. EPA	United States Environmental Protection Agency
UCL	Upper Confidence Limit
USFWS	United States Fish and Wildlife Service
VOCs	Volatile Organic Compounds
VSI	Visual Site Inspection
WQS	Water Quality Standard

USEPA COMMENTS ON DRAFT REMEDIAL INVESTIGATION/RCRA FACILITY INVESTIGATION REPORT, SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA U.S. MARINE CORPS RECRUIT DEPOT, SOUTH CAROLINA EPA ID# SC6170022762

GENERAL COMMENTS:

1. **Comment:** The RI/RFI Report presents the data clearly and concisely. The technical approach, data presentation, and conclusions are consistent and adequately substantiated. However, the report should be reviewed by a technical editor as there are sentence fragments, redundant phrases and other grammatical errors, particularly in section 3, which need to be corrected.

   Response: Acknowledged. The report will be re-reviewed by a technical editor.

2. **Comment:** The data collected appear to be of sufficient quantity and quality to support decision making, and the general conclusions of the RI/RFI Report are reasonable. Since the waste and debris appear to be of limited quantity and dumped at the surface, clean-up and off site disposal of the waste may be an acceptable remedial alternative. EPA recommends that the Navy focus on a narrow set of alternatives (i.e., no action and clean-up with off site disposal and land use controls that restrict residential development and use of the groundwater) through a Focused Feasibility Study.

   Response: The Navy concurs. A Feasibility Study will be started on this site in the near future. The likely alternatives to be considered include those listed, but onsite containment options will also be considered. In addition, based on comments from another reviewer, natural attenuation/biodegradation of two soil areas of potential ecological concern for PAHs will be evaluated.

3. **Comment:** It is recommended that PAHs be screened without using surrogates for PAH compounds for which a screening value is not available. Since most PAHs act with a similar toxic effect, screening the total PAHs (where applicable) should be adequate to evaluate those PAHs without screening values.

   Response: The approach on addressing the PAHs differs between the human health and ecological risk assessments. Both were conducted in accordance with direction received from

the EPA. The human health screening criteria for individual PAHs are based on noncarcinogenic and carcinogenic effects, consequently it is not possible to use one criteria to screen all PAHs. As discussed during the April 2001 partnering team meeting for MCRD Parris Island, total PAHs will be used in lieu of individual PAHs for ecological screening.

4. **Comment:** The food chain model included in this risk assessment should be removed from steps 1 and 2 and (if included at all) be included after COPC refinement for those contaminants expected to present potential risk via trophic transfer.

Response: The ecological risk assessment was conducted in accordance with the protocol in place at the time. Since the approach presented in the report is more extensive than under current protocol, rework of the report is not planned. Rather, the approach recently finalized for the Site 1 RI report at Parris Island will be applied to Site 12. Also, the information in this assessment provides valuable documentation for analysis of FS alternatives.

5. **Comment:** A closer evaluation of detection frequency needs to be included in this report. Numerous COPCs (which have maximum concentrations that exceed the associated screening values) are eliminated in Step 3a based on their limited frequency of detection above the sample quantitation limit (SQL). However, in many cases the SQLs reported for the contaminants exceeded the ecological screening value for the contaminant. Therefore, this rationale for eliminating COPCs is questionable. Examples of contaminants to which this applies to includes: PAHs, pesticides, and several metals.

Response: Agreed. For samples in which the reported SQL exceeds the screening value and the frequency of detection is used as the basis for eliminating a chemical from further consideration, a more detailed evaluation of the sample detection limit will be conducted. Note that for the Site 12 evaluation, frequency of detection was not used a stand alone basis for eliminating any of the COPC. This evaluation will generally focus on the actual MDL for each sample. As previously discussed, the following example was developed to help clarify the laboratory reporting procedure.

Example of Laboratory Reporting Procedure

A sediment sample is analyzed for pesticides (e.g. DDT) in accordance with analytical procedures.

If the sample contains analytical interferences in the target parameter range, the sample extract is diluted in the laboratory to eliminate/minimize matrix interference and the diluted extract is reanalyzed. The matrix interference most commonly occurs in sample containing relatively high concentrations of organic compounds such as PAHs and other non target compounds including fuels and natural organic compounds. Dilution factors are commonly in the range of 10 to 100, and carry through the following calculations for the non detected values.

If the chemical is detected above the method detection limit (MDL), (e.g. DDT = 0.75 µg/kg (Instrument 29). Since the result is less than the PQL, a j (estimated) is also assigned to the sample result.

Next, the laboratory corrects the sample result for the moisture content of the sample (e.g. for a sediment sample that is 70% water, the final reported value is 2.5 µg/kg

If the chemical is not detected above MDL (e.g. DDT not detected - On Instrument 29, the MDL is 0.715 µg/kg).

The laboratory initially assigns the result as less than CLP PQL (e.g. DDT < 3.3 µg/kg).

Next the laboratory corrects the reported non detect value for moisture content of the sample (e.g. for sediment sample that is 70% water, the final reported value is < 11 µg/kg dry weight.

6. **Comment:** For clarity, it is recommended that COPC refinement included in Step 3a be presented by assessment endpoints after the abiotic screen has been completed. Step 3a should include refinement of COPCs by evaluating their potential effect to all identified assessment endpoints. As it is currently presented, it appears that the refinement still focuses on evaluating COPCs primarily by conducting food chain models. The original abiotic screen identifies potential risk to the first of the assessment endpoints for this site (soil and/or sediment dwelling invertebrate communities) that is not adequately discussed in the COPC refinement section.

Response: Since the approach presented in the report is more extensive than under current protocol, this rework of the report is not planned. Rather, the approach recently finalized for the Site 1 RI report at Parris Island will be applied to Site 12.

7. **Comment:** The food chain model included in this report contains several factors that are not adequately conservative for a screening level ecological risk assessment in which limited site specific data is available. It is recommended that the ecological sub-committee develop a more appropriate food chain model for use in evaluating contaminants expected to bioaccumulate in Step 3 of the risk assessment process.

Response: The food chain model approach and assumptions were developed by the MCRD Parris Island partnering team and conducted in accordance with EPA protocol in place at the time of development. Specific concerns and issues with the food chain modeling should be identified for discussion and evaluation by the team.

SPECIFIC COMMENTS:

1. **Comment: Page 1-3, Section 1.4.2, 2nd paragraph, 1st sentence.** The text refers to three surface debris areas, but the referenced figure (Figure 1-2) illustrates only two. It appears the east-central upland debris pile is not shown. Revise the figure for completeness.

Response: Three surface debris piles are shown on Figure 1-2. The third pile is very small (10 foot by 10 foot), on the west side and in the northern half of the island.

2. **Comment: Pages 2-1 and 2-2, Sections 2.2 and 2.3.** Information regarding the specific topography and surface water drainage for Jericho Island should be included along with the general MCRD description. For example, no perennial streams are apparent on Jericho Island, and surface water is expected to move by overland flow to a poorly defined radial network of swales, discharging to the surrounding marsh.

Response: Section 2.0 presents general information for MCRD Parris Island. Site specific information is presented in Sections 3.0 to 7.0. However, we concur that the information should be added to the report. The following section will be added to Section 3.0.

3.5 SURFACE WATER HYDROLOGY

The site is a small relatively flat sandy island with minimal topographic relief. The highest elevation on site is approximately 9 feet about mean sea level. High tides in the areas are range from approximately 4 to 5 feet above mean sea level. Except for minor erosion near the edge of the island, surface water and surface water flow channels are not present on the island. During storm events, precipitation would either infiltrate the sandy soils or migrate radially as sheet flow toward the surrounding marsh.

In the marsh surrounding the island, surface water flow patterns were observed during the recent sampling events in 1998, 1999, and 2000. Just after high tide, surface water was noted to flow primarily to the east on the east side of the island and to the west on the west side of the island toward the tidal channels illustrated in blue on the site figures (e.g. Figure 3-1). From the tidal channels, the surface water flows to the south and into Archers Creek.

3. **Comment: Page 3-7, Section 3.2.7, 2nd sentence.** Please clarify why falling head tests were not conducted in these wells. It is assumed that this is because the well screens partially penetrated the water table.

Response: To address this comment, the following text will be added to the report.

"Falling head tests were not conducted on groundwater monitoring wells screened across the water table (shallow) because flow through unsaturated portions of the well screen would adversely effect the reliability of the results. "

4. **Comment: Page 3-11, Section 3.4, 4th paragraph, last sentence.** Please provide potentiometric contour maps of the shallow and deep water table to substantiate the radial groundwater flow. Also, it appears that the deep and shallow water tables are significantly higher at the southern margin of Jericho Island than anywhere else measured. Discuss the significance of these measurements.

Response: In accordance with investigation of site under the presumptive remedy approach, groundwater monitoring wells were not installed within the middle of the site. In absence of data from the interior of the site, technically accurate potentiometric contour maps cannot be generated. Since the data has only minimal relevance to the investigation, the groundwater data is presented as an observation only.

5. **Comment: Figures 3-1 through 3-4.** Drawings illustrating the topography, roads, debris piles and sampling locations at a smaller scale would provide a more useful and readable base map than the aerial photograph. The proximity of the sampling locations to the debris piles should be evident on the revised maps. Smaller scale maps would also support planning and volume estimating for the feasibility study.

Response: The only base maps available for Jericho Island are the USGS quads (Figure 1-1) and the aerial photograph presented in Section 3.0. The figures can be reprinted without the

aerial photograph background, however, much of the surrounding island, water, and marsh information would be lost. This information was considered to be critical to this study because it demonstrates the location of the site relative to surroundings.

To help clarify the figures and drawings in Section 3.0, the debris piles will be added to the figures. Also, the sample locations and topography lines will be color coded to illustrate better contrast. Note that the locations of debris piles relative to sample locations are already presented on Section 4.0 figures.

Volume calculations are generally done at much larger scales, like that presented at the recent partnering team meeting for another site. In particular, once the study area has been focused. The size of the drawing was primarily selected to illustrate the tags presented in the later sections.

6. **Comment: Page 4-1, 3rd paragraph.** The 1995 data do not appear to be included in Appendix C, please include the data or provide a reference for the source of this data.

Additionally, there appears to be a wide range of reported detection limits for the various analyte groups. Provide a discussion relating the achieved detection limits to the relevant screening levels, and, in cases where the reported detection limit exceeds the screening level, how the data was managed (e.g., included at ½ the detection limit or treated as zero).

Response: The 1995 soil data is already presented in the report, e.g. Page C-15. The 1995 sediment data was inadvertently omitted and will be added to the Appendix C.

To address the comment on detection limits, the following text will be added to the report.

"During the testing, the best available reliable analytical methods were used. However, for some samples elevated detection limits occurred because of sample moisture content and/or other matrix interferences. For chemicals that were not detected in any sample, the chemical was assumed not to be present at the site. If the chemical was detected in one or more samples, then one half the detection limit would be used for average concentration calculations. Normally, this evaluation would use the laboratory reported sample quantitation limit (SQL). In some cases in which the screening value is very low relative to the quantitation limit and it appears that the chemical may be carried through the evaluation only because of the elevated SQL, then individual sample MDL may be developed and used for the calculations."

7. **Comment: Page 4-5, Section 4.2, 4th paragraph, 6th and 7th sentences.** These two statements appear to be contradictory. Please clarify whether the statement that no ecological screening criteria were exceeded is intended to apply to unfiltered results only.

Response: The last sentence will be revised as follows. No other ecological screening criteria were exceeded."

8. **Comment: Page 4-9.** Provide an additional section to summarize the nature and extent findings across the various media relative to their spatial distribution and the potential source materials. For example, in the vicinity of the east central debris pile various SVOCs were detected above screening levels in surface soil, surface water and sediment which may be consistent with degradation of plastic and asphaltic debris. Similar discussion contrasting the detected metals with background concentrations and waste materials should be included. Additionally, provide discussion regarding the VOCs detected in the various media (i.e., are they waste derived or laboratory contamination). Considering the nature and age of the waste materials, the climate at MCRD, and the results of the organic data validation, the VOC results may be questionable.

Response: Additional text will be added to the individual media write ups to attempt to relate the contaminant findings to specific sources. However, without adequate site history, this approach can become very speculative and potentially misleading. With the exception of SS-014 and SD-014, there are no observable trends between the observation of waste and screening level exceedences of metals.

For example, the fuel type PAHs detected at SS-008 and SS-012 are not related to observable waste. Although we agree that VOCs are not likely to be site related, the data cannot be eliminated through data validation. As a result, the Navy uses a conservative approach of screening this data during the human health and ecological screening processes presented in Section 6.0 and 7.0.

9. **Comment: Page 4-33, Figure 4-5**. The sediment screening value for mercury is incorrectly listed as 15.9 mg/kg. This figure should be corrected with the appropriate sediment screening value for mercury (0.13 mg/kg).

Response: Agreed.

10. **Comment: Page 5-2, Section: 5.2.2, 2nd paragraph.** This paragraph discusses the bioaccumulation/bioconcentration of PAHS. However, for most species the PAHS are

metabolized readily and do not accumulate in the higher trophic levels. It is suggested that this paragraph be revised and referenced.

Response: The referenced paragraph does not address bioaccumulation/ bioconcentration of PAHs. The comment presumably refers to page 5-3, Section 5.2.4, second paragraph, which discusses bioaccumulation and bioconcentration of PAHs. This paragraph will be revised as suggested.

11. **Comment: Page 5-2, Section: 5.2.3, 6th paragraph, 3rd sentence.** This sentence states that the mobility of metals generally increases with decreasing pH and cation exchange capacity. However, this is true for only the metals existing as cations. Metals such as arsenic and hexavalent chromium usually exist as anions (arsenate and chromate) and will migrate more readily with increasing pH. Revise the sentence to discuss the metal COPCs (i.e. lead). Follow this discussion through to Table 5-2.

Response: To clarify this issue, the following will be added to the section. "One notable exception is arsenic, which under some conditions is more mobile under some higher pHs."

Chromate is so soluble, that pH has no significant effect under most environmental conditions. Note also that hexavalent chromium is a unique form of chromium that is unstable under most normal environments, and is found in only a few select industrial wastes (e.g. plating wastes and some paints). None of these wastes would be expected to be present at the site.

12. **Comment: Pages 7-26 through 7-45, Section 7.8.** Currently contains statements that do not appear to be supported by the data presented in the tables for this section. As with Site 1/41, it is recommended that the COPC refinement for this site be re-evaluated by the ecological subcommittee and then once the subcommittee has reached consensus the COPC refinement section of this report be revised.

Response: The Site 12/SWMU 10 report was issued for comment for this purpose. Specific comments from members of the ecological subcommittee identified PAHs in soils, and the report will be revised to address these comments.

13. **Comment: Page 7-16, Section 7.4.2.1.** The text presented on this page is not consistent with the equation shown for evaluating risk to the red drum on page 7-20. The text states that prey items for the red drum are assumed to be exclusively mummichogs; however; the equation on page 7-20 indicates that three separate prey items were used in estimating exposure to the red

drum. It is recommended that the rationale for selecting a representative prey item for the red drum be presented. The representative prey item should be the one assumed to represent the highest exposure potential for that organism. These types of assumptions should be presented and agreed upon prior to submittal of any food chain model. This, and other areas of uncertainty inherent in food chain models, could be addressed by the ecological sub committee and proposed for use in future food chain models.

Response: Section 7.4.2 (pages 7-13 through 7-17) describes how contaminant doses were estimated. These doses were then compared to toxicity reference values to derive food chain hazard quotients. However, as explained in the opening paragraph of Section 7.4.3, this section describes how contaminant tissue concentrations were estimated. Thus, the two approaches reflect different methods of evaluating potential risks to fish. The approach described in Section 7.4.3.1 was suggested by NOAA, and both approaches have been previously approved by the MCRD Parris Island Partnering team.

14. **Comment: Page 7-18, Section 7.4.3.1.** It is unclear why a detailed discussion of estimated red drum exposure to mercury is presented; however no other contaminants (or assessment endpoints) have similarly detailed discussions.

Response: See response to Comment 13. NOAA previously suggested the approach and provided the model, which was included with approval of the MCRD Parris Island Partnering team.

15. **Comment: Page 8-1, point 4.0, 1st sentence.** The text states that four inorganics exceeded human health criteria, but two are indicated on Table 4-8 and are parenthetically noted within the referenced sentence. Please correct/clarify this statement.

Response: The text will be revised to read "three inorganics (arsenic, iron, and lead)".

16. **Comment: Page 8-2, Section 8, 5th Paragraph, 1st Sentence**. This paragraph should be reworded as follows for the human health portion: *The analytical data for SWMU 21 suggests that there is no additional risk for the maintenance and construction workers. Residential risk was not considered. At the current time there is no evidence that the contamination is more or less extensive than observed.*

Response: As discussed during the April 2001 partnering team meeting, the Site 12 RI addresses residential risks.

17. **Comment: Page 8-4, point 6.0, last bullet.** Each of these points appears to be reasonable and germane to the risk management decisions for this site. Additional information should be included in Section 4.0 to support these conclusions (see Specific Comment 8).

Response: Agreed.

18. **Comment: Page 8-5, points 9.0 and 10.0.** These points should be combined, a single action recommendation should be presented based on results from all media. The FS/CMS should consider clean-up and off site disposal of wastes in all three of the identified debris areas. The Navy can compare this approach to clean-up of the wastes in the southernmost area only as part of the FS/CMS. Additionally, it is recommended that the FS/CMS use a focused approach (see General Comment 2).

Response: Since this comment is editorial in nature, no change is proposed. An FS will be prepared to address the wastes and contaminated media at the site. At this time, the Navy is planning on evaluating four options consisting of no action, onsite containment, offsite disposal, and insitu biodegradation/monitoring of soils. In addition, two soil samples (SS-08 and SS-12) were collected in April 2001 to determine the fate of the PAHs and pentachlorophenol at two soil locations. If these contaminants no longer remain, then surface soils will not be addressed.

19. **Comment: Page 8-5, point 12.0.** While it is agreed that the groundwater exceedances are of limited concern, the proposed clean-up approach (southernmost area only) would not be expected to minimize future potential groundwater impacts (if these COPCs are related to site wastes, see Specific Comment 8). All of the organic compounds, as well as a portion of the inorganic compounds, are associated with wells that are up-gradient or cross-gradient to the southernmost area (based on radial groundwater flow). This provides an additional reason to clean-up all identified debris areas - to be protective of groundwater.

Response: Only three debris piles were observed at the site. Two of the debris piles are relatively extensive and are located on the southern end of the island. The third debris pile (broken bottles, can, and an old washing machine) will be similarly picked up.

20. **Comment: Appendix A.** Manually recorded field data sheets and chain-of-custody forms have some documentation QA/QC discrepancies that are consistent with discrepancies noted for previously reported field activities performed during the same time period (e.g., chain-of-custody #02227 includes un-initialed cross-outs, and an unaccounted period of time between relinquishing

the samples and laboratory receipt). Please continue to take steps to eliminate these problems in future investigation efforts.

Response: Agreed.

21. **Comment:** **Appendix D.** It is noted that this appendix includes the RBC Tables in their entirety, as well as the Drinking Water Advisories. It is not necessary to include these tables, as they are standard tables readily available. This will reduce the bulk of Appendix D.

Response: Appendix D contains the PARCC Parameters/Data Validation Letters, there are no copies of the EPA Region III RBC Tables or EPA Drinking Water Advisories included in any of the appendices to this report.

SOUTH CAROLINA DEPARTMENT OF HEALTH SERVICES COMMENTS DRAFT REMEDIAL INVESTIGATION/RCRA FACILITY INVESTIGATION FOR SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA (10/00), MARINE CORP RECRUIT DEPOT, PARRIS ISLAND, SC6 170 022 762

1. **Comment:** General The Department agrees with the EPA concerning the development of a focused CMS. This focused CMS must evaluate, at a minimum, the removal and disposal of the waste material.

   Response: Agreed.

2. **Comment: Section 3.2.2.** It is unclear why subsurface soil samples were not analyzed for the typical investigative parameters such as VOCs, SVOCs, pesticides, etc... There are two facts to consider that would indicate the potential need for additional subsurface soil sampling such as:

   a. Landfill debris was encountered at depth at PAI-10-SB-06 and PAI-10-SB-07. Contaminants may have leached from the waste to the subsurface soils.

   b. Several subsurface soil borings (PAI-10-SB-01 and PAI-10-SB-06) had elevated PID readings indicating potential VOC contamination.

   Response: In accordance with the presumptive remedy approach used in developing the sampling strategy for this site and presented in the Site work plan, waste materials like those encountered in the soil borings are not sampled.

   Note that SB-06 and SB-07 are within the area identified as a debris pile and that the finding of waste was anticipated. Under the presumptive remedy, impacted soils would be addressed with the waste, via either excavation or covering.

   If environmentally significant VOC contamination was present in the soils/waste near the monitoring wells, then it would have been found in the groundwater samples. Note that the only VOCs detected in groundwater were acetone and chloroform. Neither of which was detected at concentrations exceeding MCLs.

3. **Comment: Section 3.2.5, Page 3-5.** Please include a figure illustrating background sample locations relative to SWMU 10 (Jericho Island).

Response: Maps depicting the location of the background samples are presented in Appendix A. The background locations are several miles away from Jericho Island and do not fit on the site maps. In response to the request during the April 2001 partnering team meeting, a separate map will be generated and incorporated into Appendix A showing the location of the SWMU 10 background sample locations relative to Jericho Island.

4. **Comment: Figure 1-2 and Figure 3-2.** Figures on a smaller scale are necessary to better identify the proximity of the sample location relative to the waste piles.

Response: The size of the figures was selected to be uniform through the report presentation and be sufficient size to show the tags on the maps. However, we concur that the black sample dot on the black background is difficult to see and propose changing the sample location color to be better illustrated (e.g. yellow and blue). Otherwise, the site would have to be shown on "D" sized black and white drawings (22" by 34"), which are good for detailed planning and calculations, but are more difficult to work with in a report, especially when multiple figures are used.

5. **Comment: Section 4 Figures.** The Department would like to commend the author for incorporating the applicable screening levels onto these figures. By doing so, the reviewer can easily determine the magnitude of the human health and/or ecological exceedances.

Response: Acknowledged.

6. **Comment: Section 4.2.** This section states that the EPA Region 4 freshwater ecological screening values were used for comparison purposes based upon the assumption that the groundwater would eventually become surface water. However, Section 7.3.1 states that the EPA Region 4 saltwater ecological values would be used for screening based upon the elevated salinity in both the surface water and groundwater. Please revise accordingly.

Response: Agreed. Note that Section 4.2 actually evaluates the data relative to salt water ecological screening values. The foot note on Figure 4-2 and text in Section 4.2 will be revised, but criteria presented is actually the salt water criteria, (see Table 4-5).

7. **Comment: Figure 4-1.** It does not appear as though soil samples were collected within the vicinity of the inland waste piles; particularly the northern-most waste pile. Please explain.

Response: In accordance with the approved work plan and the presumptive remedy, the debris piles were not sampled. Rather, soil, sediment, surface water, and/or groundwater down gradient from the debris piles were sampled. For example, potential migration from the northern-most waste pile would be evaluated by sediment samples SD-12 and SD-13, see Figure 4-5.

8. **Comment: Figure 4-1.** Soil sample PAI-10-SS-05-01 appears to have elevated concentrations of PAHs; however, there is not a waste pile within the vicinity of this sample. Please attempt to explain the source of this contamination.

Response: We assume that the comment is referring to SS-08, since PAHs were not detected in SS-05. Low level and infrequent detections of anthropogenic compounds such as PAHs are common. The location was sampled because of the presence of an electromagnetic anomaly. There is no visible evidence of waste. Additionally, subsurface hand excavations found no evidence of waste. Based on the low concentrations detected, the initial recommendation was to not actively remediate the site. However, in 2001, a sample was collected within one foot of the original sample to determine if the PAHs and pentachlorophenol are still present. The 2001 confirmed the results of the original sample. Consequently, the RI has been revised to indicate that this location will be addressed in the FS/CMS.

9. **Comment: Figures 4-3 and 4-5.** There does not appear to be a correlation between the surface water and sediment samples to the east side of the site. The surface water samples have consistently elevated detections of metals, particularly manganese. However, the corresponding sediment samples do not have any exceedances; thereby, eliminating elevated turbidity as an explanation. Please attempt to explain the source of the elevated metals in the surface water.

Response: The correlation between elevated metals in the surface water and sediment is based on total concentration and not comparison to sediment screening criteria. For example, the concentration of manganese in the sediment to the east of the site is approximately 26,000 µg/kg (26 mg/kg), which is below the background sediment concentration of 186 mg/kg. To account for 214 µg/l of manganese in the surface water, the suspended solids concentration in the surface water would have to be approximately 121 mg/l. 121 mg/l of suspended solids is within the range of moderately turbid water.

10. **Comment: Section 6.2.3.3, Page 6-10; Figure 6-2; Table 6-13.** Section 6.2.3.3 states that the ingestion of groundwater will be considered a pathway. This is confirmed in Table 6-13 for the child resident, adult resident, and lifelong resident. However, the CSM provided in Figure 6-2 does not indicate this exposure route for the onsite resident. Please revise accordingly.

Response: Agreed. Figure 6-2 will be modified to show ingestion of groundwater as a pathway.

DH COMMENTS

1. **Comment:** The Division of Hydrogeology has reviewed the above referenced document. This document was received on 15 November, 2000. It provides a physical description of SWMU 10 that includes the known history this SWMU. It briefly describes previous studies performed at this SWMU, and presents analytical data generated during this current RI/RFI. This document was reviewed with respect to R.61-79 of the South Carolina Hazardous Waste Management Regulations (SCHWMR), and appropriate guidance documents.

   The Division of Hydrogeology found this report technically inadequate. This document should be revised to incorporate the following comments, and then resubmitted for review/approval:

2. **Comment:** Section 3.2.8, Tidal Influence Study: The observations with respect to the tidal influence upon water able levels in the monitoring wells are reported, but this section lacks any real discussion of the meaning or usefulness of this data. Additionally, there's no discussion on the timing of the groundwater sampling with respect to tidal levels. Please revise the text to expound upon this topic.

   Response: The tidal study was conducted in support of potential groundwater modeling efforts and ultimately groundwater remediation design. Since environmentally significant groundwater contamination was not found at the site and groundwater modeling is not planned at this time, only minimal effort was applied to the evaluation of this data at this time.

   In response to the sampling time relative to tidal levels, the following text will be added to Section 3.2.4.

   "The groundwater samples were collected during the receding tide generally close to the low tide. Since the well purge times were uncertain and variable, the standard procedure was to start purging the wells approximately 2 to 4 hours before low tide."

3. **Comment:** Monitoring well water levels are reported in Table 3-6, but there are no figures showing groundwater contours or flow directions for the shallow and deeper components of the surficial aquifer at SWMU-10. Please revise the document to include figures that show the groundwater contours, and revise the current figures to indicate the groundwater flow for the shallow and deeper components of the surficial aquifer. Depending on the results of these

figures, additional discussion might be necessary concerning how groundwater flows at SWMU-10. This could be tied in to the response with Comment 1.

Response: The monitoring wells at the site were installed to evaluate the migration of potential contamination from the site. Therefore, the wells were placed in a ring around the island without interior water elevation data. As a result, developing figures as requested would not be technically accurate.

Because the site is an island, surrounded by salt water marsh, groundwater flow is assumed to be radially outward. However, in the unlikely event that groundwater flow is not in a radial pattern, the island is surrounded by a ring of monitoring wells that would be used to observe other potential migration patterns.

4. **Comment:** There is no discussion on the proximity of drinking water wells near SWMU-10. A survey of the residences in this area should have already been performed to identify drinking water wells (public or private) in the vicinity of SWMU-10. The results of this survey should be reported in this document.

Response: A survey of wells was not part of the work plan and as a result was not conducted. Based on the absence of significant groundwater contamination at the site, a survey is not proposed at this time.

5. **Comment:** There is no discussion about the drinking water well that is currently located on SWMU-10. This well should be sampled and if clean, abandoned per R.61-71 of the South Carolina Well Standards and Regulations.

Response: There is little information available on this well. As part of a site remedy, the well at the site will be checked and abandoned in accordance with applicable requirements.

6. **Comment:** The base boundary is not shown on any of the figures. Please revise the figures to indicate the location of the base boundary.

Response: Agreed. The base boundary will be added to the figures.

7. **Comment:** The figures do not indicate the presence of any residences in the area of SWMU-10 even though there are residences located adjacent to this area. Any residences that are located within the area covered by the figures should be noted on said figures, including docks or piers

that would indicate recreational use of the tidal creeks nearby. Please revise the figures accordingly.

Response: Agreed. Figure 1-2 will be revised to indicate the location of nearby house. Piers and other access to the tidal creeks are not present within a 1/4 mile of the site.

The Department has reviewed the above referenced document and has the following comments pertaining to the human health and ecological risk assessments.

GENERAL COMMENTS:

Comments by NOAA, EPA, and DNR have been reviewed. The department concurs with their comments and adds the following:

1. **Comment:** Detection Limits of some surface soil samples are above the perspective Human Health and Ecological Screening Values (i.e.; semi-volatile and mercury samples in Appendix C pages 5-7). Please provide specific laboratory information for these samples to indicate if the contaminants could have been detected in the form of J-flagged data down to the level of the screening value.

   Response: Laboratory supplied information (Form Is) were provided to SCDHEC electronically. In addition, the laboratory supplied MDL are attached to these responses and can be used to develop sample specific MDLs.

2. **Comment:** Based on the Human Health Risk Assessment Guidance for Superfund document, the use of unfiltered samples is normally recommended. Please provide justification for the use of filtered samples for ecological screening. Commonly, filtered samples are used in conjunction with unfiltered ones to show turbidity related increases/decreases for inorganics. However, the Department does not recommend the use of filtered samples for COPC selection.

   Response: The use of filtered data was excluded from human health risk assessments for groundwater because a study was conducted that indicated colloidal sized particles containing contamination could flow through certain groundwater aquifers and be ingested by human receptors. The filtering process could remove some of these particles, and therefore may bias results low. To resolve this issue, improved sand packs around well screens and well development were employed. Also, low flow sampling techniques were developed which helped to minimize turbidity in the monitoring wells.

This approach is not feasible for surface water samples and therefore both filtered and unfiltered data was collected. Although we consider the use of filtered data for ecological evaluations to be more technically correct, the ecological risk assessment used the higher of the filtered and unfiltered data.

3. **Comment:** The Department concurs with NOAA and SCDNR regarding the need for further site delineation.

Response: NOAA and SCDNR did not request additional site delineation in their comments.

SPECIFIC COMMENTS:

1. **Comment: Tables 4-7 and 4-8**: It appears as though the ecological screening criteria used for pesticides in these tables are the Region IV Sediment Effects Values and not the Screening Values. Please re-screen against Region IV's recommended screening criteria as listed in Region IV's Ecological Risk Assessment Bulletins.

Response: The screening was conducted in accordance with direction from the U.S. EPA which recommends screening (at least in the initial) steps be conducted against the effects level. The primary difference between the effects level and the screening level is that, when the effects levels is less than the reliable detection limit (PQL), the screening level is established at the PQL.

2. **Comment: Table 6-1**: As no dilution attenuation factor (DAF) was given, it appears that the Soil Screening Levels (SSLs) for migration to ground water are those corresponding to a (DAF) of 20. The Department recommends screening against the generic SSLs corresponding to a DAF of 1. If a contaminant exceeds the generic SSL, MCRD may consider calculating a site specific DAF.

Response: A DAF of 20 was used in the table. As requested, the table will be revised to use a DAF of 1. Note however, that this will not effect the risk assessment since actual site groundwater data was used.

3. **Comment: Table 6-8**: It is most likely a typographical error, but the selection of "None" as type of analysis for surface soil in the trespasser scenario needs to be changed.

Response: The table will be revised as suggested. Note that a similar change will be required for the appendix.

4. **Comment: Page 6-10**: Since additional site delineation is needed, the zone of tidal influence may change with respect to its closest point of contamination. Therefore the human health fish ingestion scenario may need to be reevaluated. Please provide a map showing tidal zones in relation to contamination.

Response: Additional site delineation is not planned for this site. The Navy believes that data is sufficient to proceed to a CMS. Figure 3-3, showing the location of the surface water and sediment sample locations will be revised to illustrate an approximate high water mark. At low tide, the nearest surface water (Archers Creek) is approximately 3000 feet south of the Site.

5. **Comment:** Table 6-14: Magnesium (1,100,000 µg/L) far exceeds the screening value of 118,807 µg/L for surface water. Human Health Risk Assessment Guidance for Superfund states, "In order to eliminate an essential nutrient from the risk assessment, it must be shown to be present at levels not associated with adverse health effects." Please provide more justification for eliminating magnesium as a COPC.

Response: Discussion is provided on Page 6-32 of the report (uncertainty analysis) and is based on the finding that the groundwater data used in this screening is diluted salty surface water from the ocean. The presence of calcium, magnesium, potassium, and sodium, as well as salinity and total dissolved solids is all consistent with this assumption.

SCDNR COMMENTS ON THE RE: RI/RFI FOR SITE 12/SWMU 10 JERICHO ISLAND DISPOSAL AREA; MCRD PARRIS ISLAND; BEAUFORT COUNTY, SC

The S.C. Department of Natural Resources (SCDNR) has reviewed the document referenced above, as well as the comments provided by NOAA (by letter dated January 8, 2001).

1. **Comment:** First of all, the SCDNR concurs with the conclusion in the Ecological Risk Summary (Section 7.10) that certain pesticides, PCBs, and inorganic contaminants pose a risk to aquatic receptors in the vicinity of sediment samples SDW-01, SDW-02, and SD-14, which are in close proximity to each other within the debris pile at the south end of Jericho Island. We concur with NOAA, however, that the "no action" recommendation for sediments other than SDW-01 and SDW-02 (also referred to as PI-012-01 (35) PI-012-02 (36), respectively) should be omitted from Section 8.0, Conclusion 10.0. Remedial action in the vicinity of SD-14 should be considered in the FS/CMS, as well.

   Response: Agreed. The intention of the RI recommendation was to include the SD-14 area. As a result, the recommendation will be modified to specifically include this location.

2. **Comment:** Secondly, the SCDNR concurs with the conclusion in the Ecological Risk Summary that several inorganic contaminants pose a risk to terrestrial receptors in the vicinity of surface soil SS-14, which is in close proximity to the three sediment samples mentioned above. We agree with NOAA, however, that remediation of PAH-contaminated soils in the vicinity of SS-08 and SS-12 should also be considered, and that the "no action" recommendation for surface soils other than SS-14 should be omitted from Section 8.0, Conclusion 9.0. Furthermore, we concur with NOAA that the apparent absence of any samples from at least one of the debris piles should be addressed in the RI/RFI.

   Response: As indicated in the response to NOAA comments, the Navy agrees to add further consideration of soils in the area of SS-08 and SS-12 for PAHs in the FS. Soil samples were collected from these locations in April 2001. At sample location SS-08, the 2001 sample confirmed the results of the 1998 sample; consequently, this location will be addressed in the FS/CMS. Conversely, the 2001 sample at SS-12 did not confirm the results of the 1998 sample and this location will not be addressed in the FS.

   To clarify the issue of sampling of the debris piles, the following text will be added to Section 3.2.

"In accordance with the presumptive remedy approach for landfill, waste materials such as those found in the debris piles were not sampled as part of this investigation. Rather, soils, sediments, surface water, and/or groundwater down gradient of these waste piles were tested to evaluate potential contaminant migration. Under the presumptive remedy, the waste materials will be remediated."

Finally, we have the following two specific comments that should be addressed:

3. **Comment:** The locations of soil samples SS-07-01 and SS-08-01 on Figure 3-1 are not the same as those on Figure 4-1. Identifying the correct location of SS-08-01 is particularly important, since this is where several exceedances of PAH screening values were detected.

   Response: Figure 3-1 will be modified to reverse the locations of SS-07 and SS-08.

4. **Comment:** In the discussion of arsenic on pages 7-35 and 7-36, the sentence at the end of the second paragraph concludes that "...arsenic should not be dropped from further consideration at Site 12"; whereas, the sentence at the end of the third paragraph concludes that "...arsenic should be dropped from further consideration." This apparent discrepancy should be corrected.

   Response: The inclusion of the last sentence in the second paragraph of the arsenic discussion was in error. The sentence will be deleted.

NOAA COMMENTS ON DRAFT RI/RFI REPORT FOR SITE 12 JERICHO ISLAND

1. **Comment:** NOAA concurs with the Ecological Risk Summary (§7.10) that certain pesticides, PCBs and inorganics pose to risk aquatic receptors and with the report's recommendation to proceed with a FS/CMS for surface soils and sediments, (§8.9.0 and §8.10.0, respectively) with the following provisos.

   Response: Acknowledged.

1a. **Comment:** Soils – Recommendation in §8.9.0 correctly focuses on sample SS-14 which is located within the large intertidal debris pile at the south end of Jericho Island. However, the report's recommendation to ignore a priori other surface soils should be omitted. The FS/CMS should consider the feasibility of addressing PAH-contaminated soils in the vicinity of samples SS-08 and SS-12. Also, it appears that some of the debris piles (Figure 4-1) and geophysical anomalies (Figure 1-3) have not been sampled, but should be. The location of all debris piles should be added to all figures. The location of the dirt road should be added to Figure 1-3 for clarity.

   Response: Since the purpose of the RI is to define the nature and extent of contamination, conclusions regarding areas that do and do not need to be further addressed are important. Although we consider the level of PAHs observed at the site to relatively minor, we will modify the conclusions to include SS-08 and SS-12 to be addressed along with SS-14. Note however, that there was no observed waste in the areas of SS-08 and SS-012, and the PAHs are slightly volatile and biodegradable. Soil samples were collected at SS-08 and SS-012 on April 26, 2001 to determine if these contaminants still remain at the site. At sample location SS-08, the 2001 sample confirmed the results of the 1998 sample; consequently, this location will be addressed in the FS/CMS. Conversely, the 2001 sample at SS-12 did not confirm the results of the 1998 sample and this location will not be addressed in the FS/CMS.

   As requested, the dirt road will be added to Figure 1-3. Note that there are only three defined debris piles at the site. These debris piles are presented on the figures in Section 4.0. The other anomalies shown on Figure 1-3 are not debris piles.

   In accordance with the presumptive remedy approach used in developing the sampling strategy for this site and presented in the Site work plan, waste materials like those encountered in the soil borings are not sampled. Rather, soil, sediment, surface water, and/or groundwater down gradient from the debris piles were sampled. The only waste sampled was conducted in 1995

and was not part of the planned field activities for this RI. This information was presented because of its relevance.

To help document the sampling strategy for soils, the following text will be added to Section 3.2.1.

"Except as noted below, the surface soil samples correspond to all of electromagnetic anomalies noted during the April 2000 geophysical survey, See Figure 7-2 of the Jericho Island Work Plan, (Brown & Root Environmental, 1998c). Prior to sampling, the exact location of each of the anomalies was established by using the same instrument as the initial survey.

Based on the history, an anomaly identified as an abandoned drinking water well in between SS-005, SS-006, SS-007, and SS-008 was not sampled. A debris area to the west of SS-007 that was visually identified as glass was not sampled. However, in the event that this area (SS-007) represented a potential threat, sediment, surface water, and groundwater samples were collected to the west of this debris pile. Also, sediment, surface water, and groundwater samples were collected from around the entire island. In the event that a significant source of contamination was missed during the sediment sampling, then these other samples would identify the release. "

1b. **Comment:** Sediments – Recommendation in §8.10.0 correctly focuses on two 1995 samples collected within the large debris pile at the south end of Jericho Island. However, the recommendation to ignore other sediments should be omitted. Sample SD-14, also located within the intertidal debris pile, should be considered in the FS/CMS. This sample routinely contained the highest concentration of chemicals from the 1998/1999 investigation (Table 7-4, Figure 4-5). In addition, the report's own ecological risk summary highlights sample SD-14 (along with the two 1995 samples) as being most "risky".

Response: Except for the debris area south of the Jericho Island, the Navy believes that the RI data is sufficient to eliminate further consideration of the other sediments. However, the Navy agrees that SD-14 is an area of concern, and did intend for this location to be part of an FS. Therefore, to clarify Recommendation No. 10, the text will be revised as follows. Similarily, an FS/CMS is recommended to address sediments/surface debris in the vicinity of sediment sample locations PI-012-01 (35), PI-012-01 (36), "and PAI-10-SD-014". No action is recommended for remaining sediment at Site 12.

2. **Other Comments**

2a. **Comment:** Provide rationale for selecting soil and sediment sampling locations. Explain why some debris piles shown in figures and geophysical anomalies (Figure 1-3) were not sampled. A brief discussion in §1.4.3 explaining the results and significance of the geophysical survey would be helpful. If this rationale is amply described in the team's partnering minutes, consider appending them to this report.

Response: As discussed under Comment 1, most of the soil anomalies were addressed and additional text is being added to address the remaining anomalies. Rationale for collecting the soil and sediment samples and the results and significance of the geophysical survey are discussed in Section 2.3.3 and Appendix A of the Jericho Island RI Work Plan. A reference to these documents is provided in the reports.

2b. **Comment:** Footnotes in Table 3-10 indicate grain size analysis was conducted on all sediment samples. Please report these results in Section 7.0.

Response: Grain size analysis are presented in report appendices and will be added to a Table in Section 4.0. This is the same format as recently agreed to for Site 1 at Parris Island.

2c. **Comment:** Include all 13 PAHs, not just detected PAHs, for the Total sediment PAH expression in Table 7-4. Use 1/2 detection limit for U-flagged results.

Response: Although we are still checking into the technical basis for use of the 1/2 detection limit for ecological screening purposes; for the Site 12 report we plan to use 1/2 the highest reported laboratory method detection limit as adjusted for sample moisture content and sample dilution. In the event that ecological screening values are exceeded only because of matrix specific detection limits, then the calculated value will be flagged accordingly.

2d. **Comment:** In the future, please provide a Total PAH expression for soil results (Table 7-6) as suggested above for sediments.

Response: Agreed. The report will be modified accordingly.

2e. **Comment:** The considerable food web modeling effort in §7.0 provides minimal value to decision-making at this stage of the ecological risk assessment. Consider deleting this analysis in the Final RI/RFI report. Instead, concentration on revising the abiotic screening/refinement tables per Parris Island Ecological Risk Assessment Work Group guidance.

Response: The ecological risk assessment was conducted in accordance with the protocol in place at the time. Since the approach presented in the report is more extensive than under current protocol, rework of the report is not planned. Rather, the approach recently finalized for the Site 1 RI report at Parris Island will be applied to Site 12. Also, the information in this assessment provides valuable documentation for analysis of FS alternatives.

2f. **Comment:** The most contaminated soil and sediment samples (discussed in comment 1.) are all located within the large intertidal debris field at the south end of Jericho Island. Consider combining recommendations §8.9.0 and §8.10.0 to more clearly convey this spatial focus. This also suggests the FS/CMS can adopt a more narrow spatial focus (assuming the unsampled debris piles do not represent unacceptable risks).

Response: Combining recommendations 9 and 10 are editorial in nature, and as such, are not necessary. The debris piles will be addressed in accordance with the presumptive remedy, although based on the relatively small area, excavation and offsite disposal will be seriously considered.

EXECUTIVE SUMMARY

This report documents the Remedial Investigation/Resource Conservation and Recovery Act (RCRA) Facility Investigation (RI/RFI) for Site 12/Solid Waste Management Unit (SWMU) 10 – Jericho Island Disposal Area, Marine Corps Recruit Depot (MCRD) Parris Island, South Carolina. Tetra Tech NUS, Inc. (TtNUS) prepared this report for the Department of the Navy (Navy) Southern Division (SOUTHDIV) Naval Facilities Engineering Command (NAVFAC) under Contract Task Order (CTO) 0053, Comprehensive Long-Term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888.

PURPOSE OF REPORT

The report summarizes RI/RFI field activities conducted from 1998 to 2001, describes the nature and extent of contamination, and presents human health and ecological risk assessments. The report references previous investigations where relevant. The previous investigations include an initial assessment study in 1986, an interim RCRA facility assessment in 1990, Navy relative site ranking efforts in 1995, and a geophysical investigation in 1998. Results from the 1995 relative site ranking, along with 1998, 1999, and 2001 results, are used in the RI/RFI report to develop the nature and extent of contamination and the human health and ecological risk assessments.

FACILITY DESCRIPTION

MCRD Parris Island is located along the southern coast of South Carolina within Beaufort County, approximately 1 mile south of the city of Port Royal and 3 miles south of the city of Beaufort. MCRD Parris Island covers approximately 8,047 acres that consist of dry land, salt marshes, saltwater creeks, and ponds. MCRD Parris Island is the reception and recruit training facility for the Marine Corps for enlisted men from states east of the Mississippi River and for enlisted women nationwide.

SITE DESCRIPTION AND HISTORY

Jericho Island is approximately 25 acres in size and is located northwest of Horse Island. The island was acquired by the Navy in 1968 to comply with the limited distance arc required for the Depot's rifle range. Site 12 was reportedly used from 1955 to 1968 as an unauthorized waste disposal area for local residents. However, no organized landfill operations were reported to have occurred at the site. Disposed waste consisted of routine domestic refuse including small metal cans, beer and soda bottles, hubcaps, tires, buckets, cinderblocks, rusted metal 5-gallon cans, sheet metal, paper, plastic, and wood. The site has an irregular, undulating surface due to the random scattering of waste piles, ranging up to approximately 30 feet in diameter and 5 feet in height.

Three areas containing surface debris are currently present on Jericho Island. Two of these areas are located in the upland portion of the island (one in the east-central and one in the southern portion of the island). The other area containing surface debris is located at the southern edge of the island and extends into the adjacent sediment.

INVESTIGATION SUMMARY

RI/RFI field activities were primarily conducted from July to September 1998; three additional sampling events occurred in December 1998, December 1999, and April 2001. Field activities included the following:

- Collection of surface soil samples from 18 locations in 1998; laboratory analyses included Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), Target Analyte List (TAL) inorganics (total), cyanide, and acid volatile sulfide/simultaneous extracted metals (AVS/SEM).

- Two surface soil locations were resampled in April 2001 to confirm 1998 results.

- Installation of seven exploratory soil borings and collection of seven subsurface soil samples that were analyzed for physical parameters.

- Installation of 14 monitoring wells in shallow and deep clusters; one well was installed in the shallow surficial aquifer and one well was installed in the deep surficial aquifer.

- Collection of 14 groundwater samples at the newly installed wells using low-flow sampling techniques; laboratory analyses included TCL VOCs, SVOCs, pesticides, PCBs, TAL inorganics (total and dissolved), cyanide, total dissolved solids (TDS), total suspended solids (TSS), chloride, fluoride, nitrate/nitrite, sulfate, total organic carbon (TOC), and hardness.

- Collection of surface water samples from 16 locations; laboratory analyses included TCL VOCs, SVOCs, pesticides, PCBs, TAL inorganics (total and dissolved), cyanide, TOC, and hardness.

- Collection of sediment samples at 18 locations from July to December 1998, laboratory analyses included TCL VOCs, SVOCs, pesticides, PCBs, polycyclic aromatic hydrocarbons (PAHs), TAL inorganics (total), cyanide, TOC, hardness, and AVS/SEM.

- Two additional sediment samples were collected in December 1999 to bound the southern extent of contamination; laboratory analyses included TCL SVOCs, pesticides, PCBs, PAHs, TAL inorganics, and cyanide.

- Slug testing on the 14 newly installed monitoring wells to estimate hydraulic conductivities.

- A tidal influence study on the 14 newly installed monitoring wells.

- A limited test pit investigation in the hummock area south of Jericho Island.

- Surveying of sampling locations to establish horizontal and vertical control.

SITE GEOLOGY/HYDROGEOLOGY RESULTS

The soil that comprises Site 12 is the Seabrook series. Seabrook soil typically consists of fine sands that are moderately well drained and nearly level. The water table is typically 2 to 4 feet below ground surface (bgs) with gradients generally less than 1 percent but reaching 2 percent along drainageways. The soil along the northern tidal flat adjacent to Site 12 consists of the Capers series. Capers soil generally consists of silty and clayey marine sediment that is nearly level and is found along tidal flats. The remainder of the tidal flat soil adjacent to the site consists of the Bohicket series. Bohicket soil consists of deep, poorly drained, low-permeability soil that forms in silty and clayey marine sediment on broad tidal flats.

Surface soil at Site 12 consisted of fine to medium sands with varying silt. Sediment samples collected from the tidal flat area consisted of fine to coarse sand with a varying silt and clay content and clay with a varying sand and silt content. Surface debris was observed primarily on the central and southern portions of the island; most of the debris was located on the southern end. Debris consisting of glass and rusted metal was observed over a distance of approximately 200 feet along the tidal flat at the southern end of the island.

Subsurface soil at Site 12 did not appear to have been affected by human activities. Landfilled debris was observed on the surface but was only encountered at depth at two borings located on the southern end of the island within a large area of surface debris. At these borings, surface debris was encountered at depths of 4 feet and 2 feet, respectively.

In general, a shallow groundwater table exists at Site 12. The depths to groundwater measured at the beginning of the tidal study ranged from 0.78 to 7.82 feet bgs. Groundwater was encountered during installation of the wells at depths ranging from less than 1 foot to approximately 4 feet bgs. The surficial

aquifer, comprising primarily Pleistocene age sands, is approximately 21 to 30 feet thick at the site based on the depth of the top of rock encountered in the soil borings. Recharge of the shallow aquifer beneath the site is likely to occur primarily through infiltration of precipitation across the island. Groundwater flow is most likely from the interior of the island toward the tidal flats. Site 12 is located within the 100-year flood plain. The geometric mean average hydraulic conductivity for the seven shallow surficial aquifer wells was calculated to be 3.39 feet per day (1.20×10^{-3} cm/sec). The geometric mean hydraulic conductivity for the seven deep surficial aquifer wells was calculated to be 3.30 feet per day (1.17×10^{-3} cm/sec).

NATURE AND EXTENT OF CONTAMINATION

In surface soil samples, one SVOC [benzo(a)pyrene] and three inorganics (arsenic, iron, and lead) exceeded human health screening criteria (U.S. EPA Region 3 residential RBCs). In addition, one VOC (chloroform), 13 SVOCs (pentachlorophenol and 12 PAHs), one pesticide (4,4'-DDE), and 10 inorganics exceeded ecological screening criteria (U.S. EPA Region 4 soil screening values).

In 2001, surface soil sample locations PAI-10-SS-08 and PAI-10-SS-12 were resampled at the request of the MCRD Parris Island partnering team to confirm 1998 detections of PAHs at both locations and an estimated detection of pentachlorophenol at PAI-10-SS-12. The 2001 analytical results at PAI-10-SS-08 confirm the results of the 1998 sampling and indicate that potential risks to human health and the environment may be present at this location. The 2001 analytical results at PAI-10-SS-12 indicate that risks to human health and the environment are not present at this location and do not confirm the 1998 results.

In groundwater samples, two VOCs (acetone and chloroform) exceeded human health screening criteria (U.S. EPA Region 3 tapwater RBCs). No other organic compounds detected in groundwater exceeded a human health screening criterion and no organics exceeded an ecological screening criterion. In a comparison of unfiltered inorganic groundwater results to human health criteria, detections of four inorganics (arsenic, iron, manganese, and thallium) exceeded such criteria. In a comparison of filtered groundwater results to U.S. EPA Region 4 surface water ecological screening values (assuming groundwater discharges to surface water), only detections of nickel exceeded such criteria.

In surface water samples, one SVOC [bis(2-ethylhexyl) phthalate] exceeded a human health screening criterion. No other organic compounds detected in surface water exceeded a human health screening criterion and no organics exceeded an ecological screening criterion. In a comparison of unfiltered inorganic surface water results to human health criteria, detections of three inorganics (arsenic, iron, and manganese) exceeded such criteria. In a comparison of filtered surface water results to U.S. EPA Region 4 ecological screening values, only detections of thallium exceeded such criteria.

In sediment samples collected in 1998-99, three inorganics (arsenic, iron, and lead) exceeded a human health screening criterion (U.S. EPA Region 3 residential RBCs). Three SVOCs [acenaphthene, benzo(b) fluoranthene, and bis(2-ethylhexyl) phthalate] and three pesticides (4,4'-DDT, alpha-chlordane, and gamma-chlordane) exceeded ecological screening criteria (U.S. EPA Region 4 screening values). Nine inorganics (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) exceeded their ecological screening criteria; criteria were not available for the remaining nine inorganics.

In sediment waste samples collected in 1995, one PCB (Aroclor-1254) and three inorganics (arsenic, iron, and lead) exceeded human health screening criteria (U.S. EPA Region 3 residential RBCs). Two SVOCs [di-n-octyl phthalate and bis(2-ethylhexyl) phthalate], four pesticides (4,4'-DDE, 4,4'-DDT, dieldrin, and endrin), one PCB (Aroclor 1254), and 10 inorganics (antimony, arsenic, cadmium, chromium, copper, iron, lead, nickel, silver, and zinc) exceeded ecological screening criteria (U.S. EPA Region 4 screening values).

HUMAN HEALTH RISK ASSESSMENT SUMMARY

The human health risk assessment considered site media exposure to construction workers, adolescent trespassers, adolescent recreational users, adult recreational users, potential future child residents, potential future adult residents, and hypothetical lifelong residents. The estimated cancer risks and Hazard Indices are summarized as follows.

- All estimated cancer risks for construction workers, adolescent trespasser, adolescent recreational user, and adult recreational user were within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. The total cancer risks across all media for each receptor are construction workers (4.5×10^{-6}), adolescent trespasser (1.3×10^{-5}), adolescent recreational user (1.3×10^{-5}), and adult recreational user (5.9×10^{-6}).

- The estimated Hazard Index (HI) for a construction worker exposed to surface soil was 1.4, which exceeds the acceptable level of 1.0. However, the HIs for the individual target organs were less than the acceptable level of 1.0. Arsenic (HI = 0.52) and iron (HI = 0.8) were the main contributors to the HI. Similarly, the estimated HI for exposure to sediment waste was 1.1, but the HIs for the individual target organs were all less than the acceptable level of 1.0, indicating that no adverse health effects are anticipated for construction workers exposed to sediment waste under the defined conditions. The estimated HIs for exposure to groundwater, surface water, and sediment were each less than 1.0. The cumulative HI across all media was 2.7.

- All estimated HIs for the adolescent trespasser and adolescent recreational user were less than the acceptable level of 1.0. These values indicate that no adverse health effects are anticipated for adolescent trespassers exposed to surface soil, sediment, surface water, and sediment waste under the defined conditions. For both receptors, the cumulative HI across all media was 1.0.

- All estimated HIs for the adult recreational user were less than the acceptable level of 1.0. The cumulative HI across all media was 0.70.

- Estimated cancer risks for the on-site child resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6} with the exception of exposure to groundwater. Arsenic [incremental lifetime cancer risk (ILCR) = 2.9×10^{-4}] was the major contributor to the cancer risk for exposure to groundwater. The total cancer risk across all media was 4.1×10^{-4}.

- Estimated cancer risks for the on-site adult resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6} with the exception of exposure to groundwater. Arsenic (ILCR = 4.9×10^{-4}) was the major contributor to the cancer risk for exposures to groundwater. The total cancer risk across all media was 5.5×10^{-4}.

- Estimated cancer risks for the on-site lifelong resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6} with the exception of exposure to surface soil and groundwater. Arsenic was the major contributor to the cancer risk for exposures to surface soil (ILCR = 1.5×10^{-4}) and groundwater (ICR = 7.8×10^{-4}). The total cancer risk across all media was 9.6×10^{-4}.

- The estimated HI for a child resident exposed to surface soil was 7.3, which exceeds the acceptable level of 1.0. Arsenic (HI = 2.5) and iron (HI = 4.3) were the main contributors to the HI for exposure to surface soil. The estimated HI for a child resident exposed to groundwater was 43, which exceeds the acceptable level of 1.0. Arsenic (HI = 6.5), cadmium (HI = 1.0), iron (HI = 23), manganese (HI = 4.4), and thallium (HI = 7.9) were the main contributors to the HI. The estimated HI for a child resident exposed to sediment waste was 4.2, which exceeds the acceptable level of 1.0. Aroclor 1254 (HI = 2.0) and iron (HI = 1.7) were the main contributors to the HI for exposure to sediment waste. The estimated HIs for exposure to sediment and surface water were each less than the acceptable level of 1.0, indicating that no adverse health effects are anticipated for child residents exposed to sediment and surface water under the defined conditions. The cumulative HI across all media was 55.0.

- Estimated HIs for the adult resident were less than the acceptable level of 1.0 with the exception of exposure to groundwater. The estimated HI for an adult resident exposed to groundwater was 73,

which exceeds the acceptable level of 1.0. Acetone (HI = 1.2), arsenic (HI = 11), cadmium (HI = 1.8), iron (HI = 38), manganese (HI = 7.4), and thallium (HI = 13) were the main contributors to the HI. The estimated HIs for exposure to soil, sediment, surface water, and sediment waste were each less than the acceptable level of 1.0. The cumulative HI across all media was 74.

- In summary, arsenic and iron are the leading risk drivers in surface soil. However, only one detection of arsenic and iron was observed above human health screening criteria. These detections are localized to surface soil sample location PAI-10-SS-14. Risks associated with surface soil in areas outside PAI-10-SS-14 are within acceptable risk ranges. Similarly, Aroclor 1254 and iron are the leading risk drivers in the sediment waste samples [PI-012-01 (35) and PI-012-01 (36)]. Risks associated with chemicals detected in other sediment samples are within acceptable risk ranges.

- Risk drivers in groundwater consist of acetone, arsenic, cadmium, iron, manganese, and thallium. However, risks to human receptors may be overestimated due to the following circumstances:

  - Iron and manganese are likely attributable to natural sources.

  - Cadmium was detected at concentrations at levels slightly greater than maximum contaminant levels (MCLs); but at concentrations less than RBCs.

  - Thallium was detected in only one groundwater sample and infrequently throughout other media.

  - Arsenic was detected in groundwater samples but at concentrations less than MCLs.

  - Detected concentrations of acetone are relatively infrequent, with minor exceedances of risk-based concentrations. Detections of acetone could be attributable to laboratory concentrations.

ECOLOGICAL RISK ASSESSMENT SUMMARY

The initial ecological risk screening determined that one VOC (chloroform), several SVOCs [pentachlorophenol, di-n-octyl phthalate, bis(2-ethylhexyl) phthalate, and 13 PAHs], six pesticides (4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin, gamma-chlordane), one PCB (Aroclor 1254), and several inorganics exceeded U.S. EPA Region 4 screening values, indicating a potential risk to ecological receptors. As a result, these constituents were retained as chemicals of potential concern (COPCs). In addition, several other chemicals were retained as COPCs because they lacked ecological screening criteria.

The food chain modeling evaluated five aquatic receptors (the mink, heron, mummichog, red drum, and osprey) and six terrestrial receptors (the shrew, mouse, robin, hawk, fox, and woodcock). The modeling indicated that the many of the initial COPCs do not represent a threat to site receptors even under a worst-case scenario (organisms constantly exposed to maximum concentrations). Chemicals that pose potential risks are identified below.

- 4,4'-DDE, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, mercury, vanadium, and zinc had at least one hazard quotient (HQ) greater than 1.0 for the terrestrial food chain modeling using maximum concentrations of surface soil.

- 4,4'-DDT, aluminum, antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, mercury, nickel, selenium, thallium, vanadium, and zinc had at least one HQ greater than 1.0 for the aquatic food chain modeling using samples collected in 1998 and 1999.

- Bis(2-ethylhexyl) phthalate, 4,4'-DDE, 4,4'-DDT, Aroclor 1254, endrin, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, vanadium, and zinc had at least one HQ greater than 1.0 for the aquatic food chain modeling using maximum concentrations of 1995 sediment COPCs.

- Only four metals were detected in filtered surface water samples. Results of the food-chain modeling using maximum and mean concentrations of filtered surface water indicated that thallium and vanadium had HQs greater than 1.0.

RECOMMENDATIONS

A feasibility study/corrective measure study (FS/CMS) is recommended to address surface soil/surface debris in the vicinity of surface soil sample locations PAI-10-SS-08 and PAI-10-SS-14. No action is recommended for remaining surface soil at Site 12.

Similarly, an FS/CMS is recommended to address sediment/surface debris in the vicinity of sediment sample locations PI-012-01 (35), PI-012-01 (36) and PAI-10-SD-14. No action is recommended for remaining sediment at Site 12.

Due to the low human and ecological risks attributable to exposure to surface water and the relatively few exceedances of surface water screening criteria, no further action is recommended for surface water.

Based on the finding of only relatively minor groundwater criteria exceedances attributable to site-related sources, groundwater does not need to be remediated. It is expected that any further site-related impacts

to groundwater would be minimized through addressing surface soil and sediment at the site. Site restrictions on the use of groundwater as a drinking water source would address remaining groundwater risks.

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

This report documents the Remedial Investigation/Resource Conservation and Recovery Act (RCRA) Facility Investigation (RI/RFI) for Site 12/Solid Waste Management Unit (SWMU) 10 – Jericho Island Disposal Area, Marine Corps Recruit Depot (MCRD) Parris Island, South Carolina. Tetra Tech NUS, Inc. (TtNUS) prepared this report for the Department of the Navy (Navy) Southern Division (SOUTHDIV) Naval Facilities Engineering Command (NAVFAC) under Contract Task Order (CTO) 0053, Comprehensive Long-Term Environmental Action Navy (CLEAN) III, Contract Number N62467-94-D-0888.

1.2 REGULATORY SETTING

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Superfund Amendments and Reauthorization Act of 1986 (SARA) established a program for the cleanup of hazardous waste disposal and spill sites nationwide. This program contains provisions for the cleanup of contamination from past hazardous waste operations and past hazardous material spills and is the framework for Installation Restoration (IR) Programs at Navy and Marine Corps installations. RCRA, as amended, also establishes a cleanup program that provides for current and future hazardous waste management practices, as well as cleanup of past disposal sites at permitted or interim status Navy/Marine Corps installations. NAVFAC is responsible for implementing the IR Program at MCRD Parris Island.

Because of the past activities conducted at the MCRD Parris Island, South Carolina, the MCRD meets criteria for conducting IR activities under the CERCLA regulatory framework. To date, the MCRD has completed steps equivalent to the preliminary assessment/site inspection (PA/SI) phases of the CERCLA remedial action process at Site 12/SWMU 10. The MCRD also meets the criteria for conducting IR activities under the authority of RCRA because, in 1980, the MCRD submitted a RCRA Part A application. Per RCRA, this action required the MCRD to conduct corrective action for the release of hazardous waste or hazardous constituents from SWMUs. An Interim RCRA Facility Assessment (RFA) was conducted in 1990 as part of this requirement. Since this time, the MCRD has withdrawn its Part A application.

Because of the circumstances surrounding the IR Program history at MCRD, discussions have been held among representatives from the Marine Corps, Navy, South Carolina Department of Health and Environmental Control (SCDHEC), and United States Environmental Protection Agency (U.S. EPA) Region 4 to determine the appropriate regulatory framework for conducting IR activities at the MCRD. From these discussions, it has been decided that this report will encompass both CERCLA and RCRA

requirements and the title, RI/RFI, reflects this decision. An RI is the CERCLA counterpart of the RCRA RFI. For ease of reading and clarity, Site 12/SWMU 10 will be referred to as Site 12 for the remainder of this document.

In 1996, the partnering team for MCRD Parris Island was established. The original members of the team consisted of the Navy, Marine Corps - MCRD Parris Island, U.S. EPA, and SCDHEC. In 1997, representatives of National Oceanic and Atmospheric Administration (NOAA), South Carolina Department of Natural Resources (SCDNR), and U.S. Fish and Wildlife Service (U.S. FWS) joined the team as natural resource trustees. The partnering team was developed to facilitate the development, review and approval of work plans, reports [feasibility study/corrective measures study (FS/CMS), and decision documents [Proposed Plan and record of decision (ROD)].

1.3 SCOPE OF RI/RFI

The initial RI/RFI field investigation was conducted from July 1998 to September 1998; three additional sampling events occurred in December 1998, December 1999, and April 2001. Field activities at Site 12 included soil, groundwater, surface water, sediment, and sediment waste pile sampling. The purpose of the RI/RFI was to characterize the nature and extent of contamination in areas where the potential for off-site migration of contamination exists from past waste disposal at Site 12. The report includes both human health and ecological risk assessments to support site decisions.

Data collected during the investigation were entered into a database that was used in this report to support the risk assessments, including the comparison of analytical results to state and federal standards and background levels. Data evaluation and recommendations are included herein. Data validation on these data consisted of either a data review or a full data validation. The full data validation was performed on approximately 10 percent of the data packages received from each laboratory. All analytes were covered by at least one full data validation. A data review was performed on the remaining data packages for the purposes of identifying false positive and negative results.

1.4 HISTORICAL INFORMATION

1.4.1 Facility Background

MCRD Parris Island is located along the southern coast of South Carolina within Beaufort County, approximately 1 mile south of the city of Port Royal and 3 miles south of the city of Beaufort. MCRD Parris Island covers approximately 8,047 acres that consist of dry land, salt marshes, saltwater creeks, and ponds, as shown in Figure 1-1. MCRD Parris Island is the reception and recruit training facility for the

Marine Corps for enlisted men from states east of the Mississippi River and for enlisted women nationwide.

1.4.2 Site Description and History

Jericho Island (Site 12) is approximately 25 acres in size and is located northwest of Horse Island, as shown in Figure 1-1. The island was acquired by the Navy in 1968 to comply with the limited distance arc required for the Depot's rifle range. Site 12 was reportedly used from 1955 to 1968 as a unauthorized waste disposal area for local residents. However, no organized landfill operations were reported to have occurred at the site. Disposed waste consisted of routine domestic refuse including small metal cans, beer and soda bottles, hubcaps, tires, buckets, cinderblocks, rusted metal 5-gallon cans, sheet metal, paper, plastic, and wood. The site has an irregular, undulating surface due to the random scattering of waste piles, ranging up to approximately 30 feet in diameter and 5 feet in height (Kearney, 1990). After the Depot acquired Site 12, the area was no longer used for waste disposal purposes.

As shown on Figure 1-2, three areas containing surface debris are currently present on Jericho Island. Two of these areas are located in the upland portion of the island (one in the east-central and one in the southern portion of the island). The other area containing surface debris is located at the southern edge of the island and extends into the adjacent sediment.

1.4.3 Previous Investigations

Previous investigations at Site 12 included an initial assessment study (IAS), an interim RFA, sampling for Navy site ranking purposes, and a geophysical investigation. Based on the results of these investigations, an RI/RFI was recommended to further evaluate Site 12. A brief description of each previous investigation is presented below.

Initial Assessment Study

In 1986, the Naval Energy and Environmental Support Activity (NEESA) conducted an IAS (NEESA, 1986) under the Naval Assessment and Control of Installation Pollutants (NACIP) Program. The IAS is equivalent to the PA phase of the CERCLA process. The purpose of the IAS (Phase I of the NACIP Program) was to identify potentially contaminated sites at MCRD Parris Island that may pose a threat to human health or the environment. NEESA reviewed historical records and conducted a site survey. The Jericho Island Disposal Area was identified as a site that contains nonhazardous waste. NEESA concluded that there is no potential threat for contaminant migration from Site 12 and the site does not pose a threat to human health or the environment. Therefore, a verification step (Phase II of the NACIP Program) was not recommended for Site 12.

Interim RCRA Facility Assessment

In accordance with the requirements of MCRD's application for a RCRA permit, an interim RFA was performed from January 1990 to March 1990 (Kearney, 1990). The RFA report identified that a release had occurred at Site 12 and that groundwater, surface water, and sediment were potential pollutant migration pathways to receptors. Based on these findings, the interim RFA Report recommended RFA Phase II sampling.

Navy Site Ranking Data

In December 1995, Brown and Root (B&R) Environmental conducted sampling and analysis of surface soil and sediment at MCRD Parris Island to generate a contaminant hazard score and relative site ranking.

Sampling locations were selected to investigate two distinct dumping locations. Two sediment samples, PI-012-01(35) and PI-012-02(36), were collected immediately south of Jericho Island within a cone-shaped peninsula in the salt water marsh. One surface soil sample, PI-012-03(37), was collected in a wooded area on Jericho Island, just north of the southern peninsula. Samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals, and cyanide. The analytical methods followed Contract Laboratory Program (CLP) procedures.

The analytical results indicated the presence of VOCs, SVOCs, pesticides, PCBs, and inorganics in the sediment directly south of Jericho Island and VOCs, SVOCs, pesticides, and inorganics in the surface soil from the wooded area. Table 1-1 provides a summary of contaminants that exceeded one or more of the screening levels for risk-based concentrations (RBCs), U.S. EPA Region 4 sediment screening values, and U.S. EPA Region 3 soil screening values. These results are used later in this RI/RFI to evaluate the nature and extent of contamination, the human health risk assessment, and the ecological risk assessment.

Geophysical Investigation

In May 1998, B&R Environmental conducted a high-resolution vertical magnetic gradient survey and global positioning system (GPS) survey (B&R Environmental, 1998a). The purpose of the vertical magnetic gradient survey was to delineate the lateral extent of waste disposal activities that were suspected to have occurred at Site 12. The purpose of the GPS survey was to provide station position information for the vertical magnetic gradient data. The GPS was also used to map the perimeter of the island for future

planning activities. The results of the geophysical investigation are depicted in Figure 1-3. The vertical magnetic gradient results were used by the MCRD Parris Island partnering team in the RI scoping process for sample location selection.

1.5 REPORT ORGANIZATION

This report is divided into eight sections. Section 1.0, the Introduction, presents the purpose of the report, the regulatory setting, the scope of the RI/RFI, historical information pertaining to the MCRD and Site 12, and the report organization. Section 2.0, Environmental Setting, briefly describes the climate, topography, surface water drainage, soil, geology, hydrogeology, and ecology at the MCRD Parris Island. Section 3.0, Investigation Summary, describes deviations from the work plan, field investigation activities, the site-specific geology, and the site-specific hydrogeology. Section 4.0, Nature and Extent of Contamination, presents and evaluates the analytical results of surface soil, groundwater, surface water, sediment, and sediment waste. Section 5.0, Contaminant Fate and Transport Analysis, is a reference-like section describing the chemical and physical properties of the analytes positively detected at Site 12. Section 6.0, Human Health Risk Assessment, and Section 7.0, Ecological Risk Assessment, present the methodology and results of the human health and ecological risk assessments, respectively. Section 8.0, Conclusions and Recommendations, discusses the magnitude of site-related risks and remedies required, if any, to address those risks. Appendices A through G provide support documentation for the field investigation and supplemental information for the evaluation of results.

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TABLE 1-1

SUMMARY OF CONTAMINANTS EXCEEDING SCREENING LEVELS
RELATIVE SITE RANKING, 1995
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	Soil			Sediment			
	PI-012-03(37) Soil	U.S EPA Region 3 RBCs Soil-Residential	U.S. EPA Region 4 Eco. Soil Screening Values	PI-012-01(35) Sediment	PI-012-02(36) Sediment	U.S EPA Region 3 RBCs Soil-Residential	U.S. EPA Region 4 Sediment Screening Values
SVOCs (µg/kg)							
Benzo(b)fluoranthene	**130 J**	870	100	ND	ND	NA	NA
Bis(2-ethylhexyl)phthalate	150	46,000	NA	**10,000**	ND	46,000	182
Di-N-Octyl Phthalate	ND	NA	NA	**900 J**	ND	63,000,000	182
Pesticides/PCBs (µg/kg)							
4,4'-DDE	ND	NA	NA	**520**	**96**	1,900	2.1
4,4'-DDT	ND	NA	NA	ND	**38**	1,900	1.2
Aroclor-1254	ND	NA	NA	**24,000**	ND	320	21.6
Dieldrin	ND	NA	NA	ND	**6.2 J**	40	0.02
Endrin	ND	NA	NA	**1,200 J**	ND	23,000	0.02
Inorganics (mg/kg)							
Antimony	ND	NA	NA	**3.3**	**9.4**	31	2
Arsenic	**0.78***	**0.43**	10	ND	ND	NA	NA
Copper	3.3	3,100	40	**168**	**489**	3,100	18.7
Cadmium	0.06	39	1.6	**1.8**	**4.7**	39	0.676
Chromium	8.2	120,000	10	**37.8**	**119**	120,000	52.3
Iron	**2,940***	23,00	200	**122,000**	**307,000**	23,000	NA
Lead	31.7	400	50	**589**	**2930**	400	30.2
Nickel	1.5	1,600	30	**41.4**	**86.9**	1,600	15.9
Silver	ND	NA	NA	**1.2**	**1.1**	390	0.733
Zinc	43	23,000	50	**751**	**1,520**	23,000	124

Bold values indicate that a screening level has been exceeded.
* Detection is below MCRD Parris Island background value.
NA = Not Available or Not Applicable.
ND = Not Detected.

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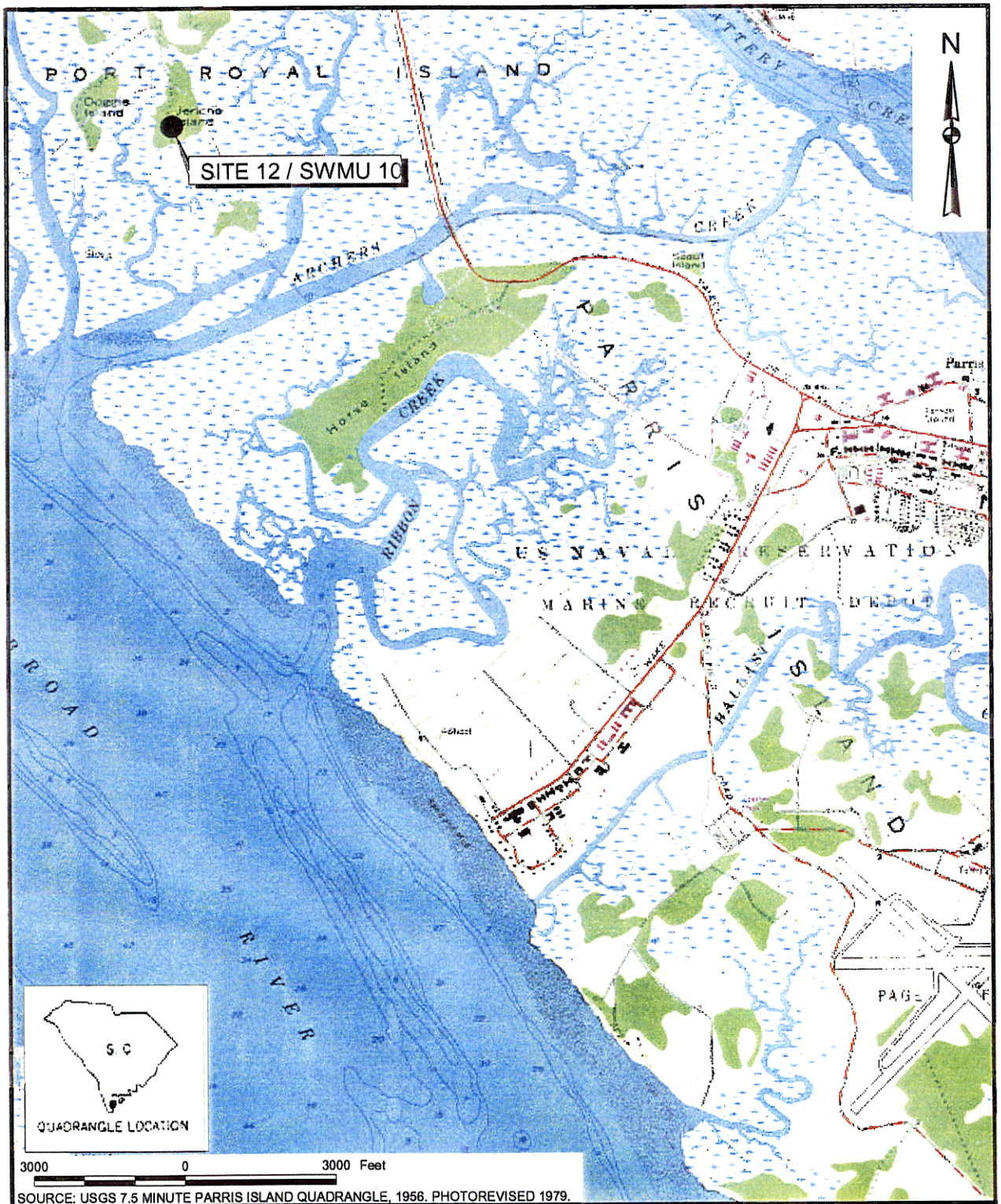
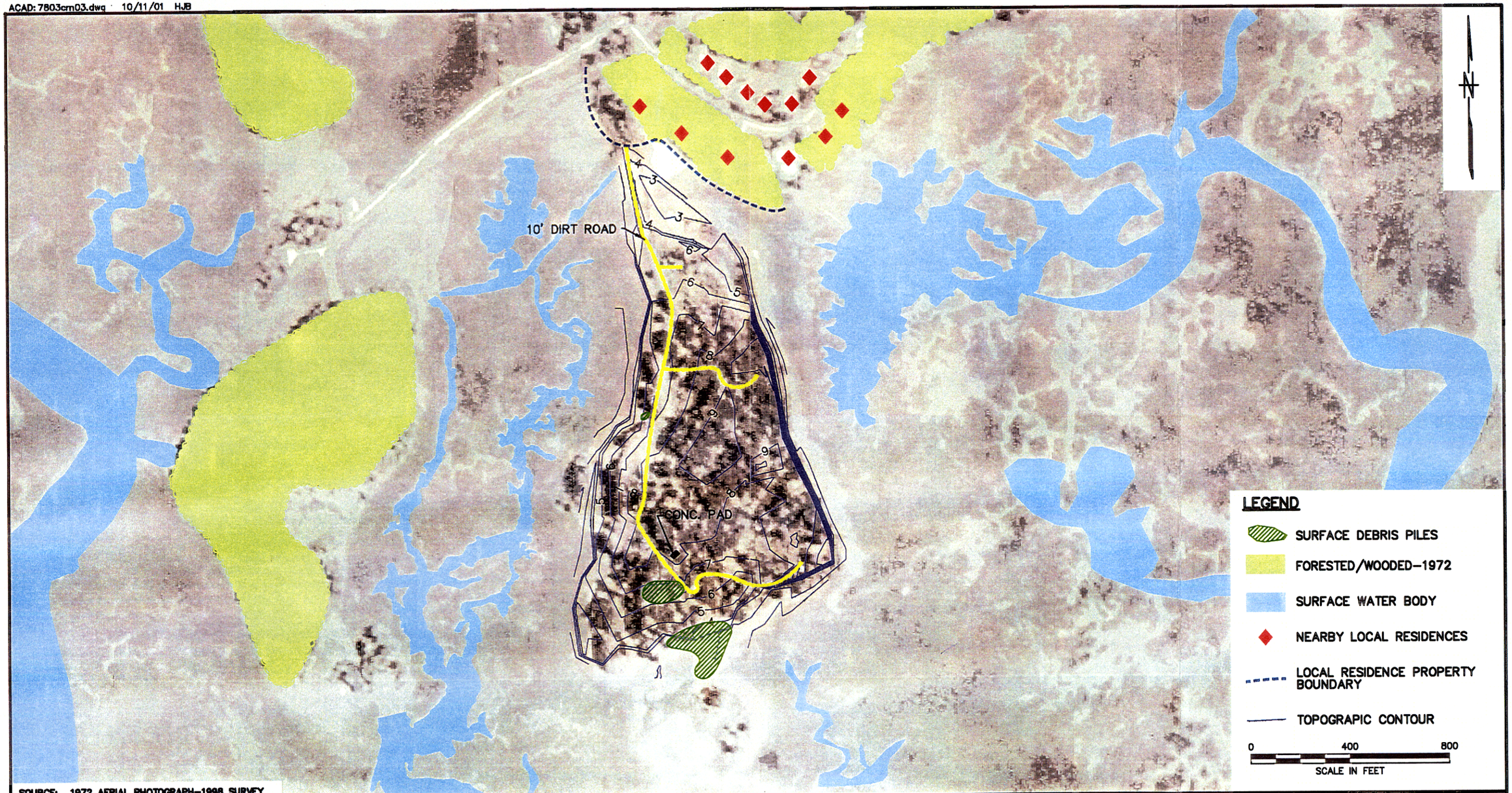


SOURCE: USGS 7.5 MINUTE PARRIS ISLAND QUADRANGLE, 1956. PHOTOREVISED 1979.

DRAWN BY MJJ	DATE 09Oct99	DEPOT LOCATION MAP MCRD, PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NUMBER 7803
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-1 / REV 0

P:\GIS\PARRIS\JERICHO.APR 09Oct99 MJJ DEPOT LOCATION MAP

ACAD: 7803cm03.dwg 10/11/01 HJB



SOURCE: 1972 AERIAL PHOTOGRAPH–1998 SURVEY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DATE: HJP 6/24/99
CHECKED BY DATE:
COST/SCHED–AREA:
SCALE: AS NOTED

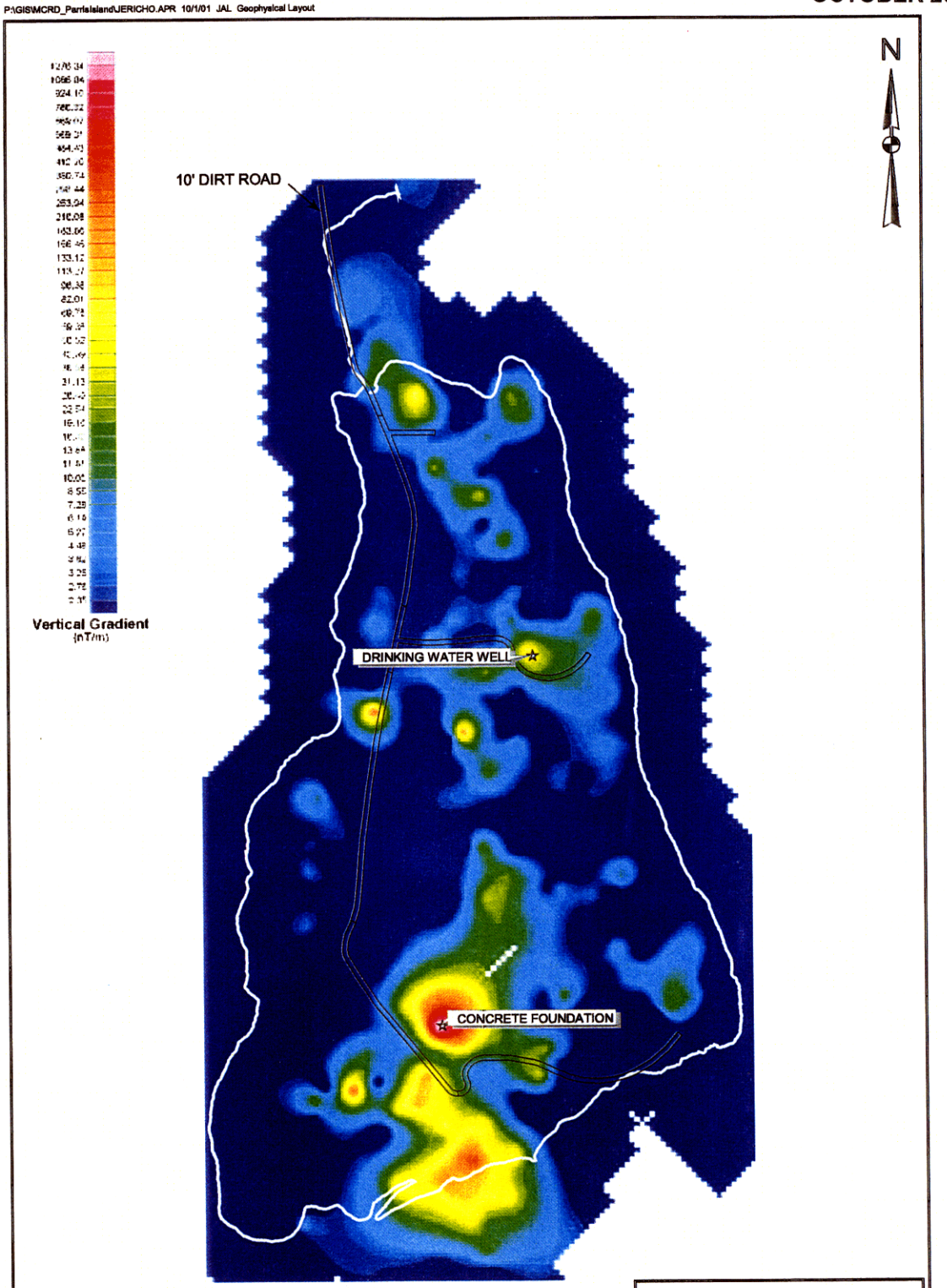
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
DEPARTMENT OF THE NAVY

SITE LAYOUT
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 1–2
REV. 0

FORM CADD NO. SDIV_BH.DWG – REV 0 – 1/20/98

P:\GIS\MCRD_ParrisIsland\JERICHO.APR 10/1/01 JAL Geophysical Layout



DRAWN BY S. TABLER	DATE 3/20/98	GEOPHYSICAL SURVEY RESULTS (1998) SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NUMBER 7803
CHECKED BY B. RUSHE	DATE 4/23/98		APPROVED BY / DATE
COST/SCHEDULE-AREA			APPROVED BY / DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1-3 / REV 0

2.0 ENVIRONMENTAL SETTING

This section briefly describes the environmental setting at MCRD Parris Island. A more comprehensive description is located in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998b) and the IAS (NEESA, 1986).

2.1 CLIMATE

MCRD Parris Island is located in the southernmost region of South Carolina, where the climate is milder than elsewhere in the state. This low-lying coastal area has numerous islands, inlets, streams, and marshes and a temperature regime that clearly reflects the influences of its maritime and southerly location. The climate is subtropical, with long and hot summers followed by short and mild winters. Precipitation is abundant, averaging about 49 inches per year and remaining within the range of 40 to 58 inches during most years. Precipitation in the amount of 0.1 inch or more falls an average of about 77 days per year. The annual distribution shows a major monthly maximum of about 7 inches in July and a major monthly minimum of about 2 inches in November. The period from April through October, which includes the growing season for most crops in this area, receives an average of about 34 inches of rain, which is about 70 percent of the annual total.

2.2 TOPOGRAPHY

MCRD Parris Island lies in the Lower Coastal Plain Physiographic Province. Elevations range from sea level to 22 feet above mean sea level (msl). The Depot consists of Parris Island (the largest and most developed island), seven smaller named islands, many small unnamed islands, salt marshes, and related tidal creeks. Because of the low elevation, most of the Depot is located within the 100-year flood plain. The majority of the area of Parris Island north of Ballast Creek, the east-central area of Page Field, and the central part of Horse Island are the only surfaces above the 100-year flood plain (NEESA, 1986).

The Depot covers 8,047 acres: 1,502 acres are devoted to forest management; 744 acres are grass and facilities; 4,344 acres are saltwater marsh; and the remainder consists of creeks, ponds, and causeways. Dry land makes up 3,274 acres (NEESA, 1986).

2.3 SURFACE WATER DRAINAGE

Drainage off the land surface is to the nearest surface water body. Three generally east-west creeks drain much of the Depot. Archers Creek is at the northern boundary of the Depot and connects Battery Creek to the north with the Broad River to the west of Parris Island (see Figure 1-1). Ribbon Creek drains the area between Horse and Parris Islands and flows westward into the Broad River. Ballast Creek

enters the Beaufort River and drains central Parris Island. Smaller unnamed creeks drain the areas west and east of Page Field.

The Beaufort and Broad Rivers meet at the southern end of Parris Island to form Port Royal Sound, which extends about 4 miles southeastward to the Atlantic Ocean.

2.4 SOILS

Soils at MCRD Parris Island have been mapped by the United States Soil Conservation Service as both individual soils and groupings of soils (units). The Depot has been mapped as having 15 individual soil types, but only eight types are present beneath the identified sites. Three soil units have been mapped for the Depot (Wando-Seabrook-Seewee, Coosaw-Williman-Ridgeland, Bohicket-Capers-Handsboro Soil Unit). A further discussion of the soils and soil units identified at the MCRD can be found in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998b) and the IAS (NEESA, 1986).

2.5 GEOLOGY

Four geological units in the Beaufort-Jasper County area are of local interest in terms of groundwater supply and environmental investigations. These units from the oldest (Eocene age) to the youngest (Pleistocene age) are the Santee Limestone, Cooper Marl, Hawthorn Formation, and Pleistocene sands and clays. A further discussion of the descriptive and structural geology of the Beaufort-Jasper County area can be found in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998b) and the IAS (NEESA, 1986).

2.6 HYDROGEOLOGY

Two primary aquifers are present within the Beaufort-Jasper County area: the surficial aquifer, comprising Pleistocene age sediments, and the Tertiary Limestone Aquifer (Santee Limestone). These aquifers are generally separated by the Hawthorn Formation and Cooper Marl, which act as confining units to the underlying Floridan Aquifer (Tertiary Limestone Aquifer).

In the MCRD Parris Island area, the shallow, unconfined aquifer generally consists of permeable, fine to medium, Pleistocene age sands. Groundwater recharge to the unconfined (water-table) aquifer is through precipitation infiltration. Surface relief is relatively low. The area is drained by fresh and brackish water streams inland and by tidal streams along the coast. The water table in the MCRD Parris Island area usually ranges from 0 to 10 feet below ground surface (bgs) and is most commonly found at a depth of 3 feet bgs. Water-table fluctuations are a function of recharge, evaporation, and transpiration and have been observed to be as great as 6.5 feet at some locations (Glowacz et al., 1980). The direction of

groundwater flow in the surficial aquifer is generally toward the nearest surface water body, such as a pond, river, tidal creek, or the ocean.

In the Beaufort-Jasper County area, the Floridan Aquifer system occurs near the land surface and confining beds vary from essentially 0 to more than 150 feet in thickness. Groundwater in the aquifer occurs in solutionally enlarged openings or cavities in the limestone. In general, groundwater occurs in a series of broadly defined water-bearing (permeable) zones that serve as aquifers and are separated by less permeable rocks. Two hydrogeologic zones within the Floridan Aquifer are beneath the MCRD Parris Island area. These two hydrogeologic units consist of a 200-foot-thick Upper Hydrogeologic Unit and an 800-foot-thick Lower Hydrogeologic Unit. Within each hydrogeologic unit, there is a discrete zone of higher permeability rocks separated by thick sequences of lower permeability rocks. The Lower Hydrogeologic Unit has a somewhat lower overall permeability compared to the Upper Unit.

A further discussion of the hydrogeological characteristics of the Beaufort-Jasper County area can be found in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998b) and the IAS (NEESA, 1986).

2.7 ECOLOGY

Discussions on the ecoystems that are present and the threatened and endangered plants and animals that occur or potentially occur on MCRD Parris Island can be found in the MCRD Parris Island Master Work Plan (B&R Environmental, 1998b), the IAS (NEESA, 1986), and Section 7.0 (the ecological risk assessment) of this RI/RFI Report.

3.0 INVESTIGATION SUMMARY

The initial RI/RFI field investigation was conducted from July 1998 to September 1998; three additional sediment sampling events occurred in December 1998, December 1999, and April 2001. The following sections discuss deviations from the RI/RFI work plan, the RI/RFI field activities, the site-specific geology, and the site-specific hydrogeology.

3.1 DEVIATIONS FROM THE WORK PLAN

During the RI/RFI field effort, the following deviations were made from the approved Site 12 work plan (B&R Environmental, 1998c):

- After consultation with the SCDHEC, the method of well installation was changed from mud rotary drilling to the use of 4-1/4-inch inner diameter (ID) hollow-stem augers.

- The approved work plan stated that surface water samples would be collected at low tide. However, due to the lack of surface water along the tidal flats at low tide, the samples were collected at the proposed locations on the receding tide when water was available to sample.

- Due to the shallow groundwater encountered during drilling at borings PAI-10-SB-01 and PAI-10-SB-06, no vadose zone samples were collected from these locations.

- The surface soil identification PAI-10-SS-15-01 was used for two Site 12 surface soil samples, one background (collected in the southwestern portion of Parris Island) and the other from Jericho Island. The Jericho Island sample identification was changed to PAI-10-SS-15-01A.

- In addition to the proposed analytical parameters, surface soil samples PAI-10-SS-01-01 through PAI-10-SS-06-01, PAI-10-SS-08-01, and PAI-10-SS-09-01 were also analyzed for total organic carbon (TOC) content and pH.

- Due to the shallowness of the surface water at the time of sampling, Secchi Disk readings were not obtained at six of the surface water locations (PAI-10-SW-03-00, PAI-10-SW-04-00, PAI-10-SW-05-00, PAI-10-SW-06-00, PAI-10-SW-04-00, and PAI-10-SW-11-00).

- A proposed Shelby tube sample was not collected at soil boring PAI-10-SB-03 to evaluate the confining material of the Hawthorn Formation. The Hawthorn Formation was not encountered in any of the borings at Site 12.

- Polynuclear aromatic hydrocarbons (PAHs) were added to the sediment sampling requirements for Site 12. These samples were collected during the December 1998 field event.

- Surface water sample identification numbers PAI-10-SW-14-00 and PAI-10-SW-15-00 were not used as originally proposed. The numbers were inadvertently skipped and two additional identification numbers, PAI-10-SW-17-00 and PAI-10-SW-18-00, were added. Therefore, no sample data are associated with PAI-10-SW-14-00 and PAI-10-SW-15-00.

3.2 FIELD ACTIVITIES

The following sections describe the RI/RFI field activities. These activities included surface soil sampling, subsurface soil sampling, monitoring well installation, groundwater sampling, surface water sampling, sediment sampling, slug tests, a tidal influence study, a test pit investigation, surveying, the management of investigation derived waste (IDW), quality assurance/quality control (QA/QC) sampling, and laboratory analyses. With the exceptions listed in Section 3.1, field activities were performed in accordance with the approved Site 12 work plan (B&R Environmental, 1998c).

Figure 3-1 presents surface soil sampling locations, Figure 3-2 presents soil boring and monitoring well locations, and Figure 3-3 presents surface water and sediment sampling locations. Table 3-1 summarizes the rationale behind the placement of sampling locations. Appendix A addresses background sampling locations for surface soil, surface water, and sediment.

In accordance with the presumptive remedy approach for landfill, waste materials such as those found in the debris piles were not sampled as part of this investigation. Rather, soils, sediments, surface water, and/or groundwater downgradient of these waste piles were tested to evaluate potential contaminant migration. Under the presumptive remedy, the waste materials will be remediated.

3.2.1 Surface Soil Sampling

A total of 21 surface soil samples were collected for the Site 12 RI/RFI. In 1998, samples PAI-10-SS-01-01 through PAI-10-SS-15-01A, were collected from 18 locations on site at the locations identified in Figure 3-1. A duplicate sample, PAI-10-SS-12-01D, was also collected at the PAI-10-SS-12-01 location. Samples PAI-10-SS-15-01 through PAI-10-SS-17-01 were collected in 1998 as background samples in a forested area on the southwestern edge of Parris Island (Appendix A). In April 2001, sample locations PAI-10-SS-08 and PAI-10-SS-12 were resampled to assess elevated PAH levels detected in 1998. Location PAI-10-SS-12 was also sampled for pentachlorophenol for similar reasons.

Surface soil sampling was performed in accordance with the RI/RFI work plan (B&R Environmental, 1998c). Except as noted below, the surface soil samples correspond to all electromagnetic anomalies noted during the April 2000 geophysical survey, see Figure 7-2 of the Jericho Island Work Plan (B&R Environmental, 1998c). Prior to sampling, the exact location of each of the anomalies was established by using the same instrument as the initial survey.

Based on the history, an anomaly identified as an abandoned drinking water well between SS-005, SS-006, SS-007, and SS-008 was not sampled. A debris area west of SS-007 that was visually identified as glass was not sampled. However, in the event that this area (SS-007) represented a potential threat, sediment, surface water, and groundwater samples were collected west of this debris pile. Also, sediment, surface water, and groundwater samples were collected from around the entire island. In the event that a significant source of contamination was missed during the sediment sampling, then these other samples would identify the release.

All surface soil samples were collected from a depth of 0 to 1 foot bgs. Surface materials consisting of grasses and other organic material were removed before the sample was obtained. A pre-cleaned plastic or stainless-steel trowel was used to collect the sample to a depth of 1 foot. For all analytical parameters except VOCs, the soil was directly placed in the appropriate containers and packed in ice. The VOCs were collected using Encore® samplers, which were capped and placed on ice.

Table 3-2 summarizes the laboratory analyses performed on each sample. All surface soil samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL metals (total), cyanide, and acid volatile sulfide/simultaneous extracted metals (AVS/SEM). In addition, samples PAI-10-SS-01-01 through PAI-10-SS-10-01 were analyzed for TOC and pH. Samples PAI-10-SS-05-01, PAI-10-SS-13-01, and PAI-10-SS-14-01 were collected from across the site at representative locations and analyzed for hexavalent chromium. Samples PAI-10-SS-07-01, PAI-10-SS-07-01, and PAI-10-SS-10-01 were also analyzed for grain size, bulk density, porosity, and specific gravity. Sample PAI-10-SS-10-01 was also analyzed for natural moisture content, grain size, and Atterberg Limits. Appendix A contains sample log sheets.

3.2.2 Subsurface Soil Sampling

Exploratory soil borings were installed at Site 12 to locate the Hawthorn Formation or other confining unit and to obtain lithologic samples. Seven soil borings were installed: PAI-10-SB-01, PAI-10-SB-02, PAI-10-SB-03, PAI-10-SB-04, PAI-10-SB-05, PAI-10-SB-06, and PAI-10-SB-07. Figure 3-2 identifies the locations of these soil borings, which were later converted to monitoring wells.

Table 3-3 presents a summary of the subsurface soil samples. Vadose zone samples were collected at locations PAI-10-SB-02-04, PAI-10-SB-03-02, PAI-10-SB-04-02, and PAI-10-SB-05-02 from depths of 2

to 6 feet bgs. No vadose zone samples were collected from borings PAI-10-SB-01 and PAI-10-SB-06 because groundwater was encountered at depths less than 1 foot bgs. Subsurface samples PAI-10-SB-01-22, PAI-10-SB-02-10, PAI-10-SB-03-30, PAI-10-SB-03-34, PAI-10-SB-04-06, PAI-10-SB-04-08, PAI-10-SB-05-24, PAI-10-SB-05-26, PAI-10-SB-06-06, PAI-10-SB-07-24, and PAI-10-SB-07-26 were collected from within the saturated zone.

Subsurface soil samples were collected using split-spoon sampling techniques. Analyses included TOC, pH, natural moisture content, grain size analysis, Atterberg Limits, porosity, bulk density, and specific gravity. Water was encountered during boring installation at depths ranging from less than 1 foot bgs to approximately 4 feet bgs. All borings encountered auger refusal at depths ranging from 26 feet bgs (PAI-10-SB-01) to 39.5 feet bgs (PAI-10-SB-03). All split-spoon samples were screened in the field using a photoionization detector (PID). Boring PAI-10-SB-01 soil samples exhibited elevated PID readings (up to 11.4 ppm) at a 4- to 6-foot depth range. Boring PAI-10-SB-06 exhibited elevated PID readings (up to 2.3 ppm) at a depth range of 6- to 8-feet. Landfilled debris was not encountered at depth, with the exception of borings PAI-10-SB-06 and PAI-10-SB-07. At these borings, surface debris was encountered at depths of 4 feet and 2 feet, respectively. Both borings were located on the southern end of the island within a large area of surface debris. None of the remaining borings exhibited elevated PID readings or visual signs of contamination. Appendix A contains sample log sheets.

3.2.3 Monitoring Well Installation

Fourteen monitoring wells were installed during the 1998 RI/RFI field investigation at the locations identified in Figure 3-2. The wells were installed in clusters or pairs. In each cluster, one well was installed within the shallow surficial aquifer and one well was installed at the base of the surficial aquifer. The shallow portion of the surficial aquifer wells were installed to depths of approximately 14 bgs. The deep surficial aquifer wells were installed to depths ranging from 26 to 38 feet bgs. The deep surficial aquifer wells were installed by converting the seven existing soil borings (Section 3.2.1) into monitoring wells. Appendix A contains the well permit authorization.

A licensed South Carolina driller installed the monitoring wells in accordance with SCDHEC regulations. The monitoring wells were installed through 8-inch outside-diameter hollow-stem augers to help ensure a proper sand pack. The shallow surficial aquifer wells were constructed with 10-foot screen sections with 0.010-inch slot openings and no. 1 sand (sand passing U.S. Standard Sieve No. 20-30) due to the fines that were encountered. The deep surficial aquifer wells were constructed using 5-foot screen sections with 0.020-inch slot screens and no. 2 sand (sand passing U.S. Standard Sieve No. 10-20). Appendix A contains boring logs documenting the material encountered during well installation. Table 3-4 presents monitoring well construction details, and Appendix A contains monitoring well construction sheets. The

newly installed monitoring wells were developed using a surge block and a submersible pump. Appendix A contains well development records.

As indicated in Table 3-4, seven wells [PAI-10-MW-01(S), PAI-10-MW-03(S), PAI-10-MW-05(S), PAI-10-MW-07(S), PAI-10-MW-09(S), PAI-10-MW-11(S), and PAI-10-MW-13(S)] were installed as shallow monitoring wells and screened in the upper part of the surficial aquifer. The wells were installed, where possible, so that the well screen intercepted the water table. PAI-10-MW-02(D), PAI-10-MW-04(D), PAI-10-MW-06(D), PAI-10-MW-08(D), PAI-10-MW-10(D), PAI-10-MW-12(D), and PAI-10-MW-14(D) were installed as deep surficial aquifer wells.

3.2.4 Groundwater Sampling

Groundwater sampling was conducted at the 14 newly installed monitoring wells using a peristaltic pump and pre-cleaned disposable tubing. The tubing was lowered to the approximate midpoint of the well screens. The wells were then purged in accordance with the low-flow sampling techniques specified in the approved work plan (B&R Environmental, 1998c). Water-level measurements and water-quality parameters (temperature, pH, specific conductance, dissolved oxygen, salinity, and turbidity) were collected during purging and recorded on Low-Flow Purge Data Sheets and Groundwater Sample Log Sheets (Appendix A). With the exception of samples analyzed for VOCs, groundwater was collected by reducing the flow to minimize volatilization and filling the appropriate containers directly from the discharge end of the peristaltic pump tubing. The VOC samples were collected from the inlet end of the tubing after the tubing was removed from the well and the water was allowed to flow backward under gravity.

Groundwater samples included PAI-10-GW-01-01 through PAI-10-GW-07-01, PAI-10-GW-07-01D, and PAI-10-GW-08-01 through PAI-10-GW-14-01. The samples were analyzed for TOC, hardness, TCL VOCs, SVOCs, pesticides, PCBs, TAL metals (total and dissolved), cyanide, total dissolved solids (TDS), total suspended solids (TSS), chloride, fluoride, nitrate/nitrite, and sulfate. Samples PAI-10-GW-01-01, PAI-10-GW-02-01, and PAI-10-GW-11-01 were collected from across the site at representative locations and analyzed for hexavalent chromium. Samples PAI-10-GW-09-01 and PAI-10-GW-11-01 were analyzed for RCRA Appendix IX organics including VOCs, SVOCs, pesticides, chlorinated herbicides, PCBs, RCRA Appendix IX inorganics, and cyanide. Appendix IX analysis was conducted at the two monitoring wells to satisfy SCDHEC requirements under the state RCRA program. Table 3-5 summarizes the groundwater samples and analytical parameters. Prior to purging, depth-to-water measurements were collected at each well as documented in a round of water-level measurements collected prior to the start of a water-level study. These water-level measurements are presented in Table 3-6. During purging, water from each well was tested for groundwater-quality parameters including temperature, pH,

specific conductance, dissolved oxygen, salinity, and turbidity. Table 3-7 summarizes the groundwater-quality results.

As shown in Table 3-7, the temperature readings varied from 20.4°C (PAI-10-GW-01-01) to 24.2°C (PAI-10-GW-14-01). The pH varied from 5.11 (PAI-10-GW-06-01) to 6.81 (PAI-10-GW-13-01). The specific conductance varied from 1.19 mS/cm (PAI-10-GW-07-01) to 45.9 mS/cm (PAI-10-GW-14-01). Dissolved oxygen readings varied from 0.48 to 4.45 mg/L. Salinity readings ranged from 0.05 (PAI-10-GW-07-01) to 3.03 (PAI-10-GW-14-01) percent. The salinity readings indicate that all the groundwater samples are considered to be salt water (fresh water is less than 0.048 percent as identified by SCDHEC, 1998). The wells were purged in an effort to reduce the turbidity to less than the benchmark of 5 nephelometric turbidity units (NTUs). Turbidity of the samples collected ranged from 0 to less than 10 NTUs.

The groundwater samples were collected during the receding tide, generally close to the low tide. Since the well purge times were uncertain and variable, the standard procedure was to start purging the wells approximately 2 to 4 hours before low tide.

3.2.5 Surface Water Sampling

Seventeen surface water samples were collected from 16 locations during the Site 12 RI/RFI. Samples PAI-10-SW-01-00 through PAI-10-SW-13-00 and duplicate sample PAI-10-SW-08-00D were collected along the tidal flats adjacent to Site 12 at the locations identified in Figure 3-3. Samples PAI-10-SW-16-00 through PAI-10-SW-18-00 were collected as background samples along Ballast Creek, near the outlet to Broad River and the outlet of an unnamed creek across from the boat landing at Elliott's Beach (Appendix A). No samples are associated with sample identification numbers PAI-10-SW-14 and PAI-10-SW-15.

All surface water samples were collected during a receding tide. At low tide, the tidal flat adjacent to the northern end of Site 12 was completely devoid of water. In areas where water was insufficient to collect samples under natural flow conditions, a depression was excavated to facilitate surface water collection.

Table 3-8 summarizes the surface water samples and analytical parameters. All samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL metals (total and dissolved), cyanide, TOC, and hardness. In addition, samples PAI-10-SW-09-00, PAI-10-SW-10-00, and PAI-02-SW-13-00 were analyzed for hexavalent chromium to determine the speciation of total chromium and support the risk assessment; Appendix A contains the surface water sample log sheets. The samples were collected from across the site at representative locations.

Table 3-9 summarizes the surface water quality parameters collected during sampling. These parameters include temperature, pH, specific conductance, dissolved oxygen, salinity, turbidity, and Secchi disk readings. Surface water sampling was performed in accordance with the RI/RFI work plan (B&R Environmental, 1998c), with the exception of Secchi Disk readings that were not obtained at locations PAI-10-SW-03, PAI-10-SW-04, PAI-10-SW-05, PAI-10-SW-06, PAI-10-SW-07, and PAI-10-SW-11 due to the shallowness of the surface water. A Secchi Disk reading was obtained at the remainder of the sample locations. The surface water quality parameters indicate that, at the time of sampling, the water temperature ranged from 26.8°C to 37.9°C. The pH readings varied from 6.40 to 7.65. The specific conductance varied from 33.6 to 48.7 mS/cm. Dissolved oxygen varied from 3.25 to 13.19 mg/L. Salinity remained fairly constant, ranging only from 2.13 to 3.19 percent. Turbidity of the samples varied from 7 to 250 NTUs. The Secchi Disk readings varied from 0.25 to 1.35 feet.

3.2.6 Sediment Sampling

Site 12 sediment samples were collected from July to September 1998, in December 1998, and in December 1999. Figure 3-3 identifies the sampling locations and Table 3-10 summarizes the samples and analytical parameters for all three sampling events.

Sediment sampling was performed in accordance with the RI/RFI work plan (B&R Environmental, 1998c). A pre-cleaned plastic or stainless-steel trowel was used to collect the sample to the appropriate depth. With the exception of samples analyzed for VOCs, sediment samples were directly placed in the appropriate containers and packed in ice. VOC samples were collected using Encore® samplers, which were capped and placed on ice. Appendix A contains sediment sample log sheets.

A total of 20 samples were collected from 18 locations during the July to September sampling event. Samples PAI-10-SD-01-01 through PAI-10-SD-15-01, PAI-10-SD-14-02, and PAI-10-SD-02-01D were collected along the tidal flats adjacent to Site 12 at the locations identified in Figure 3-3. Samples PAI-10-SD-16-01, PAI-10-SD-17-01, and PAI-10-SD-18-01 were collected as background samples along Ballast Creek, near the outlet to Broad River and the outlet of an unnamed creek across from the boat landing at Elliott's Beach. As shown in Table 3-10, the samples were analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL metals (total), cyanide, TOC, hardness, and AVS/SEM. In addition, samples PAI-10-SD-09-01, PAI-10-SD-10-01, and PAI-10-SD-13-01 were analyzed for hexavalent chromium to determine the speciation of total chromium and support the risk assessment. All sediment samples were also tested for grain size and bulk density. Sampling results are presented in Appendix A.

In December 1998, 20 additional samples were collected from the same locations as the July to September event. These December 1998 samples were identified as PAI-10-SD-01-01A through PAI-10-

SD-18-01A and were analyzed for PAHs. These samples were tested with a special analytical method designed to generate low detection limits compatible with ecological screening valves.

In December 1999, two additional sediment samples, PAI-10-SD-19 and PAI-10-SD-20, were collected along the southern extent of Site 12. Figure 3-3 identifies the sample locations. The purpose of the samples was to bound the sediment contamination along the southern extent. As shown in Table 3-10, the samples were analyzed for TCL SVOCs, pesticides, PCBs, PAHs, TAL metals, and cyanide.

3.2.7 Slug Tests

Slug tests were performed on the 14 new monitoring wells. Rising head slug tests were performed in wells PAI-10-MW-03(S), PAI-10-MW-05(S), PAI-10-MW-07(S), and PAI-10-MW-09(S). Both rising and falling head slug tests were performed in the remainder of the monitoring wells. The rising head slug test involved the insertion of a slug of known volume below the water surface within the well. After the water level stabilized, the slug was removed to create a water-level drop within the well. A 20 pounds per square inch (psi) pressure transducer and a data logger were used to record the rate of water-level recovery. The falling head slug test involved the rapid insertion of a slug of known volume below the water surface within the well, thereby creating a rise in the water level. The rate of water-level recovery to the original static water level (time versus recovery) was measured. The data were analyzed using the Hvorslev Method (Hvorslev, 1951). Table 3-11 presents the slug test results for the shallow surficial aquifer and deep surficial aquifer. Appendix A contains slug test calculations and data.

Falling head tests were not conducted on groundwater monitoring wells screened across water table (shallow) because flow through unsaturated portions of the well screen would adversely affect the reliability of the results.

3.2.8 Tidal Influence Study

A tidal influence study was conducted in August 1998. The study consisted of the collection of water levels over a 2- to 3-day period in the 14 monitoring wells and a control point, using transducers and data loggers. Appendix B contains the tidal study results. The study indicated that all wells installed at Site 12 are tidally influenced. The greatest tidal fluctuation (1.9 feet) was observed in the deep surficial monitoring well PAI-10-MW-10(D). The tidal fluctuations in the shallow surficial monitoring well ranged from approximately 0.28 to 0.7 feet. The tidal fluctuations in the deep surficial monitoring well ranged from approximately 0.35 to 1.9 feet. The control point was located in a tidal creek southeast of well clusters PAI-10-MW-13(S)/PAI-10-MW-14(D) and PAI-10-MW-11(S)/PAI-10-MW-12(D).

3.2.9 Test Pit Investigation

In December 1999, a limited test pit investigation was initiated in the hummock area south of Jericho Island. Soil located up to 3 feet bgs was removed using a hand shovel from eight locations (PAI-10-TP-01 through PAI-10-TP-08). The test pit was terminated when the water table was reached. Visual inspection of the soil indicated no evidence of waste debris, and the test pit investigation was terminated. Appendix A contains test pit log sheets.

3.2.10 Surveying

The locations of surface soil samples, soil borings, monitoring wells, surface water samples, and sediment samples were surveyed for horizontal and vertical control. Donaldson, Garrett & Associates, Inc., of Macon, Georgia (South Carolina licensed), conducted the survey in accordance with the RI/RFI work plan (B&R Environmental, 1998c). Existing MCRD Parris Island survey monuments were used as reference points. The concrete monuments were tied to plaques containing the northing, easting, and ground surface elevations. The northing and easting coordinates were tied into the South Carolina State Plane Coordinate System, North American Datum 1983 (NAD 83).

3.2.11 Investigation-Derived Waste

IDW was collected and containerized. Before final disposal, 55-gallon drums of water (decontamination, development, and purge water) and soil IDW were stored on Jericho Island. All IDW was handled in accordance with the Master Work Plan (B&R Environmental, 1998b) and the RI/RFI work plan (B&R Environmental, 1998c).

A composite sample was collected from the drummed water and analyzed for TCL VOCs, SVOCs, pesticides, PCBs, and TAL inorganics. Additionally, a composite sample was collected from the drummed soil and analyzed for TCL VOCs, SVOCs, pesticides, PCBs, TAL inorganics, and toxicity characteristic leaching procedure (TCLP) inorganics. Analytical results from groundwater samples collected during the field investigation were used to characterize development and purge waters.

The soil IDW was characterized as nonhazardous. One inorganic compound, arsenic, was detected in the soil composite sample at a level exceeding the U.S. EPA Region 3 residential RBC (U.S. EPA, 1998). Arsenic was detected at a maximum concentration of 1.3 mg/kg, which exceeds the RBC of 0.43 mg/kg. However, background arsenic soil and sediment detections ranged from 1.2 to 12 mg/kg. Per concurrence with the MCRD Parris Island partnering team, soil IDW was spread on the surface of Site 12.

Decontamination, development, and purge waters were also found to be nonhazardous. All liquid IDW was discharged to the Depot's wastewater treatment facility. Fenn-Vac, Inc., the IDW subcontractor, conducted the discharge of waters and the spreading of soil.

3.2.12 Quality Assurance/Quality Control Samples

QA/QC objectives are evaluated by assessing the precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters, as defined in the Master Quality Assurance Plan (QAP). QA/QC samples were collected to provide information pertaining to these key quality characteristics.

Appendix D contains the data validation summaries and a detailed PARCC discussion. The sample chain-of-custody forms and QA/QC sample log sheets can be found in Appendix A.

3.3 SITE-SPECIFIC GEOLOGY

The geology at Site 12 was interpreted by classifying subsurface soil samples collected during the drilling of soil borings. Information from the Soil Survey of Beaufort and Jasper Counties, South Carolina, (U.S. Department of Agriculture, Soil Conservation Service, 1980) was used for the correlation of soil types.

According to the Soil Survey of Beaufort and Jasper Counties, the soil that comprises the Site 12 area consists of the Seabrook, Capers, and Bohicket series. The soil that comprises Site 12 itself is the Seabrook series. Seabrook soil typically consists of fine sands that are moderately well drained and nearly level. The water table is typically 2 to 4 feet bgs, with gradients generally less than one percent but reaching two percent along drainageways. The soil along the northern tidal flat adjacent to Site 12 consists of the Capers series. Capers soil generally consists of silty and clayey marine sediment that is nearly level and found along tidal flats. The remainder of the tidal flat soil adjacent to the site consists of the Bohicket series. Bohicket soil consists of deep, poorly drained, low-permeability soil that forms in silty and clayey marine sediment on broad tidal flats.

Surface soil collected from Site 12 during the RI/RFI field event consisted of fine to medium sands with varying silt content, as indicated in the lithologic descriptions for the sampling event. Sediment samples collected from the tidal flat area consisted of fine to coarse sand with a varying silt and clay content and clay with a varying sand and silt content (see Appendix A for grain size analyses). Surface debris was observed primarily on the northern and southern ends of the islands; most of the debris was located on the southern end. Debris, consisting of glass and rusted metal, was observed over a distance of approximately 200 feet along the tidal flat at the southern end of the island.

Subsurface materials at Site 12 were classified based on samples collected during the drilling of seven soil test borings during the RI/RFI field investigation. Soil borings PAI-10-SB-01 through PAI-10-SB-07 were sampled continuously to the termination of each boring using split-spoon sampling techniques. The subsurface geology at the site does not appear to have been affected by human activities. Landfilled debris was observed on the surface but was not encountered at depth, with the exception of borings PAI-10-SB-06 and PAI-10-SB-07. At these borings, surface debris was encountered at depths of 4 feet and 2 feet, respectively. These borings were located on the southern end of the island within a large area of surface debris.

Figure 3-4 identifies the locations of cross-sections A-A' and A-B in a plan view. Figures 3-5 and 3-6 present the cross-sectional transects of A-A' and A-B, respectively. The soil encountered typically consisted of fine to medium sand with a varying silt and clay content. Sandy clay was encountered in soil borings PAI-10-SB-05, PAI-10-SB-06, and PAI-10-SB-07 at depths of 8 to 17 feet bgs. These units were predominantly clay but also contained sand. The sandy clays were wet and did not appear to be associated with the Hawthorn Formation; they were only encountered at the southern end of Jericho Island. Due to the limited areal extent, the clay units most likely do not act as local confining units within the surficial aquifer beneath the site. The borings were terminated when auger refusal was encountered at depths ranging from 26 to 39.5 feet bgs, which was interpreted to be the top of the Hawthorne Formation.

Subsurface soil and sediment samples that were analyzed for geological parameters confirmed the geology encountered at Site 12. Appendix A presents the sampling results. Based on grain size analyses (Appendix A), the deeper sediments within the surficial aquifer (fine-medium sands with silt) are slightly coarser grained overall than the shallow sediments, which are predominantly fine silty sands.

3.4 SITE-SPECIFIC HYDROGEOLOGY

The hydrogeologic conditions at Site 12 were interpreted from soil boring data, groundwater-level measurements, and slug tests.

The uppermost aquifer at the site consists of primarily sand-sized Pleistocene age sediments. Sandy clay lenses were encountered in some borings; however, they do not appear to be laterally extensive and therefore do not isolate lower sands from upper sands within the surficial aquifer.

In general, a shallow groundwater table exists at Site 12. The depths to groundwater measured at the beginning of the tidal study ranged from 0.78 to 7.82 feet bgs. Groundwater was encountered during installation of the wells at depths ranging from less than 1 foot to approximately 4 feet bgs. Based on the results of the tidal study, all wells are tidally influenced, with fluctuations varying from 0.28 to 1.9 feet.

Groundwater primarily moves through the coarser, sand-size sediments of the surficial aquifer. Sandy clays encountered in borings PAI-10-SB-05, PAI-10-SB-06, and PAI-10-SB-07 are limited to the southern end of the island. Due to the limited extent of the sandy clays, they are not likely to act as confining units. The upper surficial aquifer is approximately 21 to 30 feet thick across the site, based on the depth of the top of rock encountered in the soil borings. Recharge of the shallow aquifer beneath the site is likely to occur primarily through infiltration of precipitation across the island. The highest measured groundwater elevations (see Table 3-6) in shallow surficial aquifer wells were along the southern and southeastern margins of the island (PAI-10-MW-11 and PAI-10-MW-09). In the deep surficial aquifer, the highest groundwater elevations were in wells PAI-10-MW-12 and PAI-10-MW-06, located along the southern and northwestern island margins. In general, the water-level data suggest an overall groundwater flow pattern from the interior and southern end of the island to the marshes and open water located east and west of the island.

Based on the groundwater elevation data collected during this field event, the vertical gradient within the surficial aquifer is downward at well clusters PAI-10-MW-01(S)/PAI-10-MW-02(D), PAI-10-MW-07(S)/PAI-10-MW-08(D), PAI-10-MW-09(S)/PAI-10-MW-10(D), PAI-10-MW-11(S)/PAI-10-MW-12(D), and PAI-10-MW-13(S)/PAI-10-MW-14(D). The vertical gradient at well clusters PAI-10-MW-03(S)/PAI-10-MW-04(D) and PAI-10-MW-05(S)/PAI-10-MW-06(D) appears to be slightly upward. Four of the five well clusters with downward gradients are in the southern half of the island, and both well clusters with upward gradients are located in the northern half of the island. This suggests that the southern portion of the site is a local recharge area for groundwater.

Slug tests were performed in the newly installed wells to estimate the hydraulic conductivity of the shallow aquifer sediments. Rising head slug tests were performed in wells PAI-10-MW-03(S), PAI-10-MW-05(S), PAI-10-MW-07(S), and PAI-10-MW-09(S). Rising and falling head slug tests were performed at the remainder of the monitoring wells. For wells in which both rising and falling head tests were performed, the data were averaged prior to the calculation of the geometric mean. Table 3-11 presents the results of the slug tests. The geometric mean hydraulic conductivity for the seven shallow surficial aquifer wells was calculated to be 3.39 feet per day (1.20×10^{-3} cm/sec). The geometric mean hydraulic conductivity for the seven deep surficial aquifer wells was calculated to be 3.30 feet per day (1.17×10^{-3} cm/sec). The values for the shallow and deep wells are within the typical range of hydraulic conductivity for silty sands, well-sorted sands, and fine sands (Fetter, 1980). Hydraulic conductivity curves and calculations based on the slug tests are included in Appendix B.

The tidal study results (Appendix B) indicate that both shallow groundwater and deeper groundwater within the surficial aquifer are tidally influenced. At each cluster location, the deep well had a greater tidal

range than the shallow well, indicating that the hydraulic influence of the tides is greater in the deeper portion of the surficial aquifer. Overall, tidal effects were most prominent in the deep wells located along the eastern and northern island margins, with tidal fluctuations of over 1 foot observed in wells PAI-10-MW-02, 04, and 10. Well PAI-10-MW-10 had the greatest response overall to the tides, with a maximum fluctuation of about 1.8 feet.

Site 12 is located within the 100-year flood plain. This was determined by reviewing the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (1986).

3.5 SURFACE WATER HYDROLOGY

The site is a small relatively flat sandy island with minimal topographic relief. The highest elevation on site is approximately 9 feet about MSL. High tides in the area range from approximately 4 to 5 feet above MSL. Except for minor erosion near the edge of the island, surface water and surface water flow channels are not present on the island. During storm events, precipitation would either infiltrate the sandy soils or migrate radially as sheet flow toward the surrounding marsh.

In the marsh surrounding the island, surface water flow patterns were observed during the recent sampling events in 1998, 1999, and 2000. Just after high tide, surface water was noted to flow primarily to the east on the eastern side of the island and to the west on the western side of the island toward the tidal channels, illustrated in blue on the site figures (e.g., Figure 3-1). From the tidal channels, the surface water flows to the south and into Archers Creek.

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TABLE 3-1

SAMPLING RATIONALE
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Sample Location	Sampling Rationale
Surface Soil	
PAI-10-SS-01 to PAI-10-SS-14, PAI-10-SS-15-01A	Collected to characterize the nature and extent of contamination of the surface soil near anomalies throughout Jericho Island.
PAI-10-SS-15 to PAI-02-SS-17	Collected as background samples.
Subsurface Soil	
PAI-10-SB-01 through PAI-10-SB-07	Collected as exploratory soil borings to locate the Hawthorn Formation or a confining unit and to obtain lithologic samples.
Groundwater	
PAI-10-GW-01, PAI-10-GW-02	Collected to assess potential migration and accumulation of chemicals in groundwater from an anomaly located on the northern portion of Jericho Island.
PAI-10-GW-03 through PAI-10-GW-06	Collected to assess potential migration and accumulation of chemicals in groundwater from an anomaly located on the central portion of Jericho Island.
PAI-10-GW-07 through PAI-10-GW-14	Collected to assess potential migration and accumulation of chemicals in groundwater from an anomaly located on the southern portion of Jericho Island.
Surface Water	
PAI-10-SW-01 through PAI-10-SW-03	Collected to assess potential migration and accumulation of chemicals in surface water from an anomaly located on the northwestern portion of Jericho Island.
PAI-10-SW-04	Collected to assess potential migration and accumulation of chemicals in surface water from an anomaly located on the northeastern portion of Jericho Island.
PAI-10-SW-05 through PAI-10-SW-07	Collected to assess potential migration and accumulation of chemicals in surface water from an anomaly located on the west-central portion of Jericho Island.
PAI-10-SW-08 through PAI-10-SW-11	Collected to assess potential migration and accumulation of chemicals in surface water from the disposal area located on the southern portion of Jericho Island.
PAI-10-SW-12 through PAI-10-SW-13	Collected to assess potential migration and accumulation of chemicals in surface water from an anomaly located on the eastern central portion of Jericho Island.
PAI-10-SW-16 through PAI-10-SW-18	Collected as background samples along Ballast Creek near the outlet of an unnamed creek across from the boat landing at Elliot's Beach.
Sediment	
PAI-10-SD-01 through PAI-10-SD-03	Collected to assess potential migration and accumulation of chemicals in sediment from an anomaly located on the northwestern portion of Jericho Island.

TABLE 3-1

SAMPLING RATIONALE
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Sample Location	Sampling Rationale
PAI-10-SS-08-02	Collected to assess elevated PAH levels at location PAI-10-SS-08 (collected in 1998).
PAI-10-SS-12-02	Collected to assess elevated PAH & pentachlorophenol levels at location PAI-10-SS-12 (collected in 1998)
PAI-10-SD-04	Collected to assess potential migration and accumulation of chemicals in sediment from an anomaly located on the northeastern portion of Jericho Island.
PAI-10-SD-05 through PAI-10-SD-07	Collected to assess potential migration and accumulation of chemicals in sediment from an anomaly located on the west-central portion of Jericho Island.
PAI-10-SD-08 through PAI-10-SD-11, PAI-10-SD-14, PAI-10-SD-15, PAI-10-SD-19, and PAI-10-SD-20	Collected to assess potential migration and accumulation of chemicals in sediment from the disposal area located on the southern portion of Jericho Island.
PAI-10-SD-12 through PAI-10-SD-13	Collected to assess potential migration and accumulation of chemicals in sediment from an anomaly located on the eastern central portion of Jericho Island.
PAI-10-SD-16, PAI-10-SD-17, and PAI-10-SD-18	Collected as background samples.

TABLE 3-2

SUMMARY OF SURFACE SOIL SAMPLES COLLECTED
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	Date Collected	Medium	Depth Collected (Feet)	Analysis
PAI-10-SS-01-01	1998	Soil	0 - 1	(1), (2), (3)
PAI-10-SS-02-01	1998	Soil	0 - 1	(1), (2), (3)
PAI-10-SS-03-01	1998	Soil	0 - 1	(1), (2), (3)
PAI-10-SS-04-01	1998	Soil	0 - 1	(1), (2), (3)
PAI-10-SS-05-01	1998	Soil	0 - 1	(1), (2), (3), (4)
PAI-10-SS-06-01	1998	Soil	0 - 1	(1), (2), (3)
PAI-10-SS-07-01	1998	Soil	0 - 1	(1), (2), (3), (6)
PAI-10-SS-08-01	1998	Soil	0 - 1	(1), (2), (3)
PAI-10-SS-08-02	2001	Soil	0 - 1	(7)
PAI-10-SS-09-01	1998	Soil	0 - 1	(1), (2), (3)
PAI-10-SS-10-01	1998	Soil	0 - 1	(1), (2), (3), (5), (6)
PAI-10-SS-11-01	1998	Soil	0 - 1	(1), (2)
PAI-10-SS-12-01 PAI-10-SS-12-01D	1998 1998	Soil Soil	0 - 1 0 - 1	(1), (2) (1), (2)
PAI-10-SS-12-02	2001	Soil	0 - 1	(7) (8)
PAI-10-SS-13-01	1998	Soil	0 - 1	(1), (2), (4)
PAI-10-SS-14-01	1998	Soil	0 - 1	(1), (2), (4)
PAI-10-SS-15-01A	1998	Soil	0 - 1	(1), (2)
PAI-10-SS-15-01	1998	Soil	0 - 1	(1), (2)
PAI-10-SS-16-01	1998	Soil	0 - 1	(1), (2)
PAI-10-SS-17-01	1998	Soil	0 - 1	(1), (2)

PAI-10-SS-15-01A – Surface soil sample collected at Site 12. Sample ID changed from PAI-10-SS-15-01. PAI-10-SS-15-01 was used for a background location sample ID.
PAI-10-SS-012-01D - duplicate sample.

1 TCL VOCs, SVOCs, Pesticides, PCBs, TAL Metals (Total), and Cyanide.
2 AVS/SEM.
3 TOC, pH.
4 Hexavalent chromium.
5 Natural moisture content, grain size analysis, and Atterberg Limits.
6 Porosity, grain size analysis, bulk density, and specific gravity.
7 PAHs.
8 Pentachlorophenol.

TABLE 3-3

SUMMARY OF SUBSURFACE SOIL SAMPLES COLLECTED
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	Date Collected	Medium	Depth Collected (ft bgs)	Analysis
PAI-10-SB-01-22*	1998	Subsurface soil	22 - 26	(1), (2), (3)
PAI-10-SB-02-04*	1998	Subsurface soil	4 – 6	(2)
PAI-10-SB-02-10*	1998	Subsurface soil	10 – 12	(1), (2), (3)
PAI-10-SB-03-02*	1998	Subsurface soil	2 - 4	(2)
PAI-10-SB-03-30*	1998	Subsurface soil	30 – 32	(2), (3)
PAI-10-SB-03-34*	1998	Subsurface soil	34 – 36	(1)
PAI-10-SB-04-02*	1998	Subsurface soil	2 – 4	(2)
PAI-10-SB-04-06*	1998	Subsurface soil	6 – 8	(2), (3)
PAI-10-SB-04-08*	1998	Subsurface soil	8 – 10	(1)
PAI-10-SB-05-02*	1998	Subsurface soil	2 – 4	(2)
PAI-10-SB-05-24*	1998	Subsurface soil	24 - 26	(2), (3)
PAI-10-SB-05-26*	1998	Subsurface soil	26 – 28	(1)
PAI-10-SB-06-06*	1998	Subsurface soil	6 – 8	(1), (2), (3)
PAI-10-SB-07-24*	1998	Subsurface soil	24 - 26	(1)
PAI-10-SB-07-26*	1998	Subsurface soil	26 – 28	(2), (3)

* denotes top of sample interval
1 TOC, pH
2 Natural moisture content, grain size analysis and Atterberg Limits
3 Porosity, grain size analysis, bulk density, and specific gravity

TABLE 3-4

MONITORING WELL CONSTRUCTION DETAILS
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Well Number	Installation Date	Ground Elevation (ft. msl)	Measuring Point Elevation (TPVC) (ft. msl)	Total Depth (feet bgs)	Depth to Water (feet TPVC)	Screened Interval (feet bgs)
PAI-10-MW-01 (S)	1998	4.5	7.37	14	5.72	4 – 14
PAI-10-MW-02 (D)	1998	4.4	7.11	26	5.56	21 – 26
PAI-10-MW-03 (S)	1998	8.9	11.73	14	10.65	4 – 14
PAI-10-MW-04 (D)	1998	8.7	11.31	38	10.19	33 – 38
PAI-10-MW-05 (S)	1998	6.4	9.18	13.9	7.66	3.9 – 13.9
PAI-10-MW-06 (D)	1998	6.3	9.15	36	7.3	31 – 36
PAI-10-MW-07 (S)	1998	8.2	10.97	13.5	9.53	3.5 – 13.5
PAI-10-MW-08 (D)	1998	8.1	11.20	29.2	9.78	24.2 – 29.2
PAI-10-MW-09 (S)	1998	6.7	9.37	14	7.45	4 – 14
PAI-10-MW-10 (D)	1998	6.6	9.30	29	8.12	24 – 29
PAI-10-MW-11 (S)	1998	3.4	6.02	14	3.40	4 – 14
PAI-10-MW-12 (D)	1998	3.4	6.13	29	3.63	24 – 29
PAI-10-MW-13 (S)	1998	3.9	6.69	14	5.02	4 – 14
PAI-10-MW-14 (D)	1998	3.9	6.74	30	5.13	25 – 30

PAI-10-MW-05 (S) - well installed in shallow surficial aquifer
PAI-10-MW-06 (D) - well installed in deep surficial aquifer
Depths to groundwater measured 08/21/98.
TPVC - top of PVC casing
bgs - below ground surface
ft. msl - feet above mean sea level

TABLE 3-5

SUMMARY OF GROUNDWATER SAMPLES COLLECTED
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	Date Collected	Medium	Depth Collected (Feet)	Analysis
PAI-10-GW-01-01	1998	Groundwater	Shallow surficial	(1), (2), (3), (5), (6)
PAI-10-GW-02-01	1998	Groundwater	Deep surficial	(1), (2), (3), (5), (6)
PAI-10-GW-03-01	1998	Groundwater	Shallow surficial	(1), (3), (5), (6)
PAI-10-GW-04-01	1998	Groundwater	Deep surficial	(1), (3), (5), (6)
PAI-10-GW-05-01	1998	Groundwater	Shallow surficial	(1), (3), (5), (6)
PAI-10-GW-06-01	1998	Groundwater	Deep surficial	(1), (3), (5), (6)
PAI-10-GW-07-01	1998	Groundwater	Shallow surficial	(1), (3), (5), (6)
PAI-10-GW-07-01D	1998	Groundwater	Shallow surficial	(1), (3), (5), (6)
PAI-10-GW-08-01	1998	Groundwater	Deep surficial	(1), (3), (5), (6)
PAI-10-GW-09-01	1998	Groundwater	Shallow surficial	(1), (3), (4), (5), (6)
PAI-10-GW-10-01	1998	Groundwater	Deep surficial	(1), (3), (5), (6)
PAI-10-GW-11-01	1998	Groundwater	Shallow surficial	(1), (2), (4), (5), (6)
PAI-10-GW-12-01	1998	Groundwater	Deep surficial	(1), (3), (5), (6)
PAI-10-GW-13-01	1998	Groundwater	Shallow surficial	(1), (3), (5), (6)
PAI-10-GW-14-01	1998	Groundwater	Deep surficial	(1), (3), (5), (6)

PAI-10-GW-07-01D - duplicate sample

1 TOC, hardness ($CaCO_3$)
2 Hexavalent chromium
3 TCL VOCs, SVOCs, pesticides, PCBs, TAL metals (Totals), TAL metals, (Dissolved) cyanide
4 RCRA Appendix IX organics (including volatile organics, semivolatile organics, pesticides/PCBs, pesticides, and chlorinated herbicides), RCRA Appendix IX inorganics, cyanide.
5 TDS, TSS, chloride, fluoride, nitrate/nitrite, sulfate
6 Dissolved oxygen, salinity, temperature, pH, and turbidity

TABLE 3-6

WATER-LEVEL MEASUREMENTS
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Well Number	Date Measured	Measuring Point Elevation (ft. msl)	Depth to Water (ft. from TPVC)	Groundwater Elevation (ft. msl)
PAI-10-MW-01 (S)	08/21/98	7.37	5.72	1.65
PAI-10-MW-02 (D)	08/21/98	7.11	5.56	1.55
PAI-10-MW-03 (S)	08/21/98	11.73	10.65	1.08
PAI-10-MW-04 (D)	08/21/98	11.31	10.19	1.12
PAI-10-MW-05 (S)	08/21/98	9.18	7.66	1.52
PAI-10-MW-06 (D)	08/21/98	9.15	7.30	1.85
PAI-10-MW-07 (S)	08/21/98	10.97	9.53	1.44
PAI-10-MW-08 (D)	08/21/98	11.20	9.78	1.42
PAI-10-MW-09 (S)	08/21/98	9.37	7.45	1.92
PAI-10-MW-10 (D)	08/21/98	9.30	8.12	1.18
PAI-10-MW-11 (S)	08/21/98	6.02	3.4	2.62
PAI-10-MW-12 (D)	08/21/98	6.13	3.63	2.5
PAI-10-MW-13 (S)	08/21/98	6.69	5.02	1.67
PAI-10-MW-14 (D)	08/21/98	6.74	5.13	1.61

PAI-10-MW-05 (S) - well installed in shallow surficial aquifer
PAI-10-MW-06 (D) - well installed in deep surficial aquifer
ft msl - feet above mean sea level
TPVC -top of polyvinyl chloride (PVC)
Water-level measurements obtained during tidal study.

TABLE 3-7

SUMMARY OF GROUNDWATER-QUALITY PARAMETERS COLLECTED DURING PURGING SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample Number	Temperature (°C)	pH	Specific Conductance (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (%)	Turbidity (NTU)
PAI-10-GW-01-01	20.4	5.71	20.4	0.61	1.23	<10
PAI-10-GW-02-01	21.3	6.10	27.3	0.49	1.68	<10
PAI-10-GW-03-01	22.8	5.88	24.2	0.48	1.47	<10
PAI-10-GW-04-01	21.3	6.58	21.8	0.49	1.31	<10
PAI-10-GW-05-01	22.9	5.98	7.59	7.53	0.41	0
PAI-10-GW-06-01	21.5	5.11	13.7	4.06	0.79	0
PAI-10-GW-07-01	22.0	5.28	1.19	0.53	0.05	<10
PAI-10-GW-07-01D	22.0	5.28	1.19	0.53	0.05	<10
PAI-10-GW-08-01	22.1	5.78	1.50	2.50	0.06	0
PAI-10-GW-09-01	23.6	6.01	32.7	0.70	2.06	4
PAI-10-GW-10-01	21.3	6.76	21.0	4.45	1.26	<10
PAI-10-GW-11-01	23.8	6.62	40.5	0.33	2.60	2
PAI-10-GW-12-01	21.5	6.28	25.9	3.38	1.60	<10
PAI-10-GW-13-01	23.8	6.81	42.2	3.74	2.73	<10
PAI-10-GW-14-01	24.2	6.52	45.9	1.02	3.03	6

PAI-10-GW-07-01D - duplicate sample.
mS/cm - milliSiemens per centimeter.
mg/L - milligram per Liter.
NTU - Nephlometric turbidity units.

TABLE 3-8

SUMMARY OF SURFACE WATER SAMPLES COLLECTED
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	Date Collected	Medium	Depth Collected (Feet)	Analysis
PAI-10-SW-01-00	1998	Surface water	Surface	(1), (3), (4), (5)
PAI-10-SW-02-00	1998	Surface water	Surface	(1), (3), (4), (5)
PAI-10-SW-02-00	1998	Surface water	Surface	(1), (3), (4)
PAI-10-SW-03-00	1998	Surface water	Surface	(1), (3), (4)
PAI-10-SW-04-00	1998	Surface water	Surface	(1), (3), (4)
PAI-10-SW-05-00	1998	Surface water	Surface	(1), (3), (4)
PAI-10-SW-06-00	1998	Surface water	Surface	(1), (3), (4)
PAI-10-SW-07-00	1998	Surface water	Surface	(1), (3), (4)
PAI-10-SW-08-00	1998	Surface water	Surface	(1), (3), (4), (5)
PAI-10-SW-08-00-D	1998	Surface water	Surface	(1), (3), (4), (5)
PAI-10-SW-09-00	1998	Surface water	Surface	(1), (2), (3), (4), (5)
PAI-10-SW-10-00	1998	Surface water	Surface	(1), (2), (3), (4), (5)
PAI-10-SW-11-00	1998	Surface water	Surface	(1), (3), (4)
PAI-10-SW-12-00	1998	Surface water	Surface	(1), (3), (4), (5)
PAI-10-SW-13-00	1998	Surface water	Surface	(1), (2), (3), (4), (5)
PAI-10-SW-14-00	(6)	(6)	(6)	(6)
PAI-10-SW-15-00	(6)	(6)	(6)	(6)
PAI-10-SW-16-00	1998	Surface water	Surface	(1), (3), (4), (5)
PAI-10-SW-17-00	1998	Surface water	Surface	(1), (3), (4), (5)
PAI-10-SW-18-00	1998	Surface water	Surface	(1), (3), (4), (5)

PAI-01-SW-001-00D - duplicate sample

1 TOC, hardness ($CaCO_3$).
2 Hexavalent chromium.
3 TCL volatiles, semivolatiles, pesticides, PCBs, TAL metals (totals), TAL metals, (dissolved) cyanide.
4 Dissolved oxygen, salinity, temperature, pH, and turbidity.
5 Secchi disk.
6 Background samples were inadvertently numbered during the field event, so a surface water sample was not associated with sample location PAI-10-SW-14 and PAI-10-SW-15.

TABLE 3-9

SUMMARY OF SURFACE WATER QUALITY PARAMETERS
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample Number	Temperature (°C)	pH	Specific Conductance (mS/cm)	Dissolved Oxygen (mg/L)	Salinity (%)	Turbidity (NTU)	Secchi Disk (FT)
PAI-10-SW-01-00	30.9	7.27	36.6	7.56	2.34	175	1
PAI-10-SW-02-00	30.5	7.31	33.6	7.66	2.13	200	1
PAI-10-SW-03-00	37.9	7.60	48.5	5.90	3.18	33	(1)
PAI-10-SW-04-00	34.1	7.31	44.6	6.98	2.89	250	(1)
PAI-10-SW-05-00	33.6	7.40	44.1	6.48	2.85	75	(1)
PAI-10-SW-06-00	30.6	7.26	38.2	7.43	2.45	12	(1)
PAI-10-SW-07-00	33.9	7.38	38.1	7.11	2.42	<10	(1)
PAI-10-SW-08-00	30.9	7.33	45.3	11.87	2.95	9	0.83
PAI-10-SW-08-00-D	30.9	7.33	45.3	11.87	2.95	9	0.83
PAI-01-SW-09-00	29.9	7.24	45.3	13.19	2.95	50	1.07
PAI-10-SW-10-00	30.4	7.07	45.2	11.06	2.94	36	0.95
PAI-10-SW-11-00	26.8	6.40	48.7	6.5	3.19	27	(1)
PAI-01-SW-12-00	30.9	6.75	44.9	8.82	2.91	48	0.83
PAI-01-SW-13-00	30.2	7.37	45.0	12.76	2.93	15	0.67
PAI-01-SW-14-00	(2)	(2)	(2)	(2)	(2)	(2)	(2)
PAI-01-SW-15-00	(2)	(2)	(2)	(2)	(2)	(2)	(2)
PAI-01-SW-16-00	27.4	6.72	44.3	3.25	2.87	7	0.75
PAI-01-SW-17-00	28.7	7.65	44.7	4.64	2.91	<9	1.35
PAI-01-SW-18-00	28.4	7.51	44.5	3.79	2.91	23	0.25

1. Surface water too shallow to obtain Secchi Disk readings.
2. Background samples were inadvertently numbered during the field event so a surface water sample was not associated with sample location PAI-10-SW-14 and PAI-10-SW-15.

mS/cm - milliSiemens per centimeter.
mg/L - milligram per liter.
NTU - Nephlometric turbidity units.

TABLE 3-10

SUMMARY OF SEDIMENT SAMPLES COLLECTED
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Sample ID	Date Collected	Medium	Depth Collected (Feet)	Analysis
PAI-10-SD-01-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-01-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-02-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-02-01D	1998	Sediment	0-0.5	(1), (2)
PAI-10-SD-02-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-02-01DA	1998	Sediment	0-0.5	(4)
PAI-10-SD-03-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-03-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-04-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-04-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-05-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-05-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-06-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-06-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-07-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-07-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-08-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-08-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-09-01	1998	Sediment	0-0.5	(1), (2), (3), (5), (6)
PAI-10-SD-09-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-10-01	1998	Sediment	0-0.5	(1), (2), (3), (5), (6)
PAI-10-SD-10-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-11-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-11-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-12-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-12-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-13-01	1998	Sediment	0-0.5	(1), (2), (3), (5), (6)
PAI-10-SD-13-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-14-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-14-02	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-14-01A	1998	Sediment	0.5-1.0	(4)
PAI-10-SD-14-02A	1998	Sediment	0.5-1.0	(4)
PAI-10-SD-15-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-15-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-16-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-16-01A	1998	Sediment	0-0.5	(4)
PAI-10-SD-17-01	1998	Sediment	0-0.5	(1), (2), (5), (6)
PAI-10-SD-17-01A	1998	Sediment	0-0.5	(4)

TABLE 3-10

SUMMARY OF SEDIMENT SAMPLES COLLECTED
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Sample ID	Date Collected	Medium	Depth Collected (Feet)	Analysis
PAI-10-SD-18-01 PAI-10-SD-18-01A	1998 1998	Sediment Sediment	0-0.5 0-0.5	(1), (2), (5), (6) (4)
PAI-10-SD-19-01	1999	Sediment	0-0.5	(1) excluding VOCs
PAI-10-SD-20-01	1999	Sediment	0-0.5	(1) excluding VOCs

PAI-10-SD-02-01D - duplicate sample.
PAI-10-SD-01-01A – Addendum sample collected in December 1998. All other samples collected July to September 1998.

1 TCL VOCs, SVOCs, pesticides, PCBs, TAL metals (Total), cyanide.
2 TOC, pH.
3 Hexavalent chromium.
4 PAH.
5 AVS/SEM.
6 Grain size analysis and bulk density.

TABLE 3-11

HYDRAULIC CONDUCTIVITY TESTING RESULTS
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Well	Rising Head Test Result (ft/day)	Falling Head Test Result (ft/day)	Average Hydraulic Conductivity (ft/day)
PAI-10-MW-01 (S)	1.32	1.32	1.32
PAI-10-MW-02 (D)	7.39	7.26	7.33
PAI-10-MW-03 (S)	6.1		6.1
PAI-10-MW-04 (D)	0.56	0.54	0.55
PAI-10-MW-05 (S)	3.17		3.17
PAI-10-MW-06 (D)	16.3	16.3	16.3
PAI-10-MW-07 (S)	6.18		6.18
PAI-10-MW-08 (D)	2.61	3.54	3.07
PAI-10-MW-09 (S)	3.41		3.41
PAI-10-MW-10 (D)	0.49	1.23	0.86
PAI-10-MW-11 (S)	2.22	1.54	1.88
PAI-10-MW-12 (D)	2.91	3.54	3.22
PAI-10-MW-13 (S)	5.53	4.75	5.14
PAI-10-MW-14 (D)	6.25	9.03	7.64
Geometric Mean, Shallow Wells	3.39 ft/day		
Geometric Mean, Deep Wells	3.30 ft/day		

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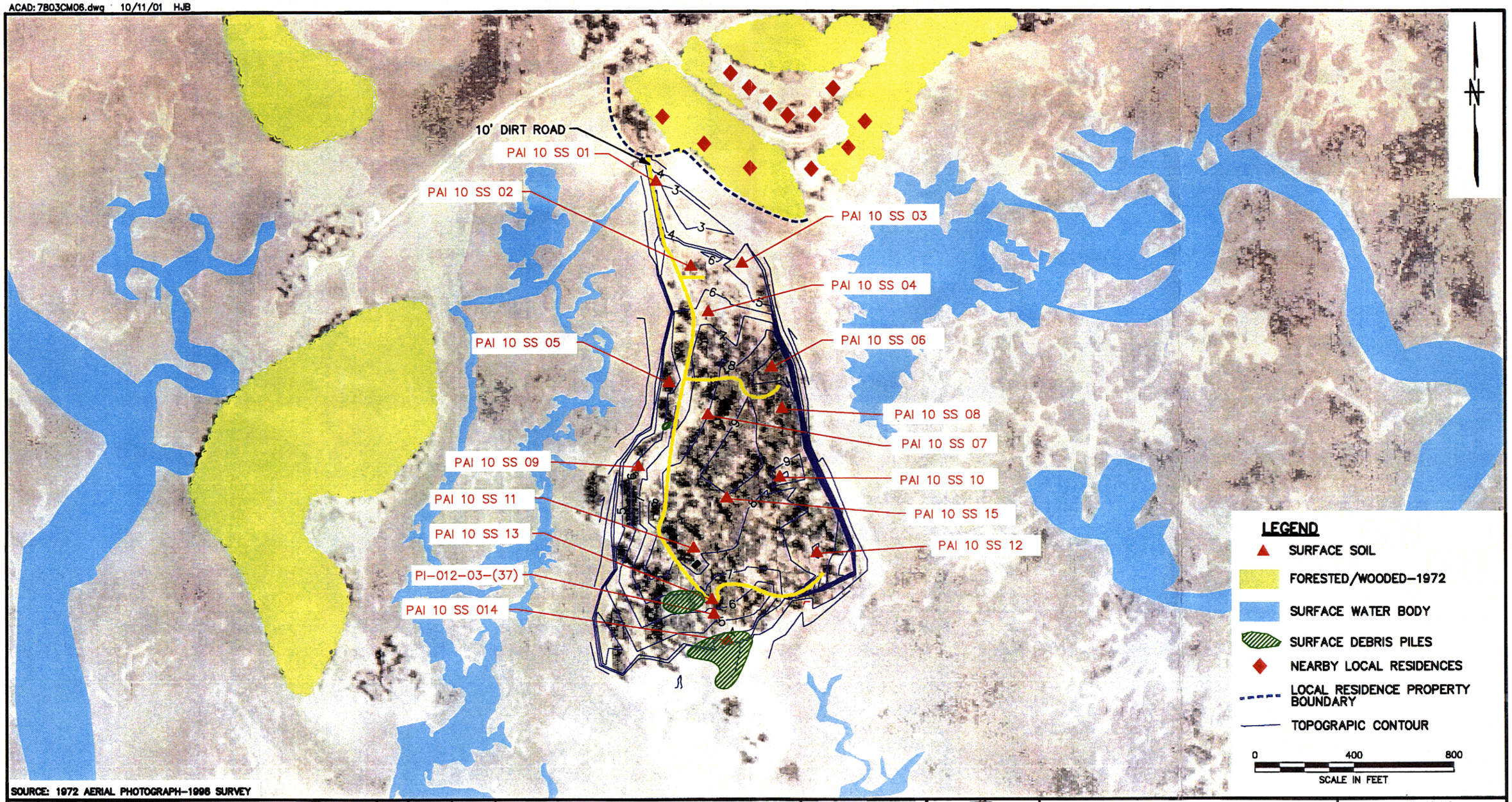


SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 7/25/00
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

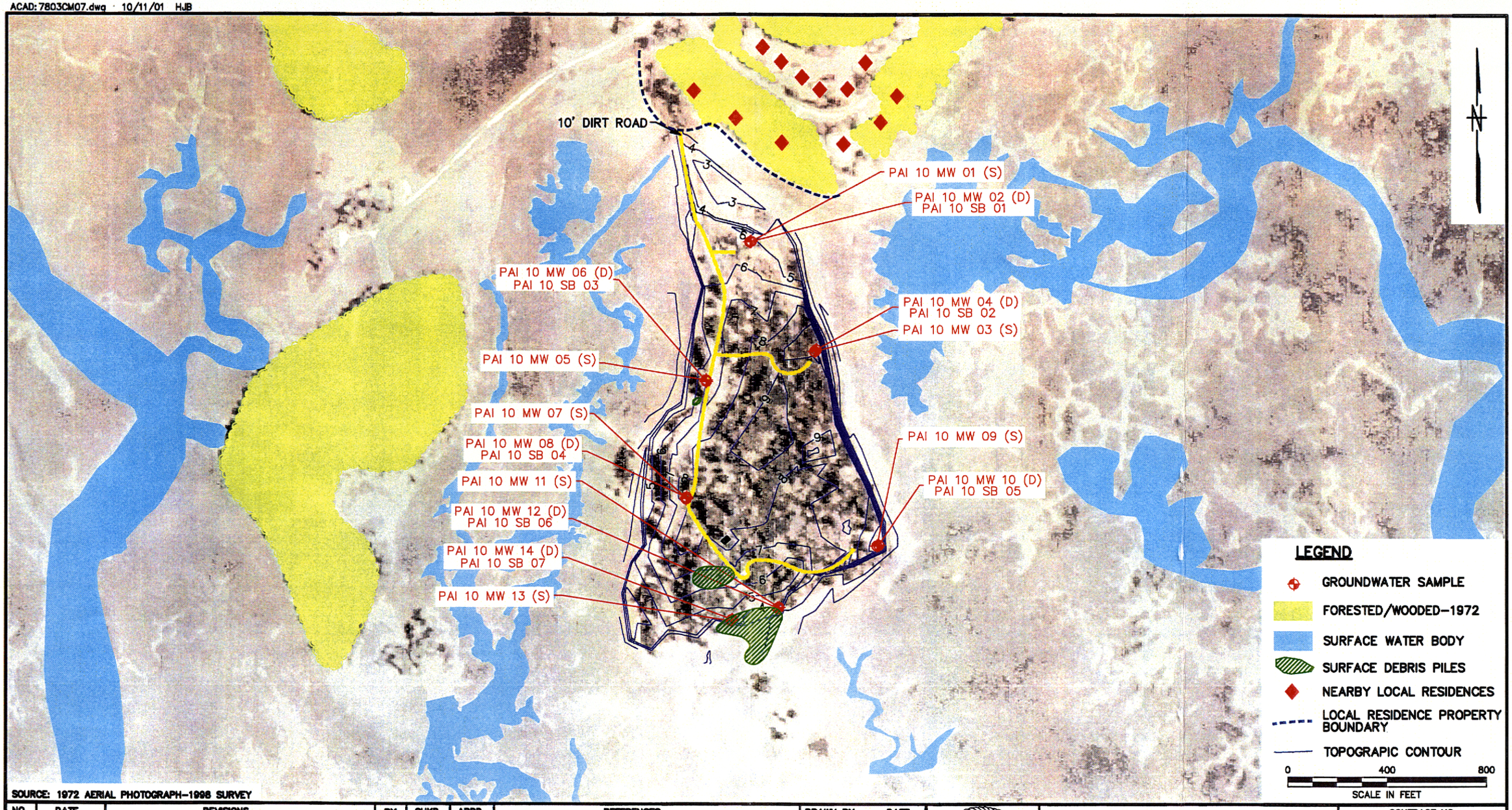
DEPARTMENT OF THE NAVY · SOUTHDIV FACILITIES ENGINEERING COMMAND

SURFACE SOIL
SAMPLE LOCATION MAP
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-1
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD: 7803CM07.dwg · 10/11/01 HJB



SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

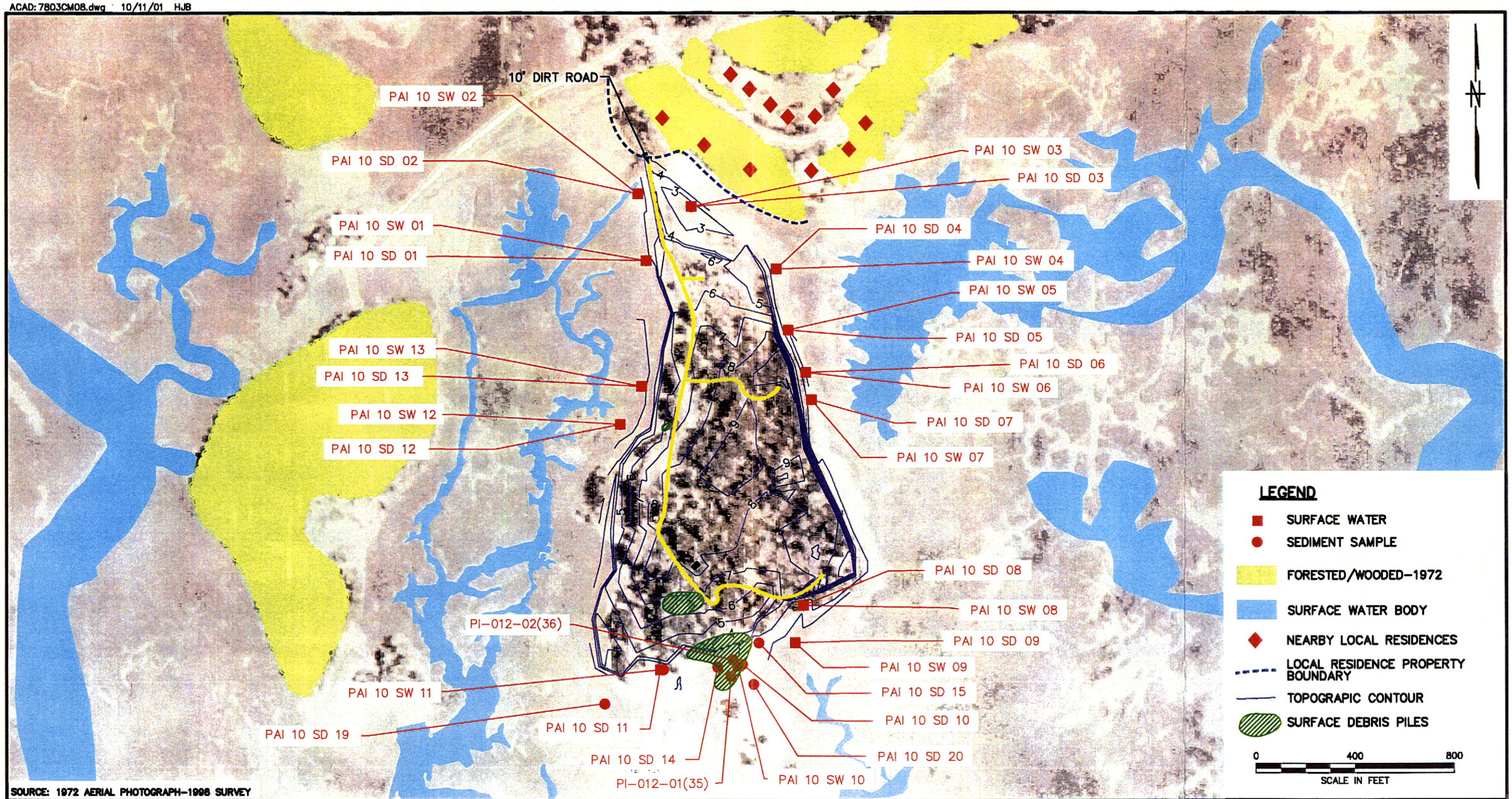
DRAWN BY MF DATE 7/25/00
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

SOIL BORING AND MONITORING WELL LOCATION MAP
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-2
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD: 7803CM08.dwg 10/11/01 HJB



SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 7/24/00
CHECKED BY DATE
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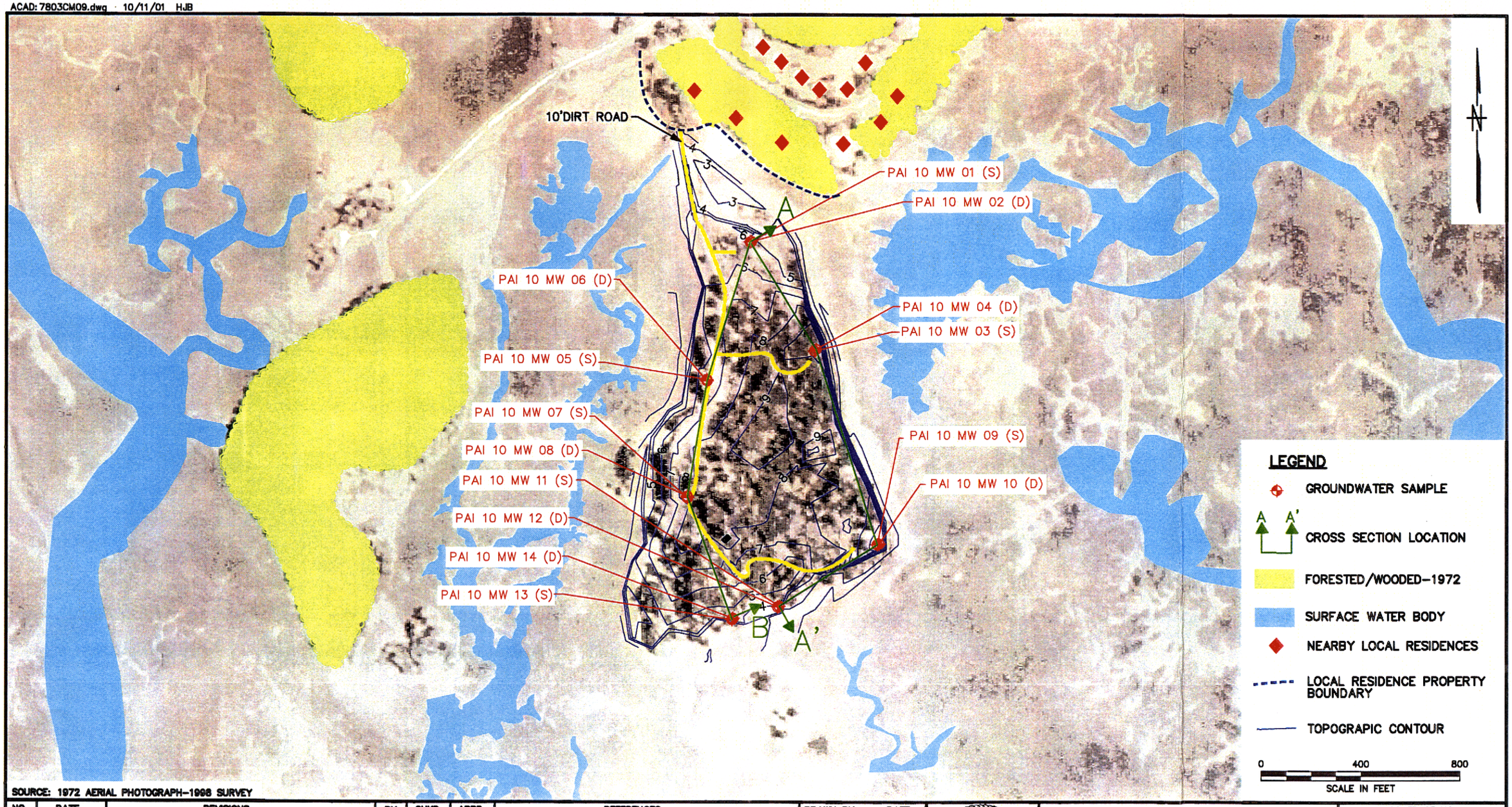
DEPARTMENT OF THE NAVY NAVFAC SOUTHERN DIV FACILITIES ENGINEERING COMD

SURFACE WATER AND SEDIMENT SAMPLE LOCATION MAP
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-3
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD: 7803CM09.dwg 10/11/01 HJB



SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 7/25/00
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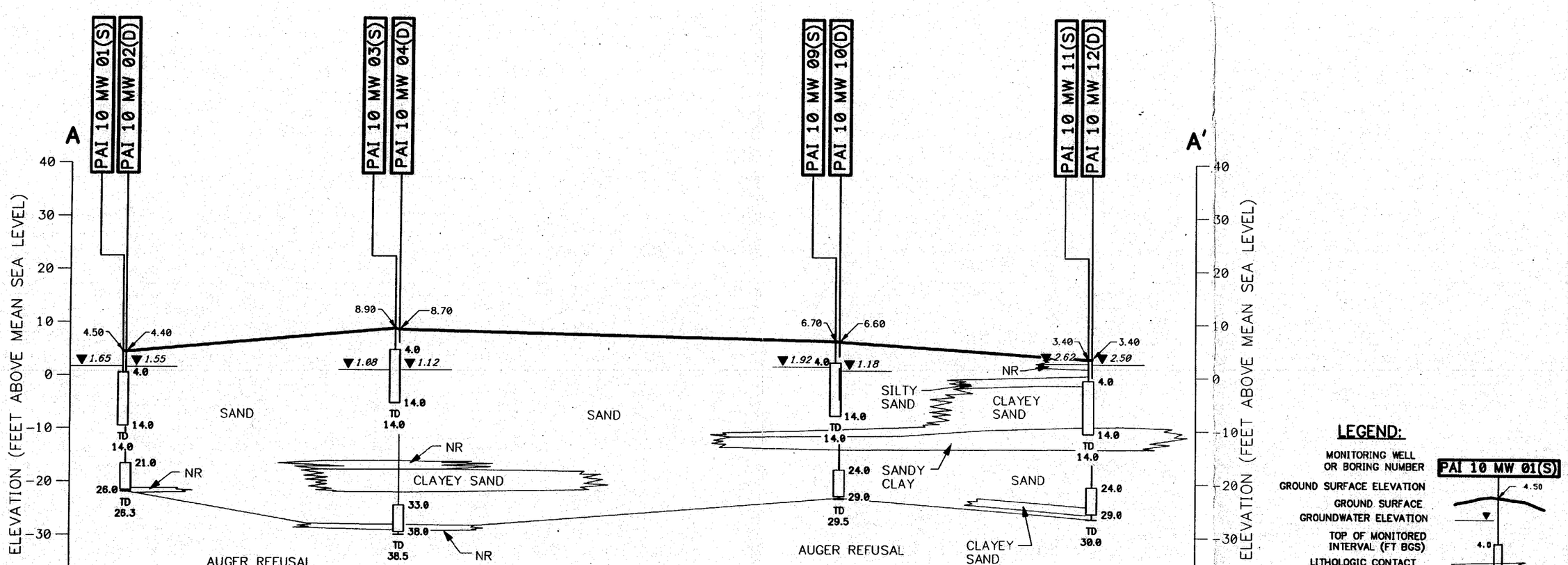
COST/SCHED-AREA
SCALE AS NOTED

CROSS SECTION
LOCATION MAP
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-4
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD: 7803CX03.dwg 08/29/00 HJP



LEGEND:

MONITORING WELL OR BORING NUMBER — PAI 10 MW 01(S)
GROUND SURFACE ELEVATION — 4.50
GROUND SURFACE
GROUNDWATER ELEVATION
TOP OF MONITORED INTERVAL (FT BGS) — 4.0
LITHOLOGIC CONTACT (INFERRED BETWEEN BORINGS)
BOTTOM OF MONITORED INTERVAL (FT BGS) — 14.0
TOTAL DEPTH OF WELL OR BORING (FT BGS) — TD 14.0
NR = NO RECOVERY

0 200 400
HORIZONTAL SCALE IN FEET

0 20 40
VERTICAL SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 8/29/00
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COST/SCHED-AREA
SCALE AS NOTED

DEPARTMENT OF THE NAVY · NAVFAC · SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

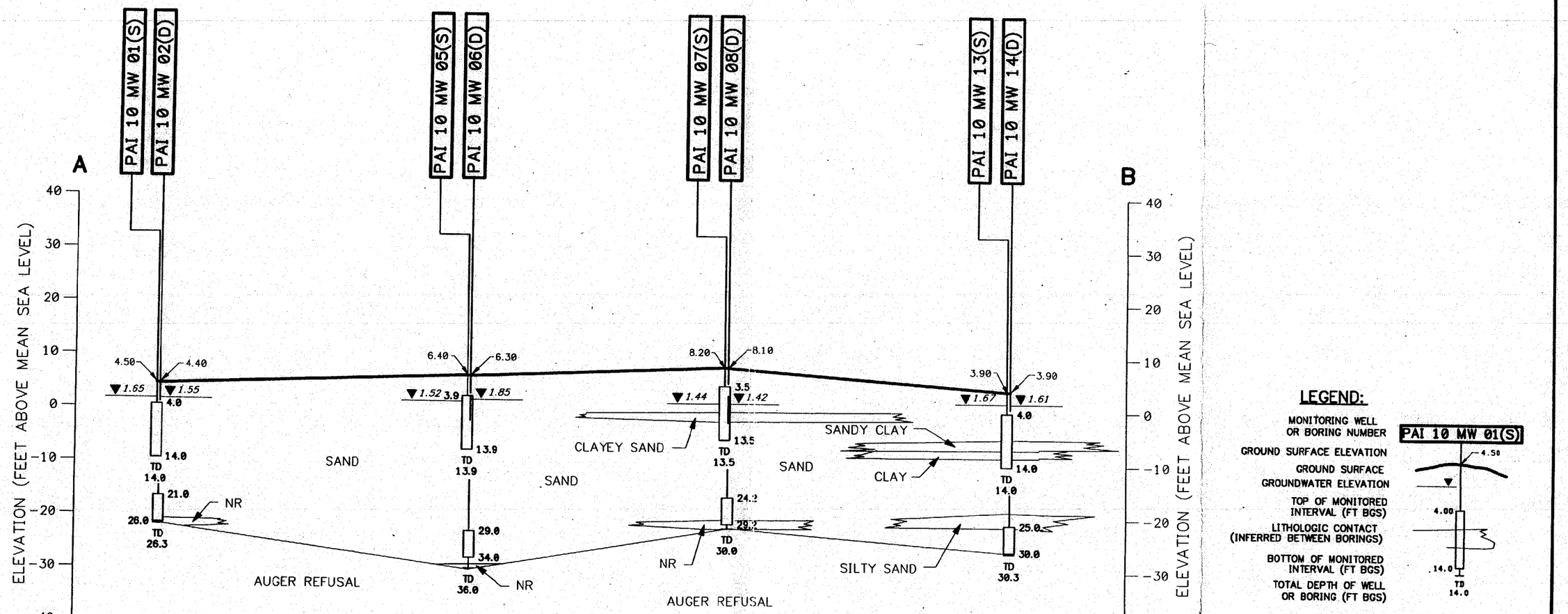
CROSS SECTION A–A'
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-5
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

227AB32

ACAD: 7803CX04.dwg 08/29/00 HJP



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 8/29/00
CHECKED BY DATE
COST/SCHED–AREA
SCALE AS NOTED

CROSS SECTION A–B
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3-6
REV. 0

FORM CADD NO. SDIV_BH.DVG - REV 0 - 1/20/98

4.0 NATURE AND EXTENT OF CONTAMINATION

This section discusses the nature and extent of contamination at Site 12, based on sampling results from the 1995 Navy relative site ranking and the 1998 to 2001 RI/RFI.

In 1995, one surface soil [PI-012-03(37)] and two sediment samples [PI-012-01(35) and PI-012-02(36)] were collected as part of the Navy's relative site ranking efforts. In the summer of 1998, the RI/RFI was conducted, and surface soil, subsurface soil, groundwater, surface water, and sediment samples were collected at the locations identified in Figures 3-1, 3-2, and 3-3. Three additional sediment sampling events occurred in December 1998, December 1999, and April 2001 as part of the RI/RFI; the sample locations are identified in Figure 3-3. A complete set of analytical results from the 1995 and 1998-01 sampling events is presented in Appendix C.

Analytical results from the 1995 and 1998-01 sampling events were compared to human health and ecological criteria on a preliminary basis. Data presented in Section 4.0 figures exceed background levels and human health risk-based concentrations (RBCs) (corresponding to 1.0×10^{-6} carcinogenic risk or a Hazard Index of 1.0) or ecological screening values. A detailed discussion pertaining to the comparison of analytical results to U.S. EPA human health and ecological criteria is provided in the human health and ecological risk assessments presented in Sections 6.0 and 7.0, respectively. Inorganic background levels are based on samples collected from areas that are remote from the investigative sites and other waste management activities at Parris Island and are therefore biased toward clean to avoid anthropogenic sources of contamination. For each background area, sample locations were visually located in the field to confirm the absence of waste management activities and represent a range of undisturbed soils and sediment types. The two locations selected for background samples are Pickney Island and an undeveloped area on the southwestern portion of Parris Island. See Appendix A for sample locations. Six background samples were collected for all media of concern, except groundwater. Positive detections were noted for most inorganic parameters (see Table 4-1). The background values presented in Table 4-1 are based on U.S. EPA Region 4 protocol and equal two times the mean value. A complete set of analytical results is presented in Appendix C.

During the testing, the best available reliable analytical methods were used. However, for some samples, elevated detection limits occurred because of sample moisture content and/or other matrix interferences. For chemicals that were not detected in any sample, the chemical was assumed not to be present at the site. If the chemical was detected in one or more samples, then one half the detection limit would be used for average concentration calculations. Normally, this evaluation would use the laboratory-reported sample quantitation limit (SQL). In some cases in which the screening value is very low relative to the quantitation limit and it appears that the chemical may be carried through the evaluation only because of

the elevated SQL, then individual sample method detection limit (MDL) may be developed and used for the calcuations.

Data were validated in accordance with the U.S. EPA National Functional Guidance for Organic and Inorganic Data Review (U.S.EPA, 1994c,d).

The following sections discuss the 1995 and 1998-01 analytical results for surface soil, groundwater, surface water, and sediment. Subsurface soil samples were collected during the RI/RFI. These samples were only analyzed for TOC, pH, natural moisture content, grain size, Atterberg limits, porosity, bulk density, and specific gravity. The results are located in Appendix A. Because chemical parameters were not part of the subsurface soil analyses, this medium is not included in the nature and extent discussion.

4.1 SURFACE SOIL

Table 4-2 presents a statistical summary of 1995 and 1998 surface soil results. Figure 4-1 identifies the organics and inorganics that exceeded background levels and U.S. EPA human health or ecological criteria. The human health criteria consist of the soil concentration equal to the lower of a 1E-06 incremental lifetime cancer risk or a Hazard Quotient equal to 1.0 under the residential use scenario (U.S. EPA Region 3 RBCs). The ecological criterion is based on U.S. EPA Region 4 guidance. See Sections 6.0 and 7.0 for a more detailed evaluation.

4.1.1 1995 Results

One surface soil sample [PI-012-03(37)] was collected in 1995. The VOCs carbon disulfide, carbon tetrachloride, and PCE were detected at low levels (6 µg/kg, 6 µg/kg, and 1 µg/kg, respectively). All detected VOCs were below human health and ecological screening values. Several SVOCs were detected including benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, dimethyl phthalate, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene. Concentrations ranged from 34 µg/kg [dibenz(a,h)anthracene] to 180 µg/kg (dimethyl phthalate). Detected inorganics included aluminum (4,160 mg/kg), chromium (8.2 mg/kg), iron (2,940 mg/kg), lead (31.7 mg/kg), manganese (21.1 mg/kg), and zinc (43 mg/kg).

4.1.2 1998 Results

VOCs detected in surface soil in 1998 included 2-hexanone, 4-methyl-2-pentanone, acetone, chloroform, chloromethane, and toluene. 2-Hexanone, chloroform, and chloromethane were detected in one or two of the samples at maximum concentrations of 0.0085 mg/kg, 0.0075 mg/kg, and 0.017 mg/kg, respectively. Toluene was found in the majority of samples (nine out of 15) at a maximum concentration of

0.0039 mg/kg at location PAI-10-SS-13A. Acetone and 4-methyl-2-pentanone were detected at maximum concentrations of 0.35 mg/kg (PAI-10-SS-11) and 0.026 mg/kg (PAI-10-SS-09), respectively. The range of detected VOC levels in soil was generally low. Most VOCs were not detected at concentrations exceeding human health or ecological screening values (Figure 4-1). Only one VOC, chloroform, exceeded an ecological screening criteria (sample locations: . PAI-10-SS-09-01 and PAI-10-SS-13-01). No detected VOCs exceeded a human health screening criterion.

SVOCs detected in 1998 surface soil samples included 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, bis(2-ethylhexyl) phthalate, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, pentachlorophenol, phenanthrene, and pyrene. Most of the SVOCs were detected in only one to three samples. Bis(2-ethylhexyl) phthalate was detected in nine samples. The maximum concentrations ranged from 0.024 mg/kg (anthracene) to 2.7 mg/kg (naphthalene). 2-Methylnaphthalene, acenaphthylene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, fluorene, naphthalene, pentachlorophenol, phenanthrene, and pyrene were detected at concentrations exceeding ecological screening criteria. Only one SVOC, benzo(a)pyrene, exceeded a human health criterion at location PAI-10-SS-08, at a concentration of 120 J mg/kg.

Detected pesticides included 4,4'-DDE and methoxychlor. The pesticides were detected in only one sample of the 15 samples collected in 1998. Methoxychlor was detected at a concentration of 0.07 mg/kg (PAI-10-SS-14) and 4,4'-DDE was detected at a concentration of 0.043 mg/kg (PAI-10-SS-14). The detection of 4,4'-DDE exceeded its ecological screening criterion.

Inorganics were also detected throughout the surface soil samples collected at Site 12. These inorganics included aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, vanadium, and zinc. Essential nutrients like calcium, magnesium, potassium, and sodium were also detected.

Aluminum, arsenic, chromium, iron, lead, nickel, and vanadium were detected in all samples. Barium (11/15), mercury (11/15), manganese (9/15), zinc (8/15), and copper (7/16) were detected in fewer samples. The following metals were detected in five or fewer samples: antimony, beryllium, cadmium, cobalt, and selenium.

Several metals were detected at elevated levels. Aluminum and iron were detected at maximum levels of 5,370 mg/kg and 99,700 mg/kg, respectively. Lead was detected at a maximum level of 1,100 mg/kg. Zinc was detected at a maximum level of 1,020 mg/kg. The range of maximum detections for the remaining metals (excluding the essential nutrients) was 0.12 mg/kg (selenium) to 522 mg/kg

(manganese). Nearly all the maximum levels for these metals were detected at sample location PAI-10-SS-14 (Figure 4-1). Antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, and zinc exceeded background levels and a screening criterion (Figure 4-1).

4.1.3 Comparison of 1995 and 1998 Results

Table 4-3 presents a comparison of the 1995 maximum detections to the 1998 maximum detections. Six additional and different VOCs were detected in the soil samples collected in 1998 in comparison to the 1995 results. Carbon disulfide, carbon tetrachloride, and PCE were not detected in the soil samples collected in 1998. VOC concentrations were generally less than 0.1 mg/kg (excluding acetone, which was detected at a maximum level of 0.35 mg/kg in 1998). In general, twice as many VOCs were detected in the 1998 soil samples.

More SVOCs were detected in the 1998 sampling event compared to the 1995 sampling event. All SVOC concentrations increased in the 1998 samples, with the exception of benzo(b)fluoranthene, benzo(g,h,i)perylene, dibenz(a,h)anthracene, and dimethyl phthalate.

Only two pesticides were detected in 1998: 4,4'-DDE and methoxychlor. No pesticides were detected in 1995.

With the exception of aluminum, iron, and zinc, inorganics were generally found at higher concentrations in 1998 compared to 1995.

For evaluation of data, the 1995 sample will be combined with the 1998 sample data.

4.1.4 April 2001 sampling results

Analytical results from 1998 samples collected at surface soil sample locations PAI-10-SS-08 and PAI-10-SS-12 indicated that elevated levels of PAHs were present at both sampling locations and an estimated detection of pentachlorophenol was present at PAI-10-SS-12. Consequently, the MCRD Parris Island partnering team decided to resample these locations in April 2001 for these parameters to confirm the 1998 results. A comparison of the 1998 and 2001 samples is presented in Table 4-4.

At surface soil location PAI-10-SS-08, the 2001 analytical results denote higher PAH concentrations than those detected in 1998. In most cases, the 2001 PAH concentrations were one order of magnitude higher than 1998 results and most detected PAHs exceeded ecological screening criteria. Additionally, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and B(a)P equivalent concentrations exceeded human health screening criterion in the 2001

sample. Consequently, the 2001 analytical results at PAI-10-SS-08 confirm the results of the 1998 sampling and indicate that potential risks to human health and the environment may be present at this location.

At surface soil location PAI-10-SS-12, 10 PAHs were detected in the 2001 sample; however, none of the detected concentrations exceeded human health or ecological screening criterion. In addition, pentachlorophenol was not detected in the 2001 sample. Accordingly, the 2001 analytical results at PAI-10-SS-12 indicate that risks to human health and the environment are not present at this location and do not confirm the 1998 results.

4.1.5 Surface Soil Summary

The following conclusions and observations can be made from the surface soil data:

- Of the 10 detected VOCs, one (chloroform) was detected above a screening criterion (U.S. EPA Region 4 soil ecological screening value). The detected concentrations of chloroform were located at surface soil sample locations PAI-10-SS-11 and PAI-10-SS-13, located near the inland southern debris pile. No general trend is apparent in the spatial distribution of the other detected VOCs.

- PAHs were the most frequent type of SVOC detected in surface soil. All PAH exceedences were located at one of three surface soil sample locations [PAI-10-SS-08, PAI-10-SS-12, or PI-012-03(37)]. PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances (ATSDR, 1996) and may be attributable to the surface debris piles on the island.

- One other SVOC, pentachlorophenol, was detected once at surface soil location PAI-10-SS-08 in 1998. A surface soil sample collected in 2001 at this location did not indicate the presence of pentachlorophenol.

- Two pesticides (4,4'-DDE and methoxyclor) were detected infrequently in surface soil. Each pesticide was detected at only one surface soil location. Only the 4,4'-DDE detection at PAI-10-SS-14 exceeded a screening criterion (U.S. EPA Region 4 soil ecological screening values). This location is found in the southern portion of the site and may be attributable to the surface debris piles. Site 12 was once used as farmland and the 4,4'-DDE detection may also be attributable to past pesticide use for agricultural purposes.

- Ten inorganic analytes exceeded screening criteria. All but two of the inorganic exceedances were observed at surface soil location PAI-10-SS-14, which is located within the southern most debris pile and indicates that the presence of inorganics at this location is likely related to the surface debris. One arsenic and one manganese screening criteria exceedance was located in the northern portion of the site. Detected concentrations at these locations are within a factor of two of naturally occurring concentrations.

4.2 GROUNDWATER

Table 4-5 presents a statistical summary of the 1998 groundwater results (groundwater was not sampled in the 1995 event). Figure 4-2 identifies the organics and inorganics that exceeded U.S. EPA human health or ecological criteria. The human health criteria consist of the groundwater concentration equal to the lower of a 1E-06 incremental lifetime cancer risk or a Hazard Quotient equal to 1.0 under the potable water use scenario (U.S. EPA Region 3 RBCs). For ecological screening, the U.S. EPA Region 4 saltwater ecological screening value was used based on the assumption that groundwater would become surface water. See Sections 6.0 and 7.0 for a more detailed evaluation.

VOCs detected in groundwater included acetone, carbon disulfide, chloroform, chloromethane, toluene, and trichloroethene. Carbon disulfide was detected in one-half of the 14 samples. The maximum concentration of this VOC was 24 µg/L. The other VOCs were detected in four or fewer of the samples. The maximum concentrations of these VOCs ranged from 0.2 µg/L (toluene) to 650 µg/L (acetone). Acetone and chloroform were detected at concentrations that exceeded the human health RBC (Figure 4-2).

Two SVOCs were detected: benzoic acid and di-n-butyl phthalate. Both SVOCs were detected once with a maximum level of 1 µg/L and were less than the human health and ecological criteria (Figure 4-2).

The following inorganics were detected in the non-filtered groundwater samples collected from Site 12: aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, manganese, nickel, selenium, thallium, vanadium, and zinc. Essential nutrients like calcium, magnesium, potassium, and sodium were also detected.

The following inorganics were detected in nearly all the samples: arsenic, barium, iron, manganese, and vanadium. The other metals were detected in five or fewer samples. Iron was detected at a maximum level of 122,000 µg/L. Aluminum was detected at a maximum concentration of 5,140 µg/L. The maximum concentration of manganese was 1,530 µg/L. The remaining metals (excluding essential nutrients) were detected at maximum levels ranging from 7.1 µg/L (selenium) to 216 µg/L (barium). Thallium exceeded human health criteria at one location, and arsenic, iron, and manganese exceeded

human health criteria at several locations (Figure 4-2). No ecological screening criteria were exceeded. Detections of iron and manganese are likely attributable to natural sources.

Filtered results were relatively similar to total results (Table 4-6). In filtered groundwater, the following metals were detected: aluminum, arsenic, barium, cadmium, chromium, cobalt, copper, iron, manganese, nickel, selenium, vanadium, and zinc. Essential nutrients like calcium, magnesium, potassium, and sodium were also detected.

Arsenic, barium, iron, manganese, and vanadium were detected in nearly all the samples. The remaining metals were detected in seven or fewer samples. Iron was detected at a maximum concentration of 124,000 µg/L. The maximum level of manganese was 1,530 µg/L. The remaining metals (excluding essential nutrients) were detected at maximum levels ranging from 2.8 µg/L (copper) to 391 µg/L (aluminum). Nickel levels exceeded the ecological screening value at two sample locations (Figure 4-2). No other ecological screening criteria were exceeded.

The following conclusions and observations can be made from groundwater data:

- In groundwater, two VOCs (acetone and chloroform) were detected at concentrations that exceeded human health screening criteria (U.S. EPA Region 3 Tapwater RBCs). No other organic compounds detected in groundwater exceeded a human health screening criterion and no organics exceeded an ecological screening criterion. Detected concentrations of acetone and chloroform are relatively infrequent with minor exceedances. Acetone and chloroform are both extraction solvents commonly used by analytical laboratories.

- In a comparison of unfiltered inorganic groundwater results to human health criteria, detections of four inorganics (arsenic, iron, manganese, and thallium) exceeded such criteria. In a comparison of filtered groundwater results to U.S. EPA Region 4 surface water ecological screening values (assuming groundwater discharges to surface water), only detections of nickel exceeded such criteria. However, the following should be noted.

  - Arsenic was detected at concentrations less than MCLs.
  - Iron and manganese are likely attributable to natural sources.
  - Thallium was detected in only one groundwater sample and infrequently throughout other media.
  - Nickel was detected in only three groundwater samples. The maximum detected value was only 1.2 times above its ecological screening criterion.

- No trend regarding the spatial distribution of contaminants in groundwater is apparent. A maximum concentration of one of the detected chemicals can be found in 12 of the 14 monitoring wells.

4.3 SURFACE WATER

Table 4-7 presents a statistical summary of the 1998 surface water results. (Surface water was not sampled in the 1995 event.) Figure 4-3 identifies the organics and inorganics that exceeded background and U.S. EPA human health or ecological criteria. The human health criteria consist of the surface water concentration equal to the lower of a 1E-06 incremental lifetime cancer risk or a Hazard Quotient equal to 1.0 for consumption of surface water and organisms (U.S. EPA water quality standards). The U.S. EPA Region 4 salt water screening levels are used for ecological screening. See Sections 6.0 and 7.0 for a more detailed evaluation.

Organic compounds detected in surface water samples included 2-butanone, acetone, bis(2-ethylhexyl) phthalate, butylbenzyl phthalate, carbon disulfide, and phenol. Carbon disulfide and butylbenzyl phthalate were found in five of 13 total samples, and the other organics were detected in one or two samples. Maximum detections ranged from 1 µg/L to 13 µg/L (acetone). Other than bis(2-ethylhexyl) phthalate, no organic compounds exceeded human health or ecological screening values (Figure 4-3).

The following inorganics were detected in the non-filtered surface water sample collected from Site 12: aluminum, arsenic, barium, chromium, iron, manganese, selenium, and vanadium. Essential nutrients like calcium, magnesium, potassium, and sodium were also detected.

In the unfiltered samples, aluminum was detected at a maximum concentration of 12,900 µg/L. Iron was detected at a maximum level of 7,890 µg/L. The range of maximum detections of the other metals was 9 µg/L (arsenic) to 214 µg/L (manganese). Most metals were detected in nearly all the surface water samples, with the exception of selenium, which was detected in only two samples. Detections of arsenic, iron, and manganese exceeded human health screening criteria. No ecological screening criteria were exceeded.

Detected filtered metals results included arsenic, barium, chromium, manganese, thallium, vanadium, and zinc. Essential nutrients like calcium, magnesium, potassium, and sodium were also detected. Maximum levels of the filtered metals ranged from 7.9 µg/L (arsenic) to 253 µg/L (barium). Thallium was detected at one location (PAI-10-SW-10) in excess of ecological screening criteria. No human health screening criteria were exceeded.

The following conclusions and observations can be made from surface water data:

- In surface water samples, one SVOC [bis(2-ethylhexyl)phthalate] exceeded a human health screening criterion. No other organic compound detected in surface water exceeded a human health screening criterion and no organics exceeded an ecological screening criterion. Phthalates are common in the environment due to plastic wastes (ATSDR, 1993).

- In a comparison of unfiltered inorganic surface water results to human health criteria, detections of three inorganics (arsenic, iron, and manganese) exceeded such criteria. The maximum concentration of these analytes were located in the northern portion of the site, remote from any surface debris pile. The maximum detected concentrations of these chemicals are within a factor of four of naturally occurring concentrations.

- In a comparison of filtered surface water results to U.S. EPA Region 4 ecological screening values, only detections of thallium exceeded such criteria. The only exceedance of thallium is located in the southern portion of the site near the southern debris piles and this detection could be related to the debris piles.

4.4 SEDIMENT

4.4.1 1995 Results

Table 4-8 presents a statistical summary of the 1995 sediment results. These samples [PI-012-01(35) and PI-012-02(36)] are also referred to as the sediment waste samples because they were collected within a waste pile area. Figure 4-4 identifies the organics and inorganics that exceeded background levels and U.S. EPA human health or ecological criteria. The human health criteria consist of the soil concentration equal to the lower of a 1E-06 incremental lifetime cancer risk or a Hazard Quotient equal to 1.0 under the residential use scenario (U.S. EPA Region 3 RBCs) assuming that the sediment is the same as surface soils. The ecological criteria consist of the U.S. EPA Region 4 screening values. See Sections 6.0 and 7.0 for a more detailed evaluation.

No VOCs were detected in the two sediment waste samples.

Three phthalates were the only SVOCs detected in the sediment waste samples. Bis(2-ethylhexyl) phthalate and di-n-octyl phthalate were detected in sample PI-012-01(35) and diethyl phthalate was detected in sample PI-012-02(36). As shown in Figure 4-4, bis(2-ethylhexyl) phthalate, at a concentration of 10 mg/kg, and di-n-octyl phthalate, at a concentration of 0.9 mg/kg, exceeded the ecological screening level.

Six pesticides were detected in the two sediment waste samples. 4.4'-DDE was detected in both samples and 4,4'-DDT, Aroclor 1254, dieldrin, endrin, and alpha-BHC were detected in just one sample. Detected concentrations of all pesticides except alpha-BHC exceeded ecological screening values. The detection of Aroclor 1254 also exceeded its human health screening criterion.

The following inorganics were detected in the sediment waste samples: aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, silver, vanadium, and zinc. Essential nutrients like calcium, magnesium, potassium, and sodium were also detected.

Concentrations of aluminum, magnesium, potassium, sodium, and vanadium were within background levels. Antimony, arsenic, cadmium, chromium, copper, iron, lead, nickel, silver, and zinc were detected at levels exceeding human health RBCs and/or ecological screening values (Figure 4-4).

4.4.2 1998-99 Results

Table 4-9 presents a statistical summary of the 1998-99 sediment TCL/TAL analytical results. Table 4-10 presents the results of sediment grain size and TOC analysis. Figure 4-5 identifies the organics and inorganics that exceeded background levels and/or U.S. EPA human health or ecological criteria. The human health criteria consist of the soil concentration equal to the lower of a 1E-06 incremental lifetime cancer risk or a Hazard Quotient equal to 1.0 under the residential use scenario (U.S. EPA Region 3 RBCs), assuming that the sediment is the same as surface soils. The ecological criteria consist of the U.S. EPA Region 4 screening values. See Sections 6.0 and 7.0 for a more detailed evaluation.

VOCs detected in sediment at Site 12 included the following: 2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone, carbon disulfide, toluene, and xylenes (total). The detected SVOCs included two phthalates [bis(2-ethylhexyl) phthalate and di-n-octyl phthalate], nine PAHs [acenaphthene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene], and pentachlorophenol. Pesticides were detected in sediment and included 4,4'-DDT, alpha-chlordane, gamma-chlordane, and methoxychlor.

Carbon disulfide was detected in 13 of the 16 samples at a maximum concentration of 0.031 mg/kg. Acetone and toluene were detected in one-half of the samples at maximum levels of 0.39 mg/kg and 0.023 mg/kg, respectively. The remaining VOCs were detected in six or fewer samples at maximum concentrations ranging from 0.0023 mg/kg (xylenes) to 0.0537 mg/kg (4-methyl-2-pentanone). As shown in Figure 4-5, no VOCs exceeded human health RBCs or ecological screening values.

Most of the SVOCs were detected in one or two samples, with the exception of benzo(a)pyrene, which was detected in seven out of 16 samples, and bis(2-ethylhexyl) phthalate, which was detected in one-half

of the samples. Maximum concentrations ranged from 0.018 mg/kg [benz(a)anthracene and benzo(k)fluoranthene] to 0.44 mg/kg [bis(2-ethylhexyl) phthalate]. Acenaphthene, benzo(b)fluoranthene, and bis(2-ethylhexyl) phthalate were detected at concentrations exceeding ecological screening criteria (Figure 4-5).

Pesticides were detected in just one sample, PAI-10-SD-14 (see Figure 4-5). The maximum concentrations ranged from 0.012 mg/kg (alpha-chlordane) to 0.68 mg/kg (methoxychlor). 4,4'-DDT, alpha-chlordane, and gamma-chlordane were detected at levels that exceeded ecological screening criteria (Figure 4-5).

The following inorganics were detected in the sediment at Site 12: aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, thallium, vanadium, and zinc. Essential nutrients like calcium, magnesium, potassium, and sodium were also detected.

The following metals were detected in most of the samples (11 or more out of 18 samples): aluminum, arsenic, barium, beryllium, chromium, iron, lead, nickel, manganese, vanadium, and zinc. Cobalt, copper, and mercury were detected in seven to 10 samples. Antimony, cadmium, selenium, and thallium were detected in three or fewer samples. Aluminum was detected at a maximum concentration of 52,700 mg/kg. The maximum level of iron was 43,100 mg/kg. The range of maximum detections for the other metals was 0.1 mg/kg (selenium) to 60,800 mg/kg (sodium). Sodium and thallium were the only inorganics that did not exceed the background concentration. Antimony, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, and zinc were detected at levels exceeding screening criteria (Figure 4-5).

4.4.3 Comparison of 1995 and 1998 to 1999 Sediment Results

Table 4-11 presents a comparison of the 1995 maximum detections to the 1998 to 1999 maximum detections. Although no VOCs were detected in 1995, seven VOCs were detected in 1998 to 1999. Detected concentrations of VOCs were less than 0.1 mg/kg, with the exception of acetone, which was detected at a maximum level of 0.39 mg/kg.

More SVOCs were detected in the 1998 to1999 sampling event than in the 1995 sampling event. Most SVOC concentrations increased in the 1998 to 1999 samples, with the exception of bis(2-ethylhexyl) phthalate, di-n-octyl phthalate, and diethyl phthalate.

Fewer pesticides and PCBs were detected in the 1998 to 1999 samples. The following compounds were detected in the 1995 samples but were not detected in the 1998 soil samples: 4,4'-DDE, alpha-BHC,

Aroclor 1254, dieldrin, and endrin. Three pesticides were detected in 1998 to 1999 that were not detected in 1995: alpha chlordane, gamma chlordane, and methoxychlor.

Inorganic concentrations both increased and decreased between the two sampling events. The following inorganics increased: aluminum, beryllium, magnesium, mercury, nickel, potassium, selenium, sodium, thallium, and vanadium. The following inorganics were detected in 1998 to 1999, but not in 1995: beryllium, mercury, and thallium. For risk assessment purposes, the sediment and sediment waste samples will be addressed separately.

4.4.4 Sediment Summary

The following conclusions and observations can be made from sediment data:

- PAHs were detected infrequently in sediment; however, two PAHs [acenaphthene and benzo(b)fluoranthene] were detected in the southern portion of the island at concentrations above screening criterion. PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances (ATSDR, 1996) and may be attributable to the surface debris piles on the island.

- Bis(2-ethyhexyl)phthalate] was detected more frequently (8/18 sediment samples and 1/2 sediment waste samples). These concentrations exceeded ecological screening criterion in five samples. Phthalates are common in the environment due to plastic wastes (ATSDR, 1993).

- Five pesticides (4,4'-DDE, 4,4'-DDT, alpha-chloradane, gamma-chlordane, and dieldrin) and one PCB (Aroclor-1254) exceeded ecological screening criteria (U.S. EPA Region 4 screening values). The exceedances were localized to the southern portion of the site and may be attributable to the surface debris piles. The pesticide detections may also be attributable to past pesticide use for agricultural purposes at the site.

- Ten inorganics (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc) exceeded their ecological screening criteria and background concentration and three inorganics (arsenic, iron, and lead) exceeded a human health screening criteria and background concentration. All of the exceedances were localized to the southern portion of the site and are likely attributable to the southern surface debris piles.

TABLE 4-1

SUMMARY OF DETECTED BACKGROUND CONCENTRATIONS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
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	N/A	<2 to <5
2-Butanone	<6 to <8	22	N/A	<2 to <5
Acetone	267	<7 to <110	N/A	<2 to <5
Chloromethane	<4 to <8	<7 to <18	N/A	0.68
Carbon Disulfide	<4 to <8	9.2	N/A	<1 to <2
Toluene	5.7	9.7	N/A	<0.5 to <1
Xylenes	<4 to <8	<7 to <18	N/A	1
Bis(2-ethylhexyl) phthalate	<340 to <390	421	N/A	45
Fluorene	646	<10 to <1200	N/A	<0.24 to <5
Indeno(1,2,3-cd)pyrene	<43 to <370	518	N/A	2.6
Beta-BHC	<1.8 to <8.9	7.1	N/A	<0.024 to <0.05
Inorganics	**(mg/kg)**	**(mg/kg)**	**(µg/l)**	**(µg/l)**
Aluminum	7270	24200	<22 to <99.4	3100
Arsenic	1.4	12	4.3	5.1
Barium	24	28	256	38
Beryllium	0.095	0.98	<0.2 to <0.6	<0.2 to <0.8
Cadmium	<0.03 to <0.22	0.28	<0.3 to <2	<0.3 to <0.2
Calcium	766	4000	650000	637000
Chromium	6.2	35.2	20	22.5
Cobalt	0.36	2.6	<0.6 to <3.7	<0.6 to <3.7
Copper	1.5	10	13	7
Iron	3920	21500	48	2090
Lead	12.5	21	11	<1 to <11
Magnesium	515	6400	1900000	1900000
Manganese	129	186	18	53
Mercury	0.11	0.09	<0.1 to <0.2	<0.1 to <0.2
Nickel	1.8	6	<1 to <4.4	<1 to <4.4
Potassium	313	3200	890000	830000
Selenium	0.29	<0.17 to <1.2	<1.7 to <7	<1.7 to <7
Sodium	241	19000	15900000	16000000
Thallium	0.098	0.41	<1.6 to<18	<1.6 to <18
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 one half 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.

TABLE 4-2

STATISTICAL SUMMARY OF SURFACE SOIL RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

PARAMETER	FREQUENCY OF DETECT.	RANGE OF POS. HITS	LOCATION OF MAXIMUM	AVERAGE ALL	BACK-GROUND	Human Health Screening Criteria [1]	Ecological Screening Criteria [2]	MAXIMUM > BACKGROUND
VOCs (mg/kg)								
2-Hexanone	1/16	0.0085	PAI-10-SS-09-01	0.0612	NA	3,100	NA	NA
4-Methyl-2-pentanone	6/16	0.0038 - 0.026	PAI-10-SS-09-01	0.0631	NA	6,300	NA	NA
Acetone	4/15	0.023 - 0.35	PAI-10-SS-11-01	0.1233	NA	7,800	NA	NA
Carbon Disulfide	1/16	0.006	PI-012-03(37)	0.0365	NA	7,800	NA	NA
Carbon Tetrachloride	1/16	0.006	PI-012-03(37)	0.0365	NA	4.9	1,000	NA
Chloroform	2/16	0.0018 - 0.0075	PAI-10-SS-11-01	0.0368	NA	100	**0.001**	NA
Chloromethane	2/16	0.0036 - 0.017	PAI-10-SS-11-01	0.0375	NA	49	NA	NA
Tetrachloroethene	1/16	0.001	PI-012-03(37)	0.0362	NA	12	0.01	NA
Toluene	9/16	0.0013 - 0.0039	PAI-10-SS-15-01A	0.0367	NA	16,000	0.05	NA
SEMIVOLATILES (mg/kg)								
2-Methylnaphthalene	1/16	0.6	PAI-10-SS-12-01-D	0.203	NA	1,600	**0.1** [a]	NA
Acenaphthene	1/16	0.44	PAI-10-SS-12-01-D	0.198	NA	4,700	20	NA
Acenaphthylene	1/16	0.58	PAI-10-SS-12-01-D	0.203	NA	2,300 [d]	**0.1** [b]	NA
Anthracene	1/16	0.024	PAI-10-SS-08-01	0.180	NA	23,000	0.1	NA
Benzo(a)anthracene	3/16	0.041 - 0.14	PAI-10-SS-08-01	0.168	NA	0.87	**0.1** [a]	NA
Benzo(a)pyrene	3/16	0.032 - 0.12	PAI-10-SS-08-01	0.167	NA	**0.087**	**0.1**	NA
Benzo(b)fluoranthene	3/16	0.033 - 0.13	PI-012-03(37)	0.172	NA	0.87	**0.1** [a]	NA
Benzo(g,h,i)perylene	2/16	0.05 - 0.055	PI-012-03(37)	0.172	NA	2,300 [d]	0.1 [a]	NA
Benzo(k)fluoranthene	2/16	0.034 - 0.11	PAI-10-SS-08-01	0.177	NA	8.7	**0.1** [a]	NA
Bis(2-Ethylhexyl)phthalate	9/16	0.03 - 0.48	PAI-10-SS-07-01	0.141	NA	46	NA	NA
Chrysene	3/16	0.047 - 0.16	PAI-10-SS-08-01	0.171	NA	87	**0.1** [a]	NA
Dibenzo(a,h)anthracene	1/16	0.034	PI-012-03(37)	0.178	NA	0.087	0.1 [a]	NA
Dimethyl Phthalate	1/16	0.18	PI-012-03(37)	0.188	NA	780,000	200	NA
Fluoranthene	3/16	0.041 - 0.28	PAI-10-SS-08-01	0.180	NA	3,100	**0.1**	NA
Fluorene	1/16	0.22	PAI-10-SS-12-01-D	0.192	NA	3,100	**0.1** [b]	NA
Indeno(1,2,3-cd)pyrene	2/11	0.064 - 0.069	PAI-10-SS-08-01	0.169	NA	0.87	0.1 [a]	NA
Naphthalene	1/16	2.7	PAI-10-SS-12-01-D	0.269	NA	1,600	**0.1**	NA
Pentachlorophenol	1/16	0.24	PAI-10-SS-12-01-D	0.381	NA	5.3	**0.002**	NA
Phenanthrene	2/16	0.069 - 0.14	PAI-10-SS-08-01	0.181	NA	2,300 [d]	**0.1**	NA
Pyrene	4/16	0.024 - 0.23	PAI-10-SS-08-01	0.166	NA	2,300	**0.1**	NA
PESTICIDES/PCBs (mg/kg)								
4,4'-DDE	1/16	0.043	PAI-10-SS-14-01	0.004	NA	1.9	**0.0025**	NA
Methoxychlor	1/16	0.07	PAI-10-SS-13-01	0.013	NA	390	0.1	NA
INORGANICS (mg/kg)								
Aluminum	16/16	822 - 5370	PAI-10-SS-14-01	3399	7270	78,000	50	No
Antimony	1/16	8	PAI-10-SS-14-01	1.376	NA	31	**3.5**	Yes
Arsenic	16/16	0.24 - 50.8	PAI-10-SS-14-01	3.87	**1.44**	**0.43**	**10**	Yes
Barium	12/16	7 - 76.4	PAI-10-SS-14-01	13.2	23.6	5,500	165	Yes
Beryllium	5/16	0.08 - 0.18	PAI-10-SS-12-01	0.078	0.095	160	1.1	Yes

TABLE 4-2

STATISTICAL SUMMARY OF SURFACE SOIL RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
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PARAMETER	FREQUENCY OF DETECT.	RANGE OF POS. HITS	LOCATION OF MAXIMUM	AVERAGE ALL	BACK-GROUND	Human Health Screening Criteria [1]	Ecological Screening Criteria [2]	MAXIMUM > BACKGROUND
Cadmium	2/16	0.06 - 3.2	PAI-10-SS-14-01	0.294	NA	39	**1.6**	Yes
Calcium	16/16	33.9 - 2780	PAI-10-SS-14-01	308	766	NA	NA	Yes
Chromium	16/16	1.8 - 18.1	PAI-10-SS-14-01	4.16	6.23	120,000 [e]	**10** [c]	Yes
Cobalt	6/16	0.47 - 6.6	PAI-10-SS-14-01	0.722	0.363	4,700	20	Yes
Copper	8/16	0.55 - 189	PAI-10-SS-14-01	13.2	1.52	3,100	**40**	Yes
Iron	16/16	485 - 99700	PAI-10-SS-14-01	8124	**3920**	**23,000**	**200**	Yes
Lead	16/16	4.4 - 1100	PAI-10-SS-14-01	78.6	12.5	**400** [f]	**50**	Yes
Magnesium	16/16	123 - 3240	PAI-10-SS-14-01	432	515	NA	NA	Yes
Manganese	10/16	10.6 - 522	PAI-10-SS-14-01	66.2	**129**	1,600	**100**	Yes
Mercury	11/16	0.02 - 0.89	PAI-10-SS-14-01	0.089	**0.110**	23 [g]	**0.1**	Yes
Nickel	16/16	0.61 - 26.5	PAI-10-SS-14-01	2.68	1.80	1,600	30	Yes
Potassium	16/16	57.8 - 640	PAI-10-SS-14-01	153	313	NA	NA	Yes
Selenium	5/16	0.09 - 0.12	PAI-10-SS-08-01	0.093	0.285	390	0.81	No
Sodium	7/16	27.1 - 10700	PAI-10-SS-14-01	1133	241	NA	NA	Yes
Vanadium	16/16	1.7 - 9.3	PAI-10-SS-14-01	4.52	9.50	550	2.0	No
Zinc	9/16	4.1 - 1020	PAI-10-SS-14-01	72.4	9.70	23,000	**50**	Yes
MISCELLANEOUS PARAMETERS								
Ph	10/10	4.3 - 7.7	PAI-10-SS-02-01	5.43	NA	NA	NA	NA
Total Organic Carbon	10/10	0.41 - 0.96	PAI-10-SS-07-01	0.7	NA	NA	NA	NA

Associated Samples:

PAI-10-SS-01-01	PAI-10-SS-05-01	PAI-10-SS-09-01	PAI-10-SS-13-01
PAI-10-SS-02-01	PAI-10-SS-06-01	PAI-10-SS-10-01	PAI-10-SS-14-01
PAI-10-SS-03-01	PAI-10-SS-07-01	PAI-10-SS-11-01	PAI-10-SS-15-01A
PAI-10-SS-04-01	PAI-10-SS-08-01	PAI-10-SS-12-01	PI-012-03(37)

1. U.S. EPA Region 3 Soil Residential RBCs (April 13, 2000).
2. U.S. EPA Region 4 Ecological Screening Levels.

a Benzo(a)pyrene was used as a surrogate for high molecular weight PAH compounds when an ESV was not available.
b Naphthalene was used as a surrogate for low molecular weight PAH compounds when an ESV was not available.
c ESV for total chromium. Hexavalent chromium not detected.
d Value for pyrene.
e Value for trivalent chromium, hexavalent chromium was not detected in surface soil.
f OSWER screening level.
g Value for mercuric chloride.

NA = Not Applicable.
Bold values indicate that the screening level has been exceeded. If a background value is greater than a screening level that has been exceeded, the background value is also bolded.

TABLE 4-3

COMPARISON OF 1995 AND 1998 SOIL RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

PARAMETER	1995 [1] Maximum	1998 [1] Maximum	Change (+/-)	Background Level
Volatiles (mg/kg)				
2-Hexanone	ND	0.0085	+	NA
4-Methyl-2-pentanone	ND	0.026	+	NA
Acetone	ND	0.35	+	NA
Carbon Disulfide	0.006	ND	-	NA
Carbon Tetrachloride	0.006	ND	-	NA
Chloroform	ND	0.0075	+	NA
Chloromethane	ND	0.017	+	NA
Tetrachloroethene	0.001	ND	-	NA
Toluene	ND	0.0039	+	NA
Semivolatiles (mg/kg)				
2-Methylnaphthalene	ND	0.385	+	NA
Acenaphthene	ND	0.305	+	NA
Acenaphthylene	ND	0.375	+	NA
Anthracene	ND	0.024	+	NA
Benzo(a)anthracene	0.041	0.14	+	NA
Benzo(a)pyrene	0.053	0.12	+	NA
Benzo(b)fluoranthene	0.130	0.12	-	NA
Benzo(g,h,i)perylene	0.055	0.05	-	NA
Benzo(k)fluoranthene	ND	0.11	+	NA
Bis(2-ethylhexyl)phthalate	ND	0.48	+	NA
Chrysene	0.062	0.16	+	NA
Dibenzo(a,h)anthracene	0.034	ND	-	NA
Dimethylphthalate	0.180	ND	-	NA
Fluoranthene	0.041	0.28	+	NA
Fluorene	ND	0.22	+	NA
Indeno(1,2,3-cd)pyrene	0.064	0.069	+	NA
Naphthalene	ND	1.435	+	NA
Pentachlorophenol	ND	0.24	+	NA
Phenanthrene	ND	0.14	+	NA
Pyrene	0.043	0.23	+	NA
Pesticides/PCBs (mg/kg)				
4,4'-DDE	ND	0.043	+	NA
Methoxychlor	ND	0.07	+	NA
Inorganics (mg/kg)				
Aluminum	4,160	5,370	-	7270
Antimony	ND	8	+	NA
Arsenic	0.78	50.8	+	1.4366
Barium	12.3	76.40	+	23.6334
Beryllium	ND	0.17	+	0.095
Cadmium	0.06	3.2	+	NA
Calcium	155	2,780	+	766.3334
Chromium	8.2	18.10	+	6.2334

TABLE 4-3

COMPARISON OF 1995 AND 1998 SOIL RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

PARAMETER	1995 [1] Maximum	1998 [1] Maximum	Change (+/-)	Background Level
Cobalt	0.47	6.60	+	0.3634
Copper	3.3	189	+	1.5184
Iron	2,940	99,700	-	3920
Lead	31.7	1,100	+	12.5334
Magnesium	220	3,240	+	515
Manganese	21.1	522	+	128.5
Mercury	0.091	0.89	+	0.11
Nickel	1.5	26.50	+	1.8
Potassium	137	640	+	312.6666
Selenium	ND	0.12	+	0.285
Sodium	ND	10,700	+	240.8166
Vanadium	3.8	9.30	+	9.5
Zinc	43	1,020	-	9.70

NA = Not applicable or available.

1 Average values used for those samples where a duplicate sample was collected.

TABLE 4-4

COMPARISON OF PAI-10-SS-08 AND PAI-10-SS-12 1998 AND 2001 RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	PAI-10-SS-08-01 1998	PAI-10-SS-08-02 2001	Human Health Screening Criteria [1]	Ecological Screening Criteria [2]
2-METHYLNAPHTHALENE	ND	9 J	1,600,000	100[a]
ACENAPHTHENE	ND	30	4,700,000	20,000
ACENAPHTHYLENE	ND	32	2,300,000[b]	100[c]
ANTHRACENE	24 J	350 J	23,000,000	100
BENZO(A)ANTHRACENE	140 J	3,100	870	100[a]
BENZO(A)PYRENE	120 J	1,700	87	100
BENZO(B)FLUORANTHENE	120 J	2,900	870	100[a]
BENZO(G,H,I)PERYLENE	50 J	1,200	2,300,000[b]	100[a]
BENZO(K)FLUORANTHENE	110 J	1,400	8,700	100[a]
CHRYSENE	160 J	1,800	87,000	100[a]
DIBENZO(A,H)ANTHRACENE	ND	840 J	87	100[a]
FLUORANTHENE	280 J	4,000	3,100,000	100
FLUORENE	ND	17 J	3,100,000	100[c]
INDENO(1,2,3-CD)PYRENE	69 J	1,300	870	100[a]
NAPHTHALENE	ND	10 J	1,600,000	100
PHENANTHRENE	140 J	1,600	2,300,000[b]	100
PYRENE	230 J	3,400	2,300,000	100
B(a)P EQUIVALENTS [d]	214	3,286	434[e]	NA
TOTAL PAH CONC. [d]	1,464	16,888	NA	1,000

Parameter	PAI-10-SS-12-01 1998	PAI-10-SS-12-01-D 1998	PAI-10-SS-12-02 2001	Human Health Screening Criteria [1]	Ecological Screening Criteria [2]
2-METHYLNAPHTHALENE	ND	600	ND	1,600,000	100[a]
ACENAPHTHENE	ND	440	ND	4,700,000	20,000
ACENAPHTHYLENE	ND	580	ND	2,300,000[b]	100[c]
BENZO(A)ANTHRACENE	ND	ND	33	870	100[a]
BENZO(A)PYRENE	ND	ND	33	87	100
BENZO(B)FLUORANTHENE	ND	ND	53	870	100[a]
BENZO(G,H,I)PERYLENE	ND	ND	16 J	2,300,000[b]	100[a]
BENZO(K)FLUORANTHENE	ND	ND	15 J	8,700	100[a]
CHRYSENE	ND	ND	27	87,000	100[a]
FLUORANTHENE	ND	ND	39	3,100,000	100
FLUORENE	ND	220 J	ND	3,100,000	100[c]
INDENO(1,2,3-CD)PYRENE	NA	NA	22	870	100[a]
NAPHTHALENE	ND	2,700	ND	1,600,000	100
PENTACHLOROPHENOL	ND	240 J	ND	5,300	2
PHENANTHRENE	ND	ND	16 J	2,300,000[b]	100
PYRENE	ND	ND	40	2,300,000	100
B(a)P EQUIVALENTS [d]	154	154	47	434[e]	NA
TOTAL PAH CONC. [d]	794	5,029	203	NA	1,000

1. U.S. EPA Region 3 Soil Residential RBCs (April 13, 2000).
2. U.S. EPA Region 4 Ecological Screening Levels.

a Benzo(a)pyrene was used as a surrogate for high molecular weight PAH compounds when an ESV was not available.
b Naphthalene was used as a surrogate for low molecular weight PAH compounds when an ESV was not available.
c Value for pyrene.
d Value derived via methodology provided in Appendix G.
e Seven times the Region 9 PRG for benzo(a)pyrene.

Blacked cells indicate that a criterion has been exceeded.

TABLE 4-5

STATISTICAL SUMMARY OF TOTAL GROUNDWATER RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	Frequency of Detection	Range of Positive Detects	Range of Nondetects	Location of Maximum Positive Detect	Average All	Back-ground	Human Health Screening Criteria [1]	Ecological Screening Criteria[2]
Volatiles (ug/L)								
Acetone	4/10	9.3 - 650	5 - 50	PAI-10-GW-08-01	159	NA	**610**	NA
Carbon Disulfide	7/14	0.2 - 24	1 - 10	PAI-10-GW-10-01	2.95	NA	1,000	NA
Chloroform	4/14	0.4 - 4.5	1 - 10	PAI-10-GW-04-01	1.49	NA	**0.15**	815
Chloromethane	2/14	0.2 - 0.3	1 - 10	PAI-10-GW-10-01	1.11	NA	2.1	2700
Toluene	1/14	0.2	1 - 10	PAI-10-GW-04-01	1.12	NA	750	37
Trichloroethene	1/14	0.4	1 - 10	PAI-10-GW-04-01	1.14	NA	1.6	NA
Semivolatiles (ug/L)								
Benzoic Acid	1/12	1	25 - 26	PAI-10-GW-01-01	11.6	NA	150,000	NA
Di-n-butyl phthalate	1/14	1	5	PAI-10-GW-10-01	2.39	NA	3,700	3.4
Inorganics (ug/L)								
Aluminum	6/13	532 - 5140	22 - 168	PAI-10-GW-03-01	1030	NA	37,000	NA
Arsenic	12/14	1.075 - 35.4	0.9	PAI-10-GW-02-01	10.6	NA	**0.045**	NA
Barium	14/14	36.4 - 216	NA	PAI-10-GW-12-01	121	NA	2,600	NA
Cadmium	7/14	1.9 - 8.1	2 - 200	PAI-10-GW-12-01	9.56	NA	18	NA
Calcium	13/13	21800 - 501000	NA	PAI-10-GW-10-01	255092	NA	NA	NA
Chromium	6/14	8.1 - 23.2	6.4 - 32	PAI-10-GW-10-01	10.2	NA	55,000 [a]	NA
Cobalt	3/14	3.9 - 11.7	3.3	PAI-10-GW-08-01/PAI-10-GW-06-01	3.25	NA	2,200	NA
Copper	2/14	2.7 - 8.1	2.6	PAI-10-GW-06-01	1.89	NA	1,500	NA
Iron	13/13	4150 - 122000	NA	PAI-10-GW-05-01	46916	NA	**11,000**	NA
Magnesium	13/13	18600 - 1100000	NA	PAI-10-GW-14-01	517877	NA	NA	NA
Manganese	13/13	44.7 - 1530	NA	PAI-10-GW-06-01	609	NA	**730**	NA
Nickel	3/14	5.3 - 10.5	4.4	PAI-10-GW-08-01	3.37	NA	730	NA
Potassium	13/13	4370 - 371000	NA	PAI-10-GW-13-01	147198	NA	NA	NA
Selenium	1/14	7.1	0.7 - 17.5	PAI-10-GW-09-01	2.62	NA	180	NA
Sodium	13/13	146000 - 8670000	NA	PAI-10-GW-13-01	3894846	NA	NA	NA
Thallium	1/14	10	9 - 18	PAI-10-GW-06-01	5.21	NA	**2.6**	NA
Vanadium	12/14	3.7 - 14.2	2.6	PAI-10-GW-09-01	7.88	NA	260	NA
Zinc	5/14	7.5 - 82.8	7.9 - 19.5	PAI-10-GW-06-01	13.9	NA	11,000	NA

Associated Samples:

PAI-10-GW-01-01	PAI-10-GW-05-01	PAI-10-GW-09-01	PAI-10-GW-13-01
PAI-10-GW-02-01	PAI-10-GW-06-01	PAI-10-GW-10-01	PAI-10-GW-14-01
PAI-10-GW-03-01	PAI-10-GW-07-01	PAI-10-GW-11-01	
PAI-10-GW-04-01	PAI-10-GW-08-01	PAI-10-GW-12-01	

1. U.S. EPA Region 3 Tapwater RBCs (April 13, 2000).
2. U.S. EPA Region 4 Ecological Screening Levels (saltwater). Filtered inorganic results are screened against ecological criteria (See Table 4-5).

a Value for trivalent chromium, hexavalent chromium was not detected in groundwater.

NA = Not applicable.
Bold values indicate that the screening level has been exceeded. If a background value is greater than a screening level that has been exceeded, the background value is also bolded.

TABLE 4-6

STATISTICAL SUMMARY OF FILTERED GROUNDWATER RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	Frequency of Detection	Range of Positive Detects	Range of Nondetects	Location of Maximum Positive Detect	Average All	Back-ground	Human Health Screening Criteria (1)	Ecological Screening Criteria (2)
Inorganics (ug/L)								
Aluminum	2/13	299 - 391	22 - 113	PAI-10-GW-06-01-F	67.4	NA	NA	NA
Arsenic	14/14	0.775 - 35.9	NA	PAI-10-GW-02-01-F	10.6	NA	NA	36
Barium	14/14	55.3 - 366	NA	PAI-10-GW-14-01-F	147	NA	NA	NA
Calcium	13/13	22650 - 520000	NA	PAI-10-GW-10-01-F	258088	NA	NA	NA
Cadmium	4/14	3 - 9.2	2	PAI-10-GW-12-01-F	2.52	NA	NA	9.3
Chromium	6/14	4.95 - 17.3	6.4 - 64	PAI-10-GW-10-01-F	9.13	NA	NA	103
Cobalt	2/14	13.7 - 15.5	3.3	PAI-10-GW-08-01-F	3.50	NA	NA	NA
Copper	1/14	2.8	2.6	PAI-10-GW-06-01-F	1.41	NA	NA	2.9
Iron	13/13	2700 - 124000	NA	PAI-10-GW-05-01-F	47562	NA	NA	NA
Magnesium	13/13	18850 - 1100000	NA	PAI-10-GW-14-01-F	527012	NA	NA	NA
Manganese	13/13	44.4 - 1530	NA	PAI-10-GW-06-01-F	615	NA	NA	NA
Nickel	3/14	4.05 - 9.8	4.4	PAI-10-GW-08-01-F	3.40	NA	NA	**8.3**
Potassium	13/13	4360 - 371000	NA	PAI-10-GW-13-01-F	148768	NA	NA	NA
Selenium	1/14	25.8	0.7 - 17.5	PAI-10-GW-12-01-F	4.15	NA	NA	71
Sodium	13/13	146000 - 8640000	NA	PAI-10-GW-14-01-F	3944154	NA	NA	NA
Vanadium	12/14	2.7 - 11.7	2.6	PAI-10-GW-14-01-F	6.52	NA	NA	NA
Zinc	7/14	5.9 - 81.6	5.3 - 20.2	PAI-10-GW-06-01-F	20.6	NA	NA	86

Associated Samples:

PAI-10-GW-01-01-F	PAI-10-GW-05-01-F	PAI-10-GW-09-01-F	PAI-10-GW-13-01-F
PAI-10-GW-02-01-F	PAI-10-GW-06-01-F	PAI-10-GW-10-01-F	PAI-10-GW-14-01-F
PAI-10-GW-03-01-F	PAI-10-GW-07-01-F	PAI-10-GW-11-01-F	
PAI-10-GW-04-01-F	PAI-10-GW-08-01-F	PAI-10-GW-12-01-F	

1. U.S. EPA Region 3 Tapwater RBCs (April 13, 2000). Total inorganic results are screened against human health criteria (See Table 4-4).
2. U.S. EPA Region 4 Ecological Screening Levels (saltwater).

NA = Not applicable.
Bold values indicate the screening level has been exceeded.

TABLE 4-7

STATISTICAL SUMMARY OF TOTAL SURFACE WATER RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

PARAMETER	FREQUENCY OF DETECT.	RANGE OF POSITIVE HITS	LOCATION OF MAXIMUM	AVERAGE	BACKGROUND	Human Health Screening Criteria [1]	Ecological Screening Criteria[2]	MAXIMUM > BACKGROUND
Volatiles (ug/L)								
2-Butanone	2/2	2.1 - 2.6	PAI-10-SW-03-00	2.35	NA	1,900 (a)	NA	NA
Acetone	1/3	13	PAI-10-SW-13-00	7.70	NA	610 (a)	NA	NA
Carbon Disulfide	5/13	0.2 - 1	PAI-10-SW-02-00	0.477	NA	1000 (a)	NA	NA
Semivolatiles (ug/L)								
Bis(2-Ethylhexyl)phthalate	2/13	1 - 10.25	PAI-10-SW-08-00-AVG	2.98	NA	**1.8**	NA	NA
Butylbenzyl Phthalate	5/13	1 - 2	PAI-10-SW-04-00	2.00	NA	3000	29.4	NA
Phenol	1/13	7	PAI-10-SW-04-00	2.85	NA	21000	58	NA
Inorganics (ug/L) - Unfiltered								
Aluminum	13/13	499 - 12900	PAI-10-SW-04-00	2692	3113	37,000 (a)	NA	YES
Arsenic	13/13	2.4 - 9	PAI-10-SW-01-00	5.41	**5.13**	**0.018**	NA	YES
Barium	13/13	20.1 - 34.8	PAI-10-SW-04-00	25.6	38.4	2,600 (a)	NA	NO
Calcium	13/13	238000 - 374000	PAI-10-SW-03-00	338500	637000	NA	NA	NO
Chromium	13/13	9.5 - 32.1	PAI-10-SW-04-00	17.4	22.5	55,000 (a,b)	NA	YES
Iron	13/13	292 - 7890	PAI-10-SW-04-00	1683	**2091**	**300**	NA	YES
Magnesium	13/13	726000 - 1120000	PAI-10-SW-03-00	997615	1918667	NA	NA	NO
Manganese	13/13	30.3 - 214	PAI-10-SW-05-00	139	**53.1**	**50**	NA	YES
Potassium	13/13	264000 - 406000	PAI-10-SW-03-00	362154	831333	NA	NA	NO
Selenium	2/13	14.675 - 18	PAI-10-SW-11-00	6.16	NA	170	NA	NA
Sodium	13/13	6570000 - 10200000	PAI-10-SW-03-00	8493462	16226667	NA	NA	NO
Vanadium	12/13	13.4 - 33.9	PAI-10-SW-04-00	18.0	18.2	260 (a)	NA	YES
Inorganics (ug/L) - Filtered								
Arsenic	13/13	2.2 - 7.9	PAI-10-SW-03-00-F	5.02	4.30	NA	36	YES
Barium	13/13	17.3 - 253	PAI-10-SW-12-00-F	131.41	256.0	NA	NA	NO
Calcium	13/13	248000 - 383000	PAI-10-SW-03-00-F	340643	650000	NA	NA	NO
Chromium	13/13	8 - 22.8	PAI-10-SW-06-00-F	14.87	20.0	NA	103	YES
Magnesium	13/13	743000 - 1110000	PAI-10-SW-03-00-F	1004571	1900000	NA	NA	NO
Manganese	13/13	23.2 - 211	PAI-10-SW-02-00-F, PAI-10-SW-01-00-F	133	18.0	NA	NA	YES
Potassium	13/13	269000 - 405000	PAI-10-SW-03-00-F	363286	890000	NA	NA	NO
Sodium	13/13	6750000 - 10200000	PAI-10-SW-03-00-F	8445000	15900000	NA	NA	NO
Thallium	2/13	14 - 30.1	PAI-10-SW-11-00-F	5.63	NA	NA	**21.3**	YES
Vanadium	12/13	10.1 - 23	PAI-10-SW-03-00-F	14.5	15.0	NA	NA	YES
Zinc	6/13	61.4 - 84.7	PAI-10-SW-09-00-F	38.2	66.0	NA	86	YES

Associated Samples:

PAI-10-SW-01	PAI-10-SW-05	PAI-10-SW-09	PAI-10-SW-13
PAI-10-SW-02	PAI-10-SW-06	PAI-10-SW-10	PAI-10-SW-14
PAI-10-SW-03	PAI-10-SW-07	PAI-10-SW-11	
PAI-10-SW-04	PAI-10-SW-08	PAI-10-SW-12	

1. Criteria as published in FR 63:68354-68364 unless otherwise noted. For inorganics, unfiltered results are screened against human health criteria.
2. U.S. EPA Region 4 Ecological Screening Levels (saltwater). For inorganics, filtered results are screened against ecological criteria.

a. Water quality criteria not available EPA Region III RBC for tap water ingestion used (Cancer benchmark value = 1E-6, HI = 1.0).
b. Value for trivalent chromium; hexavalent chromium was not detected in surface water.

NA = Not applicable.
Bold values indicate that the screening level has been exceeded. If a background value is greater than a screening level that has been exceeded, the background value is also bolded.

TABLE 4-8

STATISTICAL SUMMARY OF SEDIMENT WASTE RESULTS, 1995
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Parameter	Frequency of Detection	Range of Positive Results	Location of Maximum Positive Result	Average of All Results	Background	Human Health Screening Criteria [1]	Ecological Screening Criteria [2]	Maximum > Background
Semivolatile Organics (mg/kg)								
Bis(2-Ethylhexyl)phthalate	1/2	10	PI-12-01(35)/PI-012-01(35)	5.20	NA	46	**0.182[a]**	NA
Di-n-octyl phthalate	1/2	0.9	PI-12-01(35)/PI-012-01(35)	0.605	NA	1600	**0.182[a]**	NA
Diethyl Phthalate	1/2	0.029	PI-12-02(36)/PI-012-02(36)	0.515	NA	63000	0.182[a]	NA
Pesticides/PCBs (mg/kg)								
4,4'-DDE	2/2	0.096 - 0.52	PI-12-01(35)/PI-012-01(35)	0.308	NA	1.9	**0.00207**	NA
4,4'-DDT	1/1	0.038	PI-12-02(36)/PI-012-02(36)	0.038	NA	1.9	**0.00119**	NA
Aroclor-1254	1/2	24	PI-12-01(35)/PI-012-01(35)	12.0	NA	**0.32**	**0.0216**	NA
Dieldrin	1/1	0.0062	PI-12-02(36)/PI-012-02(36)	0.006	NA	0.04	**0.00002**	NA
Endrin	1/2	1.2	PI-12-01(35)/PI-012-01(35)	0.602	NA	23	**0.00002**	NA
alpha-BHC	1/2	0.0031	PI-12-02(36)/PI-012-02(36)	0.013	NA	0.1	NA	NA
Inorganics (mg/kg)								
Aluminum	2/2	9580 - 11700	PI-12-02(36)/PI-012-02(36)	10640	24284	78000	NA	NO
Antimony	2/2	3.3 - 9.4	PI-12-02(36)/PI-012-02(36)	6.35	NA	31	**2**	YES
Arsenic	2/2	40.6 - 49.7	PI-12-02(36)/PI-012-02(36)	45.2	**12.2**	**0.43**	**7.24**	YES
Barium	2/2	66.8 - 73.2	PI-12-01(35)/PI-012-01(35)	70.0	28.0	550	NA	YES
Cadmium	2/2	1.8 - 4.7	PI-12-02(36)/PI-012-02(36)	3.25	0.278	39	**0.676**	YES
Calcium	2/2	4600 - 6670	PI-12-02(36)/PI-012-02(36)	5635	4002	NA	NA	YES
Chromium	2/2	37.8 - 119	PI-12-02(36)/PI-012-02(36)	78.4	35.2	120000 [b]	**52.3**	YES
Cobalt	2/2	8.2 - 22.7	PI-12-02(36)/PI-012-02(36)	15.5	2.63	4700	NA	YES
Copper	2/2	168 - 489	PI-12-02(36)/PI-012-02(36)	329	10.1	3100	**18.7**	YES
Iron	2/2	122000 - 307000	PI-12-02(36)/PI-012-02(36)	214500	21450	**23000**	NA	YES
Lead	2/2	589 - 2930	PI-12-02(36)/PI-012-02(36)	1760	20.6	**400 (c)**	**30.2**	YES
Magnesium	2/2	3990 - 6220	PI-12-02(36)/PI-012-02(36)	5105	6437	NA	NA	NO
Manganese	2/2	297 - 1480	PI-12-02(36)/PI-012-02(36)	889	186	1600	NA	YES
Nickel	2/2	41.4 - 86.9	PI-12-02(36)/PI-012-02(36)	64.2	5.95	1600	**15.9**	YES
Potassium	2/2	1470 - 2210	PI-12-02(36)/PI-012-02(36)	1840	3190	NA	NA	NO
Selenium	2/2	0.86 - 1.2	PI-12-01(35)/PI-012-01(35)	1.03	NA	390	NA	YES
Silver	2/2	1.1 - 1.2	PI-12-01(35)/PI-012-01(35)	1.15	NA	390	**0.733**	YES
Sodium	2/2	8870 - 11200	PI-12-01(35)/PI-012-01(35)	10035	19110	NA	NA	NO
Vanadium	2/2	27.6 - 44.9	PI-12-02(36)/PI-012-02(36)	36.3	49.6	550	NA	NO
Zinc	2/2	751 - 1520	PI-12-02(36)/PI-012-02(36)	1136	45.0	23000	**124**	YES

Associated Samples:
PI-012-01(35)/PAI-10-SDW-01
PI-012-02(36)/PAI-10-SDW-02

1 U.S. EPA Region 3 Soil Residential RBCs (April 13, 2000).
2 U.S. EPA Region 4 Ecological Screening Levels.
a Bis(2-ethylhexyl)phthalate was used as a surrogate for other phthalates.
b Value for hexavalent chromium.
c OSWER screening level.

NA = Not applicable.
Bolded cells indicate that the screening level has been exceeded. If a background value is greater than a screening level that has been exceeded, the background value is also bolded.

TABLE 4-9

STATISTICAL SUMMARY OF 1998-1999 SEDIMENT RESULTS
SITE 12/SWMU 10-JERICHO ISLAND
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

PARAMETER	FREQUENCY OF DETECT.	RANGE OF POS. HITS	LOCATION OF MAXIMUM	AVERAGE ALL	BACK-GROUND	Human Health Screening Criteria [1]	Ecological Screening Criteria [2]	MAXIMUM > BACKGROUND
VOLATILES (mg/kg)								
2-Butanone	2/16	0.005 - 0.020	PAI-10-SD-07-01	0.0291	NA	47,000	NA	NA
2-Hexanone	1/16	0.0044	PAI-10-SD-15-01	0.0280	NA	3,100	NA	NA
4-Methyl-2-pentanone	6/16	0.004 - 0.0537	PAI-10-SD-06-01	0.0315	NA	6,300	NA	NA
Acetone	8/16	0.025 - 0.39	PAI-10-SD-08-01	0.1503	NA	7,800	NA	NA
Carbon Disulfide	13/16	0.0019 - 0.031	PAI-10-SD-08-01	0.0183	NA	7,800	NA	NA
Toluene	8/16	0.0025 - 0.023	PAI-10-SD-08-01	0.0175	NA	16,000	NA	NA
Xylenes, Total	3/16	0.0018 - 0.0023	PAI-10-SD-04-01	0.0167	NA	160,000	NA	NA
SEMIVOLATILES (mg/kg)								
Acenaphthene	1/18	0.12	PAI-10-SD-20-01	0.0712	NA	4,700	**0.00671**	NA
Benzo(a)anthracene	1/16	0.018	PAI-10-SD-013-01A	0.00761	NA	0.87	0.0748	NA
Benzo(a)pyrene	7/16	0.011 - 0.038	PAI-10-SD-008-01A	0.0141	NA	0.087	0.0888	NA
Benzo(b)fluoranthene	2/16	0.025 - 0.120	PAI-10-SD-008-01A	0.0200	NA	0.87	**0.0888** [a]	NA
Benzo(k)fluoranthene	1/15	0.018	PAI-10-SD-013-01A	0.0078	NA	8.7	0.0888 [a]	NA
Bis(2-Ethylhexyl)phthalate	8/18	0.045 - 0.44	PAI-10-SD-07-01	0.331	NA	46	**0.182**	NA
Chrysene	1/16	0.044	PAI-10-SD-013-01A	0.00924	NA	87	0.108	NA
Di-n-octyl phthalate	1/18	0.063	PAI-10-SD-06-01	0.347	NA	1,600	0.182[b]	NA
Fluoranthene	1/16	0.092	PAI-10-SD-013-01A	0.0184	NA	3,100	0.113	NA
Indeno(1,2,3-cd)pyrene	1/16	0.026	PAI-10-SD-014-01A	0.0080	NA	0.87	NA	NA
Pentachlorophenol	1/18	0.18	PAI-10-SD-14-02	0.805	NA	5.3	NA	NA
Pyrene	1/16	0.089	PAI-10-SD-013-01A	0.0121	NA	2,300	0.153	NA
PESTICIDES/PCBs (mg/kg)								
4,4'-DDT	1/18	0.066	PAI-10-SD-14-02	0.00855	NA	1.9	**0.00119**	NA
Alpha-Chlordane	1/18	0.012	PAI-10-SD-14-02	0.00317	NA	1.8[d]	**0.0005**[c]	NA
Gamma-Chlordane	1/18	0.014	PAI-10-SD-14-02	0.00328	NA	1.8[d]	**0.0005**[c]	NA
Methoxychlor	1/18	0.68	PAI-10-SD-14-02	0.0628	NA	390	NA	NA
INORGANICS (mg/kg)								
Aluminum	18/18	1870 - 52700	PAI-10-SD-08-01	9844	24284	78,000	NA	YES
Antimony	2/18	3.5 - 6.8	PAI-10-SD-09-01	2.20	NA	31	**2**	YES
Arsenic	18/18	0.35 - 18.5	PAI-10-SD-08-01	4.65	**12.2**	**0.43**	**7.24**	YES
Barium	11/18	5.7 - 62.9	PAI-10-SD-08-01	12.09	28.0	5,500	NA	YES
Beryllium	13/18	0.21 - 2	PAI-10-SD-08-01	0.41	0.977	160	NA	YES
Cadmium	3/18	0.002 - 0.84	PAI-10-SD-14-01	0.23	0.278	39	**0.676**	YES
Calcium	18/18	338 - 5550	PAI-10-SD-13-01	1420	4002	NA	NA	YES
Chromium	18/18	3.2 - 75	PAI-10-SD-08-01	16.3	35.2	120,000[e]	**52.3**	YES
Cobalt	9/18	0.92 - 10.3	PAI-10-SD-14-02	2.20	2.63	4,700	NA	YES
Copper	10/18	0.03 - 113	PAI-10-SD-14-01	9.71	10.1	3,100	**18.7**	YES
Iron	18/18	1420 - 43100	PAI-10-SD-08-01	11212	21450	**23,000**	NA	YES
Lead	18/18	3.1 - 203	PAI-10-SD-14-01	22.6	20.6	400[f]	**30.2**	YES
Magnesium	18/18	1130 - 15100	PAI-10-SD-08-01	3127	6437	NA	NA	YES
Manganese	17/18	13.3 - 210	PAI-10-SD-08-01	49.7	186	1,600	NA	YES
Mercury	7/18	0.06 - 0.35	PAI-10-SD-14-01	0.07	0.090	23[g]	**0.13**	YES
Nickel	18/18	1.3 - 1060	PAI-10-SD-14-02	63.1	5.95	1,600	**15.9**	YES
Potassium	18/18	684 - 9090	PAI-10-SD-08-01	1762	3190	NA	NA	YES
Selenium	3/18	0.1 - 10.7	PAI-10-SD-20-01	1.16	NA	390	NA	YES
Sodium	18/18	3920 - 60800	PAI-10-SD-08-01	12321	19110	NA	NA	NO
Thallium	1/18	0.36	PAI-10-SD-14-02	0.72	0.405	5.5	NA	NO

TABLE 4-9

STATISTICAL SUMMARY OF 1998-1999 SEDIMENT RESULTS
SITE 12/SWMU 10-JERICHO ISLAND
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

PARAMETER	FREQUENCY OF DETECT.	RANGE OF POS. HITS	LOCATION OF MAXIMUM	AVERAGE ALL	BACK-GROUND	Human Health Screening Criteria [1]	Ecological Screening Criteria [2]	MAXIMUM > BACKGROUND
Vanadium	18/18	4.9 - 112	PAI-10-SD-08-01	23.1	49.6	550	NA	YES
Zinc	12/18	8.5 - 197	PAI-10-SD-14-01	30.6	45.0	23,000	124	YES
MISCELLANEOUS PARAMETERS								
Ph	16/16	6.7 - 7.8	PAI-10-SD-14-02	7.41	NA	NA	NA	NA
Total Organic Carbon	16/16	0.67 - 4.7	PAI-10-SD-08-01	1.61	NA	NA	NA	NA

Associated Sample Locations:

PAI-10-SD-01-01	PAI-10-SD-05-01	PAI-10-SD-09-01	PAI-10-SD-13-01	PAI-10-SD-19-01
PAI-10-SD-02-01	PAI-10-SD-06-01	PAI-10-SD-10-01	PAI-10-SD-14-01	PAI-10-SD-20-01
PAI-10-SD-03-01	PAI-10-SD-07-01	PAI-10-SD-11-01	PAI-10-SD-14-02	
PAI-10-SD-04-01	PAI-10-SD-08-01	PAI-10-SD-12-01	PAI-10-SD-15-01	

1. U.S. EPA Region 3 Soil Residential RBCs (April 13, 2000).
2. U.S. EPA Region 4 Ecological Screening Levels.

a Benzo(a)pyrene was used as surrogate for benzo(b)fluoranthene and benzo(k)fluoranthene.
b Bis(2-ethylhexyl) phthalate was used as surrogate for di-*n*-octyl phthalate.
c Chlordane was used as surrogate for alpha- and gamma-chlordane.
d Value for chlordane.
e Value for trivalent chromium; hexavalent chromium was not detected in sediment.
f OSWER screening level.
g Value for mercuric chloride.

NA = Not applicable.
Bold values indicate that the screening level has been exceeded. If a background value is greater than a screening level that has been exceeded, the background value is also bolded.

TABLE 4-10

SEDIMENT GRAIN SIZE AND TOC
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Sample ID	TOC %	Grain Size			
		% Gravel	% Sand	% Silt	% Clay
PAI-10-SS-01-01	0.72	NA	NA	NA	NA
PAI-10-SS-02-01	0.94	NA	NA	NA	NA
PAI-10-SS-03-01	0.41	NA	NA	NA	NA
PAI-10-SS-04-01	0.79	NA	NA	NA	NA
PAI-10-SS-05-01	0.62	NA	NA	NA	NA
PAI-10-SS-06-01	0.84	NA	NA	NA	NA
PAI-10-SS-07-01	0.96	0	86.7	7.9	5.4
PAI-10-SS-08-01	0.46	NA	NA	NA	NA
PAI-10-SS-09-01	0.71	NA	NA	NA	NA
PAI-10-SS-10-01	0.55	0	87.9	11.7	0.4
PAI-10-SB-01-22	0.05	0	93.1	3.7	3.2
PAI-10-SB-02-04	1.5	0	77.2	9.2	13.6
PAI-10-SB-02-10	0.08	0	66.6	7.4	26
PAI-10-SB-03-02	NA	0	82.5	12.4	5.1
PAI-10-SB-03-30	NA	0	89.3	3.4	7.3
PAI-10-SB-04-02	NA	0	86.1	8.3	5.6
PAI-10-SB-04-06	NA	0	89.9	2.3	7.8
PAI-10-SB-05-02	NA	0.1	87.7	8.9	3.3
PAI-10-SB-05-24	NA	2.3	87.9	6.3	3.5
PAI-10-SB-06-06	0.06	0	92.6	0.9	6.5
PAI-10-SB-07-24	0.33	NA	NA	NA	NA
PAI-10-SB-07-26	NA	1.2	90.2	2.3	6.3
PAI-10-SD-01-01	0.95	0	91.6	4.1	4.3
PAI-10-SD-02-01	0.97	NA	NA	NA	NA
PAI-10-SD-02-01-D	1.2	NA	NA	NA	NA
PAI-10-SD-03-01	0.67	0	80.5	7.2	12.3
PAI-10-SD-04-01	0.86	0	83.4	3.9	12.7
PAI-10-SD-05-01	1.1	0	83.5	7.6	8.9
PAI-10-SD-06-01	0.72	0	87.5	2	10.5
PAI-10-SD-07-01	0.96	0.1	81.5	5.6	12.8
PAI-10-SD-08-01	4.7	3	11.8	39.1	46.1
PAI-10-SD-09-01	4	0	12.2	40.2	47.6
PAI-10-SD-10-01	0.8	0	75.5	13.7	10.8
PAI-10-SD-11-01	1.1	0.5	70.8	15.5	13.2
PAI-10-SD-12-01	1	0.1	74	13.6	12.3
PAI-10-SD-13-01	1.1	0.4	79.1	7.7	12.8
PAI-10-SD-14-01	3.8	0.3	62.2	21.4	16.1
PAI-10-SD-14-02	1.3	0.3	77.1	12.8	9.8
PAI-10-SD-15-01	1.6	0	70.9	14	15.1
PAI-10-SD-16-01	2.8	NA	NA	NA	NA
PAI-10-SD-17-01	3	NA	NA	NA	NA
PAI-10-SD-18-01	2.7	NA	NA	NA	NA

NA – Not Analyzed

TABLE 4-11

COMPARISON OF 1995 AND 1998 TO 1999 SEDIMENT RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

PARAMETER	1995 Maximum	1998-99 Maximum	Change (+/-)	Background Level
Volatiles (mg/kg)				
2-Butanone	ND	0.02	+	NA
2-Hexanone	ND	0.0044	+	NA
4-Methyl-2-pentanone	ND	0.0537	+	NA
Acetone	ND	0.39	+	NA
Carbon Disulfide	ND	0.031	+	NA
Toluene	ND	0.023	+	NA
Xylenes, Total	ND	0.0023	+	NA
Semivolatiles (mg/kg)				
Acenaphthene	ND	0.12	+	NA
Bis(2-Ethylhexyl)phthalate	10	0.44	-	NA
Chrysene	ND	0.044	+	NA
Di-n-octyl phthalate	0.9	0.063	-	NA
Diethyl phthalate	0.029	ND	-	NA
Fluoranthene	ND	0.092	+	NA
Pentachlorophenol	ND	0.18	+	NA
Pyrene	ND	0.089	+	NA
Pesticides/PCBs (mg/kg)				
4,4'-DDE	0.52	ND	-	NA
4,4'-DDT	0.038	0.066	+	NA
Alpha-Chlordane	ND	0.012	+	NA
Alpha-BHC	0.0031	ND	-	NA
Aroclor 1254	24	ND	-	NA
Dieldrin	0.0062	ND	-	NA
Endrin	1.2	ND	-	NA
Gamma-Chlordane	ND	0.014	+	NA
Methoxychlor	ND	0.68	+	NA
Inorganics (mg/kg)				
Aluminum	11700	52700	+	24200
Antimony	9.4	6.8	-	NA
Arsenic	49.7	18.5	-	12.2
Barium	73.2	62.9	-	28.0
Beryllium	ND	2	+	0.977
Cadmium	4.7	0.84	-	0.278
Calcium	6670	5550	-	4002
Chromium	119	75	-	35.2
Cobalt	22.7	10.3	-	2.63
Copper	489	113	-	10.1
Iron	307000	43100	-	21450
Lead	2930	203	-	20.6
Magnesium	6220	15100	+	6437
Manganese	1480	210	-	186
Mercury	ND	0.35	+	0.090

TABLE 4-11

COMPARISON OF 1995 AND 1998 TO 1999 SEDIMENT RESULTS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

PARAMETER	1995 Maximum	1998-99 Maximum	Change (+/-)	Background Level
Nickel	86.9	1060	+	5.95
Benzo(a)anthracene	ND	0.018	+	NA
Benzo(a)pyrene	ND	0.038	+	NA
Benzo(b)fluoranthene	ND	0.12	+	NA
Benzo(k)fluoranthene	ND	0.018	+	NA
Indeno(1,2,3-cd)pyrene	ND	0.026	+	NA
Potassium	2210	9090	+	3190
Selenium	1.2	10.7	+	ND
Silver	1.2	ND	-	ND
Sodium	11200	60800	+	19110
Thallium	ND	0.36	+	0.405
Vanadium	44.9	112	+	49.6
Zinc	1520	197	-	45.0

NA = Not Applicable or Available

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ACAD: 7803Gt03.dwg 10/11/01 HJB

SURFACE SOIL SCREENING LEVELS (1) (REFER TO NOTES)		
ORGANICS (UG/KG)	HUMAN HEALTH (2)	ECOLOGICAL (3)
CHLOROFORM		1
2-METHYLNAPHTHALENE		100
ACENAPHTHYLENE		100
BENZO(A)ANTHRACENE		100
BENZO(A)PYRENE	87	100
BENZO(B)FLUORANTHENE		100
BENZO(K)FLUORANTHENE		100
CHRYSENE		100
FLUORANTHENE		100
FLUORENE		100
NAPHTHALENE		100
PENTACHLOROPHENOL		2
PHENANTHRENE		100
PYRENE		100
B(a)P EQUIVALENTS (6)	434 (5)	
PAHs (6)		1,000
"4,4'-DDE"		2.5
INORGANICS (MG/KG)	HUMAN HEALTH (2)	ECOLOGICAL (3)
ANTIMONY		3.5
ARSENIC	1.44 (4)	10
CADMIUM		1.6
CHROMIUM		10
COPPER		40
IRON	23,000	3,920 (4)
LEAD	400	50
MANGANESE		129 (4)
MERCURY		0.110 (4)
ZINC		50

PAI-10-SS-02-01
NO EXCEEDANCES

PAI-10-SS-05-01
NO EXCEEDANCES

INORGANICS (UG/KG)
MANGANESE 206 E

PAI-10-SS-09-01
NO EXCEEDANCES

PAI-10-SS-11-01
ORGANICS (UG/KG)
CHLOROFORM 7.5 E

PAI-10-SS-13-01
ORGANICS (UG/KG)
CHLOROFORM 1.8 J E

PI-012-03(37)
ORGANICS (UG/KG)
BENZO(B)FLUORANTHENE 130 J E
TOTAL PAHs (7) 1,878 E

10' DIRT ROAD

PAI-10-SS-01-01
ORGANICS (UG/KG)
TOTAL PAHs (7) 1,021 E

PAI-10-SS-03-01
INORGANICS (MG/KG)
ARSENIC 2.2 H

PAI-10-SS-04-01
NO EXCEEDANCES

PAI-10-SS-06-01
NO EXCEEDANCES

PAI-10-SS-07-01
NO EXCEEDANCES

PAI-10-SS-10-01
NO EXCEEDANCES

PAI-10-SS-08-01
ORGANICS (UG/KG)

BENZO(A)ANTHRACENE	140 J E
BENZO(B)FLUORANTHENE	120 J E
BENZO(K)FLUORANTHENE	110 J E
BENZO(A)PYRENE	120 J E,H
CHRYSENE	160 J E
FLUORANTHENE	280 J E
PHENANTHRENE	140 J E
PYRENE	230 J E
TOTAL PAHs	1,464 E

PAI-10-SS-08-02
ORGANICS (UG/KG)

ANTHRACENE	350 J E
BENZO(A)ANTHRACENE	3,100 J E
BENZO(B)FLUORANTHENE	2,900 E,H
BENZO(K)FLUORANTHENE	1,400 E
BENZO(A)PYRENE	1,700 E,H
BENZO(G,H)PERYLENE	1,200 E
CHRYSENE	1,800 E
DIBENZO(A,H)ANTHRACENE	840 J E,H
FLUORANTHENE	4,000 E
INDENO(1,2,3-CD)PYRENE	1,300 E,H
PHENANTHRENE	1,600 E
PYRENE	3,400 E
B(a)P EQUIVALENTS	3,256 E,H
TOTAL PAHs	16,888 E

PAI-10-SS-14-01
ORGANICS (UG/KG)

TOTAL PAHs (7)	1,016 E
"4,4'-DDE"	43 E

INORGANICS (MG/KG)

ANTIMONY	8 E
ARSENIC	50.8 E,H
CADMIUM	3.2 E
CHROMIUM	18.1 E
COPPER	189 E
IRON	99700 E,H
LEAD	1100 J E,H
MANGANESE	522 E
MERCURY	0.89 E
ZINC	1020 E

PAI-10-SS-12-01 | **DUP**
ORGANICS (UG/KG)

2-METHYLNAPHTHALENE	600 E
ACENAPHTHYLENE	580 E
PENTACHLOROPHENOL	240 J E
NAPHTHALENE	2,700 E
FLUORENE	220 E
TOTAL PAHs	5,029 E

PAI-10-SS-12-02
NO EXCEEDANCES

LEGEND
- SURFACE SOIL SAMPLE
- SURFACE DEBRIS PILES
- H EXCEEDS HUMAN HEALTH SCREENING VALUES
- E EXCEEDS ECOLOGICAL SCREENING VALUES
- FORESTED/WOODED-1972
- SURFACE WATER BODY
- LOCAL RESIDENCE PROPERTY BOUNDARY

0 400 800
SCALE IN FEET

NOTES
1. A BLANK SPACE INDICATES THAT THE CHEMICAL DID NOT EXCEED BACKGROUND AND A HUMAN HEALTH OR ECOLOGICAL CRITERION.
2. U.S. EPA REGION 3 RESIDENTIAL SOIL RBCS.
3. U.S. EPA REGION 4 ECOLOGICAL SCREENING VALUES (SEDIMENT)
4. MCRD PARRIS ISLAND BACKGROUND VALUE.
5. 7 X REGION IX PRG FOR BENZO(a)PYRENE.
6. CALCULATED USING 1/2 THE METHOD DETECTION LIMIT FOR NON-DETECTED VALUES.
7. PAHs WERE NOT DETECTED IN THE SAMPLE. EXCEEDANCE DUE TO ELEVATED DETECTION LIMITS.

SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/26/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

DEPARTMENT OF THE NAVY · NAVFAC · SOUTHERN DIV FACILITIES ENGINEERING COMMAND

SURFACE SOIL SAMPLE RESULTS
THAT EXCEED BACKGROUND, HUMAN HEALTH
RBCs, AND/OR ECOLOGICAL SCREENING VALUES
SITE 12/SWMU 10 - JERICHO ISLAND
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 4-1
REV. 0

FIRM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

2224B4Y

ACAD: 7803Gt06.dwg 10/11/01 HJB

GROUNDWATER SCREENING LEVELS (1) (REFER TO NOTES)		
ORGANICS (UG/L)	HUMAN HEALTH (2)	ECOLOGICAL
ACETONE	610	
CHLOROFORM	0.15	
INORGANICS (UG/L)	HUMAN HEALTH (2)	ECOLOGICAL
ARSENIC	0.045	
IRON	11,000	
MANGANESE	730	
NICKEL		8.3 (3)
THALLIUM	2.6	

10' DIRT ROAD

PAI-10-MW-06(D)-01		
INORGANICS (UG/L)	UNFILT	FILT
ARSENIC	1.3 H	
IRON	93700 H	
MANGANESE	1530 H	
NICKEL		9.5 E
THALLIUM	10 H	

PAI-10-MW-05(S)-01	
INORGANICS (UG/L)	UNFILT
ARSENIC	7.9 H
IRON	122000 H

PAI-10-MW-07(S)-01		
ORGANICS (UG/L)	UNFILT	UNFILT DUP
CHLOROFORM	0.5 J H	0.4J H
INORGANICS (UG/L)		
ARSENIC		1.7 H

PAI-10-MW-08(D)-01		
ORGANICS (UG/L)	UNFILT	FILT
ACETONE	650 J H	
CHLOROFORM	1.5 H	
INORGANICS (UG/)		
ARSENIC	19 H	
MANGANESE	1360 H	
NICKEL		9.8 E

PAI-10-MW-11(S)-01	
INORGANICS (UG/L)	UNFILT
ARSENIC	12.6 H

PAI-10-MW-12(D)-01	
INORGANICS (UG/L)	UNFILT
ARSENIC	10.7 H
IRON	111000 H

PAI-10-MW-14(D)-01	
INORGANICS (UG/L)	UNFILT
ARSENIC	29.2 H
IRON	35400 H

PAI-10-MW-13(S)-01	
INORGANICS (UG/L)	UNFILT
ARSENIC	3.4 H
MANGANESE	1390 H

PAI-10-MW-02(D)-01	
ORGANICS (UG/L)	UNFILT
CHLOROFORM	0.4 J H
INORGANICS (UG/L)	
ARSENIC	35.4 H
IRON	102000 H

PAI-10-MW-01(S)-01	
INORGANICS (UG/L)	UNFILT
ARSENIC	2.3 H

PAI-10-MW-04(D)-01	
ORGANICS (UG/L)	UNFILT
ACETONE	620 J H
CHLOROFORM	4.5 H
INORGANICS (UG/L)	
ARSENIC	5.6 H
IRON	18400 H
MANGANESE	941 H

PAI-10-MW-03(S)-01	
INORGANICS (UG/L)	UNFILT
ARSENIC	15.7 H
IRON	51400 H

PAI-10-MW-09(S)-01	
INORGANICS (UG/L)	UNFILT
ARSENIC	3.7 H

PAI-10-MW-10(D)-01	
INORGANICS (UG/L)	UNFILT
IRON	49300 H
MANGANESE	1030 H

LEGEND

- GROUNDWATER SAMPLE
- SURFACE DEBRIS PILES
- H EXCEEDS HUMAN HEALTH SCREENING VALUES
- E EXCEEDS ECOLOGICAL SCREENING VALUES
- FORESTED/WOODED-1972
- SURFACE WATER BODY
- NEARBY LOCAL RESIDENCES
- LOCAL RESIDENCE PROPERTY BOUNDARY
- TOPOGRAPIC CONTOUR

0 400 800
SCALE IN FEET

NOTES

1. A BLANK SPACE INDICATES THAT THE CHEMICAL DID NOT EXCEED BACKGROUND AND A HUMAN HEALTH OR ECOLOGICAL CRITERION.
2. U.S. EPA REGION 3 RESIDENTIAL TAP WATER RBCS.
3. U.S. EPA REGION 4 ECOLOGICAL SCREENING VALUES (SURFACE-WATER - SALTWATER)

SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 6/21/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

DEPARTMENT OF THE NAVY · SOUTHERN DIVISION · NAVAL FACILITIES ENGINEERING COMMAND

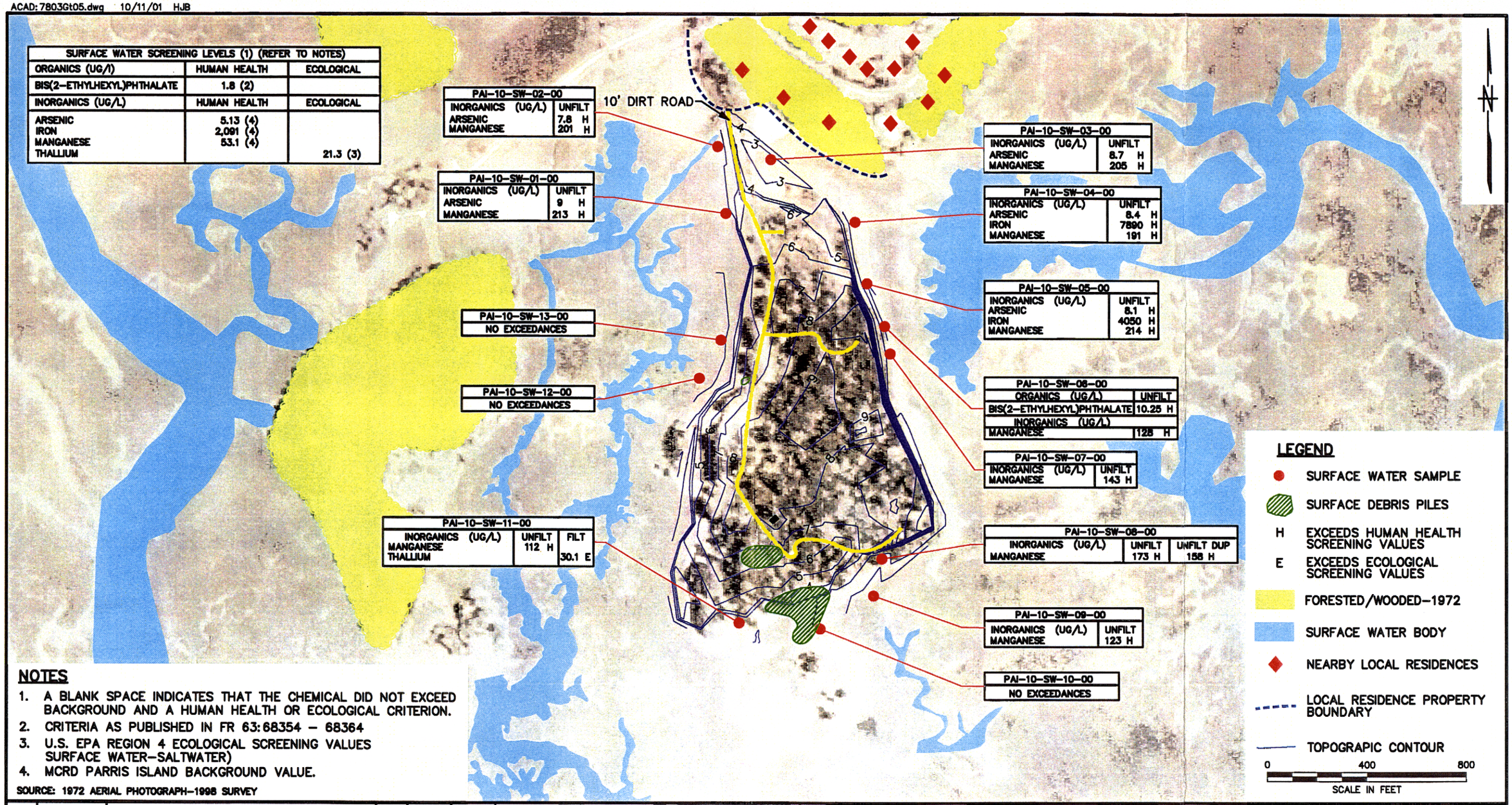
GROUNDWATER SAMPLE RESULTS
THAT EXCEED HUMAN HEALTH RBCs OR
ECOLOGICAL SCREENING VALUES
SITE 12/SWMU 10-JERICHO ISLAND
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 4-2
REV. 0

FIRM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD: 7803Gt05.dwg 10/11/01 HJB

SURFACE WATER SCREENING LEVELS (1) (REFER TO NOTES)		
ORGANICS (UG/l)	HUMAN HEALTH	ECOLOGICAL
BIS(2-ETHYLHEXYL)PHTHALATE	1.8 (2)	
INORGANICS (UG/L)	HUMAN HEALTH	ECOLOGICAL
ARSENIC	5.13 (4)	
IRON	2,091 (4)	
MANGANESE	53.1 (4)	
THALLIUM		21.3 (3)



NOTES

1. A BLANK SPACE INDICATES THAT THE CHEMICAL DID NOT EXCEED BACKGROUND AND A HUMAN HEALTH OR ECOLOGICAL CRITERION.
2. CRITERIA AS PUBLISHED IN FR 63:68354 – 68364
3. U.S. EPA REGION 4 ECOLOGICAL SCREENING VALUES SURFACE WATER-SALTWATER)
4. MCRD PARRIS ISLAND BACKGROUND VALUE.

SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 6/21/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

DEPARTMENT OF THE NAVY SOUTHERN DIV FACILITIES ENGINEERING COMD

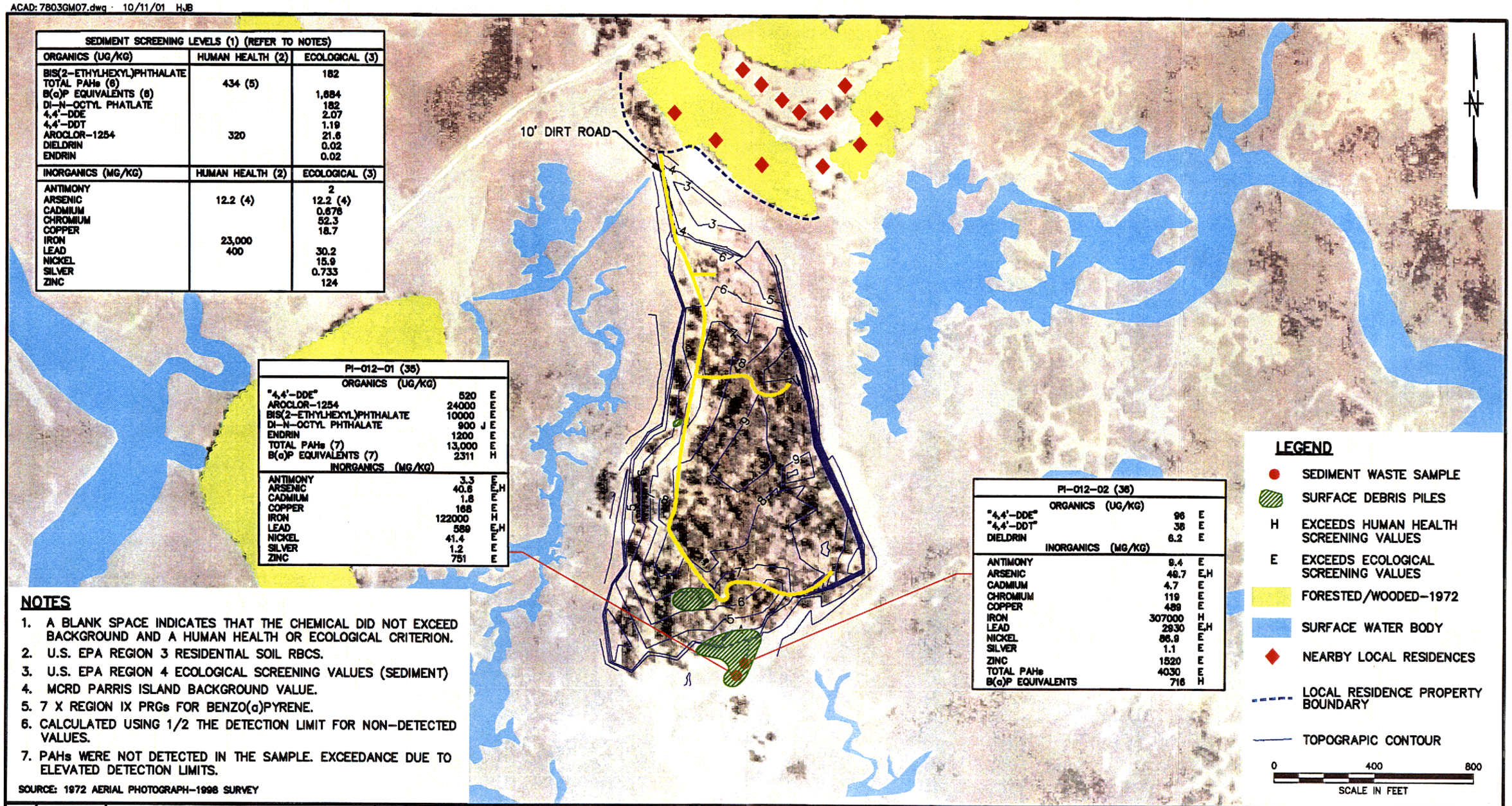
SURFACE WATER RESULTS
THAT EXCEED BACKGROUND, HUMAN HEALTH RBCs, AND/OR ECOLOGICAL SCREENING VALUES
SITE 12/SWMU 10-JERICHO ISLAND
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 4-3 REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD: 7803GM07.dwg · 10/11/01 HJB

SEDIMENT SCREENING LEVELS (1) (REFER TO NOTES)		
ORGANICS (UG/KG)	HUMAN HEALTH (2)	ECOLOGICAL (3)
BIS(2-ETHYLHEXYL)PHTHALATE	434 (5)	182
TOTAL PAHs (6)		
B(a)P EQUIVALENTS (6)		1,684
DI-N-OCTYL PHATLATE		182
4,4'-DDE		2.07
4,4'-DDT		1.19
AROCLOR-1254	320	21.6
DIELDRIN		0.02
ENDRIN		0.02
INORGANICS (MG/KG)	HUMAN HEALTH (2)	ECOLOGICAL (3)
ANTIMONY		2
ARSENIC	12.2 (4)	12.2 (4)
CADMIUM		0.676
CHROMIUM		52.3
COPPER		18.7
IRON	23,000	
LEAD	400	30.2
NICKEL		15.9
SILVER		0.733
ZINC		124



PI-012-01 (35)		
ORGANICS (UG/KG)		
"4,4'-DDE"	520	E
AROCLOR-1254	24000	E
BIS(2-ETHYLHEXYL)PHTHALATE	10000	E
DI-N-OCTYL PHTHALATE	900 J	E
ENDRIN	1200	E
TOTAL PAHs (7)	13,000	E
B(a)P EQUIVALENTS (7)	2311	H
INORGANICS (MG/KG)		
ANTIMONY	3.3	E
ARSENIC	40.6	E,H
CADMIUM	1.8	E
COPPER	168	E
IRON	122000	H
LEAD	589	E,H
NICKEL	41.4	E
SILVER	1.2	E
ZINC	751	E

PI-012-02 (36)		
ORGANICS (UG/KG)		
"4,4'-DDE"	96	E
"4,4'-DDT"	38	E
DIELDRIN	6.2	E
INORGANICS (MG/KG)		
ANTIMONY	9.4	E
ARSENIC	48.7	E,H
CADMIUM	4.7	E
CHROMIUM	119	E
COPPER	489	E
IRON	307000	H
LEAD	2930	E,H
NICKEL	86.9	E
SILVER	1.1	E
ZINC	1520	E
TOTAL PAHs	4030	E
B(a)P EQUIVALENTS	716	H

NOTES

1. A BLANK SPACE INDICATES THAT THE CHEMICAL DID NOT EXCEED BACKGROUND AND A HUMAN HEALTH OR ECOLOGICAL CRITERION.
2. U.S. EPA REGION 3 RESIDENTIAL SOIL RBCS.
3. U.S. EPA REGION 4 ECOLOGICAL SCREENING VALUES (SEDIMENT)
4. MCRD PARRIS ISLAND BACKGROUND VALUE.
5. 7 X REGION IX PRGs FOR BENZO(a)PYRENE.
6. CALCULATED USING 1/2 THE DETECTION LIMIT FOR NON-DETECTED VALUES.
7. PAHs WERE NOT DETECTED IN THE SAMPLE. EXCEEDANCE DUE TO ELEVATED DETECTION LIMITS.

SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

LEGEND

- SEDIMENT WASTE SAMPLE
- SURFACE DEBRIS PILES
- H EXCEEDS HUMAN HEALTH SCREENING VALUES
- E EXCEEDS ECOLOGICAL SCREENING VALUES
- FORESTED/WOODED-1972
- SURFACE WATER BODY
- NEARBY LOCAL RESIDENCES
- LOCAL RESIDENCE PROPERTY BOUNDARY
- TOPOGRAPIC CONTOUR

0 400 800
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 6/30/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

DEPARTMENT OF THE NAVY · SOUTHERN DIV FACILITIES ENGINEERING COMD

SEDIMENT WASTE SAMPLE RESULTS, 1995
THAT EXCEED BACKGROUND, HUMAN HEALTH
RBCs, AND/OR ECOLOGICAL SCREENING VALUES
SITE 12/SWMU 10 - JERICHO ISLAND
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 4-4
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

ACAD: 7803Gt04.dwg 10/11/01 HJB

SEDIMENT SCREENING LEVELS (1) (REFER TO NOTES)		
ORGANICS (UG/KG)	HUMAN HEALTH (2)	ECOLOGICAL (3)
ACENAPHTHENE		6.71
BENZO(B)FLUORANTHENE		88.8
BIS(2-ETHYLHEXYL)PHTHALATE		182
4,4'-DDT		1.19
ALPHA-CHLORDANE		0.5
GAMMA-CHLORDANE		0.5
INORGANICS (MG/KG)	HUMAN HEALTH (2)	ECOLOGICAL (3)
ANTIMONY		2
ARSENIC	12.2 (4)	12.2 (4)
CADMIUM		0.676
CHROMIUM		52.3
COPPER		18.7
IRON	23,000	
LEAD		30.2
MANGANESE		
MERCURY		0.13
ZINC		124

PAI-10-SD-02-01	DUP
ORGANICS (UG/KG)	
BIS(2-ETHYLHEXYL)PHTHALATE	490 J E

PAI 10 SD 01
NO EXCEEDANCES

PAI-10-SD-13-01
NO EXCEEDANCES

PAI-10-SD-12-01
NO EXCEEDANCES

PAI-10-SD-14-01	
ORGANICS (UG/KG)	
BIS(2-ETHYLHEXYL)PHTHALATE	220 J E
INORGANICS (MG/KG)	
CADMIUM	0.84 E
COPPER	113 E
IRON	25200 H
LEAD	203 E
MERCURY	0.35 E
ZINC	197 E

PAI-10-SD-14-02	
ORGANICS (UG/KG)	
ALPHA-CHLORDANE	12 E
BIS(2-ETHYLHEXYL)PHTHALATE	430 J E
"4,4'-DDT"	66 E
GAMMA-CHLORDANE	14 E
INORGANICS (MG/KG)	
IRON	28800 E,H
LEAD	49.7 E
NICKEL	1060 E

PAI-10-SD-11-01
NO EXCEEDANCES

PAI-10-SD-19-01
NO EXCEEDANCES

PAI-10-SD-10-01
NO EXCEEDANCES

10' DIRT ROAD

PAI-10-SD-03-01
NO EXCEEDANCES

PAI-10-SD-04-01
NO EXCEEDANCES

PAI-10-SD-05-01
NO EXCEEDANCES

PAI-10-SD-06-01
NO EXCEEDANCES

PAI-10-SD-07-01	
ORGANICS (UG/KG)	
BIS(2-ETHYLHEXYL)PHTHALATE	440 J E

PAI-10-SD-08-01	
ORGANICS (UG/KG)	
BENZO(B) FLUORANTHENE	120 E
INORGANICS (MG/KG)	
ARSENIC	18.5 E,H
CHROMIUM	75 E
IRON	43100 H
LEAD	38.7 E
NICKEL	19.6 E

PAI-10-SD-15-01
NO EXCEEDANCES

PAI-10-SD-09-01	
INORGANICS (MG/KG)	
ANTIMONY	6.8 E
IRON	23300 H
MERCURY	0.14 E

PAI-10-SD-20-02	
ORGANICS (UG/KG)	
ACENAPHTHENE	120 J E

NOTES

1. A BLANK SPACE INDICATES THAT THE CHEMICAL DID NOT EXCEED BACKGROUND AND A HUMAN HEALTH OR ECOLOGICAL CRITERION.
2. U.S. EPA REGION 3 RESIDENTIAL SOIL RBCS.
3. U.S. EPA REGION 4 ECOLOGICAL SCREENING VALUES (SEDIMENT)
4. MCRD PARRIS ISLAND BACKGROUND VALUE.

SOURCE: 1972 AERIAL PHOTOGRAPH-1998 SURVEY

LEGEND

- SEDIMENT SAMPLE
- SURFACE DEBRIS PILES
- H — EXCEEDS HUMAN HEALTH SCREENING VALUES
- E — EXCEEDS ECOLOGICAL SCREENING VALUES
- FORESTED/WOODED-1972
- SURFACE WATER BODY
- NEARBY LOCAL RESIDENCES
- LOCAL RESIDENCE PROPERTY BOUNDARY
- TOPOGRAPIC CONTOUR

0 400 800
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 4/26/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND

SEDIMENT SAMPLE RESULTS, 1998-99
THAT EXCEED BACKGROUND, HUMAN HEALTH
RBCs, AND/OR ECOLOGICAL SCREENING VALUES
SITE 12/SWMU 10 - JERICHO ISLAND
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 4-5
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

5.0 CHEMICAL FATE AND TRANSPORT ANALYSIS

This section contains information on contaminant fate and transport and the chemical properties affecting contaminant migration at Site 12. Section 5.1 discusses the chemical and physical properties of the detected analytes. Section 5.2 presents brief discussions of contaminant persistence. Section 5.3 presents a summary of contaminant migration.

5.1 CHEMICAL AND PHYSICAL PROPERTIES

Chemical and physical properties are used to estimate the environmental behavior of site chemicals. Table 5-1 presents the chemical and physical properties of the organics detected Site 12. Table 5-2 presents the chemical and physical properties of the detected inorganics.

Empirically determined literature values of the water solubility, octanol/water partition coefficient, organic carbon partition coefficient, vapor pressure, Henry's Law constant, bioconcentration factor, and specific gravity are presented, when available. Calculated values, which were obtained using approximation methods, are presented when literature values are not available.

5.2 CHEMICAL PERSISTENCE

The persistence of various classes of chemicals is discussed in this section. Several transformation mechanisms affect chemical persistence, such as hydrolysis, biodegradation, photolysis, and oxidation/reduction reactions. The following general classes of compounds are discussed:

- Ketones
- Monocyclic aromatics
- Miscellaneous VOCs
- PAHs
- Phthalate esters
- Pesticides
- PCBs
- Metals

5.2.1 Ketones

Ketones are highly volatile and soluble, and these two processes dominate the fate of these compounds in the environment. Hydrolysis is generally not a significant fate process for this class of chemicals, nor is bioconcentration significant, based on the low (K_{ow}s) (Howard, 1990).

Acetone is completely miscible in water and is unlikely to adsorb to soil or sediment or to bioaccumulate. It has a high vapor pressure and, once released to the air, photolysis and reaction with hydroxyl radicals result in an average half-life of 22 days (Howard, 1990).

2-Butanone will partially evaporate into the atmosphere if released to the soil and may also leach into the groundwater. Once in the groundwater, 2-butanone may slowly degrade. In surface water, 2-butanone has a half-life of approximately 3 to 12 days. Hydrolysis, photolysis, bioconcentration, and adsorption are not significant fate processes for this chemical (Howard, 1990).

5.2.2 Monocyclic Aromatics

Monocyclic aromatic compounds such as toluene, styrene, and xylenes are not considered to be persistent in the environment, particularly in comparison to chemicals such as PCBs and pesticides. Monocyclic aromatics are subject to degradation via the action of both soil and aquatic microorganisms. The biodegradation of these compounds in the soil matrix is dependent on the abundance of microflora, macronutrient availability, soil reaction (pH), temperature, etc.

Although these compounds are amenable to microbial degradation, it is not anticipated that degradation will occur at an appreciable rate, although macronutrient availability is not known. In the event that these compounds discharge to surface water bodies, volatilization and biodegradation may occur relatively rapidly. For example, a reported biodegradation rate constant for benzene is 0.11 day^{-1} in aquatic systems (Lyman et al., 1990). This corresponds to an aquatic half-life of approximately 6 days. Other monocyclic aromatics are subject to similar degradation processes in aquatic environments (U.S. EPA, 1982). However, chlorinated monocyclic aromatics such as chlorobenzene are not expected to be as susceptible to microbial degradation. For example, a reported first-order biodegradation rate constant for chlorobenzene is 0.0045 day^{-1} in aquatic systems (Lyman et al., 1990), which corresponds to an aquatic half-life of approximately 150 days.

Benzene in groundwater is significantly reduced by the action of aerobic bacteria. A biodegradation rate of 0.95 percent/day has been reported (Chiang et al., 1989). The amount of benzene, toluene, and xylenes in the groundwater was reported to be directly proportional to the availability of dissolved oxygen.

Additional environmental degradation processes, such as hydrolysis and photolysis, are considered to be insignificant fate mechanisms for monocyclic aromatics in aquatic systems (U.S. EPA, 1982). However, some monocyclic aromatics, such as benzene and toluene, have been shown to undergo clay-, mineral-, and soil-catalyzed oxidation (Dragun, 1988).

5.2.3 Miscellaneous Volatile Organic Compounds

Chloroform, 1,2-dichlorobenzene, and ethylbenzene were also detected. These VOCs tend to volatilize and degrade in the atmosphere via reaction with photochemically produced hydroxyl radicals. 1,2-Dichlorobenzene will adsorb more readily to soil than chloroform or ethylbenzene. Chloroform and ethylbenzene tend to leach into the underlying groundwater. In water, 1,2-dichlorobenzene will adsorb to sediment and bioconcentrate in aquatic organisms. Chloroform and ethylbenzene do not readily bioconcentrate in aquatic organisms.

5.2.4 Polycyclic Aromatic Hydrocarbons

PAHs have very low solubilities, vapor pressures, and Henry's Law constants and high K_{oc}s and K_{ow}s. The low molecular weight PAHs (e.g., acenaphthene, anthracene, fluorene, and phenanthrene) may volatilize from surface water, whereas the high molecular weight PAHs [e.g., benzo(a)pyrene, benz(a)anthracene, chrysene, etc.] are less likely to volatilize. PAHs in soil are much more likely to bind to soil and be transported via mass transport mechanisms than to go into solution.

Bioconcentration of PAHs in aquatic organisms is greater for the higher molecular weight compounds than the lower molecular weight compounds. PAHs in fish are usually low because they rapidly metabolize PAHs, and the higher molecular weight PAHs do not seem to accumulate in fish (Eisler, 1987). However, PAHs are known to accumulate in shellfish (i.e., mussels, lobsters) and other invertebrates (Eisler, 1987 and USEPA, 2000).

Landspreading applications have indicated that PAHs are highly amenable to microbial degradation in soil. Temperature, pH, oxygen concentrations, initial chemical concentrations, and moisture influence the rate of degradation. Photolysis, hydrolysis, and oxidation are not important fate processes for the degradation of PAHs in soil (ATSDR, 1989).

The most important fates of PAHs in water are photo-oxidation, chemical oxidation, and biodegradation. PAHs do not contain functional groups that are susceptible to hydrolytic action. Therefore, hydrolysis is considered to be an insignificant degradation mechanism. Water depth, turbidity, and temperature influence the rate of photodegradation. Benzo(a)pyrene, chrysene, fluorene, and pyrene are reported to

be resistant to photodegradation. PAHs may also be oxidized by chlorination and ozonation and may be metabolized by microbes under oxygenated conditions (ATSDR, 1989).

5.2.5 Phthalate Esters

Phthalate esters are considered to be relatively persistent chemicals in the environment. Although numerous studies have demonstrated that phthalate esters undergo biodegradation, it appears that this is a slow process in both soil and surface water. Certain microorganisms have been shown to excrete products that increase the solubility of phthalate esters and enhance their biodegradation (Gibbons and Alexander, 1989).

Biodegradation of bis(2-ethylhexyl) phthalate and other phthalates in water is an important fate mechanism, with a half-life of 2 to 3 weeks reported for bis(2-ethylhexyl) phthalate (Howard, 1989). Bioaccumulation is also a significant fate process. Hydrolysis of phthalate esters is very slow, with calculated half-lives of 3 years (dimethyl phthalate) to 2,000 years [bis(2-ethylhexyl) phthalate] (U.S. EPA, 1979). Similarly, photolysis and volatilization are considered to be insignificant degradation mechanisms (U.S. EPA, 1979; Howard, 1989). Diethyl phthalate and di-n-octyl phthalate were also detected. These compounds will adsorb to particulates and sediment. Di-n-octyl phthalate will also bioconcentrate in aquatic organisms.

5.2.6 Pesticides

Whether pesticides are sprayed, dusted, or applied directly to the soil, the soil acts as a collection basin. Runoff may carry pesticides to adjacent surface water bodies. Bioconcentration of pesticides in the food chain is another important fate mechanism. Hydrolysis, oxidation, and photolysis are not generally important fate mechanisms for pesticides in soil or water. Hydrolysis half-lives for several pesticides is reported in periods of months to years (U.S. EPA, 1979).

4,4'-DDT and its metabolites are considered to be persistent chemicals. They undergo extensive adsorption to soil and are not highly soluble. Biodegradation may occur under both aerobic and anaerobic conditions in the presence of certain soil microorganisms. Under aerobic conditions, DDT may be transformed to DDE, whereas, under anaerobic conditions, DDD may result. These compounds are, however, somewhat volatile, with a reported half-life of 100 days for DDT. These compounds are highly lipophilic and therefore readily bioaccumulate (ATSDR, 1992). DDT is no longer in production in the United States.

α-BHC, β-BHC, δ-BHC, and γ-BHC (lindane) were detected. Lindane is not expected to volatilize or hydrolyze in water. When released to soil, it is slow to volatilize and does not readily leach to

groundwater. Lindane binds tightly to soil particles. It can biodegrade more readily under aerobic conditions versus anaerobic conditions. It will degrade in the atmosphere via reaction with hydroxyl radicals. Lindane bioconcentrates slightly in aquatic organisms.

5.2.7 Polychlorinated Biphenyls

PCBs are considered to be very persistent organic chemicals. Biodegradation is the only process known to transform PCBs under environmental conditions, and only the lighter compounds are measurably biodegraded (U.S. EPA, 1979). Although some microorganisms (e.g., *Phanaerochaete chrysosporium*) may biodegrade PCBs, such fungi may not exist in local soil. There is experimental evidence to suggest that heavier PCBs (five or more chlorine atoms per molecule) can undergo photolytic degradation, but there are no data to suggest that this process operates under environmental conditions (U.S. EPA, 1979). Base-, acid-, and neutral-promoted hydrolyses are considered to be inconsequential degradation mechanisms for PCBs (U.S. EPA, 1982).

5.2.8 Metals

Metals are highly persistent environmental contaminants. They do not biodegrade, photolyze, hydrolyze, etc. The major fate mechanisms for metals are adsorption to the soil matrix (as compared to being part of the soil structure) and bioaccumulation.

The mobility of metals is influenced primarily by their chemical and physical properties in combination with the chemical and physical characteristics of the soil matrix. Factors that assist in predicting the mobility of inorganic species are the soil/pore water pH, soil/pore water Eh, and cation exchange capacity. The mobility of metals generally increases with decreasing soil pH and cation exchange capacity. One notable exception is arsenic, which under some conditions is more mobile under some higher pHs.

5.3 CHEMICAL MIGRATION

This section presents a brief overview of contaminant fate and transport issues for volatile organics, PAHs, pesticides, and metals.

5.3.1 Volatile Organics

Volatile organic chemicals are typically considered to be fairly soluble and have a low capacity for retention by soil organic carbon; therefore, volatiles are the organic compounds most frequently detected in groundwater. Volatile organics may migrate through the soil column after being released by a spill event or by subsurface waste burial as infiltrating precipitation solubilizes them. Some fraction of these chemicals is retained by the soil, but most will continue migrating downward to the water table. At that

time, migration occurs primarily laterally with the hydraulic gradient. Again, some portion of the chemical may be retained by the saturated soil.

Several of these compounds have specific gravities less than that of water (e.g., benzene and toluene). These compounds are typically found in fuel, and if a large enough fuel spill occurs, these compounds may move through the soil column as a bulk liquid, until they reach the water table. There, instead of going into solution, the majority of the release may remain as a discrete fuel layer on the water table surface, with some of the material going into solution at the water/fuel interface.

Similarly, compounds with specific gravities greater than that of water (e.g., trichloroethene) are often used in various industrial applications such as degreasing. If a large enough spill of these solvents occurs, these chemicals may also migrate as a bulk liquid but will not stop at the water table (i.e., these chemicals will mix/sink into the aquifer).

5.3.2 Polycyclic Aromatic Hydrocarbons

PAHs are generally considered to be fairly immobile chemicals in the environment. They are large molecules with high organic carbon partition coefficients and low solubilities when compared to the volatile organics. These compounds, when found in the soil, generally do not migrate vertically to a great extent. Instead, they are more likely to adhere to soil particles and to be removed from the site via surface runoff and erosional processes.

5.3.3 Pesticides

Pesticides were widely used at this installation. Many of the detected compounds are no longer licensed for general sale and use in the United States. Therefore, it is assumed that much of what was detected in the soil and sediment is representative of past application for insect control.

Like the PAHs, pesticides as a class of compounds are not considered to be very mobile in the environment. These chemicals, upon application or disposal, tend to remain affixed to soil particles. Migration of pesticides occurs primarily by erosion via the action of wind or water.

5.3.4 Metals

Because metals are frequently incorporated into the soil matrix and remain bound to particulate matter, they also migrate from the source areas via bulk movement processes (erosion). The larger particles (greater than 0.45 microns, which are removed via the filtration step prior to water analysis) are not

generally considered to be mobile in groundwater. The metals detected in unfiltered groundwater samples are often representative of suspended soil material in the samples.

There are some instances, however, where these metals are found at such concentrations or in such form as to be able to migrate in solution. It is possible that industrial activities could saturate all available exchange sites in soil and hence a metal may be mobilized. Metals are also more mobile under acidic conditions, which may exist in areas where plating-type activities have occurred. Finally, a metal solution may be utilized in some industrial applications. In these cases, it is possible for metals to migrate vertically through the soil column and reach the groundwater.

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TABLE 5-1

FATE AND TRANSPORT CHEMICAL AND PHYSICAL CHARACTERISTICS FOR ORGANICS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Chemical	Specific Gravity (@ 20/4°C)[1, 6,7]	Vapor Pressure (mm Hg @ 20°C)[1,6,7]	Solubility (mg/L @ 20°C)[1,6,7]	Octanol/ Water Partition Coefficient[1,6,7]	Organic Carbon Partition Coefficient[2,6,7]	Henry's Law Constant (atm-m3/mole)[1,6,7]	Bioconcentration Factor (mg/L/mg/kg)[2,6,7]
VOLATILE ORGANIC COMPOUNDS							
2-Butanone	0.8054	1.0E+02 (25°C)	2.75E+05	1.82E+00	4.44E+0[5]	4.66E-05 (25°C)	9.3E-01[4]
2-Hexanone	0.830	2.0	35,000	2.4E+01	NA	NA	NA
4-Methyl-2-pentanone	0.8017	6.0	19,000	1.55E+01	19 - 106	9.4E-05	2 - 5
Acetone	0.7899	2.66E+02 (25°C)	Miscible	5.75E-01	7.8E+03[3]	4.276E-05 (25°C)	3.81E-01[4]
Carbon disulfide	1.2632	2.98E+02	2.90E+03	1.45E+02	4.57E+01[3]	1.921E-02 (25°C)	2.6E+01[4]
Carbon Tetrachloride	1.59	113.8	805	4.4E+02	110	3.04E-02	17.4
Chloroform	1.5	1.51E+02	8.2E+03	9.33E+02	31	2.87E-03	3.75
Chloromethane	0.991	4.31E+03	4,000	8.128	5	2.4E-02	2.9
Ethylbenzene	0.867	1E+1 (25.9°C)	1.52E+02	1.41E+03	3.63E+02 [3]	8.043E-3 (25°C)	4.70E+02
Phenol	1.0576	3.5E-01 (25°C)	8E+04 (25°C)	2.88E+01	2.88E+01[3]	1.3E-06 (25°C)	9.40E+00
Tetrachloroethene	1.626	1.4E+01	150	2512	1.55E+02	1.8E-02	226
Toluene	0.8669	2.8E+01 (25°C)	5.15E+02	4.90E+02	1.82E+02[3]	5.92E-03 (25°C)	1.48E+02
Trichloroethene	1.46	69	1,100	2.63E+02	1.0E+02	1.03E-02	9.7E+01
Xylenes (Total)	0.86104 - 0.8801	1E+01 (27.3 - 32.1°C)	1.6E+02 - 1.75E+02[7]	5.89E+02 – 1.58E+03	3.63E+02 – 4.07E+02[3]	4.184E-03 – 6.662E-03 (25°C)	7.5E+01 – 1.59E+02[4]
SEMIVOLATILE ORGANIC COMPOUNDS							
1,2-Dichlorobenzene	1.3048	1.5E+0 (25°C)	1.45E+02	2.40E+03	3.17E+02 [3]	2.95E-03	4.00E+02
2,4-Dimethylphenol	0.965	9.8E+1 (104°C)	7.868E+03 (25°C)	2.63E+02	2.09E+02 [3]	6.55E-06 (25°C)	7.50E+01
2-Methylphenol	1.0273	2.4E-01 (25°C)	3.1E+04 (40°C)	8.91E+01	9.12E+01 [3]	8.41E-07	1.8E+07
Acenaphthene	1.0242(90/4°C)	1E+01 (131°C)	3.42E+0 (25°C)	8.32E+03	7.08E+03[3]	2.41E-04 (25°C)	1.80E+03
Acenaphthylene	0.899	NA	3.93	NA	NA	NA	NA
Anthracene	1.283 (25/4°C)	1.95E-04 (25°C)	1.29E+0 (25°C)	2.82E+04	2.95E+04[3]	8.6E-05 (25°C)	4.70E+03
Benzoic Acid	1.27	4.5E-03	2700	7.41E+01	NA	7.0E-08	< 10 – 2,800
Benzo(a)anthracene	1.274	5.00E-09	1.0E-02 (24°C)	4.07E+05	3.98E+05[3]	6.60E-07	5.30E+04
Benzo(b)fluoranthene	NA	5.00E-07	1.2E-03 (25°C)	3.72E+06	1.23E+06[3]	1.20E-05	1.40E+05
Benzo(k)fluoranthene	NA	9.59E-11	5.5E-04 (25°C)	6.92E+06	1.23E+06[3]	1.04E-03	1.40E+05
Benzo(g,h,i)perylene	NA	1.00E-10	2.6E-04 (25°C)	1.70E+07	1.60E+06	1.4E-07 (25°C)	3.50E+05
Benzo(a)pyrene	1.351	5.00E-09	3.8E-03 (25°C)	9.55E+05	1.02E+06[3]	4.9E-07 (25°C)	1.40E+05
Carbazole	1.1 (18/4°C)	4.0E+02 (323°C)	NA	1.95E+03	3.39E+03	NA	1.86E+02
Chrysene	1.274 (20°C)	6.3E-09 (25°C)	6E-03 (25°C)	4.07E+05	3.98E+05[3]	1.05E-06 (25°C)	5.30E+04
Dibenzo(a,h)anthracene	1.282	1.00E-10	5E-04 (25°C)	9.33E+05	3.80E+06[3]	7.3E-08 (25°C)	6.90E+05
Dibenzofuran	1.0886(99/4°C)	NA	1.00E+01	1.32E+04	1.23E+3	NA	7.97E+02
Fluoranthene	1.252	5.0E-06 (25°C)	2.65E-01 (25°C)	2.14E+05	1.07E+05[3]	6.5E-06 (25°C)	1.20E+04
Fluorene	1.202	1E+01 (146°C)	1.9E+0 (25°C)	1.51E+04	1.38E+04[3]	1.17E-04 (25°C)	3.80E+03
Indeno(1,2,3-cd)pyrene	NA	1E-010 (25°C)	6.20E-02	4.57E+07	3.47E+06[3]	6.95E-08 (25°C)	3.50E+05

TABLE 5-1

FATE AND TRANSPORT CHEMICAL AND PHYSICAL CHARACTERISTICS FOR ORGANICS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Chemical	Specific Gravity (@ 20/4°C)[1, 6,7]	Vapor Pressure (mm Hg @ 20°C)[1,6,7]	Solubility (mg/L @ 20°C)[1,6,7]	Octanol/ Water Partition Coefficient[1,6,7]	Organic Carbon Partition Coefficient[2,6,7]	Henry's Law Constant (atm-m3/mole)[1,6,7]	Bioconcentration Factor (mg/L/mg/kg)[2,6,7]
2-Methylnaphthalene	1.0058	1E+01 (105°C)	2.6E+01 (25°C)	7.24E+03	7.27E+02[5]	4.99E-04 (25°C)	5.1E+02[4]
Naphthalene	1.162	8.2E-02 (25°C)	3E+01 (25°C)	2.34E+03	2.00E+03[3]	4.83E-04 (25°C)	4.20E+02
Pentachlorophenol	1.978 (22/4°C)	1.10E-04	1.40E+01	1.02E+05	5.92E+02[3]	2.80E-06	1.6E-04
Phenanthrene	0.980 (4°C)	1E+0 (118.2°C)	8.16E-01 (21°C)	2.88E+04	1.40E+04	3.93E-05 (25°C)	4.70E+03
Phenol	1.0576	3.5E-01 (25°C)	8.0E+04 (25°C)	2.88E+01	2.88E+01	1.3E-06 (25°C)	9.4E+00
Pyrene	1.271 (23/4°C)	2.5E+0 (200°C)	1.6E-01 (26°C)	1.51E+05	1.05E+05[3]	5.1E-06 (25°C)	1.20E+04
PHTHALATE ESTERS							
Bis(2-ethylhexyl) phthalate	0.99 (20/20°C)	1.2E+0 (200°C)	4.0E-01 (25°C)	2.00E+05	1.51E+07[3]	3.00E-07	2.30E+08
Butylbenzyl pthalate	NA	8.6E-06	2.69	8.123E+04	68-350	1.3E-06	663
Di-n-butyl phthalate	1.047 (20/20°C)	1.0E-01 (115°C)	4.0E+02 (25°C)	1.58E+05	3.39E+04[3]	2.8E-07 (25°C)	4.70E+04
Diethyl phthalate	1.12	1.65E-03	1,080	2.95E+02	142	4.8E-06	117
Di-n-octyl phthalate	6.978	6.45E-06	0.3	1.3E+05	10,000-100,000	1.1E-05	100-10,000
Di-methyl phthalate	1.19	1.65E-03	4E+03	3E+01 to 1.32E+02	44; 160	1.1E-07	4.7;5.2
PESTICIDES							
alpha-BHC	NA	1.6E-04	7.8	7.94E+03	1080	7.85E-06	500
Chlordane	1.61 (25°C)	1E-05 (25°C)	5.60E-02	6.03E+02	1.20E+05[8]	4.79E-05 (25°C)	4.00E+04
4,4'-DDE	NA	6.50E-06	4.00E-02	4.90E+05	4.47E+06[3]	2.34E-05	8.90E+05
4,4'-DDT	1.5 (15/4°C)	1.50E-07	3.1E-03 (25°C)	1.55E+06	2.63E+06[3]	3.89E-05 (25°C)	8.00E+06
Dieldrin	1.75	3.1E-06	0.17	2.1E+04	7.4E+03 to 1.2E+04	5.8E-05	4,420-5,800
Endrin	NA	3E-06	0.25 ug/L	3.63E+04	34,000	7.52E-06	1,355-16,000
Methoxychlor	1.41	0.040 @ 24°C	0.045	5E+04 – 1.2E+05	9,700 – 92,000	1.58E-05	138 - 12,000
PCBs							
Aroclor-1254	NA	7.71E-05	0.012-0.057	3.2E+06	NA	2E-03	26,000-660,000

1 U.S. EPA, September 1992, Handbook of RCRA Groundwater Monitoring Constituents: Chemical and Physical Properties.
2 U.S. EPA, December 1982, Aquatic Fate Process Data for Organic Priority Pollutants.
3 U.S. EPA, July 1996, Soil Screening Guidance.
4 Lyman et al., 1990 Eq. 5-2.
5 Lyman et al., 1990; Equation 4-5.
6 Howard, 1989, Handbook of Environmental Fate and Exposure Data for Organic Chemicals, Volumes I, II, and III.
7 Verschueren, 1983, Handbook of Environmental Data of Organic Chemicals.

NA - Not available.

TABLE 5-2

FATE AND TRANSPORT CHEMICAL AND PHYSICAL CONSTANTS FOR INORGANICS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical	Molecular Weight (g/mol)[1]	Specific Gravity (20/4 C)[1]	Vapor Pressure (25 C) (mm Hg)[1]	Solubility (25 C) (mg/L)[1]	Henry's Law Constant (25 C) (atm-m^3/mol)[1]	Bioconcentration Factor (L/kg)[2]
Inorganics						
Aluminum	26.98[3]	2.708 (20 C)[3]	NA	NA	NA	NA
Antimony	121.75	6.684 (25 C)	1 (886 C)	insoluble	NA	NA
Arsenic	74.9216	5.727 (14 C)	1 (372 C)	insoluble	NA	NA
Barium	137.33	3.51 (20 C)	10 (1049 C)	hydrolyzes	NA	NA
Beryllium	9.01218	1.85 (20 C)	1 (1520 C)	insoluble	NA	NA
Cadmium	112.41	8.642 (UT)	NA	insoluble	NA	NA
Chromium	51.996	7.2 (28 C)	1 (1616 C)	insoluble	NA	NA
Cobalt	58.9332	8.9 (UT)	30 (2375 C)	insoluble	NA	NA
Copper	63.546	8.92 (UT)	1 (1628 C)	insoluble	NA	NA
Iron						
Lead	207.2	11.2960 (16 C)	1 (970 C)	insoluble	NA	NA
Manganese	54.938[4]	7.2[4]	NA	NA	NA	NA
Mercury	200.59	13.5939	100 (260 C)	0.056	1.14E-02 (UT)	3133[5]
Nickel	58.69	8.9 (UT)	1 (1800 C)	insoluble	NA	NA
Selenium	78.96	4.81 (20/4+1 C)	NA	NA	NA	NA
Silver	107.8682	10.5 (20 C)	1 (1310 C)	insoluble	NA	NA
Thallium	204.383	11.85 (UT)	1 (825 C)	insoluble	NA	NA
Vanadium	50.9415	5.96 (UT)	NA	insoluble	NA	NA
Zinc	65.38	7.14 (UT)	1 (487 C)	insoluble	NA	NA

1 Handbook of RCRA Ground-Water Monitoring Constituents: Chemical and Physical Properties, September 1992. Solubility of metals in water is dependent on other parameters, such as pH and temperature.
2 Aquatic Fate Process Data for Organic Priority Pollutants, December 1982.
3 The Condensed Chemical Dictionary, Van Nostrand Reinhold Company, New York, 1971.
4 Chemical, Physical, and Biological Properties of Compounds Present at Hazardous Waste Sites, Clement Associates, September 1985.
5 Lyman, W., Reehl, W., and Rosenblatt, D., 1990. Handbook of Chemical Property Estimation Methods.

6.0 BASELINE HUMAN HEALTH RISK ASSESSMENT

The baseline human health risk assessment contained in this section was performed to characterize and quantify potential health risks at Site 12 in the absence of remedial action. The results of the baseline risk assessment are also used to focus the evaluation of remedial action alternatives, if action is required. The baseline risk assessment consists of six major components:

- Data evaluation
- Exposure assessment
- Toxicity assessment
- Risk characterization
- Uncertainty analysis
- Remedial goal options

Methods for selection of the chemicals of potential concern (COPCs) that will be evaluated quantitatively in the baseline human health risk assessment, as well as those chemicals identified as COPCs for Site 12, are described in Section 6.1, Data Evaluation. The data evaluation section is primarily concerned with the selection of COPCs that are representative of the type and magnitude of potential human health effects. The COPC screening process involves the comparison of maximum site concentrations to risk-based screening levels and other health-based standards. Recent and historical data available for the site are considered during the selection process. A brief discussion of data usability is also provided.

Section 6.2, Exposure Assessment, identifies potential receptor populations and exposure pathways by which receptors may come in contact with contaminants at the site. Potential exposure routes under current and future land uses are developed from information on source area, chemical concentrations, chemical release mechanisms, patterns of human activity, and other pertinent information. A concise conceptual site model illustrates the potential receptors and exposure pathways evaluated in the baseline risk assessment. The exposure assessment also includes the calculation of quantitative estimates of chemical intake for each identified receptor, pathway, and route of exposure under the reasonable maximum exposure (RME) scenario. Equations and relevant exposure input parameters used in estimating chemical intakes are provided.

Section 6.3, Toxicity Assessment, presents the chemical-specific toxicity criteria for the identified COPCs that are used in the quantification of potential human health risks. These toxicity criteria, when integrated with the estimated chemical intakes developed in the exposure assessment, provide the basis for quantifying potential human health risks.

Methods used for characterizing risks associated with noncarcinogenic and carcinogenic effects for exposure to COPCs are provided in Section 6.4, Risk Characterization. Actual numerical results of the baseline human health risk assessment for Site 12 are summarized.

Because the quantitative risk estimates developed in the risk characterization are based on a number of assumptions (concerning exposure, land use, toxicity, etc.), various uncertainties are associated with the risk assessment process. A brief discussion of the uncertainties associated with the risk evaluation for Site 12 is contained in Section 6.5, Uncertainty Analysis.

Remedial goal options are developed in Section 6.6 for those media with estimated lifetime cancer risks greater than 1×10^{-4} and total HIs greater than 1.0.

To assess potential public health risks, four major aspects of chemical contamination and exposure must be considered: contaminants with toxic characteristics must be found in environmental media; the contaminants must be released by either natural processes or by human action; potential exposure points must exist; and human receptors must be present at the point of exposure. Risk is a function of both toxicity and exposure; without one of the factors listed above, there is no risk.

An illustration of the baseline human health risk assessment process is provided in Figure 6-1.

The baseline human health risk assessment for Site 12 was conducted using the most recent guidance from the U.S. EPA (U.S. EPA, 1989, 1993a, 1998a, 1998b), including Regional supplemental guidance (U.S. EPA Region 4, 1995a). To maintain consistency among risk assessments performed at various sites at the Base, methodologies presented in the Master Work Plan for MCRD Parris Island (B&R Environmental, 1998b) were also used to develop the baseline risk assessment for this site.

6.1 DATA EVALUATION

Data evaluation is a site-specific task that uses a variety of information to determine which of the detected chemicals at a site are most likely to present a risk to potential human receptors. The end result of this qualitative selection process is a list of COPCs for each environmental medium under consideration. Section 6.1.1 provides a brief summary of data usability, as it pertains to the baseline human health risk assessment. The selection of COPCs for Site 12 is contained in Section 6.1.2.

6.1.1 Data Usability

This section addresses the usability of data collected as part of the 1998 RI/RFI field investigation. The use of approved work plans for the Site 12 RI/RFI promotes quality by identifying appropriate sample

locations, analytical parameters, analytical methods, and data quality objectives (DQOs). Appendix D summarizes the results of measures (field and laboratory quality control, data validation, etc.) taken to ensure the quality of data collected during the RI/RFI field investigation.

All sample data collected for Site 12 were used to assess potential human health risks. The qualification of data during the formal data validation process is not expected to compromise the results of the baseline human health risk assessment. Analytical data qualified as estimated were utilized, even though the reported positive concentrations or sample-specific quantitation limits may be somewhat imprecise. The use of estimated data adds to the uncertainty associated with the risk assessment; however, the associated uncertainty is expected to be negligible compared to the other uncertainties inherent in the risk evaluation process (i.e., uncertainties with land uses, exposure scenarios, toxicological criteria, etc.).

6.1.2 Selection of COPCs

The overall goal of the baseline human health risk assessment is to quantify risks associated with those chemicals that represent a potentially significant human health hazard on the basis of toxicity, environmental concentration, and mobility. U.S. EPA guidance (U.S. EPA, 1989, 1995b) recommends focusing the baseline risk assessment by quantifying risk only for a select list of COPCs at a site. These chemicals, which are a subset of all detected chemicals in a given medium, are defined as those chemicals likely to dominate the overall potential risks for a site.

For the purposes of this baseline risk assessment, COPCs for a particular medium are limited to those chemicals that exceed a selection criterion. The maximum concentration of a chemical detected in soil, sediment, and groundwater was compared to the RBCs for that chemical. RBCs have been determined for cancer risk levels of 1×10^{-6} and noncancer (Hazard Quotient) levels of 1.0 and are presented in the most recent version of the U.S. EPA Region 3 Risk-Based Concentration Table (U.S. EPA, 2000a). The values in the RBC table were divided by 10 for noncarcinogens to screen to the more conservative Hazard Quotient of 0.1. Chemicals detected in groundwater were retained as COPCs if the maximum concentration detected exceeded the RBC for tap water. The maximum concentrations of chemicals detected in soil or sediment were compared to Region 3 residential RBCs for soil ingestion. U.S. EPA soil screening levels for transfer to air or groundwater were used to evaluate the inhalation pathway and the potential for chemicals to migrate from soil to groundwater (U.S. EPA, 1996a). Chemicals with concentrations exceeding these RBCs will be retained as COPCs.

Concentrations (maximum) of chemicals detected in surface water were compared to the National Recommended Water Quality Standard (WQS) for human health (consumption of water and organisms) (U.S. EPA, 1999a) and the chemicals were retained as COPCs whenever the standards were exceeded.

If WQSs were not available for detected chemicals, comparisons were made to the U.S. EPA Region 3 tap water RBCs.

Inorganic COPCs were also selected based on a comparison of site-specific chemical concentrations to background chemical concentrations. Comparisons were made between the maximum concentration of the site-specific chemical and twice the mean of the background chemical concentration. If the maximum detected concentration was less than twice the mean of the background chemical concentrations, then that chemical was not retained as a COPC.

Samples were analyzed for both total chromium and hexavalent chromium. Consequently, criteria for trivalent chromium will be used to evaluate concentrations of total chromium.

The initial list of COPCs for an area under investigation included any chemical detected at least once in validated environmental samples from the area. Essential human nutrients (magnesium, potassium, calcium, and sodium) present at relatively low concentrations were eliminated from the initial list of COPCs. They can be eliminated because they are only toxic at high doses. Potential adverse health effects resulting from exposure to essential nutrients in site media will be discussed in Section 6.5, Uncertainty Analysis.

Maximum detected concentrations (in a single sample) in each sample medium for Site 12 were compared to the risk-based and health-based screening criteria. If the maximum concentration exceeded any of the screening criteria, that chemical was retained as a COPC for all significant exposures involving that medium. For example, if arsenic was retained for soil, this chemical was evaluated as a COPC for both ingestion and dermal exposure routes. If none of the chemicals detected in a medium exceeded criteria, that medium was dropped from further consideration and the potential risks associated with exposure to that medium were regarded as relatively insignificant.

Table 6-1 summarizes the screening criteria used in the selection of COPCs. A medium-specific discussion of the specific criteria used for COPC selection and the results for the selection process are provided in the remainder of this section.

Appendix E contains a comparison of maximum sediment results against U.S. EPA Region 9 Preliminary Remediation Goals (PRGs) (December 3, 1999). This comparison was performed as a result of recent U.S. EPA Region 4 guidance recommending the use of Region 9 PRGs instead of Region 3 RBCs during the COPC screening step in the human health risk assessment process. The use of PRGs rather than RBCs in the screening process did not result in any additional compounds being retained as COPCs for this site.

6.1.2.1 Surface Soil

Sixteen surface soil samples were collected at Site 12 and analyzed for VOCs, SVOCs, pesticides, PCBs, and inorganics. A comparison of the maximum detected concentrations to the risk-based screening levels is presented in Table 6-2. The following chemicals were detected at maximum concentrations in surface soil that exceeded the risk-based COPC screening levels:

- SVOCs - benzo(a)pyrene
- Inorganics - antimony, arsenic, iron, lead, and manganese

In accordance with U.S. EPA Region 4 guidance, since one carcinogenic PAH [benzo(a)pyrene] had a maximum concentration exceeding the screening criteria, all carcinogenic PAHs will be retained as COPCs for surface soil.

Concentrations of all chemicals detected in surface soil were less than the U.S. EPA soil screening levels (SSLs) for soil to air (Table 6-2). Therefore, exposures through inhalation of fugitive dust will not be retained for evaluation in the risk assessment.

Maximum detected concentrations in surface soil were also compared to U.S. EPA SSLs for migration to groundwater, as summarized in Table 6-2. Concentrations of all chemicals detected in surface soil were less than the U.S. EPA SSL for migration from soil to groundwater.

6.1.2.2 Groundwater

Fourteen groundwater samples were collected at Site 12 and analyzed for VOCs, SVOCs, pesticides, PCBs, and inorganics. A comparison of the maximum detected concentrations to the risk-based screening levels is presented in Table 6-3. The following chemicals were detected at maximum concentrations in groundwater that exceeded the risk-based COPC screening levels:

- VOCs - acetone and chloroform
- Inorganics - aluminum, arsenic, cadmium, iron, manganese, and thallium

6.1.2.3 Surface Water

Thirteen surface water samples were collected at Site 12 and analyzed for VOCs, SVOCs, pesticides, PCBs, and inorganics. A comparison of the maximum detected concentrations to the risk-based

screening levels is presented in Table 6-4. The following chemicals were detected at maximum concentrations in surface water that exceeded the risk-based COPC screening levels:

- SVOCs - bis(2-ethylhexyl)phthalate
- Inorganics - aluminum, arsenic, iron, manganese, and vanadium

6.1.2.4 Sediment

Eighteen sediment samples were collected at Site 12 and analyzed for VOCs, SVOCs, pesticides, PCBs, and inorganics. A comparison of the maximum detected concentrations to the risk-based screening levels is presented in Table 6-5. The following chemicals were detected at maximum concentrations in sediment that exceeded the risk-based COPC screening levels:

- Inorganics - aluminum, antimony, arsenic, iron, manganese, nickel, and vanadium

6.1.2.5 Sediment Waste

Two sediment waste samples were collected at Site 12 and analyzed for SVOCs, pesticides, PCBs, and inorganics. A comparison of the maximum detected concentrations to the risk-based screening levels is presented in Table 6-6. The following chemicals were detected at maximum concentrations in sediment that exceeded the risk-based COPC screening levels:

- PCBs - Aroclor 1254
- Inorganics - antimony, arsenic, cadmium, copper, iron, lead, and manganese

Table 6-7 lists the chemicals retained as COPCs for surface soil, groundwater, surface water, and sediment.

6.2 EXPOSURE ASSESSMENT

The exposure assessment defines and evaluates the exposures experienced by likely receptor populations at a site. In order to have an exposure, several factors must be present: a source and mechanism of release, a route of contaminant transport through an environmental medium, a contact point for a human receptor, and an exposure route at the point of contact. All four components must be present for the exposure to occur.

The exposure assessment presented in this section of the report consists of several subsections that characterize the physical site setting and the potential receptors of concern, identify the potential

contaminant migration and exposure pathways, define the contaminant concentrations at the point of exposure, and present the equations used to quantify exposure in terms of contaminant intake (dose). Appendix E-1 of this report contains sample calculations for the quantification of contaminant intakes, as well as the chemical-specific intakes for Site 12.

6.2.1 Exposure Setting

Reportedly, wastes were brought to the island by local residents prior to the Depot's acquisition of the island. The Depot has not used the site as a disposal area. No organized landfill operations occurred by the local residents. Disposal of waste at this site occurred from about 1955 to 1968. The disposal area received routine domestic refuse that included small metal cans, beer and soda bottles, hubcaps, tires, buckets, cinderblocks, rusted metal 5-gallon cans, sheet metal, paper, plastic, and wood. The area has an irregular, undulating surface due to the random scattering of waste piles, ranging up to approximately 30 feet in diameter and 5 feet in height.

6.2.2 Conceptual Site Model

This section discusses the conceptual site model for Site 12. A conceptual site model facilitates consistent and comprehensive evaluation of the potential risks to human health by creating a framework for identifying the pathways by which human receptors may come in contact with contaminated media resulting from the source area. A conceptual site model depicts the relationships among the following elements, which are necessary for defining complete exposure pathways:

- Site sources of contamination
- COPCs in environmental media
- Contaminant release mechanisms
- Contaminant transport pathways
- Exposure mechanisms and exposure routes
- Potential receptors

The conceptual site model for Site 12 is provided in Figure 6-2. The potential sources of contamination at Site 12 are the wastes disposed on the site. Contaminants may be released from the site by mechanisms such as stormwater runoff and subsequent erosion of surface soil, leaching of COPCs from soil via infiltrating water to subsurface soil and subsequent migration through the subsurface soil to the water table, wind erosion of surface soil (fugitive dust), and the volatilization of chemicals from soil (volatile emissions).

Storms generate runoff, which is directed toward the surrounding surface water. Initially, this water may move across the site as sheet flow, which can entrain loose soil material. This soil is moved from the site as a sediment and will be deposited where the flow velocity diminishes below that needed to carry a particular grain size.

Soluble chemicals may also migrate downward through the soil column via infiltrating precipitation. The migration of these chemicals may be somewhat impeded by the chemical's tendency to bind to soil organic material. However, these soluble chemicals may eventually reach the water table. Once in the groundwater, these chemicals continue to migrate via dispersion and advection.

Chemicals adsorbed to surface soil may also be released from a site via wind erosion of loose soil material. These particulates are carried downwind and potentially off site if the grain size is small enough and the wind velocity is great enough. Additionally, chemicals may also be released from soil via volatilization.

Once released from the source, contaminants are transported in media such as soil, groundwater, surface water, sediment, or air. Potential receptors may be exposed either directly or indirectly to contaminants in these media by a variety of exposure mechanisms, such as direct contact and immersion. Typically, several exposure routes (ingestion, dermal contact, inhalation, etc.) are associated with a particular exposure mechanism.

The conceptual site model presented in Figure 6-2 also indicates those exposure routes that are carried through the quantitative risk assessment for each potential receptor. An objective of the development of the conceptual site model, as well as the baseline human health risk assessment, is to focus attention on those pathways that contribute the most to the potential impacts on human health and the environment and to provide the rationale for eliminating other exposure pathways that are considered to be minor components of the overall risk.

6.2.3 Potential Exposure Pathways

Potential receptors can come into contact with contaminants in a variety of ways, which are generally the result of interactions between a receptor's behavior or lifestyle and an exposure medium. This assessment defines an exposure route as a stylized description of the behavior that brings a receptor into contact with a contaminated medium.

6.2.3.1 Air

This pathway is based on the scenario that a receptor is immersed in air that contains suspended particulates and/or volatile organic vapors originating from the source area. Subsequent exposure of the receptor occurs upon inhalation of the ambient air.

A qualitative comparison of maximum detected concentrations in surface soil at Site 12 to U.S. EPA SSLs, based on intermedium transfer (from soil to air), was performed to determine if additional quantitative analysis of this potential exposure pathway was warranted. The SSLs are based on residential land use and lifetime exposure scenarios and are, therefore, conservative values for potential receptors under current and future land use conditions. Exposures to fugitive dust and VOCs released from soil were found to be relatively insignificant, based on the qualitative screening. This screening is summarized in Table 6-2. Maximum detections of all chemicals in surface soil were less than the SSLs; therefore, exposure via the inhalation pathway is considered to be minimal and was not considered for further evaluation.

6.2.3.2 Direct Contact with Soil and Sediment

Potential receptors may come into direct contact with surface soil and sediment, which may be affected by the release of chemicals from the source area. During the receptor's period of contact, the individual may be exposed via incidental ingestion of surface soil and sediment or via dermal absorption of contaminants from surface soil and sediment.

Dermal contact with chemicals detected in the site surface soil and sediment may or may not result in a significant exposure. In general, inorganics, which were detected frequently in the soil/sediment samples and were selected as COPCs, tend to strongly adhere to organic matter. For these chemicals to be percutaneously absorbed, they must first desorb from soil and diffuse through the skin. Various factors affect the rate of dermal absorption, including the amount of soil on the skin surface, soil characteristics (moisture, pH, organic carbon content, etc.), skin characteristics (thickness, temperature, hydration, etc.), volatilization losses, and chemical-specific properties. Dermal exposures to chemicals in soil and sediment are evaluated quantitatively in the baseline risk assessment.

6.2.3.3 Direct Contact with Groundwater

Human receptors using groundwater as a potable water supply may be exposed to groundwater via ingestion, dermal contact, and inhalation. Groundwater is not currently used as a potable water supply at the site nor is it expected to be used in the future as a potable water supply. This scenario is based on the high salinity of the groundwater and the current and future use of the site. Salinity readings ranged

from 0.6 to 33 parts per trillion (ppt), with an average reading of 16 ppt. These salinity readings are most likely the result of the salt water marsh surrounding Site 12, which makes the groundwater unsuitable for potable use. Attempts to pump groundwater from the area would be more likely to draw from the abundant supply of salt water. In addition, the site is a former disposal area. Under future scenarios considered for the site, restrictions would be implemented to prevent the installation of wells. Furthermore, there are no off-site residents located downgradient of the site who might use groundwater as a potable water supply. Construction workers may have dermal contact with groundwater if excavation below the water table occurs. Although it is unlikely that groundwater would be used for potable purposes, ingestion of groundwater will be considered as an ingestion pathway.

6.2.3.4 Direct Contact with Surface Water

Receptors may come into direct contact with surface water in marshy areas of the site. These surface waters may contain contaminants in a dissolved phase. Individuals may be exposed via dermal contact and/or incidental ingestion.

6.2.3.5 Ingestion of Fish

The surface water bodies adjacent to Site 12 are tidally influenced and are dry at low tide. Consequently, any fish in surface water adjacent to Site 12 originated from outside these areas. Therefore, ingestion of fish caught at Site 12 will not be retained for evaluation in the risk assessment.

6.2.4 Potential Receptors

Potential receptors were identified for both current and future land use conditions. The receptors were identified by analyzing the interaction of current land use practices and the identified sources of contamination. Future site use is expected to remain the same as the current site use, which is industrial. Receptors are as follows:

- Individuals (**construction workers**) who may contact surface and subsurface soil while excavating will be evaluated for exposure to surface soil and surface water/sediment. Dermal exposure to shallow groundwater may also be possible for this receptor. It will be assumed that the construction worker is exposed to surface soil 6 months over a 1-year period and would be engaged in activities where he could be exposed to groundwater, surface water, and sediment 1 month out of the year.

- The site is located adjacent to a residential area and it is possible for individuals to trespass on the site. On-site **adolescent trespassers** are assumed to be exposed to soil, surface water, and sediment on an infrequent basis.

- At present, the site is not used for recreational activities, although recreational use of the site may occur in the future. On-site **adolescent or adult recreational users** are assumed to be exposed to soil, surface water, and sediment on an infrequent basis.

- **Hypothetical Future On-Site Residents** are evaluated as potential receptors. Future on-site residents are assumed to be exposed to soil and groundwater on a daily basis and to surface water and sediment less frequently. Future child and adult residents are not receptors under current or expected future land use and are included only to provide an indication of potential risks if the base were to close and then be developed for residential use. Although military personnel reside at the base under current conditions, the residential scenario is not applicable for these receptors since they do not reside in the areas of investigation and they are assigned to the base for a relatively short period of time (e.g., 3 to 6 years).

A summary of the rationale used for the selection or elimination of a potential receptor group is provided in Table 6-8. Site workers (e.g., full-time employees and maintenance workers) will not be considered potential receptor groups and will not be evaluated in the human health risk assessment for the following reasons: No development (industrial, commercial, or residential) exists at the site and any development by the Depot is extremely unlikely because the island is within the distance arc required for the Depot's small arms weapons range. Additionally, access to the island is limited. Within the confines of the Depot, no direct route exists from the main portion of the base to Jericho Island. To access the island, Depot personnel must exit the main gate of the Depot, drive through a residential community, and access the island via a causeway from a residential street. Industrial or commercial development (by the Depot or a third-party owner) is extremely unlikely. As such, only future residents, trespassers, and recreational users will be evaluated in the human health risk assessment.

6.2.5 Exposure Point Concentrations

According to U.S. EPA guidance (1989, 1992), risk assessments are conducted using a representative exposure point concentration for each COPC. The exposure point concentration is typically defined as the upper 95 percent confidence limit (UCL), which is based on the distribution of a data set. However, when small data sets (i.e., fewer than 11 samples) are available for a site and/or medium, the 95 percent UCL is not considered to be a good estimate of the sample mean; in those cases, the maximum detected concentration is used as the exposure point concentration. It should be noted that a sample and its duplicate sample were averaged prior to the determination of the exposure point concentration.

For normally distributed data, the calculation of the exposure point concentration (UCL) is a two-step process. First, the standard deviation of the sample set must be determined, as follows:

$$S = \left[\frac{\Sigma(X_i - \overline{X})^2}{(n-1)}\right]^{1/2}$$

where: S = standard deviation
X_i = individual sample value
n = number of samples
$\overline{X}$ = mean sample value

The one-sided UCL on the mean is then calculated as follows:

$$UCL = \overline{X} + t\left(\frac{S}{n^{1/2}}\right)$$

where: UCL = 95% upper confidence limit of the mean
$\overline{X}$ = arithmetic average
t = one-sided t distribution factor ($t_{0.95}$)
S = standard deviation
n = number of samples

For lognormally distributed data sets, the exposure concentration is calculated using the following equation:

$$UCL = \exp\left(\overline{X} + 0.5S^2 + \frac{HS}{(n-1)^{1/2}}\right)$$

where: UCL = 95% upper confidence limit of the mean
exp = constant (base of the natural log, e)
$\overline{X}$ = mean of the transformed data
S = standard deviation of the transformed data
H = H-statistic (from Gilbert, 1987; $H_{0.95}$)
n = number of samples

This equation uses individual sample results that have been transformed using the natural logarithm function. If the data set has an undefined distribution, then the maximum detected concentration was used as the exposure point concentration.

U.S. EPA Region 4 has adopted a Toxicity Equivalence Factor (TEF) approach to evaluate potentially carcinogenic PAHs. These TEFs are based on the relative potency of each compound relative to that of benzo(a)pyrene. TEFs for the individual carcinogenic PAHs are as follows:

Compound	TEF
Benzo(a)pyrene	1.0
Benz(a)anthracene	0.1
Benzo(b)fluoranthene	0.1
Benzo(k)fluoranthene	0.01
Chrysene	0.001
Dibenz(a,h)anthracene	1.0
Indeno(1,2,3-cd)pyrene	0.1

The TEFs are used to convert each individual carcinogenic PAH concentration into an equivalent concentration of benzo(a)pyrene. Using individual benzo(a)pyrene equivalent concentrations, an exposure point concentration for carcinogenic PAHs is derived.

Exposure point concentrations for COPCs for surface soil, groundwater, surface water, and sediment are summarized in Table 6-9. Only two sediment waste samples were collected; consequently, the maximum detected concentration in sediment waste samples was used as the exposure point concentration.

6.2.6 Quantification of Exposure

Estimates of exposure are based on the contaminant concentrations at the exposure points and on scenario-specific assumptions and intake parameters. The models and equations used to quantify intakes are described in this section and have been obtained from a variety of U.S. EPA guidance documents, which are cited in the specific intake estimation sections that follow.

Exposure model parameters for all receptors are presented in Table 6-10. The parameters are based on those presented in the Master Work Plan for MCRD Parris Island (B&R Environmental, 1998) and standard U.S. EPA Region 4 default values. Rationale is provided below for those parameters that are non-standard values or values other than those presented in the Master Work Plan. The parameters are used in the equations presented in this section, along with the exposure point concentrations previously defined to estimate contaminant intakes, which will be used to determine potential risks. Individual chemical intakes for each receptor/exposure route combination are presented in Appendix E.

6.2.6.1 Incidental Ingestion of Soil/Sediment

Direct physical contact with soil (and sediment) may result in the incidental ingestion of chemicals by construction workers, trespassers, on-site recreational users, and on-site residents. Exposure associated with the oral route is estimated in the following manner (U.S. EPA, 1989):

$$Intake_{si} = \frac{(C_{si})(IR_s)(FI)(EF)(ED)(CF)}{(BW)(AT)}$$

where:
- $Intake_i$ = intake of contaminant "i" from soil or sediment (mg/kg/day)
- C_{si} = concentration of contaminant "i" in soil or sediment (mg/kg)
- IR = incidental ingestion rate (mg/day)
- FI = fraction ingested from contaminated source (decimal fraction)
- EF = exposure frequency (days/year)
- ED = exposure duration (years)
- CF = conversion factor (10^{-6} kg/mg)
- BW = body weight (kg)
- AT = averaging time (days);
  for noncarcinogens, AT = ED x 365 days/year;
  for carcinogens, AT = 70 years x 365 days/year

Since Site 12 is relatively small in size, it was assumed that a construction worker would be engaged in construction-related activities 125 days a year (EF_{Soil}) over a 1-year period (ED). It was further assumed that a construction worker would be exposed to sediment for 1 work month or 21 days per year ($EF_{Sediment}$) while at the site. An exposure frequency of 45 days a year will be used for trespassers, on-site recreational users, and on-site residents exposed to sediment. This value is based on U.S. EPA Region 4's default value for recreational swimming. All other exposure parameters for incidental ingestion of soil and sediment are standard U.S. EPA default values.

6.2.6.2 Dermal Contact with Soil/Sediment

During direct contact, construction workers, trespassers, on-site recreational users, and on-site residents may contact contaminated soil and sediment with their skin. Dermal absorption from potentially contaminated soil and sediment is calculated using the following equation (U.S. EPA, 1989):

$$Intake_{si} = \frac{(C_{si})(SA)(AF)(ABS)(CF)(EF)(ED)}{(BW)(AT)}$$

where: $Intake_{si}$ = amount of chemical "i" absorbed during contact with soil or sediment (mg/kg/day)

C_{si} = concentration of chemical "i" in soil or sediment (mg/kg)

SA = skin surface area available for contact (cm^2/day)

AF = skin adherence factor (mg/cm^2)

ABS = absorption factor (decimal fraction)

CF = conversion factor (10^{-6} kg/mg)

EF = exposure frequency (days/year)

ED = exposure duration (years)

BW = body weight (kg)

AT = averaging time (days);
for noncarcinogens, AT = ED x 365 days/year;
for carcinogens, AT = 70 years x 365 days/year

The same exposure frequencies and durations used in the estimation of incidental ingestion intakes of soil/sediment are used to estimate exposure via dermal contact. Current guidance (U.S. EPA, 1998b) is used to develop the following default assumptions concerning the amount of skin surface area available for contact for a receptor: For construction workers, the exposed skin surface area was assumed to be 4,100 cm^2. This value represents the hands, forearms, and head being exposed to soil (U.S. EPA, 1992). It was assumed that 25 percent of the total body surface area (U.S. EPA, 1998b) was available for exposure by the adolescent trespasser (3,820 cm^2), adolescent recreational user (3,820 cm^2), adult recreational user (5,700 cm^2), child resident (2,000 cm^2), and adult resident (5,700 cm^2). Soil/sediment skin adherence factors used in the risk assessment were 0.5 mg/cm^2 for the construction worker; 0.2 mg/cm^2 for the adolescent trespasser, adolescent recreational user, adult recreational user, and child resident; and 0.07 for the adult resident (U.S. EPA, 1998b). Absorption factors of 0.13 and 0.03 were used to assess dermal exposure to benzo(a)pyrene and arsenic, respectively (U.S. EPA, 1998b). Region 4 default values of 0.01 for organics and 0.001 for inorganics were used for those chemicals for which chemical-specific absorption factors were not available (U.S. EPA Region 4, 1995a).

6.2.6.3 Incidental Ingestion of Surface Water/Ingestion of Groundwater

Construction workers, trespassers, recreational users, and on-site residents may incidentally ingest surface water while at Site 12. Future child and adult residents may use groundwater as a potable water supply. Intakes associated with ingestion of water are evaluated using the following equations (U.S. EPA, 1989):

$$Intake_{wi} = \frac{(C_w)(CR)(ET)(EF)(ED)}{(BW)(AT)} \quad \text{for Surface Water}$$

$$Intake_{wi} = \frac{(C_w)(IR_w)(EF)(ED)}{(BW)(AT)} \quad \text{for Groundwater}$$

where: $Intake_{wi}$ = intake of chemical "i" from water (mg/kg/day)
C_w = concentration of chemical "i" in water (mg/L)
IR_w = ingestion rate for groundwater (L/day)
CR = contact rate for surface water (L/hour)
ET = exposure time for surface water (hours/day)
EF = exposure frequency (days/year)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (days);
for noncarcinogens, AT = ED x 365 days/year;
for carcinogens, AT = 70 years x 365 days/year

It is assumed that construction workers, trespassers, on-site recreational users, and on-site residents may incidentally ingest (CR) 0.01 L/hr (similar to wading) while at the site (U.S. EPA, 1995). It was assumed that exposure frequencies for surface water would be the same as those for exposure to sediments. The exposure time (ET) for construction workers is 8 hours per day, the length of a typical work day. The exposure time for trespassers, on-site recreational users, and on-site residents exposed to surface water was 2.6 hours, which is the U.S.-EPA-recommended default value for swimming (U.S. EPA, 1989). It was assumed that all other exposure parameters for incidental ingestion of surface water are standard U.S. EPA default values. For potable use of groundwater, it was assumed that a child would ingest 1 liter per day, 350 days a year for 6 years and an adult would ingest 2 liters per day, 350 days a year for 24 years.

6.2.6.4 Dermal Contact with Groundwater/Surface Water

Construction workers may contact groundwater during construction activities if excavation occurs below the water table. In addition, construction workers, trespassers, on-site recreational users, and on-site residents may come into contact with surface water. Future child and adult residents may use groundwater as a potable water supply. The following equation is used to assess exposures resulting from dermal contact with water (U.S. EPA, 1998b):

$$DAD_{wi} = \frac{(DA_{event})(EV)(ED)(EF)(A)}{(BW)(AT)}$$

where: DAD_{wi} = dermally absorbed dose of chemical "i" from water (mg/kg/day)
DA_{event} = absorbed dose per event (mg/cm^2/event)
EV = event frequency (events/day)
ED = exposure duration (years)
EF = exposure frequency (days/year)
A = skin surface area available for contact (cm^2)
BW = body weight (kg)
AT = averaging time (days);
for noncarcinogens, AT = ED x 365 days/year;
for carcinogens, AT = 70 years x 365 days/year

The absorbed dose per event (DA_{event}) is estimated using a non-steady-state approach for organic compounds and a more traditional steady-state approach for inorganics. For organics, the following equations apply (U.S. EPA, 1998b):

$$\text{If } t_{event} < t^*, \text{ then : } DA_{event} = (2K_p)(C_{sw})(CF)\left(\sqrt{\frac{6\,\tau\, t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^*, \text{ then : } DA_{event} = (K_p)(C_{sw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

where: t_{event} = duration of event (hour/event)
t^* = time it takes to reach steady-state conditions (hours)
K_p = permeability coefficient from water through skin (cm/hour)
C_{sw} = concentration of chemical "i" in water (mg/L)
τ = lag time (hour)
π = constant (unitless; equal to 3.141592654)
CF = conversion factor (10^{-3} L/cm^3)
B = partitioning constant derived by Bunge Model (dimensionless)

For organic COPCs for groundwater and surface water, values for K_p are obtained from the current dermal guidance (U.S. EPA, 1998b). The partitioning constant derived by Bunge Model, B, is calculated from

$$B = K_p \times \sqrt{MW} / 2.6$$

where:
MW = Molecular weight.

The lag time, τ, is calculated from

$$\tau = 0.105 \times 10^{(0.0056 \times MW)}$$

If B is less than or equal to 0.6, then the time it takes to reach steady-state conditions, t*, is calculated from

$$t^* = 2.4 \times \tau$$

And if B is greater than 0.6, then t* is calculated from

$$t^* = (b - \sqrt{b^2 - c^2}) \times \frac{l_{sc}^2}{D_{sc}}$$

and

$$b = \frac{2 \times (1+B)^2}{\pi} - c$$

$$c = \frac{1 + 3B + 3B^2}{3(1+B)}$$

$$D_{sc} = l_{sc} \times 10^{(-2.80 - 0.0056 \times MW)}$$

where:

l_{sc}	=	apparent thickness of skin (cm),
D_{sc}	=	effective diffusivity for chemical transfer through skin (cm^2/hr)

The following steady-state equation is used to estimate DA_{event} for inorganics:

$$DA_{event} = (K_p)(C_{sw})(t_{event})$$

The recommended default permeability coefficient value of 0.001 cm/hour was used for the inorganics selected as COPCs.

Current guidance (U.S. EPA, 1998b) is used to develop the following default assumptions concerning the amount of skin surface area available for contact. The exposed skin surface area for construction workers was assumed to be 2,490 cm^2. This value represents the hands and forearms being exposed to groundwater/surface water (U.S. EPA, 1998b). It was assumed that exposure frequencies for groundwater/surface water would be the same as those for exposure for sediments. The exposure time (ET) for construction workers is 8 hours per day, the length of a typical workday. The exposure time for trespassers, on-site recreational users, and on-site residents exposed to surface water was 2.6 hours, which is the U.S.-EPA-recommended default value for swimming (U.S. EPA, 1989). It was assumed that

25 percent of the total body surface area (U.S. EPA, 1998b) was available for exposure to surface water by the adolescent trespasser (3,820 cm^2), adolescent recreational user (3,820 cm^2), adult recreational user (5,700 cm^2), child resident (2,000 cm^2), and adult resident (5,700 cm^2). All other exposure parameters for dermal contact with groundwater and surface water are standard U.S. EPA default values. For potable use of groundwater, it was assumed that the entire body would be available for exposure for a child (6,600 cm^2) and adult (18,000 cm^2). It was assumed that a child would be exposed to groundwater while bathing 15 min per day, 350 days per year for 6 years and an adult would be exposed 15 min per day, 350 days per year for 24 years.

6.2.6.5 Exposure to Lead

The equations and methodology presented in the previous section cannot be used to evaluate exposure to lead because of the absence of published dose response parameters for this chemical. Exposure to lead can be evaluated using the U.S. EPA Integrated Exposure Uptake Biokinetic (IEUBK) Model for lead, version 0.99D (U.S. EPA, 1994a). This model is designed to estimate blood levels of lead in children (under 7 years of age) based on either default or site-specific input values for air, drinking water, diet, dust, and soil exposure. Exposures to lead by nonresidential adults are evaluated by use of a slope factor approach developed by the U.S. EPA Technical Review Workgroup for Lead (U.S. EPA, 1996c). The approach focuses on estimating fetal blood-lead concentrations in women exposed to lead-contaminated soils.

Studies indicate that infants and young children are extremely susceptible to adverse effects from exposure to lead. Considerable behavioral and developmental impairments have been noted in children with elevated blood-lead levels. The threshold for toxic effects to children from this chemical is believed to be in the range of 10 µg/dL to 15 µg/dL. Blood-lead levels greater than 10 µg/dL are considered to be a concern.

In general, the IEUBK Model and Technical Review Work Group Model for lead were used to address exposure to lead when detected soil concentrations exceeded the Office of Solid Waste and Environmental Response (OSWER) soil screening level of 400 mg/kg for residential land use (U.S. EPA, 1994b). Concentrations of lead in groundwater and surface water concentrations were less than the 15 µg/L Federal Action Level promulgated under the Safe Drinking Water Act. Consequently, exposures to lead in groundwater and surface water were not evaluated with the IEUBK model. Exposure concentrations, as well as default parameters for some input parameters, were used in the evaluation. The input parameters used and the results of lead models, estimated blood-lead levels, and probability density histograms are presented in the site-specific appendices.

6.3 TOXICITY ASSESSMENT

The toxicity assessment examines information concerning the potential human health effects associated with exposure to COPCs. The goal of the toxicity assessment is to provide, for each COPC, a quantitative estimate of the relationship between the magnitude and type of exposure and the severity or probability of human health effects. The toxicity values presented in this section are integrated with the outputs of the exposure assessment to characterize the potential for the occurrence of adverse health effects.

The toxicological evaluation involves a critical review and interpretation of toxicity data from epidemiological, clinical, animal, and in vitro studies. This review of the data ideally determines both the nature of the health effects associated with a particular chemical and the probability that a given quantity of a chemical could result in the referenced effect. This analysis defines the relationship between the dose received and the incidence of an adverse effect for the COPC.

The entire toxicological database is used to guide the derivation of cancer slope factors (CSFs) for carcinogenic effects and reference doses (RfDs) for noncarcinogenic effects. These data may include epidemiological studies, long-term animal bioassays, short-term tests, and comparisons of molecular structure. Data from these sources are reviewed to determine if a chemical is likely to be toxic to humans. Because of the lack of available human studies, however, the majority of toxicity data used to derive CSFs and RfDs comes from animal studies.

For noncarcinogenic effects, the most appropriate animal model (i.e., the species most biologically similar to the human) is identified. Pharmacokinetic data often enter into this determination. In the absence of sufficient data to identify the most appropriate animal model, the most sensitive species is chosen. The RfD is generally derived from the most comprehensive toxicology study that characterizes the dose response relationship for the critical effect of the chemical. Preference is given to studies using the exposure route of concern. In the absence of such data, however, an RfD for one route of exposure may be extrapolated from data from a study that used a different route of exposure. Such extrapolation must take into account pharmacokinetic and toxicological differences between the routes of exposure. Uncertainty factors are applied to the highest no-observed-adverse-effect-level (NOAEL) to adjust for inter- and intraspecies variation, deficiencies in the toxicological database, and use of subchronic rather than chronic animal studies. Additional uncertainty factors may be applied to estimate a NOAEL from a lowest-observed-adverse-effect-level (LOAEL) if the key study failed to determine a NOAEL.

CSFs for weights-of-evidence of Group A or B chemicals are generally derived from positive cancer studies that adequately identify the target organ in the test animal data and characterize the dose response relationship. CSFs are derived for Group C compounds for which the data are sufficient but are

not derived for Group D or E chemicals. No consideration is given to similarity in the animal and human target organ(s) because a chemical capable of inducing cancer in any animal tissue is considered potentially carcinogenic to humans. Preference is given to studies using the route of exposure of concern, in which normal physiologic function was not impaired and in which exposure occurred during most of the animal's lifetime. Exposure and pharmacokinetic considerations are used to estimate equivalent human doses for computation of the CSF. When a number of studies of similar quality are available, the data may be combined in the derivation of the CSF.

Toxicological profiles for each of the COPCs are presented in Appendix E. These profiles present a summary of the available literature on carcinogenic and noncarcinogenic effects associated with human exposure to the chemical.

6.3.1 Carcinogenic Effects

The toxicity information considered in the assessment of potential carcinogenic risks includes a weight-of-evidence classification and a slope factor. The weight-of-evidence classification qualitatively describes the likelihood that a chemical is a human carcinogen and is based on an evaluation of the available data from human and animal studies. A chemical may be placed in one of three groups in U.S. EPA's classification system to denote its potential for carcinogenic effects:

- Group A - known human carcinogen
- Group B1 or B2 - probable human carcinogen
- Group C - possible human carcinogen

Chemicals that cannot be classified as a human carcinogen because of a lack of data are placed in Group D, and those for which there is evidence of noncarcinogenicity in humans are placed in Group E.

The CSF is the toxicity value used to quantitatively express the carcinogenic hazard of cancer-causing chemicals. It is defined as the upper-bound estimate of the probability of cancer incidence per unit dose averaged over a lifetime. Slope factors are derived from studies of carcinogenicity in humans and/or laboratory animals and are typically calculated for compounds in Groups A, B1, and B2, although some Group C carcinogens also have slope factors and some B2 carcinogens have none (e.g., lead). Slope factors are specific to a chemical and route of exposure and are expressed in units of $(mg/kg/day)^{-1}$ for both oral and inhalation routes. Inhalation cancer toxicity values are usually expressed as inhalation unit risks in units of reciprocal $\mu g/m^3$ $(1/\mu g/m^3)$. Because cancer risk characterization requires an estimate of reciprocal dose in units of 1/mg/kg/day, the inhalation unit risk must be converted to the mathematical equivalent of an inhalation cancer slope factor, or risk per unit dose (mg/kg/day). This is done by assuming that humans weigh 70 kg and inhale 20 m^3 of air per day [i.e., the inhalation unit risk $(1/\mu g/m^3)$

is divided by 20 m^3, multiplied by 70 kg, and multiplied by 1,000 µg/mg to yield the mathematical equivalent of an inhalation slope factor (1/mg/kg/day)].

CSFs for COPCs at Site 12 are presented in Table 6-11. The primary sources of information for these values are the U.S. EPA's Integrated Risk Information System (IRIS) (U.S. EPA, 2000a). U.S. EPA intends that IRIS supersede all other sources of toxicity information for risk assessment. If values are not available in IRIS, the annual Health Effects Assessment Summary Tables (HEAST) (U.S. EPA, 1997) are consulted. U.S. EPA Region 3 Risk-Based Concentration Tables (April 13, 2000) are also used as a quick tabulated reference for available CSFs. If no CSF is available from any of these sources, carcinogenic risks are not quantified and potential exposures are addressed in Section 6.5, Uncertainty Analysis.

CSFs also exist for several (but not all) Class C compounds, which are identified as "possible" human carcinogens. These compounds typically exhibit inadequate evidence of carcinogenicity in humans and limited evidence in animals. In this human health risk assessment, Class C compounds are evaluated the same as Class A, B1, and B2 compounds. The uncertainty associated with this approach is discussed in Section 6.5.

Dermal CSFs are derived from the corresponding oral values. Regional guidance (U.S. EPA, Region 4, 1995a, 1996b) is used as a basis for determining the dermal CSFs. In the derivation of a dermal CSF, the oral CSF is divided by the gastrointestinal absorption efficiency to determine a CSF based on an absorbed dose rather than an administered dose, as follows:

$$CSF_{dermal} = (CSF_{oral}) / (ABS_{GI})$$

The oral CSF is divided by the absorption efficiency because CSFs are expressed as reciprocal doses. Dermal CSFs and the absorption efficiencies used in their determination are also included in Table 6-11.

As discussed in Section 6.2.5, U.S. EPA Region 4 has adopted a TEF approach to evaluate potentially carcinogenic PAHs. These TEFs are based on the relative potency of each compound relative to that of benzo(a)pyrene. U.S. EPA Region 4 also requires that dermal exposures to PAHs be evaluated using the TEF approach. Consequently, the oral and dermal CSF for benzo(a)pyrene is used to evaluated exposures to all carcinogenic PAHs in terms of benzo(a)pyrene equivalents.

6.3.2 Noncarcinogenic Effects

For noncarcinogens, it is assumed that there exists a dose below which no adverse health effects will be seen. Below this "threshold" dose, exposure to a chemical can be tolerated without adverse effects. For noncarcinogens, a range of exposure exists that can be tolerated. Toxic effects are manifested only when physiologic protective mechanisms are overcome by exposures to a chemical above its threshold level. Maternal and developmental endpoints are considered systemic toxicity.

The potential for noncarcinogenic health effects resulting from exposure to chemicals is assessed by comparing an exposure estimate (intake or dose) to an RfD. The RfD is expressed in units of mg/kg/day and represents a daily intake of contaminant per kilogram of body weight that is not sufficient to cause the threshold effect of concern. An RfD is specific to the chemical, the route of exposure, and the duration over which the exposure occurs. Separate RfDs are presented for ingestion and inhalation pathways. In particular, reference concentrations (RfCs) in units of mg/m^3 are typically presented for the inhalation pathway. Because characterization of noncarcinogenic effects requires an estimate of dose in units of mg/kg/day, the inhalation RfC must be converted to an inhalation RfD. This is done by assuming that humans weigh 70 kg and inhale 20 m^3 of air per day [i.e., the inhalation RfC (mg/m^3) is multiplied by 20 m^3/day and divided by 70 kg to yield an inhalation RfD (mg/kg/day)].

To derive an RfD, U.S. EPA reviews all relevant human and animal studies for each compound and selects the study (studies) pertinent to the derivation of the specific RfD. Each study is evaluated to determine the NOAEL or, if the data are inadequate for such a determination, the LOAEL. The NOAEL corresponds to the dose (in mg/kg/day) that can be administered over a lifetime without inducing observable adverse effects. The LOAEL corresponds to the lowest daily dose that induces an observable adverse effect. The toxic effect characterized by the LOAEL is referred to as the "critical effect." To derive an RfD, the NOAEL (or LOAEL) is divided by uncertainty factors to ensure that the RfD will be protective of human health. Uncertainty factors are applied to account for extrapolation of data from laboratory animals to humans (interspecies extrapolation), variation in human sensitivity to the toxic effects of a compound (intraspecies differences), derivation of a chronic RfD based on a subchronic rather than a chronic study, and/or derivation of an RfD from the LOAEL rather than the NOAEL. In addition to these uncertainty factors, modifying factors between 1 and 10 may be applied to reflect additional qualitative considerations in evaluating the data. For most compounds, the modifying factor is 1.

A dermal RfD is developed from an oral RfD by multiplying by the gastrointestinal tract absorption factor, as follows:

$$RfD_{dermal} = (RfD_{oral})(ABS_{GI})$$

The resulting dermal RfD is, therefore, based on absorbed dose, which is what is calculated by the dermal exposure algorithms.

RfDs for the COPCs at Site 12 are presented in Table 6-12. The primary source of these values is the IRIS database (U.S. EPA, 2000b), followed by other U.S. EPA sources described for the carcinogens. Table 6-12 also includes the primary target organs affected by a particular chemical. This information may be used in the risk characterization section to segregate risks by target organ effects, unless the total HI is below unity. This ensures that "risks" are not overestimated when different compounds affect different target organs.

6.4 RISK CHARACTERIZATION

This section provides a characterization of the potential human health risks associated with the potential exposure to COPCs at Site 12. Section 6.4.1 outlines the methods used to quantitatively estimate the type and magnitude of potential risks for human receptors. A summary of the risk characterization for Site 12 is provided in Section 6.4.2.

6.4.1 Methodology for Estimation of Quantitative Risks

Potential human health risks resulting from exposure to COPCs are estimated using algorithms established by U.S. EPA (U.S. EPA, 1989). The methods described by U.S. EPA are protective of human health and are likely to overestimate (rather than underestimate) risk. The methodology uses specific algorithms to calculate risk as a function of chemical concentration, human exposure parameters, and toxicity.

Risks from hazardous chemicals are calculated for either carcinogenic or noncarcinogenic effects. Some carcinogenic chemicals may also exhibit noncarcinogenic effects. Potential impacts are then characterized for both types of health effects.

6.4.1.1 *Carcinogenic Effects*

Risks attributable to exposure to carcinogenic COPCs are estimated as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. At low doses, the incremental lifetime cancer risk (ILCR) is determined as follows (U.S. EPA, 1989):

$$ILCR_i = (Intake_i)(CSF_i)$$

where: $ILCR_i$ = incremental lifetime cancer risk for chemical "i", expressed as a unitless

probability

$Intake_i$ = intake of chemical "i" (mg/kg/day)

CSF_i = cancer slope factor of chemical "i" (kg/day/mg)

Estimated ILCRs are compared to the U.S. EPA target risk range, 10^{-4} to 10^{-6}. Risks below 1×10^{-6} (1/1,000,000, or a risk less than 1 in 1 million) are generally considered to be "acceptable" by the U.S. EPA, whereas risks greater than 1×10^{-4} (1 in 10,000) are generally considered to be "unacceptable" by the Agency. Depending on the risk management goals for the site, risks within 10^{-4} to 10^{-6} are also typically regarded as "acceptable."

When carcinogenic risks exceed 1×10^{-2} using the above methodology, the U.S. EPA (1989) specifies that the one-hit model be used, as follows:

$$ILCR_i = 1 - \exp(-Intake_i)(CSF_i)$$

Risks are estimated for all carcinogenic compounds regardless of the class designation (A, B, or C).

6.4.1.2 Noncarcinogenic Effects

The hazards associated with the effects of noncarcinogenic COPCs are evaluated by comparing an exposure level or intake to an RfD. The ratio of the intake to the RfD is called the Hazard Quotient (HQ) and is defined as follows (U.S. EPA, 1989):

$$HQ_i = \frac{Intake}{RfD_i}$$

where: HQ_i = Hazard Quotient for chemical "i" (unitless)

$Intake_i$ = intake of chemical "i" (mg/kg/day)

RfD_i = reference dose of chemical "i" (mg/kg/day)

A Hazard Index (HI) is generated by summing the individual HQs for all the COPCs. If the HI exceeds unity, there exists a potential for noncarcinogenic (toxic) effects to occur. When the HI exceeds unity, it is necessary to segregate the HQs by target organ effects since the HQs for all noncarcinogens are not considered to be truly additive unless similar target organs are affected.

The estimation of noncarcinogenic effects (i.e., the calculation of HQs/HIs) should not be construed as a probability in the manner of the ILCR but rather a numerical indicator of the extent to which a predicted intake exceeds, or is less than, an RfD.

6.4.2 Results of the Risk Characterization

This section contains a summary of the results of the risk characterization for Site 12. Potential cancer risks and HIs were calculated for construction workers, trespassers, on-site recreational users, and on-site residents and are summarized in Table 6-13. Sample calculations are presented in Appendix E. Results of the risk assessment in RAGS Part D format are included in Appendix E.

Construction Workers

All estimated cancer risks for construction workers were within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. The estimated cancer risk for construction workers was 3.5×10^{-6} for exposure to surface soil, 3.1×10^{-8} for exposure to groundwater, 1.0×10^{-7} for exposure to sediment, 3.4×10^{-8} for exposure to surface water, and 8.3×10^{-7} for exposure to sediment waste. The total cancer risk across all media was 4.5×10^{-6}.

The estimated HI for a construction worker exposed to surface soil was 1.4, which exceeds the acceptable level of 1.0, but the HQs for the individual target organs were less than the acceptable level of 1.0. The estimated HIs of 0.14 for exposure to groundwater, 0.06 for exposure to sediment, and 0.02 for exposure to surface water were less than the acceptable level of 1.0, indicating that no adverse health effects are anticipated for construction workers exposed to groundwater, sediment, and surface water under the defined conditions. The estimated HI for exposure to sediment waste was 1.1, but the HQs for the individual target organs were all less than the acceptable level of 1.0, indicating that no adverse health effects are anticipated for construction workers exposed to sediment waste under the defined conditions. The cumulative HI across all media was 2.7.

Adolescent Trespassers

All estimated cancer risks for the adolescent trespassers were within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. The estimated cancer risks for the adolescent trespassers were 4.9×10^{-6} for exposure to surface soil, 8.5×10^{-7} for exposure to sediment, 7.2×10^{-7} for exposure to surface water, and 6.6×10^{-6} for exposure to sediment waste. The total cancer risk across all media was 1.3×10^{-5}.

All estimated HIs for the adolescent trespassers were less than the acceptable level of 1.0. The HIs for an adolescent trespasser were 0.18 for exposure to surface soil, 0.04 for exposure to sediment, 0.03 for exposure to surface water, and 0.76 for exposure to sediment waste. These values indicate that no adverse health effects are anticipated for adolescent trespassers exposed to surface soil, sediment,

surface water, and sediment waste under the defined conditions. The cumulative HI across all media was 1.0.

Adolescent Recreational Users

All estimated cancer risks for the adolescent recreational user were within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. The estimated cancer risks for the adolescent recreational user were 4.9×10^{-6} for exposure to surface soil, 8.5×10^{-7} for exposure to sediment, 7.2×10^{-7} for exposure to surface water, and 6.6×10^{-6} for exposure to sediment waste. The total cancer risk across all media was 1.3×10^{-5}.

All estimated HIs for the adolescent recreational user were less than the acceptable level of 1.0. The HIs for an adolescent recreational user were 0.18 for exposure to surface soil, 0.04 for exposure to sediment, 0.03 for exposure to surface water, and 0.76 for exposure to sediment waste. These values indicate that no adverse health effects are anticipated for an adolescent recreational user exposed to surface soil, sediment, surface water, and sediment waste under the defined conditions. The cumulative HI across all media was 1.0.

Adult Recreational Users

All estimated cancer risks for the adult recreational user were within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. The estimated cancer risks for the adult recreational user were 2.2×10^{-6} for exposure to surface soil, 3.9×10^{-7} for exposure to sediment, 3.9×10^{-7} for exposure to surface water, and 2.9×10^{-6} for exposure to sediment waste. The total cancer risk across all media was 5.9×10^{-6}.

All estimated HIs for the adult recreational user were less than the acceptable level of 1.0. The HIs for an adult recreational user were 0.13 for exposure to surface soil, 0.03 for exposure to sediment, 0.03 for exposure to surface water, and 0.51 for exposure to sediment waste. These values indicate that no adverse health effects are anticipated for the adult recreational user exposed to surface soil, sediment, surface water, and sediment waste under the defined conditions. The cumulative HI across all media was 0.70.

On-Site Residents

All estimated cancer risks for the on-site child resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6} with the exception of exposure to groundwater. The estimated cancer risks for the on-site child resident were 9.9×10^{-5} for exposure to surface soil, 2.9×10^{-4} for exposure to groundwater, 2.3×10^{-6} for exposures to sediment, 7.7×10^{-7} for exposure to surface water, and 1.9×10^{-5} for exposure to sediment waste. Arsenic (ICR = 2.9×10^{-4}) was the major contributor to the cancer risk for exposure to groundwater. The total cancer risk across all media was 4.1×10^{-4}.

All estimated cancer risks for the on-site adult resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6} with the exception of exposure to groundwater. The estimated cancer risks for the on-site adult resident were 4.8×10^{-5} for exposure to surface soil, 4.9×10^{-4} for exposure to groundwater, 1.1×10^{-6} for exposure to sediment, 1.6×10^{-6} for exposure to surface water, and 8.8×10^{-6} for exposure to sediment waste. Arsenic (ICR = 4.9×10^{-4}) was the major contributor to the cancer risk for exposures to groundwater. The total cancer risk across all media was 5.5×10^{-4}.

All estimated cancer risks for the on-site lifelong resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6} with the exception of exposure to surface soil and groundwater. The estimated cancer risks for the on-site lifelong resident were 1.5×10^{-4} for exposure to surface soil, 7.8×10^{-4} for exposure to groundwater, 3.4×10^{-6} for exposure to sediment, 2.3×10^{-6} for exposure to surface water, and 2.8×10^{-5} for exposure to sediment waste. Arsenic was the major contributor to the cancer risk for exposure to surface soil (ICR = 1.4×10^{-4}) and groundwater (ICR = 7.8×10^{-4}). The total cancer risk across all media was 9.6×10^{-4}.

The estimated HI for a child resident exposed to surface soil was 7.3, which exceeds the acceptable level of 1.0. Arsenic (HI = 2.5) and iron (HI = 4.3) were the main contributors to the HI for exposure to surface soil. The estimated HI for a child resident exposed to groundwater was 43, which exceeds the acceptable level of 1.0. Arsenic (HI = 6.5), cadmium (HI = 1.0), iron (HI = 23), manganese (HI = 4.4), and thallium (HI = 7.9) were the main contributors to the HI. The estimated HIs of 0.23 for exposure to sediment and 0.06 for exposure to surface water were less than the acceptable level of 1.0, indicating that no adverse health effects are anticipated for child residents exposed to sediment and surface water under the defined conditions. The estimated HI for a child resident exposed to sediment waste was 4.2, which exceeds the acceptable level of 1.0. Aroclor 1254 (HI = 2.0) and iron (HI = 1.7) were the main contributors to the HI for the exposure to sediment waste. The cumulative HI across all media was 55.0.

All estimated HIs for the adult resident were less than the acceptable level of 1.0 with the exception of exposure to groundwater. The HIs for an adult resident were 0.82 for exposure to surface soil, 0.03 for exposure to sediment, 0.03 for exposure to surface water, and 0.47 for exposure to sediment waste, indicating that no adverse health effects are anticipated for the adult recreational user exposed to surface soil, sediment, surface water, and sediment waste under the defined conditions. The estimated HI for an adult resident exposed to groundwater was 73, which exceeds the acceptable level of 1.0. Acetone (HI = 1.2), arsenic (HI = 11), cadmium (HI = 1.8), iron (HI = 38), manganese (HI = 7.4), and thallium (HI = 13) were the main contributors to the HI. The cumulative HI across all media was 74.

6.4.3 Lead

Lead was identified as a COPC in surface soil at Site 12. Lead was detected at a maximum concentration of 1,100 mg/kg, which exceeds the OSWER soil screening level of 400 mg/kg for residential land use (U.S. EPA, 1994a).

Exposure to lead in surface soil by residential children was evaluated using the U.S. EPA IEUBK Model, as discussed in Section 6.2.6.5. As recommended by the model, the average concentration of lead in surface soil, 78.6 mg/kg, was used for the exposure point concentration. Default parameters were used for the rest of the model input parameters. IEUBK Model outputs are included in Appendix E. The estimated geometric mean blood-lead level for children exposed to lead in site surface soil was 2.3 micrograms per deciliter (µg/dL), which is less than the established level of concern of 10 µg/dL. The IEUBK model estimates that less than one percent of children are expected to have blood-lead levels greater than 10 µg/dL, which is within the U.S. EPA acceptable range of less than five percent of children having a blood lead-level of 10 µg/dL. The IEUBK results indicate that adverse effects are not anticipated for children exposed to lead in surface soil at Site 12.

Exposure to lead in surface soil by construction workers was evaluated by use of a slope factor approach developed by the U.S. EPA Technical Review Workgroup for Lead (U.S. EPA, 1996c). As recommended by the model, the average concentration of lead in surface soil, 78.6 mg/kg, was used for the exposure point concentration. A value of 100 mg/day was used as the incidental ingestion rate since the input assumptions for the model should be based on average exposures and not reasonable maximum exposures (U.S. EPA, 1999b). Default parameters were used for the rest of the model input parameters. The model estimated that the 95th percentile blood-lead concentration among fetuses born to women having site exposures ranged from 4.3 µg/dl to 7.1 µg/dL, which is less than the acceptable level of 10 µg/dL. This indicates that adverse effects are not anticipated for women workers exposed to lead in surface soil at Site 12.

6.5 UNCERTAINTY ANALYSIS

There is uncertainty associated with all aspects of the baseline human health risk assessment presented in this section. A summary of the uncertainties, including a discussion of how they may affect the final risk numbers, is provided in this section.

Uncertainty in the selection of COPCs is related to the current status of the predictive databases, the grouping of samples, and the procedures used to include or exclude constituents as COPCs. Uncertainty associated with the exposure assessment includes the values used as input variables for a given intake route scenario, the assumptions made to determine exposure point concentrations, and the predictions

regarding future land use and population characteristics. Uncertainty in the toxicity assessment includes the quality of the existing toxicity data needed to support dose response relationships and the weight-of-evidence used for determining the carcinogenicity of COPCs. Uncertainty in risk characterization includes that associated with exposure to multiple chemicals and the cumulative uncertainty from combining conservative assumptions made in earlier activities.

Although there are various sources of uncertainty, as described above, the direction of uncertainty can be influenced by the assumptions made throughout the risk assessment, including selection of COPCs and selection of values for dose response relationships. Throughout the entire risk assessment, assumptions that consider safety factors are made so that the final calculated risks are overestimated.

Generally, risk assessments carry two types of uncertainty - measurement and informational. Measurement uncertainty refers to the usual variance that accompanies scientific measurements. For example, this type of uncertainty is associated with analytical data collected for each site. The risk assessment reflects the accumulated variances of the individual values used.

Informational uncertainty stems from inadequate availability of information needed to complete the toxicity and exposure assessments. Often, this gap is significant, such as the absence of information on the effects of human exposure to low doses of a chemical, on the biological mechanism of action of a chemical, or on the behavior of a chemical in soil.

Once the risk assessment is complete, the results must be reviewed and evaluated to identify the type and magnitude of uncertainty involved. Reliance on results from a risk assessment without consideration of uncertainties, limitations, and assumptions inherent in the process can be misleading. For example, to account for uncertainties in the development of exposure assumptions, conservative estimates must be made to ensure that the particular assumptions that are made are protective of sensitive subpopulations or the maximum exposed individuals. If a number of conservative assumptions are combined in an exposure model, the resulting calculations can propagate the uncertainties associated with those assumptions, thereby producing a much larger uncertainty for the final results. This uncertainty is biased toward over predicting both carcinogenic and noncarcinogenic risks. Thus, both the results of the risk assessment and the uncertainties associated with those results must be considered when making risk management decisions.

This interpretation is especially relevant when the risks exceed the point of departure for defining "acceptable" risk. For example, when risks calculated using a high degree of uncertainty are below an "acceptable" risk level (i.e., 1×10^{-6}), the interpretation of no significant risk is typically straightforward.

However, when risks calculated using a high degree of uncertainty are above an "acceptable" risk level (i.e., 1×10^{-4}), a conclusion can be difficult unless uncertainty is considered.

6.5.1 Uncertainty in Selection of COPCs

There is a minor amount of uncertainty associated with the selection of COPCs that may impact the numerical risk estimates presented in Section 6.4, Risk Characterization. The most significant issues related to uncertainty in COPC selection for Site 12 are the screening levels used and the absence of screening levels for a few chemicals detected in the site media. A brief discussion of each of these issues is provided in the remainder of this section.

6.5.1.2 COPC Screening Levels

The use of predetermined screening values based on conservative land use scenarios (i.e., residential land use for soil and sediment and ingestion and inhalation for groundwater and surface water), in combination with the use of risk-based screening values corresponding to an ILCR of 1×10^{-6} and an HI of 0.1, should ensure that the significant contributors to risk from a site are evaluated. The elimination of chemicals that are present at concentrations that correspond to an ILCR less than 1×10^{-6} and an HI less than 0.1 should not affect the final conclusions of the risk assessment since these chemicals are not expected to cause a potential health concern.

6.5.1.5 Absence of COPC Screening Levels

There are several chemicals [acenaphthylene, benzo(g,h,i)perylene, and phenanthrene] for which there are no available health criteria and for which no risk-based COPC screening criterion could be developed. Therefore, as recommended by U.S. EPA Region 4 (1995), the screening criterion for pyrene was used as a surrogate for these chemicals since their chemical structures are similar to that of pyrene. Therefore, there is some uncertainty associated with screening these chemicals using the screening criteria for pyrene. The maximum detected concentrations of acenaphthylene, benzo(g,h,i)perylene, and phenanthrene in soil/sediment are approximately one or more orders of magnitude lower than the screening criteria for pyrene. Consequently, the absence of screening criteria for acenaphthylene, benzo(g,h,i)perylene, and phenanthrene and the use of naphthalene as a surrogate for these chemicals do not affect the conclusions of the risk assessment.

There are no EPA Region 3 RBCs for the essential nutrients (calcium, magnesium, potassium, and sodium). EPA's Risk Assessment Guidance for Superfund (RAGS), Volume I, Part A states that "Chemicals that are (1) essential human nutrients, (2) present at low concentrations (i.e., only slightly elevated above naturally occurring levels), and (3) toxic only at very high doses (i.e., much higher than those that could be associated

with contact at the site) need not be considered further in the quantitative risk assessment. Examples of such chemicals are iron, magnesium, calcium, potassium, and sodium." As shown in Tables 6-2 to 6-6, the maximum detected concentrations of all essential nutrients in surface water and sediment waste are less than background levels, with the exception of calcium in sediment waste. There are no background data available for groundwater.

Essential nutrient screening levels were derived using recommended daily allowances advocated by the Food and Nutrition Board. The development of the essential nutrient screening levels is presented in Appendix E. Table 6-14 presents a comparison of the maximum detected concentration in surface soil, sediment, sediment waste, surface water, and groundwater with essential nutrient screening levels. The maximum detected concentrations of all essential nutrients in surface soil, sediment, and sediment waste are less than their respective screening levels. The maximum detected concentrations of all essential nutrients in groundwater and surface water exceeded their respective screening levels, although, as discussed above, concentrations of these chemicals were within background levels in surface water. In addition, groundwater and surface water samples contained high concentrations of total dissolved solids that are indicative of salt water; consequently, groundwater and surface water at the site are not suitable for drinking water. Therefore, no adverse health effects are anticipated from exposure to essential nutrients in surface soil, sediment, sediment waste, groundwater, and surface water at the site.

6.5.2 Uncertainty in the Exposure Assessment

Uncertainty in the exposure assessment arises because of the methods used to calculate exposure point concentrations, the determination of land use conditions, the selection of receptors and scenarios, and the selection of exposure parameters. Each of these is discussed below.

6.5.2.1 Land Use

The current land use patterns at the site are well established, thereby reducing the uncertainty associated with land use assumptions. Land use at the site is currently limited and is expected to be limited in the future.

6.5.2.2 Exposure Point Concentrations

For some chemicals in surface soil, surface water, and sediment, the distribution of the chemical was not defined and the maximum detected concentration was used as the exposure point concentration. As a result, the estimations of risk, where the maximum concentrations were used as the exposure point concentrations, are most likely to be overstated because it is unlikely that potential receptors would be exposed to the maximum concentration over the entire exposure period.

6.5.2.3 Exposure Routes and Receptor Identification

Receptors quantitatively evaluated in the human health risk assessment for Site 12 included construction workers, trespassers, on-site recreational users, and on-site residents. As previously discussed, no development (industrial, commercial, or residential) exists at the site and any development by the Depot is extremely unlikely because the island is within the distance arc required for the Depot's small arms weapons range. Additionally, access to the island is limited. Within the confines of the Depot, no direct route exists from the main portion of the base to Jericho Island. Consequently, there is uncertainty associated with the selection of construction workers and on-site residents as receptors at Site 12.

6.5.2.4 Exposure Parameters

Each exposure factor selected for use in the risk assessment has some associated uncertainty. Generally, exposure factors are based on surveys of physiological and lifestyle profiles across the United States. The attributes and activities studied in these surveys generally have a broad distribution. To avoid underestimation of exposure, the U.S. EPA guidelines on the reasonable maximum exposure (RME) receptor were used; these generally consist of the 95th percentile for most parameters. Therefore, the selected values for the RME receptor represent the upper bound of the observed or expected habits of the majority of the population.

Generally, the uncertainty can be assessed quantitatively for a number of assumptions made in determining factors for calculating exposures and intakes. Many of these parameters were determined from statistical analyses on human population characteristics. Often, the database used to summarize a particular exposure parameter (i.e., body weight) is quite large. Consequently, the values chosen for such variables in the RME scenario have low uncertainty. For many parameters for which limited information exists (i.e., dermal absorption of organic chemicals from soil), there is greater uncertainty. However, there are often sufficient data to estimate these parameters with low uncertainty.

Many of the quantities used to calculate exposures and risks in this report are selected from a distribution of possible values. For the RME scenario, the value representing the 95th percentile is generally selected for each parameter to ensure that the assessment bounds the actual risks from a postulated exposure. This risk number is used in risk management decisions but does not indicate what a more average or typical exposure might be or what risk range might be expected for individuals in the exposed population.

6.5.3 Uncertainty in the Toxicological Evaluation

Uncertainties associated with the toxicity assessment (determination of RfDs and CSFs and use of available criteria) are presented in this section.

6.5.3.1 Derivation of Toxicity Criteria

Uncertainty with the toxicity assessment is associated with hazard assessment and dose response evaluations for the COPCs. The hazard assessment deals with characterizing the nature and strength of the evidence of causation or the likelihood that a chemical that induces adverse effects in animals will also induce adverse effects in humans. Hazard assessment of carcinogenicity is evaluated as a weight-of-evidence determination, using the U.S. EPA methods. Positive animal cancer test data suggest that humans contain tissue(s) that may also manifest a carcinogenic response. However, the animal data cannot necessarily be used to predict the target tissue in humans. In the hazard assessment of noncancer effects, however, positive animal data suggest the nature of the effects (i.e., the target tissues and type of effects) anticipated in humans.

Uncertainty in hazard assessment arises from the nature and quality of the animal and human data. Uncertainty is reduced when similar effects are observed across species, strain, sex, and exposure route; when the magnitude of the response is clearly dose related; when pharmacokinetic data indicate a similar fate in humans and animals; when postulated mechanisms of toxicity are similar for humans and animals; and when the chemical of concern is structurally similar to other chemicals for which the toxicity is more completely characterized.

Uncertainty in the dose response evaluation includes the determination of a CSF for the carcinogenic assessment and derivation of an RfD for the noncarcinogenic assessment. Uncertainty is introduced from interspecies (animal to human) extrapolation, which, in the absence of quantitative pharmacokinetic or mechanistic data, is usually based on consideration of interspecies differences in basal metabolic rate. Uncertainty also results from intraspecies variation. Most toxicity experiments are performed with animals that are very similar in age and genotype, so that intragroup biological variation is minimal, but the human population of concern may reflect a great deal of heterogeneity, including unusual sensitivity or tolerance to the COPC. Even toxicity data from human occupational exposure reflect a bias, because only those individuals sufficiently healthy to attend work regularly (the "healthy worker effect") and those not unusually sensitive to the chemical are likely to be occupationally exposed. Finally, uncertainty arises from the quality of the key study from which the quantitative estimate is derived and the database. For cancer effects, the uncertainty associated with dose response factors is mitigated by assuming the 95 percent upper bound for the slope factor. Another source of uncertainty in carcinogenic assessment is the method by which data from high doses in animal studies are extrapolated to the dose range expected

for environmentally exposed humans. The linearized multistage model, which is used in nearly all quantitative estimations of human risk from animal data, is based on a nonthreshold assumption of carcinogenesis. There is evidence to suggest, however, that epigenetic carcinogens, as well as many genotoxic carcinogens, have a threshold below which they are noncarcinogenic (Williams and Weisburger, 1991); therefore, the use of the linearized multistage model is conservative for chemicals that exhibit a threshold for carcinogenicity.

For noncancer effects, additional uncertainty factors may be applied in the derivation of the RfD to mitigate poor quality of the key study or gaps in the database. Additional uncertainty for noncancer effects arises from the use of an effect level in the estimation of an RfD, because this estimation is predicated on the assumption of a threshold below which adverse effects are not expected. Therefore, an uncertainty factor is usually applied to estimate a no-effect level. Additional uncertainty arises in estimation of an RfD for chronic exposure from less-than-chronic data. Unless empirical data indicate that effects do not worsen with increasing duration of exposure, an additional uncertainty factor is applied to the no-effect level in the less-than-chronic study. Uncertainty in the derivation of RfDs is mitigated by the use of uncertainty and modifying factors that normally range between 3 and 10. The resulting combination of uncertainty and modifying factors may reach 1,000 or more.

The derivation of dermal RfDs and CSFs from oral values may cause uncertainty. This is particularly the case when no gastrointestinal absorption rates are available in the literature or when only qualitative statements regarding absorption are available. Whenever possible, gastrointestinal absorption rates from U.S. EPA Region 4 were used for all chemicals in the human health risk assessment. U.S. EPA is currently revising the dermal guidance and has interim gastrointestinal absorption rates that differ from those recommended by U.S. EPA Region 4. For example, U.S. EPA Region 4 recommends a gastrointestinal absorption rate of 31 percent for PAHs. The draft U.S. EPA dermal guidance lists a gastrointestinal absorption rate of 89 percent for PAHs and recommends that the oral CSF be used as the dermal CSF. Consequently, risks from dermal exposures evaluated using the draft U.S. EPA guidance will be lower than those evaluated using the U.S. EPA Region 4 guidance. Therefore, dermal exposures based on the U.S. EPA Region 4 guidance may overestimate the cancer risks.

6.5.3.2 Use of PAH Toxicity Criteria

Uncertainty also arises in the dose response assessment for values derived for several PAHs by using studies with limitations. These criteria are used to not only calculate risks for COPCs but are also used to determine risk-based COPC screening levels for PAHs. Potentially carcinogenic PAHs for which no toxicity data are available are evaluated using benzo(a)pyrene toxicity data with estimated orders of potential potency for the average and RME receptors. This may either underestimate or overestimate the carcinogenic risks associated with PAHs.

6.5.3.3 Use of Arsenic Toxicity Criteria

The carcinogenicity of arsenic via ingestion is not confirmed by the available data. However, the U.S. EPA has proposed an oral unit risk factor that was used for all oral and dermal exposures to arsenic at this site. Since arsenic is selected as a COPC for various media at Site 12, the risks associated with this chemical may be overstated. Although the more restrictive basis for evaluating risk associated with exposure to arsenic is to assume it is a carcinogen, carcinogenic effects are not the primary health effects expected to be manifested upon exposure to arsenic. The preponderance of scientific information indicates that humans are capable of metabolizing arsenic to expedite its elimination from the body (ATSDR, 1988). Its elimination from the body obviously mitigates the possibility for arsenic to manifest carcinogenic effects. Therefore, evaluating arsenic as a noncarcinogen would be more appropriate.

6.5.3.4 Use of Arsenic Toxicity Criteria from NCEA

The estimated HI for hypothetical child residents exposed to iron in surface soil (HI = 4.3) and sediment waste (HI = 1.7) exceeded the acceptable level of 1.0. No toxicity criteria are available for iron in EPA's IRIS or in EPA's Health Effects Assessment Summary Tables. EPA's National Center for Environmental Assessment (NCEA) has derived a provisional RfD of 0.3 mg/kg/day. NCEA's provisional RfD was used to evaluate exposures to iron in site media by child and adult residents. The RfD for iron is based on the Recommended Dietary Allowance (RDA) for adult human nutrition. Children and adolescents require more iron in their diets than adults do; consequently, use of an RfD based on the adult RDA for iron to evaluate exposures to children results in an overestimation of the risks for children.

Iron is an essential nutrient and derivation of an RfD for such chemicals poses a special problem in that the dose adversity curve is "U-shaped." Thus, the RfD must be protective against deficiency as well as toxicity. The National Academy of Science has determined that the RDA for iron is 10 mg/day (0.13 mg/kg/day) for adult men and 15 mg/day (0.24 to 0.33 mg/kg/day) for females aged 11 to 50 years. The RDA is 6 mg/day (1 mg/kg/day) for non-breast-fed infants aged 0 to 6 months, 10 mg/kg/day (0.36 to 1.1 mg/kg/day) for children aged 6 months to 10 years, and 12 mg/day (0.18 to 0.27 mg/kg/day) for males aged 11 to 14 years. An RfD of 1.1 mg/kg/day is recommended for children based on the above information.

The HI for child residents exposed to iron in surface soil and sediment waste was recalculated using an RfD of 1.1 mg/kg/day, which is based on child nutritional requirements. The resulting HI for exposure to iron in sediment waste is 0.46, which is less than the acceptable level of 1.0, indicating that no adverse health effects are anticipated for child residents exposed to sediment waste under the defined conditions. The resulting HI for exposure to iron in surface soil is 1.2, which still slightly exceeds the acceptable level

of 1.0. Again, it should be noted that the reference dose is based on child nutritional needs and not on any adverse health effects. Consequently, the exceedance of the acceptable level of 1.0 for exposures to iron in surface soil only indicates that a child resident is receiving more than his RDA for iron; the exceedance does not indicate that any adverse health effects are anticipated for a child resident exposed to iron in surface soil.

6.5.4 Uncertainty in the Risk Characterization

Uncertainty in risk characterization results primarily from assumptions made regarding additivity of effects from exposure to multiple COPCs from various exposure routes. High uncertainty exists when summing cancer risks for several substances across different exposure pathways. This assumes that each substance has a similar effect and/or mode of action. Often compounds affect different organs, have different mechanisms of action, and differ in their fate in the body, so additivity may not be an appropriate assumption. However, the assumption of additivity is made to provide a conservative estimate of risk.

Finally, the risk characterization does not consider antagonistic or synergistic effects. Little or no information is available to determine the potential for antagonism or synergism for the COPCs. Therefore, this uncertainty cannot be discussed for its impact on the risk assessment, since it may either underestimate or overestimate potential human health risk.

6.6 REMEDIAL GOAL OPTIONS

In accordance with EPA Region 4 guidance, remedial goal options (RGOs) were developed for those media with estimated lifetime cancer risks greater than 1×10^{-4} and total HI greater than 1.0. As discussed in Sections 6.4 and 6.5, HIs for child residents exposed to iron in surface soil, arsenic, iron, manganese, and thallium in groundwater, and Aroclor 1254 in sediment, and HIs for adult residents exposed to acetone, arsenic, cadmium, iron, manganese, and thallium in groundwater exceeded the acceptable level of 1.0. ICRs for the lifelong resident exposed to arsenic in soil and child and adult residents exposed to arsenic in groundwater exceeded EPA's target risk range of 10^{-4} to 10^{-6}; consequently, RGOs will be developed for these receptors.

RGOs for Site 12 were developed according to guidance provided in the Region 4 Human Health Risk Assessment Bulletins. The RGOs were calculated using the following equation:

$$RGO[\text{chemical i}] = EPC[\text{chemical i}] \times \text{Target Risk}/\text{Calculated Risk}[\text{chemical i}]$$

Where:

RGO[chemical i]	=	the chemical-specific remediation goal option.
EPC[chemical i]	=	the exposure point concentration for the chemical used in risk assessment calculations.
Target Risk	=	Target risk for carcinogens or the Target Hazard Quotients for noncarcinogens.
Calculated Risk[chemical i]	=	the total risk calculated for a specific chemical in the risk assessment.

In accordance to the Region 4 guidance, the target cancer risks to be used are 1 $x10^{-6}$, 1 x 10^{-5}, and 1 x 10^{-4} and the target HQs are 0.1, 1, and 3. RGOs for a child resident exposed to iron in surface soil and groundwater were derived using an RfD based on child nutritional requirements.

The chemical-specific RGOs for child, adult, and lifelong residents are presented in Tables 6-15 and 6-16.

TABLE 6-1

SCREENING CRITERIA USED IN SELECTION OF COPCs
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL REA
MCRD PARRIS ISLAND, SOUTH CAROLINA
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CAS Number	Chemical	EPA Region III RBC (1) Residential (mg/kg)		EPA SSL (2) Soil to Air (mg/kg)		EPA SSL (2) Soil to Groundwater DAF 1 (mg/kg)		EPA Region III RBC (1) Tap Water (ug/L)		EPA MCL (3) (ug/L)	EPA AWQC (4) (ug/L)
Volatile Organic Compounds											
67-64-1	Acetone	7800	N	100000	sat	0.8	N	610	N	NA	NA
78-93-3	2-Butanone	47000	N	NA		NA		1900	N	NA	NA
75-15-0	Carbon Disulfide	7800	N	720	sat	2	N	1000	N	NA	NA
56-23-5	Carbon Tetrachloride	4.9	C	0.3	C	0.003		0.16	C	5	0.25
67-66-3	Chloroform	100	C	0.3	C	0.03		0.15	C	80	5.7
74-87-3	Chloromethane	49	C	NA		NA		2.1	C	NA	NA
100-41-4	Ethylbenzene	7800	N	400	sat	0.7		1300	N	700	3100
591-78-6	2-Hexanone	3100	N	NA		NA		1500	N	NA	NA
108-10-1	4-Methyl-2-pentanone	6300	N	NA		NA		140	N	NA	NA
79-01-6	Trichloroethene	58	C	5	C	0.003		1.6	C	5	2.7
127-18-4	Tetrachloroethene	12	C	11	C	0.003		1.1	C	5	0.8
108-88-3	Toluene	16000	N	650	sat	0.6		750	N	1000	6800
1330-20-7	Xylenes, Total	160000	N	NA		NA		12000	N	10000	NA
Semivolatile Organic Compounds											
95-50-1	1,2-Dichlorobenzene	7000	N	560	sat	0.9		550	N	600	NA
105-67-9	2,4-Dimethylphenol	1600	N	NA		0.4	N	730	N	NA	540
91-57-6	2-Methylnaphthalene	1600	N	NA		NA		120	N	NA	NA
95-48-7	2-Methylphenol	3900	N	NA		0.8	N	1800	N	NA	NA
120-82-1	1,2,4-Trichlorobenzene	780	N	3200	sat	0.3		190	N	70	260
120-12-7	Anthracene	23000	N	NA		590	N	1800	N	NA	9600
83-32-9	Acenaphthene	4700	N	NA		29	n	370	N	NA	NA
208-96-8	Acenaphthylene	2300 (5)	N	NA		NA		180 (5)	N	NA	NA
65-85-0	Benzoic Acid	310000	N	NA		20	N	150000	N	NA	NA
56-55-3	Benzo(a)anthracene	0.87	C	NA		0.08	C	0.092	C	NA	0.0044
50-32-8	Benzo(a)pyrene	0.087	C	NA		0.4		0.0092	C	0.2	0.0044
205-99-2	Benzo(b)fluoranthene	0.87	C	NA		0.2	C	0.092	C	NA	0.0044

TABLE 6-1

SCREENING CRITERIA USED IN SELECTION OF COPCs
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL REA
MCRD PARRIS ISLAND, SOUTH CAROLINA
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CAS Number	Chemical	EPA Region III RBC (1) Residential (mg/kg)		EPA SSL (2) Soil to Air (mg/kg)		EPA SSL (2) Soil to Groundwater DAF 1 (mg/kg)		EPA Region III RBC (1) Tap Water (ug/L)		EPA MCL (3) (ug/L)	EPA AWQC (4) (ug/L)
191-24-2	Benzo(g,h,I)perylene	2300 (5)	N	NA		NA		180 (5)	N	NA	NA
207-08-9	Benzo(k)fluoranthene	8.7	C	NA		2	C	0.92	C	NA	0.0044
117-81-7	Bis(2-ethylhexyl)phthalate	46	C	31000	sat	180		4.8	C	6	1.8
85-68-7	Butylbenzyl Phthalate	16000	N	930	sat	810	sat	7300	N	NA	3000
86-74-8	Carbazole	32	C	NA		0.03	C	3.3	C	NA	NA
218-01-9	Chrysene	87	C	NA		8	C	9.2	C	NA	0.0044
53-70-3	Dibenzo(a,h)anthracene	0.087	C	NA		0.08	C	0.0092		NA	0.0044
84-74-2	Di-n-butyl phthalate	7800	N	2300	sat	270	N	3700	N	NA	2700
117-84-0	Di-n-octyl phthalate	1600	N	10000	sat	10000	sat	730	N	NA	NA
132-64-9	Dibenzofuran	310	N	NA		NA		24	N	NA	NA
84-66-2	Diethyl Phthalate	63000	N	2000	sat	23	N	29000	N	NA	23000
131-11-3	Dimethyl Phthalate	780000	N	NA		NA		370000	N	NA	313000
206-44-0	Fluoranthene	3100	N	NA		210	N	1500	N	NA	300
86-73-7	Fluorene	3100	N	NA		28	N	240	N	NA	1300
91-20-3	Naphthalene	1600	N	NA		4	N	6.5	N	NA	NA
193-39-5	Indeno(1,2,3-cd)pyrene	0.87	C	NA		0.7	C	0.092	C	NA	0.0044
87-86-5	Pentachlorophenol	5.3	C	NA		0.001		0.56	C	1	0.28
85-01-8	Phenanthrene	2300 (5)	N	NA		NA		180 (5)	N	NA	NA
108-95-2	Phenol	47000	N	NA		5	N	22000	N	NA	21000
129-00-0	Pyrene	2300	N	NA		210	N	180	N	NA	960
Pesticides/PCBs											
72-54-8	4,4'-DDD	2.7	C	NA		0.8	C	0.28	C	NA	0.00059
72-55-9	4,4'-DDE	1.9	C	NA		3	C	0.2	C	NA	0.00059
50-29-3	4,4'-DDT	1.9	C	NA		2	C	0.2	C	NA	0.00083
5103-71-9	Alpha-Chlordane	1.8 (6)	C	20	C	0.5		0.19 (6)	C	2	0.0021
11097-69-1	Aroclor-1254	0.32	C	NA		NA		0.033	C	0.5	0.00017
60-57-1	Dieldrin	0.04	C	1	C	0.00002	C	0.0042	C	NA	0.00014

TABLE 6-1

SCREENING CRITERIA USED IN SELECTION OF COPCs
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL REA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 3 OF 4

CAS Number	Chemical	EPA Region III RBC (1) Residential (mg/kg)		EPA SSL (2) Soil to Air (mg/kg)		EPA SSL (2) Soil to Groundwater DAF 1 (mg/kg)		EPA Region III RBC (1) Tap Water (ug/L)		EPA MCL (3) (ug/L)	EPA AWQC (4) (ug/L)
72-20-8	Endrin	23	N	NA		0.05		11	N	2	0.76
57-74-9	Gamma-Chlordane	1.8 (6)	C	20	C	0.05		0.19 (6)	C	2	0.0021
	Endrin Ketone	23 (7)	N	NA		0.05 (7)		11 (7)	N	2	0.76
72-43-5	Methoxychlor	390	N	NA		8		180	N	40	NA
319-84-6	alpha-BHC	0.1	C	0.8	C	0.00003	C	0.011	C	NA	0.0039
319-85-7	beta-BHC	0.35	C	NA		0.0001	C	0.037	C	NA	0.014
319-86-8	delta-BHC	0.1 (8)	C	NA		NA		0.011 (8)	C	NA	NA
58-89-9	gamma-BHC (Lindane)	0.49	C	NA		0.0005	C	0.052	C	0.2	0.019
Inorganics											
7429-90-5	Aluminum	78000	N	NA		NA		37000	N	50 To 200 (9)	NA
7440-36-0	Antimony	31	N	NA		0.3		15	N	6	14
7440-38-2	Arsenic	0.43	C	750	C	1		0.045	C	50	0.018
7440-39-3	Barium	5500	N	690000	N	82		2600	N	2000	1000
7440-41-7	Beryllium	160	N	1300	C	3		73	N	4	NA
7440-43-9	Cadmium	39	N	1800	C	0.4		18	N	5	NA
7440-70-2	Calcium	NA		NA		NA		NA		NA	NA
7440-47-3	Chromium	120000 (10)	N	270 (10)	C	2 (11)	C	55000 (11)	N	100 (11)	NA
1854-02-99	Hexavalent Chromium	230	N	270	C	2	C	110	N	NA	NA
7440-48-4	Cobalt	4700	N	NA		NA		2200	N	NA	NA
7440-50-8	Copper	3100	N	NA		NA		1500	N	1300 (13)	1300
7439-89-6	Iron	23000	N	NA		NA		11000	N	300 (9)	300
7439-92-1	Lead	400 (12)		NA		NA		NA		15 (13)	NA
7439-95-4	Magnesium	NA		NA		NA		NA		NA	NA
7439-96-5	Manganese	1600	N	NA		NA		730	N	50 (9)	50
7487-94-7	Mercury	23 (14)	N	10	N	0.1		11 (14)	N	2	0.05
7440-02-0	Nickel	1600	N	13000	C	7	N	730	N	NA	610
7440-09-7	Potassium	NA		NA		NA		NA		NA	NA

TABLE 6-1

SCREENING CRITERIA USED IN SELECTION OF COPCs
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL REA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 4 OF 4

CAS Number	Chemical	EPA Region III RBC (1) Residential (mg/kg)		EPA SSL (2) Soil to Air (mg/kg)	EPA SSL (2) Soil to Groundwater DAF 1 (mg/kg)		EPA Region III RBC (1) Tap Water (ug/L)		EPA MCL (3) (ug/L)	EPA AWQC (4) (ug/L)
7440-22-4	Silver	390	N	NA	2	N	180	N	100 (9)	NA
7782-49-2	Selenium	390	N	NA	0.3	N	180	N	50	170
7440-23-5	Sodium	N/A		NA	NA		NA		NA	NA
7440-28-0	Thallium	5.5	N	NA	0.04		2.6	N	2	1.7
7440-62-2	Vanadium	550	N	NA	300	N	260	N	NA	NA
7440-66-6	Zinc	23000	N	NA	620	N	11000	N	5000 (9)	9100

Notes:

1 U.S. EPA Region 3 Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 1.0)
2 U.S. EPA Soil Screening Level Guidance: Technical Background Document. May 1996.
3 U.S. EPA Drinking Water Standards and Health Advisories, Summer 2000.
4 U.S. EPA National Recommended Water Quality Criteria - Correction, April 1999.
5 Value is for pyrene.
6 Value is for chlordane.
7 Value is for endrin.
8 Value is for alpha-BHC.
9 Secondary MCLs.
10 Value is for trivalent chromium.
11 Value is for total chromium.
12 OSWER screening level.
13 Action level.
14 Value is for mercuric chloride.

Definitions:

N/A = Not applicable.
C = Carcinogenic.
N = Non-carcinogenic.
sat = saturation concentration.
MCL = Maximum Contaminant Level.
SMCL = Secondary Maximum Contaminant Level.
RBC = Risk-based concentration.
SSL = Soil screening level.
AWQC = Ambient Water Quality Criteria.

TABLE 6-2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
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 (4) SSL Soil to Air		US EPA (5) SSL Soil to Groundwater		COPC Flag	Rationale for (6) Contaminant Deletion or Selection
	Volatile Organic Compounds																		
78-93-3	2-Hexanone	0.0085		0.0085		mg/kg	PAI-10-SS-09-01	1/16	0.0054 - 0.68	0.0085	NA	310	N	NA		NA		No	BSL
108-10-1	4-Methyl-2-pentanone	0.0038	J	0.026		mg/kg	PAI-10-SS-09-01	6/16	0.0056 - 0.68	0.026	0.007	630	N	NA		NA		No	BSL
67-64-1	Acetone	0.023		0.35	J	mg/kg	PAI-10-SS-11-01	4/15	0.011 - 0.66	0.35	0.266	780	N	100000	sat	0.8	N	No	BSL
75-15-0	Carbon Disulfide	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	780	N	720	sat	2	N	No	BSL
56-23-5	Carbon Tetrachloride	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	0.49	N	0.3		0.003		No	BSL
67-66-3	Chloroform	0.0018	J	0.0075		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.0075	NA	100	C	0.3	C	0.03	C	No	BSL
74-87-3	Chloromethane	0.0036	J	0.017		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.017	NA	49	C	NA		NA		No	BSL
127-18-4	Tetrachloroethene	0.001	J	0.001	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.001	NA	12	C	11		0.003		No	BSL
108-88-3	Toluene	0.0013	J	0.0039	J	mg/kg	PAI-10-SS-15-01A	9/16	0.0034 - 0.41	0.0034	0.0056	1600	N	650	sat	0.6	N	No	BSL
	Semivolatile Organic Compounds																		
91-57-6	2-Methylnaphthalene	0.385		0.385		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.385	NA	160	N	NA		NA		No	BSL
83-32-9	Acenaphthene	0.305		0.305		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.305	NA	470	N	NA		29	N	No	BSL
208-96-8	Acenaphthylene	0.375		0.375		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.375	NA	230	N	NA		NA		No	BSL
120-12-7	Anthracene	0.024	J	0.024	J	mg/kg	PAI-10-SS-08-01	1/16	0.34 - 0.46	0.024	NA	2300	N	NA		590	N	No	BSL
56-55-3	Benzo(a)anthracene	0.041	J	0.14	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.14	NA	0.87	C	NA		0.08	C	No	BSL
50-32-8	Benzo(a)pyrene	0.032	J	0.12	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.12	NA	0.087	C	NA		0.4	C	Yes	ASL
205-99-2*	Benzo(b)fluoranthene	0.033	J	0.13	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	3/16	0.34 - 0.46	0.13	NA	0.87	C	NA		0.2	C	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.05	J	0.055	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	2/16	0.34 - 0.46	0.055	NA	230 (7)	N	NA		NA		No	BSL
207-08-9	Benzo(k)fluoranthene	0.034	J	0.11	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.11	NA	8.7	C	NA		2	C	No	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	0.03	J	0.48		mg/kg	PAI-10-SS-07-01	9/16	0.34 - 0.44	0.48	NA	46	C	31000	sat	180	C	No	BSL
218-01-9	Chrysene	0.047	J	0.16	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.16	NA	87	C	NA		8	C	No	BSL
53-70-3	Dibenzo(a,h)anthracene	0.034	J	0.034	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.034	NA	0.087	C	NA		0.08	C	No	BSL
131-11-3	Dimethyl Phthalate	0.18	J	0.18	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.18	NA	78000	N	NA		NA		No	BSL
206-44-0	Fluoranthene	0.041	J	0.28	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.28	NA	310	N	NA		2107	N	No	BSL
86-73-7	Fluorene	0.22	J	0.22	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.22	0.646	310	N	NA		28	N	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.064	J	0.069	J	mg/kg	PAI-10-SS-08-01	2/11	0.35 - 0.46	0.069	NA	0.87	C	NA		0.7	C	No	BSL
91-20-3	Naphthalene	1.435		1.435		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	1.435	NA	160	N	NA		4	N	No	BSL
87-86-5	Pentachlorophenol	0.24	J	0.24	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.69 - 1.1	0.24	NA	5.3	C	NA		0.001	C	No	BSL
85-01-8	Phenanthrene	0.069	J	0.14	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.14	NA	230 (7)	N	NA		NA		No	BSL
129-00-0	Pyrene	0.024	J	0.23	J	mg/kg	PAI-10-SS-08-01	4/16	0.34 - 0.46	0.23	NA	230	N	NA		210	N	No	BSL
	Pesticides/PCBs																		
72-55-9	4,4'-DDE	0.043		0.043		mg/kg	PAI-10-SS-14-01	1/14	0.0034 - 0.0045	0.043	NA	1.9	C	NA		3	C	No	BSL
72-43-5	Methoxychlor	0.07		0.07		mg/kg	PAI-10-SS-13-01	1/14	0.018 - 0.023	0.07	NA	39	N	NA		8	N	No	BSL
	Inorganics																		
7429-90-5	Aluminum	822		5370		mg/kg	PAI-10-SS-14-01	16/16	ND	5370	7270	7800	N	NA		NA		No	BSL, BKG
7440-36-0	Antimony	8		8		mg/kg	PAI-10-SS-14-01	1/16	0.48 - 2.5	8	NA	3.1	N	NA		0.3		Yes	ASL
7440-38-2	Arsenic	0.24		50.8		mg/kg	PAI-10-SS-14-01	16/16	ND	50.8	1.44	0.43	C	750	C	1		Yes	ASL
7440-39-3	Barium	7		76.4		mg/kg	PAI-10-SS-14-01	12/16	2.7 - 5.9	76.4	23.6	550	N	690000	N	82		No	BSL
7440-41-7	Beryllium	0.08		0.17		mg/kg	PAI-10-SS-12-01-AVG, PAI-10-SS-15-01A	5/16	0.02 - 0.19	0.17	0.095	16	N	1300	C	3		No	BSL

TABLE 6-2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 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 (4) SSL Soil to Air		US EPA (5) SSL Soil to Groundwater		COPC Flag	Rationale for (6) Contaminant Deletion or Selection
7440-43-9	Cadmium	0.06		3.2		mg/kg	PAI-10-SS-14-01	2/16	0.19 - 0.26	3.2	NA	3.9	N	1800	C	0.4		No	BSL
7440-70-2	Calcium	33.9		2780		mg/kg	PAI-10-SS-14-01	16/16	ND	2780	766	NA		NA		NA		No	NUT
7440-47-3	Chromium	1.8		18.1		mg/kg	PAI-10-SS-14-01	16/16	ND	18.1	6.23	12000 (8)		270	C	2		No	BSL
7440-48-4	Cobalt	0.455		6.6		mg/kg	PAI-10-SS-14-01	6/16	0.33 - 0.82	6.6	0.363	470	N	NA		NA		No	BSL
7440-50-8	Copper	0.72		189		mg/kg	PAI-10-SS-14-01	8/16	0.27 - 1	189	1.52	310	N	NA		NA		No	BSL
7439-89-6	Iron	485		99700		mg/kg	PAI-10-SS-14-01	16/16	ND	99700	3920	2300	N	NA		NA		Yes	ASL
7439-92-1	Lead	4.4		1100		mg/kg	PAI-10-SS-14-01	16/16	ND	1100	12.5	400 (9)		NA		NA		Yes	ASL
7439-95-4	Magnesium	123		3240		mg/kg	PAI-10-SS-14-01	16/16	ND	3240	515	NA		NA		NA		No	NUT
7439-96-5	Manganese	10.6		522		mg/kg	PAI-10-SS-14-01	16/16	3.9 - 9.7	522	129	180	N	NA		NA		Yes	ASL
7487-94-7	Mercury	0.02		0.89		mg/kg	PAI-10-SS-14-01	11/16	0.02 - 0.09	0.89	0.11	2.3 (10)	N	10		0.1		No	BSL
7440-02-0	Nickel	0.61		26.5		mg/kg	PAI-10-SS-14-01	16/16	ND	26.5	1.8	160	N	13000	C	7		No	BSL
7440-09-7	Potassium	57.8		640		mg/kg	PAI-10-SS-14-01	16/16	ND	640	313	NA		NA		NA		No	NUT
7782-49-2	Selenium	0.09		0.12		mg/kg	PAI-10-SS-08-01	5/16	0.07 - 0.44	0.12	0.285	39	N	NA		0.3		No	BSL, BGK
7440-23-5	Sodium	20.525		10700		mg/kg	PAI-10-SS-14-01	7/16	11.4 - 35.6	10700	241	NA		NA		NA		No	NUT
7440-62-2	Vanadium	1.7		9.3		mg/kg	PAI-10-SS-14-01	16/16	ND	9.3	9.5	55	N	NA		300	N	No	BSL, BKG
7440-66-6	Zinc	4.75		1020		mg/kg	PAI-10-SS-14-01	9/16	1.9 - 6.4	1020	9.7	2300	N	NA		620	N	No	BSL

Notes:

1 Minimum/maximum detected concentration.

2 N/A - Refer to supporting information for background discussion.

3 U.S. EPA Region 3 Risk-Based Concentration Table, April 13, 2000. (Cancer benchmark value = 1E-06, HI = 0.1).

4 U.S. EPA Soil Screening Level Guidance: Technical Background Document. May 1996.

5 U.S. EPA 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 Value for pyrene.

8 Value for trivalent chromium, hexavalent chromium was not detected in surface soil.

9 OSWER screening level.

10 Value for mercuric chloride.

Shading indicates that the criterion were exceeded.

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 6-3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organic Compounds																
67-64-1	Acetone	9.3	J	650	J	ug/L	PAI-10-GW-08-01	4/10	5 - 50	650	NA	61	N	NA	NA	Yes	ASL
75-15-0	Carbon disulfide	0.2	J	24		ug/L	PAI-10-GW-10-01	7/14	1 - 10	24	NA	100	N	NA	NA	No	BSL
67-66-3	Chloroform	0.4	J	4.5		ug/L	PAI-10-GW-04-01	4/14	1 - 10	4.5	NA	0.15	C	80	MCL	Yes	ASL
74-87-3	Chloromethane	0.2	J	0.3	J	ug/L	PAI-10-GW-10-01	2/14	1 - 10	0.3	NA	2.1	C	NA	NA	No	BSL
108-88-3	Toluene	0.2	J	0.2	J	ug/L	PAI-10-GW-04-01	1/14	1 - 10	0.2	NA	75	N	1000	MCL	No	BSL
79-01-6	Trichloroethene	0.4	J	0.4	J	ug/L	PAI-10-GW-04-01	1/14	1 - 10	0.4	NA	1.6	C	5	MCL	No	BSL
	Semivolatile Organic Compounds																
65-85-0	Benzoic Acid	1	J	1	J	ug/L	PAI-10-GW-01-01	1/12	25 - 26	1	NA	15000	N	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	1	J	1	J	ug/L	PAI-10-GW-10-01	1/14	5	1	NA	370	N	NA	NA	No	BSL
	Inorganics (Unfiltered)																
7429-90-5	Aluminum	532		5140		ug/L	PAI-10-GW-03-01	6/13	22 - 168	5140	NA	3700	N	50 To 200	SMCL	Yes	ASL
7440-38-2	Arsenic	1.075		35.4		ug/L	PAI-10-GW-02-01	12/14	0.9	35.4	NA	0.045	C	50	MCL	Yes	ASL
7440-39-3	Barium	36.4		216		ug/L	PAI-10-GW-12-01	14/14	NA	216	NA	260	N	2000	MCL	No	BSL
7440-43-9	Cadmium	1.9		8.1		ug/L	PAI-10-GW-12-01	7/14	2 - 200	8.1	NA	1.8	N	5	MCL	Yes	ASL
	Calcium	21800		501000		ug/L	PAI-10-GW-10-01	13/13	NA	501000	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	8.1		23.2		ug/L	PAI-10-GW-10-01	6/14	6.4 - 32	23.2	NA	5500 (5)	N	100 (6)	MCL	No	BSL
7440-48-4	Cobalt	3.9		11.7		ug/L	PAI-10-GW-08-01, PAI-10-GW-06-01	3/14	3.3	11.7	NA	220	N	NA	NA	No	BSL
7440-50-8	Copper	2.7		8.1		ug/L	PAI-10-GW-06-01	2/14	2.6	8.1	NA	150	N	1000	SMCL	No	BSL
7439-89-6	Iron	4150		122000		ug/L	PAI-10-GW-05-01	13/13	NA	122000	NA	1100	N	300	SMCL	Yes	ASL
7439-96-5	Magnesium	18600		1100000		ug/L	PAI-10-GW-14-01	13/13	NA	1100000	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	44.7		1530		ug/L	PAI-10-GW-06-01	13/13	NA	1530	NA	73	N	50	SMCL	Yes	ASL
7440-02-0	Nickel	5.3		10.5		ug/L	PAI-10-GW-08-01	3/14	4.4	10.5	NA	73	N	100	MCL	No	BSL
	Potassium	4370		371000		ug/L	PAI-10-GW-13-01	13/13	NA	371000	NA	NA		NA	NA	No	NUT
7782-49-2	Selenium	7.1	J	7.1	J	ug/L	PAI-10-GW-09-01	1/14	0.7 - 17.5	7.1	NA	18	N	50	MCL	No	BSL
	Sodium	146000		8670000		ug/L	PAI-10-GW-13-01	13/13	NA	8670000	NA	NA		NA	NA	No	NUT
7440-28-0	Thallium	10		10		ug/L	PAI-10-GW-06-01	1/14	9 - 18	10	NA	0.26	N	2	MCL	Yes	ASL
7440-62-2	Vanadium	3.7		14.2		ug/L	PAI-10-GW-09-01	12/14	2.6	14.2	NA	26	N	NA	NA	No	BSL
7440-66-6	Zinc	7.5		82.8		ug/L	PAI-10-GW-06-01	5/14	7.9 - 19.5	82.8	NA	1100	N	5000	SMCL	No	BSL

Notes

1 Minimum/maximum detected concentration.

2 N/A - Refer to supporting information for background discussion.
Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

3 U.S. EPA Region 3 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 for trivalent chromium, hexavalent chromium was not detected in groundwater.

6 Value for total chromium.

Shading indicates that the criterion was exceeded.

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.

TABLE 6-4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organic Compounds																
78-93-3	2-Butanone	2.1	J	2.6	J	ug/L	PAI-10-SW-03-00	2/2	NA	2.6	NA	190 (5)	N	NA	NA	No	BSL
67-64-1	Acetone	13	J	13	J	ug/L	PAI-10-SW-13-00	1/3	9.2 - 11	13	NA	61 (5)	N	NA	NA	No	BSL
75-15-0	Carbon disulfide	0.2	J	1		ug/L	PAI-10-SW-02-00	5/13	1	1	NA	100 (5)	N	NA	NA	No	BSL
	Semivolatile Organic Compounds																
117-81-7	Bis(2-ethylhexyl)phthalate	1	J	10.25		ug/L	PAI-10-SW-08-00-AVG	2/13	5	10.25	44.8	1.8		NA	NA	Yes	ASL
85-68-7	Butylbenzyl Phthalate	1	J	2	J	ug/L	PAI-10-SW-04-00	5/13	5	2	NA	3000		NA	NA	No	BSL
108-95-2	Phenol	7		7		ug/L	PAI-10-SW-04-00	1/13	5	7	NA	21000		NA	NA	No	BSL
	Inorganics (Unfiltered)																
7429-90-5	Aluminum	499		12900		ug/L	PAI-10-SW-04-00	13/13	NA	12900	3113	3700 (5)	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	2.4		9		ug/L	PAI-10-SW-01-00	13/13	NA	9	5.13	0.018		NA	NA	Yes	ASL
7440-39-3	Barium	20.1		34.8		ug/L	PAI-10-SW-04-00	13/13	NA	34.8	36.4	260 (5)	N	NA	NA	No	BSL, BKG
7440-70-2	Calcium	238000		374000		ug/L	PAI-10-SW-03-00	13/13	NA	374000	637000	NA		NA	NA	No	NUT, BKG
7440-47-3	Chromium	9.5		32.1		ug/L	PAI-10-SW-04-00	13/13	NA	32.1	22.5	5500 (5,6)	N	NA	NA	No	BSL
7439-89-6	Iron	292		7890		ug/L	PAI-10-SW-04-00	13/13	NA	7890	2091	300		NA	NA	Yes	ASL
7439-96-5	Magnesium	726000		1120000		ug/L	PAI-10-SW-03-00	13/13	NA	1120000	1918667	NA		NA	NA	No	NUT, BKG
7439-96-5	Manganese	30.3		214		ug/L	PAI-10-SW-05-00	13/13	NA	214	53.1	50		NA	NA	Yes	ASL
7440-09-7	Potassium	264000		406000		ug/L	PAI-10-SW-03-00	13/13	NA	406000	831333	NA		NA	NA	No	NUT, BKG
7782-49-2	Selenium	14.675		18		ug/L	PAI-10-SW-11-00	2/13	3.5 - 17.5	18	NA	170		NA	NA	No	BSL
7440-23-5	Sodium	6570000		10200000		ug/L	PAI-10-SW-03-00	13/13	NA	10200000	16226667	NA		NA	NA	No	NUT, BKG
7440-62-2	Vanadium	13.4		33.9		ug/L	PAI-10-SW-04-00	12/13	16.1	33.9	18.2	26 (5)	N	NA	NA	Yes	ASL

Notes:

1 Minimum/maximum detected concentration.

2 Background values presented 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 Value for trivalent chromium, hexavalent chromium was not detected in surface water.

Shading indicates that the criterion was exceeded.

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.
N = Non-carcinogenic.

TABLE 6-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	(2) Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(4) Rationale for Contaminant Deletion or Selection
	Volatile Organic Compounds																
78-93-3	2-Butanone	5	J	20		ug/kg	PAI-10-SD-07-01	2/16	7.1 - 670	20	NA	4700000	N	NA	NA	No	BSL
591-78-6	2-Hexanone	4.4	J	4.4	J	ug/kg	PAI-10-SD-15-01	1/16	7.1 - 670	4.4	NA	310000	N	NA	NA	No	BSL
108-10-1	4-Methyl-2-pentanone	4	J	53.7	J	ug/kg	PAI-10-SD-06-01	6/16	7.3 - 670	53.7	NA	630000	N	NA	NA	No	BSL
67-64-1	Acetone	25		390		ug/kg	PAI-10-SD-08-01	8/16	35 - 810	390	NA	780000	N	NA	NA	No	BSL
75-15-0	Carbon Disulfide	1.9	J	31	J	ug/kg	PAI-10-SD-08-01	13/16	5.1 - 400	31	NA	780000	N	NA	NA	No	BSL
108-88-3	Toluene	2.5	J	23	J	ug/kg	PAI-10-SD-08-01	8/16	4.3 - 400	23	NA	1600000	N	NA	NA	No	BSL
1330-20-7	Xylenes, Total	1.8	J	2.3	J	ug/kg	PAI-10-SD-04-01	3/16	4.3 - 400	2.3	NA	16000000	N	NA	NA	No	BSL
	Semivolatile Organic Compounds																
83-32-9	Acenaphthene	120	J	120	J	ug/kg	PAI-10-SD-20-01	1/18	93 - 270	120	NA	470000	N	NA	NA	No	BSL
56-55-3	Benzo(a)anthracene	18		18		ug/kg	PAI-10-SD-013-01A	1/18	6.9 - 27	18	NA	870	C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	11		38		ug/kg	PAI-10-SD-008-01A	7/18	6.9 - 13	38	NA	87	C	NA	NA	No	BSL
205-99-2	Benzo(b)fluoranthene	25		120		ug/kg	PAI-10-SD-008-01A	2/18	2.8 - 42	120	NA	870	C	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	18		18		ug/kg	PAI-10-SD-013-01A	1/17	2.8 - 27	18	NA	8700	C	NA	NA	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	45	J	440	J	ug/kg	PAI-10-SD-07-01	8/18	480 - 2600	440	NA	46000	C	NA	NA	No	BSL
218-01-9	Chrysene	44	J	44	J	ug/kg	PAI-10-SD-013-01A	1/18	6.9 - 27	44	NA	87000	C	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	63	J	63	J	ug/kg	PAI-10-SD-06-01	1/18	460 - 2600	63	NA	160000	N	NA	NA	No	BSL
206-44-0	Fluoranthene	10		92		ug/kg	PAI-10-SD-013-01A	2/18	6.9 - 52	92	NA	310000	N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	26		26		ug/kg	PAI-10-SD-014-01A	1/18	6.9 - 27	26	NA	870	C	NA	NA	No	BSL
87-86-5	Pentachlorophenol	180	J	180	J	ug/kg	PAI-10-SD-14-02	1/18	910 - 5100	180	NA	5300	C	NA	NA	No	BSL
129-00-0	Pyrene	89		89		ug/kg	PAI-10-SD-013-01A	1/18	9.3 - 27	89	NA	230000	N	NA	NA	No	BSL
	Pesticides/PCBs																
50-29-3	4,4'-DDT	66		66		ug/kg	PAI-10-SD-14-02	1/18	4.5 - 41	66	NA	1900	C	NA	NA	No	BSL
5103-71-9	Alpha-Chlordane	12		12		ug/kg	PAI-10-SD-14-02	1/18	2.3 - 21	12	NA	1800 (6)	C	NA	NA	No	BSL
12789-03-6	Gamma-Chlordane	14		14		ug/kg	PAI-10-SD-14-02	1/18	2.3 - 21	14	NA	1800 (6)	C	NA	NA	No	BSL
72-43-5	Methoxychlor	680		680		ug/kg	PAI-10-SD-14-02	1/18	23 - 210	680	NA	39000	N	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	1870		52700		mg/kg	PAI-10-SD-06-01	18/18	NA	52700	24284	7800	N	NA	NA	Yes	ASL
7440-36-0	Antimony	3.5		6.8		mg/kg	PAI-10-SD-09-01	2/18	2.3 - 13.2	6.8	NA	3.1	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	0.35		18.5		mg/kg	PAI-10-SD-08-01	18/18	NA	18.5	12.2	0.43	C	NA	NA	Yes	ASL
7440-39-3	Barium	5.7		62.9		mg/kg	PAI-10-SD-08-01	11/18	3.7 - 6.7	62.9	28.0	550	N	NA	NA	No	BSL
7440-41-7	Beryllium	0.21		2		mg/kg	PAI-10-SD-08-01	13/18	0.11 - 0.79	2	0.977	16	N	NA	NA	No	BSL
7440-43-9	Cadmium	0.002		0.84		mg/kg	PAI-10-SD-14-01	3/18	0.25 - 1.4	0.84	0.278	3.9	N	NA	NA	No	BSL
7440-70-2	Calcium	338		5550		mg/kg	PAI-10-SD-13-01	18/18	NA	5550	4002	NA		NA	NA	No	NUT
7440-47-3	Chromium	3.2		75		mg/kg	PAI-10-SD-08-01	18/18	NA	75	35.2	12000 (7)	N	NA	NA	No	BSL
7440-48-4	Cobalt	0.92		10.3		mg/kg	PAI-10-SD-14-02	9/18	0.92 - 3.4	10.3	2.63	470	N	NA	NA	No	BSL
7440-50-8	Copper	0.03		113		mg/kg	PAI-10-SD-14-01	10/18	1.3 - 2.7	113	10.1	310	N	NA	NA	No	BSL
7439-89-6	Iron	1420		43100		mg/kg	PAI-10-SD-08-01	18/18	NA	43100	21450	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	3.1		203		mg/kg	PAI-10-SD-14-01	18/18	NA	203	20.6	400 (8)		NA	NA	No	BSL
7439-95-4	Magnesium	1130		15100		mg/kg	PAI-10-SD-08-01	18/18	NA	15100	6437	NA		NA	NA	No	NUT
7439-96-5	Manganese	13.3		210		mg/kg	PAI-10-SD-08-01	17/18	9.2	210	186	160	N	NA	NA	Yes	ASL

TABLE 6-5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
7439-97-6	Mercury	0.06		0.35		mg/kg	PAI-10-SD-14-01	7/18	0.02 - 0.28	0.35	0.090	2.3 (9)	N	NA	NA	No	BSL
7440-02-0	Nickel	1.3		1060		mg/kg	PAI-10-SD-14-02	18/18	NA	1060	5.95	160	N	NA	NA	Yes	ASL
7440-09-7	Potassium	684		9090		mg/kg	PAI-10-SD-08-01	18/18	NA	9090	3190	NA		NA	NA	No	NUT
7782-49-2	Selenium	0.1		10.7		mg/kg	PAI-10-SD-20-01	3/18	0.1 - 2.5	10.7	NA	39	N	NA	NA	No	BSL, BKG
7440-23-5	Sodium	3920		60800		mg/kg	PAI-10-SD-08-01	18/18	NA	60800	19110	NA		NA	NA	No	NUT
7440-28-0	Thallium	0.36		0.36		mg/kg	PAI-10-SD-14-02	1/18	0.21 - 13.1	0.36	0.405	0.55	N	NA	NA	No	BSL, BKG
7440-62-2	Vanadium	4.9		112		mg/kg	PAI-10-SD-08-01	18/18	NA	112	49.6	55	N	NA	NA	Yes	ASL
7440-66-6	Zinc	8.5		197		mg/kg	PAI-10-SD-14-01	12/18	4.7 - 9.9	197	45.0	2300	N	NA	NA	No	BSL

Notes:

1 Minimum/maximum detected concentration.

2 N/A - Refer to supporting information for background discussion.

3 U.S. EPA 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 Value is for naphthalene.

6 Value for chlordane.

7 Value for trivalent chromium, hexavalent chromium was not detected in sediment.

8 OSWER screening level.

9 Value for mercuric chloride.

Shading indicates that the criterion was exceeded.

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 6-6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DIRECT CONTACT WITH SEDIMENT WASTES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	(2) Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(4) Rationale for Contaminant Deletion or Selection
	Semivolatile Organic Compounds																
117-81-7	Bis(2-ethylhexyl)phthalate	10		10		mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.78	10	0.42	46	C	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	0.9	J	0.9	J	mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.62	0.9	ND	160	N	NA	NA	No	BSL
84-66-2	Diethyl Phthalate	0.029	J	0.029	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/2	2	0.029	ND	6300	N	NA	NA	No	BSL
	Pesticides/PCBs																
72-55-9	4,4'-DDE	0.096		0.52		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	0.52	ND	1.9	C	NA	NA	No	BSL
50-29-3	4,4'-DDT	0.038		0.038		mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/1	NA	0.038	ND	1.9	C	NA	NA	No	BSL
11097-69-1	Aroclor-1254	24		24		mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.062	24	ND	0.32	C	NA	NA	Yes	ASL
60-57-1	Dieldrin	0.0062	J	0.0062	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/1	NA	0.0062	ND	0.04	C	NA	NA	No	BSL
72-20-8	Endrin	1.2	J	1.2	J	mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.0062	1.2	ND	2.3	N	NA	NA	No	BSL
319-84-6	alpha-BHC	0.0031	J	0.0031	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/2	0.047	0.0031	ND	0.1	C	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	9580		11700		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	11700	24284	7800	N	NA	NA	No	BKG
7440-36-0	Antimony	3.3		9.4		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	9.4	ND	3.1	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	40.6		49.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	49.7	12.2	0.43	C	NA	NA	Yes	ASL
7440-39-3	Barium	66.8		73.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	73.2	28.0	550	N	NA	NA	No	BSL
7440-43-9	Cadmium	1.8		4.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	4.7	0.278	3.9	N	NA	NA	Yes	ASL
7440-70-2	Calcium	4600		6670		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	6670	4002	NA		NA	NA	No	NUT
7440-47-3	Chromium	37.8		119		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	119	35.2	12000 (7)	N	NA	NA	No	BSL
7440-48-4	Cobalt	8.2		22.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	22.7	2.63	470	N	NA	NA	No	BSL
7440-50-8	Copper	168		489		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	489	10.1	310	N	NA	NA	Yes	ASL
7439-89-6	Iron	122000		307000		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	307000	21450	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	589		2930		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	2930	20.6	400 (8)		NA	NA	Yes	ASL
7439-93-2	Magnesium	3990		6220		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	6220	6437	NA		NA	NA	No	BKG, NUT
7439-96-5	Manganese	297		1480		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	1480	186	160	N	NA	NA	Yes	ASL
7440-02-0	Nickel	41.4		86.9		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	86.9	5.95	160	N	NA	NA	No	BSL
7440-09-7	Potassium	1470		2210		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	2210	3190	NA		NA	NA	No	BKG, NUT
7782-49-2	Selenium	0.86		1.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	1.2	ND	39	N	NA	NA	No	BSL
7440-02-4	Silver	1.1		1.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	1.2	ND	39	N	NA	NA	No	BSL
7440-28-0	Sodium	8870		11200		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	11200	19110	NA		NA	NA	No	BKG, NUT
7440-62-2	Vanadium	27.6		44.9		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	44.9	49.6	55	N	NA	NA	No	BSL, BKG
7440-66-6	Zinc	751		1520		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	1520	45.0	2300	N	NA	NA	No	BSL

Notes:

1 Minimum/maximum detected concentration.

2 N/A - Refer to supporting information for background discussion.

3 U.S. EPA 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) Essential Nutrient (NUT)
No Toxicity Information (NTX) Below Screening Level (BSL)

5 Value for naphthalene.

6 Value for chlordane

7 Value for hexavalent chromium.

8 OSWER screening level.

9 Value for mercuric chloride.

Shading indicates that the criterion was exceeded.

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 6-7

CHEMICALS RETAINED AS COPCs
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical	Surface Soil	Groundwater	Surface Water	Sediment	Sediment Waste	Soil to Air	Soil to Groundwater
Volatile Organic Compounds							
Acetone		X					
Chloroform		X					
Semivolatile Organic Compounds							
Benzo(a)pyrene	X						
Bis(2-Ethylhexyl)phthalate			X				
Pesticides/PCBs							
Aroclor-1254					X		
Inorganics							
Aluminum		X	X	X			
Antimony	X			X	X		
Arsenic	X	X	X	X	X		
Cadmium		X			X		
Copper					X		
Iron	X	X	X	X	X		
Lead	X				X		
Manganese	X	X	X	X	X		
Nickel				X			
Thallium		X					
Vanadium			X	X			

Notes
X - Indicates chemical was retained as a COPC.

TABLE 6-8

SELECTION OF EXPOSURE PATHWAYS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 3

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	Surface Soil	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Construction workers may have contact with soil during excavation activities.
				Full-time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	There is no current or anticipated future industrial use of the site.
				Maintenance Workers	Adult	Ingestion Dermal	On-Site On-Site	None None	There is no current or anticipated future industrial use of the site.
				Military Personnel	Adult	Ingestion Dermal	On-Site On-Site	None None	No military personnel at the site.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Trespassers may be exposed to soil while at the site.
				Recreational Users	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to soil while at the site.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to soil while at the site.
				Residents	Child	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
	Surface Soil	Air	Surface Soil	Construction Workers	Adult	Inhalation	On-site	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Full-time Employees	Adult	Inhalation	On-site	None	There is no current or anticipated future industrial use of the site.
				Maintenance Workers	Adult	Inhalation	On-site	None	There is no current or anticipated future industrial use of the site.
				Military Personnel	Adult	Inhalation	On-site	None	No full-time military personnel at the site.
				Trespassers	Adolescents	Inhalation	On-site	Quant	Trespassers may be exposed to fugitive dust and volatile emissions from soil.
				Recreational Users	Adolescents	Inhalation	On-Site	Quant	Recreational users may be exposed to fugitive dust and volatile emissions from soil.
					Adult	Inhalation	On-Site	Quant	Recreational users may be exposed to fugitive dust and volatile emissions from soil.
				Residents	Child	Inhalation	On-Site	Quant	Future child residents may be exposed to fugitive dust and volatile emissions from soil.
					Adult	Inhalation	On-Site	Quant	Future adult residents may be exposed to fugitive dust and volatile emissions from soil.

TABLE 6-8

SELECTION OF EXPOSURE PATHWAYS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 3

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
	Groundwater	Groundwater	Shallow Aquifer	Construction Workers	Adult	Ingestion	On-Site	None	Groundwater is not used as a potable water supply at the site.
						Dermal	On-Site	Quant	Construction workers may contact groundwater during excavation activities.
				Full-time Employees	Adult	Ingestion	On-Site	None	Groundwater is not suitable for use as a potable water supply
						Dermal	On-Site	None	
				Maintenance Workers	Adult	Ingestion	On-Site	None	Maintenance workers are not exposed to groundwater.
						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	Trespassers are not exposed to groundwater.
						Dermal	On-Site	None	
	Groundwater	Groundwater	Shallow Aquifer	Recreational Users	Adolescents	Ingestion	On-Site	None	Recreational users are not exposed to groundwater.
						Dermal	On-Site	None	
					Adult	Ingestion	On-Site	None	Recreational users are not exposed to groundwater.
						Dermal	On-Site	None	
				Residents	Child	Ingestion	On-Site	Quant	Groundwater may be used as a potable water supply in the future.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Groundwater may be used as a potable water supply in the future.
						Dermal	On-Site	Quant	
	Groundwater	Air	Shallow Aquifer	Construction Workers	Adult	Inhalation	On-site	None	Exposure to volatiles is insignificant compared to dermal exposure.
				Full-time Employees	Adult	Inhalation	On-site	None	Groundwater is not suitable for use as a potable water supply.
				Maintenance Workers	Adult	Inhalation	On-site	None	Maintenace workers are not exposed to groundwater.
				Military Personnel	Adult	Inhalation	On-Site	None	Site is not used by military personnel.
				Trespassers	Adolescents	Inhalation	On-Site	None	Trespassers are not exposed to groundwater.
				Recreational Users	Adolescents	Inhalation	On-Site	None	Recreational users are not exposed to groundwater.
					Adult	Inhalation	On-Site	None	Recreational users are not exposed to groundwater.
				Residents	Child	Inhalation	On-Site	Quant	Groundwater may be used as a potable water supply in the future.
					Adult	Inhalation	On-Site	Quant	Groundwater may be used as a potable water supply in the future.

TABLE 6-8

SELECTION OF EXPOSURE PATHWAYS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
	Sediment	Sediment	Sediment	Construction Workers	Adult	Ingestion	On-Site	Quant	Construction workers may contact sediment during construction activities.
						Dermal	On-Site	Quant	
				Full-time Employees	Adult	Ingestion	On-Site	None	There is no current or anticipated future industrial use of the site.
						Dermal	On-Site	None	
				Maintenance Workers	Adult	Ingestion	On-Site	None	There is no current or anticipated future industrial use of the site.
						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	Quant	Trespassers may be exposed to sediment while at the site.
						Dermal	On-Site	Quant	
				Recreational Users	Adolescents	Ingestion	On-Site	Quant	Recreational users may be exposed to sediment while at the site.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Recreational users may be exposed to sediment while at the site.
						Dermal	On-Site	Quant	
				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	
	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	There is no current or anticipated future industrial use of the site.
						Dermal	On-Site	None	
				Maintenance Workers	Adult	Ingestion	On-Site	None	There is no current or anticipated future industrial use of the site.
						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	Quant	Trespassers may be exposed to surface water while at the site.
						Dermal	On-Site	Quant	
				Recreational Users	Adolescents	Ingestion	On-Site	Quant	Recreational users may be exposed to surface water while at the site.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Recreational users may be exposed to surface water while at the site.
						Dermal	On-Site	Quant	
				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	

TABLE 6-9

EXPOSURE POINT CONCENTRATIONS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical	Surface Soil (mg/kg)	Groundwater (ug/L)	Surface Water (ug/L)	Sediment (mg/kg)	Sediment Waste (mg/kg)
Volatile Organic Compounds					
Acetone	NA	650 (1)	NA	NA	NA
Chloroform	NA	4.5 (1)	NA	NA	NA
Semivolatile Organic Compounds					
Benzo(a)pyrene equivalents	0.214 (1)	NA	NA	NA	NA
Bis(2-Ethylhexyl)phthalate	NA	NA	10.3 (1)	NA	NA
Pesticides/PCBs					
Aroclor-1254	NA	NA	NA	NA	24 (5)
Inorganics					
Aluminum	NA	5140 (3)	4700	14845	NA
Antimony	8 (1)	NA	NA	2.82	9.4 (5)
Arsenic	50.8 (1)	35.4 (3)	7.1	9.34	49.7 (5)
Cadmium	NA	8.1 (1)	NA	NA	4.7 (5)
Copper	NA	NA	NA	NA	489 (5)
Iron	99700 (1)	122000 (1)	2926	19376	307000 (5)
Lead	78.6 (2)	NA	NA	NA	1760 (2)
Manganese	328	1530 (3)	165 (4)	89.4	1480 (5)
Nickel	NA	NA	NA	62.6	NA
Thallium	NA	10	NA	NA	NA
Vanadium	NA	NA (1)	21.4	33.2	NA

Notes:
NA - Not applicable.
RAGS Part D Tables for the exposure point concentrations are included in Appendix E.
All concentrations and 95 percent UCL for lognormal distribution unless otherwise noted.
1 - Distribution could not be determined; therefore, maximum detected concentration is used for the exposure point concentration.
2 - Average concentration per IEUBK model guidance.
3 - UCL is greater than the maximum detected concentration; therefore, the maximum detected concentration is used as the exposure point concentration.
4 - UCL for normal distribution.
5 - Insufficient number of samples to calculate UCL; therefore, the maximum detected concentration is used as the exposure point concentration.

TABLE 6-10

SUMMARY OF EXPOSURE INPUT PARAMETERS
SITE12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Exposure Parameter	Construction Worker	Adolescent Trespasser	Adolescent Recreational User	Adult Recreational User	Child Resident	Adult Resident
All Exposures						
C_{soil} / C_{sed} (mg/kg) C_{sw} (mg/L)	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]	Maximum or 95% UCL[1]
C_{gw} (mg/L)	Average[1]	NA	NA	NA	NA	NA
ED (years)	1[2]	10[9]	10[9]	6[9]	6[3]	24[3]
BW (kg)	70[3]	45[7]	45[7]	70[3]	15[3]	70[3]
AT_n (days)	365[4]	3,650[4]	3,650[4]	2,190[4]	2,190[4]	8760[4]
AT_c (days)	25,550[4]	25,550[4]	25,550[4]	25,550[4]	25,550[4]	25,550[4]
Incidental Ingestion/Dermal Contact with Soil and Sediment						
IR (mg/day)	480[3]	100[6]	100[6]	100[6]	200[6]	100[6]
EF-Soil (days/year)	125[1]	45[9]	45[9]	45[9]	350[3]	350[3]
EF-Sediment (days/year)	21[5]	45[9]	45[9]	45[9]	45[9]	45[9]
FI (unitless)	1[6]	1[6]	1[6]	1[6]	1[6]	1[6]
SA (cm^2/day)	4,100[7]	3,820[7]	3,820[7]	5,700[7]	2,000[7]	5,700[7]
AF (mg/cm^2)	0.5[7]	0.2[7]	0.2[7]	0.2[7]	0.2[7]	0.07[7]
ABS (unitless)	chemical-specific[6,8]	chemical-specific[6,8]	chemical-specific[6,8]	chemical-specific[6,8]	chemical-specific[6,8]	chemical-specific[6,8]
CF (kg/mg)	1E-06	1E-06	1E-06	1E-06	1E-06	1E-06
Ingestion/Dermal Contact with Groundwater						
IR_{gw} (L/day)	NA	NA	NA	NA	1[3]	2[3]
EF (days/year)	21[5]	NA	NA	NA	350[3]	350[3]
ET (hours/day) and t_{event} (hours/event)	8[5]	NA	NA	NA	0.25[7]	0.25[7]
EV (events/day)	1[5]	NA	NA	NA	1	1
A (cm^2/day)	2,490[7]	NA	NA	NA	6600[7]	18000[7]
K_p (cm/hour)	chemical-specific[8]	NA	NA	NA	chemical-specific[8]	chemical-specific[8]
t* (hour/event), T (hour), and B (unitless)	chemical-specific[8]	NA	NA	NA	chemical-specific[8]	chemical-specific[8]
CF (L/cm^3)	1E-03	NA	NA	NA	1E-3	1E-3
Incidental Ingestion/Dermal Contact with Surface Water						
CR (L/hour)	0.01[6]	0.01[6]	0.01[6]	0.01[6]	0.01[6]	0.01[6]
ET (hours/day) and t_{event} (hours/event)	8[5]	2.6[6]	2.6[6]	2.6[6]	2.6[6]	2.6[6]
EF (days/year)	21[5]	45[9]	45[9]	45[9]	45[9]	45[9]
EV (events/day)	1[5]	1[9]	1[9]	1[9]	1[9]	1[9]
A (cm^2/day)	2,490[7]	3,820[7]	3,820[7]	5,700[7]	2,000[7]	5,700[7]
K_p (cm/hour)	chemical-specific[8]	chemical-specific[8]	chemical-specific[8]	chemical-specific[8]	chemical-specific[8]	chemical-specific[8]
t* (hour/event), T (hour), and B (unitless)	chemical-specific[8]	chemical-specific[8]	chemical-specific[8]	chemical-specific[8]	chemical-specific[8]	chemical-specific[8]
CF (L/cm^3)	1E-03	1E-03	1E-03	1E-03	1E-03	1E-03

$C_{soil/sed/gw/sw}$ Exposure concentration for soil/sediment/groundwater/surface water.
EF Exposure frequency.
ED Exposure duration.
BW Body weight.
AT_n Averaging time for noncarcinogenic effects.
AT_c Averaging time for carcinogenic effects.
IR Ingestion rate (soil or groundwater).
Fi Fraction ingested from contaminated source.
SA Skin surface area available for contact.
AF Soil-to-skin adherence factor.
ABS Absorption factor.
CF Conversion factor.
ET Exposure time.
t_{event} Duration of event.
A Skin surface area available for contact.

TABLE 6-10

SUMMARY OF EXPOSURE INPUT PARAMETERS
SITE12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

EV	Event frequency.
K_p	Permeability coefficient from water through skin.
t*	Time it takes to reach steady-state conditions.
T	Lag time.
B	Bunge Model partitioning coefficient.
CR	Contact rate.

1 U.S. EPA 4, 1995. 95% UCL is used if the data set is of sufficient size (i.e., 11 samples or more). For smaller data sets (i.e., less than 10 samples); the 95% UCL is not appropriate and the maximum concentration is used.
2 Assumed that construction activties take place 125 days a year over a 1 year period.
3 U.S. EPA, 1993.
4 U.S. EPA, 1989.
5 Assumed that a construction worker is exposed to groundwater/sediment/surface water one working month.
6 U.S. EPA, Region 4, November 1995.
7 U.S. EPA, 1997.
8 U.S. EPA, 1998.
9 Professional judgment assumes an individual visits the site approximately 1 day per week.

TABLE 6-11

CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
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							
Acetone	NA	83%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Chloroform	6.1E-03	20%	3.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	9/25/00
SVOCs							
Benzo(a)pyrene	7.3E+00	31%	2.4E+01	$(mg/kg/day)^{-1}$	B2	IRIS	9/25/00
Bis(2-ethylhexyl)phthalate	1.4E-02	19%	7.4E-02	$(mg/kg/day)^{-1}$	B2	IRIS	9/25/00
Pesticides/PCBs							
Aroclor-1254	2.0E+00	90%	2.2E+00	$(mg/kg/day)^{-1}$	NA	IRIS	9/25/00
Inorganics							
Aluminum	NA	10%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Antimony	NA	2%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Arsenic	1.5E+00	41%	3.7E+00	$(mg/kg/day)^{-1}$	A	IRIS	9/25/00
Cadmium	NA	1%	NA	$(mg/kg/day)^{-1}$	B1	IRIS	9/25/00
Copper	NA	30%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Iron	NA	15%	NA	$(mg/kg/day)^{-1}$	N/A	N/A	N/A
Lead	NA	15%	NA	$(mg/kg/day)^{-1}$	B2	IRIS	9/25/00
Manganese	NA	4%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Nickel	NA	27%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Thallium	NA	15%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Vanadium	NA	1%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA

Notes:

IRIS = Integrated Risk Information System.

HEAST= Health Effects Assessment Summary Tables.

1 - USEPA Region IV, February 26, 1996.

2 - CSFdermal = CSForal/Oral to Dermal Adjustment Factor.

3 - For IRIS values, the date IRIS was searched.
For HEAST values, the date of 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.

TABLE 6-12

NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
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										
Acetone	Chronic	1.0E-01	mg/kg/day	83%	8.3E-02	mg/kg/day	Kidney, Liver	1000/1	IRIS	9/25/00
Chloroform	Chronic	1.0E-02	mg/kg/day	20%	2.0E-03	mg/kg/day	Liver	1000/1	IRIS	9/25/00
SVOCs										
Benzo(a)pyrene	Chronic	NA	mg/kg/day	31%	NA	mg/kg/day	Cancer	NA	NA	NA
Bis(2-ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg/day	19%	3.8E-03	mg/kg/day	Liver	1000/1	IRIS	9/25/00
Pesticides/PCBs										
Aroclor-1254	Chronic	2.0E-05	mg/kg/day	90%	1.8E-05	mg/kg/day	Cancer, Immune	300/1	IRIS	9/25/00
Inorganics										
Aluminum	Chronic	1E+00	mg/kg/day	10%	1.0E-01	mg/kg/day	Body Weight	NA	EPAIII	4/13/00
Antimony	Chronic	4E-04	mg/kg/day	2%	8.0E-06	mg/kg/day	Blood	1000/1	IRIS	9/25/00
Arsenic	Chronic	3.0E-04	mg/kg/day	41%	1.2E-04	mg/kg/day	Skin, CVS	3/1	IRIS	9/25/00
Cadmium	Chronic	5.0E-04	mg/kg/day	1%	5.0E-06	mg/kg/day	Kidney	10/1	IRIS	9/25/00
Copper	Chronic	4.0E-02	mg/kg/day	30%	1.2E-02	mg/kg/day	GS	NA	HEAST	7/97
Iron	Chronic	3.0E-01	mg/kg/day	15%	4.5E-02	mg/kg/day	Blood, GS	NA	EPAIII	4/13/00
Lead	Chronic	NA	mg/kg/day	15%	NA	mg/kg/day	CNS	NA	IRIS	9/25/00
Manganese	Chronic	2.0E-02	mg/kg/day	4%	8.0E-04	mg/kg/day	CNS	1/1	IRIS	9/25/00
Nickel	Chronic	2.0E-02	mg/kg/day	27%	5.4E-03	mg/kg/day	Body Weight	300/1	IRIS	9/25/00
Thallium	Chronic	7.0E-05	mg/kg/day	15%	1.1E-05	mg/kg/day	None Reported	NA	EPAIII	4/13/00
Vanadium	Chronic	7.0E-03	mg/kg/day	1%	7.0E-05	mg/kg/day	None Reported	NA	HEAST	7/97

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, the date of HEAST.
FOR EPAIII, date of RBC Table.

N/A = Not applicable.

IRIS = Integrated Risk Information System.

HEAST= Health Effects Assessment Summary Tables.

EPAIII = U.S. EPA Region 3 Risk-Based Concentration Table, April 13, 2000.

CNS = Central Nervous System.

CVS = Cardiovascular System.

Immune = Immunological.

GS = Gastrointestinal.

TABLE 6-13

SUMMARY OF CANCER RISKS AND HAZARD INDICES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 3

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$	Chemicals with Cancer Risks $>10^{-6}$	Hazard Index	Chemicals with HI > 1
Construction Worker	Soil	Ingestion	2.6E-06	--	--	Arsenic	1.3	--
		Dermal Contact	8.7E-07	--	--	--	0.16	--
		Total	3.5E-06	--	--	Arsenic	1.4	--
	Groundwater	Dermal Contact	3.1E-08	--	--	--	0.14	--
	Sediment	Ingestion	7.9E-08	--	--	--	0.05	--
		Dermal Contact	2.5E-08	--	--	--	0.006	--
		Total	1.0E-07	--	--	--	0.06	--
	Surface Water	Ingestion	1.0E-08	--	--	--	0.003	--
		Dermal Contact	2.3E-08	--	--	--	0.02	--
		Total	3.4E-08	--	--	--	0.02	--
	Sediment Waste	Ingestion	6.9E-07	--	--	--	0.99	--
		Dermal Contact	1.4E-07	--	--	--	0.06	--
		Total	8.3E-07	--	--	--	1.1	--
		Total All Media	4.5E-06				2.7	
Adolescent Trespassers	Soil	Ingestion	3.0E-06	--	--	Arsenic	0.15	--
		Dermal Contact	1.8E-06	--	--	Arsenic	0.03	--
		Total	4.9E-06	--	--	Arsenic	0.18	--
	Sediment	Ingestion	5.5E-07	--	--	--	0.04	--
		Dermal Contact	3.1E-07	--	--	--	0.008	--
		Total	8.5E-07	--	--	--	0.04	--
	Surface Water	Ingestion	1.1E-07	--	--	--	0.004	--
		Dermal Contact	6.1E-07	--	--	--	0.03	--
		Total	7.2E-07	--	--	--	0.03	--
	Sediment Waste	Ingestion	4.8E-06	--	--	Aroclor-1254, Arsenic	0.69	--
		Dermal Contact	1.8E-06	--	--	Arsenic	0.08	--
		Total	6.6E-06	--	--	Aroclor-1254, Arsenic	0.76	--
		Total All Media	1.3E-05				1.0	
Adolescent Recreational Users	Soil	Ingestion	3.0E-06	--	--	Arsenic	0.15	--
		Dermal Contact	1.8E-06	--	--	Arsenic	0.03	--
		Total	4.9E-06	--	--	Arsenic	0.18	--
	Sediment	Ingestion	5.5E-07	--	--	--	0.04	--
		Dermal Contact	3.1E-07	--	--	--	0.008	--
		Total	8.5E-07	--	--	--	0.04	--
	Surface Water	Ingestion	1.1E-07	--	--	--	0.004	--
		Dermal Contact	6.1E-07	--	--	--	0.03	--
		Total	7.2E-07	--	--	--	0.03	--
	Sediment Waste	Ingestion	4.8E-06	--	--	Aroclor-1254, Arsenic	0.69	--
		Dermal Contact	1.8E-06	--	--	Arsenic	0.08	--
		Total	6.6E-06	--	--	Aroclor-1254, Arsenic	0.76	--
		Total All Media	1.3E-05				1.0	

TABLE 6-13

SUMMARY OF CANCER RISKS AND HAZARD INDICES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 3

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$	Chemicals with Cancer Risks $>10^{-6}$	Hazard Index	Chemicals with HI > 1
Adult Recreational Users	Soil	Ingestion	1.2E-06	--	--	Arsenic	0.09	--
		Dermal Contact	1.0E-06	--	--	--	0.03	--
		Total	2.2E-06	--	--	Arsenic	0.13	--
	Sediment	Ingestion	2.1E-07	--	--	--	0.02	--
		Dermal Contact	1.8E-07	--	--	--	0.008	--
		Total	3.9E-07	--	--	--	0.03	--
	Surface Water	Ingestion	4.2E-08	--	--	--	0.002	--
		Dermal Contact	3.5E-07	--	--	--	0.03	--
		Total	3.9E-07	--	--	--	0.03	--
	Sediment Waste	Ingestion	1.9E-06	--	--	Arsenic	0.44	--
		Dermal Contact	1.0E-06	--	--	--	0.07	--
		Total	2.9E-06	--	--	Arsenic	0.51	--
		Total All Media	5.9E-06				0.70	
Child Resident	Soil	Ingestion	8.5E-05	--	Arsenic	cPAHs	6.9	Arsenic, Iron
		Dermal Contact	1.3E-05	--	Arsenic	cPAHs	0.41	--
		Total	9.9E-05	--	Arsenic	cPAHs	7.3	Arsenic, Iron
	Groundwater	Ingestion	2.9E-04	Arsenic	--	--	42	Arsenic, Iron, Manganese, Thallium
		Dermal Contact	1.2E-06	--	--	Arsenic	0.69	--
		Inhalation	1.5E-07	--	--	--	0.38	--
		Total	2.9E-04	Arsenic	--	--	43	Arsenic, Cadmium, Iron, Manganese, Thallium
	Sediment	Ingestion	2.0E-06	--	--	Arsenic	0.21	--
		Dermal Contact	2.9E-07	--	--	--	0.01	--
		Total	2.3E-06	--	--	Arsenic	0.23	--
	Surface Water	Ingestion	2.0E-07	--	--	--	0.01	--
		Dermal Contact	5.7E-07	--	--	--	0.05	--
		Total	7.7E-07	--	--	--	0.06	--
	Sediment Waste	Ingestion	1.7E-05	--	Arsenic	Aroclor-1254	4.1	Aroclor-1254, Iron
		Dermal Contact	1.7E-06	--	--	Arsenic	0.12	--
		Total	1.9E-05	--	Arsenic	Aroclor-1254	4.2	Aroclor-1254, Iron
		Total All Media	4.1E-04				55	

TABLE 6-13

SUMMARY OF CANCER RISKS AND HAZARD INDICES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 3 OF 3

Receptor	Medium	Exposure Route	Cancer Risk	Chemicals with Cancer Risks $>10^{-4}$	Chemicals with Cancer Risks $>10^{-5}$	Chemicals with Cancer Risks $>10^{-6}$	Hazard Index	Chemicals with HI > 1
Adult Resident	Soil	Ingestion	3.6E-05	--	Arsenic	--	0.74	--
		Dermal Contact	1.1E-05	--	Arsenic	--	0.09	--
		Total	4.8E-05	--	Arsenic	cPAHs	0.82	--
	Groundwater	Ingestion	4.9E-04	Arsenic	--	--	71	Arsenic, Cadmium, Iron, Manganese, Thallium
		Dermal Contact	2.8E-06	--	--	Arsenic	1.6	--
		Inhalation	2.5E-07	--	--	--	0.63	--
		Total	4.9E-04	Arsenic	--	--	73	Acetone, Arsenic, Cadmium, Iron, Manganese, Thallium
	Sediment	Ingestion	8.5E-07	--	--	--	0.02	--
		Dermal Contact	2.5E-07	--	--	--	0.003	--
		Total	1.1E-06	--		Arsenic	0.03	--
	Surface Water	Ingestion	1.7E-07	--	--	--	0.002	--
		Dermal Contact	1.4E-06	--	--	Bis(2-ethylhexyl)phthalate	0.03	--
		Total	1.6E-06	--	--	Bis(2-ethylhexyl)phthalate	0.03	--
	Sediment Waste	Ingestion	7.4E-06	--	--	Aroclor-1254, Arsenic	0.44	--
		Dermal Contact	1.4E-06	--	--	Arsenic	0.03	--
		Total	8.8E-06	--	--	Aroclor-1254, Arsenic	0.47	--
		Total All Media	5.5E-04				74	
Lifelong Resident	Soil	Ingestion	1.2E-04	Arsenic	--	cPAHs	NA	--
		Dermal Contact	2.5E-05	--	Arsenic	cPAHs	NA	--
		Total	1.5E-04	Arsenic	--	cPAHs	NA	--
	Groundwater	Ingestion	7.8E-04	Arsenic	--	--	NA	--
		Dermal Contact	4.0E-06	--	--	Arsenic	NA	--
		Inhalation	4.0E-07	--	--	--	NA	--
		Total	7.8E-04	Arsenic	--	--	NA	--
	Sediment	Ingestion	2.8E-06	--	--	Arsenic	NA	--
		Dermal Contact	5.4E-07	--	--	--	NA	--
		Total	3.4E-06	--	--	Arsenic	NA	--
	Surface Water	Ingestion	3.7E-07	--	--	--	NA	--
		Dermal Contact	2.0E-06	--	--	Bis(2-ethylhexyl)phthalate	NA	--
		Total	2.3E-06	--	--	Bis(2-ethylhexyl)phthalate	NA	--
	Sediment Waste	Ingestion	2.5E-05	--	Arsenic	Aroclor-1254	NA	--
		Dermal Contact	3.1E-06	--	--	Arsenic	NA	--
		Total	2.8E-05	--	Arsenic	Aroclor-1254	NA	--
		Total All Media	9.6E-04				NA	

TABLE 6-14

COMPARISON OF ESSENTIAL NUTRIENT CONCENTRATIONS TO SCREENING LEVELS SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA MCRD PARRIS ISLAND, SOUTH CAROLINA

Chemical	Surface Soil (mg/kg)	Sediment (mg/kg)	Sediment Waste (mg/kg)	Essential Nutrient Screening Levels (mg/kg)
Calcium	2,780	5,550	6,670	1,000,000
Magnesium	3,240	15,100	6,220 (B)	460,468
Potassium	640	9,090	2,210 (B)	1,000,000
Sodium	10,700	60,800	11,200 (B)	1,000,000

Chemical	Ground Water (ug/L)	Surface Water (ug/L)	Essential Nutirent Screening Levels (ug/L)
Calcium	501,000	374,000 (B)	1,000,000
Magnesium	1,100,000	1,120,000 (B)	118,807
Potassium	371,000	406,000 (B)	297,016
Sodium	8,670,000	10,200,000 (B)	396,022

Notes:
(B) - Below background concentration.

TABLE 6-15

REMEDIAL GOAL OPTIONS - SOIL/SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CHILD RESIDENT EXPOSED TO SURFACE SOIL						
	Target Cancer Risk Level			Target Hazard Index		
Chemical	10^{-6} (mg/kg)	10^{-5} (mg/kg)	10^{-4} (mg/kg)	0.1 (mg/kg)	1 (mg/kg)	3 (mg/kg)
Iron	NTX	NTX	NTX	8,490	84,900	254,700

CHILD RESIDENT EXPOSED TO SEDIMENT WASTE						
	Target Cancer Risk Level			Target Hazard Index		
Chemical	10^{-6} (mg/kg)	10^{-5} (mg/kg)	10^{-4} (mg/kg)	0.1 (mg/kg)	1 (mg/kg)	3 (mg/kg)
Aroclor-1254	3.47	34.7	347	1.2	12	36

LIFELONG RESIDENT EXPOSED TO SURFACE SOIL						
	Target Cancer Risk Level			Target Hazard Index		
Chemical	10^{-6} (mg/kg)	10^{-5} (mg/kg)	10^{-4} (mg/kg)	0.1 (mg/kg)	1 (mg/kg)	3 (mg/kg)
Arsenic	0.36	3.6	36	6.9	69	207

Notes:
NTX - No toxicity values available.

TABLE 6-16

REMEDIAL GOAL OPTIONS - GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CHILD RESIDENTS							
	EPA	Target Cancer Risk Level			Target Hazard Index		
Chemical	MCL (1) (ug/L)	10^{-6} (ug/L)	10^{-5} (ug/L)	10^{-4} (ug/L)	0.1 (ug/L)	1 (ug/L)	3 (ug/L)
Arsenic	50	0.12	1.2	12	0.55	5.5	16
Cadmium	5	NTX	NTX	NTX	0.78	7.8	23
Iron	300 (2)	NTX	NTX	NTX	1,986	19,857	59,570
Manganese	50 (2)	NTX	NTX	NTX	35	351	1,052
Thallium	2	NTX	NTX	NTX	0.13	1.3	3.8

ADULT RESIDENTS							
	EPA	Target Cancer Risk Level			Target Hazard Index		
Chemical	MCL (ug/L)	10^{-6} (ug/L)	10^{-5} (ug/L)	10^{-4} (ug/L)	0.1 (ug/L)	1 (ug/L)	3 (ug/L)
Acetone	NV	NTX	NTX	NTX	53	530	1,590
Arsenic	50	0.07	0.7	7	0.32	3.2	9.5
Cadmium	5	NTX	NTX	NTX	0.43	4.3	13
Iron	300 (2)	NTX	NTX	NTX	315	3,147	9,440
Manganese	50 (2)	NTX	NTX	NTX	20	202	605
Thallium	2	NTX	NTX	NTX	0.07	0.73	2.2

LIFELONG RESIDENTS							
	EPA	Target Cancer Risk Level			Target Hazard Index		
Chemical	MCL (ug/L)	10^{-6} (ug/L)	10^{-5} (ug/L)	10^{-4} (ug/L)	0.1 (ug/L)	1 (ug/L)	3 (ug/L)
Arsenic	50	0.04	0.45	4	NA	NA	NA

Notes:
1 - U.S. EPA Drinking Water Standards and Health Advisories, Summer 2000.
2 - Secondary MCL.
NA - Not applicable.
NTX - No toxicity criteria available.

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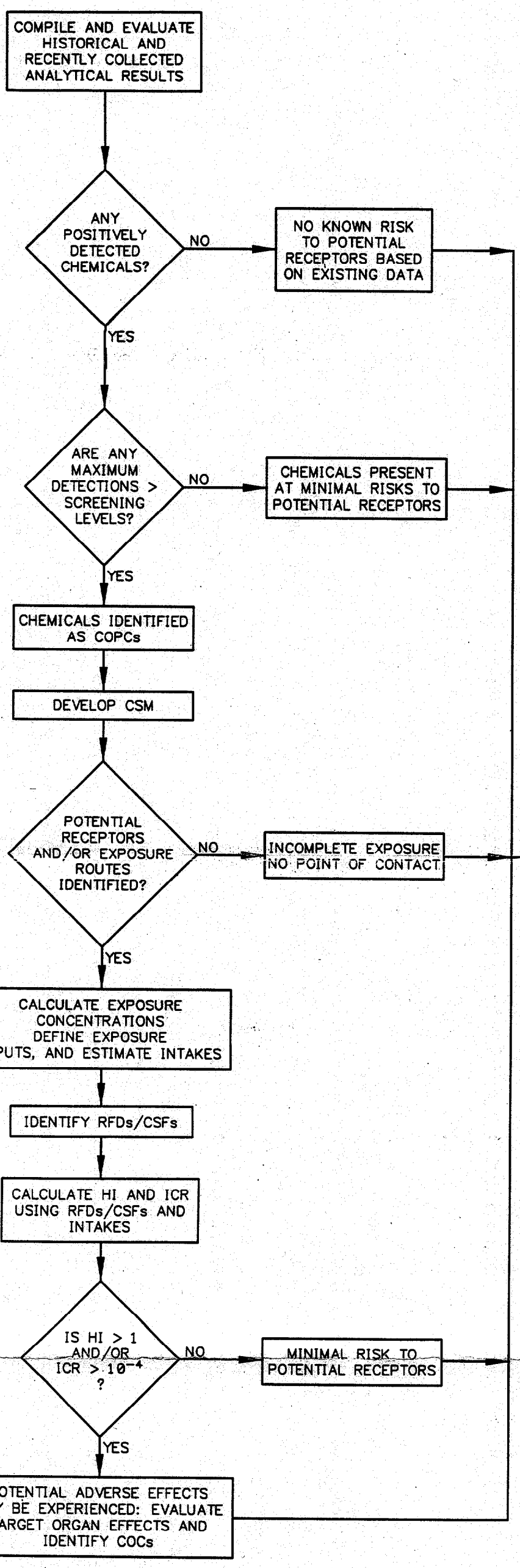

KEY

COC – CHEMICAL OF CONCERN
COPC – CHEMICAL OF POTENTIAL CONCERN
CSF – CANCER SLOPE FACTOR
CSM – CONCEPTUAL SITE MODEL
HI – HAZARD INDEX
ICR – INCREMENTAL CANCER RISK
RFD – REFERENCE DOSE

DRAWN BY MF DATE 8/8/00	SUMMARY OF HUMAN HEALTH RISK ASSESSMENT PROCESS SITE 12/SWMU 10 JERICHO ISLAND DISPOSAL AREA MCRD PARRIS ISLAND, SOUTH CAROLINA	CONTRACT NO. 7803
CHECKED BY DATE		APPROVED BY DATE
COST/SCHED–AREA		APPROVED BY DATE
SCALE NOT TO SCALE		DRAWING NO. FIGURE 6-1 REV. 0

FORM CADD NO. SDIV_BV.DVG - REV 0 - 1/20/98

REVISION 1
OCTOBER 2001

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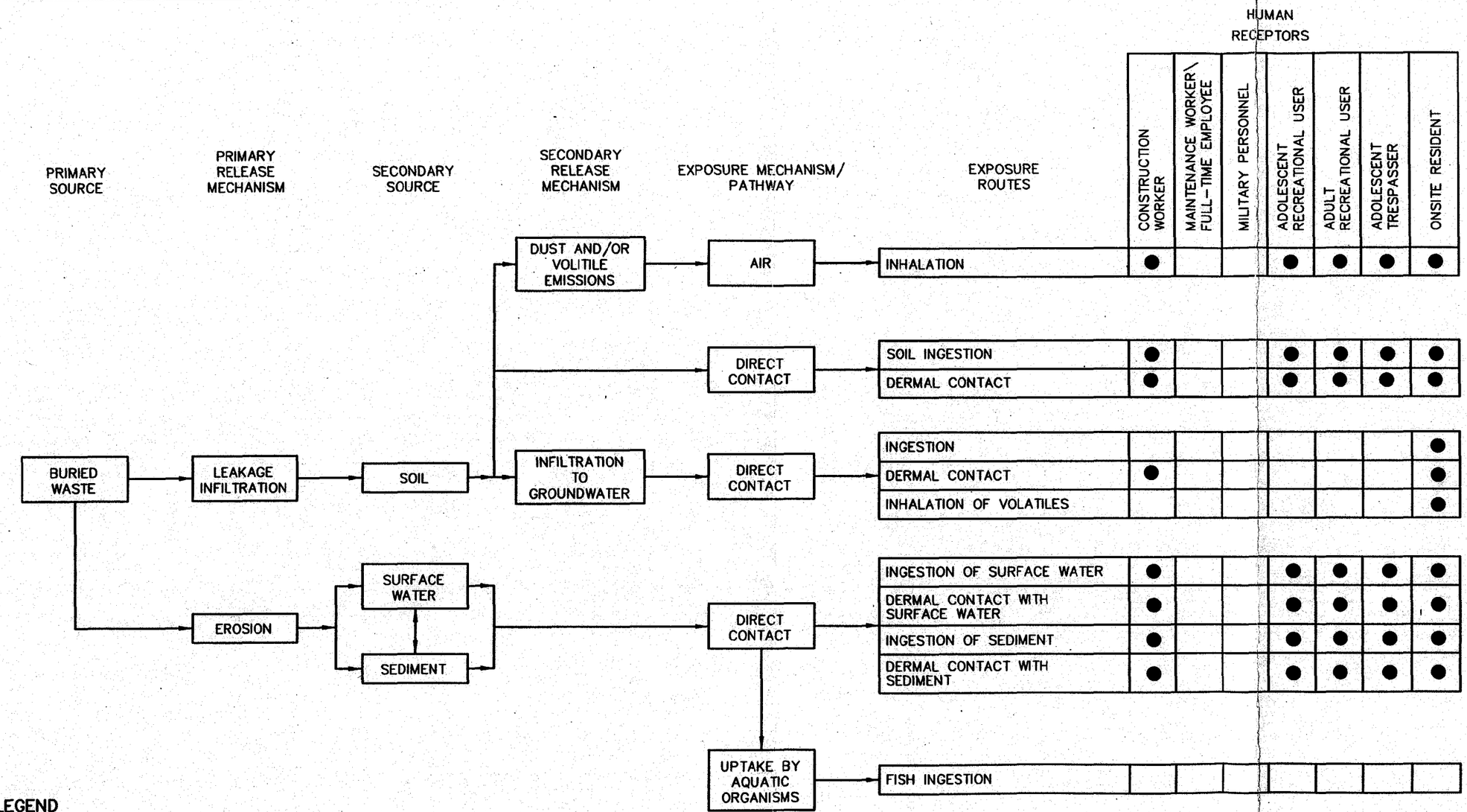

LEGEND

● COMPLETE EXPOSURE PATHWAY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DATE: MF 8/8/00
CHECKED BY DATE:
COST/SCHED-AREA:
SCALE: NOT TO SCALE

CONCEPTUAL SITE MODEL
HUMAN HEALTH RISK ASSESSMENT
SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7803
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 6-2
REV. 0

FORM CADD NO. SDV_BH12.DGN - REV 0 - 1/20/98

080001/P

CTO 0053

7.0 ECOLOGICAL RISK ASSESSMENT

The RI/RFI process requires an assessment of the potentially adverse effects of site contamination on the environment. Specifically, ecological receptors that utilize Site 12 could be at risk from environmental contamination associated with this area. For this reason, an ecological risk assessment (ERA) was performed to characterize the potential risks from site-related contaminants to ecological receptors.

7.1 OVERVIEW OF METHODS

This section provides an outline of the general approach that was taken to assess the impacts of site contamination on ecological receptors. This assessment generally followed a two-step process, as follows:

Step 1: Preliminary Problem Formulation (Section 7.2) and Ecological Effects Evaluation (Section 7.3)

- Preliminary Problem Formulation - This first phase of an ecological risk assessment discusses the goals, breadth, and focus of the assessment. It includes general descriptions of the site, with emphasis on the habitats and ecological receptors that are present. This phase also involves characterization of contaminant sources and migration pathways, evaluation of routes of contaminant exposure, and selection of analytes to be assessed. Assessment and measurement endpoints are also selected in this phase, and a conceptual model is developed that describes how contaminants associated with Site 12 may come into contact with ecological receptors.

- Preliminary Ecological Effects Evaluation - In this phase, medium-specific ecological screening guidelines for each analyte (i.e., concentrations of each contaminant above which adverse effects to ecological receptors may occur) are identified. Contaminant doses associated with toxicity to representative ecological receptors are also identified. This step is undertaken concurrently with the exposure assessment described below.

Step 2: Preliminary Exposure Assessment (Section 7.4) and Risk Calculation (Section 7.5)

- Preliminary Exposure Estimate - This portion of the ecological risk assessment includes the identification of data used to represent concentrations of contaminants to which ecological receptors may be exposed in various media and the selection of exposure point contaminant concentrations from those data. Contaminant doses for representative receptors are also calculated.

- Preliminary Risk Calculation - In this step, exposure point concentrations are compared to guidelines in order to characterize potential risk to ecological receptors. Contaminant doses associated with toxicity are compared to calculated doses for representative receptors. Analytes that are found to pose potential risk after these comparisons are selected as ecological COPCs.

When these two steps are completed, the results are interpreted, ecological contaminants of concern (COCs) are selected, and the uncertainties associated with the ecological risk assessment are addressed. COCs are COPCs that are shown to present unacceptable risks to ecological receptors based on their concentrations, distributions, and modes of toxicity. The above process, described in further detail below, represents the general approach recommended in the most recent U.S. EPA guidance for performing ecological risk assessments (U.S. EPA, 1997b, 2000b), which served as the basis for the ecological risk assessment methodology. Furthermore, the ecological risk assessment was conducted in accordance with Navy policy (DoN, 1999) and other available guidance documents and publications (Suter, 1993; Calabrese and Baldwin, 1993; Wentsel et al., 1996; Ingersoll et al., 1997; U.S. EPA, 1999e). The methods used in this ecological risk assessment and discussed below were summarized in the Master Work Plan for MCRD Parris Island (B&R Environmental, 1998a). Revisions to the Master Work Plan have been discussed with the MCRD Parris Island partnering team.

Due to the potential complexity, ecological risk assessments are often conducted using a tiered approach and punctuated with scientific/management decision points (SMDPs). SMDPs consist of meetings involving the risk managers and risk assessment team and are conducted to evaluate the work up to that point and to ensure that the ecological risk assessment is proceeding in an efficient manner. Information analyzed in one tier is evaluated to determine whether the objectives of the study have been met. The results are then used to identify the data required for the next tier, if necessary. The Tier 1 ecological risk assessment is also known as a screening risk assessment. The screening risk assessment uses conservative (i.e., stringent) assumptions to evaluate site data and determine whether additional ecological risk assessment or accelerated site cleanup may be warranted or that the site poses negligible ecological risks.

The second tier is a baseline ecological risk assessment, which is conducted if the results of the screening-level ecological risk assessment indicate that an additional study is warranted. The baseline ecological risk assessment is a more focused study of the initial COPCs and comprises Steps 3 through 7 of the 8-step ecological risk assessment process. The baseline ecological risk assessment begins with a more balanced evaluation of the conservativeness inherent in the first two steps of the risk assessment process (U.S. EPA, 1997b; DoN, 1999).

U.S. EPA Region 4 has recently amended its desired approach regarding the implementation of U.S. EPA's (1997c) guidance for performing ecological risk assessments. Under the recent guidance (U.S. EPA, 2000b), food-chain modeling (i.e., the calculation of estimated doses for representative receptors and the subsequent comparison of estimated doses to contaminant doses associated with toxicity) is conducted in Step 3a, rather than in Step 2 of the risk assessment. Furthermore, in the new approach, food-chain modeling is recommended only for COPCs that are known to significantly bioaccumulate or biomagnify. However, the ecological risk assessment for Site 12 was drafted prior to dissemination of the amended guidance. Therefore, the risk assessment is organized following the format described in the Master Work Plan for MCRD Parris Island (B&R Environmental, 1998b), which differs in certain aspects from the approach currently recommended by U.S. EPA (2000b). For example, all SVOCs and metals that were identified as COPCs are included in food-chain modeling in this risk assessment. In addition, food-chain modeling is conducted in Step 2 of this risk assessment. The differences between the procedures used herein and those recommended by Region IV's recent guidance are primarily related to format and in no case affect the conclusions of risk assessment.

7.2 PRELIMINARY PROBLEM FORMULATION

7.2.1 Habitat Types and Ecological Receptors

Site 12 is located in the southern portion of Jericho Island. The island lies along the northwestern portion of the Depot. The site was used by local residents from 1955 to 1968 for disposal of wastes prior to acquisition of the property by the Depot.

Site 12 and the entire upland portion of Jericho Island are forested. The overstory is dominated by slash pine (*Pinus elliottii*), loblolly pine (*Pinus taeda*), live oak (*Quercus virginiana*), and laurel oak (*Quercus laurifolia*). Common midstory species include wax myrtle (*Myrica cerifera*) and cabbage palm (*Sabal palmetto*). Common understory plants include Eastern baccharis (*Baccharis halimfolia*), saw palmetto (*Serenoa repens*), yaupon holly (*Ilex vomitoria*), poison ivy (*Rhus radicans*), Virginia creeper (*Parthenocissus quinquefolia*), muscadine grape (*Vitis rotundifolia*), and greenbriar (*Smilax rotundifolia*) and *Vaccinium*. The island is surrounded by an extensive saltwater marsh dominated by cordgrass (*Spartina alterniflora*). Seashore saltgrass (*Distichlis spicata*) and rush (*Juncus effusus*) are present at the marsh/upland interface.

A variety of wildlife species occurs on Jericho Island. White-tailed deer (*Odocoileus virginianus*) and raccoons (*Procyon lotor*) are known to forage in the area and gray squirrels (*Sciurus carolinensis*) are common. Other mammalian herbivores expected to occur in the upland portion of the peninsula include the cotton rat (*Sigmodon hispidus*) and the cotton mouse (*Peromyscus gossypinus*). The opossum (*Didelphis virginiana*), short-tailed shrew (*Blarina carolinensis*), and eastern mole (*Scalopus aquaticus*)

probably occur there. The marsh rabbit (*Sylvilagus palustris*) and rice rat (*Oryzomys palustris*) probably forage along the edge of the marsh. Mink (*Mustela vison*) and river otters (*Lutra canadensis*) are expected to forage along the marsh edge. Other mammalian carnivores expected to occur, at least occasionally, at the site include the red fox (*Vulpes vulpes*) and striped skunk (*Mephitus mephitus*). A variety of birds, reptiles, and amphibians utilize the site.

The saltwater marsh provides habitat for a variety of fauna, particularly fish and crustaceans. Several species of animals probably prey upon these fish and crustaceans. These predators include mammals such as the raccoon, mink, and river otter, and wading birds such as the tricolored heron (*Egretta tricolor*), great blue heron (*Ardea herodias*), green heron (*Butorides striatus),* and snowy egret (*Egretta thula*). Various shorebirds and wintering waterfowl forage in the marsh.

The shallow marsh is alternately flooded and drained by changing tides, and thus, fish near Jericho Island are largely limited to small schooling species such as mud minnows (*Umbra pygmaea*) and mummichogs (*Fundulus heteroclitus*). However, fish such as red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), southern flounder (*Paralichthys lethostigma*), whiting (*Menticirrhus americanus*), and striped mullet (*Mugil cephalus)* are known to occur in Archer's Creek south of Jericho Island. These and other fish species probably occur, at least occasionally, in portions of the marsh during high tides.

Threatened and endangered species that could occur at or near the sites consist of the bald eagle (*Haliaeetus leucocephalus*), wood stork (*Mycteria americana*), and least tern (*Sterna antillarum*). An active bald eagle nest is located approximately 2.3 miles southeast of the site, and bald eagles (state and federally listed as threatened) could forage on fish near Jericho Island. Wood storks (state and federally listed as endangered) forage in various areas throughout the Depot, and they could forage in the marsh surrounding the sites. Least terns (*Sterna antillarum*) have been observed at MCRD Parris Island and might occasionally forage in the marsh near the site, but observations of this species have not been recorded in the vicinity. The least tern is state listed as threatened. It occurs in coastal South Carolina only during the breeding season or briefly during migration. Preferred nesting habitat for the least tern does not exist at Jericho Island, and this species is not known to nest at MCRD Parris Island.

Although other endangered and threatened species occur in Beaufort County (Table 2-2 of Volume I, Master Work Plan), the site provides poor habitats for these species. For example, the manatee (*Trichechus manatus*), shortnose sturgeon (*Acipenser brevirostrum*), and various sea turtles are occasionally observed in the Broad River, Beaufort River, and Port Royal Sound, and the Atlantic bottlenosed dolphin (*Tursiops truncatus*) is a year-round resident of these areas. (Although not threatened or endangered, dolphins are afforded protection under the Federal Marine Mammal Act.) However, these species usually are not associated with shallow marshes like that near Site 12. With the

exception of the bald eagle and wood stork, the likelihood of endangered and threatened species in the vicinity of the site is probably remote.

7.2.2 Contaminant Sources and Migration Pathways

The contaminant source at Site 12 is debris from historical disposal of wastes that were brought to the island by local residents prior to the Depot's acquisition of the island. No organized landfill operations were conducted by local residents. The Depot has not used Jericho Island as a disposal area.

The contaminant migration pathways applicable at this site include volatilization, erosion, overland runoff, and infiltration. Contaminants in the soil could volatilize from surficial material or become airborne through wind erosion. Surface soil, if disturbed, may serve as a source for airborne transport of contaminants, which could then be transported to downwind locations. Precipitation runoff and wave action during storm surges could carry contaminants to nearby surface water and sediment in the tidal marsh. Infiltrating precipitation could cause contamination of subsurface soil and groundwater. Groundwater from the site could discharge to surface water in the marsh, where groundwater contaminants could be subsequently deposited in sediment or in the tissues of aquatic organisms.

7.2.3 Exposure Routes

Aquatic and semi-aquatic organisms in the tidal marsh near the site could be exposed to contaminants through direct contact with surface water and sediment, incidental ingestion of surface water and sediment, and consumption of contaminated food items. Aquatic and semi-aquatic organisms could also be exposed to constituents from contaminated groundwater that discharges to nearby surface water.

Terrestrial animals could be exposed to soil contaminants through ingestion of contaminated food items. Animals can incidentally ingest soil while grooming fur, preening feathers, digging, grazing close to the soil, or feeding on items to which soil has adhered (such as roots and tubers). Terrestrial vegetation could be exposed to contaminants via direct aerial deposition and root translocation. Aerial deposition was not investigated, primarily because the contaminant sources at the site are largely covered by vegetation and leaf litter, reducing the amount of bare soil and fugitive dust. Terrestrial animal receptors could also come into contact with contaminants in surface water through drinking, although this exposure route represents a negligible portion of total exposure for most receptors (Sample et al., 1996). In addition, the salinity of the surface water in the marsh precludes its use as drinking water. Nevertheless, organisms that prey on aquatic species could incidentally ingest surface water when consuming food items. Therefore, this exposure route was investigated for piscivorous wading birds and mammals.

Exposure to contaminants in the soil via dermal contact may occur but is unlikely to represent a major exposure pathway because fur, feathers, and chitinous exoskeletons probably minimize transfer of contaminants across dermal tissue. In addition, little information is available (e.g., absorption factors) to evaluate dermal exposures to wildlife.

Inhalation of volatile and semivolatile contaminants might occur. However, inhalation does not represent a significant exposure pathway because air contaminant concentrations are assumed to be quite low, even for burrowing wildlife. In addition, inhalation ecotoxicity data for chronic exposure are lacking. Therefore, the air pathway was not investigated.

7.2.4 Selection of Analytes to be Investigated

Analytes initially included for quantitative analysis were all analytes detected in surface water, sediment, surface soil, and groundwater samples. However, calcium, magnesium, potassium, and sodium were excluded since they are essential nutrients that are toxic only at extremely high concentrations. Due to the scarcity of data for these essential nutrients, it was not possible to develop ranges of toxicity for them even at high concentrations. The limited toxicity data that are available indicate that high dietary intake of these nutrients is well tolerated. The process that was used to select COPCs from the detected analytes is described in Section 7.5. Profiles describing the environmental fate, transport, and toxicity of COPCs are presented in Appendix F.

7.2.5 Assessment and Measurement Endpoints

One of the major tasks in preliminary problem formulation is the selection of assessment and measurement endpoints. An assessment endpoint is "an explicit expression of actual environmental values that are to be protected" and measurement endpoints are "measurable ecological characteristics that are related to the valued characteristic chosen as the assessment endpoint" (U.S. EPA, 1997b). The assessment endpoints selected for this ecological risk assessment were based on the environmental setting, contaminants known to exist at the sites, contaminant fate and transport mechanisms, exposure pathways, mechanisms of ecotoxicity, and likely categories of receptors that could be affected by site-related contaminants. The assessment endpoints at Site 12 consist of the protection of the following groups of receptors from adverse effects of site-related contaminants on growth, survival, and reproduction:

- benthic invertebrate communities
- fish communities (forage fish and higher trophic level fish)
- piscivorous birds
- vermivorous birds

- omnivorous birds
- carnivorous birds
- carnivorous mammals
- piscivorous mammals
- herbivorous mammals
- mammals that feed on soil invertebrates
- terrestrial and aquatic vegetation

Amphibians and reptiles are absent from the above list of assessment endpoints since toxicity data for both are sparse, resulting in a small, sporadic toxicity database. A discussion of the uncertainties associated with the absence of toxicity data for amphibians and reptiles is provided in Section 7.9.

Measurement endpoints serve as surrogates for assessment endpoints, since they are more easily quantified or observed than assessment endpoints. Measurement endpoints consisted of contaminant concentrations associated with adverse effects on growth, survival, and reproduction of aquatic organisms (surface water screening levels), benthic organisms (sediment screening levels), and terrestrial vegetation and soil invertebrates (surface soil screening levels). In addition, measurement endpoints for representative receptor groups were contaminant doses associated with adverse effects on growth, survival, and reproduction of these receptors. Taken together, the measurement endpoints address all the groups of receptors chosen as assessment endpoints.

7.2.6 Conceptual Site Model

The conceptual model is designed to diagram the potentially exposed receptor populations and applicable exposure pathways, based on the physical nature of the site and the potential contaminant source areas. Actual or potential exposures of ecological receptors associated with Site 12 were determined by identifying the most likely pathways of contaminant release and transport. A complete exposure pathway has three components: a source of contaminants that can be released to the environment, a route of contaminant transport through an environmental medium, and an exposure route or contact point for an ecological receptor. A preliminary conceptual model for Site 12 is presented in Figure 7-1. Dermal (direct contact) and inhalation exposure routes are included in the conceptual model since they are theoretically possible, but, as mentioned earlier, they represent minor exposure routes and were not investigated.

7.3 PRELIMINARY ECOLOGICAL EFFECTS EVALUATION

For this ecological risk assessment, exposure-point concentrations of detected analytes in surface water, groundwater, sediment, and surface soil were compared to ecologically based guidelines to determine if the analytes should be selected as COPCs. In addition, toxic doses of contaminants were compared to

modeled doses for representative receptors. The methods used for the selection of ecological screening values are discussed below.

7.3.1 Ecological Screening Values

Maximum concentrations of chemicals detected in Site 12 media were initially compared to Region 4-approved ecological screening values (ESVs). If the maximum concentration was less than the ESV, the chemical was eliminated from further consideration. If the maximum concentration equaled or exceeded the ESV, or if an ESV was not available, the chemical was then considered to be an ecological COPC and was retained for further study in the ecological risk assessment.

The ESVs used for the initial screening of groundwater, surface water, surface soil, and sediment were those established by EPA Region 4 (U.S. EPA, 1999e). Since Site 12 is surrounded by a tidal marsh, the surface water samples were saline (average salinity = 28 ppt, range = 21 to 32 ppt). Therefore, salt water ESVs were used for the surface water screening value comparison. Groundwater samples were also saline (average salinity = 16 ppt, range = 0.6 to 33 ppt) and, thus, chemical concentrations were compared to surface water ESVs for salt water.

Following recent discussions with U.S. EPA Region 4 (ABB, 1997), the ESV for benzo(a)pyrene was used as a surrogate for high molecular weight PAHs when ESVs were not available for those compounds. Likewise, the ESV for naphthalene was used as a surrogate for low molecular weight PAHs, and the ESV for diethylhexyl phthalate (DEHP) was used when ESVs were not available for phthalates. The ESV for the most toxic form of each metal was used, except for chromium in surface soil, for which data on hexavalent chromium were available. Three soil samples at Site 12 were analyzed for hexavalent chromium, and all 16 soil samples at the site were analyzed for total chromium. An ESV of 10 mg/kg (Efroymson et al., 1997a) was used for screening the total chromium data. An ESV of 0.4 mg/kg (Efroymson et al., 1997a) was to have been used for screening the hexavalent chromium data, but hexavalent chromium was not detected in any soil sample. The detection limits for hexavalent chromium in these three samples (2.0 mg/kg) were greater, however, than the ESV for hexavalent chromium (0.4 mg/kg).

7.3.2 Toxicity Reference Values

Contaminant exposure via the food chain was modeled to investigate potential risks to representative receptors. Toxicity reference values (TRVs), which are contaminant doses associated with adverse effects on growth, survival, and reproduction, were obtained for comparison to doses that the receptors could possibly receive in the environment. TRVs were preferentially selected that represent a threshold for sublethal effects, such as impairment of reproduction or growth.

Since toxicity data for the specific receptors chosen herein were usually not available, toxicity data from laboratory species were extrapolated to receptor species. Most of the toxicity data were obtained from Oak Ridge National Laboratory (ORNL) wildlife toxicity data (Sample et al., 1996), but some data were obtained from other sources (Table 7-1). No-observed-adverse-effects-levels (NOAELs) and lowest-observed-adverse-effects-levels (LOAELs) were used in the models. Following U.S. EPA Region 4 guidance, LOAELs were divided by a factor of 10 to obtain NOAELs if NOAELs were not available for a contaminant, and VOCs were not included in food chain modeling, since analytes with log K_{ow} values less than 3.5 (VOCs) generally do not accumulate in animal tissue (Suter, 1993).

7.3.3 Representative Receptors

Species used in the food-chain modeling (Table 7-2) were chosen to represent the groups of receptors most likely to be exposed to the highest contaminant concentrations because of their position in the food web, diet (ingestion rate and food type), home range (contained within the area of contamination), and body size. The socio-cultural nature of the receptor species (e.g., threatened or endangered species) was also considered. The selected species are assumed to be representative of other species within the same trophic group or guild and represent the groups of organisms specified in the assessment endpoints. For each of the representative species, information on life history was collected, including diet, body weight, food ingestion rates, and home range. Maximum food ingestion rates and minimum body were generally used to calculate doses. Information regarding the representative receptors chosen for this ecological risk assessment is presented below.

7.3.3.1 Short-Tailed Shrew (*Blarina carolinensis*)

The short-tailed shrew was selected as a representative insectivorous small mammal. It is found in forested areas, brushy areas, and near marshes. It feeds primarily on insects but will prey on earthworms, snails, centipedes, slugs, and even small vertebrates (Burt and Grossenheider, 1980). The short-tailed shrew has a voracious appetite for its body size and, as a result, may receive high doses of contaminants relative to other small mammals. Its home range is approximately 0.5 to 2.4 acres (Cothran et al., 1991; U.S. EPA, 1993b), allowing it to potentially spend all or much of its time at Site 12.

7.3.3.2 Cotton Mouse (*Peromyscus gossypinus*)

The cotton mouse was chosen as a representative herbivorous small mammal. It is frequently associated with forested areas and moist habitats along the wetland/upland interface (Burt and Grossenheider, 1980). It is common in the Southeast and feeds on grasses, sedges, seeds, fruits, grains, and bark.

Since its home range is usually less than 1 acre (U.S. EPA, 1993b), it could reside permanently within the site.

7.3.3.3 Mink (*Mustela vison*)

The mink was selected as a representative mammalian piscivore. Mink are associated with aquatic habitats of all types, including rivers, lakes, streams, ditches, swamps, and marshes. Mink are opportunistic predators, taking whatever prey is abundant. Terrestrial prey includes birds, reptiles, and insects, while aquatic prey includes fish, crustaceans, and amphibians. Most home ranges in several studies fell within the range of 259 to 1,626 hectares (640 to 4018 acres). Home ranges measured in terms of distances along stream or river shoreline habitats were usually in the range of 1 to 3 km (0.6 to 1.9 miles) of shoreline (U. S. EPA, 1993).

7.3.3.4 Red Fox (*Vulpes vulpes*)

The red fox was chosen as a representative mammalian predator. The red fox is common in South Carolina and the entire eastern United States. It is one of only a few mid-size carnivorous mammals in the region. Its principal food items are small mammals (especially mice and voles) but it also preys on insects and birds. The red fox utilizes many habitat types but prefers deciduous woodlands and edge areas. Home ranges vary from 50 to over 3,000 acres, but most values in the literature are within a range of 140 to 2,100 acres (U.S. EPA, 1993b). Thus, although the red fox is known to exist at MCRD Parris Island, Site 12 would comprise only a small portion of its home range.

7.3.3.5 American Woodcock (*Scolopax minor*)

The American woodcock was selected as a representative vermivorous (earthworm-eating) avian species. It also consumes insects and other soil invertebrates. The species is common in South Carolina and the entire eastern United States. The woodcock prefers moist woodlands and thickets. Its home range varies from approximately 8 to 185 acres (U.S. EPA, 1993b).

7.3.3.6 American Robin (*Turdus migratorius*)

The American robin was chosen as a representative omnivorous bird. Common winter food items include seeds and fruit. Insects and invertebrates, especially earthworms, are eaten more frequently in the spring and summer. The robin is common in South Carolina and the entire eastern United States in a variety of habitats. During the non-breeding seasons, robins in South Carolina are joined by migratory individuals from the northern United States, roaming over large areas and usually forming communal roosts within 1 to 2 miles of foraging areas. The home range during breeding season is approximately 0.5 to 2.0 acres (U.S. EPA, 1993b). Therefore, a robin might forage exclusively at Site 12 only during nesting.

7.3.3.7 Green Heron (*Butorides striatus*)

The green heron was selected to serve as representative piscivorous bird. The species is common in South Carolina and throughout the eastern United States. It forages in both fresh and salt water, especially along forested margins of ponds, lakes, rivers, streams, marshes, and swamps. Small fish are the primary prey, but green herons also consume insects and a variety of aquatic invertebrates. Breeding populations in coastal South Carolina are non-migratory. The green heron is typically a solitary bird, but it nests in colonies with other green herons or with other species.

Home range data for the green heron was not located. Peters (1983) used data from several studies to develop the following formula for the relationship of body size to home range for predatory birds:

$$\text{home range } (km^2) = 8.3\ W^{1.37}$$

where W = body mass (kg)

Using this formula and a body weight of 212 g (Dunning, 1993), the estimated home range for a green heron would be 0.99 km^2 (245 acres).

7.3.3.8 Osprey (*Pandion haliaetus*)

In addition to the green heron, the osprey was selected as a representative avian piscivore. The osprey would generally be expected to prey on larger fish than the green heron. Ospreys are found near freshwater or saltwater, and their diet is almost completely restricted to fish. The distance that ospreys travel from their nests to forage depends on the availability of suitable nest sites near areas with sufficient fish. Most values in the literature for the osprey's foraging radius were within a range of 0.3 to 6 miles (U.S. EPA, 1993b).

7.3.3.9 Red-Tailed Hawk (*Buteo jamaicensis*)

The red-tailed hawk was selected as a representative avian carnivore. This hawk is common in South Carolina and the entire eastern United States, and it forages in a variety of habitats. The red-tailed hawk feeds primarily on small mammals but will also consume small birds, lizards, snakes, and insects (U.S. EPA, 1993b). Breeding populations in South Carolina are non-migratory. The home range size is highly variable, depending on the available habitat. Mean home ranges varied from 150 to over 4,300 acres in several studies summarized by U.S. EPA (1993). The home range shown in Table 7-2 (940 to 2,440 acres) represents the data from habitats most similar to those at MCRD Parris Island (U.S. EPA, 1993b). The habitat at Site 12 would constitute a minor portion of the hawk's foraging area.

7.3.3.10 Mummichog (*Fundulus heteroclitus*)

The mummichog represents a forage fish; i.e., a fish that is a food source of other organisms. The mummichog is one of the most abundant and productive fish species in coastal areas from the Gulf of St. Lawrence to Texas. It inhabits brackish coves, inlets, tidal creeks, and salt marshes. The mummichog feeds primarily on crustaceans, polychaetes, insects, algae, and detritus and is an important food source for many predators. It is one of the most stationary estuarine fish, with a summer home range of approximately 40 yards along tidal creeks; however, some may move as much as 400 yards (Abraham, 1985).

7.3.3.11 Red Drum (*Sciaenops ocellatus*)

The red drum represents upper trophic level fish. This fish is distributed in coastal and estuarine waters from Massachusetts to Mexico. It uses sight and touch to forage primarily on bottom-dwelling animals. Crabs, shrimps, and fish compose the bulk of the diet for adults, and juveniles feed on copepods, amphipods, and small shrimp (Manooch and Raver, 1984; Pattillo et al., 1997). Red drum become sexually mature at 3 years of age. Eggs are spawned in nearshore and inshore waters close to barrier island passes and channels (Pattillo et al., 1997). Red drums are known to occur in the Broad River and probably occur in the Archer's Creek channel south of Site 12.

The body weight of red drum shown in Table 7-2 (1000 grams) and used as representative of red drum in the food-chain modeling calculations is the approximate maximum weight of a fish that an osprey can lift and carry (Henny, 1988).

A sediment ingestion rate could not be located for red drum. However, approximately 15 percent of an adult red drum's diet is composed of detritus (Gerking, 1994). It is assumed that this material is composed entirely of sediment as conservative estimate (Table 7-2).

7.3.3.12 Other Potential Receptors

Potential risks from ingestion of contaminants for organisms such as crustaceans and other aquatic invertebrates cannot be determined using the food-chain model since ingestion toxicity data for these receptors do not exist or are not available. For example, body burdens associated with adverse effects on aquatic invertebrates can be found in the literature, but NOAELs for oral doses are rare. It should be noted that ambient water quality criteria (AWQCs) for most contaminants are based, in part, on sensitive aquatic species. Also, sediment guidelines are based on potential risks to sediment invertebrates. Thus,

the surface water and sediment screening assessment accounts for the exclusion of the aquatic invertebrate species from the food-chain modeling.

The osprey was selected to represent piscivorous birds rather than the bald eagle, since food ingestion on a body weight basis (and thus, the potential dosage) is greater for the osprey than the eagle (U.S. EPA, 1993b). Thus, the use of the osprey as a representative piscivorous bird ensures that risks to the bald eagle are also assessed. The green heron rather than the wood stork was selected to represent piscivorous birds since the food ingestion rate has been better established for the heron than for the wood stork.

7.4 PRELIMINARY EXPOSURE ESTIMATE

7.4.1 Exposure Point Concentrations

Exposure point contaminant concentrations in this ecological risk assessment were obtained from samples collected in 1995, 1998, and 1999. Raw data are presented in Appendix C. The maximum detected concentrations of analytes in surface water (filtered and unfiltered samples), sediment, and surface soil were used as exposure point concentrations and were compared to ecological screening levels. Two sediment samples were collected in 1995 from the south end of Jericho Island. Data from these two samples were assessed separately from the samples collected in 1998 and 1999.

The maximum detected concentrations in filtered and unfiltered groundwater were used as exposure point contaminants in that medium. Although aquatic and semi-aquatic organisms will not be directly exposed to groundwater contaminants, they could be exposed via groundwater discharge to aquatic environments. Comparing groundwater concentrations to Region 4 surface water screening levels is a conservative measure of potential impacts to aquatic media from contaminated groundwater discharge. This measure does not take into account dilution at the discharge point(s), the amount of discharge, location of the point(s) of discharge, direction of groundwater flow, or bioavailability of groundwater contaminants.

U.S. EPA Region 4 considers 0- to 1-foot soil samples to be representative of surface soil. Surface soil samples were collected from this depth.

7.4.2 Contaminant Doses for Representative Receptors

Contaminants with maximum concentrations less than Region -4- approved ESVs were dropped from further consideration, and those with concentrations that equaled or exceeded ecological screening levels were retained as preliminary COPCs. A simple food-chain model was then used to predict dietary exposures of preliminary COPCs for representative receptor species. The predicted exposures were

compared to TRVs in the risk calculation step. Both the maximum and mean concentrations of contaminants were used in the model. Means were calculated using one-half the detection limit for "nondetects" and were used to provide balance to the assessment. The actual dose a receptor receives as the result of indirect or direct exposure is dependent upon the habits of the species and other factors. Mean concentrations were presented in Tables 4-2 (surface soil), 4-6 (surface water), and 4-7 and 4-8 (sediment).

7.4.2.1 Dose Equation

Food-chain modeling utilized the following equation to estimate contaminant intake from the ingestion of food and water and incidental ingestion of soil or sediment:

$$PD = [(C_{soil}\ FI * SA * F) + (C_{water} * W * FI) + (C_{food} * F * FA * FI)]/WR$$

where:

PD	=	predicted dose from the ingestion of food, water, and the incidental ingestion of soil or sediment (mg/kg/day)
C_{soil}	=	concentration in soil or sediment (mg/kg)
FI	=	fractional intake (portion of home range that overlaps affected area; assumed to be 100 percent)
SA	=	portion of diet that equals soil or sediment
F	=	food consumed (kg/day)
C_{water}	=	concentration in water (mg/L)
W	=	water consumed (L/day)
WR	=	weight of receptor (kg)
FA	=	portion of diet consisting of prey or vegetation
C_{food}	=	contaminant concentration (vegetation or prey; mg/kg)

The contaminant concentration in food (C_{food} in the equation shown above) was calculated using bioaccumulation factors (BAFs), bioconcentration factors (BCFs), and biota sediment accumulation factors (BSAFs) from published sources (see Appendix F). Values of 1.0 were assumed where BAFs, BCFs, and BSAFs were not available.

Surface soil data were used in the food-chain modeling to calculate doses to the shrew, mouse, robin, woodcock, fox, and hawk as follows. Chemical concentrations in terrestrial invertebrates (food items of the shrew, robin, and woodcock) were estimated by multiplying each chemical's surface soil concentration by its associated soil-to-invertebrate BAF. Food of the robin was assumed to consist of 60 percent vegetation and 35 percent invertebrates (Table 7-2). Chemical concentrations in vegetation (food items of the mouse) were estimated by multiplying each chemical's surface soil concentration by its

associated soil-to-plant BAF. The resulting estimated concentrations in invertebrates and plants were multiplied by the associated food-to-mammal BAF to derive estimated concentrations in the shrew and mouse, respectively. The estimated mammal concentrations were then used to derive an estimated dose to the hawk and fox. Initial calculations of doses used maximum detected soil concentrations and conservatively assumed that the hawk and fox preyed exclusively on shrews (since most contaminant concentrations in shrews were greater than contaminant concentrations in mice). Subsequently, average soil concentrations were also used to calculate doses to the hawk and fox. In this scenario, prey items of the hawk and fox were assumed to consist of equal amounts of shrews and mice. Tables were generated that present the HQ values for each of these scenarios. Incidental ingestion of surface soil was also included in the dose equations for the shrew, mouse, robin, woodcock, and fox. Incidental ingestion of surface soil is negligible for birds of prey (Sample and Suter, 1994) and, therefore, was not included in the dose equations for the hawk and osprey.

Sediment data were used to calculate doses to the mink, heron, osprey, mummichog, and red drum. Since BSAFs do no exist for inorganic compounds in salt water environments, concentrations of inorganic compounds (i.e., metals) in food items of the mink, heron, osprey, mummichog, and red drum were assumed to be equal to sediment concentrations. This is a conservative assumption since accumulation transfer through the food chain does not occur for most metals. Mercury, however, is known to biomagnify in aquatic systems. Therefore, mercury was also assessed using the methodology discussed in Section 7.4.3.1.

The following equation (U.S. EPA, 1997c) was used to estimate tissue concentrations [i.e., the theoretical bioaccumulation potential (TBP)] of organic compounds in food items of the mink, heron, osprey, and red drum:

$$TBP = BSAF(C_s/f_{oc})f_l$$

where

	TBP	=	theoretical bioaccumulation potential (mg/kg)
	C_s	=	chemical concentration in sediment (mg/kg)
	BSAF	=	biota-sediment accumulation factor (ratio of the concentration of a chemical in tissue, normalized to lipid, to the concentration of the chemical in surface sediment, normalized to organic carbon)
	f_{oc}	=	total organic carbon (TOC) content of sediment expressed as a decimal fraction
	f_l	=	organism lipid content expressed as a decimal fraction

The average TOC in sediment samples at Site 12 was 1.61 percent and ranged from 0.67 to 4.7 percent. Thus, the f_{oc} used in the TBP calculations was 0.0161. Lipid content values were assumed to be 3.5 percent for the mummichog (Iannuzzi, et al., 1996) and 1.1 percent for the red drum (Sullivan and Otwell, 1992). Prey items of the mink, heron, and red drum were assumed to consist exclusively of mummichogs, and the osprey was assumed to forage exclusively on red drum.

Incidental ingestion of sediment was also included in the dose equations for the mink and red drum but was assumed to be negligible for the heron and osprey (Sample and Suter, 1994). Incidental ingestion of surface water was included in the dose equations for the mink and heron.

Because BSAFs have not been generated for inorganic chemicals, a subsequent food-chain modeling iteration was also conducted using surface water data. In this iteration, concentrations in prey items of the mink, heron, red drum, and osprey were calculated by multiplying fish BCFs by filtered surface water concentrations.

The TBP formula described above was not used to calculate doses to the mummichog. Food items of the mummichog consist of a variety of crustaceans, polychaetes, insects, algae, and detritus (Abraham, 1985), and BSAFs have not been generated for most of these organisms. Instead, chemical concentrations in food items of the mummichog were conservatively assumed to be equal to measured sediment concentrations.

Most input parameters shown in Table 7-2 for representative receptors were obtained from the Wildlife Exposure Factors Handbook: Volumes I and II (U.S. EPA, 1993b). The values used for the input parameters were generally the most conservative (e.g., upper-bound food ingestion rate) presented in the U.S. EPA publication. Body weights were preferentially those from geographic areas nearest South Carolina. Wet weight food ingestion rates were calculated as follows:

- Shrew: 0.62 grams food/gram body weight/day (g/g bw/day) (U.S. EPA, 1993b).

- Cotton mouse: 8.6 g/day calculated using rodent equation for food ingestion (g/day): $0.621 \times bw^{0.564}$ (U.S. EPA, 1993b); converted to wet weight assuming 50 percent water content in food items (vegetation).

- Mink: 0.22 g/gbw/day (U.S. EPA, 1993b).

- Red fox: 0.14 g/g bw/day (U.S. EPA, 1993b).

- Woodcock: 0.77 g/g bw/day (U.S. EPA, 1993b).
- Robin: 0.89 g/g bw/day (U.S. EPA, 1993b).
- Green heron: 40 g/day; calculated using equation for food ingestion rate for herons: log ingestion rate (g/day) = 0.966 (log bw) – 0.64 (Kushlan, 1978).
- Osprey: 0.21 g/g bw/day (U.S. EPA, 1993b).
- Hawk: 0.11 g/g bw/day (U.S. EPA, 1993b).
- Mummichog: 0.06g/g bw/day (Abraham, 1985).
- Red drum: 0.02 g/g bw/day (Evans and Engel, 1994).

7.4.2.2 Ingestion of Surface Water

Since water in the marsh and tidal channel near the Site 12 landfill is presumably saline, surface water was not considered to be a source of drinking water. However, some organisms that prey on aquatic species could incidentally ingest surface water while consuming food items. For example, a wading bird or mink would probably ingest a small amount of surface water when ingesting aquatic prey. Therefore, the incidental ingestion of unfiltered surface water was investigated for the green heron and mink at Site 12. The incidental ingestion of surface water was assumed to be negligible for the other representative receptors listed in Table 7-2, due to their feeding habits. The osprey, for example, usually consumes prey items after carrying them to a perch (e.g., tree or nest) and would not incidentally ingest surface water with the prey item.

A literature review was conducted for data on the amount of surface water incidentally ingested while consuming aquatic prey items. No helpful information was found. Instead, a value was experimentally derived as follows. A euthanized shrimp (11.6 g wet weight) and minnow (0.3 g wet weight), each held by forceps, were submersed in water and then allowed to drip onto a tared, electronic balance. After 60 trials, the average mass of water that dripped from the shrimp was 0.46 g, which equates to 0.0397 gram water per gram shrimp (0.46/11.6). After 190 trials, the average mass of water that dripped from the minnow was 0.0484 g, which equates to 0.161 gram water per gram minnow (0.0484/0.3). Based on these results, an organism consuming shrimp immediately removed from the water would incidentally ingest an amount of surface water equal to 3.97 percent of the shrimp's body weight. Similarly, consumption of minnows would result in the ingestion of surface water at a ratio of 16.1 percent of the

minnow's body weight. The greater of these two values was chosen and conservatively rounded to 20 percent. Thus, daily water consumption in the dose equation for the mink and green heron was assumed to be 20 percent of the respective food consumption.

7.4.3 Predicted Contaminant Concentrations in Representative Fish Tissue

Toxicity reference values based on oral doses in fish have been established for very few contaminants. Therefore, an assessment of potential toxicity to fish using the methods described in Section 7.4.2 was not possible for some contaminants (e.g., organochlorine pesticides). In order to reduce the uncertainty resulting from the paucity of dose-based toxicity data for fish, a residue-based approach was used for contaminants that are known to biomagnify in the food web. Specifically, this approach was used to assess the potential risks to fish from organochlorine pesticides and mercury and is described below.

7.4.3.1 Mercury in Red Drum

An approach based on a model developed by NOAA (Evans and Engel, 1994) was used in which sediment concentrations of mercury are used to predict the mercury tissue concentration in upper trophic-level fish, represented by the red drum. The model assumes that mercury uptake into the red drum occurs exclusively through prey ingestion. The three prey sources are small fish, crustaceans, and infaunal invertebrates. Mercury tissue concentrations in these prey items were estimated as follows.

Small Fish

There are few data available for predicting mercury concentrations in small fish based on mercury concentrations in sediment. In general, there is agreement that the larger species of marine fish with longer life spans usually have the highest concentrations of mercury. Mercury concentrations also increase in fish with increasing body weight. Methyl mercury is the predominant form of mercury that is accumulated.

In a study performed by Walter et al. (1973), wet weight mercury concentrations in carp (*Cyprinus carpio*) and yellow perch (*Perca flavescens*) were compared to dry weight sediment mercury concentrations. Although carp and yellow perch are freshwater fish, they are considered representative of prey species for the red drum in an estuarine environment. Based on the mercury concentrations in sediment, carp tissue, and perch tissue from this study, a BSAF of 1.2 was derived to represent the transfer of mercury from sediment to small fish tissue, as described by the following equation:

$$Cf = (1.2)\ C_s$$

where: Cf = methyl mercury in small fish (mg/kg)

C_s = total mercury sediment concentration (mg/kg)

It is assumed that 100 percent of mercury present in small fish tissue is methyl mercury. Studies have shown that mercury predominantly occurs in the methyl form in fish muscle, which is also the tissue where most of the mercury body burden is maintained (Windom and Kendall, 1979). In a study performed on four freshwater fish species (Grieb et al., 1990), methyl mercury accounted for 99 percent of the total mercury in fish muscle. Other studies have shown that mercury is converted to its methylated form in fish tissue or by sediment microbes, reducing the significance of the methyl mercury/total mercury ratio during initial deposition or before ingestion.

Crustaceans and Infaunal Invertebrates

Based on reviews of multiple literature sources by Evans and Engel (1994), a BSAF of 2.0 was derived for mercury accumulation by all benthic organisms. This value was divided by 5 to convert to wet weight concentration in tissue. It was assumed that 70 percent of mercury in crustacean tissue is methyl mercury and 25 percent of mercury in infaunal invertebrate tissue is methyl mercury (Evans and Engel, 1994). Concentrations of methyl mercury in crustaceans and infaunal invertebrates were estimated as follows:

$$(C_{cr}) = \frac{(C_s * 2)}{5} * 0.70$$

$$\text{and } C_{inv} = \frac{(C_s * 2)}{5} * 0.25$$

where: C_{cr} = concentration of methyl mercury in crustaceans
C_{inv} = concentration of methyl mercury in infaunal invertebrates
C_s = total mercury sediment concentration (mg/kg)

The methyl mercury concentrations from the three prey species were then incorporated into the equation developed by Evans and Engel (1994) to predict wet weight methyl mercury concentrations in the red drum. Red drum are assumed to accumulate mercury from two major sources, prey and surface water. However, surface water is considered to be a minimal exposure route. The diet of the red drum is assumed to consist of crustaceans (60 percent), small fish (30 percent), and other infaunal invertebrates (10 percent). Based on the assumption that input and excretion of methyl mercury are in balance at steady state, the total methyl mercury concentration in red drum tissue can be calculated using the following formula:

$$\text{methyl mercury concentration in red drum} = (a * R)/(g+K) * [(Cf)(\%Cf) + (C_{cr})(\%C_{cr}) + (C_{inv})(\%C_{inv})]$$

where:

a	=	assimilation efficiency of mercury from food, or 0.8
R	=	feeding rate of the red drum, or 0.02/day
g	=	growth rate coefficient, or 0.003/day
K	=	methyl mercury excretion rate from the red drum, or 0.00035/day
Cf	=	methyl mercury tissue concentration in small fish
%Cf	=	percent of red drum diet composed of small fish/100, or 0.3
C_{cr}	=	methyl mercury tissue concentration in crustaceans
$\%C_{cr}$	=	percent of red drum diet composed of crustaceans/100, or 0.6
C_{inv}	=	methyl mercury tissue concentrations in infaunal benthic invertebrates
$\% C_{inv}$	=	percent of red drum diet composed of benthic invertebrates/100, or 0.1

The predicted concentrations of mercury in red drum tissue based on the maximum and average sediment concentrations of mercury were then compared to tissue concentrations considered to be protective of fish and to piscivorous receptors.

7.4.3.2 Pesticides in Fish Tissue

Concentrations of organochlorine pesticides in fish tissue were estimated by using the TBP equation for organic compounds developed by U.S. EPA (1997c). This is the same method that was used to estimate contaminant doses (i.e., tissue concentrations in prey items) for representative piscivorous receptors and was described in Section 7.4.2.1. Factors used in the equation (BSAFs, sediment TOC content, and percent lipid) were identical to those previously described in that section. The predicted concentration of pesticides in mummichog and red drum tissues based on the maximum and average sediment concentrations of these COPCs was then compared to tissue concentrations considered to be protective of fish and to piscivorous receptors.

7.5 PRELIMINARY RISK CALCULATION

The preliminary risk calculation step in the ecological risk assessment process compared contaminant doses for representative receptors to doses associated with toxic effects (U.S. EPA, 1997b). Prior to this step, the maximum concentrations of contaminants in each medium were compared to Region 4 ESVs. The ratio of the exposure point contaminant concentration to the ESV or the modeled dose to the TRV is called the HQ, defined as follows:

$$HQ_i = EPC_i/ESV_i \text{ or } ID_i/TRV$$

where: HQ_i = hazard quotient for analyte "i" (unitless)
EPC_i = exposure point concentration for analyte "i" (µg/L or µg/kg or mg/kg)
ESV_i = ecological screening value for analyte "i" (µg/L or µg/kg or mg/kg)
ID_i = intake dose for analyte "i" (mg/kg/day)
TRV_i = toxicity reference value for analyte "i" (mg/kg/day)

When the ratio of the exposure point concentration or intake dose to its respective guideline equaled or exceeded 1.0, adverse impacts were considered possible, and the contaminant was retained as a COPC. The HQ value should not be construed as being probabilistic; rather, it is a numerical indicator of the extent to which an exposure point concentration or intake dose exceeds or is less than a guideline. When an HQ value equals or exceeds 1.0, it is an indication that ecological receptors are potentially at risk; additional evaluation of data may be necessary to confirm with greater certainty whether ecological receptors are actually at risk, especially since most guidelines are conservatively derived.

The use of HQs is probably the most common method used for risk characterization in ecological risk assessments. Advantages of this method include the following (Barnthouse et al., 1986):

- The HQ method is relatively easy to use, is generally accepted, and can be applied to any data.
- The method is useful when a large number of contaminants must be screened.

This method of risk characterization has some inherent limitations. One primary limitation is that it is a "no/maybe" method for relating toxicity to exposure. That is, it uses single values for exposure concentrations and guidelines. The HQ method does not account for the variability in both of these parameters.

The results of the comparison of maximum contaminant concentrations in each medium to Region 4 screening levels are presented in screening tables. The screening tables include the frequency of detection for each analyte, the maximum exposure point concentration, and the contaminant-specific Region 4 screening level. Tables were also generated that present the HQ values for each representative receptor used in the food-chain modeling using maximum and average contaminant concentrations.

In summary, the COPC selection process was as follows:

1. The maximum concentrations of detected chemicals in Site 12 surface water, groundwater, sediment, and surface soil were compared to Region 4 screening levels (ESVs), with the exception of the essential nutrients mentioned earlier. If the maximum concentration was less than the Region 4 ESV, the chemical was dropped from further consideration; if it equaled or exceeded the Region 4 ESV, the chemical was selected as a COPC. If a Region 4 ESV was not available, the chemical was selected as a COPC.

2. All COPCs identified in surface water, sediment, and surface soil were used in the food-chain modeling.

3. Groundwater data were not used in the food-chain modeling. Aquatic and semi-aquatic organisms will not be directly exposed to groundwater contaminants. It is assumed that potential groundwater discharge to aquatic environments is taken into account through the evaluation of surface water and sediment COPCs.

7.6 STEP 3A: REFINEMENT OF CONTAMINANTS OF POTENTIAL CONCERN

The methodology presented up to this point describes a "screening-level" assessment, or "Tier 1" assessment, since the assessment is based primarily on a comparison of maximum contaminant concentrations to conservative ecological screening levels. The use of conservative guidelines and maximum detected concentrations in the screening-level assessment is necessary to ensure that potential risks are not underestimated. However, if the hazard quotients derived from comparisons of maximum concentrations to conservative screening levels are used as the single factor for including a COPC in a baseline ecological risk assessment without consideration of other relevant information, additional ecological studies such as toxicity testing or tissue analyses could be undertaken for COPCs that do not actually pose significant risks. For this reason, and since maximum concentrations of several analytes exceed conservative ecological screening levels (see Section 7.7), Step 3a of the risk assessment process was incorporated into this ecological risk assessment (U.S. EPA, 1997b; DoN, 1999).

Step 3a (Refinement of COPCs) involves the consideration of factors such as background data (mainly for inorganics), toxicological evaluation of COPCs, frequency of detection, and comparisons of COPCs to alternate guidelines (U.S. EPA, 1997b; DoN, 1999). Some factors that are outside the boundaries of the simple concentration ESV comparisons have already been presented, such as average contaminant concentrations and LOAELs in the food-chain modeling. The frequency of detection and spatial analysis of elevated contaminant concentrations were also evaluated in Step 3a to determine whether potential

risks are widespread or limited to a small area. In addition, the magnitude of the HQs was also considered. As described earlier, the relationship between the magnitude of an HQ and toxicity is not necessarily linear. However, the magnitude of an HQ can be used as a rough approximation of the extent of potential risks, especially if there is sufficient confidence in the guideline used. Background samples have been collected and analyzed as part of current RFI/RI activities at MCRD Parris Island. As a result, soil, sediment, and surface water background data are available for use in assessing the extent to which chemical concentrations at Site 1 are due to site-related activities. Background data are provided in Table 4-1.

The use of less conservative guidelines provides balance to the conservative screening-level assessment. For example, most Region 4 sediment ecological screening values are based on threshold effects level (TEL) values established by the Florida Department of Environmental Protection (FDEP, 1994), and some Region 4 sediment ecological screening values are based on Effects Range-Low (ER-L) values obtained from Long et al. (1995). However, the TEL is defined as the concentration below which "sediment-associated contaminants are not considered to represent significant hazards" while values between the TEL and the probable effects level (PEL) represent a range in which "adverse biological effects are possible" (FDEP, 1994). Similarly, an ER-L is defined as the concentration below which adverse ecological "effects would rarely be observed," and the Effects Range-Medium (ER-M) is the point below which adverse effects "would occasionally occur" (Long et al., 1995). Therefore, ascribing risk to a sediment contaminant detected at a concentration that exceeds the TEL but is below the PEL, or exceeds the ER-L but is below the ER-M, can be misleading. For this reason, when contaminant concentrations exceed Region 4 ecological screening values, or no Region 4 ecological screening value was available, less conservative guidelines are presented.

Alternative sediment guidelines include ER-M and PEL values, established by the FDEP, guidelines from various U.S. EPA publications, values established by the Ontario Ministry of Environment, and other sources. The PELs are loosely analogous to ER-Ms, which are also presented. The data set used by Long et al. (1995) to develop ER-Ls and ER-Ms was also used by FDEP to develop the PEL values (FDEP, 1994). However, unlike the ER-Ls and ER-Ms, the TELs and PELs also incorporate chemical concentrations observed or predicted to be associated with no adverse biological effects (no effects data). The PEL is the geometric mean of the 50th percentile in the effects data set and 85th percentile in the no effects data set. The PEL represents the lower limit of the range of contaminant concentrations that are usually or always associated with adverse biological effects (FDEP, 1994).

Alternative surface soil guidelines include values from ORNL indicative of toxicity to soil invertebrates and terrestrial plants (Efroymson et al., 1997a, 1997b), Dutch "A" and "B" values (Beyer, 1990), and newer Dutch values (MHSP&E, 1994). The Dutch "A" values represent background values, and the "B" values indicate "moderate soil contamination that requires further study" (Beyer, 1990). Newer Dutch values

(MHSP&E, 1994) include target values and intervention values. Target values represent the "soil quality required for the full restoration of the soil's functionality for human, animal and plant life," or "soil quality ultimately aimed for." The intervention values replace the 1990 C values and represent "the concentration levels of the contaminants in the soil above which the functionality of the soil for human, plant, and animal life is seriously impaired or threatened."

A "weight-of-evidence" approach (U.S. EPA, 1997b) was used to determine the extent of potential risks when HQ values exceeded 1.0, although analytes were automatically selected as COPCs if their maximum concentration HQ exceeded 1.0 after initial screening. Conclusions regarding the potential risks associated with Site 12, as well as recommendations for additional ecological study or remedial considerations, are presented in Section 8.0.

Note: Subsequent to their review of the first draft of this ecological risk assessment, the MCRD Parris Island Partnering Team determined that the refinement of COPCs would be assisted by the development of tables that summarize the refinement process. Accordingly, tables were created and are provided in Appendix F-5. The far right column in the tables indicate whether or not the COPC in question was retained for further evaluation as a COPC in the ecological risk assessment, and the reason for the decision.

7.7 SCREENING RESULTS

The results of the "screening-level" comparisons are presented below and are discussed in Section 7.8.

7.7.1 Surface Water

Three VOCs, one SVOC, and six metals were COPCs in surface water (Table 7-3). Acetone, 2-butanone, and carbon disulfide (VOCs), bis(2-ethylhexyl) phthalate (SVOC), and aluminum, barium, iron, manganese, and vanadium (metals) were COPCs since a Region 4 screening value was not available. Thallium was the only metal to exceed its screening value (HQ = 1.4).

7.7.2 Sediment

Seven VOCs, five SVOCs, four pesticides, and 18 metals were COPCs in sediment samples collected in 1998 and 1999 (Table 7-4). Region 4 screening values were not available for any of the seven VOCs detected in sediment. SVOCs detected in sediment that had HQs greater than 1.0 included acenaphthene, benzo(b)fluoranthene, and bis(2-ethylhexyl) phthalate. Indeno(1,2,3-cd)pyrene and pentachlorophenol did not have Region 4 screening values. The highest SVOC HQ was 17.9 (acenaphthene). Pesticides that were sediment COPCs consisted of alpha-chlordane, gamma-chlordane,

methoxychlor, and 4,4'-DDT, all of which were detected only in sample SD-14-02. The pesticide with the highest HQ was 4,4'-DDT (HQ = 55). Region 4 screening values were not available for 10 metals, and nine metals were COPCs because their maximum concentrations equaled or exceeded screening values. The highest metal HQ was for nickel (HQ = 66.7).

Two SVOCs, six PCBs/pesticides, and 16 metals were COPCs in sediment during initial sampling in 1995 (Table 7-5). Di-n-octyl phthalate and bis(2-ethylhexyl) phthalate (SVOCs) exceeded their screening value (182 µg/kg). HQ values were especially high for all pesticides except alpha-BHC, which did not have a Region 4 screening value. The highest pesticide HQ value was 60,000 (endrin). HQ values were also elevated for Aroclor 1254 (HQ = 1111) and dieldrin (HQ = 310). All metals detected in the 1995 samples were COPCs. Region 4 screening values were not available for seven metals, and HQ values for the remaining metals were relatively low (HQs = 1.6 to 12), except for lead (HQ = 97) and copper (HQ = 26.15).

7.7.3 Surface Soil

Six VOCs, five SVOCs, one pesticide, and 12 metals were COPCs in surface soil at Site 12 (Table 7-6). Region 4 screening values were not available for five VOCs and one SVOC. The only VOC that exceeded its Region 4 screening value was chloroform (HQ = 7.5). Fourteen SVOCs (pentachlorophenol, 12 PAHs, and Total PAHs) had maximum concentrations that exceeded Region 4 screening values. The highest SVOC HQ value was for pentachlorophenol (HQ = 120). The pesticide 4,4'-DDE had an HQ of 17.2. The metals with the highest HQ values were iron (HQ = 498) and aluminum (HQ = 107).

7.7.4 Groundwater

Three VOCs, one SVOC, and eight metals were COPCs in groundwater (Table 7-7). Region 4 screening values were not available for the VOCs, SVOCs, and six metals. Two metals had HQs greater than 1.0, nickel (HQ = 1.27) and copper (HQ = 2.79).

7.7.5 Food Chain Modeling

4,4'-DDE, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, mercury, vanadium, and zinc had at least one HQ greater than 1.0 for the terrestrial food-chain modeling using maximum or mean concentrations of surface soil COPCs (Tables 7-8 and 7-9).

4,4'-DDT, aluminum, antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, mercury, nickel, selenium, thallium, vanadium, and zinc had at least one HQ greater than 1.0 for the aquatic food-chain modeling using samples collected in 1998 and 1999 (Tables 7-10 and 7-11).

Bis(2-ethylhexyl) phthalate, 4,4'-DDE, 4,4'-DDT, Aroclor 1254, endrin, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, vanadium, and zinc had at least one HQ greater than 1.0 for the aquatic food-chain modeling using maximum and mean concentrations of 1995 sediment COPCs (Tables 7-12 and 7-13).

Only four metals were detected in filtered surface water samples. Results of the food-chain modeling using maximum and mean concentrations of filtered surface water indicated that thallium and vanadium had HQs greater than 1.0 (Tables 7-14 and 7-15).

7.7.6 Predicted Contaminant Concentrations in Representative Fish Tissue

The predicted concentration of mercury in red drum tissue based on the maximum and average sediment concentrations of mercury and the predicted concentrations of pesticide COPCs in mummichog and red drum tissues based on the maximum and average sediment concentrations of these COPCs are shown in Table 7-16. Guidelines based on fish tissue concentrations of mercury and pesticides are shown in Tables 7-17 and 7-18, respectively.

The values shown in Tables 7-17 and 7-18 were taken primarily from two sources: the Environmental Residue Effects Database, a website maintained by the U.S. Army Corps of Engineers, Waterways Experiment Station (ERED, 1998), and the recently published "Linkage Of Effects to Tissue Residues: Development of a Comprehensive Database for Aquatic Organisms Exposed to Inorganic and Organic Chemicals" (Jarvinen and Ankley, 1999). Both of these sources are comprehensive collections of hundreds of previous studies, and full citations for the original studies are contained therein.

7.8 SCREENING AND STEP 3A DISCUSSION

The results of the screening-level assessment and Step 3a considerations are discussed below on a COPC-specific basis.

7.8.1 Volatile Organic Compounds

2-Butanone

2-Butanone was detected in two of 16 sediment samples collected during 1998 and 1999 and in two of two unfiltered surface water samples. ESVs were not available for either medium. Concentrations ranged from 5 to 20 µg/kg in sediment and from 2.1 to 2.6 µg/L in surface water. 2-Butanone was not detected in groundwater or surface soil.

2-Hexanone

2-Hexanone was detected in one of 16 1998 and 1999 sediment samples and in one of 16 surface soil samples. It was a COPC since an ESV was not available in either medium. Concentrations of 2-hexanone were 4.4 µg/kg in sediment and 8.5 µg/L in surface soil. 2-Hexanone was not detected in groundwater or surface water.

4-Methyl-2-pentanone

4-Methyl-2-pentanone was detected in six of 16 sediment samples collected in 1998 and 1999 at levels ranging from 4 to 53.7 µg/kg. 4-Methyl-2-pentanone was detected in six surface soil samples, at levels ranging from 3.8 to 26 µg/kg. A Region 4 screening value was not available in either medium.

Acetone

Acetone was a COPC in surface water, sediment, groundwater, and surface soil since an ESV was not available for any medium. It was detected in eight of 16 sediment samples collected in 1998 and 1999; the maximum detection was 390 µg/kg. Acetone was detected in four of 15 surface soil samples, with a maximum concentration of 350 µg/kg. It was detected in one of three surface water samples, where its maximum concentration was only 13 µg/L. Concentrations ranged from 9.3 to 650 µg/L in groundwater.

Toxicity data for aquatic species could not be located, but toxicity to laboratory rats from acetone appears to be in the parts-per-thousand range. For example, rats provided with drinking water containing 5,000 ppm acetone for 8 weeks followed by 10,000 ppm for an additional 4 weeks did not exhibit any histopathological changes in central, peripheral, or distal axons (Spencer et al., 1978). Rats exposed to 25,000 ppm acetone in drinking water for 18 weeks exhibited no adverse effects except for weight loss (U.S. EPA, 1984a). Rats provided with drinking water containing acetone at a concentration equivalent to a dose of 1,071 mg/kg/day for 6 weeks exhibited no adverse effects (Larsen et al., 1991). Drinking water containing 50,000 ppm acetone (equivalent to 3.1 g acetone/kg/day) was associated with mild adverse spermatogenic effects in rats after 13 weeks exposure (Dietz et al., 1991). Because acetone is a

common laboratory contaminant, and since it was detected at relatively low concentrations in groundwater, surface water, soil and sediment, it should be dropped from further consideration at Site 12.

Carbon disulfide

Carbon disulfide was detected in 13 sediment samples (1998 and 1999), one surface soil, five surface water samples, and seven groundwater samples and was a COPC since an ESV was not available in any medium. Concentrations ranged from 1.9 to 31 µg/kg in sediment, from 0.2 to 1 µg/L in surface water, and from 0.2 to 24 µg/L in groundwater. Carbon disulfide was detected at a concentration of 6 µg/kg in surface soil. The absence of any screening values for carbon disulfide precludes an assessment of its potential toxicity to ecological receptors. However, these concentrations do not appear to be excessively high. Furthermore, because carbon disulfide occurs naturally in sediment, its presence in some sediment and shallow groundwater samples at these concentrations might not be due to site-related contamination. For these reasons, carbon disulfide should be dropped from further consideration at Site 12.

Chloroform

Chloroform was detected in two surface soil and four groundwater samples. It was a COPC only in surface soil, with a maximum concentration of 7.5 µg/kg, which exceeded its screening value of 1.0. The maximum concentration of chloroform in groundwater was 4.5 µg/L, which was less than the ESV. Chloroform was not detected in any other medium.

Chloromethane

Chloromethane was detected in two of 16 surface soil samples and four of 14 groundwater samples. Groundwater concentrations ranged from 0.2 to 0.3 µg/L, which were much less than the ESV (2,700 µg/L). The maximum concentration in surface soil was 17 µg/kg. Chloromethane was a COPC in surface soil since an ESV was not available. Because of its relatively low concentrations in groundwater and its absence as a COPC in other media, chloromethane should be dropped from further consideration at Site 12.

Toluene

Toluene was detected in eight 1998 and 1999 sediment samples and was a COPC since an ESV was not available. It was not a COPC in groundwater or surface soil and was not detected in any other medium. Sediment concentrations ranged from 2.5 to 23 µg/kg, which were much less than the lowest available guideline (1,078 µg/kg), a U.S. EPA sediment quality benchmark (Table 7-19). Because of its relatively low concentrations in sediments and its absence as a COPC in other media, toluene should be dropped from further consideration at Site 12.

Trichloroethene

Trichloroethene was detected in one of 14 groundwater samples collected (0.4 µg/L). It was a COPC because an ESV was not available.

Xylenes

Xylenes were detected in 1998 and 1999 sediment samples and were a COPC since an ESV was not available. Xylenes were not detected in any other medium. Sediment concentrations ranged from 1.8 to 2.3 µg/kg.

Conclusions – Volatile Organic Compounds

Toxicity data for volatile organic compounds are sparse, precluding a complete assessment of the risks posed by these compounds. However, because concentrations do not appear to be excessively high, and since they were generally infrequently detected, these compounds should be dropped from further consideration at Site 12.

7.8.2 Semivolatile Organic Compounds

2-Methylnaphthalene

2-Methylnaphthalene was detected in one of 16 surface soil samples, at a concentration of 385 µg/kg. The analyte was not detected in sediment, groundwater or, surface water. All terrestrial food-chain HQs were less than 1.0.

Benzoic Acid

Benzoic acid was detected in one of 12 groundwater samples. It was a COPC since an ESV was not available. Its maximum concentration was 1 µg/L. Benzoic acid was not detected in other media.

Pentachlorophenol

Pentachlorophenol was detected in one of 18 sediment samples collected during 1998 and 1999 and one of 16 surface soil samples but was not detected in surface water or groundwater. All terrestrial and aquatic food-chain HQs were less than 1.0. Pentachlorophenol is not found naturally in the environment but is a manufactured chemical used as a wood preservative for power line poles, railroad ties, cross

arms, and fence posts. At one time, it was a biocide and one of the most heavily used pesticides in the United States (ATSDR, 1997).

Phthalates

Bis(2-ethylhexyl) phthalate was detected in eight of 18 sediment samples collected in 1998 and 1999, one of two sediment samples collected in 1995, nine of 16 surface soil samples, and 2 of 13 surface water samples, but it was not detected in groundwater. Its maximum concentration was 10,000 µg/kg in sediment collected 1995, well exceeding its ESV of 182 µg/kg. The maximum concentration in 1998 and 1999 sediment samples was 440 µg/kg. The maximum concentration in surface soil was 480 µg/kg in sample SS-07-01; the other eight detects in soil ranged from 30 to 92 µg/kg. Food-chain HQs for the heron and osprey exceeded 1.0 using the 1995 maximum concentration of bis(2-ethylhexyl)phthalate but were less than 1.0 using the mean concentration (Tables 7-12 and 7-13).

Di-n-octyl phthalate was a COPC in sediment samples collected in 1995 but was not a COPC in any media collected in 1998 and 1999.

In summary, phthalates were detected in sediment, soil, surface water, and groundwater. Bis(2-ethylhexyl)phthalate exceeded its ESV in only one sediment sample collected in 1995. In view of the conservative assumptions in the food-chain modeling, the HQs for representative aquatic receptors were low (maximum HQ = 3.73; heron). Phthalates are common environmental contaminants due to their use in plastics. Phthalates can also be an artifact of the sampling and/or analytical methods. For these reasons, and since concentrations were elevated in only one sample, phthalates should be dropped from further consideration at Site 12.

PAH Compounds

Three PAHs were COPCs in 1998 and 1999 sediments. Acenaphthene and benzo(b)fluoranthene had sediment HQ values of 17.9 and 1.35, respectively. Indeno(1,2,3-cd)pyrene was a COPC since an ESV was not available. Twelve individual PAHs and total PAHs were COPCs in surface soil, with HQs ranging from 1.10 to 14.4. No PAHs were detected in surface water or groundwater. Naphthalene had the greatest soil HQ (14.4). Total PAH concentrations in 1998 and 1999 sediment samples were less than the EPA Region IV ESV, but detection limits were somewhat elevated in some samples, as were detection limits in the two sediment samples collection in 1995. Food-chain HQs for all representative terrestrial and aquatic receptors were less than 1.0 using the maximum concentrations of each PAH compound.

The lack of detection of PAHs in groundwater and surface water suggests negligible risks to ecological receptors. The HQ for total PAHs in soil was 3.0, indicating potential risk to terrestrial receptors such as soil invertebrates. The food chain modeling indicates negligible potential risks to upper level receptors. Since potential risk to invertebrates from PAHs in soil and sediment cannot be ruled out, total PAHs are retained as a COC in surface soil and sediment.

Conclusions – Semivolatile Organic Compounds

Potential ecological risks from 2-methylnaphthalene, benzoic acid, pentachlorophenol and phthalates are negligible and these compounds should be dropped from further consideration at Site 12. Total PAHs are retained as a COC in surface soil and sedment

7.8.3 Pesticides and PCBs

Aroclor 1254

Aroclor 1254 was detected in one of two 1995 sediment samples at Site 12 and was not detected in groundwater, surface water, sediment, surface soil, or sediment samples collected in 1998 and 1999. Food-chain HQs for the mink, heron, and osprey exceeded 1.0 using the maximum and mean concentrations of Aroclor 1254 (Tables 7-12 and 7-13). The detected concentration in sediment (24,000 µg/kg) was greatly elevated relative to the Region 4 ESV of 21.6 µg/kg. There are no alternate sediment screening values. No other PCBs were detected in any medium at the site. Because of the elevated concentration in one 1995 sample, Aroclor 1254 is retained as a sediment COC in the vicinity of sample PI-12-01(35).

DDT and Metabolites

4,4'-DDT and its metabolite 4,4'-DDE (hereafter referred to as DDT and DDE, or collectively as DDTR), were COPCs in sediment and surface soil, and neither of these two compounds were detected in groundwater or surface water. DDE was detected in only one of 18 soil samples (HQ = 17.20). Maximum HQ values in sediment collected in 1995 were 251 for DDE and 31.9 for DDT. DDT was detected in one of eight sediment samples collected in 1998 and 1999, with an HQ of 55.5. Food-chain HQs for the heron and osprey were especially elevated for DDE using the maximum 1995 concentration (Table 7-12). The heron and osprey have large home ranges, but the HQs were calculated by assuming that these representative receptors foraged exclusively at Site 12. The food-chain HQs would be decreased if more realistic area-use factors were used. The maximum terrestrial food-chain HQ for DDE was 19.2 (woodcock).

Numerous toxicity thresholds based on fish tissue concentrations of DDT are available, encompassing a wide range of values (Table 7-17). The predicted tissue concentrations derived using the maximum and mean sediment concentrations were less than most values shown in Table 7-17.

DDT and/or DDE were detected in four samples: one soil sample, one sediment sample collected in 1998 (SD-14-02), and two sediment samples collected in 1995. All four samples are located in close proximity to each other at the southern end of Jericho Island, and detected concentrations in these samples exceeded concentrations considered typical of basewide concentrations (Appendix F). Sediment sample SD-14-02 was collected from a depth of 6 to 12 inches; all other sediment samples were collected from 0 to 6 inches. Thus, it appears that DDTR contamination of surface sediments is negligible except at the southern end of the island. Deeper sediments might eventually become exposed by storms, tidal currents, etc.

In summary, sediment concentrations of DDTR at the southern end of Jericho Island could pose moderate potential risks to some aquatic receptors. Food-chain impacts are probably minor, based on the small area of contamination compared to the area used by wide-ranging receptors. Soil concentrations of DDTR could pose moderate potential risks to some terrestrial receptors in the same vicinity, but risks are probably minor under current conditions. DDT and DDE are retained as COCs in sediment.

Benzenehexachloride (BHC)

The alpha isomer of BHC was a COPC in sediment collected in 1995, and BHC isomers were not detected in any surface soil, groundwater, or surface water samples. A Region 4 ESV was not available for alpha-BHC in sediment. Based on maximum and mean sediment concentrations, food-chain HQs for all representative aquatic receptors were less than 1.0 (Tables 7-12 and 7-13).

Alpha-BHC was detected in only one 1995 sediment sample (SDW-02) at a concentration of 3.1 µg/kg. This value is less than the only available alternate guidelines (Table 7-19). Thus, the potential risks to aquatic receptors from BHC in sediment appear to be negligible. Because this compound was detected in only one sediment sample and was not detected in other medium, BHC should be dropped from further consideration at Site 12.

Chlordane

Alpha-chlordane is the endo-*cis* isomer of chlordane and beta-chlordane is the endo-*trans* isomer. Alpha- and gamma-chlordane were detected in one sediment sample (SD-14-02) collected during 1998 but neither compound was detected in any other medium. This sample was collected from 6 to 12 inches

deep, and the other sediment samples were collected from 0 to 6 inches. Region 4 ESVs were not available for either of these isomers in sediment, but the parent compound, chlordane, was used as a surrogate. The sediment concentrations (12 µg/kg for alpha-chlordane; 14 µg/kg for gamma-chlordane) were considerably greater than the Region 4 ESV for chlordane (0.5 µg/kg) but are at the upper end of values considered to be typical of various basewide locations [alpha-chlordane: 13.9 µg/kg; gamma chlordane: 13.2 µg/kg (Appendix F)]. The concentrations in this sample were elevated relative to most sediment guidelines for chlordane (Table 7-19). All food-chain HQs for representative aquatic receptors were less than 1.0 using maximum concentrations of these compounds. Thus, based on the infrequent detections and the results of the food-chain modeling, alpha- and gamma-chlordane appear to pose minor or negligible risks to upper-level aquatic receptors.

Based on the maximum sediment concentrations of alpha- and gamma-chlordane, the predicted tissue concentrations of chlordane in the mummichog and red drum (Table 7-16) were less than most of the tissue guidelines (Table 7-17). The predicted tissue concentrations derived using the average sediment concentrations are not elevated relative to most of the guidelines shown in Table 7-17. Overall, the potential risks from chlordane in sediment appear to be limited to benthic invertebrates in the vicinity of sediment sample SD-14-02. Chlordane is therefore selected as a sediment COC.

Dieldrin

Dieldrin was detected in one sediment sample collected in 1995 (SDW-02; HQ = 310) and was not detected in any other medium. Although food-chain HQs were less than 1.0, the concentration in this sample exceeded most sediment guidelines (Table 7-19). Therefore, dieldrin is retained as a final sediment COC.

Endrin

Endrin was detected in one of two sediment samples collected in 1995 (SDW-01). The concentration of endrin (1,200 µg/kg) greatly exceeded its Region 4 ESV of 0.02 (HQ = 60,000). It was not detected in groundwater, surface water, surface soil, or other sediment samples. The food-chain HQs for the mink, heron, and osprey were greater than 1.0, with a maximum food-chain HQ of 88.6 (heron). Endrin is retained as a sediment COC.

Methoxychlor

Methoxychlor was detected in one surface soil and one sediment sample collected in 1998 (SD-14-02) but was a COPC only in sediment. The concentration in sediment was 680 µg/kg, but no screening values were available for this compound.

Methoxychlor did not have any HQs greater than 1.0 in the terrestrial or aquatic food-chain modeling scenarios. However, TRVs were not available for birds or fish. The absence of soil and sediment screening values and of TRVs for birds and fish precludes a complete assessment of this compound. However, it was not a COPC in soil and was not detected in surface sediment (SD-14-02 was collected from 6 to 12 inches deep). Therefore, methoxychlor should be dropped from further consideration at the site.

7.8.4 Metals

The reader is advised to refer to Table 4-1 (Summary of Detected Background Concentrations) in the following assessment of metal COPCs.

Aluminum

Aluminum was detected in all sediment, surface soil, and surface water samples and in most groundwater samples. Region 4 ESVs were not available for surface water and sediment, and its maximum soil HQ was 107. Aluminum HQs for most representative aquatic and terrestrial receptors were greater than 1.0 using maximum and mean concentrations (Tables 7-8 through 7-13), and maximum NOAEL HQs were especially high for the shrew (HQ = 303) and mink (HQ = 6,010).

Aluminum was not detected in filtered surface water. As discussed by U.S. EPA (1996a), concentrations of dissolved metals, rather than total metals, more closely approximate the bioavailable fraction of metals in the water column.

However, HQs derived through food-chain modeling are typically high for aluminum. Several conservative assumptions are used in the food-chain modeling; some of these are inherent in the model and some are specific to aluminum. For example, the receptors were assumed to spend 100 percent of their life on the site. This would not be true for wide-ranging receptors such as birds and some mammals. In addition, the metal HQs for the mink, heron, and osprey are largely due to the assumption that concentrations of metals in prey items were equal to sediment concentrations. This assumption is probably over-conservative for aluminum.

The derivation of the aluminum TRVs used in the food-chain model is noteworthy. The mammal NOAEL and LOAEL, which are used as TRVs, were based on a study where aluminum chloride ($AlCl_3$) was administered to mice via drinking water (Sample et al., 1996). Aluminum chloride is much more bioavailable than aluminum compounds typically found in the environment (ATSDR, 1997), and, thus, the elevated raccoon HQs are partially a reflection of the low TRVs that were obtained from the aluminum

chloride study. Unfortunately, a mammal TRV derived from a study of other aluminum compounds is not available.

The avian TRVs were derived from a study where a single dose level of aluminum sulfate [$Al_2(SO_4)_3$] was administered to doves (Sample et al., 1996). There were no effects at the single level tested, so that level was (by definition) the NOAEL. Since there were no effects, a LOAEL could not be determined in the study, and the LOAEL used in this assessment was assumed to be equal to the NOAEL multiplied by 10, following standard practice. However, since only one dosage was tested in the aforementioned study and there were no effects, a concentration responsible for toxicity was not determined. Thus, the actual NOAEL and LOAEL could be higher than the values used to derive the avian HQs for aluminum.

The extent of the uncertainties inherent in the food-chain model for aluminum is unknown. However, aluminum concentrations in soil were less than background soil concentrations. Sediment concentrations of aluminum exceeded background conditions in only two samples (SD-08-01 and SD-09-01) and were less than the only available sediment guideline (Table 7-19). With the above considerations in mind, aluminum should be dropped from further consideration at Site 12.

Antimony

Antimony was a COPC in sediment and surface soil with a maximum screening HQ of 4.70 (1995 sediment). Antimony was not detected in groundwater or surface water. HQs in the food-chain modeling for a few mammals were greater than 1.0, with a maximum food-chain HQ of 39.6 for mink (Tables 7-8 through 7-13). Oral toxicity data were not available for birds and fish, and, thus, risks to these receptors could not be assessed via food-chain modeling. However, as discussed below, low concentrations in sediment and surface soil indicate negligible risks to fish and other aquatic receptors.

Antimony was detected in only one surface soil sample (SS-14-01). Since antimony was not elevated relative to the Region 4 ESV in nearby sediment samples and was not detected in groundwater, antimony in soil does not appear to have resulted in sediment or groundwater contamination. Thus, potential ecological risks appear to be limited to terrestrial receptors in the vicinity of this sample. The food-chain modeling suggests that antimony may pose potential risks to mammals with small home ranges (e.g., shrews, mice). Potential risks to wide-ranging mammals would be negligible since elevated soil concentrations were limited to a single sample. As mentioned above, potential toxicity to birds could not be assessed via food-chain modeling. However, since birds are wide ranging, potential risks to these receptors are also expected to be negligible. In summary, potential risks from antimony appear to be minor at worst and are limited to soil invertebrates, plants, and small mammals such as shrews, mice, and moles in the vicinity of soil sample SS-14-01. The infrequent elevated concentrations and relatively low HQs indicate negligible to minor potential risks. Therefore, antimony is not retained as a final COC.

Arsenic

Arsenic was a COPC in 1995 sediment samples (HQ = 6.86), 1998-1999 sediment samples (HQ = 3.40), and surface soil (HQ = 5.08) but was not a COPC in surface water or groundwater. Some HQs in the terrestrial and aquatic food-chain modeling were greater than 1.0.

Arsenic concentrations in surface soil exceeded the 10 mg/kg Region 4 ESV in one of 16 samples (SS-14-01 at 50.8 mg/kg). This value is elevated relative to most alternate screening values (Table 7-20). 1998 and 1999 sediment concentrations were not elevated relative to alternative screening values (Table 7-19), but 1995 concentrations were elevated relative to most alternative ESVs (Table 7-19).

In summary, surface soil concentrations of arsenic exceeded the ESV in only one sample, with a relatively low HQ (5.08). Sediment concentrations were elevated only in the two 1995 samples, but the maximum screening HQ was not excessively high (HQ = 6.86). Arsenic at Site 12 does not pose significant risks to most upper-level receptors considering the conservative assumptions used in the food-chain model. Overall, arsenic poses minor potential risks and arsenic should be dropped from further consideration.

Barium

Barium was detected in all groundwater, surface water, and 1995 sediment samples collected. It was a COPC in these media since Region 4 ESVs were not available. Barium was found in 11 of 18 sediment samples collected during 1998-1999, with a maximum concentration of 62.9 mg/kg.

Surface soil concentrations of barium did not exceed the Region 4 ESV (165 mg/kg) in its maximum concentration sample (SS-14-01; 76.4 mg/kg), but barium was included in terrestrial food-chain modeling since it was a COPC in sediment and surface water. Some food-chain HQs slightly exceeded 1.0 for representative terrestrial receptors using maximum and mean concentrations, with a maximum HQ of 9.27 for the shrew (Tables 7-8 and 7-9). Concentrations of barium in all filtered and unfiltered surface water samples were less than the background value. Barium concentrations in sediment exceeded the 28 mg/kg background value in all samples collected in 1995 and in three of 18 samples collected during 1998-1999. However, barium is a common element in sediment and it is not generally associated with significant toxicity (ATSDR, 1997). In summary, barium was not a COPC in soil. Concentrations in all surface water samples and in most sediment samples were less than background concentrations. All aquatic food-chain HQs were less than 1.0. For these reasons, barium should be dropped from further consideration at Site 12.

Beryllium

Beryllium was detected in 13 of 18 sediment samples collected in 1998 and 1999 and in five of 16 surface soil samples and was a COPC in sediment since a Region 4 ESV was not available. Alternate sediment ESVs for beryllium were not available (Table 7-19). It was not detected in surface water or groundwater samples, and concentrations in Site 12 surface soil were less than the Region 4 ESV. Beryllium did not have any HQs greater than 1.0 in the food-chain modeling for representative mammals, but toxicity data for oral ingestion were not available for birds and fish. The paucity of toxicity data prevents a complete assessment of the potential toxicity of beryllium to ecological receptors. However, sediment concentrations exceeded the background value in only two samples, and the maximum concentration in sediment (2.0 mg/kg) was only slightly elevated relative to background (0.98 mg/kg). Since the only available toxicity data show that risks to terrestrial mammals from the maximum detected sediment and soil concentrations are negligible and the few detected concentrations are not excessively elevated, beryllium should be dropped from further consideration at Site 12.

Cadmium

Cadmium was a COPC in sediment collected in 1995 (HQ = 6.95), sediment collected in 1998 and 1999 (HQ = 1.24), and surface soil (HQ = 2.00) but was not a COPC in groundwater. Some HQs in the terrestrial food-chain modeling exceeded 1.0 using maximum and mean concentrations (maximum HQ = 13.5), but the maximum HQ for aquatic receptors was only 1.03 (Tables 7-8 through 7-13).

Concentrations in surface soil exceeded the 1.6 mg/kg Region 4 ESV in one of 16 samples collected (SS-14-01 at 3.2 mg/kg). This value is slightly greater than some alternate screening values and less than others (Table 7-20). Although cadmium was not identified as a COPC in groundwater, sample GW-12-01-F had a concentration of 9.2 µg/L, which was slightly below the ESV (9.3). Cadmium was detected in sediment collected in 1995 (maximum 4.7 mg/kg) and 1998 and 1999 (maximum 0.84 mg/kg). These concentrations exceeded the Region 4 ESV (0.676 mg/kg) and the background concentration (0.28 mg/kg) but were less than some alternate screening values (Table 7-19). Because of the infrequent detections and/or relatively low concentrations and since cadmium at the site does not appear to pose significant risks to upper-level receptors considering the conservative assumptions inherent in the food-chain model, cadmium should be dropped from further consideration at Site 12.

Chromium

Chromium was detected in all media. Chromium was a COPC in sediment collected in 1995 (HQ = 2.28), sediment collected in 1998 and 1999 (HQ = 1.43), and surface soil (HQ = 1.81). All surface water concentrations were less than the ESV. Maximum terrestrial food-chain HQs exceeded 1.0 only for the

robin (HQ = 1.73) and the woodcock (HQ = 3.44) but were less than 1.0 using average concentrations (Table 7-8 and 7-9). Most food-chain HQs for aquatic receptors exceeded 1.0 using the maximum and mean concentrations and were especially high for the mummichog (maximum HQ = 357) (Tables 7-10 through 7-13).

As shown above, maximum screening HQs were relatively low. In addition, chromium concentrations were less than most alternate guidelines (Tables 7-19 and 7-20). Surface soil concentrations exceeded the background value (6.2 mg/kg) only in sample SS-14-01 (18.1 mg/kg), and sediment concentrations exceeded background (35.2 mg/kg) in three samples (two 1995 samples and one in 1998) with a maximum concentration of 119 mg/kg in a 1995 sample. The elevated food-chain HQs for the mummichog are partially a result of the assumption that chemical concentrations in food items of the mummichog were conservatively assumed to be equal to measured sediment concentrations (see Section 7.4.2.1). Because maximum screening HQs were relatively low and since soil and sediment concentrations rarely exceeded background values, potential risks due to chromium appear to be negligible or minor at worst. Thus, chromium is not retained as a final COC.

Cobalt

Cobalt was a COPC in sediment and groundwater because a Region 4 ESV was not available. Cobalt was not detected in surface water, and all concentrations in surface soil were less than Region 4 screening values. The maximum aquatic food-chain HQ was 4.99 (mink) based on 1995 samples and 2.27 (mink) based on samples collected in 1998 and 1999. Cobalt was included in terrestrial food-chain modeling since it was a sediment COPC, although it was not a COPC in surface soil. The maximum terrestrial food-chain HQ was 5.07 (woodcock).

Toxicity data for cobalt are scarce. Sediment concentrations exceeded the background value in four 1998 samples and in two 1995 samples, but the concentrations were not greatly elevated relative to the only two available guidelines (Table 7-19). Groundwater guidelines were not available. However, cobalt was detected in only three groundwater samples. Since cobalt was not detected in surface soil, its presence in sediment and groundwater at these concentrations is probably not site related. Cobalt is present in all natural media and is a component of certain B vitamins, which are essential for birds and mammals (ATSDR, 1997). For these reasons, cobalt should be dropped from further consideration at Site 12.

Copper

Copper was a COPC in all media except surface water. Maximum concentrations did not substantially exceed Region 4 ESVs in groundwater (HQ = 2.79), sediment collected in 1998 and 1999 (HQ = 6.04),

and surface soil (HQ = 4.73). Concentrations were higher in 1995 sediment samples (HQ = 26.2). Some food-chain HQs slightly exceeded 1.0 for representative terrestrial receptors using maximum concentrations, with a maximum HQ of 5.78 for the shrew (Table 7-8). The maximum aquatic food-chain HQ was 2.12 (mink) based on samples collected in 1998 and 1999 and was 9.19 (mink) based on samples collected in 1995 (Tables 7-10 through 7-13). Sediment concentrations exceeded the Region 4 ESV and the background value in one 1998 sample (SD-14-01: 113 mg/kg) and in both 1995 samples (168 and 489 mg/kg). Soil concentrations of copper exceeded the ESV in only one sample (SS-14-01, at 189 mg/kg). The concentration in this sample was also elevated relative to alternate guidelines (Table 7-20). The three sediment samples and one soil sample with elevated copper concentrations were all located in the vicinity of the southern end of Jericho Island.

In summary, potential risks to upper-level receptors from copper are minimal, based on the conservative assumptions used in the model. However, moderate risks to benthic invertebrates and terrestrial receptors such as invertebrates and plants exist in the vicinity of the southern end of the island. Thus, copper is retained as a final COC.

Iron

Iron was detected in all sediment, surface water, groundwater, and soil samples. It was a COPC in all media, with a maximum HQ of 498 in surface soil. Region 4 ESVs were not available for groundwater, surface water, or sediment. Iron was not detected in filtered surface water. Food-chain HQs were greater than 1.0 for all representative terrestrial and aquatic receptors using maximum concentrations and for most receptors using mean concentrations (Tables 7-8 through 7-13).

Sediment concentrations of iron exceeded the average background sediment concentration (21,500 mg/kg) in four samples collected in 1998 and 1999 and both 1995 samples, with a maximum concentration of 307,000 mg/kg (1995 sediment: SDW-02). Iron concentrations in sediment exceeded the "Severe Effects Level" (Table 7-19) in one sample collected in 1998 (SD-08-01) and in both samples collected in 1995. The elevated food-chain HQs for aquatic receptors are partially a result of the conservative assumption that concentrations of iron in prey items were equal to sediment concentrations.

Iron in all soil samples exceeded the Region 4 ESV, and concentrations in one sample (SS-14-01: 99,700 mg/kg) exceeded the background value (3,920 mg/kg). With this sample excluded, the average iron concentration in soil would drop from 8,124 mg/kg to 2,019 mg/kg. Toxicity data for iron in soil are sparse, precluding a complete assessment of the potential risks of this metal. The terrestrial food-chain HQs based on the maximum soil concentration were particularly high for the robin (NOAEL HQ = 593), shrew (NOAEL HQ = 201), woodcock (NOAEL HQ = 106), and mouse (NOAEL HQ = 553) (Table 7-8).

Terrestrial food-chain HQs based on the mean soil concentration (8,124 mg/kg) were also elevated (Table 7-9). These HQs would be reduced by approximately 75 percent with sample SS-14-01 excluded.

Sediment concentrations of iron in samples SD-14-01, SD-14-02, SDW-01, and SDW-02 were elevated. These are the sediment samples nearest soil sample SS-14-01, where soil concentrations were elevated. Thus, migration of iron from soil to sediment could be occurring in this vicinity.

In summary, results of the food-chain modeling indicate negligible risks to upper trophic-level receptors from iron in sediment. Potential risks to benthic invertebrates from iron in sediment appear to be primarily limited to the vicinity of the southern end of Jericho Island. Potential risks to terrestrial receptors appear to be limited primarily to the vicinity of soil samples SS-14-01. Therefore, iron is retained as a COC.

Lead

Lead was a COPC in sediment and surface soil, with maximum screening HQs of 22.0 (surface soil), 6.72 (1998 and 1999 sediment), and 97 (1995 sediment). Sediment concentrations exceeded the Region 4 ESV and background concentration in five samples: SD-08-01 (38.7 mg/kg), SD-14-01 (203 mg/kg), SD-14-02 (49.7 mg/kg), SDW-01 (589 mg/kg), and SDW-02 (2,930 mg/kg). All sediment concentrations were less than the ER-M and most other alternate sediment guidelines, but the PEL was exceeded in the three samples with the highest concentrations (Table 7-19). The food-chain HQs for representative aquatic receptors using the maximum concentrations of sediment collected in 1998 and 1999 do not appear to be substantially elevated considering the conservative assumptions used in the model (prey concentration equal to sediment concentration, 100 percent absorption, 100 percent area use factor).

Surface soil concentrations exceeded the Region 4 ESV and background value in one of 16 samples. The elevated values in many samples are assumed to be due to site-related contamination. Lead concentrations in sample SS-14-01 (1,100 mg/kg) were especially elevated relative to the Dutch "intervention" value of 530 mg/kg (Table 7-20). The terrestrial food-chain HQs based on the maximum soil concentration were particularly high for the robin (NOAEL HQ = 145) and woodcock (NOAEL HQ = 256). Although the robin and woodcock have home ranges much larger than the area encompassed by Site 12, and the 100 percent bio-absorption factor assumed in the food-chain model is probably overly conservative, these HQs are nevertheless elevated and suggest potential risks to terrestrial receptors.

Four of the five locations with elevated sediment concentrations of lead were near soil sample SS-14-01, where soil concentrations were elevated. Thus, migration of lead from soil to sediment could be occurring in this vicinity.

In summary, results of the food-chain modeling indicate negligible risks to upper trophic-level receptors from lead in sediment. Potential risks to benthic invertebrates from lead in sediment appear to be primarily limited to the southern end of Jericho Island. Potential risks to terrestrial receptors appear to be limited primarily to the vicinity of soil sample SS-14-01. Therefore, lead is retained as a COC.

Manganese

Manganese was detected in all surface water and groundwater samples, in 19 of 20 sediment samples, and in 10 of 16 surface soil samples. Manganese was a COPC in sediment, surface water, and groundwater because Region 4 ESVs were not available. Manganese concentrations in soil exceeded the 100 mg/kg Region 4 ESV in two samples, with values of 522 and 206 mg/kg. All terrestrial food-chain HQs were less than 1.0. The maximum aquatic food-chain HQ was 3.07 (mink). Although a Region 4 ESV for sediment was not available, all manganese 1998-1999 sediment concentrations were less than alternate ESVs (Table 7-19). In addition, 1998-1999 sediment concentrations exceeded the 186 µg/L background value only in sample SD-08-01 (210 mg/kg).

Alternate soil ESVs were exceeded in one sample (SS-14-01: 522 mg/kg). The food-chain modeling indicates negligible ecological risks for terrestrial mammals and birds. Furthermore, manganese was not elevated in the nearest sediment samples (SD-14-01 or SD-14-02), suggesting that contaminated soil in the vicinity has not resulted in sediment contamination. In summary, manganese concentrations appear to be elevated in only one soil sample, but the concentration in that sample suggests minor potential risks (at worst) to plants and terrestrial invertebrates. Potential risks to upper-level terrestrial and aquatic receptors are negligible. Therefore, manganese should be dropped from further consideration at Site 12.

Mercury

Mercury was a COPC in sediment collected in 1998 and 1999 and surface soil, with maximum screening HQs of 2.69 and 8.9, respectively. Mercury was not detected in sediment collected in 1995 groundwater or surface water. Food-chain HQs exceeded 1.0 for some representative terrestrial receptors using the maximum and mean concentrations, with a maximum HQ of 173 for the woodcock (Tables 7-8 and 7-9). Food-chain HQs exceeded 1.0 for most representative aquatic receptors using maximum and mean concentrations of sediment (Tables 7-10 and 7-11).

Mercury was detected in seven of 18 sediment samples, and all detection limits were below or only slightly above the Region 4 ESV. Sediment concentrations of mercury exceeded the ESV in only two samples (SD-14-01: 0.35 mg/kg and SD-09-01: 0.14 mg/kg). The maximum sediment concentration (0.35 mg/kg) was below the ER-M and PEL values (Table 7-19). Using mean concentrations, aquatic

food-chain HQs were greater than 1.0 for the heron (2.07) and osprey (2.31). The HQs for these wide-ranging receptors do not appear to be elevated when their home ranges are considered.

Numerous toxicity thresholds based on fish tissue concentrations of mercury are available (Table 7-17). These thresholds cover a wide range of values. The predicted tissue concentration of 0.90 mg/kg (Table 7-16), derived using the maximum sediment concentration of 0.35 mg/kg, exceeded some of the guidelines shown in Table 7-17. However, it is probably overly conservative to assume that fish would be exposed to this sediment concentration for a significant portion of their lives. The predicted tissue concentration of 0.32 mg/kg, derived using the average sediment concentration of 0.0703 mg/kg (calculated using one-half the detection limit in non-detects), is greater than some guidelines and less than others. Thus, an accurate assessment of this derived value is difficult to accomplish. However, since sediment concentrations only slightly exceeded the ESV in two samples and mercury was not detected in surface water, potential risks to aquatic receptors are negligible.

Soil concentrations of mercury exceeded the 0.1 mg/kg ESV and 0.11 mg/kg background value in one sample (SS-14-01), which was also elevated relative to most of the soil guidelines shown in Table 7-20. Food-chain HQs exceeded 1.0 for many representative terrestrial receptors using the maximum soil concentration and were especially high for the robin (129) and woodcock (173). The HQs for the robin and woodcock would drop considerably when the area-use factor of these two wide-ranging receptors is considered. The shrew (HQ = 58.8), however, has a small home range and could reside within the vicinity of sample SS-14-01.

In summary, potential risks to aquatic receptors are negligible or minor at worst, and migration of mercury to nearby sediments and surface water appears to be negligible. Potential risks from mercury in soil are limited to the vicinity of sample SS-14-01, where moderate potential risks to soil invertebrates, plants, and vermivorous receptors (primarily small mammals such as shrews and moles) could exist. Therefore, mercury is retained as a soil COC.

Nickel

Nickel was a COPC in sediment collected in 1995 (HQ = 5.47), sediment collected in 1998 and 1999 (HQ = 66.7), and groundwater (HQ = 1.27) but was not detected in surface water and was not a COPC in surface soil. All HQs in the terrestrial food-chain modeling were less than 1.0. Food-chain HQs did not exceed 1.0 in representative aquatic receptors using mean concentrations of sediment, but HQs were slightly greater than 1.0 for the mink, heron, and osprey using the maximum concentrations (Tables 7-10 through 7-13). Nickel concentrations in sediment exceeded the Region 4 ESV (15.9) in four samples, SD-08-01 (19.6 mg/kg), SD-14-02 (1060 mg/kg), SDW-01 (41.4 mg/kg), and SDW-02 (86.9 mg/kg). The maximum nickel concentration (1060 mg/kg) exceeded all alternate guidelines (shown in Table 7-19).

In summary, potential risks to terrestrial receptors and to upper-level aquatic receptors are negligible. Moderate potential risks to aquatic invertebrates are indicated by measured concentrations in samples SD-14-2, SDW-01, and SDW-02. Therefore, nickel is retained as a sediment COC.

Selenium

Selenium was a COPC in sediment collected in 1995, 1998, and 1999 since Region 4 screening values were not available but was not a COPC in surface soil, surface water, or groundwater. Food-chain HQs exceeded 1.0 for aquatic receptors using the maximum sediment concentrations from 1998 and 1999 samples, with a maximum HQ of 11.8 for the mink (Table 7-10). All terrestrial food-chain HQs were less than 1.0 (Tables 7-8 and 7-9). Selenium was not detected in filtered surface water.

In summary, soil concentrations of selenium did not exceed the conservative Region 4 ESV. The maximum sediment concentration (10.7 mg/kg) was elevated relative to alternate guidelines (Table 7-19), but selenium was infrequently detected. Potential risks to upper-level aquatic receptors are negligible, when considering the conservative assumptions inherent in the food-chain model. For these reasons, selenium should be dropped from further consideration at Site 12.

Silver

Silver was detected in both sediment samples collected in 1995 and was a sediment COPC (HQ = 1.64). Silver was not detected in any other medium. All HQs in the food-chain modeling were less than 1.0, but oral toxicity data were not available for birds and fish (Table 7-12 and 7-13). Because the maximum concentrations of silver in sediment only slightly exceeded Region 4 ESVs but did not exceed alternate screening values, silver should be dropped from further consideration at Site 12.

Thallium

Thallium was a COPC in surface water (HQ = 1.41) and in sediment collected in 1998 and 1999 since a Region 4 ESV was not available. Thallium was detected in two of 13 filtered surface water samples but was not detected in unfiltered surface water samples. Thallium was not detected in sediment collected in 1995 or surface soil and was not a COPC in groundwater. Thallium was not included in the terrestrial food-chain modeling since it was not detected in surface soil. Mink HQs were greater than 1.0 using the maximum and mean concentrations in sediment collected in 1998 and 1999 and filtered surface water (Tables 7-10, 7-11, 7-14, and 7-15). Thallium was detected in one of 18 sediment samples from 1998 and 1999. However, the detection limits in some "non-detects" exceeded the single detected concentration, resulting in an average concentration (using one-half the detection limit in non-detects) that

is greater than the maximum detected concentration. Thus, the HQs using the maximum sediment concentration were less than the HQs calculated using the average sediment concentration (Tables 7-10 and 7-11). The mink HQ values greater than 1.0 were calculated by assuming that the concentrations of thallium in prey items were equal to sediment concentrations. As discussed earlier, this assumption was used since marine/estuarine BSAFs do no exist for inorganic compounds and is probably overly conservative since transfer through the food chain is not known to occur for thallium.

The absence of any sediment screening values precludes a complete assessment of thallium's potential toxicity to aquatic receptors. However, thallium was detected in only one sediment sample (SD-14-02), at a concentration of 0.36 mg/kg compared to a background value of 0.41 mg/kg. Furthermore, because thallium was not detected in surface soil and was detected in only one groundwater sample (at less than the ESV), potential ecological risks are negligible. For these reasons, thallium should be dropped from further consideration at Site 12.

Vanadium

Vanadium was a COPC in all media. Region 4 ESVs were not available for groundwater, surface water, and sediment, and the maximum HQ in surface soil was 4.65. Food-chain HQs exceeded 1.0 for the shrew (maximum HQ = 4.49) and some aquatic receptors (maximum HQ = 117 for the mink) (Tables 7-8 through 7-15). Most 1998 and 1999 sediment concentrations (mean: 23 mg/kg) were considerably less than the background sediment concentration (50 mg/kg). Sediment concentrations exceeded the background value only in sample SD-08. All surface soil concentrations were less than the background value (9.5 mg/kg). No surface water ESVs were available from any source, and all sediment concentrations (except the maximum concentration) were less than the only available sediment ESV (Table 7-19). Few alternate soil ESVs are available (Table 7-19), so the potential toxicity is difficult to assess, but vanadium is not generally considered to be toxic in the environment (Mailman, 1980).

In summary, sediment concentrations were not elevated relative to its background value, except in sample SD-08-01. Aquatic food-chain HQs were not elevated when the conservative assumptions inherent in the model are considered. Thus, site related risks to aquatic receptors are negligible. Surface soil concentrations of vanadium are not site related. For these reasons, vanadium should be dropped form further consideration at Site 12.

Zinc

Zinc was a COPC in sediment (1998 and 1999, HQ = 1.59; 1995 HQ = 12.3) and surface soil (HQ = 20.4). Zinc was detected in nine of 16 surface soil samples but the Region 4 ESV was exceeded only in sample SS-14-01 (1020 mg/kg). The maximum concentration of zinc detected in groundwater and surface water

(82.8 and 84.7 µg/L, respectively) did not exceed the ESV (86 µg/L). Food-chain HQs exceeded 1.0 for most terrestrial receptors using the maximum concentration, with a maximum HQ of 161 for the woodcock (Table 7-8). Aquatic food-chain HQs for 1998 and 1999 slightly exceeded 1.0 for the heron (HQ = 2.56) and osprey (HQ = 2.86) using the maximum concentrations, and all aquatic HQs were less than 1.0 using the mean concentrations (Tables 7-10 and 7-11). Heron and osprey HQs based on the maximum and mean concentrations of 1995 samples exceeded 1.0, with a maximum HQ of 22.0 for the osprey (Tables 7-10 through 7-13). As previously discussed, these values were derived by assuming that concentrations of zinc in prey items of the osprey and heron were equal to sediment concentrations. Even using this conservative assumption, the HQs for these two representative receptors were relatively low, and the HQ for the mink was less than 1.0.

An absorption fraction of 100 percent was assumed for the food-chain modeling (i.e., 100 percent of the ingested contaminant was absorbed). However, available data indicate that gastrointestinal absorption of zinc varies from 20 to 80 percent and depends on the chemical compound, as well as on zinc levels in the body and on concentrations of other nutrients (U.S. EPA, 1984b). Thus, even though the maximum food-chain HQs for most representative terrestrial species were greater than 1.0, the HQ values would decrease when less than 100 percent absorption is assumed. Furthermore, the maximum terrestrial HQs for the representative bird species would decrease if more realistic area-use factors were used.

In summary, although the food-chain HQs for some terrestrial species were elevated, several conservative assumptions in the model contribute to the high-risk HQs. In addition, zinc was elevated in only one of 16 soil samples. Sediment concentrations of zinc were elevated in only three samples. Potential risks to sediment invertebrates might exist in the vicinity of these three samples, but potential risks to upper-level aquatic receptors are negligible. Overall, zinc concentrations pose minor risks to ecological receptors. Thus, zinc is not retained as a final COC.

7.8.5 Metals – Cumulative Toxicity

Concentrations of most metals detected at Site 12 appear to pose negligible potential risks to ecological receptors when considered as individual COPCs. However, as discussed by U.S. EPA (1997b), the potential effects of cumulative toxicity should be considered when appropriate. The maximum soil concentrations of most metals were recorded in sample SS-14-01 (Table 7-6). At this location, the HI of metals in soil would be well above 1.0. The exact HI was not calculated since the toxic mechanisms of metals are complex and it is difficult to ascertain the degree to which the metals "produce effects by the same toxic mechanism" (U.S. EPA, 1997b). The important point here is that concentrations of several metals in soil at this location are elevated. The extent of potential cumulative toxicity to terrestrial receptors from these elevated concentrations is not clear. Likewise, definitive conclusions regarding which metals could pose the greatest potential risks from cumulative toxicity cannot be made. It is

assumed, however, that the concentrations of metals in this sample could pose potential risks to terrestrial receptors from cumulative toxicity.

7.9 SCREENING-LEVEL AND STEP 3A UNCERTAINTY ANALYSIS

Uncertainty is associated with all aspects of the ecological risk assessment process. This section provides a summary of the general uncertainties involved in this ecological risk assessment, with a discussion of how they may affect the final risk values and conclusions.

7.9.1 Uncertainty in the Preliminary Problem Formulation

Some portions of Site 12 could receive contaminant inputs from more than one source, although, initially, contaminants are conservatively assumed to stem directly from site-related activities. For example, the marsh surrounding the peninsula on which the sites are located probably receives contaminant inputs from floating debris and other materials via the tidal flow of marine surface water. The extent that other sources are responsible for the presence of COCs at the sites is uncertain. Since contaminant concentrations may reflect inputs from many sources, including non-Navy sources, uncertainties exist regarding whether risk characterized at the sites stems from site-related contaminants.

Representative species used in the food-chain modeling included species with home ranges much larger than Site 12. However, the resulting over-estimate of potential risks was partially mitigated by applying area-use factors.

7.9.2 Uncertainty in the Ecological Effects Characterization

Uncertainty in this risk assessment also arises from the nature and quality of the available toxicity data used to derive guidelines. This uncertainty is reduced when similar effects are observed across species, sex, and exposure route; when the magnitude of the response is clearly dose related; and when mechanisms of toxicity are similar for laboratory and wildlife species. Most guidelines are based on conservative assumptions. Although conservativeness is needed in a screening-level ecological risk assessment to ensure that the most sensitive receptors are protected, conservative guidelines may heavily overestimate potential risks and the resulting HQ values may be misleading. Region 4 screening levels and the NOAELs and LOAELs used in this assessment are based on laboratory studies that often do not take into account mitigating or ameliorating physical and chemical conditions in the environment. That is, the most bioavailable (i.e., toxic) form of the contaminant is usually applied to the exposure medium. In reality, bioavailability is rarely, if ever, 100 percent. Conversely, laboratory studies frequently ignore potentially exacerbating conditions such as the possibility of synergistic effects of complex mixtures of chemicals and altered sediment chemistry due to periodic hypoxia and resultant pH

depression. The use of ecological guidelines may underestimate potential risks when these factors are inadequately determined.

As mentioned earlier, few data are available for investigating dietary exposures and related risks to reptiles and amphibians. The absence of toxicity data for these organisms precludes modeling of potential risks to them. As a result, direct conclusions about the potential risks to reptiles and amphibians cannot be made, and only qualitative inferences can be drawn.

Similarly, few data are available for investigating dietary exposures and related risks to the mummichog and red drum, the species selected as representative fish species to use in the aquatic food-chain modeling. Specifically, dietary NOAELs and LOAELs for fish were not available for some of the COPCs identified in sediment and surface water at Site 12. As a result, direct conclusions about the potential risks to fish through ingestion cannot be made, and only qualitative inferences can be drawn. It should be noted that AWQCs for most contaminants are based, in part, on sensitive aquatic species (including fish species). Thus, the surface water screening assessment at least partially accounts for fish species.

In order to reduce the uncertainty resulting from the paucity of dose-based toxicity data for fish, a residue-based approach was also used to assess the potential toxicity to fish from contaminants that are known to biomagnify in the food web. However, available tissue NOAELs and LOAELs cover a wide range of values depending on species tested, dose levels, route of administration, form of chemical, and other factors. Furthermore, as discussed further in Section 7.9.3, the relationships between tissue concentrations and adverse effects are not clear. Thus, uncertainty exists for chemicals regarding the validity and applicability of tissue-based toxicity reference values.

Ecological risk assessments, unlike human health risk assessments, must consider risks to many different species. Calculation of risks for every potential receptor species is not possible. For this ecological risk assessment, conservative guidelines protective of a wide range of ecological receptors were sought. The underlying assumption associated with the use of these guidelines is that contaminant concentrations in excess of these values are indicative of potential impacts to actual receptors inhabiting the area. However, species-specific physiological differences that may influence an organism's response to a contaminant or subtle behavioral differences that may increase or decrease a receptor's contact with a contaminant are seldom known. Also, some contaminants were present for which no suitable guidelines were available, and, as a result, they could not be quantitatively assessed. The use of guidelines, while necessary, will introduce error into the results of an assessment.

7.9.3 Uncertainty in the Exposure Assessment

Uncertainty in the exposure assessment arises mainly in the methods used to obtain exposure-point concentrations. The maximum detected contaminant concentrations were initially used to represent the highest contaminant concentrations to which ecological receptors might be exposed. If the samples evaluated in this ecological risk assessment are representative of contaminant concentrations associated with the sites, then this approach is conservative and should overestimate potential risks to ecological receptors. Although the use of maximum values is appropriate for screening in an ecological risk assessment, maximum values could grossly over-predict potential risks in some situations. To somewhat mitigate these uncertainties, average concentrations were also considered in the food-chain modeling, but they do not fully account for the uncertainties involved in selecting exposure-point contaminant concentrations.

Contaminant concentrations in a given medium may under-predict potential risks if sample locations are not properly selected. For example, sediment samples should be collected from areas where sediment deposition is expected to be maximal. Otherwise, sediment data may not be adequate for conservatively estimating ecological risks.

Dermal and inhalation exposures were not evaluated in this ecological risk assessment. As discussed in Section 7.2.3, these exposure routes are usually miniscule, but since they cannot be quantitatively assessed, only limited, qualitative conclusions regarding their significance can be drawn and uncertainties remain. Dermal exposure is usually limited by the outer coverings of most receptors. Nonetheless, certain portions of some receptors, such as food pads, eyes, and nose do not contain fur or feathers, for example, and may have a higher chance of exposure. However, these areas generally constitute a small portion of the total surface area of most receptors. Although some of the concentrations of contaminants in surface soils and sediments are elevated, they do not appear to be high enough qualitatively to warrant concern over dermal exposure. Surface water can reach the dermis regardless of outer coverings such as fur and feathers, but interpretability of the surface water data is low.

Inhalation of contaminants is assumed to be miniscule. Airborne aerosols, particulates, and vapors are not assumed to be applicable for aquatic media. As mentioned earlier, bare soil is minimal at the sites. As a result, airborne particles would be expected to be minimal. Concentrations of VOCs in surface soils at Site 12 were low. Nevertheless, burrowing wildlife (e.g., moles) would be exposed to some contaminants via inhalation. However, data regarding inhalation exposure and toxicity for wildlife were not available.

Uncertainty is also associated with the use of literature-based BAFs, BCFs, and BSAFs used in the screening-level food-chain modeling. These values often vary considerably between species and sites. This can lead to both over- and underestimation of potential risks.

Data on food ingestion rates for mink (used herein to represent piscivorous mammals) were sparse. The Wildlife Exposures Factors Handbook (U.S. EPA, 1993b) contains the following ingestion rates for mink: 0.13 g/g bw/d for captive mink, 0.12 and 0.16 g/g bw/d for farm raised mink, and 0.22 g/g bw/day estimated using Nagy's (1987) equation. These values may not adequately represent actual food ingestion rates for wild mink. The mink food ingestion rate used herein was 0.22 g/g bw/day and is only slightly greater than rates estimated using Nagy's (1987) equation for two other piscivorous mammals (raccoon: 0.21 g/g bw/day; otter: 0.19 g/g bw/day). Thus, although the food ingestion rate of the mink is uncertain, the value used in this assessment is probably an adequate conservative estimate of food ingestion for piscivorous mammals.

Uncertainty regarding exposure to contaminated sediments also results from the assumption that contaminant concentrations in fish tissues are correlated with sediment concentrations and with adverse effects. Although it may be true that doses, tissue concentrations, and effects are all correlated, there is no indication in the two primary databases from which most of the tissue NOAELs and LOAELs were gathered (ERED, 1998; Jarvinen and Ankley, 1999) of the strength of any correlation between tissue concentrations and effects. As pointed out by Jarvinen and Ankley (1999), the use of effects/tissue-residue relationships in ecological risk assessments must incorporate consideration of contaminant toxicokinetics. The authors further discuss studies in which the toxicity associated with mercury (and other chemical) residues in fish depends on factors such as food quality, temperature, and pH. Other factors that affect the relationship between tissue concentrations and toxicity include species tested, dose levels, route of administration, and the form of chemical (Jarvinen and Ankley, 1999; Wiener and Spry, 1995). It may be appropriate to treat these data like Long et al. (1995) and other researchers have treated sediment toxicity data (i.e., by ranking concentrations, calculating distributional statistics, and verifying the predictive capability of the statistics with independent data). However, this has not been done with available tissue databases. In summary, cause and effect have not been established for the relationship between tissue concentrations and effects observed in the animals with contaminated tissue. Thus, uncertainty exists for chemicals regarding the validity and applicability of tissue-based toxicity reference values.

7.9.4 Uncertainty in the Risk Characterization

Uncertainty in the risk characterization is affected by all aspects of the ecological risk assessment process described in the above sections. Uncertainty in risk characterization also stems, in part, from combining different components of the ecological risk assessment in this step. Each of those

components already contains uncertainty. Thus, uncertainties may be propagated when these components are combined. To try to reduce the overall uncertainty in the risk assessment, the weight of evidence approach is used to make risk decisions. This approach takes the results of all aspects of the assessment into account, including the uncertainties, to make determinations of potential risk versus no risk.

Uncertainty in risk characterization of soil contaminants at Site 12 results from the lack of toxicity data regarding the cumulative toxicity of metals. Concentrations of several metals were elevated in sample SS-14-01. Concentrations of some of these metals, when assessed individually, appear to pose negligible or minor potential risks to terrestrial receptors. The extent to which these same concentrations of metals might contribute to cumulative toxicity is uncertain.

7.10 ECOLOGICAL RISK SUMMARY

Several inorganic and organic compounds were present in Site 12 sediment, groundwater, surface water, and surface soil samples at concentrations that exceeded U.S. EPA Region 4 ecological screening values and were retained as COPCs. Several other compounds were retained as COPCs since screening levels were not available. Most COPCs were eliminated as COCs in Step 3a of the risk assessment process for one or more reasons, such as low frequency of detection, concentrations comparable to background values (primarily inorganics) or to alternative screening levels, and spatial analysis of detections.

Surface water contaminants do not appear to pose potential risks to ecological receptors.

PAHs, chlordane, DDT, DDE, dieldrin, endrin, Aroclor 1254, copper, iron, lead, and nickel pose potential risks to aquatic receptors (primarily benthic invertebrates) in the vicinity of sediment samples SDW-01, SDW-02, and SD-14. These three samples are located in close proximity to each other at the southern end of Jericho Island. Copper, iron, lead, and mercury pose potential risks to terrestrial invertebrates and/or terrestrial plants in the vicinity of surface soil sample SS-14-01. Additionally, PAHs pose potential risks to terrestrial invertebrates/plants in the vicinity of surface soil locations SS-08, SS-14, SWD-01, and SDW-02. Iron, lead, and mercury concentrations in soil sample SS-14-01 also pose potential risks to some upper-level terrestrial receptors. This soil sample is in close proximity to sediment samples SDW-01, SDW-02, and SD-14.

TABLE 7-1

TOXICITY REFERENCE VALUES (TRVs) FOR MAMMALS, BIRDS, AND FISH
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
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Chemical	Test Species	NOAEL derived TRV (mg/kg/day)	LOAEL derived TRV (mg/kg/day)	NOAEL Source	LOAEL Source
Semivolatile Organic Compounds					
2-Methylnaphthalene[1]	Mouse - reproduction	1	10	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
	Channel catfish - mortality[2]	0.3	3.0	Martin, 1980	Martin, 1980
Acenaphthene	Mouse - reproduction	1.3	2.6	ERT, 1997	ERT, 1997
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Acenaphthylene	Mouse - reproduction	1.3	2.6	ERT, 1997	ERT, 1997
	European starling - body weight, hemoglobin	10	100	ERT, 1997	ERT, 1997
Benzo(a)anthracene[1]	Mouse - reproduction	1	10	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Benzo(a)pyrene	Mouse - reproduction	1	10	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Benzo(b)fluoranthene[1]	Mouse - reproduction	1	10	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Benzo(k)fluoranthene[1]	Mouse - reproduction	1	10	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Benzoic acid	Mammal: NA	NA	NA	NA	NA
	Bird: NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	Mouse - tumors	18.3	183	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	1.1	11	Sample et al., 1996	Sample et al., 1996
Chrysene[1]	Mouse - reproduction	1	10	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Di-*n*-octyl phthalate	Mouse - reproduction	13	130	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	1.1	11	Sample et al., 1996	Sample et al., 1996
Fluoranthene[1]	Mouse - reproduction	1	10	Sample et al., 1996	ERT, 1997
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Fluorene	Mouse - reproduction	1.3	2.6	ERT, 1997	ERT, 1997
	European starling - body weight, hemoglobin	10	100	ERT, 1997	ERT, 1997
Indeno(1,2,3-cd)pyrene[1]	Mouse - tumors	1	10	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993

TABLE 7-1

TOXICITY REFERENCE VALUES (TRVs) FOR MAMMALS, BIRDS, AND FISH
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
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Chemical	Test Species	NOAEL derived TRV (mg/kg/day)	LOAEL derived TRV (mg/kg/day)	NOAEL Source	LOAEL Source
Naphthalene	Mouse - reproduction	1.3	2.6	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Pentachlorophenol	Rat - reproduction	0.24	2.4	Sample et al., 1996	Sample et al., 1996
	Bird: NA	NA	NA	NA	NA
Phenanthrene	Mouse - reproduction	1.3	2.6	ERT, 1997	ERT, 1997
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Pyrene[1]	Mouse - reproduction	1	10	Sample et al., 1996	Sample et al., 1996
	European starling - body weight, hemoglobin	10	100	Trust et al., 1993	Trust et al., 1993
Pesticides/PCBs					
4,4'-DDE[3]	Rat - reproduction	0.8	4	Sample et al., 1996	Sample et al., 1996
	Brown pelican - reproduction	0.0028	0.028	Sample et al., 1996	Sample et al., 1996
4,4'-DDT	Rat - reproduction	0.8	4	Sample et al., 1996	Sample et al., 1996
	Brown pelican - reproduction	0.0028	0.028	Sample et al., 1996	Sample et al., 1996
Aroclor-1254	Mouse - reproduction	0.068	0.68	Sample et al., 1996	Sample et al., 1996
	Ring-necked pheasant - reproduction	0.18	1.8	Sample et al., 1996	Sample et al., 1996
Alpha-BHC[4]	Mink - reproduction	0.014	0.14	Sample et al., 1996	Sample et al., 1996
	Japanese quail - reproduction	0.56	2.25	Sample et al., 1996	Sample et al., 1996
Alpha-chlordane[5]	Mouse - reproduction	4.6	9.2	Sample et al., 1996	Sample et al., 1996
	Red-winged blackbird - mortality	2.14	10.7	Sample et al., 1996	Sample et al., 1996
Gamma-chlordane[5]	Mouse - reproduction	4.6	9.2	Sample et al., 1996	Sample et al., 1996
	Red-winged blackbird - mortality	2.14	10.7	Sample et al., 1996	Sample et al., 1996
Dieldrin	Rat - reproduction	0.02	0.2	Sample et al., 1996	Sample et al., 1996
	Barn owl - reproduction	0.077	0.77	Sample et al., 1996	NOAEL x 10
Endrin	Mouse - reproduction	0.092	0.92	Sample et al., 1996	Sample et al., 1996
	Screech owl - reproduction	0.01	0.1	Sample et al., 1996	Sample et al., 1996
Methoxychlor	Rat - reproduction	4	8	Sample et al., 1996	Sample et al., 1996
	Bird: NA	NA	NA	NA	NA
Metals and Inorganics					
Aluminum	Mouse - reproduction	1.93	19.3	Sample et al., 1996	Sample et al., 1996
	Ringed dove - reproduction	109.7	1097	Sample et al., 1996	Sample et al., 1996

TABLE 7-1

TOXICITY REFERENCE VALUES (TRVs) FOR MAMMALS, BIRDS, AND FISH
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
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Chemical	Test Species	NOAEL derived TRV (mg/kg/day)	LOAEL derived TRV (mg/kg/day)	NOAEL Source	LOAEL Source
Antimony	Mouse - lifespan, longevity	0.125	1.25	Sample et al., 1996	Sample et al., 1996
	Bird: NA	NA	NA	NA	NA
Arsenic	Mouse - reproduction	0.126	1.26	Sample et al., 1996	Sample et al., 1996
	Brown-headed cowbird - mortality	2.46	7.38	Sample et al., 1996	Sample et al., 1996
	Rainbow trout - growth	0.59	7.1	ERT, 1997	ERT, 1997
Barium	Rat - growth, hypertension	5.1	51	Sample et al., 1996	Sample et al., 1996
	1-day-old chicks - mortality	20.8	41.7	Sample et al., 1996	Sample et al., 1996
Beryllium	Rat - weight loss, longevity	0.66	6.6	Sample et al., 1996	Sample et al., 1996
	Bird: NA	NA	NA	NA	NA
Cadmium	Rat - reproduction	1	10	Sample et al., 1996	Sample et al., 1996
	Bird: NA	1.45	20	Sample et al., 1996	Sample et al., 1996
Chromium (total)	Rat - body weight	3.28	32.8	Sample et al., 1996	NOAEL x 10
	black duck - reproduction	1	5	Sample et al., 1996	Sample et al., 1996
	Rainbow trout - growth	0.02	0.12	ERT, 1997	ERT, 1997
Cobalt	Mammal: Not Provided	1	10	ERT, 1997	ERT, 1997
	Bird: Not Provided	1	10	ERT, 1997	ERT, 1997
Copper	Mink - reproduction	11.7	15.14	Sample et al., 1996	Sample et al., 1996
	1-day-old chicks - growth, mortality	47	61.7	Sample et al., 1996	Sample et al., 1996
Iron	Not provided	50	500	ERT, 1997	ERT, 1997
	Chicken - not provided	100	1000	ERT, 1997	ERT, 1997
Lead	Rat - reproduction	8	80	Sample et al., 1996	Sample et al., 1996
	Japanese quail - reproduction	1.13	11.3	Sample et al., 1996	Sample et al., 1996
Manganese	Rat - reproduction	88	284	Sample et al., 1996	Sample et al., 1996
	Japanese quail - growth, behavior	977	9770	Sample et al., 1996	Sample et al., 1996
Mercury	Mink - reproduction	0.015	0.025	Sample et al., 1996	Sample et al., 1996
	Mallard duck - reproduction	0.0064	0.064	Sample et al., 1996	Sample et al., 1996
	Rainbow trout - growth	0.008	0.94	ERT, 1997	ERT, 1997
Nickel	Rat - reproduction	40	80	Sample et al., 1996	Sample et al., 1996
	Mallard duck - growth	77.4	107	Sample et al., 1996	Sample et al., 1996
Selenium	Rat - reproduction	0.2	0.33	Sample et al., 1996	Sample et al., 1996
	Mallard duck - reproduction	0.4	0.8	Sample et al., 1996	Sample et al., 1996

TABLE 7-1

TOXICITY REFERENCE VALUES (TRVs) FOR MAMMALS, BIRDS, AND FISH
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
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Chemical	Test Species	NOAEL derived TRV (mg/kg/day)	LOAEL derived TRV (mg/kg/day)	NOAEL Source	LOAEL Source
Silver	Mouse - behavior	1.8	18	Rungby & Danscher, 1984	Rungby & Danscher, 1984
	Bird: NA	NA	NA	NA	NA
Thallium	Rat - reproduction	0.0074	0.074	Sample et al., 1996	Sample et al., 1996
	Bird	0.47	4.7	Hudson et al., 1984	Hudson et al., 1984
Vanadium	Rat - reproduction	0.21	2.1	Sample et al., 1996	Sample et al., 1996
	Mallard duck - mortality	11.4	114	Sample et al., 1996	Sample et al., 1996
Zinc	Rat - reproduction	160	320	Sample et al., 1996	Sample et al., 1996
	Chicken - reproduction	14.5	131	Sample et al., 1996	Sample et al., 1996

NA Not available.

1 Benzo(a)pyrene value used as a surrogate for mammal NOAELs and LOAELs; dimethylbenz(a)anthracene used as a surrogate for avian NOAELs and LOAELs.

2 A NOAEL of 0.3 mg/kg/day and a LOAEL of 3.0 mg/kg/day were used as fish TRVs for all PAHs and were based on the use of benzo(a)pyrene value as a surrogate.

3 4,4'-DDT used as a surrogate.

4 BHC mixed isomers used as a surrogate.

5 Chlordane used as a surrogate.

TABLE 7-2

EXPOSURE PARAMETERS FOR REPRESENTATIVE ECOLOGICAL RECEPTORS
SITE 12/SWMU 10 – JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Receptor	Representative Group	Body Weight[1] (grams)	Food Ingestion[1,2] (grams/day)	Assumed Diet for Exposure Assessment[1]	Home Range[1] (acres)
Short-tailed shrew (*Blarina carolinensis*)	Insectivorous Mammal	9.7[3]	6.0	87% invertebrates 13% soil[4]	0.96[1] to 2.4[3]
Cotton mouse (*Peromyscus gossypnius*)	Herbivorous Mammal	31[5]	8.6	98% vegetation 2% soil[6]	0.05 to 0.3[7]
Mink (*Mustela vison*)	Piscivorous Mammal	550	121	90.6% aquatic invertebrates 9.4% sediment[8]	640 to 4018 acres; 0.6 to 1.9 miles of shoreline
Red fox (*Vulpes vulpes*)	Predatory Mammal	3940	552	97.2% prey 2.8% soil	140 to 2100
American woodcock (*Scolopax minor*)	Vermivorous Bird	134	103	89.6% invertebrates 10.4% soil	8 to 185
American robin (*Turdus migratorius*)	Omnivorous Bird	77	69	35% invertebrates 60% vegetation 5% soil[9]	0.5 to 2.1 (nesting season)
Green Heron (*Butorides striatus*)	Piscivorous Bird	212[10]	40[11]	100% fish soil, sediment: none[9]	250[12]
Osprey (*Pandion haliaetus*)	Piscivorous Bird	1403	295	100% fish soil, sediment: none[9]	0.3 to 6 miles[13]
Red-tailed hawk (*Buteo jamaicensis*)	Carnivorous Bird	957	105	100% prey soil, sediment: none[9]	940 to 2440
Mummichog (*Fundulus heteroclitus*)	Forage fish	3.0[14]	0.18[15]	N/A; exposure assumed equal to sediment concentrations	40-400 yards in tidal creeks[15]
Red drum (*Sciaenops ocellatus*)	Upper trophic level fish	1000[16]	20[17]	85% prey, 15% sediment[18]	not available

1 Exposure parameters are from EPA (1993) unless otherwise noted.

2 Food ingestion includes intended food items and incidentially ingested soil or sediment. For example, a shrew would be expected to consume 5.2 g invertebrates plus 0.8 g soil per day.

3 Cothran et al. (1991).

4 Talmage and Walton (undated manuscript).

5 Lowery (1974).

6 Based on white-footed mouse (*Peromyscus leucopus*).

7 Based on deer mouse (*Peromyscus maniculatus*).

8 Incidental ingestion of soil/sediment not available for mink; assumed to be the same as the raccoon when feeding on aquatic prey items. Thus, values shown are those of the raccoon (EPA, 1993).

9 Sample and Suter (1994).

10 Dunning (1993).

11 Estimated using Kushlan's (1978) equation for food ingestion rate of herons.

12 Estimated using allometric equation from Peters (1983).

13 Foraging radius (home range acreage not available).

14 Iannuzzi et al. (1996).

15 Abraham (1985).

16 Wenner (1992); see Section 7.3.3.11 of text.

17 Evans and Engel (1994).

18 Gerking (1994); see Section 7.3.3.11 of text.

TABLE 7-3

SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Range of Non-Detects	Location of Maximum	EPA Region IV Screening Value	Maximum Hazard Quotient	Selected as COPC (Yes/No?)
		Min	Max					
Volatile Organic Compounds (ug/L)								
2-Butanone	2/2	2.1	2.6	0	PAI-10-SW-03-00	NA	NA	**Yes**
Acetone	1/3	13	13	9.2 - 11	PAI-10-SW-13-00	NA	NA	**Yes**
Carbon disulfide	5/13	0.2	1	1	PAI-10-SW-02-00	NA	NA	**Yes**
Semivolatile Organic Compounds (ug/L)								
Bis(2-ethylhexyl)phthalate	2/13	1	10.25	5	PAI-10-SW-08-00-AVG	NA	NA	**Yes**
Butylbenzyl phthalate	5/13	1	2	5	PAI-10-SW-04-00	29.4	0.07	No
Phenol	1/13	7	7	5	PAI-10-SW-04-00	58	0.12	No
Inorganics (ug/L)								
Aluminum	13/13	499	12900	0	PAI-10-SW-04-00	NA	NA	**Yes**
Arsenic	13/13	2.2	9	0	PAI-10-SW-01-00	36	0.25	No
Barium	13/13	17.3	253	0	PAI-10-SW-12-00-F	NA	NA	**Yes**
Chromium	13/13	8	32.1	0	PAI-10-SW-04-00	103	0.31	No
Iron	13/13	292	7890	0	PAI-10-SW-04-00	NA	NA	**Yes**
Manganese	13/13	23.2	214	0	PAI-10-SW-05-00	NA	NA	**Yes**
Selenium	2/13	14.675	18	3.5 - 17.5	PAI-10-SW-11-00	71	0.25	No
Thallium	2/13	14	30.1	0	PAI-10-SW-11-00-F	21.3	1.41	**Yes**
Vanadium	12/13	10.1	33.9	16.1	PAI-10-SW-04-00	NA	NA	**Yes**
Zinc	6/13	61.4	84.7	4.1 - 11.6	PAI-10-SW-09-00-F	86	0.98	No

N/A = Ecological screening value not available.

NOTE: The maximum concentrations shown above indicate the maximum concentration of filtered and unfiltered samples. See Appendix C for filtered vs. unfiltered data. The denominator in the frequency of detection refers to the numbers of sample locations; one filtered plus one unfiltered sample were collected at each sample location.

TABLE 7-4

SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SEDIMENT SAMPLES COLLECTED IN 1998-1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Analyte	Frequency of Detection	Range of Detection		Range of Non-Detects	Location of Maximum	EPA Region IV Screening Values	Maximum Hazard Quotient	Selected as COPC (Yes/No?)
		Min	Max					
Volatile Organic Compounds (ug/kg)								
2-Butanone	2/16	5	20	7.1 - 670	PAI-10-SD-07-01	NA	NA	**Yes**
2-Hexanone	1/16	4.4	4.4	7.1 - 670	PAI-10-SD-15-01	NA	NA	**Yes**
4-Methyl-2-pentanone	6/16	4	53.7	7.3 - 670	PAI-10-SD-06-01	NA	NA	**Yes**
Acetone	8/16	25	390	35 - 810	PAI-10-SD-08-01	NA	NA	**Yes**
Carbon disulfide	13/16	1.9	31	5.1 - 400	PAI-10-SD-08-01	NA	NA	**Yes**
Toluene	8/16	2.5	23	4.3 - 400	PAI-10-SD-08-01	NA	NA	**Yes**
Xylenes, Total	3/16	1.8	2.3	4.3 - 400	PAI-10-SD-04-01	NA	NA	**Yes**
Semivolatile Organic Compounds (ug/kg)								
Acenaphthene	1/18	120	120	93 - 270	PAI-10-SD-20-01	6.71	17.9	**Yes**
Benzo(a)anthracene	1/18	18	18	6.9 - 27	PAI-10-SD-013-01-AVG	74.8	0.24	No
Benzo(a)pyrene	7/18	11	38	6.9 - 13	PAI-10-SD-008-01-AVG	88.8	0.43	No
Benzo(b)fluoranthene	2/18	25	120	2.8 - 42	PAI-10-SD-008-01-AVG	88.8 [a]	1.35	**Yes**
Benzo(k)fluoranthene	1/17	18	18	2.8 - 27	PAI-10-SD-013-01-AVG	88.8 [a]	0.20	No
Bis(2-ethylhexyl)phthalate	8/18	45	440	480 - 2600	PAI-10-SD-07-01	182	2.42	**Yes**
Chrysene	1/18	44	44	6.9 - 27	PAI-10-SD-13-01-AVG	108	0.41	No
Di-*n*-octyl phthalate	1/18	63	63	460 - 2600	PAI-10-SD-06-01	182[b]	0.35	No
Fluoranthene	2/18	10	92	6.9 - 52	PAI-10-SD-013-01-AVG	113	0.81	No
Indeno (1,2,3-cd)pyrene	1/18	26	26	6.9 - 27	PAI-10-SD-014-01-AVG	NA	NA	**Yes**
Pentachlorophenol	1/18	180	180	910 - 5100	PAI-10-SD-14-02	NA	NA	**Yes**
Pyrene	1/18	89	89	9.3 - 27	PAI-10-SD-13-01-AVG	153	0.58	No
Total PAHs	8/18	246	1407	171-326	PAI-10-SD-008-01A	1684	0.84	No

TABLE 7-4

SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SEDIMENT SAMPLES COLLECTED IN 1998-1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Analyte	Frequency of Detection	Range of Detection		Range of Non-Detects	Location of Maximum	EPA Region IV Screening Values	Maximum Hazard Quotient	Selected as COPC (Yes/No?)
		Min	Max					
Pesticides/PCBs (ug/kg)								
4,4'-DDT	1/18	66	66	4.5 - 41	PAI-10-SD-14-02	1.19	55	Yes
Alpha-chlordane	1/18	12	12	2.3 - 21	PAI-10-SD-14-02	0.5[c]	24	Yes
Gamma-chlordane	1/18	14	14	2.3 - 21	PAI-10-SD-14-02	0.5[c]	28	Yes
Methoxychlor	1/18	680	680	23 - 210	PAI-10-SD-14-02	NA	NA	Yes
Inorganics (mg/kg)								
Aluminum	18/18	1870	52700	0	PAI-10-SD-08-01	NA	NA	Yes
Antimony	2/18	3.5	6.8	2.3 - 13.2	PAI-10-SD-09-01	2	3.40	Yes
Arsenic	18/18	0.35	18.5	0	PAI-10-SD-08-01	7.24	2.56	Yes
Barium	11/18	5.7	62.9	3.7 - 6.7	PAI-10-SD-08-01	NA	NA	Yes
Beryllium	13/18	0.21	2	0.11 - 0.79	PAI-10-SD-08-01	NA	NA	Yes
Cadmium	3/18	0.002	0.84	0.25 - 1.4	PAI-10-SD-14-01	0.676	1.24	Yes
Chromium	18/18	3.2	75	0	PAI-10-SD-08-01	52.3	1.43	Yes
Cobalt	9/18	0.92	10.3	0.92 - 3.4	PAI-10-SD-14-02	NA	NA	Yes
Copper	10/18	0.03	113	1.3 - 2.7	PAI-10-SD-14-01	18.7	6.04	Yes
Iron	18/18	1420	43100	0.5 - 1.1	PAI-10-SD-08-01	NA	NA	Yes
Lead	18/18	3.1	203	0	PAI-10-SD-14-01	30.2	6.72	Yes
Manganese	17/18	13.3	210	9.2	PAI-10-SD-08-01	NA	NA	Yes
Mercury	7/18	0.06	0.35	0.02 - 0.28	PAI-10-SD-14-01	0.13	2.69	Yes
Nickel	18/18	1.3	1060	0	PAI-10-SD-14-02	15.9	66.7	Yes
Selenium	3/18	0.1	10.7	0.1 - 2.5	PAI-10-SD-20-01	NA	NA	Yes
Thallium	1/18	0.36	0.36	0.21 - 13.1	PAI-10-SD-14-02	NA	NA	Yes
Vanadium	18/18	4.9	112	0	PAI-10-SD-08-01	NA	NA	Yes
Zinc	12/18	8.5	197	4.7 - 9.9	PAI-10-SD-14-01	124	1.59	Yes

N/A = Ecological screening value not available.

a Benzo(a)pyrene was used as surrogate for benzo(b)fluoranthene and benzo(k)fluoranthene.

b Bis(2-ethylhexyl) phthalate was used as surrogate for di-*n*-octyl phthalate.

c Chlordane was used as surrogate for alpha- and gamma-chlordane.

TABLE 7-5

SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SEDIMENT SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Range of Non Detects	Location of Maximum	EPA Region IV Screening Values	Maximum Hazard Quotient	Selected as COPC (Yes/No?)
		Min	Max					
Semivolatile Organic Compounds (ug/kg)								
Bis(2-ethylhexyl)phthalate	1/2	10000	10000	780	PI-12-01(35)/PAI-10-SDW-01	182	55.0	**Yes**
Di-n-octyl phthalate	1/2	900	900	620	PI-12-01(35)/PAI-10-SDW-01	182	4.95	**Yes**
Diethyl phthalate	1/2	29	29	200	PI-12-02(36)/PAI-10-SDW-02	182	0.16	No
Total PAHs	0/2	NA	NA	4030-13,000	PI-012-01(35)	1684	7.70	Yes
Pesticides/PCBs (ug/kg)								
4,4'-DDE	2/2	96	520	0	PI-12-01(35)/PAI-10-SDW-01	2.07	251	**Yes**
4,4'-DDT	1/1	38	38	0	PI-12-02(36)/PAI-10-SDW-02	1.19	31.9	**Yes**
Aroclor-1254	1/2	24000	24000	62	PI-12-01(35)/PAI-10-SDW-01	21.6	1111	**Yes**
Dieldrin	1/1	6.2	6.2	0	PI-12-02(36)/PAI-10-SDW-02	0.02	310	**Yes**
Endrin	1/2	1200	1200	6.2	PI-12-01(35)/PAI-10-SDW-01	0.02	60,000	**Yes**
alpha-BHC	1/2	3.1	3.1	47	PI-12-02(36)/PAI-10-SDW-02	NA	NA	**Yes**
Inorganics (mg/kg)								
Aluminum	2/2	9580	11700	0	PI-12-02(36)/PAI-10-SDW-02	NA	NA	**Yes**
Antimony	2/2	3.3	9.4	0	PI-12-02(36)/PAI-10-SDW-02	2	4.70	**Yes**
Arsenic	2/2	40.6	49.7	0	PI-12-02(36)/PAI-10-SDW-02	7.24	6.86	**Yes**
Barium	2/2	66.8	73.2	0	PI-12-01(35)/PAI-10-SDW-01	NA	NA	**Yes**
Cadmium	2/2	1.8	4.7	0	PI-12-02(36)/PAI-10-SDW-02	0.676	6.95	**Yes**
Chromium	2/2	37.8	119	0	PI-12-02(36)/PAI-10-SDW-02	52.3	2.28	**Yes**
Cobalt	2/2	8.2	22.7	0	PI-12-02(36)/PAI-10-SDW-02	NA	NA	**Yes**
Copper	2/2	168	489	0	PI-12-02(36)/PAI-10-SDW-02	18.7	26.2	**Yes**
Iron	2/2	122000	307000	0	PI-12-02(36)/PAI-10-SDW-02	NA	NA	**Yes**
Lead	2/2	589	2930	0	PI-12-02(36)/PAI-10-SDW-02	30.2	97.0	**Yes**
Manganese	2/2	297	1480	0	PI-12-02(36)/PAI-10-SDW-02	NA	NA	**Yes**
Nickel	2/2	41.4	86.9	0	PI-12-02(36)/PAI-10-SDW-02	15.9	5.47	**Yes**
Selenium	2/2	0.86	1.2	0	PI-12-01(35)/PAI-10-SDW-01	NA	NA	**Yes**
Silver	2/2	1.1	1.2	0	PI-12-01(35)/PAI-10-SDW-01	0.733	1.64	**Yes**
Vanadium	2/2	27.6	44.9	0	PI-12-02(36)/PAI-10-SDW-02	NA	NA	**Yes**
Zinc	2/2	751	1520	0	PI-12-02(36)/PAI-10-SDW-02	124	12.3	**Yes**

NA = Ecological screening value not available.
Bis(2-ethylhexyl)phthalate was used as a surrogate for other phthalates.

TABLE 7-6

SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Analyte	Frequency of Detection	Range of Detection		Range of Non-Detects	Location of Maximum	EPA Region IV Screening Value	Maximum Hazard Quotient	Selected as COPC (Yes/No?)
		Min	Max					
Volatile Organic Compounds (ug/kg)								
2-Hexanone	1/16	8.5	8.5	5.4 - 680	PAI-10-SS-09-01	NA	NA	Yes
4-Methyl-2-pentanone	6/16	3.8	26	5.6 - 680	PAI-10-SS-09-01	NA	NA	Yes
Acetone	4/15	23	350	11 - 660	PAI-10-SS-11-01	NA	NA	Yes
Carbon disulfide	1/16	6	6	3.3 - 410	PAI-10-SS-01A (1995)	NA	NA	Yes
Carbon tetrachloride	1/16	6	6	3.3 - 410	PAI-10-SS-01A (1995)	1,000,000	6.00E-06	No
Chloroform	2/16	1.8	7.5	3.3 - 410	PAI-10-SS-11-01	1.0	7.50	Yes
Chloromethane	2/16	3.6	17	3.3 - 410	PAI-10-SS-11-01	NA	NA	Yes
Tetrachloroethene	1/16	1	1	3.3 - 410	PAI-10-SS-01A	10	0.10	No
Toluene	9/16	1.3	3.9	3.3 - 410	PAI-10-SS-15-01A	50	0.08	No
Semivolatile Organic Compounds (ug/kg)								
2-Methylnaphthalene	1/16	385	385	350 - 460	PAI-10-SS-12-01-AVG	100 [a]	3.85	Yes
Acenaphthene	1/16	305	305	350 - 460	PAI-10-SS-12-01-AVG	20,000	0.02	No
Acenaphthylene	1/16	375	375	350 - 460	PAI-10-SS-12-01-AVG	100 [b]	3.75	Yes
Anthracene	1/16	24	24	340 - 460	PAI-10-SS-08-01	100	0.24	No
Benzo(a)anthracene	3/16	41	140	340 - 460	PAI-10-SS-08-01	100 [a]	1.40	Yes
Benzo(a)pyrene	3/16	32	120	340 - 460	PAI-10-SS-08-01	100	1.20	Yes
Benzo(b)fluoranthene	3/16	33	130	340 - 460	PAI-10-SS-01A (1995)	100 [a]	1.30	Yes
Benzo(g,h,i)perylene	2/16	50	55	340 - 460	PAI-10-SS-01A (1995)	100 [a]	0.55	No
Benzo(k)fluoranthene	2/16	34	110	340 - 460	PAI-10-SS-08-01	100 [a]	1.10	Yes
Bis(2-ethylhexyl)phthalate	9/16	30	480	340 - 440	PAI-10-SS-07-01	NA	NA	Yes
Chrysene	3/16	47	160	340 - 460	PAI-10-SS-08-01	100 [a]	1.60	Yes
Dibenzo(a,h)anthracene	1/16	34	34	340 - 460	PAI-10-SS-01A (1995)	100 [a]	0.34	No
Dimethyl phthalate	1/16	180	180	340 - 460	PAI-10-SS-01A (1995)	200,000	0.009	No
Fluoranthene	3/16	41	280	340 - 460	PAI-10-SS-08-01	100	2.80	Yes
Fluorene	1/16	220	220	350 - 460	PAI-10-SS-12-01-AVG	100 [b]	2.20	Yes
Indeno(1,2,3-cd)pyrene	2/11	64	69	350 - 460	PAI-10-SS-08-01	100 [a]	0.69	No
Naphthalene	1/16	1435	1435	350 - 460	PAI-10-SS-12-01-AVG	100	14.35	Yes
Pentachlorophenol	1/16	240	240	690 - 1100	PAI-10-SS-12-01-AVG	2	120	Yes
Phenanthrene	2/16	69	140	340 - 460	PAI-10-SS-08-01	100	1.40	Yes

TABLE 7-6

SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Analyte	Frequency of Detection	Range of Detection		Range of Non-Detects	Location of Maximum	EPA Region IV Screening Value	Maximum Hazard Quotient	Selected as COPC (Yes/No?)
		Min	Max					
Pyrene	4/16	24	230	340 - 460	PAI-10-SS-08-01	100	2.30	Yes
Total PAHs	5/16	782	2992	761-1021	PAI-10-SS-12-01-AVG	1000	3.00	Yes
Pesticides/PCBs (ug/kg)								
4,4'-DDE	1/16	43	43	3.4 - 4.5	PAI-10-SS-14-01	2.5	17.2	Yes
Methoxychlor	1/16	70	70	18 - 23	PAI-10-SS-13-01	100	0.70	No
Inorganics (mg/kg)								
Aluminum	16/16	822	5370	0	PAI-10-SS-14-01	50	107	Yes
Antimony	1/16	8	8	0.48 - 2.5	PAI-10-SS-14-01	3.5	2.29	Yes
Arsenic	16/16	0.24	50.8	0	PAI-10-SS-14-01	10	5.08	Yes
Barium	12/16	7	76.4	2.7 - 5.9	PAI-10-SS-14-01	165	0.46	No
Beryllium	5/16	0.08	0.17	0.02 - 0.19	PAI-10-SS-12-01-AVG	1.1	0.15	No
Cadmium	2/16	0.06	3.2	0.19 - 0.26	PAI-10-SS-14-01	1.6	2.00	Yes
Chromium	16/16	1.8	18.1	0	PAI-10-SS-14-01	10 [c]	1.81	Yes
Cobalt	6/16	0.455	6.6	0.33 - 0.82	PAI-10-SS-14-01	20	0.33	No
Copper	8/16	0.72	189	0.27 - 1	PAI-10-SS-14-01	40	4.73	Yes
Iron	16/16	485	99700	0	PAI-10-SS-14-01	200	498	Yes
Lead	16/16	4.4	1100	0	PAI-10-SS-14-01	50	22	Yes
Manganese	10/16	10.6	522	3.9 - 9.7	PAI-10-SS-14-01	100	5.22	Yes
Mercury	11/16	0.02	0.89	0.02 - 0.09	PAI-10-SS-14-01	0.1	8.90	Yes
Nickel	16/16	0.61	26.5	0	PAI-10-SS-14-01	30	0.88	No
Selenium	5/16	0.09	0.12	0.07 - 0.44	PAI-10-SS-08-01	0.81	0.15	No
Vanadium	16/16	1.7	9.3	0	PAI-10-SS-14-01	2.0	4.65	Yes
Zinc	9/16	4.75	1020	1.9 - 6.4	PAI-10-SS-14-01	50	20.4	Yes

Note: Sample number PAI-10-SS-01A was collected 12/14/95 and was originally designated as PI-012-03(37).
N/A = Ecological screening value (ESV) not available.

a Benzo(a)pyrene was used as a surrogate for high molecular weight PAH compounds when an ESV was not available.

b Naphthalene was used as a surrogate for low molecular weight PAH compounds when an ESV was not available.

c ESV for total chromium. Hexavalent chromium not detected.

TABLE 7-7

SELECTION OF CHEMICALS OF POTENTIAL CONCERN
GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Range of Non-Detects	Location of Maximum	EPA Region IV Screening Value[a]	Maximum Hazard Quotient	Selected as COPC (Yes/No?)
		Min	Max					
Volatile Organic Compounds (ug/L)								
Acetone	4/10	9.3	650	5 - 50	PAI-10-GW-08-01	NA	NA	**Yes**
Carbon disulfide	7/14	0.2	24	1 - 10	PAI-10-GW-10-01	NA	NA	**Yes**
Chloroform	4/14	0.4	4.5	1 - 10	PAI-10-GW-04-01	815	0.01	No
Chloromethane	2/14	0.2	0.3	1 - 10	PAI-10-GW-10-01	2700	0.0001	No
Toluene	1/14	0.2	0.2	1 - 10	PAI-10-GW-04-01	37	0.01	No
Trichloroethene	1/14	0.4	0.4	1 - 10	PAI-10-GW-04-01	NA	NA	**Yes**
Semivolatile Organic Compounds (ug/L)								
Benzoic acid	1/12	1	1	25 - 26	PAI-10-GW-01-01	NA	NA	**Yes**
Di-*n*-butyl phthalate	1/14	1	1	5	PAI-10-GW-10-01	3.4	0.29	No
Inorganics (ug/L)								
Aluminum	6/13	299	5140	22 - 168	PAI-10-GW-03-01	NA	NA	**Yes**
Arsenic	14/14	0.775	35.9	0	PAI-10-GW-02-01-F	36	0.997	No
Barium	14/14	36.4	366	0	PAI-10-GW-14-01-F	NA	NA	**Yes**
Cadmium	14/14	1.9	9.2	2	PAI-10-GW-12-01-F	9.3	0.99	No
Chromium	6/14	4.95	23.2	6.4 - 32	PAI-10-GW-10-01	103	0.23	No
Cobalt	3/14	3.9	15.5	3.3	PAI-10-GW-08-01-F	NA	NA	**Yes**
Copper	2/14	2.7	8.1	2.6	PAI-10-GW-06-01	2.9	2.79	**Yes**
Iron	13/13	2700	124000	0	PAI-10-GW-05-01-F	NA	NA	**Yes**
Manganese	13/13	44.4	1530	0	PAI-10-GW-06-01	NA	NA	**Yes**
Nickel	3/14	4.05	10.5	4.4	PAI-10-GW-08-01	8.3	1.27	**Yes**
Selenium	1/14	7.1	25.8	0.7 - 17.5	PAI-10-GW-12-01-F	71	0.36	No
Thallium	1/14	10	10	9 - 18	PAI-10-GW-06-01	21.3	0.47	No
Vanadium	12/14	2.7	14.2	2.6	PAI-10-GW-09-01	NA	NA	**Yes**
Zinc	5/14	5.9	82.8	7.9 - 19.5	PAI-10-GW-06-01	86	0.96	No

N/A = Ecological screening value not available.

a Average salinity of groundwater samples was 15.7 ppt. Thus, salt water ESVs were used.

TABLE 7-8

RESULTS OF FOOD-CHAIN MODELING
TERRESTRIAL RECEPTORS
MAXIMUM CONCENTRATIONS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Ecological Contaminant of Potential Concern	Shrew		Mouse		Robin		Hawk		Fox		Woodcock	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds												
2-Methylnaphthalene	5.26E-02	5.26E-03	2.84E-03	2.84E-04	3.13E-03	3.13E-04	1.33E-04	1.33E-05	3.16E-03	3.16E-04	5.85E-03	5.85E-04
Acenaphthene	1.45E-01	7.26E-02	1.73E-03	8.65E-04	1.10E-02	1.10E-03	1.00E-03	1.00E-04	1.05E-02	5.25E-03	2.34E-02	2.34E-03
Acenaphthylene	3.94E-02	1.97E-02	2.13E-03	1.06E-03	3.05E-03	3.05E-04	1.29E-04	1.29E-05	2.37E-03	1.18E-03	5.70E-03	5.70E-04
Benzo(a)anthracene	1.31E-02	1.31E-03	1.03E-03	1.03E-04	7.87E-04	7.87E-05	1.15E-05	1.15E-06	6.92E-04	6.92E-05	1.36E-03	1.36E-04
Benzo(a)pyrene	1.41E-02	1.41E-03	8.84E-04	8.84E-05	8.38E-04	8.38E-05	2.70E-05	2.70E-06	8.06E-04	8.06E-05	1.52E-03	1.52E-04
Benzo(b)fluoranthene	1.49E-02	1.49E-03	9.58E-04	9.58E-05	8.90E-04	8.90E-05	2.73E-05	2.73E-06	8.49E-04	8.49E-05	1.61E-03	1.61E-04
Benzo(k)fluoranthene	1.18E-02	1.18E-03	8.11E-04	8.11E-05	7.07E-04	7.07E-05	1.83E-05	1.83E-06	6.59E-04	6.59E-05	1.26E-03	1.26E-04
Bis(2-ethylhexyl)phthalate	1.62E-02	1.62E-03	3.81E-04	3.81E-05	1.64E-01	1.64E-02	7.18E-03	7.18E-04	6.39E-04	6.39E-05	3.35E-01	3.35E-02
Chrysene	1.59E-02	1.59E-03	1.18E-03	1.18E-04	9.50E-04	9.50E-05	1.84E-05	1.84E-06	8.56E-04	8.56E-05	1.66E-03	1.66E-04
Fluoranthene	2.49E-02	2.49E-03	2.06E-03	2.06E-04	1.49E-03	1.49E-04	1.46E-05	1.46E-06	1.28E-03	1.28E-04	2.54E-03	2.54E-04
Fluorene	2.32E-02	1.16E-02	1.25E-03	6.24E-04	1.79E-03	1.79E-04	7.60E-05	7.60E-06	1.39E-03	6.95E-04	3.35E-03	3.35E-04
Indeno(1,2,3-cd)pyrene	8.66E-03	8.66E-04	5.09E-04	5.09E-05	5.16E-04	5.16E-05	1.90E-05	1.90E-06	5.07E-04	5.07E-05	9.50E-04	9.50E-05
Naphthalene	1.48E-01	7.41E-02	8.14E-03	4.07E-03	1.14E-02	1.14E-03	4.72E-04	4.72E-05	8.84E-03	4.42E-03	2.14E-02	2.14E-03
Pentachlorophenol	6.19E-01	6.19E-02	6.36E-03	6.36E-04	NA	NA	NA	NA	1.67E-01	1.67E-02	NA	NA
Phenanthrene	1.01E-02	5.04E-03	7.94E-04	3.97E-04	7.85E-04	7.85E-05	1.12E-05	1.12E-06	5.30E-04	2.65E-04	1.35E-03	1.35E-04
Pyrene	2.08E-02	2.08E-03	1.70E-03	1.70E-04	1.25E-03	1.25E-04	1.39E-05	1.39E-06	1.08E-03	1.08E-04	2.13E-03	2.13E-04
Pesticides/PCBs												
4,4'-DDE	5.35E-02	1.07E-02	4.44E-04	8.89E-05	**8.96E+00**	8.96E-01	**3.44E+00**	3.44E-01	1.51E-02	3.03E-03	**1.92E+01**	**1.92E+00**
Methoxychlor	6.78E-03	3.39E-03	1.59E-04	7.95E-05	NA	NA	NA	NA	6.87E-05	3.43E-05	NA	NA
Metals and Inorganics												
Aluminum	**3.03E+02**	**3.03E+01**	**1.60E+01**	**1.60E+00**	**3.03E+00**	3.03E-01	2.13E-02	2.13E-03	**1.24E+01**	**1.24E+00**	**5.70E+00**	5.70E-01
Antimony	**3.96E+01**	**3.96E+00**	**1.05E+00**	1.05E-01	NA	NA	NA	NA	6.87E-01	6.87E-02	NA	NA
Arsenic	**8.10E+01**	**8.10E+00**	**6.35E+00**	6.35E-01	**2.79E+00**	9.31E-01	5.08E-02	1.69E-02	**2.81E+00**	2.81E-01	**4.84E+00**	**1.61E+00**
Barium	**9.27E+00**	9.27E-01	2.05E-01	2.05E-02	**1.38E+00**	6.86E-01	3.02E-03	1.51E-03	7.41E-02	7.41E-03	**2.82E+00**	**1.41E+00**
Beryllium	1.59E-01	1.59E-02	7.15E-02	7.15E-03	NA	NA	NA	NA	2.76E-03	2.76E-04	NA	NA
Cadmium	**1.35E+01**	**1.35E+00**	5.28E-01	5.28E-02	**6.13E+00**	4.44E-01	**3.92E+00**	2.84E-01	**7.07E+00**	7.07E-01	**1.19E+01**	8.62E-01

TABLE 7-8

RESULTS OF FOOD-CHAIN MODELING
TERRESTRIAL RECEPTORS
MAXIMUM CONCENTRATIONS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Ecological Contaminant of Potential Concern	Shrew		Mouse		Robin		Hawk		Fox		Woodcock	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Chromium (total)	9.19E-01	9.19E-02	3.29E-02	3.29E-03	**1.73E+00**	3.47E-01	8.90E-02	1.78E-02	1.81E-01	3.63E-02	**3.44E+00**	6.88E-01
Cobalt	**4.08E+00**	4.08E-01	4.38E-02	4.38E-03	**2.38E+00**	2.38E-01	7.24E-01	7.24E-02	9.25E-01	9.25E-02	**5.07E+00**	5.07E-01
Copper	**5.78E+00**	**4.46E+00**	6.34E-01	4.90E-01	**1.10E+00**	8.36E-01	1.36E-01	1.04E-01	1.85E-01	1.41E-01	**1.75E+00**	**1.33E+00**
Iron	**2.01E+02**	**2.01E+01**	**5.53E+02**	**5.53E+01**	**5.93E+02**	**5.93E+01**	**4.16E+00**	4.16E-01	**9.07E+00**	9.07E-01	**1.06E+02**	**1.06E+01**
Lead	**3.07E+01**	**3.07E+00**	**2.22E+00**	2.22E-01	**1.45E+02**	**1.45E+01**	4.26E-01	4.26E-02	**4.35E+00**	4.35E-01	**2.56E+02**	**2.56E+01**
Manganese	6.49E-01	2.01E-01	1.14E-01	3.52E-02	4.74E-02	4.74E-03	6.33E-05	6.33E-06	2.17E-03	2.17E-04	6.26E-02	6.26E-03
Mercury	**5.88E+01**	**3.53E+01**	**1.08E+01**	**6.51E+00**	**1.29E+02**	**1.29E+01**	2.58E-01	2.58E-02	8.66E-01	8.66E-02	**1.73E+02**	**1.73E+01**
Nickel	4.31E-01	2.15E-01	6.92E-03	3.46E-03	1.32E-01	9.58E-02	1.19E-02	8.63E-03	1.62E-02	1.17E-02	2.77E-01	2.00E-01
Selenium	3.66E-01	2.22E-01	1.13E-01	6.85E-02	2.15E-01	1.07E-01	2.43E-02	1.22E-02	3.14E-02	1.57E-02	2.27E-01	1.14E-01
Vanadium	**4.49E+00**	4.49E-01	2.59E-01	2.59E-02	4.70E-02	4.70E-03	4.54E-04	4.54E-05	3.76E-03	3.76E-04	8.71E-02	8.71E-03
Zinc	**1.15E+01**	**5.75E+00**	6.70E-01	3.35E-01	**8.76E+01**	**9.70E+00**	**5.19E+01**	**5.74E+00**	**6.47E+01**	**7.16E+00**	**1.61E+02**	**1.78E+01**

NA = NOAEL/LOAEL not available.

TABLE 7-9

RESULTS OF FOOD-CHAIN MODELING
TERRESTRIAL RECEPTORS
MEAN CONCENTRATIONS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Ecological Contaminant of Potential Concern	Shrew		Mouse		Robin		Hawk		Fox		Woodcock	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds												
2-Methylnaphthalene	2.78E-02	2.78E-03	1.50E-03	1.50E-04	1.65E-03	1.65E-04	3.73E-05	3.73E-06	1.26E-03	1.26E-04	3.09E-03	3.09E-04
Acenaphthene	2.05E-02	1.02E-02	1.12E-03	5.62E-04	1.58E-03	1.58E-04	3.48E-05	3.48E-06	9.31E-04	4.66E-04	2.95E-03	2.95E-04
Acenaphthylene	2.13E-02	1.07E-02	1.15E-03	5.75E-04	1.65E-03	1.65E-04	3.72E-05	3.72E-06	9.67E-04	4.83E-04	3.08E-03	3.08E-04
Benzo(a)anthracene	1.58E-02	1.58E-03	1.24E-03	1.24E-04	9.47E-04	9.47E-05	8.79E-06	8.79E-07	7.70E-04	7.70E-05	1.64E-03	1.64E-04
Benzo(a)pyrene	1.96E-02	1.96E-03	1.23E-03	1.23E-04	1.17E-03	1.17E-04	2.06E-05	2.06E-06	9.11E-04	9.11E-05	2.12E-03	2.12E-04
Benzo(b)fluoranthene	1.97E-02	1.97E-03	1.27E-03	1.27E-04	1.18E-03	1.18E-04	1.99E-05	1.99E-06	9.21E-04	9.21E-05	2.13E-03	2.13E-04
Benzo(k)fluoranthene	1.90E-02	1.90E-03	1.30E-03	1.30E-04	1.14E-03	1.14E-04	1.67E-05	1.67E-06	9.01E-04	9.01E-05	2.03E-03	2.03E-04
Bis(2-ethylhexyl)phthalate	1.62E-02	1.62E-03	3.81E-04	3.81E-05	1.64E-01	1.64E-02	7.18E-03	7.18E-04	6.39E-04	6.39E-05	3.35E-01	3.35E-02
Chrysene	1.70E-02	1.70E-03	1.26E-03	1.26E-04	1.01E-03	1.01E-04	1.17E-05	1.17E-06	8.16E-04	8.16E-05	1.78E-03	1.78E-04
Fluoranthene	1.60E-02	1.60E-03	1.32E-03	1.32E-04	9.59E-04	9.59E-05	6.66E-06	6.66E-07	7.88E-04	7.88E-05	1.63E-03	1.63E-04
Fluorene	2.32E-02	1.16E-02	1.25E-03	6.24E-04	1.79E-03	1.79E-04	7.60E-05	7.60E-06	1.39E-03	6.95E-04	3.35E-03	3.35E-04
Indeno(1,2,3-cd)pyrene	2.12E-02	2.12E-03	1.24E-03	1.24E-04	1.26E-03	1.26E-04	2.52E-05	2.52E-06	9.75E-04	9.75E-05	2.33E-03	2.33E-04
Naphthalene	2.78E-02	1.39E-02	1.53E-03	7.63E-04	2.15E-03	2.15E-04	4.72E-05	4.72E-06	1.26E-03	6.32E-04	4.00E-03	4.00E-04
Pentachlorophenol	6.19E-01	6.19E-02	6.36E-03	6.36E-04	NA	NA	NA	NA	1.67E-01	1.67E-02	NA	NA
Phenanthrene	1.30E-02	6.51E-03	1.03E-03	5.13E-04	1.01E-03	1.01E-04	9.24E-06	9.24E-07	6.34E-04	3.17E-04	1.75E-03	1.75E-04
Pyrene	1.49E-02	1.49E-03	1.22E-03	1.22E-04	8.97E-04	8.97E-05	6.84E-06	6.84E-07	7.34E-04	7.34E-05	1.53E-03	1.53E-04
Pesticides/PCBs												
4,4'-DDE	5.49E-03	1.10E-03	4.56E-05	9.11E-06	9.19E-01	9.19E-02	1.77E-01	1.77E-02	7.92E-04	1.58E-04	**1.97E+00**	1.97E-01
Methoxychlor	1.30E-03	6.49E-04	3.04E-05	1.52E-05	NA	NA	NA	NA	1.31E-05	6.57E-06	NA	NA
Metals and Inorganics												
Aluminum	**1.92E+02**	**1.92E+01**	**1.02E+01**	**1.02E+00**	**1.92E+00**	1.92E-01	6.86E-03	6.86E-04	**7.39E+00**	7.39E-01	**3.61E+00**	3.61E-01
Antimony	**6.81E+00**	6.81E-01	1.81E-01	1.81E-02	NA	NA	NA	NA	8.22E-02	8.22E-03	NA	NA
Arsenic	**6.17E+00**	6.17E-01	4.83E-01	4.83E-02	2.13E-01	7.09E-02	2.26E-03	7.52E-04	1.75E-01	1.75E-02	3.68E-01	1.23E-01
Barium	**1.60E+00**	1.60E-01	3.54E-02	3.54E-03	2.37E-01	1.18E-01	2.68E-04	1.34E-04	1.15E-02	1.15E-03	4.87E-01	2.43E-01
Beryllium	7.32E-02	7.32E-03	3.28E-02	3.28E-03	NA	NA	NA	NA	1.27E-03	1.27E-04	NA	NA
Cadmium	**1.24E+00**	1.24E-01	4.85E-02	4.85E-03	5.64E-01	4.09E-02	1.94E-01	1.41E-02	3.50E-01	3.50E-02	**1.09E+00**	7.93E-02

TABLE 7-9

RESULTS OF FOOD-CHAIN MODELING
TERRESTRIAL RECEPTORS
MEAN CONCENTRATIONS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Ecological Contaminant of Potential Concern	Shrew		Mouse		Robin		Hawk		Fox		Woodcock	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Chromium (total)	2.11E-01	2.11E-02	7.55E-03	7.55E-04	3.98E-01	7.97E-02	1.03E-02	2.06E-03	8.88E-03	8.88E-04	7.91E-01	1.58E-01
Cobalt	4.46E-01	4.46E-02	4.79E-03	4.79E-04	2.60E-01	2.60E-02	3.97E-02	3.97E-03	5.22E-02	5.22E-03	5.55E-01	5.55E-02
Copper	4.02E-01	3.11E-01	4.42E-02	3.41E-02	7.65E-02	5.83E-02	5.89E-03	4.49E-03	3.38E-02	2.61E-02	1.22E-01	9.28E-02
Iron	**1.64E+01**	**1.64E+00**	**4.51E+01**	**4.51E+00**	**4.83E+01**	**4.83E+00**	**4.63E+00**	4.63E-01	**1.21E+01**	**1.21E+00**	**8.62E+00**	8.62E-01
Lead	**2.20E+00**	2.20E-01	1.58E-01	1.58E-02	**1.04E+01**	**1.04E+00**	1.74E-02	1.74E-03	4.16E-02	4.16E-03	**1.83E+01**	**1.83E+00**
Manganese	8.24E-02	2.55E-02	1.44E-02	4.46E-03	6.01E-03	6.01E-04	7.73E-06	7.73E-07	3.06E-03	9.48E-04	7.94E-03	7.94E-04
Mercury	**5.91E+00**	**3.54E+00**	**1.09E+00**	6.54E-01	**1.29E+01**	**1.29E+00**	1.80E-02	1.80E-03	3.29E-02	1.97E-02	**1.74E+01**	**1.74E+00**
Nickel	4.36E-02	2.18E-02	7.00E-04	3.50E-04	1.34E-02	9.69E-03	6.14E-04	4.44E-04	1.74E-03	8.69E-04	2.80E-02	2.03E-02
Selenium	2.83E-01	1.72E-01	8.74E-02	5.29E-02	1.66E-01	8.30E-02	1.58E-02	7.91E-03	4.11E-02	2.49E-02	1.76E-01	8.80E-02
Vanadium	**2.18E+00**	2.18E-01	1.26E-01	1.26E-02	2.29E-02	2.29E-03	1.13E-04	1.13E-05	9.21E-02	9.21E-03	4.24E-02	4.24E-03
Zinc	8.16E-01	4.08E-01	4.75E-02	2.38E-02	**6.22E+00**	6.89E-01	**2.05E+00**	2.27E-01	2.33E-01	1.16E-01	**1.14E+01**	**1.26E+00**

NA = NOAEL/LOAEL not available.

TABLE 7-10

RESULTS OF FOOD-CHAIN MODELING
AQUATIC RECEPTORS
MAXIMUM CONCENTRATION OF SAMPLES COLLECTED IN 1998 AND 1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Ecological Contaminant of Potential Concern	Mink		Heron		Mummichog		Red Drum		Osprey	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds										
Acenaphthene	1.35E-02	6.75E-03	1.43E-03	1.43E-04	2.40E-02	2.40E-03	5.49E-03	5.49E-04	5.00E-04	5.00E-05
Benzo(a)anthracene	2.63E-03	2.63E-04	2.14E-04	2.14E-05	3.60E-03	3.60E-04	8.23E-04	8.23E-05	7.50E-05	7.50E-06
Benzo(a)pyrene	5.56E-03	5.56E-04	4.52E-04	4.52E-05	7.60E-03	7.60E-04	1.74E-03	1.74E-04	1.58E-04	1.58E-05
Benzo(b)fluoranthene	1.76E-02	1.76E-03	1.43E-03	1.43E-04	2.40E-02	2.40E-03	5.49E-03	5.49E-04	5.00E-04	5.00E-05
Benzo(k)fluoranthene	2.63E-03	2.63E-04	2.14E-04	2.14E-05	3.60E-03	3.60E-04	8.23E-04	8.23E-05	7.50E-05	7.50E-06
Bis(2-ethylhexyl)phthalate	1.09E-02	1.09E-03	1.64E-01	1.64E-02	NA	NA	NA	NA	5.75E-02	5.75E-03
Chrysene	6.44E-03	6.44E-04	5.23E-04	5.23E-05	8.80E-03	8.80E-04	2.01E-03	2.01E-04	1.83E-04	1.83E-05
Fluoranthene	1.35E-02	1.35E-03	1.09E-03	1.09E-04	1.84E-02	1.84E-03	4.21E-03	4.21E-04	3.83E-04	3.83E-05
Indeno(1,2,3-cd)pyrene	3.80E-03	3.80E-04	3.09E-04	3.09E-05	5.20E-03	5.20E-04	1.19E-03	1.19E-04	1.08E-04	1.08E-05
Pentachlorophenol	3.40E-01	3.40E-02	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	1.30E-02	1.30E-03	1.06E-03	1.06E-04	1.78E-02	1.78E-03	4.07E-03	4.07E-04	3.71E-04	3.71E-05
Pesticides/PCBs										
4,4'-DDT	6.14E-02	1.23E-02	**1.61E+01**	**1.61E+00**	NA	NA	NA	NA	**5.66E+00**	5.66E-01
Alpha-chlordane	5.45E-03	2.72E-03	1.10E-02	2.19E-03	NA	NA	NA	NA	3.84E-03	7.69E-04
Gamma-chlordane	2.99E-03	1.50E-03	5.96E-03	1.19E-03	NA	NA	NA	NA	2.09E-03	4.17E-04
Methoxychlor	1.36E-01	6.81E-02	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics										
Aluminum	**6.01E+03**	**6.01E+02**	**9.06E+01**	**9.06E+00**	NA	NA	NA	NA	**1.01E+02**	**1.01E+01**
Antimony	**1.20E+01**	**1.20E+00**	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	**3.23E+01**	**3.23E+00**	**1.42E+00**	4.73E-01	**1.88E+00**	1.56E-01	6.27E-01	5.21E-02	**1.58E+00**	5.27E-01
Barium	**2.72E+00**	2.72E-01	5.71E-01	2.85E-01	NA	NA	NA	NA	6.36E-01	3.17E-01
Beryllium	6.67E-01	6.67E-02	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.85E-01	1.85E-02	1.09E-01	7.92E-03	NA	NA	NA	NA	1.22E-01	8.83E-03
Chromium (total)	**5.03E+00**	5.03E-01	**1.42E+01**	**2.83E+00**	**2.25E+02**	**3.75E+01**	**7.50E+01**	**1.25E+01**	**1.58E+01**	**3.15E+00**

TABLE 7-10

RESULTS OF FOOD-CHAIN MODELING
AQUATIC RECEPTORS
MAXIMUM CONCENTRATION OF SAMPLES COLLECTED IN 1998 AND 1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Ecological Contaminant of Potential Concern	Mink		Heron		Mummichog		Red Drum		Osprey	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Cobalt	**2.27E+00**	2.27E-01	**1.94E+00**	1.94E-01	NA	NA	NA	NA	**2.17E+00**	2.17E-01
Copper	**2.12E+00**	**1.64E+00**	4.54E-01	3.46E-01	NA	NA	NA	NA	5.06E-01	3.85E-01
Iron	**1.90E+02**	**1.90E+01**	**8.13E+01**	**8.13E+00**	NA	NA	NA	NA	**9.06E+01**	**9.06E+00**
Lead	**5.58E+00**	5.58E-01	**3.39E+01**	**3.39E+00**	NA	NA	NA	NA	**3.78E+01**	**3.78E+00**
Manganese	5.25E-01	1.63E-01	4.06E-02	4.06E-03	NA	NA	NA	NA	4.52E-02	4.52E-03
Mercury	**5.13E+00**	**3.08E+00**	**1.03E+01**	**1.03E+00**	**2.63E+00**	2.23E-02	8.75E-01	7.45E-03	**1.15E+01**	**1.15E+00**
Nickel	**5.83E+00**	**2.92E+00**	**2.58E+00**	**1.87E+00**	NA	NA	NA	NA	**2.88E+00**	**2.08E+00**
Selenium	**1.18E+01**	**7.14E+00**	**5.05E+00**	**2.52E+00**	NA	NA	NA	NA	**5.62E+00**	**2.81E+00**
Thallium	**1.07E+01**	**1.07E+00**	1.45E-01	1.45E-02	NA	NA	NA	NA	1.61E-01	1.61E-02
Vanadium	**1.17E+02**	**1.17E+01**	**1.85E+00**	1.85E-01	NA	NA	NA	NA	**2.07E+00**	2.07E-01
Zinc	2.71E-01	1.35E-01	**2.56E+00**	2.84E-01	NA	NA	NA	NA	**2.86E+00**	3.16E-01

NA = NOAEL/LOAEL not available.

TABLE 7-11

RESULTS OF FOOD-CHAIN MODELING
AQUATIC RECEPTORS
MEAN CONCENTRATIONS OF SAMPLES COLLECTED IN 1998 AND 1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Ecological Contaminant of Potential Concern	Mink		Heron		Mummichog		Red Drum		Osprey	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds										
Acenaphthene	8.02E-03	4.01E-03	8.48E-04	8.48E-05	1.43E-02	1.43E-03	3.26E-03	3.26E-04	2.97E-04	2.97E-05
Benzo(a)anthracene	1.06E-03	1.06E-04	8.61E-05	8.61E-06	1.45E-03	1.45E-04	3.31E-04	3.31E-05	3.01E-05	3.01E-06
Benzo(a)pyrene	1.91E-03	1.91E-04	1.55E-04	1.55E-05	2.61E-03	2.61E-04	5.96E-04	5.96E-05	5.43E-05	5.43E-06
Benzo(b)fluoranthene	2.64E-03	2.64E-04	2.14E-04	2.14E-05	3.60E-03	3.60E-04	8.24E-04	8.24E-05	7.50E-05	7.50E-06
Benzo(k)fluoranthene	1.03E-03	1.03E-04	8.38E-05	8.38E-06	1.41E-03	1.41E-04	3.22E-04	3.22E-05	2.93E-05	2.93E-06
Bis(2-ethylhexyl)phthalate	8.37E-03	8.37E-04	1.26E-01	1.26E-02	NA	NA	NA	NA	4.40E-02	4.40E-03
Chrysene	1.27E-03	1.27E-04	1.03E-04	1.03E-05	1.74E-03	1.74E-04	3.97E-04	3.97E-05	3.62E-05	3.62E-06
Fluoranthene	2.50E-03	2.50E-04	2.03E-04	2.03E-05	3.41E-03	3.41E-04	7.80E-04	7.80E-05	7.11E-05	7.11E-06
Indeno(1,2,3-cd)pyrene	1.10E-03	1.10E-04	8.97E-05	8.97E-06	1.51E-03	1.51E-04	3.45E-04	3.45E-05	3.14E-05	3.14E-06
Pentachlorophenol	1.52E+00	1.52E-01	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	1.71E-03	1.71E-04	1.39E-04	1.39E-05	2.33E-03	2.33E-04	5.33E-04	5.33E-05	4.86E-05	4.86E-06
Pesticides/PCBs (mg/kg)										
4,4'-DDT	7.95E-03	1.59E-03	**2.09E+00**	2.09E-01	NA	NA	NA	NA	7.32E-01	7.32E-02
Alpha-chlordane	1.44E-03	7.19E-04	2.90E-03	5.80E-04	NA	NA	NA	NA	1.02E-03	2.03E-04
Gamma-chlordane	7.01E-04	3.51E-04	1.40E-03	2.79E-04	NA	NA	NA	NA	4.89E-04	9.78E-05
Methoxychlor	1.26E-02	6.29E-03	NA	NA	NA	NA	NA	NA	NA	NA
Inorganics (mg/kg)										
Aluminum	**1.12E+03**	**1.12E+02**	**1.69E+01**	**1.69E+00**	NA	NA	NA	NA	**1.89E+01**	**1.89E+00**
Antimony	**3.87E+00**	3.87E-01	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	**8.12E+00**	8.12E-01	3.57E-01	1.19E-01	4.73E-01	3.93E-02	1.58E-01	1.31E-02	3.97E-01	1.32E-01
Barium	5.23E-01	5.23E-02	1.10E-01	5.48E-02	NA	NA	NA	NA	1.22E-01	6.10E-02
Beryllium	1.35E-01	1.35E-02	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	5.12E-02	5.12E-03	3.03E-02	2.20E-03	NA	NA	NA	NA	3.38E-02	2.45E-03
Chromium (total)	**1.09E+00**	1.09E-01	**3.07E+00**	6.14E-01	**4.88E+01**	**8.13E+00**	**1.63E+01**	**2.71E+00**	**3.42E+00**	6.84E-01
Cobalt	4.83E-01	4.83E-02	4.14E-01	4.14E-02	NA	NA	NA	NA	4.62E-01	4.62E-02
Copper	1.83E-01	1.41E-01	3.90E-02	2.97E-02	NA	NA	NA	NA	4.35E-02	3.31E-02
Iron	**4.93E+01**	**4.93E+00**	**2.12E+01**	**2.12E+00**	NA	NA	NA	NA	**2.36E+01**	**2.36E+00**
Lead	6.21E-01	6.21E-02	**3.77E+00**	3.77E-01	NA	NA	NA	NA	**4.20E+00**	4.20E-01

TABLE 7-11

RESULTS OF FOOD-CHAIN MODELING
AQUATIC RECEPTORS
MEAN CONCENTRATIONS OF SAMPLES COLLECTED IN 1998 AND 1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Ecological Contaminant of Potential Concern	Mink		Heron		Mummichog		Red Drum		Osprey	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Manganese	1.24E-01	3.85E-02	9.60E-03	9.60E-04	NA	NA	NA	NA	1.07E-02	1.07E-03
Mercury	**1.03E+00**	6.18E-01	**2.07E+00**	2.07E-01	5.27E-01	4.49E-03	1.76E-01	1.50E-03	**2.31E+00**	2.31E-01
Nickel	3.47E-01	1.74E-01	1.54E-01	1.11E-01	NA	NA	NA	NA	1.71E-01	1.24E-01
Selenium	**1.27E+00**	7.73E-01	5.47E-01	2.73E-01	NA	NA	NA	NA	6.09E-01	3.04E-01
Thallium	**2.13E+01**	**2.13E+00**	2.87E-01	2.87E-02	NA	NA	NA	NA	3.20E-01	3.20E-02
Vanadium	**2.42E+01**	**2.42E+00**	3.83E-01	3.83E-02	NA	NA	NA	NA	4.26E-01	4.26E-02
Zinc	4.21E-02	2.11E-02	3.99E-01	4.41E-02	NA	NA	NA	NA	4.44E-01	4.92E-02

NA = NOAEL/LOAEL not available.

TABLE 7-12

RESULTS OF FOOD-CHAIN MODELING
AQUATIC RECEPTORS
MAXIMUM CONCENTRATIONS - 1995 SAMPLES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Ecological Contaminant of Potential Concern	Mink		Heron		Mummichog		Red Drum		Osprey	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds										
Bis(2-ethylhexyl)phthalate	2.48E-01	2.48E-02	**3.73E+00**	3.73E-01	NA	NA	NA	NA	**1.31E+00**	1.31E-01
Di-*n*-octyl phthalate	3.14E-02	3.14E-03	3.36E-01	3.36E-02	NA	NA	NA	NA	1.18E-01	1.18E-02
Diethyl phthalate	2.87E-06	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs										
4,4'-DDE	**2.18E+00**	4.36E-01	**5.87E+02**	**5.87E+01**	NA	NA	NA	NA	**2.05E+02**	**2.05E+01**
4,4'-DDT	3.54E-02	7.07E-03	**9.30E+00**	9.30E-01	NA	NA	NA	NA	**3.26E+00**	3.26E-01
Aroclor-1254	**2.90E+02**	**2.90E+01**	**1.01E+02**	**1.01E+01**	NA	NA	NA	NA	**3.54E+01**	**3.54E+00**
Dieldrin	2.48E-01	2.48E-02	5.94E-02	5.94E-03	NA	NA	NA	NA	2.08E-02	2.08E-03
Endrin	**1.04E+01**	**1.04E+00**	**8.86E+01**	**8.86E+00**	NA	NA	NA	NA	**3.10E+01**	**3.10E+00**
alpha-BHC	1.77E-01	1.77E-02	4.09E-03	1.02E-03	NA	NA	NA	NA	1.43E-03	3.56E-04
Inorganics										
Aluminum	**1.33E+03**	**1.33E+02**	**2.01E+01**	**2.01E+00**	NA	NA	NA	NA	**2.24E+01**	**2.24E+00**
Antimony	**1.65E+01**	**1.65E+00**	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	**8.68E+01**	**8.68E+00**	**3.81E+00**	**1.27E+00**	**5.05E+00**	4.20E-01	**1.68E+00**	1.40E-01	**4.25E+00**	**1.42E+00**
Barium	**3.16E+00**	3.16E-01	6.64E-01	3.31E-01	NA	NA	NA	NA	7.40E-01	3.69E-01
Cadmium	**1.03E+00**	1.03E-01	6.12E-01	4.43E-02	NA	NA	NA	NA	6.82E-01	4.94E-02
Chromium	**7.98E+00**	7.98E-01	**2.25E+01**	**4.49E+00**	**3.57E+02**	**5.95E+01**	**1.19E+02**	**1.98E+01**	**2.50E+01**	**5.00E+00**
Cobalt	**4.99E+00**	4.99E-01	**4.28E+00**	4.28E-01	NA	NA	NA	NA	**4.77E+00**	4.77E-01
Copper	**9.19E+00**	**7.11E+00**	**1.96E+00**	**1.50E+00**	NA	NA	NA	NA	**2.19E+00**	**1.67E+00**
Iron	**1.35E+03**	**1.35E+02**	**5.79E+02**	**5.79E+01**	NA	NA	NA	NA	**6.46E+02**	**6.46E+01**
Lead	**8.06E+01**	**8.06E+00**	**4.89E+02**	**4.89E+01**	NA	NA	NA	NA	**5.45E+02**	**5.45E+01**
Manganese	**3.70E+00**	**1.15E+00**	2.86E-01	2.86E-02	NA	NA	NA	NA	3.19E-01	3.19E-02
Nickel	4.78E-01	2.39E-01	2.12E-01	1.53E-01	NA	NA	NA	NA	2.36E-01	1.71E-01
Selenium	**1.32E+00**	8.00E-01	5.66E-01	2.83E-01	NA	NA	NA	NA	6.31E-01	3.15E-01
Silver	1.47E-01	1.47E-02	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	**4.70E+01**	**4.70E+00**	7.43E-01	7.43E-02	NA	NA	NA	NA	8.28E-01	8.28E-02
Zinc	**2.09E+00**	**1.05E+00**	**1.98E+01**	**2.19E+00**	NA	NA	NA	NA	**2.20E+01**	**2.44E+00**

NA = NOAEL/LOAEL not available.

TABLE 7-13

RESULTS OF FOOD-CHAIN MODELING
AQUATIC RECEPTORS
MEAN CONCENTRATIONS - 1995 SAMPLES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Ecological Contaminant of Potential Concern	Mink		Heron		Mummichog		Red Drum		Osprey	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds										
Bis(2-ethylhexyl)phthalate	1.29E-01	1.29E-02	**1.94E+00**	1.94E-01	NA	NA	NA	NA	6.78E-01	6.78E-02
Di-n-octyl phthalate	2.11E-02	2.11E-03	2.26E-01	2.26E-02	NA	NA	NA	NA	7.90E-02	7.90E-03
Diethyl phthalate	5.10E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pesticides/PCBs										
4,4'-DDE	**1.29E+00**	2.58E-01	**3.47E+02**	**3.47E+01**	NA	NA	NA	NA	**1.22E+02**	**1.22E+01**
4,4'-DDT	3.54E-02	7.07E-03	**9.30E+00**	9.30E-01	NA	NA	NA	NA	**3.26E+00**	3.26E-01
Aroclor-1254	**1.45E+02**	**1.45E+01**	**5.07E+01**	**5.07E+00**	NA	NA	NA	NA	**1.77E+01**	**1.77E+00**
Dieldrin	2.48E-01	2.48E-02	5.94E-02	5.94E-03	NA	NA	NA	NA	2.08E-02	2.08E-03
Endrin	**5.23E+00**	5.23E-01	**4.44E+01**	**4.44E+00**	NA	NA	NA	NA	**1.56E+01**	**1.56E+00**
alpha-BHC	7.61E-01	7.61E-02	1.75E-02	4.36E-03	NA	NA	NA	NA	6.14E-03	1.53E-03
Inorganics										
Aluminum	**1.21E+03**	**1.21E+02**	**1.83E+01**	**1.83E+00**	NA	NA	NA	NA	**2.04E+01**	**2.04E+00**
Antimony	**1.12E+01**	**1.12E+00**	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	**7.88E+01**	**7.88E+00**	**3.46E+00**	**1.15E+00**	**4.59E+00**	3.82E-01	**1.53E+00**	1.27E-01	**3.86E+00**	**1.29E+00**
Barium	**3.02E+00**	3.02E-01	6.35E-01	3.17E-01	NA	NA	NA	NA	7.08E-01	3.53E-01
Cadmium	7.15E-01	7.15E-02	4.23E-01	3.07E-02	NA	NA	NA	NA	4.71E-01	3.42E-02
Chromium	**5.26E+00**	5.26E-01	**1.48E+01**	**2.96E+00**	**2.35E+02**	**3.92E+01**	**7.84E+01**	**1.31E+01**	**1.65E+01**	**3.30E+00**
Cobalt	**3.40E+00**	3.40E-01	**2.92E+00**	2.92E-01	NA	NA	NA	NA	**3.25E+00**	3.25E-01
Copper	**6.18E+00**	**4.77E+00**	**1.32E+00**	**1.00E+00**	NA	NA	NA	NA	**1.47E+00**	**1.12E+00**
Iron	**9.44E+02**	**9.44E+01**	**4.05E+02**	**4.05E+01**	NA	NA	NA	NA	**4.51E+02**	**4.51E+01**
Lead	**4.84E+01**	**4.84E+00**	**2.94E+02**	**2.94E+01**	NA	NA	NA	NA	**3.27E+02**	**3.27E+01**
Manganese	**2.22E+00**	6.88E-01	1.72E-01	1.72E-02	NA	NA	NA	NA	1.91E-01	1.91E-02
Nickel	3.53E-01	1.76E-01	1.56E-01	1.13E-01	NA	NA	NA	NA	1.74E-01	1.26E-01
Selenium	**1.13E+00**	6.87E-01	4.86E-01	2.43E-01	NA	NA	NA	NA	5.41E-01	2.71E-01
Silver	1.41E-01	1.41E-02	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	**3.80E+01**	**3.80E+00**	6.00E-01	6.00E-02	NA	NA	NA	NA	6.69E-01	6.69E-02
Zinc	**1.56E+00**	7.81E-01	**1.48E+01**	**1.64E+00**	NA	NA	NA	NA	**1.65E+01**	**1.82E+00**

NA = NOAEL/LOAEL not available.

TABLE 7-14

RESULTS OF FOOD-CHAIN MODELING
AQUATIC RECEPTORS
MAXIMUM - FILTERED SURFACE WATER CONCENTRATIONS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Ecological Contaminant of Potential Concern	Mink		Heron		Mummichog		Red Drum		Osprey	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metal and Inorganics										
Barium	2.97E-01	2.97E-02	9.64E-03	4.81E-03	NA	NA	NA	NA	1.02E-02	5.10E-03
Manganese	2.28E-01	7.06E-02	1.52E-02	1.52E-03	NA	NA	NA	NA	1.69E-02	1.69E-03
Thallium	**9.77E+01**	**9.77E+00**	**1.44E+00**	1.44E-01	NA	NA	NA	NA	**1.60E+00**	1.60E-01
Vanadium	**1.10E+01**	**1.10E+00**	7.99E-05	7.99E-06	NA	NA	NA	NA	4.24E-06	4.24E-07

NA = NOAEL/LOAEL not available.

TABLE 7-15

RESULTS OF FOOD-CHAIN MODELING
AQUATIC RECEPTORS
MEAN - FILTERED SURFACE WATER CONCENTRATIONS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Ecological Contaminant of Potential Concern	Mink		Heron		Mummichog		Red Drum		Osprey	
	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ	NOAEL HQ	LOAEL HQ
Metals and Inorganics										
Barium	6.93E-02	6.93E-03	4.67E-03	2.33E-03	NA	NA	NA	NA	4.95E-03	2.47E-03
Manganese	1.23E-01	3.83E-02	9.53E-03	9.53E-04	NA	NA	NA	NA	1.06E-02	1.06E-03
Thallium	**2.73E+01**	**2.73E+00**	3.78E-01	3.78E-02	NA	NA	NA	NA	4.20E-01	4.20E-02
Vanadium	**2.28E+00**	2.28E-01	5.08E-05	5.08E-06	NA	NA	NA	NA	2.69E-06	2.69E-07

NA = NOAEL/LOAEL not available.

TABLE 7-16

PREDICTED FISH TISSUE CONCENTRATIONS BASED ON SEDIMENT DATA FROM 1998 AND 1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Contaminant of Potential Concern (COPC)	Predicted Fish Tissue Concentrations (mg/kg wet weight)			
	Mummichog		Red Drum	
	Maximum[a]	Average[b]	Maximum[a]	Average[b]
MERCURY	NA[c]	NA[c]	0.90	0.32
4,4'-DDT	0.2396	0.0310	0.0753	0.0098
Methoxychlor	2.6608	0.2458	0.8363	0.0773
Alpha-chlordane	0.1244	0.0328	0.0391	0.0103
Gamma-chlordane	0.0675	0.0158	0.021	0.0498

a Fish tissue concentration based on maximum sediment concentration of COPC.
b Fish tissue concentration based on average sediment concentration of COPC.
c Mercury model was applicable only to the red drum.

TABLE 7-17

GUIDELINES FOR PROTECTION OF FISH AND PISCIVOROUS RECEPTORS
MERCURY
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Data Associated With Effects			Reference
Fish Species	Concentration (mg/kg)	Endpoint/Effect	
Fathead minnow	9.41	NOED growth	ERED, 1998
	1.31	LOED growth	ERED, 1998
	2.75-10.9	No effect - survival	Jarvinen and Ankley, 1999
	0.8-10.9	No effect - growth	Jarvinen and Ankley, 1999
	1.31, 4.76	Reduced growth	Jarvinen and Ankley, 1999
	2.84	No effect - reproduction	Jarvinen and Ankley, 1999
	1.36	Reduced growth, 2nd generation	Jarvinen and Ankley, 1999
Japanese medaka	16	NOED development, morphology	ERED, 1998: Jarvinen and Ankley, 1999
	29	LOED development, behavior	ERED, 1998
Winter flounder	2	LOED physiology	ERED, 1998
Rainbow trout	0.14	NOED growth	ERED, 1998
	2	LOED mortality	ERED, 1998
	1.9-12	No effect - survival	Jarvinen and Ankley, 1999
	11.2, 12.2	Reduced survival	Jarvinen and Ankley, 1999
	2.28-8.63	No effect - growth	Jarvinen and Ankley, 1999
	8.6-35	Reduced growth	Jarvinen and Ankley, 1999
	5.0-35	No effect - survival	Jarvinen and Ankley, 1999
Brook trout	2.7	NOED development, mortality	ERED, 1998
	3.4	LOED reproduction	ERED, 1998
Northern pike	7	LOED physiology	ERED, 1998
	12.5	Reduced survival	Jarvinen and Ankley, 1999
	10.9	No effect - survival, growth	Jarvinen and Ankley, 1999
Walleye	0.25	NOED growth	ERED, 1998
	0.25	LOED growth, development, physiology	ERED, 1998 ERED, 1998
	2.37	NOED mortality	ERED, 1998
Yellow perch	0.135	NOED growth	ERED, 1998
Goldfish	7	Reduced survival	Jarvinen and Ankley, 1999
	6.1	No effect - survival	Jarvinen and Ankley, 1999
Guppy	0.2	No effect - survival	Jarvinen and Ankley, 1999
Bluegill	6.5	Reduced survival	Jarvinen and Ankley, 1999
generic	0.1	Fish concentration protective of piscivorous birds	Eisler, 1987
generic	0.3	Fish concentration protective of piscivorous birds	Scheuhammer and Blancher, 1994
generic	1.1	Fish concentration protective of piscivorous mammals	Eisler, 1987
generic	3	Protection criterion for adult fish	Weiner and Spry, 1996

NOED - No observable effective dose.
LOED - Lowest observable effective dose.

TABLE 7-18

GUIDELINES FOR PROTECTION OF FISH AND PISCIVOROUS RECEPTORS
PESTICIDES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Data Associated With Effects			Reference
Fish Species	**Concentration (mg/kg)**	**Endpoint/Effect**	
4,4'-DDE			
Mosquitofish	29.2	NOED mortality	ERED, 1998
Brook trout	0.042	No effect - survival	Jarvinen and Ankley, 1999
	1.0-5.0	No effect - survival, growth	Jarvinen and Ankley, 1999
	44.9	LOED behavior	ERED, 1998
Lake trout	1.09	LOED mortality	ERED, 1998
	2.68	No effect - growth	Jarvinen and Ankley, 1999
	0.29	Reduced survival	Jarvinen and Ankley, 1999
generic	0.2[a]	Protection of sensitive wildlife species	Newell et al., 1987
generic	0.266	1 in 100 cancer risk level for piscivorous wildlife	Newell et al., 1987
4,4'-DDT			
Golden ide	95	NOED mortality	ERED, 1998
Mosquitofish	18.6	NOED mortality	ERED, 1998
Atlantic salmon	3	NOED growth, metabolic rate	ERED, 1998
Spiny dogfish	0.1	NOED mortality	ERED, 1998
Brook trout	3.9	LOED behavior	ERED, 1998
	1.92-25.6[a]	No effect-survival	Jarvinen and Ankley, 1999
	0.009	No effect-survival	Jarvinen and Ankley, 1999
	1.0-5.0	No effect-survival, growth	Jarvinen and Ankley, 1999
	2.8-7.6[a]	No effect-survival, growth	Jarvinen and Ankley, 1999
	1.92-25.6[a]	No effect-survival	Jarvinen and Ankley, 1999
Lake trout	2	LOED offspring survival	ERED, 1998
	2.93[a]	Reduced survival	Jarvinen and Ankley, 1999
Rainbow trout	0.15-4.67[a]	No effect - survival	Jarvinen and Ankley, 1999
	1.27[a]	Reduced survival	Jarvinen and Ankley, 1999
Fathead minnow	3.8	LOED reproduction	ERED, 1998
	40[a]	No effect - survival	Jarvinen and Ankley, 1999
Bluegill	4.2	LOED behavior	ERED, 1998
Atlantic menhaden	24[a]	No effect - growth	Jarvinen and Ankley, 1999
Coho salmon	16.6[a]	No effect - survival	Jarvinen and Ankley, 1999
Chinook salmon	2.2-11.4[a]	No effect - survival	Jarvinen and Ankley, 1999
Goldfish	130[a]	No effect - survival	Jarvinen and Ankley, 1999
Golden shiner	3.6[a]	No effect - survival	Jarvinen and Ankley, 1999
Mummichog	1.5[ab]	No effect - survival	Jarvinen and Ankley, 1999
Sailfin molly	43[a]	No effect - survival, growth	Jarvinen and Ankley, 1999
Sailfin molly	77.3[a]	Reduced survival, growth	Jarvinen and Ankley, 1999

TABLE 7-18

GUIDELINES FOR PROTECTION OF FISH AND PISCIVOROUS RECEPTORS
PESTICIDES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

Data Associated With Effects			Reference
Fish Species	Concentration (mg/kg)	Endpoint/Effect	
Green sunfish	24[a]	Reduced survival	Jarvinen and Ankley, 1999
generic	0.2[a]	Protection of sensitive wildlife species	Newell et al., 1987
Alpha-BHC			
Rainbow trout	42[b]	No effect - survival, growth	Jarvinen and Ankley, 1999
Guppy	25	No effect - survival	Jarvinen and Ankley, 1999
generic	0.1[c]	Non-carcinogenic piscivorous wildlife criterion	Newell et al., 1987
generic	051[c]	1 in 100 cancer risk level for piscivorous wildlife	Newell et al., 1987
Chlordane[d]			
Sheepshead minnow	1.38	NOED mortality, reproduction	ERED, 1998
	3.18	LOED mortality, reproduction	ERED, 1998
Spot	0.01	NOED mortality	ERED, 1998
Pinfish	16.6	LOED mortality	ERED, 1998
generic	0.5	Non-carcinogenic piscivorous wildlife criterion	Newell et al., 1987
generic	0.37	1 in 100 cancer risk level for piscivorous wildlife	Newell et al., 1987
generic	0.3	Fish concentration protective of piscivorous birds and mammals (based on human health criteria)	Eisler, 1990
Methoxychlor			
Rainbow trout	6.07	No effect - survival	Jarvinen and Ankley, 1999
Brook trout	1.4	NOED - behavior	ERED, 1998
	2.5	No effect - survival or growth	Jarvinen and Ankley, 1999
Striped mullet	0.2	No effect - survival	Jarvinen and Ankley, 1999
	1.64	Reduced survival	Jarvinen and Ankley, 1999
Sheepshead minnow	2.6	LOED - reproduction	ERED, 1998
Mosquitofish	0.128	NOED - mortality	ERED, 1998

NOED - No observable effective dose.
LOED - Lowest observable effective dose.
a Total DDT.
b Concentration in muscle tissue; all other concentrations are whole body.
c Total BHC.
d Total chlordane.

TABLE 7-19

COMPARISON OF SEDIMENT CHEMICALS OF POTENTIAL CONCERN (COPCs) TO VARIOUS GUIDELINES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

COPC	1995	1998-1999		EPA Region IV ESV	ER-M	PEL	PEC	AET	Ontario MOE	Other
	Concentration	Maximum	Mean							
Volatile Organic Compounds (ug/kg)										
2-Butanone	ND	20	29.13	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	ND	4.4	27.98	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	ND	53.7	31.53	NA	NA	NA	NA	NA	NA	NA
Acetone	ND	390	150.31	NA	NA	NA	NA	NA	NA	NA
Carbon disulfide	ND	31	18.33	NA	NA	NA	NA	NA	NA	NA
Toluene	ND	23	17.47	NA	NA	NA	NA	NA	NA	1078[a]; 1433[b]
Xylenes, total	ND	2.3	16.7	NA	NA	NA	NA	4[c]	NA	NA
Semivolatile Organic Compounds (ug/kg)										
Acenaphthene	ND	120	71.28	6.71	500	88.9	NA	130[d]	NA	NA
Benzo(b)fluoranthene	ND	120	18.01	NA	NA	NA	NA	1800	NA	NA
Bis(2-ethylhexyl)phthalate	10000	440	337.111	182	NA	NA	NA	NA	NA	NA
Di-*n*-octyl phthalate	900	63	347.25	NA	NA	NA	NA	61[c]	NA	NA
Indeno(1,2,3-cd)pyrene	ND	26	7.54	NA	NA	NA	836.7	600	200/3200	NA
Pentachlorophenol	ND	180	804.72	NA	NA	NA	NA	17[e]	NA	NA
Pesticides/PCBs (ug/kg)										
4,4'-DDE	96-520	ND	ND	2.07	27	374	NA	9	5/190	NA
4,4'-DDT	38	66	8.55	1.19	46.1[f]	4.77	NA	12	8/710	NA
Aroclor-1254	24000	ND	ND	NA	NA	NA	NA	NA	NA	NA
Alpha-BHC	3.1	ND	ND	NA	NA	NA	NA	NA	6/100	NA
Alpha-chlordane	ND	12	3.17	0.5[g]	NA	4.79[g]	NA	2.8[g]	7/60[e]	NA
Gamma-chlordane	ND	14	3.28	0.5[g]	NA	4.79[g]	NA	2.8[g]	7/60[e]	NA
Dieldrin	6.2	ND	ND	0.02	NA	4.3	NA	1.9	2/910	NA
Endrin	1200	ND	ND	0.02	NA	NA	NA	NA	3/1300	NA
Methoxychlor	ND	680	62.82	NA	NA	NA	NA	NA	NA	NA
Metals and Inorganic Compounds (mg/kg)										
Aluminum	9580-11700	52700	9843.89	NA	NA	NA	58030	NA	NA	NA
Antimony	3.3-9.4	6.8	2.197	2	NA	NA	NA	9.3[d]	NA	NA
Arsenic	40.6-49.7	18.5	4.65	7.24	70	41.6	57	35	6/33	NA
Barium	66.8-73.2	62.9	12.09	NA	NA	NA	NA	48	NA	NA
Beryllium	ND	2	0.405	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.8-4.7	0.84	0.232	0.676	9.6	4.21	11.7	3	0.6/10	NA

TABLE 7-19

COMPARISON OF SEDIMENT CHEMICALS OF POTENTIAL CONCERN (COPCs) TO VARIOUS GUIDELINES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

COPC	1995	1998-1999		EPA Region IV ESV	ER-M	PEL	PEC	AET	Ontario MOE	Other
	Concentration	Maximum	Mean							
Chromium	37.8-119	75	16.26	52.3	370	160	159	62[h]	26/110	NA
Cobalt	8.2-22.7	10.3	2.196	NA	NA	NA	NA	10	NA	50[i]
Copper	168-489	113	9.71	18.7	270	108	77.7	390	16/110	NA
Iron	122,000-307,000	43,100	11211.67	NA	NA	NA	NA	NA	20,000/40,000	NA
Lead	589-2930	203	22.57	30.2	218	112	396	400	31/250	NA
Manganese	297-1480	210	49.69	NA	NA	NA	1081	260	460/1110	NA
Mercury	ND	0.35	0.07	0.13	0.71	0.696	NA	0.41	0.2/2	NA
Nickel	41.4-86.9	1060	63.1	15.9	51.6	42.8	38.5	110[d]	16/75	NA
Selenium	0.86-1.2	10.7	1.158	NA	3.7	NA	NA	1[j]	NA	NA
Silver	1.1-1.2	ND	ND	0.733	3.7	1.77	NA	3.1	NA	NA
Thallium	ND	0.36	0.715	NA	NA	NA	NA	NA	NA	NA
Vanadium	27.6-44.9	112	23.11	NA	NA	NA	NA	57	NA	NA
Zinc	751-1520	197	30.63	124	410	271	1532	410	120/820	NA

ND Not detected
NA Not available
ER-M Effects Range Medium (long et al., 1995).
PEL Problem Effects Level (FDEP, 1994).
PEC Probable Effects Concentration, Assessment and Remediation of Contaminanted Sediments Program (U.S. EPA, 1996d).
AET Apparent Effects Threshold (Buchman, 1999).
MOE Ontario Ministry of the Environment: Lowest effect level/ Severe effect level (Jones et al., 1997).
AET Apparent Effects Threshold (Buchman, 1999).
a Sediment Qualitiy Benchmark (U.S.EPA, 1996a) based on site specific organic carbon content of 2.49%.
b Sediment Quality Advisory Level (U.S.EPA, 1997c) based on site specific organic carbon content of 2.49%.
c Entry is lowest value among AET tests, bivalve and larval (max.).
d Entry is lowest value among AET tests, Echinoderm larvae.
e Entry is lowest value among AET tests, bivalve.
f ER-M of r total DDT.
g Value for total chlordane.
h Entry is lowest value among AET levels, Neanthes bioassays.
i Open water disposal guideline, Ontario Ministry of the Environment (Giesy and Hoeke, 1990).
j Entry is lowest value among AET levels, Amphipod.

TABLE 7-20

COMPARISON OF SURFACE SOIL CHEMICALS OF POTENTIAL CONCERN (COPCs) TO VARIOUS GUIDELINES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

COPC	Maximum	Mean	ORNL[a]		Beyer (1990)		Dutch (1994)	
			Earthworms/ Microorganisms	Soil Phytotoxicity	"A" Value	"B" Value	Target	Intervention
Volatile Organic Compounds (ug/kg)								
2-Hexanone	8.5	61.21	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	26	63.1	NA	NA	NA	NA	NA	NA
Acetone	350	123	NA	NA	NA	NA	NA	NA
Carbon disulfide	6	36.5	NA	NA	NA	NA	NA	NA
Chloroform	7.5	36.8	NA	NA	NA	NA	NA	NA
Chloromethane	17	37.5	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (ug/kg)								
2-Methylnapthanlene	385	2023.4	NA	NA	NA	NA	NA	NA
Acenaphthylene	375	202.8	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	140	168.4	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	120	166.9	NA	NA	100	1000	NA	NA
Benzo(b)fluoranthene	130	171.8	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	110	176.8	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	480	141.3	NA	NA	NA	NA	100[b]	60000[b]
Chrysene	160	170.9	NA	NA	NA	NA	NA	NA
Fluoranthene	280	179.7	NA	NA	100	10000	NA	NA
Fluorene	220	193.1	30	NA	NA	NA	NA	NA
Naphthalene	1435	269.1	NA	NA	NA	NA	NA	NA
Pentachlorophenol	240	380.6	NA	NA	NA	NA	NA	NA
Phenanthrene	140	180.9	NA	NA	100	5000	NA	NA
Pyrene	230	165.5	NA	NA	100	10000	NA	NA
Pesticides/PCBs (µg/kg)								
4,4'-DDE	43	4.4	NA	NA	NA	NA	2.5	4000
Metals and Inorganic Compounds (mg/kg)								
Aluminum	5370	3398.9	600	50	NA	NA	NA	NA
Antimony	8	1.4	NA	5	NA	NA	NA	NA

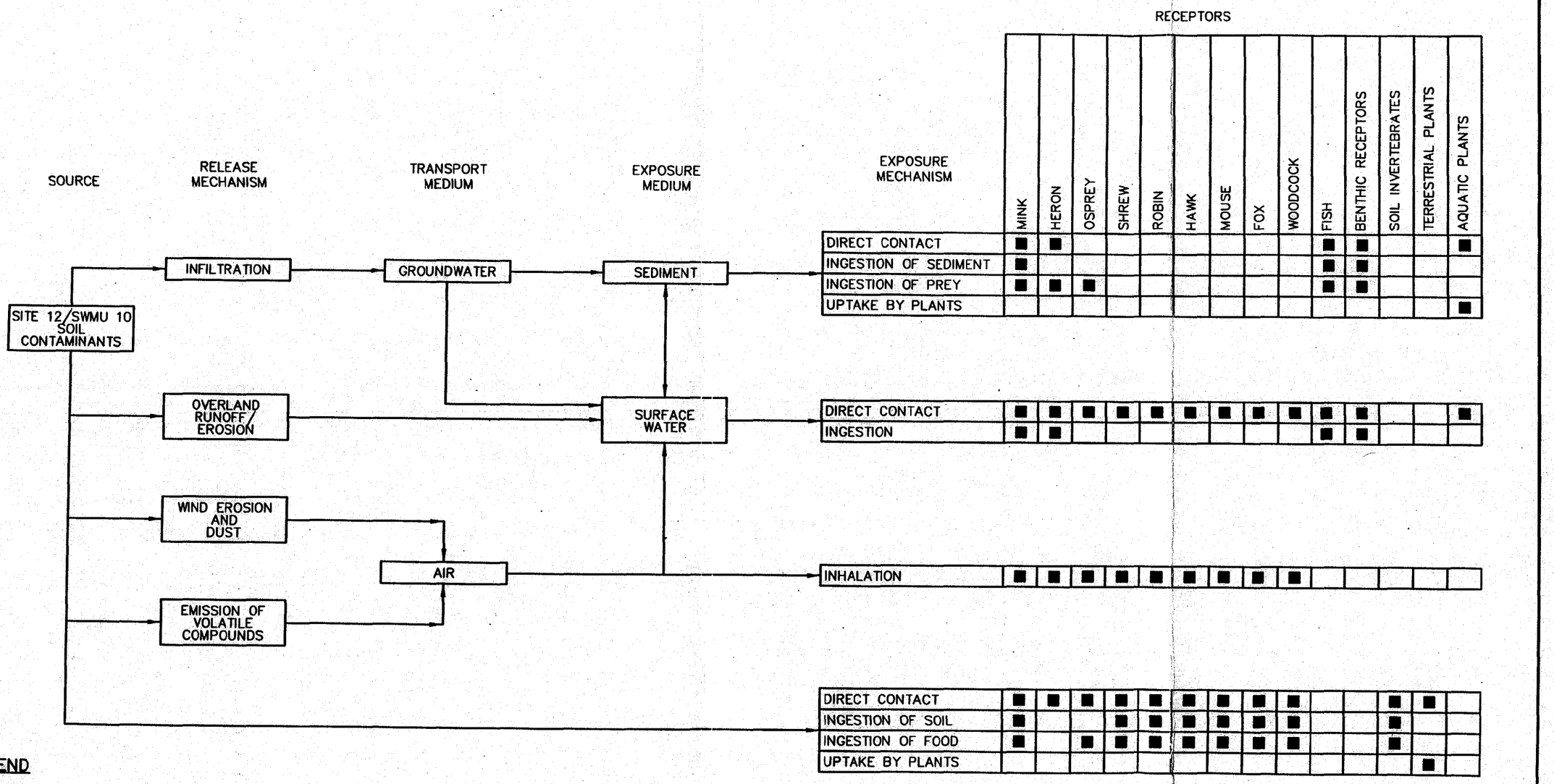
TABLE 7-20

COMPARISON OF SURFACE SOIL CHEMICALS OF POTENTIAL CONCERN (COPCs) TO VARIOUS GUIDELINES
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 2

COPC	Maximum	Mean	ORNL[a]		Beyer (1990)		Dutch (1994)	
			Earthworms/ Microorganisms	Soil Phytotoxicity	"A" Value	"B" Value	Target	Intervention
Arsenic	50.8	3.9	60	10	20	30	29	55
Cadmium	3.2	0.3	20	4	1	5	0.8	12
Chromium	18.1	4.16	0.4	1	100	250	100	380
Copper	189	1.17	50	100	50	100	36	190
Iron	99700	8123.69	200	NA	NA	NA	NA	NA
Lead	1100	78.58	500	50	50	150	85	530
Manganese	522	66.22	100	500	NA	NA	NA	NA
Mercury	0.89	0.09	0.1	0.3	0.5	2	0.3	10
Vanadium	9.3	4.52	20	2	NA	NA	NA	NA
Zinc	1020	72.42	100	50	200	500	140	720

NA Not available.
a Lowest of earthworm and micro-organism screening values.
b Value for total phthalates.

ACAD: 7394KF11.dwg 07/27/00 MF



LEGEND

■ COMPLETE EXPOSURE PATHWAY

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

DRAWN BY DATE: mf 7/27/00
CHECKED BY DATE:
COST/SCHED-AREA:
SCALE: NOT TO SCALE

CONCEPTUAL SITE MODEL
ECOLOGICAL RISK ASSESSMENT
SITE 12/SWMU 10
JERICO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

CONTRACT NO. 7394
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 7-1
REV. 0

227A06Z

8.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations for the Site 12 RI/RFI are summarized below.

1.0 In surface soil samples, one SVOC [benzo(a)pyrene] and three inorganics (arsenic, iron, and lead) exceeded human health screening criteria (U.S. EPA Region 3 residential RBCs). In addition, one VOC (chloroform), 13 SVOCs, (pentachlorophenol and 12 PAHs), one pesticide (4,4'-DDE), and 10 inorganics exceeded ecological screening criteria (U.S. EPA Region 4 Soil screening values).

2.0 In 2001, surface soil sample locations PAI-10-SS-08 and PAI-10-SS-12 were resampled at the request of the MCRD Parris Island partnering team to confirm 1998 detections and an estimated detection of pentachlorophenol at PAI-10-SS-12. The 2001 analytical results at PAI-10-SS-08 confirm the results of the 1998 sampling and indicate that potential risks to human health and the environment may be present at this location. The 2001 analytical results at PAI-10-SS-12 indicate that risks to human health and the environment are not present at this location and do not confirm the 1998 results.

3.0 In groundwater samples, two VOCs (acetone and chloroform) exceeded human health screening criteria (U.S. EPA Region 3 tapwater RBCs). No other organic compounds detected in groundwater exceeded a human health screening criterion and no organics exceeded an ecological screening criterion. In a comparison of unfiltered inorganic groundwater results to human health criteria, detections of four inorganics (arsenic, iron, manganese, and thallium) exceeded such criteria. In a comparison of filtered groundwater results to U.S. EPA Region 4 surface water ecological screening values (assuming groundwater discharges to surface water), only detections of nickel exceeded such criteria.

4.0 In surface water samples, one SVOC [bis(2-ethylhexyl) phthalate] exceeded a human health screening criterion. No other organic compounds detected in surface water exceeded a human health screening criterion and no organics exceeded an ecological screening criterion. In a comparison of unfiltered inorganic surface water results to human health criteria, detections of three inorganics (arsenic, iron, and manganese) exceeded such criteria. In a comparison of filtered surface water results to U.S. EPA Region 4 ecological screening values, only detections of thallium exceeded such criteria.

5.0 In sediment samples collected in 1998-99, three inorganics (arsenic, iron, and lead) exceeded a human health screening criterion (U.S. EPA Region 3 residential RBCs). Three SVOCs

[acenaphthene, benzo(b)fluoranthene, and bis(2-ethylhexyl) phthalate] and three pesticides (4,4-DDT, alpha-chloradane, and gamma-chlordane) exceeded ecological screening criteria (U.S. EPA Region 4 screening values). Nine inorganics (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) exceeded their ecological screening criteria; criteria were not available for the remaining nine inorganics.

6.0 In sediment waste samples collected in 1995, one PCB (Aroclor 1254) and three inorganics (arsenic, iron, and lead) exceeded human health screening criteria (U.S. EPA Region 3 residential RBCs). Two SVOCs [di-n-octyl phthalate and bis(2-ethylhexyl) phthalate], four pesticides (4,4'-DDE, 4,4'-DDT, dieldrin, and endrin), one PCB (Aroclor 1254), and 10 inorganics (antimony, arsenic, cadmium, chromium, copper, iron, lead, nickel, silver, and zinc) exceeded ecological screening criteria (U.S. EPA Region 4 screening values).

7.0 The human health risk assessment considered site media exposure to construction workers, adolescent trespassers, adolescent recreational users, adult recreational users, potential future child residents, potential future adult residents, and hypothetical lifelong residents. The estimated cancer risks and hazard indices are summarized as follows.

- All estimated cancer risks for construction workers, adolescent trespasser, adolescent recreational user, and adult recreational user were within U.S. EPA's target risk range of 10^{-4} to 10^{-6}. The total cancer risks across all media for each receptor are as follows: construction workers (4.5×10^{-6}), adolescent trespasser (1.3×10^{-5}), adolescent recreational user (1.3×10^{-5}), and adult recreational user (5.9×10^{-6}).

- The estimated HI for a construction worker exposed to surface soil was 1.4, which exceeds the acceptable level of 1.0. However, the HIs for the individual target organs were less than the acceptable level of 1.0. Arsenic (HI = 0.52) and iron (HI = 0.8) were the main contributors to the HI. Similarly, the estimated HI for exposure to sediment waste was 1.1, but the HIs for the individual target organs were all less than the acceptable level of 1.0, indicating that no adverse health effects are anticipated for construction workers exposed to sediment waste under the defined conditions. The estimated HIs for exposure to groundwater, surface water, and sediment were each less than 1.0. The cumulative HI across all media was 2.7.

- All estimated HIs for the adolescent trespasser and adolescent recreational user were less than the acceptable level of 1.0. These values indicate that no adverse health effects are anticipated for adolescent trespassers exposed to surface soil, sediment, surface water, and sediment waste under the defined conditions. For both receptors, the cumulative HI across all media was 1.0.

- All estimated HIs for the adult recreational user were less than the acceptable level of 1.0. The cumulative HI across all media was 0.70.

- Estimated cancer risks for the on-site child resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6}, with the exception of exposure to groundwater. Arsenic (ICR = 2.9×10^{-4}) was the major contributor to the cancer risk for exposure to groundwater. The total cancer risk across all media was 4.1×10^{-4}.

- Estimated cancer risks for the on-site adult resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6} with the exception of exposure to groundwater. Arsenic (ICR = 4.9×10^{-4}) was the major contributor to the cancer risk for exposures to groundwater. The total cancer risk across all media was 5.5×10^{-4}.

- Estimated cancer risks for the on-site lifelong resident were within U.S. EPA's target risk range of 10^{-4} to 10^{-6} with the exception of exposure to surface soil and groundwater. Arsenic was the major contributor to the cancer risk for exposures to surface soil (ICR = 1.5×10^{-4}) and groundwater (ICR = 7.8×10^{-4}). The total cancer risk across all media was 9.6×10^{-4}.

- The estimated HI for a child resident exposed to surface soil was 7.3, which exceeds the acceptable level of 1.0. Arsenic (HI = 2.5) and iron (HI = 4.3) were the main contributors to the HI for exposure to surface soil. The estimated HI for a child resident exposed to groundwater was 43, which exceeds the acceptable level of 1.0. Arsenic (HI = 6.5), cadmium (HI = 1.0), iron (HI = 23), manganese (HI = 4.4), and thallium (HI = 7.9) were the main contributors to the HI. The estimated HI for a child resident exposed to sediment waste was 4.2, which exceeds the acceptable level of 1.0. Aroclor 1254 (HI = 2.0) and iron (HI = 1.7) were the main contributors to the HI for the exposure to sediment waste. The estimated HIs for exposure to sediment and surface water were each less than the acceptable level of 1.0, indicating that no adverse health effects are anticipated for child residents exposed to sediment and surface water under the defined conditions. The cumulative HI across all media was 55.0.

- Estimated HIs for the adult resident were less than the acceptable level of 1.0 with the exception of exposure to groundwater. The estimated HI for an adult resident exposed to groundwater was 73, which exceeds the acceptable level of 1.0. Acetone (HI = 1.2), arsenic (HI = 11), cadmium (HI = 1.8), iron (HI = 38), manganese (HI = 7.4), and thallium (HI = 13) were the main contributors to the HI. The estimated HIs for exposure to soil, sediment, surface water, and sediment waste were each less than the acceptable level of 1.0. The cumulative HI across all media was 74.

- In summary, arsenic and iron are the leading risk drivers in surface soil. However, only one detection of arsenic and iron was observed above human health screening criteria. These detections are localized to surface soil sample location PAI-10-SS-14. Risks associated with surface soil in areas outside PAI-10-SS-14 are within acceptable risk ranges. Similarly, Aroclor 1254 and iron are the leading risk drivers in the sediment waste samples [PI-012-01 (35) and PI-012-01 (36)]. Risks associated with chemicals detected in other sediment samples are within acceptable risk ranges.

- Risk drivers in groundwater consist of acetone, arsenic, cadmium, iron, manganese, and thallium. However, risks to human receptors may be overestimated due to the following circumstances:

  - Iron and manganese are likely attributable to natural sources.

  - Cadmium was detected at concentrations at levels slightly greater than MCLs, however, at concentrations less than RBCs.

  - Thallium was detected in only one groundwater sample and infrequently throughout other media.

  - Arsenic was detected in groundwater samples but at concentrations less than MCLs.

  - Detected concentrations of acetone are relatively infrequent with minor exceedances that could be attributable to laboratory contamination.

8.0 The initial ecological risk screening determined that one VOC (chloroform), several SVOCs [pentachlorophenol, di-n-octyl phthalate, bis(2-ethylhexyl) phthalate, and 13 PAHs], six pesticides (4,4'-DDE, 4,4'-DDT, alpha-chlordane, dieldrin, endrin, gamma-chlordane), one PCB (Aroclor-1254), and several inorganics exceeded U.S. EPA Region 4 screening values, indicating a potential risk to ecological receptors. As a result, these constituents were retained as COPCs. In addition, several other chemicals were retained as COPCs because they lacked ecological screening criteria.

9.0 The food-chain modeling evaluated five aquatic receptors (the mink, heron, mummichog, red drum, and osprey) and six terrestrial receptors (the shrew, mouse, robin, hawk, fox, and woodcock). The modeling indicated that the many of the initial COPCs do not represent a threat

to site receptors even under a worst-case scenario (organisms constantly exposed to maximum concentrations). Chemicals that pose potential risks are identified below.

- 4,4'-DDE, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, mercury, vanadium, and zinc had at least one HQ greater than 1.0 for the terrestrial food-chain modeling using maximum concentrations of surface soil.

- 4,4'-DDT, aluminum, antimony, arsenic, barium, chromium, cobalt, copper, iron, lead, mercury, nickel, selenium, thallium, vanadium, and zinc had at least one HQ greater than 1.0 for the aquatic food-chain modeling using samples collected in 1998 and 1999.

- Bis(2-ethylhexyl) phthalate, 4,4'-DDE, 4,4'-DDT, Aroclor 1254, endrin, aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, vanadium, and zinc had at least one HQ greater than 1.0 for the aquatic food-chain modeling using maximum concentrations of 1995 sediment COPCs.

- Only four metals were detected in filtered surface water samples. Results of the food-chain modeling using maximum and mean concentrations of filtered surface water indicated that thallium and vanadium had HQs greater than 1.0.

10. A feasibility study/corrective measure study (FS/CMS) is recommended to address surface soil/surface debris in the vicinity of surface soil sample locations PAI-10-SS-08 and PAI-10-SS-14. No action is recommended for remaining surface soil at Site 12.

11.0 Similarly, an FS/CMS is recommended to address sediment/surface debris in the vicinity of sediment sample locations PI-012-01 (35), PI-012-01 (36), and PAI-10-SD-14. No action is recommended for remaining sediment at Site 12.

12.0 Due to the low human and ecological risks attributable to exposure to surface water and the relatively few exceedances of surface water screening criteria, no further action is recommended for surface water.

13.0 Based on the finding of only relatively minor groundwater criteria exceedances attributable to site-related sources, groundwater does not need to be remediated. It is expected that any further site-related impacts to groundwater would be minimized through addressing surface soil and sediment at the site. Site restrictions on the use of groundwater as a drinking water source should address remaining groundwater risks.

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APPENDIX A

FIELD FORMS

A-1 WELL PERMIT
A-2 SOIL BORING LOGS
A-3 WELL INSTALLATION RECORDS
A-4 WELL DEVELOPMENT RECORDS
A-5 GEOTECHNICAL/ECOLOGICAL DATA
A-6 SUBSURFACE SOIL SAMPLE LOG SHEETS
A-7 SURFACE WATER SAMPLE LOG SHEETS
A-8 SEDIMENT SAMPLE LOG SHEETS
A-9 SOIL SAMPLE LOG SHEETS
A-10 TEST PIT LOG SHEETS
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A-12 CHAIN OF CUSTODY RECORDS
A-13 BACKGROUND SAMPLE DESCRIPTION, LOCATION, AND SUPPORTING COLLECTION DATA
A-14 MONITORING WELL INSTALLATION RECORD

A-1

WELL PERMIT

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

COMMISSIONER:
Douglas E. Bryant

BOARD:
John H. Burriss
Chairman

William M. Hull, Jr., MD
Vice Chairman

Roger Leaks, Jr.
Secretary

Mark B. Kent

Cyndi C. Mosteller

Brian K. Smith

Rodney L. Grandy

CERTIFIED

May 7, 1998

Commanding General, MCRD
ATTN.: I&L ERR (NREAO)
P.O. Box 19001
Parris Island, SC 29905-9001

RE:
Approval:
DRAFT Remedial Investigation/RCRA Facility Investigation Work Plan for
Site 12/SWMU 10, Jericho Island Disposal Site, dated April 27, 1998
Marine Corps Recruit Depot (MCRD)
Parris Island, South Carolina
SC6 170 022 767

Dear Commanding General:

The Corrective Action Engineering Section and the Hazardous Waste Section/Division of Hydrogeology of the South Carolina Department of Health and Environmental Control (Department) are in receipt of and have reviewed the RI/RFI Work Plan for Site 12/SWMU 10, Jericho Island Disposal Site.

The work plan was reviewed with respect to, and was determined to meet the criteria specified in R.61-79 of the South Carolina Hazardous Waste Management Regulations (SCHWMR), and appropriate guidance documents. The work plan generated two comments (memo: Hargrove to Peterson 5 May 98) but requires no revision of the document. The work plan is approved and may be implemented as written. A monitoring well approval is enclosed as an attachment.

If you have any questions, please contact Susan Peterson at (803) 896-4182 or Don Hargrove at (803) 896-4033.

Sincerely,

Joan Hartley

Joan Hartley, Manager
Corrective Action Engineering Section
Division of Hazardous and Infectious Waste Management
Bureau of Land and Waste Management

cc: Susan Peterson, Corrective Action Engineering
Don Hargrove, Hydrogeology
Distribution List

DHEC
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

MEMORANDUM

TO: Susan Peterson, Engineering Associate
Corrective Action Permitting Section
Division of Hazardous and Infectious Waste Management
Bureau of Land and Waste Management

FROM: Donald C. Hargrove, Hydrogeologist
Hazardous Waste Section
Division of Hydrogeology
Bureau of Land and Waste Management

DATE: 5 May 1998

RE: Parris Island Marine Corps Recruit Depot (MCRD)
Parris Island, South Carolina
Beaufort County
SC6 170 022 767

DRAFT Remedial Investigation/RCRA Facility Investigation
Work Plan for Site 12/SWMU 10, Jericho Island Disposal Area
(dated April 1998)

The Division of Hydrogeology has reviewed the DRAFT Remedial Investigation/RCRA Facility Investigation Work Plan for Site 12/SWMU 10, Jericho Island Disposal Area (dated April 1998) at MCRD. This work plan (dated 27 April 1998) was received on 29 April 1998. This work plan provides a physical description of SWMU 10 that includes the history of the site and previous investigations. This work plan is designed to be used in conjunction with Volumes I, II, and III of the Master Work Plan for MCRD that was previously approved by the Department. This work plan proposes a sampling strategy and analytical parameters for soils, groundwater, sediment, and surface water that will fulfill the requirements of a RCRA Facility Investigation (RFI).

This document was reviewed with respect to R.61-79 of the South Carolina Hazardous Waste Management Regulations (SCHWMR), and appropriate guidance documents. The following comments were generated:

1) This work plan is well written and easy to follow. The sampling strategy and analytical parameters proposed are suitable as the first phase of investigation for delineation of the

nature and extent of contamination. It should be noted that the data generated by this work plan might necessitate expansion of the investigation area(s). No revision to the document is necessary.

2) This work plan specifies that a remnant drinking water well is located on this currently uninhabited island. This well should be immediately abandoned according to R.61-71 of the South Carolina Well Standards and Regulations. No revision to the document is necessary.

The Division of Hydrogeology recommends approval and immediate implementation of this work plan as written. As previously specified at the Tier I meetings, a monitoring well approval has been written (#HW-98-028) and a copy is attached. The official copy has been sent to Art Sanford of the Department of the Navy.

If you have any questions regarding these comments, please contact me at (803)896-4033.

Attached: Monitoring Well Approval #HW-98-028

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: 5 May 1998

Approval Number: HW-98-028

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

For the installation of fourteen (14) permanent monitoring wells as follows:

1) Seven (7) shallow and seven (7) deep permanent monitoring wells to be installed at the locations specified on Figure 7-3 (attached).

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

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

Conditions:

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

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

DD980312.DCH

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

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

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

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

Approval granted by:

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

Attachment: Figure 7-3, Proposed Monitoring Well Locations

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

A-2

SOIL BORING LOGS

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB01
DATE: 7/24/98
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	Sample BZ	Borehole BZ	Well BZ
1	0-2	1/2			V. Loose	Blk Brn	F SAND W/TR. SILT	SP		9.8	0	1.8	0
		2/4	8"										
2	2-4	2/4			Loose	Brn	Same	SP		7.5	0	1.6	0
		4/6	10"										
3	4-6	3/5			Loose	Brn to LT Br	Same	SP		11.4	0	1.3	0
		5/4	12"										
4	6-8	3/4			Loose	Gray Brn	Same	SP		1.8	0	0	0
		7/7	14"	8									
5	8-10	5/7			Firm	Gray	F/med Sand w/Tr Silt	SP		0	0	0	0
		7/9	16"										
6	10-12	3/4			Firm	Gray	Same	SP		0	0	0	0
		7/5	12"										
7	12-14	3/4			Loose	Gray	Same	SP		0	0	0	0
		4/2	14"	14									
8	14-16	WOR/WOR			V. Loose	Brn Gray	F/med Sand w/Tr. CL	SP		0	0	0	0
		WOR/WOR	6"										
9	16-18	3/3			Loose	Brn Gray	Same	SP	½" CL Seams @ 16.5 & 17 FT	0	0	0	0
		3/3	10"	18									
10	18-20	3/5			Firm	Brn Gray	F SAND	SP		0	0	0	0
		7/10	18"	26									
11	20-22	WOR/1			V. Loose	Brn Gray	F SAND w/TR SILT	SP		0	0	0	0
		1/2	8"										
12	22-24	2/3			Loose	Brn Gray	Same			0	0	0	0
		3/8	12"	24									
13	24-26	WOR/WOR			V. Loose	Brn Gray	Clayey F/Co SAND		very wet				

* 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: LOG USED FOR PAI-10-MW-01 (S) ALSO, WELL CLUSTER W/ 6 FT APART.

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-10-MW-02-(D)

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB01
DATE: 7/24/98
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	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
		50/3"	6"	26.3					auger refusal				

* 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: 2" well set to 26FT (5FT 0.020 Screen) Sand to 19FT Bentonite to 17FT Grout to Surface
Logs used for PAI-10-MW-01(S)

Converted to Well: Yes V No

Well I.D. #: PAI-10-MW02(D)

BORING LOG

Page 1 of 2

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB52
DATE: 7/23/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1	0-2	WOH / 2			V. Loose	LT Brn	F SAND	SP		0	0	0	0
		2 / 4	18"										
2	2-4	4 / 6			Firm					0	0	0	0
		8 / 9	20"	3		Brn	F SAND WITH SILT	SP					
3	4-6	4 / 3		4	Loose	LT Brn	F SAND		MOIST	0	0	0	0
		3 / 3	20"										
4	6-8	4 / 7			Firm	Brn	SAME	SP	wet	0	0	0	0
		7 / 8	12"										
5	8-10	4 / 5			Loose	Brn	SAME	SP		0	0	0	0
		4 / 9	18"	10									
6	10-12	2 / 3			Loose	Brn	F SAND W/TR. SILT	SP		0	0	0	0
		5 / 6	14"	12		To Lt Brn							
7	12-14	5 / 7			Firm	Brn to	SAME	SP		0	0	0	0
		12 / 13	16"			LT Brn							
8	14-16	4 / 4		14	Loose	LT Brn	F/med SAND	SP		0	0	0	0
		4 / 4	14"										
9	16-18	7 / 7			Firm	LT Brn	SAME	SP		0	0	0	0
		9 / 11	16"										
10	18-20	6 / 7			Firm	LT Brn	SAME	SP		0	0	0	0
		9 / 10	18"										
11	20-22	3 / 3			Loose	LT Brn	SAME	SP		0	0	0	0
		3 / 3	12"										
12	22-24	3 / 4			Loose	LT Brn	F/med SAND	SP	1/16" CL Seams 23.5 TO 24 FT	0	0	0	0
		5 / 6	16	24									
13	24-26	WOR / WOR					NO RECOVERY						

* 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: 2" well set to 38 FT (5 FT 0.020 Screen) Sand to 31 FT Bentonite to 29 FT. Grout to Surface
Log used for PAI-10-MW03(D)

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI-10-MW-04(D)

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB02
DATE: 7/23/98
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	Sample BZ	Borehole	Drillers BZ**
		WOR / WOR	0	26									
14	26-28	WOR / WOR			V. Loose	LT Brn	F/med SAND	SP		0	0	0	0
		3 / 6	6"										
15	28-30	9 / 5			Loose	LT Brn	SAME	SP		0	0	0	0
		5 / 6	12"										
16	30-32	WOH / 1		30.5	V Loose	LT Brn	Clayey F/co SAND	SC	very wet	0	0	0	0
		1 / 1	8"										
17	32-34	1 / 1			V. Loose	LT Brn	Same	SC	very wet	0	0	0	0
		1 / 7	8"										
18	34-36	2 / 10		34	Firm	LT Brn	F/Co Sand w/Tr. Cl		drying	0	0	0	2
		13 / 16	6"										
19	36-38	10 / 11			Firm	Brn to	SAME		drying	0	0	0	2
		13 / 23	18"			Gray			Auger refusal				
				38.5					@ 38.5 FT				

* 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:

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI-10-MW-04(D)

BORING LOG

PROJECT NAME: MCRD - Parris Island BORING NUMBER: PAI-10-SB03
PROJECT NUMBER: 7803 DATE: 7/13/98
DRILLING COMPANY: Parratt Wolff GEOLOGIST: G. GUNTER
DRILLING RIG: CME 850 TRAC RIG DRILLER: L. LeFever

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1	0-2	WOH/1			V. Loose	Tan Brn	F SAND	SP		0	0	0	0
		1/1	20"										
2	2-4	3/4			Loose	Tan WH	Same	SP		0	0	0	0
		4/4	20"										
3	4-6	4/4			Loose	Tan WH	Same	SP	Wet	0.5	0	0	0
		4/4	18"										
4	6-8	5/7		7	Firm					0	0	0	0
		9/15	24"			Gray	F/med SAND w/Tr. Silt	SP					
5	8-10	7/10			Firm	Gray	Same	SP		0	0	0	0
		12/11	24"										
6	10-12	2/1			V. Loose	Gray	Same	SP		1	0	0	0
		1/1	20"										
7	12-14	2/2		12.5	Loose	Brn	F SAND w/Tr. Silt	SP		0	0	0	0
		3/4	24"										
8	14-16	WOR/WOR			V. Loose	Brn	Same	SP		0	0	0	0
		1/1	18"	16									
9	16-18	WOR/1			V. Loose	LT Gray	F SAND	SP		0	0	0	0
		1/1	18"										
10	18-20	4/4			Loose	LT Gray	Same	SP		0	0	0	0
		4/4	20"	20									
11	20-22	4/4		21	Loose	Brn	F/med Sand	SP		0	0	0	0
		6/6	18"			LT Gray	F SAND	SP					
12	22-24	6/6			Firm	LT Gray	Same	SP		0	0	0	0
		7/10	10"										
13	24-26	6/8			Firm	LT Gray	Same	SP		0	0	0	0

* When rock coring, enter rock brokeness.

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

Remarks:

Drilling Area Background (ppm): 0

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

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB03
DATE: 7/13/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
		6/10	8"										
14	26-28	6/9			Firm	Brn	Same	SP		0	0	0	0
		15/26	10"										
15	28-30	5/5			Loose	Tan	Same	SP		0	0	0	0
		4/4	8"	30									
16	30-32	WOR/4			Loose	Orang Brn	F/med Sand	SP		0	0	0	0
		3/4	18"										
17	32-34	2/4			Loose	Orang Brn	Same	SP		0	0	0	0
		5/8	18"	34									
18	34-36	3/2			V.Loose	Brn	F/Co Sand	SW	4" Clay F Sand	0	0	0	0
		2/2	12"						Shoe				
19	36-38	WOR/WOR			V Loose	LT Brn	Same	SW	3" Grn Clayey	0	0	0	0
		WOR/4	12"	38					F/Co Sand in Shoe				
20	38-40	WOR/WOR			—	—	No Recovery		Auger Refusal	—	—	0	0
		50/4"		39.5									

* 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): C

Remarks: Boring Abandoned by grouting to surface
Log used For wells PAI-10-MW05(S) & PAI-10-MW06(D)

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

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB04
DATE: 7/14/98
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	Sample BZ	Borehole**	Driller BZ**
1	0-2	WOH / WOH			V. Loose	LT Brn	F SAND	SP		0	0	0	0
		1 / 1	18"										
2	2-4	2 / 3			Loose	LT Brn	Same	SP	damp	0	0	0	0
		3 / 3	20"										
3	4-6	3 / 3			Loose	LT Brn	Same	SP	wet	0	0	0	0
		3 / 3	20"										
4	6-8	4 / 4			Loose	LT Brn	Same	SP		0	0	0	0
		6 / 6	4"										
5	8-10	6 / 6		8	Firm	Brn TO Gray	clayey F SAND	SC		0	0	0	0
		6 / 8	24"										
6	10-12	4 / 6		10.5	Firm	Brn Gray	F/med SAND	SP		0	0	0	0
		8 / 8	18"										
7	12-14	8 / 7			Firm	Brn Gray	Same	SP		0	0	0	0
		8 / 7	18"										
8	14-16	4 / 4			Loose	Brn	F/med SAND w/TT SILT	SP		0	0	0	0
		5 / 6	16"										
9	16-18	8 / 4			Firm	Brn	F/med SAND		3in Clay Seam @ 16 FT	0	0	0	0
		8 / 7	18"										
10	18-20	4 / 3			Loose	LT Brn	F/med SAND w/TT. SILT	SP		0	0	0	0
		4 / 4	20"										
11	20-22	2 / 2			V Loose	LT Brn	Same	SP	-	0	0	0	0
		2 / 3	10"										
12	22-24	2 / 3		23						0	0	0	0
		2 / 3	18"	24	Loose	LT Brn	F SAND	SP					
13	24-26	1 / 1			V. Loose	Brn	F/CO SAND	SW	1/16" Clay Seams Last 4"	0	0	0	0

* When rock coring, enter rock brokeness.

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

Remarks:

Drilling Area Background (ppm): 0

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

BORING LOG

PROJECT NAME: MCRD - Parris Isl 2nd
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB04
DATE: 7/14/98
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	Sample 2X Jar	Borehole	Drilling Area
		1/1	16"										
14	26-28	2/2			Loose	Brn	SAME	SW	LAST 4" BLK-Gray FSa Clay-wet	0	0	0	0
		4/4	18"	28									
15	28-30	9/6				-	No Recovery	-	Auger refusal @ 30.0 FT	-	-	0	0
		50/2"	0"	30									

* When rock coring, enter rock brokeness.

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

Remarks: 2" well set to 29.2 FT (0.020 Screen 5FT) Sand to 22FT, Bent to 20FT (Grout to Surface
Log used for PAI-10-MW04(S)

Drilling Area Background (ppm): C

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI-10-MW-08(D)

BORING LOG

Page 1 of 2

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB05
DATE: 7/15/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1	0-2	WOH / 1			V. Loose	LT Brn	F SAND	SP		0	0	0	0
		1 / 1	8"										
2	2-4	3 / 3			Loose	LT Brn	Same	SP		0	0	0	0
		3 / 4	6"										
3	4-6	3 / 2			V. Loose	Brn	F/med SAND	SP	wet	0	0	0	0
		2 / 4	6"										
4	6-8	5 / 6			Firm	Brn	Same	SP		0	0	0	0
		7 / 8	10"										
5	8-10	WOR / 1			V. Loose	LT Brn	Same	SP		0	0	0	0
		3 / 5	6"										
6	10-12	5 / 8			Firm	Brn Gray	Same	SP		0	0	0	0
		9 / 8	18"										
7	12-14	4 / 5			Firm	Brn Gray	Same	SP		0	0	0	0
		6 / 6	12"										
8	14-16	4 / 4			Loose	Brn Gray	F/med SAND w/ TR. CLAY	SP		0	0	0	0
		3 / 3	18"	16									
9	16-18	WOH / 1		17	V. Soft	Gray to Brn	Clayey F/med Sand	SC		0	0	0	0
		1 / WOH	14"			Brn	F/med Sandy CLAY	CL	Close to 50% SA				
10	18-20	1 / 1		18.5	V. Loose					0	0	0	0
		1 / 1	18"			Brn	F/med SAND	SP					
11	20-22	WOH / 1			V. Loose	Rust Brn	F/Co SAND		1" Clay @ 21.5 FT	0	0	0	0
		1 / 1	8"										
12	22-24	WOH / 2			Loose	Brn to Gray	Same	SW	1" Clay @ 23.6	0	0	0	0
		3 / 4	18"										
13	24-26	4 / 1			Loose	Brn to Gray	F/Co SAND w/ Tr Silt	SW	DRY @	0	0	0	0

* When rock coring, enter rock brokeness.

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

Drilling Area Background (ppm): 0

Remarks: 2" well set to 29 FT (0.020 Screen x 5 FT) Sand to 22 FT, Bentonite to 20 FT, Grout to Surface
LOG Used For PAI-10-MW09(S)

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-10-MW10(D)

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB05
DATE: 7/14/98
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	MATERIAL DESCRIPTION: Color	MATERIAL DESCRIPTION: Material Classification	USCS*	Remarks	PID/FID Readings (ppm) Sample	PID/FID Readings (ppm) Sampler BZ**	PID/FID Readings (ppm) Borehole BZ**	PID/FID Readings (ppm) Driller BZ**
		1/1	12"										
14	26-28	1/7			Firm	Brn to Gray	F/Co SAND	SW	Dry	0	0	0	0
		9/8	14"	28									
15	28-30	5/9/4	—		—		No Recovery		Auger Refusal @ 29.5FT	—	—	0	0
				29.5									

* 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:

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-10-MW70(D)

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB06
DATE: 7/22/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1	0-2	WOH / WOH								-	-	0	0
		WOH / WOH	0	2	—	—	NO Recovery	—	wet				
2	2-4	WOH / WOH		3	V. Loose	Brn	F/co SAND	SW	wet	2	0	8	0
		1 / 1	6"	4		Brn	Silty F SAND	SM	erratic PID				
3	4-6	WOH / WOH			V. Loose	Gray	clayey F/med SAND	SC	erratic PID	13	0	8	8
		3 / 3	18"										
4	6-8	4 / 3			Loose	Gray	Same	SC	ERRATIC PID	2.3	0	0	10
		3 / 3	12"										
5	8-10	3 / 3			Loose	Gray	Same	SC	wood Fragments	0	0	0	0
		5 / 5	18"										
6	10-12	WOH / 2			V. Loose	Gray	Same	SC		0	0	0	0
		2 / 3	10"										
7	12-14	WOH / WOH		12	V. Soft	LT Gray	F/med Sandy CLAY	CL	Very wet	0	0	0	0
		WOH / WOH	2"										
8	14-16	WOH / WOH			V. Soft	LT Gray	Same		2" F/med SA	0	0	0	0
		WOH / WOH	14"						@ 15FT & 15.5FT				
9	16-18	1 / 2		16	V. Loose	Gray	F/med SAND w/Tr. Clay	SP	3" CLAY @ 17.5	1.2	0	0	0
		1 / 1	18"										
10	18-20	1 / 4		18	Loose	Gray	F/med SAND	SP		0	0	0	0
		4 / 4	16"										
11	20-22	WOH / WOH			V. Loose	Gray	Same	SP	-	0	0	0	0
		3 / 3	10"										
12	22-24	2 / 2			V. Loose	Gray	Same	SP	4" CLAY @ 23FT	0	0	0	0
		2 / 2	16"										
13	24-26	WOH / WOH			V. Loose	Gray to	SAME	SP	4" Brn CL @ 26.5FT	0	0	0	0

* When rock coring, enter rock brokeness.

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

Remarks: 2" well set to 29FT (5FT 0.020" Screen) Sand to 22 FT, Bentonite to 20 FT, Grout to Surface
Log used for PAI-10-mw11(2)

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-10-mw12(D)

BORING LOG

PROJECT NAME: MCRD - Parris Island BORING NUMBER: PAI-10-SB06
PROJECT NUMBER: 7803 DATE: 7/22/98
DRILLING COMPANY: Parratt Wolff GEOLOGIST: G. GUNTER
DRILLING RIG: CME 850 TRAC RIG DRILLER: L. LeFever

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
		3/2	14"			Yel Brn							
14	26-28	1/2			V. Loose	DK Brn	F/C SAND	SW	Rock Fragments	0	0	0	0
		1/1	10"	28		to Gray			@ 27.5 FT				
15	28-30	2/6			Dense	LT Gray	Clayey F/C SAND	SC	Rock Fragents	0	0	0	0
		27/50/2	20"	27.5			cement SS		Auger Refusal				
				30					@ 30 FT				

* When rock coring, enter rock brokeness.

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

Drilling Area Background (ppm): 0

Remarks:

Converted to Well: Yes ✓ No _____ Well I.D. #: PAI-10-MW-12(D)

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB07
DATE: 7/22/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
1	0-2	WOH / WOH			—		NO Recovery		Spoon wet	0	0	0	0
		WOH / 1	0										
2	2-4	WOH / WOH			V.Loose	Gray	Silty FSAND	SM	wet	0	0	0	0
		WOH / WOH	14"										
3	4-6	WOH / WOH			V.Loose	Gray	Same	SM		0	0	0	0
		WOH / WOH	8"										
4	6-8	1 / 2			V.Loose	Gray	Same	SM		0	0	0	0
		2 / 3	8"	8									
5	8-10	2 / 3			Firm	Gray	F Sandy CLAY	CL	very wet	0	0	0	0
		4 / 5	24"										
6	10-12	WOH / 2		10.5		Gry	CLAY	CL	very wet	0	0	0	0
		2 / 3	14"	11	V.Loose	Gray	Silty FSAND	SM					
7	12-14	5 / 6		12	Firm	Gray	F SAND w/TR. silt	SP	BRN MOTTLING	0	0	0	0
		6 / 5	14"										
8	14-16	3 / 2			V.Loose	Gray Brn	FSAND	SP	1/16" CL Seams @	0	0	0	0
		1 / 2	10"						15 FT				
9	16-18	2 / 4			Loose	Gray Brn	Same	SP	—	0	0	0	0
		3 / 3	18"										
10	18-20	2 / 2			V.Loose	Gray Brn	F/med SAND	SP		0	0	0	0
		2 / 2	20"	20									
11	20-22	WOH / WOH			V.Soft	Gray Brn	F Sandy CLAY	CL	very wet	0	0	0	0
		WOH / WOH	18"	22					not containing				
12	22-24	WOH / WOH			V.Loose	Gray	Silty F/med Sand	SM		0	0	0	0
		4 / 4	18"	24									
13	24-26	1 / 1			V.Loose	LT Brn	F SAND w/TR. SILT	SP		0	0	0	0

* When rock coring, enter rock brokeness.

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

Remarks:

Drilling Area Background (ppm): 0

Converted to Well: Yes ✓ No ____ Well I.D. #: PAI-10-MW14(D)

BORING LOG

PROJECT NAME: MCRD - Parris Island
PROJECT NUMBER: 7803
DRILLING COMPANY: Parratt Wolff
DRILLING RIG: CME 850 TRAC RIG
BORING NUMBER: PAI-10-SB07
DATE: 7/22/98
GEOLOGIST: G. GUNTER
DRILLER: L. LeFever

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
		1/1	14"	26									
14	26-28	5/6			Firm	LT Brn	F/Co SAND w/gravel	SW	Grains up to 1/4"	0	0	0	0
		7/9	20"	28		Gray	F/Co SAND	SW					
15	28-30	1/7		29	Loose	LT Brn	F/med SAND	SP		0	0	0	0
		1/5%	20	30.2		Gray	F/Co SAND		Auger Refusal at 30.2				
									Cemented Sand Calcite Cement				

* 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: 2" well set to 30 FT. 15FT 0.020 Screen
Sand to 23 FT. Bentonite to 21 FT. Grout to Surface
Log used for PAI-10-MW13(S)

Converted to Well: Yes ✓ No

Well I.D. #: PAI-10-MW-14(D)

A-3

WELL INSTALLATION RECORDS

BORING NO.: PAI-10-SB

PAI-10-MW-2

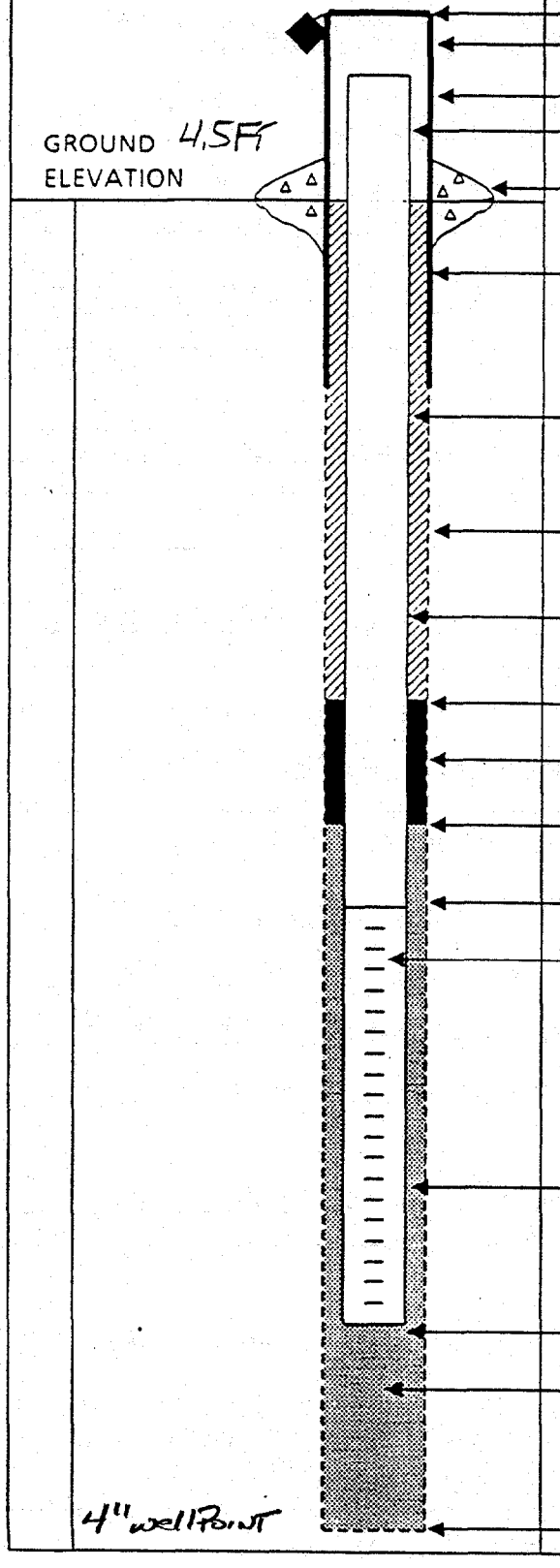
OVERBURDEN
MONITORING WELL SHEET

Constructed adjacent to

PROJECT NCBD Parris Island
PROJECT NO. 7803
ELEVATION 4.5 ft msl (ground)
FIELD GEOLOGIST G. GUNTER
Monitoring well PAI-10-MW-01(S)

LOCATION SWMU 10
BORING PAI-10-SB
DATE 7/23/98

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



ELEVATION OF TOP OF SURFACE CASING: -
ELEVATION OF TOP OF RISER PIPE: 7.37 FT

STICK - UP TOP OF SURFACE CASING: -
STICK - UP RISER PIPE: 2.87 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 2.5FT / 2FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 3FT

ELEVATION / DEPTH TOP OF SCREEN: 0.5FT / 4FT

TYPE OF SCREEN: Sch 40 PVC

SLOT SIZE x LENGTH: 0.010 INCH X 10FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: # 1 Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: -9.5FT / 14FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -10.5FT / 15FT

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

ELEVATION / DEPTH OF HOLE: -10.5FT / 15FT

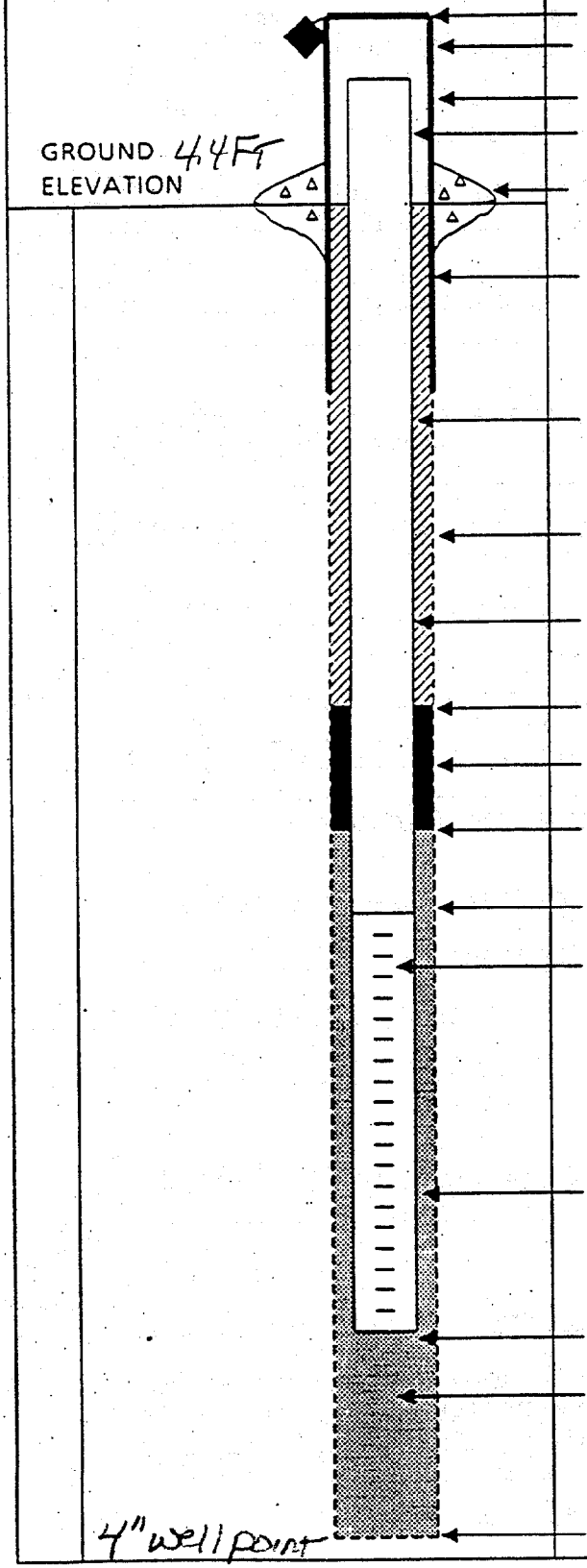
PAI-10-MW-02

OVERBURDEN
MONITORING WELL SHEET

PROJECT NCBD Parris Island
PROJECT NO. 7803
ELEVATION 4.4 ft msl (ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-02D

LOCATION SWMU 10
BORING PAI-10-SB01
DATE 7/24/98

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



ELEVATION OF TOP OF SURFACE CASING: -
ELEVATION OF TOP OF RISER PIPE: -7.11 FT

STICK - UP TOP OF SURFACE CASING: -
STICK - UP RISER PIPE : 2.71 FT

TYPE OF SURFACE SEAL: 4'x4'x9" 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: -12.6FT/17FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 19FT

ELEVATION / DEPTH TOP OF SCREEN: -16.6FT/21FT

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: -21.6FT/26 F

ELEVATION / DEPTH BOTTOM OF SAND PACK: -21.9FT/2

TYPE OF BACKFILL BELOW OBSERVATION WELL: #2 SAND
BACKFILL CONSIST of 6-8" of Sand

ELEVATION / DEPTH OF HOLE: -21.9FT/26.3

BORING NO.: PAI-10-SB
PAI-10-MW

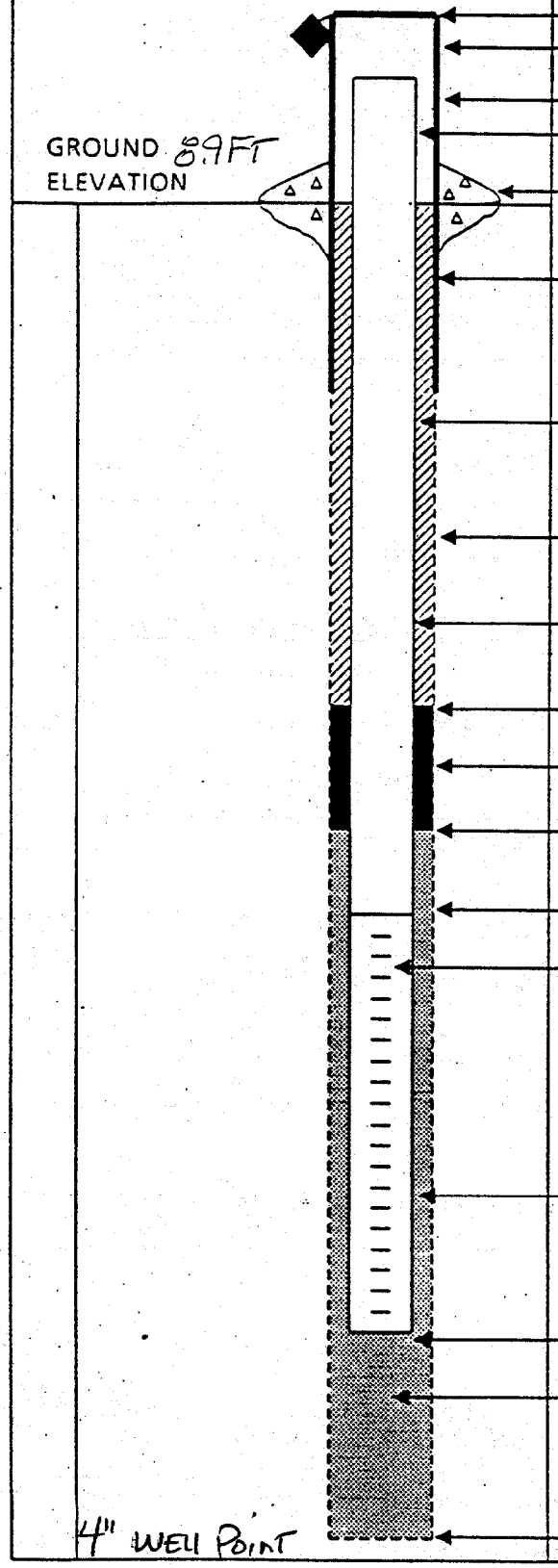
OVERBURDEN
MONITORING WELL SHEET

Constructed adjacent to

PROJECT NCRD Parris Island
PROJECT NO. 7803
ELEVATION 8.9ft msl (Grand)
FIELD GEOLOGIST G. GUNTER
Monitoring Well PAI-10-MW03(S)

LOCATION SWMU 10
BORING PAI-10-SB02
DATE 7/23/98

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



ELEVATION OF TOP OF SURFACE CASING: -
ELEVATION OF TOP OF RISER PIPE: 11.73 FT

STICK - UP TOP OF SURFACE CASING: -
STICK - UP RISER PIPE : 2.83 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 7.4 FT / 1.5FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 2.5FT

ELEVATION / DEPTH TOP OF SCREEN: 4.9 FT / 4FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.010 INCH X 10FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #1 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -5.1 FT / 14 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -6.1 FT / 15FT

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

ELEVATION / DEPTH OF HOLE: -6.1 FT / 15FT

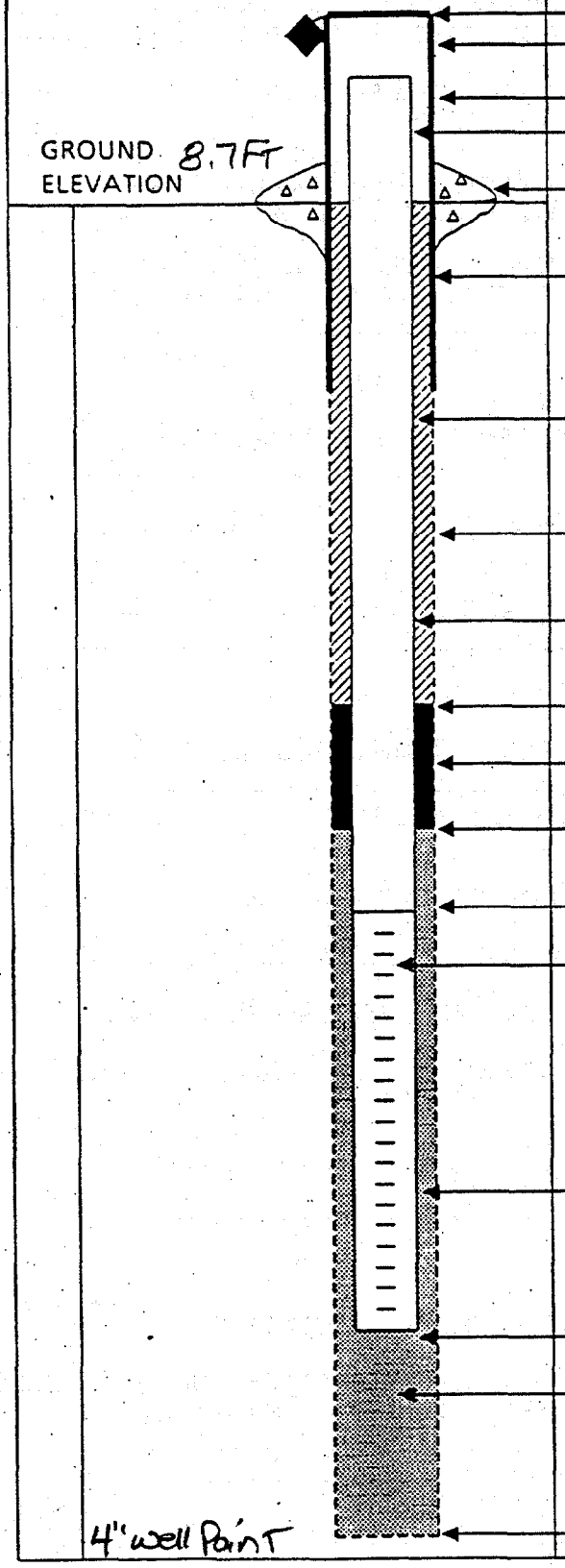
BORING NO.: PAI-10-SB02
PAI-10-MW04(D)

OVERBURDEN
MONITORING WELL SHEET

PROJECT NCBD Parris Island
PROJECT NO. 7803
ELEVATION 8.7ft MSL (Ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-04(D)

LOCATION SWMU 10
BORING PAI-10-SB02
DATE 7/23/98

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



ELEVATION OF TOP OF SURFACE CASING: —
ELEVATION OF TOP OF RISER PIPE: 11.31 FT

STICK - UP TOP OF SURFACE CASING: —
STICK - UP RISER PIPE: 2.61 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -20.3 FT / 29 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 31 FT

ELEVATION / DEPTH TOP OF SCREEN: -24.3FT / 33FT

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: -29.3FT / 38FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -29.8FT / 38.5FT

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

ELEVATION / DEPTH OF HOLE: -29.8F / 38.5FT

BORING NO.: PAI-10-SB
PAI-10-MW

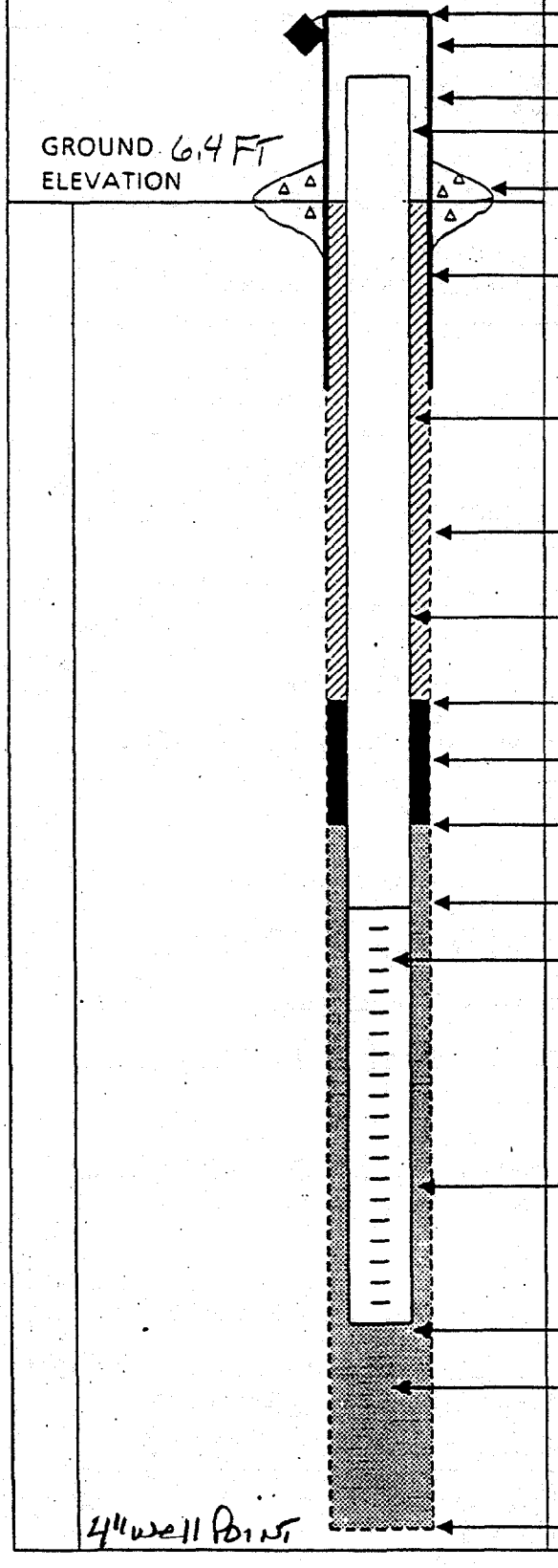
OVERBURDEN
MONITORING WELL SHEET

Constructed adjacent to PAI-10-MW-05(S)

PROJECT NCBD Parris Island
PROJECT NO. 7803
ELEVATION 6.4ft msl (ground)
FIELD GEOLOGIST G. GUNTER

LOCATION SWMU 10
BORING PAI-10-SB03
DATE 7/13/98

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



ELEVATION OF TOP OF SURFACE CASING : -
ELEVATION OF TOP OF RISER PIPE: 9.18 FT

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

TYPE OF SURFACE SEAL: _____

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: 5.4 FT / 1 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 2 FT

ELEVATION / DEPTH TOP OF SCREEN: 2.5 FT / 3.9 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: -7.5 FT / 13.9 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -8.6 FT / 15 FT

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

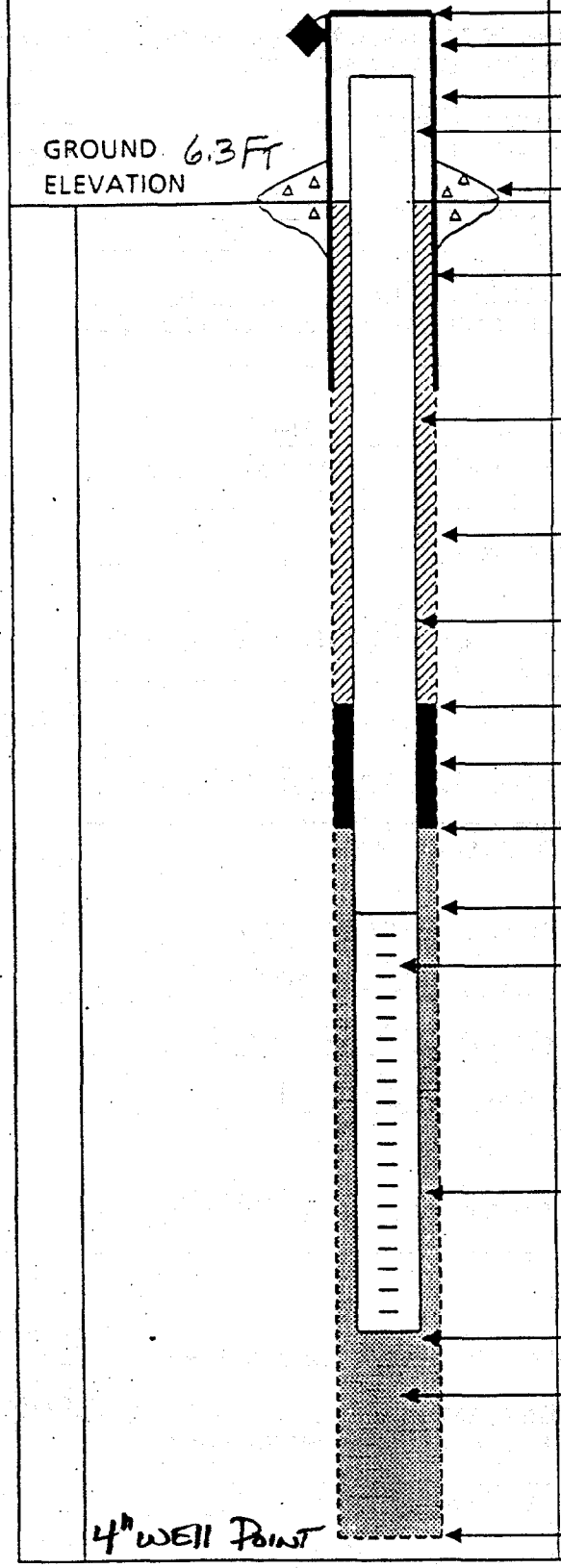
ELEVATION / DEPTH OF HOLE: -8.6 FT / 15 FT

BORING NO.: PAI-10-SB03
PAI-10-MW06(D)

OVERBURDEN
MONITORING WELL SHEET

PROJECT NCBD Parris Island LOCATION SWMU 10
PROJECT NO. 7803 BORING PAI-10-SB03
ELEVATION 6.3 FT MSL (Ground) DATE 7/13/98
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-06(D)

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



ELEVATION OF TOP OF SURFACE CASING : —
ELEVATION OF TOP OF RISER PIPE: 9.15 FT

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

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -19.7 FT / 26 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 28 FT

ELEVATION / DEPTH TOP OF SCREEN: -22.7 FT / 29 FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH X 5 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: -27.7 FT / 34 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -29.7 FT / 36 FT

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

ELEVATION / DEPTH OF HOLE: -29.7 FT / 36 FT

BORING NO.: PAI-10-SB04
PAI-10 MW-07(S)

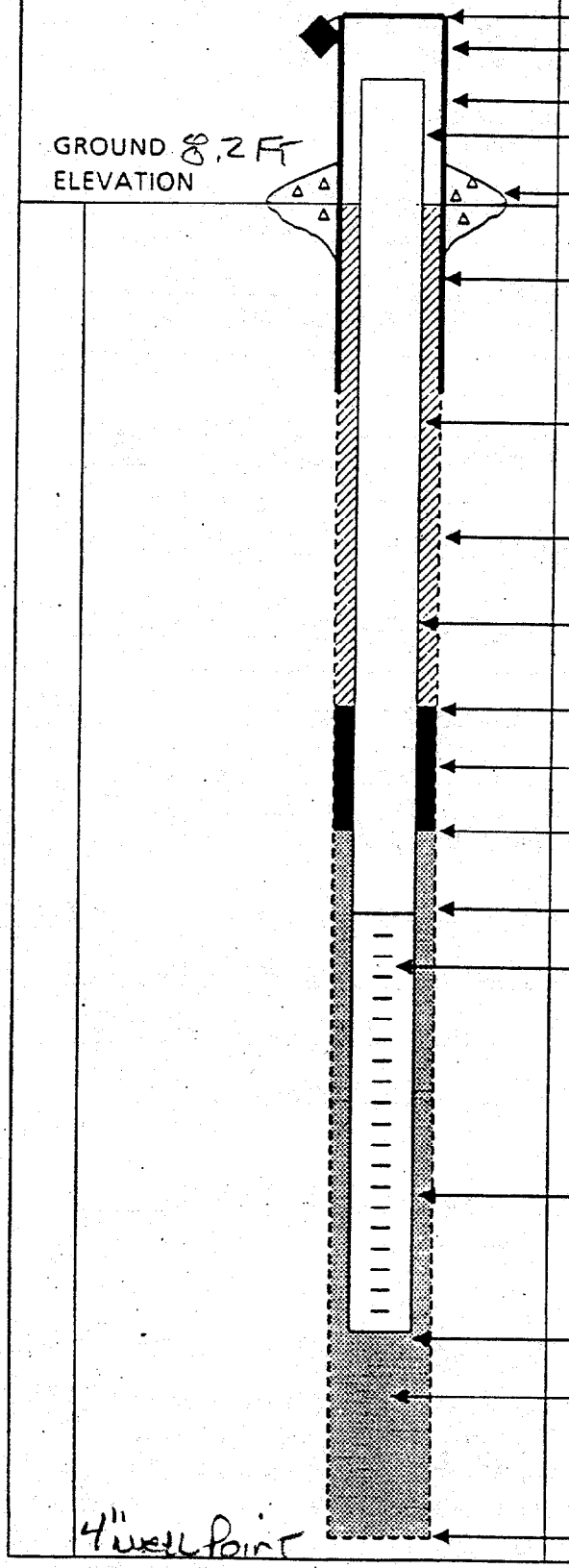
OVERBURDEN
MONITORING WELL SHEET

Constructed Adjacent To

PROJECT NCBD Parris Island
PROJECT NO. 7803
ELEVATION 8.2 ft MSL (Ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-07(S)

LOCATION SWMU 10
BORING PAI-10-SB04
DATE 7/14/98

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



ELEVATION OF TOP OF SURFACE CASING: –
ELEVATION OF TOP OF RISER PIPE: 10.97 FT

STICK - UP TOP OF SURFACE CASING: –
STICK - UP RISER PIPE: 2.77 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 6.7 FT / 1.5 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 2.5 FT

ELEVATION / DEPTH TOP OF SCREEN: 4.7 FT / 3.5 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: -5.3 FT / 13.5 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -5.8 FT / 14 FT

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

ELEVATION / DEPTH OF HOLE: -5.8 FT / 14 FT

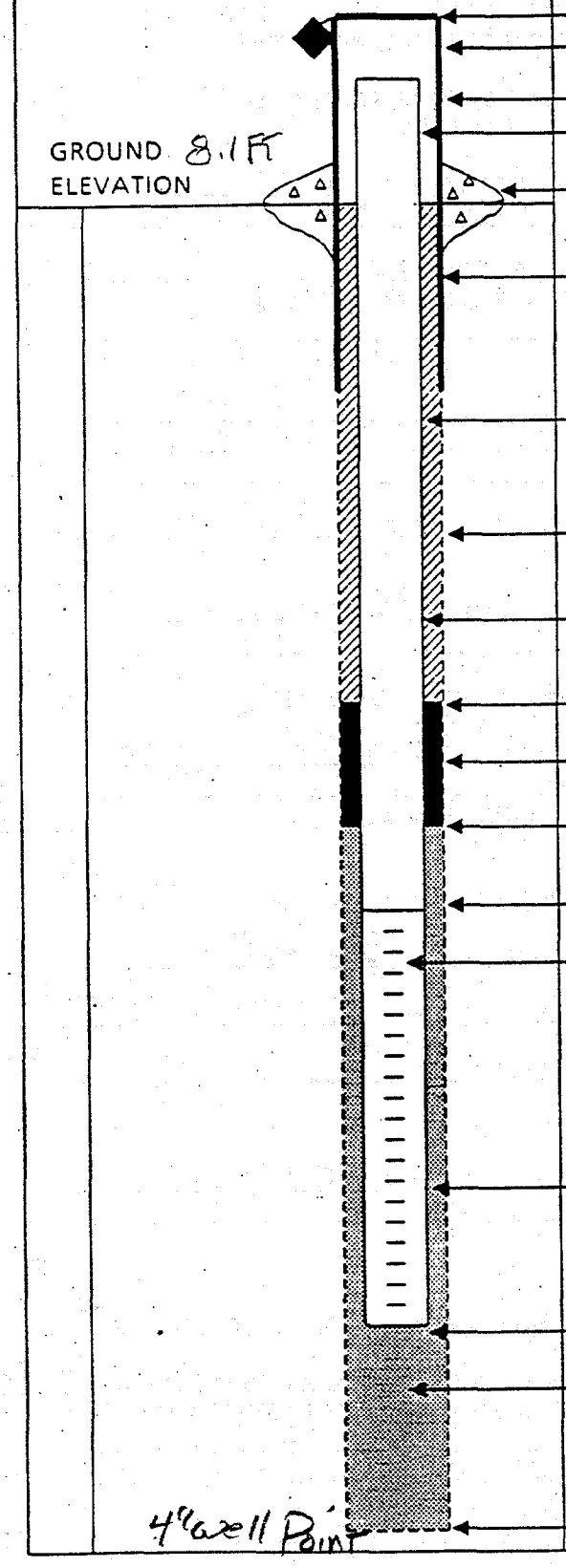
BORING NO.: PAI-10-SB04
PAI-10-MW-08

OVERBURDEN
MONITORING WELL SHEET

PROJECT NCBD Parris Island
PROJECT NO. 7803
ELEVATION 8.1 ft msl (Ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-08(D)

LOCATION SWMU 10
BORING PAI-10-SB04
DATE 7/14/98

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



ELEVATION OF TOP OF SURFACE CASING: -
ELEVATION OF TOP OF RISER PIPE: 11.20 FT

STICK - UP TOP OF SURFACE CASING: -
STICK - UP RISER PIPE : 3.1 FT

TYPE OF SURFACE SEAL: 4'X4'X 8" Concrete PAD

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -11.9 FT/20 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 22 FT

ELEVATION / DEPTH TOP OF SCREEN: -16.1 FT/24.2 FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH X 5 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -21.1 FT/29.2 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -21.9 FT/30.

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

ELEVATION / DEPTH OF HOLE: -21.9 FT/30

BORING NO.: PAI-10-SB05
PAI-10-MW-09(S)

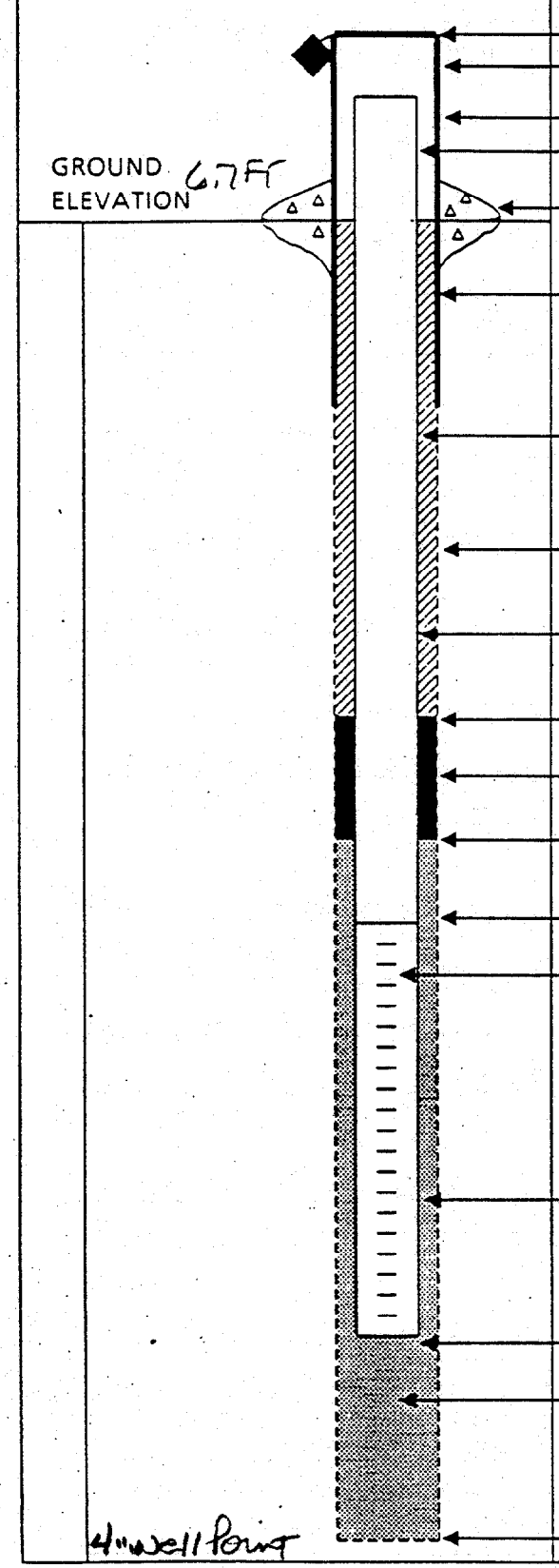
OVERBURDEN
MONITORING WELL SHEET

Construction Diagram

PROJECT NCBC Parris Island
PROJECT NO. 7803
ELEVATION 6.7 ft msl (ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-09(S)

LOCATION SWMU 10
BORING PAI-10-SB05
DATE 7/15/98

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



ELEVATION OF TOP OF SURFACE CASING: -
ELEVATION OF TOP OF RISER PIPE: 9.37 FT

STICK - UP TOP OF SURFACE CASING: -
STICK - UP RISER PIPE: 2.67 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: BENTONITE GROUT

ELEVATION / DEPTH TOP OF SEAL: 4.7 FT / 2 FT

TYPE OF SEAL: BENTONITE Pellets

DEPTH TOP OF SAND PACK: 3 FT

ELEVATION / DEPTH TOP OF SCREEN: 2.7 FT / 4 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: -7.3 FT / 14 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -8.3 FT / 15 FT

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

ELEVATION / DEPTH OF HOLE: -8.3 FT / 15 FT

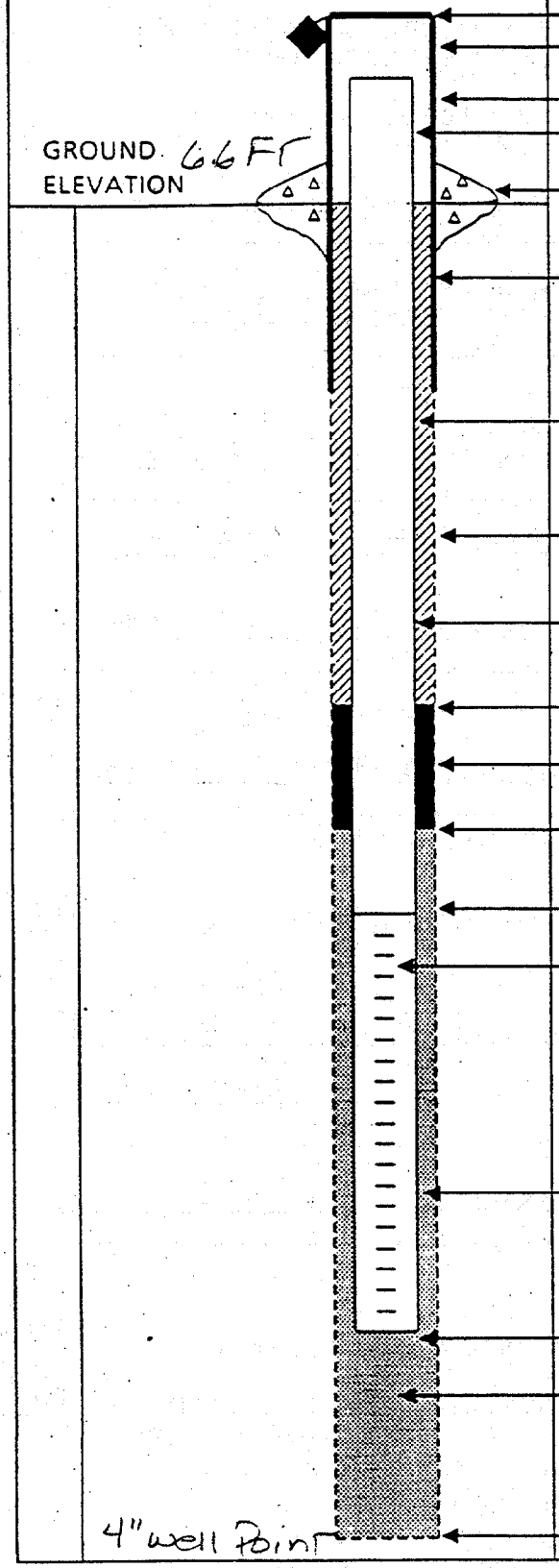
BORING NO.: PAI-10-SB05
PAI-10-MW-10(D)

OVERBURDEN
MONITORING WELL SHEET

PROJECT NCBD Parris Island
PROJECT NO. 7803
ELEVATION 66ft msl (ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-10(D)

LOCATION SWMU 10
BORING PAI-10-SB05
DATE 7/14/98

DRILLER L. LeFever #134
DRILLING METHOD HSA
DEVELOPMENT METHOD Surge & Pump



ELEVATION OF TOP OF SURFACE CASING :
ELEVATION OF TOP OF RISER PIPE: 9.30 FT

STICK - UP TOP OF SURFACE CASING:
STICK - UP RISER PIPE : 2.7 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -13.4 Ft / 20 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 22 FT

ELEVATION / DEPTH TOP OF SCREEN: -17.4 FT / 24 FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH X 5 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -22.4 FT / 29 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -22.9 FT / 29.5 FT

TYPE OF BACKFILL BELOW OBSERVATION WELL: #2 SAND
Backfill consist of 6 ft of Sand

ELEVATION / DEPTH OF HOLE: -22.9 Ft / 29.5 FT

BORING NO.: PAI-10-SB06
PAI-10-MW-11(S)

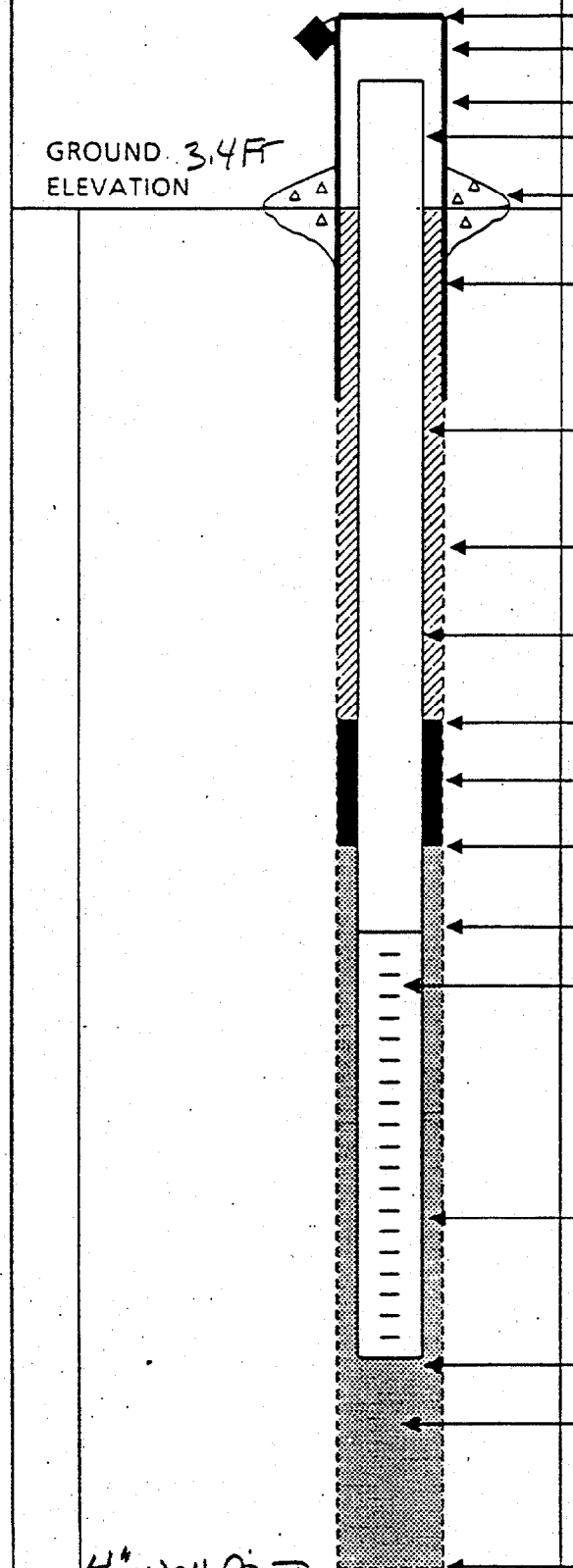
OVERBURDEN
MONITORING WELL SHEET

CONSTRUCTED ADJACENT TO

PROJECT NCRD Parris Island
PROJECT NO. 7803
ELEVATION 3.4ft MSL (ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-11(S)

LOCATION SWMU 10
BORING PAI-10-SB06
DATE 7/21/98

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



ELEVATION OF TOP OF SURFACE CASING : -
ELEVATION OF TOP OF RISER PIPE: 6.02 FT

STICK - UP TOP OF SURFACE CASING: -
STICK - UP RISER PIPE : 2.62 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 1.4 FT / 2FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 3FT

ELEVATION / DEPTH TOP OF SCREEN: -0.6FT/4FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.010 INCH x 10 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #1 Sand

ELEVATION / DEPTH BOTTOM OF SCREEN: -10.6FT / 14FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -11.6FT/15FT

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

ELEVATION / DEPTH OF HOLE: -11.6FT/15FT

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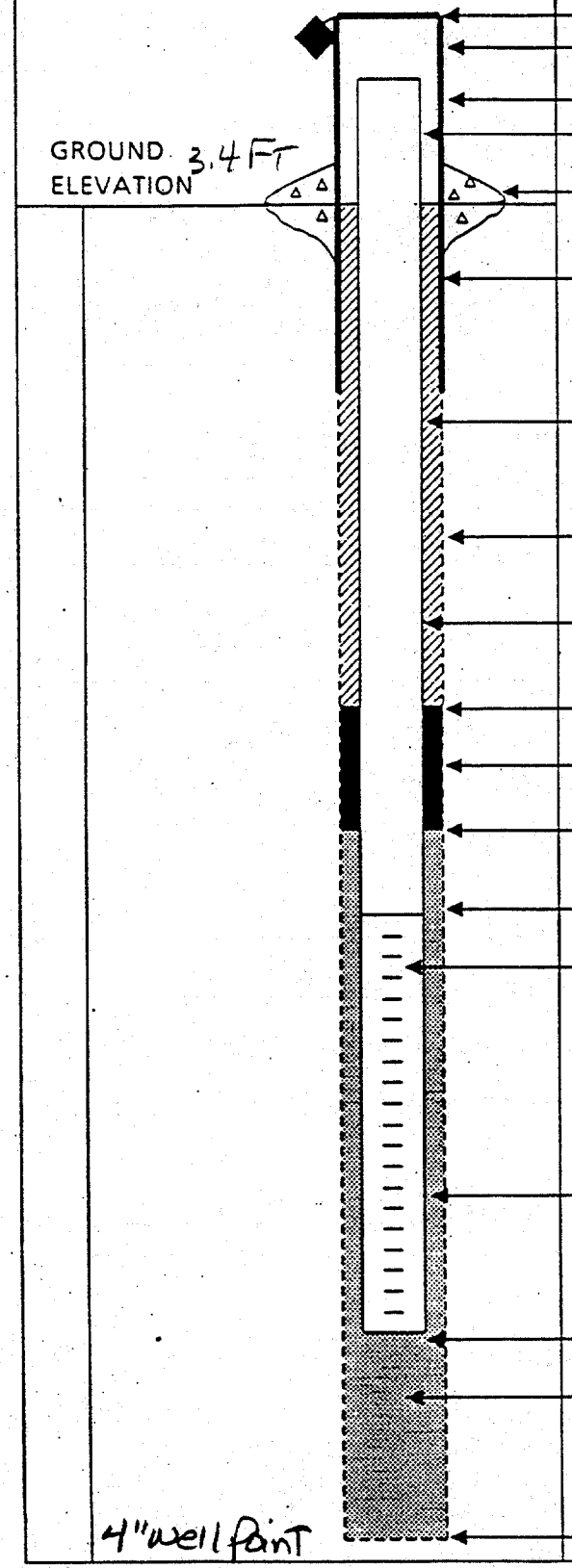
BORING NO.: PAT-10-SB06
PAT-10-MW-12(D)

OVERBURDEN
MONITORING WELL SHEET

PROJECT NCRD Parris Island
PROJECT NO. 7803
ELEVATION 3.4ft msl (ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-12(D)

LOCATION SWMU 10
BORING PAT-10-SB06
DATE 7/22/98

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



ELEVATION OF TOP OF SURFACE CASING: —
ELEVATION OF TOP OF RISER PIPE: 6.13 FT

STICK - UP TOP OF SURFACE CASING: —
STICK - UP RISER PIPE: 2.73 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: BENTONITE GROUT

ELEVATION / DEPTH TOP OF SEAL: -16.6FT/ 20FT

TYPE OF SEAL: BENTONITE Pellets

DEPTH TOP OF SAND PACK: 22 FT

ELEVATION / DEPTH TOP OF SCREEN: -20.6FT/24FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH X 5FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -25.6FT/ 29FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -26.6FT/30FT

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

ELEVATION / DEPTH OF HOLE: -26.6FT/30FT

BORING NO.: PAI-10-SB07
PAI-10-MW-13(S)

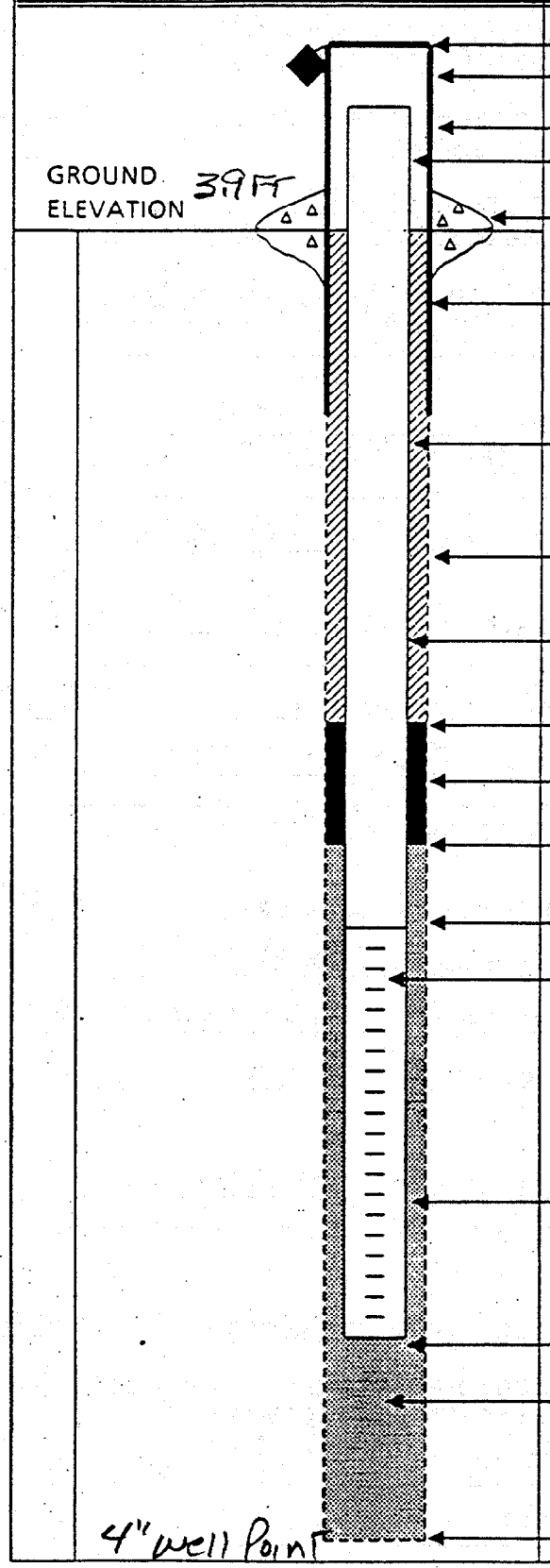
OVERBURDEN
MONITORING WELL SHEET

Constructed adjacent to

PROJECT NCBD Parris Island
PROJECT NO. 7803
ELEVATION 3.9 ft MSL (Ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-13(S)

LOCATION SWMU 10
BORING PAI-10-SB07
DATE 7/22/98

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



ELEVATION OF TOP OF SURFACE CASING: -
ELEVATION OF TOP OF RISER PIPE: 6.69 FT

STICK - UP TOP OF SURFACE CASING: -
STICK - UP RISER PIPE: 2.79 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: 1.9 FT / 2 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 3 FT

ELEVATION / DEPTH TOP OF SCREEN: -0.1 FT / 4 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: -10.1 FT / 14 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -10.6 FT / 14.5 FT

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

ELEVATION / DEPTH OF HOLE: -10.6 FT / 14.5 FT

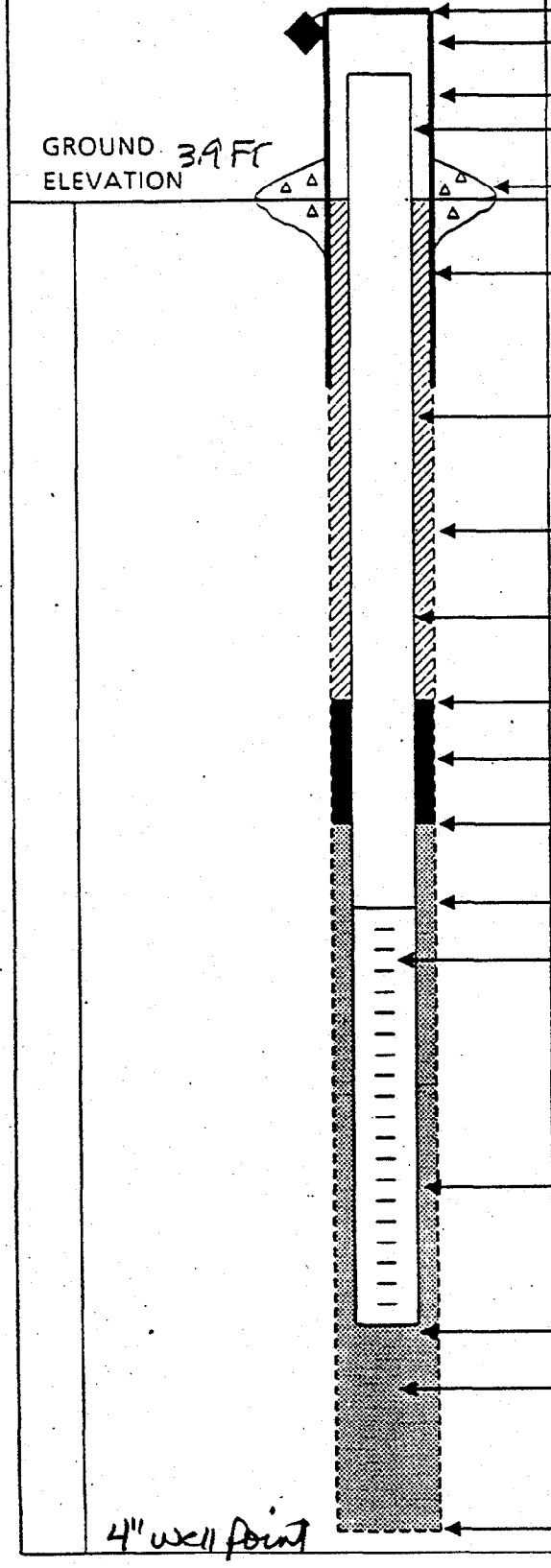
BORING NO.: PAI-10-SB01
PAI-10-MW-14(D)

OVERBURDEN
MONITORING WELL SHEET

PROJECT NCRD Parris Island
PROJECT NO. 7803
ELEVATION 3.9 ft MSL (ground)
FIELD GEOLOGIST G. GUNTER
PAI-10-MW-14(D)

LOCATION SWMU 10
BORING PAI-10-SB07
DATE 7/22/98

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



ELEVATION OF TOP OF SURFACE CASING: -
ELEVATION OF TOP OF RISER PIPE: 6.74 FT

STICK - UP TOP OF SURFACE CASING: -
STICK - UP RISER PIPE : 2.84 FT

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

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

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

BOREHOLE DIAMETER: 8 INCH

TYPE OF BACKFILL: Bentonite Grout

ELEVATION / DEPTH TOP OF SEAL: -17.1 FT / 21 FT

TYPE OF SEAL: Bentonite Pellets

DEPTH TOP OF SAND PACK: 23 FT

ELEVATION / DEPTH TOP OF SCREEN: -21.1 FT / 25 FT

TYPE OF SCREEN: SCH 40 PVC

SLOT SIZE x LENGTH: 0.020 INCH X 5 FT

I.D. OF SCREEN: 2 INCH

TYPE OF SAND PACK: #2 SAND

ELEVATION / DEPTH BOTTOM OF SCREEN: -26.1 FT / 30 FT

ELEVATION / DEPTH BOTTOM OF SAND PACK: -26.4 FT / 30.3 FT

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

ELEVATION / DEPTH OF HOLE: -26.4 FT / 30.3 FT

A-4

WELL DEVELOPMENT RECORDS

PAI-10-MW-01(S)

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-10-MW-01(S)
Site: SWMU 10 - Jericho Is.
Date Installed: 7/23/98
Date Developed: 7/29/98
Dev. Method: Pump & Surge
Pump Type: 1.66" PVC Subm.
Depth to Bottom (ft.): 16.96
Static Water Level Before (ft.): —
Static Water Level After (ft.): 6.10
Screen Length (ft.): 10 ft
Specific Capacity:
Casing ID (in.): 2 inch
Responsible Personnel: Mark Dunnington (MD)
Drilling Co.: Parratt Wolff, Inc.
Project Name: Parris Island - Jericho Is. - Site 4
Project Number: 7803

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. = %
1122	—	8-10		26.5	5.65	215	719	DO 3.10 / Sal. = 1.30
1242	—	55-60	—	23.2	5.68	22.2	7999	DO = 3.04 / Sal. = 1.35
1311	—	60-75	—	23.2	5.80	22.0	143	DO = 2.44 / Sal. = 1.33
1406	—	130-135	—	22.4	5.73	23.4	256	DO = 1.71 / Sal = 1.41
1414	—	135-140	—	23.1	5.60	22.5	(167 178 NM)	DO = 2.45 / Sal = 1.37
1425	—	140-145	—	23.2	5.55	22.7	132 (very clear)	DO = 2.60 / Sal = 1.38
1430	—	145-150	—	23.3	5.59	22.2	88 (very clear)	DO = 2.81 / Sal. = 1.34
—	Development	Concluded	—					

A-35

PAI-10-MW2 (D) PAI-10-MW-02(D)

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-10-MW2 ✓
Site: SWMU-10 - Jericho Is ✓
Date Installed: 7/23/98
Date Developed: 7/29/98
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm.

Depth to Bottom (ft.): 26.43 Bgs
Static Water Level Before (ft.): 5.25
Static Water Level After (ft.): —
Screen Length (ft.): 5.0 Ft.
Specific Capacity: —
Casing ID (in.): 2 inch

Responsible Personnel: Mark Darrington (MD)
Drilling Co.: Parratt Wolff, Inc.
Project Name: Parris Is - Jericho Is. - Site 4
Project Number: 7803

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. = %
1239	—	0-5	5.25	20.4	6.45	20.3	7999	DO = 1.15 / Sal. = 1.21
1245	—	5-10	—	20.1	6.20	25.0	236	DO = 2.01 / Sal. = 1.53
1307	—	~~40~~ 40-50	—	20.1	6.27	26.4	420	DO = 1.46 / Sal = 1.62
1315	—	55-60	—	19.6	6.27	26.3	85	DO = 1.94 / Sal = 1.62
1318	—	65-70	—	19.5	6.27	26.4	21	DO = 2.41 / Sal = 1.63
1327	—	70-80	—	19.5	6.30	26.6	9	DO = 1.39 / Sal = 1.63
1340	—	105-110	—	19.6	6.29	26.5	10	DO = 1.30 / Sal. = 1.63
—	Development Concluded							

D-36

PAIW-MW53

PAI-10-MW-03(S)

MONITORING WELL DEVELOPMENT RECORD

Well: MW-3 (shallow) ✓
Site: Area 4 - Jericho Is. Summit
Date Installed: 7/23/98
Date Developed: 7/29/98
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm. Pump

Depth to Bottom (ft.): 16.78
Static Water Level Before (ft.): 10.45
Static Water Level After (ft.):
Screen Length (ft.): 10.0'
Specific Capacity:
Casing ID (in.): 2.0" OD

Responsible Personnel: Mark Dorrington (MD)
Drilling Co.: Daniel Woltf, Inc.
Project Name: Parris Is. - Jericho Is.
Project Number: 7803

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. = %
0815	—	0	10.45	21.3	5.84	17.8	>999	DO = 2.08 / Sal. = 0.93
0836	—	5-10	—	20.9	5.96	21.4	>999	DO = 2.12 / Sal. = 1.29
0854	—	15-20	—	20.9	5.98	21.8	570	DO = 2.03 / Sal. = 1.32
0913	—	25-30	—	21.1	5.98	22.1	293	DO = 1.91 / Sal. = 1.34
0939	—	35-40	—	21.3	5.99	22.2	994	DO = 2.05 / Sal. = 1.34
0951	—	40-43	—	21.1	5.97	22.2	46	DO = 1.95 / Sal. = 1.34
1000	—	43-44	—	20.8	5.98	22.4	15	DO = 2.08 / Sal. = 1.35
1003	—	45-46	—	20.8	5.98	22.4	5	DO = 1.53 / Sal. = 1.36
1026	—	48-50	—	21.1	5.98	22.5	7	DO = 1.94 / Sal = 1.36
1046	—	60-65	—	21.1	5.99	22.5	5	DO = 2.01 / Sal = 1.36
—	Development Concluded —							

PAI10 - MW-04 (D)

MONITORING WELL DEVELOPMENT RECORD

Well: MW-4 (Deep) ✓
Site: ~~Area 4~~ - Jerichoits, Summit ✓
Date Installed: 7/23/98
Date Developed: 7/24/98
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm. Pump

Depth to Bottom (ft.): 38.10
Static Water Level Before (ft.): 8.30
Static Water Level After (ft.): —
Screen Length (ft.): 5.0'
Specific Capacity: —
Casing ID (in.): 2.0" OD

Responsible Personnel: Mark Downing (MD)
Drilling Co.: Parratt Wolfe, Inc.
Project Name: Pavis Is, Jericho Is -
Project Number: 7803

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units µS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.) DO = mg/L / Sol. = %
1435	—	5-7	8.30	22.7	6.97	6.13	>999	DO = 0.66 / Sol. = 0.38
1450	—	10-15	—	21.7	6.66	19.9	~10	DO = 0.87 / Sol. = 1.19
1515	—	18-20	—	21.2	6.65	21.8	250	DO = 0.86 / Sol. = 1.32
1540	—	35-40	—	21.5	6.63	22.7	~10	DO ~~2.88~~ / Sol. = 1.37
1600	—	50-55	—	21.6	6.62	22.6	~10	DO = 0.65 / Sol. = 1.36
—	Development Concluded —							

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PAI 10 - MW5

PAI-10-MW-05(S)

MONITORING WELL DEVELOPMENT RECORD

Well: MW-5 (shallow) ✓
Site: Area 4 - Jericho Is, Swamp 10 ✓
Date Installed: 7/13/98
Date Developed: 7/27/98 ✓
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Sub. Pump

Depth to Bottom (ft.): 16.55
Static Water Level Before (ft.): 7.55
Static Water Level After (ft.): —
Screen Length (ft.): 10.0'
Specific Capacity: —
Casing ID (in.): 2.0" OD

Responsible Personnel: Mark Dennehy (MD)
Drilling Co.: Parratt Wolff, Inc.
Project Name: Parris Is, SC - Jericho Isle
Project Number: 7803

Pump Rate = 0.5 gal/min. w/ many stops & restarts.

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. = %
1008	—	0-2	7.55	21.5	5.55	5.31	>999	DO = 1.50 / Sal. = 0.33
1054	—	~~20 35~~	~~80 75~~	21.4	5.76	5.93	>999	DO = 0.78 / Sal. = 0.31
1131	—	~~40 45~~	—	21.7	5.78	6.59	~10	DO = 2.46 / Sal. = 0.35
1200	—	~~50 55~~	—	21.3	5.76	7.06	~10	DO = 2.24 / Sal. = 0.38
1210	—	~~55 57~~	—	21.0	5.72	7.28	~10	DO = 1.71 / Sal. = 0.39
1225	— (40)	~~57 60~~	—	21.4	5.74	7.50	~10	DO = ~~2.24~~ 1.98 / Sal. = 0.40
—	— Development Concluded. ✓							

A-39

PAIO-MW-6

PAI-10-MW-06(D)

MONITORING WELL DEVELOPMENT RECORD

Well: MW-6 (Deep) ✓
Site: Area 4 - Jenkins Is. Survey
Date Installed: 7/13/98
Date Developed: 7/27/98
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm. Pump

Depth to Bottom (ft.): 37.37
Static Water Level Before (ft.): 7.69
Static Water Level After (ft.): —
Screen Length (ft.): 5.0'
Specific Capacity: —
Casing ID (in.): 2.0" OD

Responsible Personnel: Mark Jenkins (MJ)
Drilling Co.: Parratt Wolff, Inc.
Project Name: Parris Is., SC - Jenkins Is.
Project Number: 7803

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units µS/cm)	Turbidity (NTU)	Remarks (odor, color, etc.) DO = mg/L / Sal. = ‰
1006	—	0-2	7.69	19.9	5.06	15.0	>999	DO = 1.16 / Sal. = 0.87
1022	— Pumping suspended due to malfunction —			A second pump installed, develop. resumed @ 1240				
1240	—	25-30	—	19.9	5.09	15.5	~10	DO = 0.77 / Sal. = 0.90
1308	—	40-45	—	20.2	4.94	15.3	~10	DO = 0.92 / Sal. = 0.89
1338	—	80-85	—	20.3	4.93	15.2	~10	DO = 0.66 / Sal. = 0.88
1358	—	85-100	—	20.1	4.92	15.0	~10	DO = 0.74 / Sal. = 0.89
— Development Concluded —								

A-40

~~PAI-10-MW7~~ PAI-10-MW-07(S)

MONITORING WELL DEVELOPMENT RECORD

Well: ~~PAI-10-MW07~~ ✓
Site: Suma 10 - Area 4
Date Installed: 7/14/98
Date Developed: 7/27/98
Dev. Method: Surge & Pump
Pump Type: Submersible

Depth to Bottom (ft.): 16.3 TOC
Static Water Level Before (ft.): 9.18
Static Water Level After (ft.): —
Screen Length (ft.): 10FT
Specific Capacity: —
Casing ID (in.): 2 IN

Responsible Personnel: SG / M. Dannington (MD)
Drilling Co.: Parratt Wolff
Project Name: Parris Island - Jericho, Is.
Project Number: ~~7397~~ 7803

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. = %
0743	~0.2	INITIAL	9.18	21.5	6.17	0.518	>999	DO = 2.47 / Salinity = 0.02
0823	—	20	—	20.1	5.26	0.817	764	DO = 0.84 / Sal = 0.03
0835	→	25	—	20.0	5.14	0.98	>999	DO = 1.07 / Sal = 0.04
0903	—	30	—	20.1	5.04	1.19	~10	DO = 1.27 / Sal. = 0.05
0928	—	40-45	—	20.0	4.97	1.28	~10	DO = 1.35 / Sal. = 0.05
							(Very Clear!)	
	—	Development completed	—					

PAI-11

PAI 10-MW8

PAI-10-MW-08(D)

MONITORING WELL DEVELOPMENT RECORD

Page 1 of 1

Well: PAI-10-MW8
Site: Swmu 10 - Area 4
Date Installed: 7/14/98
Date Developed: 7/26/98
Dev. Method: Surge & Pump
Pump Type: Submersible

Depth to Bottom (ft.): 31.0 TOC
Static Water Level Before (ft.): 7.83
Static Water Level After (ft.): —
Screen Length (ft.): 5FT(0.020 in)
Specific Capacity: —
Casing ID (in.): 2IN

Responsible Personnel: GG / M. Demingfield (MD)
Drilling Co.: Parratt Wolff
Project Name: Parris Island & Jericho Is.
Project Number: 7803

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.=%
0740	—	INITIAL	7.83	20.5	6.07	0.487	>999	DO=0.57 / Sal=0.02
0808	—	20	—	19.8	5.66	1.13	>999	DO=0.86 / Sal=0.05
0827	—	40	—	19.2	5.45	1.27	82	DO=0.81 / Sal=0.08
0850	—	65	—	19.2	5.36	1.36	<10	DO=0.71 / Sal 0.06
0906	—	85	—	19.0	5.36	1.41	~10	DO=1.21 / Sal.=0.06
0926	—	100-105	—	19.4	5.38	1.44	~10 (Very Clear)	DO=1.21 / Sal.=0.06
—	Development Concluded	—						

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PAI10-MW9 odd - shallow wells
even - deep wells

PAI-10-MW-07(5)

MONITORING WELL DEVELOPMENT RECORD

Well: ~~PAI4-MW-8~~ PAI10-MW9 (MD)
Site: Area 4, SWMU 10 ✓
Date Installed: 7/15/98
Date Developed: ~~7/26/98~~ 7/26/98 ✓
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm. Pump
Depth to Bottom (ft.): 16.66
Static Water Level Before (ft.): 7.45
Static Water Level After (ft.): —
Screen Length (ft.): 10
Specific Capacity: —
Casing ID (in.): 2.0" OD
Responsible Personnel: Mark Darrington (MD)
Drilling Co.: Parrat Wolfe, Inc.
Project Name: Parris Is., SC - Jericho Island
Project Number:

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. = %
1418	—	1-2	>16.00	23.6	5.89	28.3	>999	DO = 3.51 / Sal. = 1.76
1431	—	5-7	>16.00	23.6	5.78	29.6	759	DO = 2.59 / Sal = 1.85
1503	—	10-15	>16.00	23.7	5.79	31.0	659	DO = 3.53 / Sal. = 1.94
1528	—	20-23	>16.00	23.3	5.83	32.6	(MD) ~~254~~ 248	DO = 3.17 / Sal = 2.05
1607	—	30-35	>16.00	23.2	5.82	34.9	187	DO = 2.49 / Sal = 2.21
1627	—	40-42	>16.00	22.9	5.81	36.1	92	DO = 2.43 / Sal = 2.30
1703	—	60	>16.00	22.8	5.88	33.1	270	DO = 3.69 / Sal = 2.09
1719	—	70	>16.00	22.6	5.88	36.9	>999	DO = 2.87 / Sal = 2.35
1727	—	73	>16.00	23.1	5.90	37.2	53	DO = 3.27 / Sal = 2.37
1738	—	75	>16.00	22.7	5.88	34.8	<10	DO = 3.48 / Sal = 2.20
1748	—	78	>16.00	22.7	5.86	37.4	7	DO = 2.77 / Sal = 2.39
1753	—	80	>16.00	22.6	5.90	37.1	43	DO = 3.68 / Sal = 2.36
—	Development Concluded —							

PAI-10-MW-10(D)

MONITORING WELL DEVELOPMENT RECORD

PAI10-MW-10

Well: ~~PAI4 mw 14 (Deep)~~ (MD 7/28/98)
Site: Area 4 Area 4 - Jericho Is.
Date Installed: 7/14/98
Date Developed: 7/26/98 ✓
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm. Pump

Depth to Bottom (ft.): 37.77
Static Water Level Before (ft.): 8.00
Static Water Level After (ft.): —
Screen Length (ft.): 5
Specific Capacity: —
Casing ID (in.): 2.0" OD

Responsible Personnel: Mark Damington (MD)
Drilling Co.: Parratt Wolfe Inc.
Project Name: Panama Is., SC - Jericho Island
Project Number: 7803

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. = %
1043	—	0	8.00	21.8	7.96	4.04	>999	DO = 0.20 / Sal. = 0.18%
1101	—	8-10	25.25	21.2	7.14	7.76	>999	DO = 0.26 / Sal. = 0.4%
1123	—	12-15	25.00	21.5	7.03	11.0	849	DO = 0.24 / Sal. = 0.6%
1138	—	18-20	25.05	21.2	6.91	11.9	599	DO = 0.54 / Sal. = 0.67
1151	—	23-25	25.05	21.3	6.84	12.0	330	DO = 0.40 / Sal. = 0.68
1400	—	80	>25.05	22.0	6.70	12.7	44 (Very Clear)	DO = 1.06 / Sal. = 0.73
1404	—	0-10	Meter malfunctioning - Turbidity reading for DI H2O = >999					
1405	—	85-100	>25.05	22.2	6.45	12.5	~10	DO = 0.76 / Sal. = 0.71
—	—	Development Concluded						

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PAI-10-MW11(S)

MONITORING WELL DEVELOPMENT RECORD

Well: PAI-10-MW11 ✓
Site: SWMU 10 - Jericho Isle ✓
Date Installed: 7/21/98
Date Developed: 7/29/98 ✓
Dev. Method: Pumping & Surge ✓
Pump Type: 1.66" OD PVC Sub. Pump

Depth to Bottom (ft.): 16.60 ✓
Static Water Level Before (ft.): 13.75 (after pump start)
Static Water Level ~~After~~ (ft.): 5.91
Screen Length (ft.): 10.0'
Specific Capacity: —
Casing ID (in.): 2 inch OD

Responsible Personnel: Mark Darrington (WD)
Drilling Co.: Parratt Wolff, Inc.
Project Name: Parris Is, SC - Jericho Isle (S. Ye4)
Project Number: 7803

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ~~m~~S/cm)	Turbidity (NTU)	Remarks (odor, color, etc.) DO = mg/l / Sal. = %
1056	—	0-5	13.75	22.2	5.92	39.1	>999	DO = 0.65 / Sal. = 2.52
1141	—	35-40	—	22.5	6.43	40.8	(sic) 18.14	~~DO~~ = 1.75 / Sal. = 2.62
1148	—	50-55	—	22.0	6.47	40.9	5 (very clear)	DO = 1.53 / Sal. = 2.63
1153	—	55-65	—	21.9	6.47	40.9	6 (V.C.)	DO = 1.72 / Sal. = 2.63
1200	—	65-70	—	21.8	6.49	41.1	7 (V.C.)	DO = 2.20 / Sal = 2.64
—	Development Concluded — ✓							

PAI-10-MW12(D)

MONITORING WELL DEVELOPMENT RECORD

Well: PAI – 10 – MW12 ✓
Site: SWMU 10 - Jericho Isle ✓
Date Installed: 7/22/98
Date Developed: 7/29/98 ✓
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm.

Depth to Bottom (ft.): 32.34
Static Water Level Before (ft.): —
Static Water Level After (ft.): —
Screen Length (ft.): 5.0'
Specific Capacity: —
Casing ID (in.): 2 inch OD

Responsible Personnel: Mark Darrington (MD)
Drilling Co.: Parratt Wolff, Inc.
Project Name: Parris Is., SC - Jericho Isle, Site 4
Project Number: 7803

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. = %
1059	—	0-5		21.4	6.58	25.0	>999	DO = 3.12 / Sal. = 1.52
1106	—	15-20	—	22.0	6.37	26.2	107	DO = 4.25 / Sal. = 1.61
1137	—	40-50	—	21.6	6.40	25.9	15 (Very clear)	DO = 3.85 / Sal. = 1.59
1143	—	55-60	—	21.5	6.53	25.1	230	DO = 2.00 / Sal. = 1.54
1146	—	60-65	—	21.4	6.47	26.9	62	DO = 3.32 / Sal. = 1.66
1151	—	65-75	—	21.1	6.47	27.2	44 (Very clear)	DO = 3.35 / Sal = 1.68
1201	—	75-85	—	21.1	6.44	27.8	18 (Very clear)	DO = 3.37 / Sal = 1.72
1207	—	85-95	—	21.1	6.47	27.5	52 (V.C.)	DO = 2.92 / Sal = 1.70
1209	—	95-100	—	21.1	6.44	27.2	8 (V.C.)	DO = 2.97 / Sal = 1.68
1215	—	100-105	—	20.7	6.41	26.5	10	DO = 3.33 / Sal. = 1.63
—	Development	Concluded		—				

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RAITO ~~MW-11~~ MW-13 (MD) 7/29/98 11-12 AE-10-MW-13(S)

MONITORING WELL DEVELOPMENT RECORD

Page 1 of 1

Well: ~~MW-11~~ MW-13 (MD) 7/29/98
Site: Area 4 - Jericho Is. Sym W-10
Date Installed: 7/22/98
Date Developed: 7/28/98
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm. pump
Depth to Bottom (ft.): 16.75
Static Water Level Before (ft.): 4.28
Static Water Level After (ft.): —
Screen Length (ft.): 10.0'
Specific Capacity: —
Casing ID (in.): 2.0" OD
Responsible Personnel: Mark Darrington (MD)
Drilling Co.: Parratt Wolff Inc.
Project Name: Kiawah Island, SC - Jericho Is.
Project Number: 7803

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. = %
1115	—	0-2	4.28 ~~4.07~~ (MD)	22.7	6.70	36.4	>999	DO = 0.25 / Sal. = 2.31
1153	—	35-40	—	22.3	6.60	33.3	571	DO = 0.40 / Sal = 2.10
1224	—	75-80	—	22.3	6.64	35.1	355	DO = 0.46 / Sal. = 2.23
1234		90-95	—	22.2	6.61	35.8	27	DO = 0.39 / Sal. = 2.27
1240	—	100-105	—	21.8	6.62	36.0	9	DO = 0.47 / Sal. = 2.29
1245	—	105-110	—	21.9	6.61	36.0	7	DO = 0.42 ~~0.45~~ (MD) / Sal. = 2.29
	—	Development concluded		—				

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PAI 10 - ~~MW12~~ (MW) 7/27/98
MW14 (D)

PAI-10-MW-14(D)

MONITORING WELL DEVELOPMENT RECORD

MW-14 7/29/98 (MW)

Well: ~~MW-12~~ (Deep) ✓
Site: Area 4 - Jericho Is. - SWMU 10 ✓
Date Installed: 7/22/98
Date Developed: 7/28/98 ✓
Dev. Method: Pump & Surge
Pump Type: 1.66" OD PVC Subm. Pump

Depth to Bottom (ft.): 32.64
Static Water Level Before (ft.): 4.87
Static Water Level After (ft.): —
Screen Length (ft.): 5.0'
Specific Capacity: —
Casing ID (in.): 2.0" OD

Responsible Personnel: Mark Dannington (MD)
Drilling Co.: Parratt Wolff, Inc.
Project Name: Parris Island, SC - Jericho Is.
Project Number: 7803

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. = %
~~1115~~	—	~~0-2~~	~~4.87~~	~~22.7~~	~~6.70~~	~~36.4~~	~~>999~~	~~DO = 0.25 / Sal. = 2.31~~ (MD) 7/29/98
1420	—	0-2	4.87	21.5	6.50	30.3	>999	DO = 0.39 / Sal. = 1.89
1425	—	5-10	—	20.9	6.39	43.3	>999	DO = 0.58 / Sal. = 2.80
1451	—	30	—	21.0	6.36	43.9	152	DO = 0.54 / Sal. = 2.83
1503	—	35-40	—	21.0	6.37	44.5	178	DO = 0.41 / Sal. = 2.87
1513	—	45-50	—	20.9	6.36	44.5	478	DO = 0.77 / Sal = 2.88
1534	—	65-70	—	21.1	6.33	44.5	49	DO = 0.53 / Sal = 2.88
1600	—	100-105	—	21.1	6.35	45.2	21	DO = 0.40 / Sal. = 2.92
1615	—	115-120	—	20.9	6.34	45.4	48	DO = 0.39 / Sal. = 2.95
1627	—	130-135	—	20.7	6.34	45.5	28	DO = 0.38 / Sal = 2.96
1638	—	140-145	—	20.7	6.34	45.5	16 (very clear)	DO = 0.42 / Sal. = 2.96
1645	—	150-155	—	20.8	6.34	45.5	22 (very clear)	DO = 0.58 / Sal. = 2.97
1659	—	165-	—	20.6	6.33	45.6	27 (very clear)	DO = 0.47 / Sal. = 2.96
—	Development Concluded							

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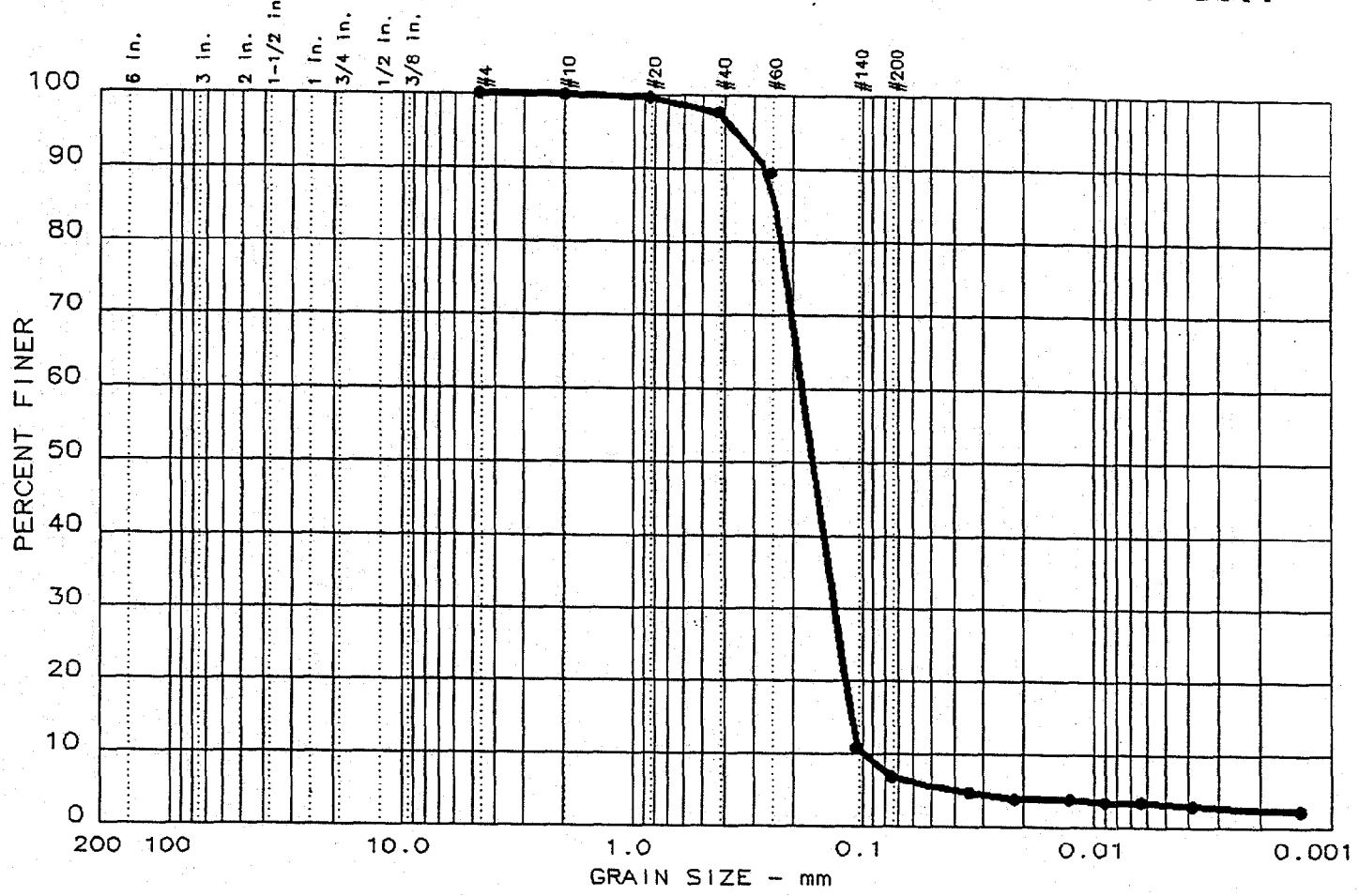
GEOTECHNICAL/ECOLOGICAL DATA

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	16	0.0	0.0	93.1	3.7	3.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.238	0.181	0.163	0.131	0.111	0.0977	0.96	1.9

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

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SB-001-22

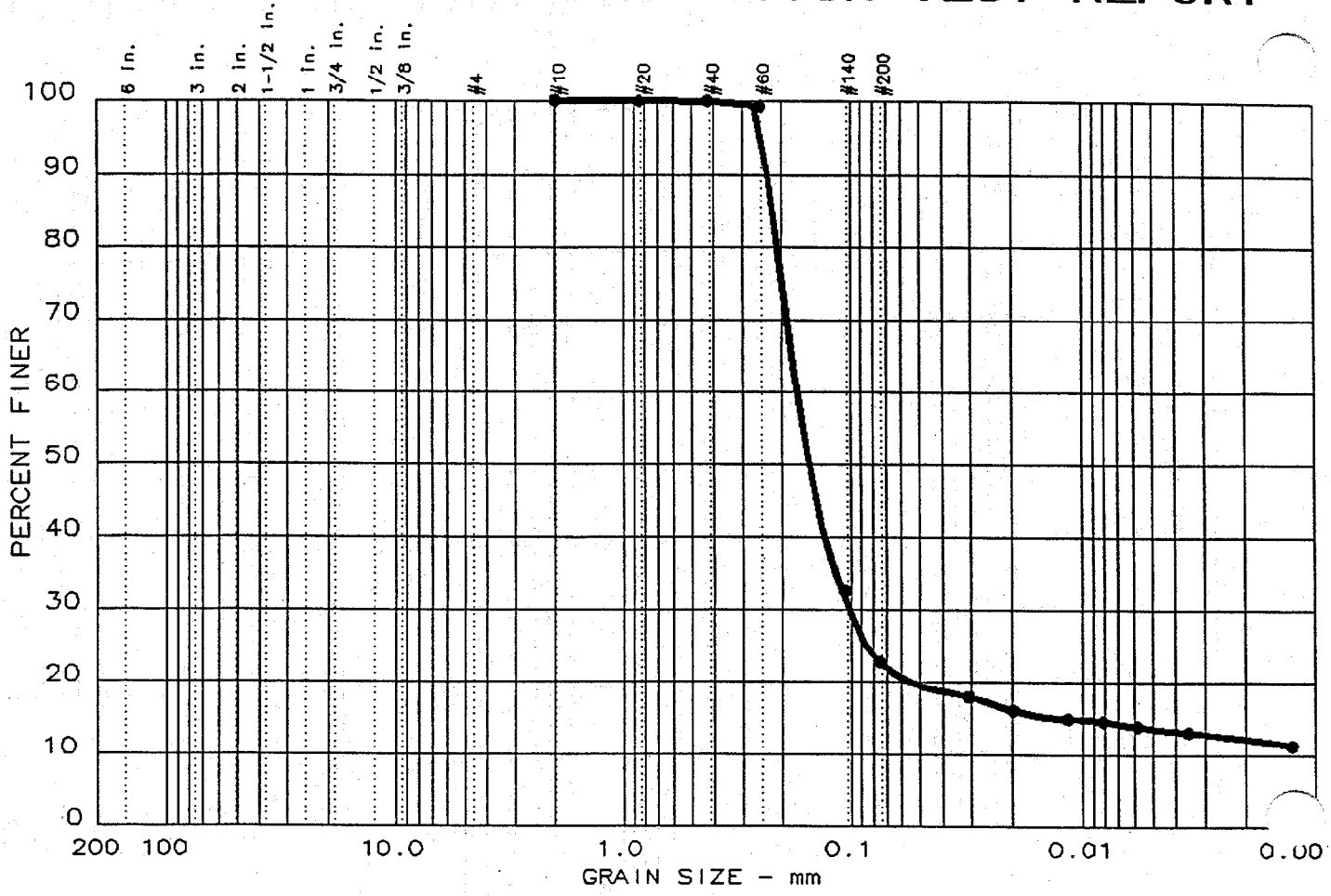
Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	0.0	77.2	9.2	13.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.219	0.169	0.150	0.100	0.0123			

MATERIAL DESCRIPTION	USCS	AASHTO
● Orangish Brown Clayey Silty Sand	SM	A-2-4(0.0)

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SB-002-04

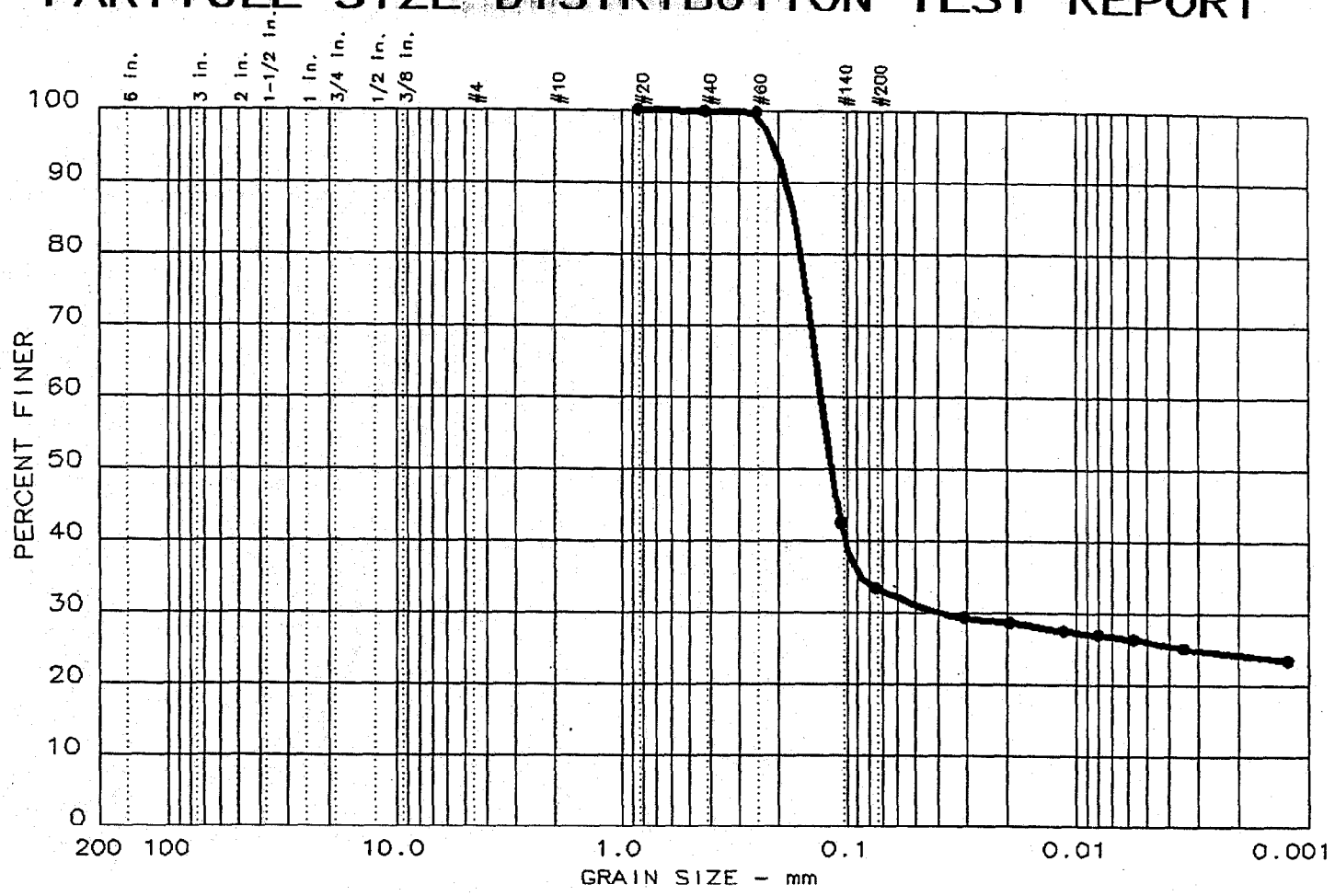
Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	20	0.0	0.0	66.6	7.4	26.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	30	12	0.168	0.129	0.116	0.0372				

MATERIAL DESCRIPTION	USCS	AASHTO
● Yellow Brown Clayey Sand	SC	A-2-6(0.4)

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SB-002-10

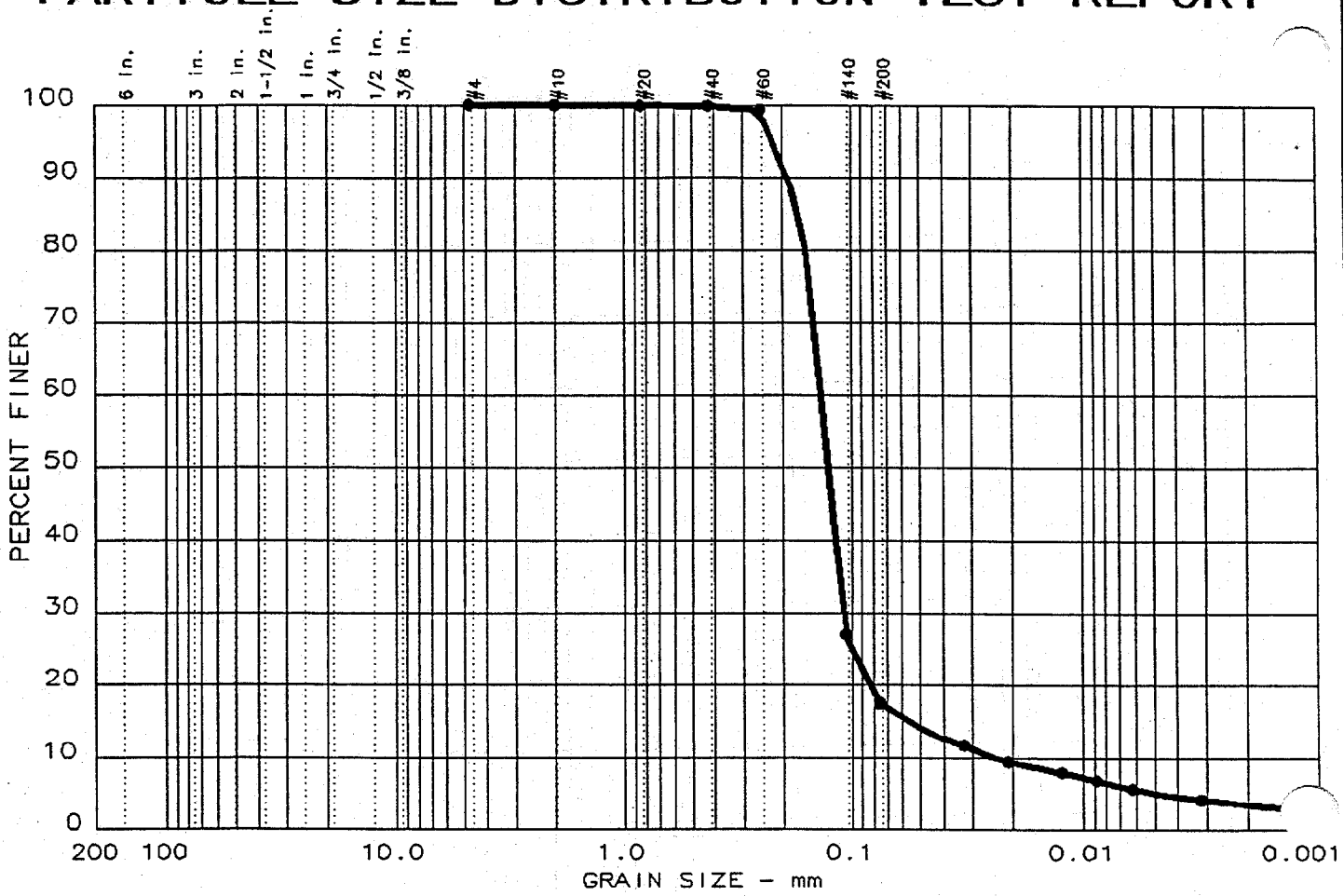
Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	6	0.0	0.0	82.5	12.4	5.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.163	0.135	0.126	0.108	0.0555	0.0231	3.75	5.8

MATERIAL DESCRIPTION	USCS	AASHTO
● Light Brown Silty Sand	SM	A-2-4(0.0)

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SB-003-02

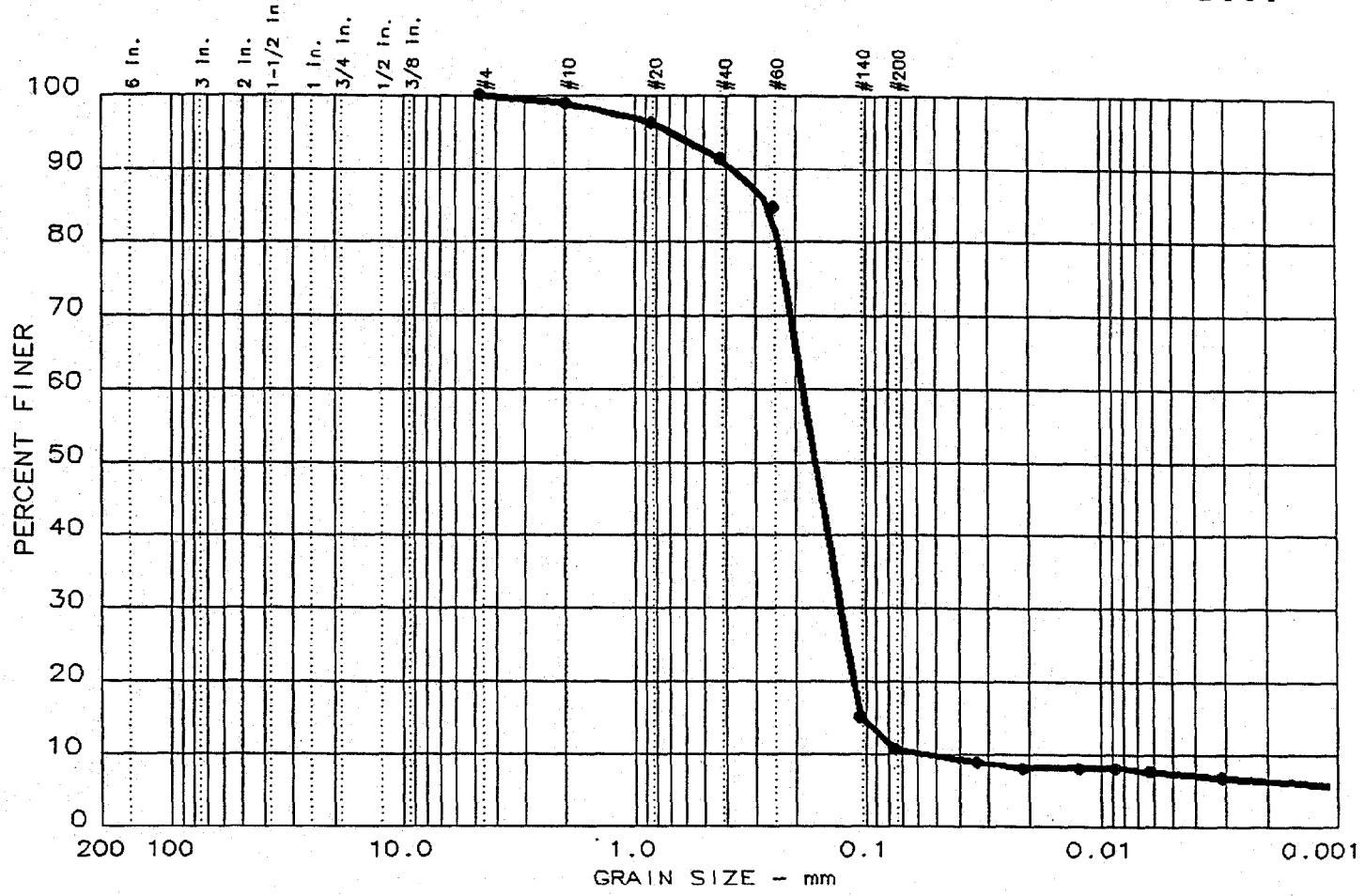
Date: 24 JULY 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	11	0.0	0.0	89.3	3.4	7.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.257	0.184	0.163	0.127	0.105	0.0531	1.66	3.5

MATERIAL DESCRIPTION	USCS	AASHTO
● Orange Brown Poorly Graded Sand with Silt	SP-SM	A-2-4(0.4)

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SB-003-30

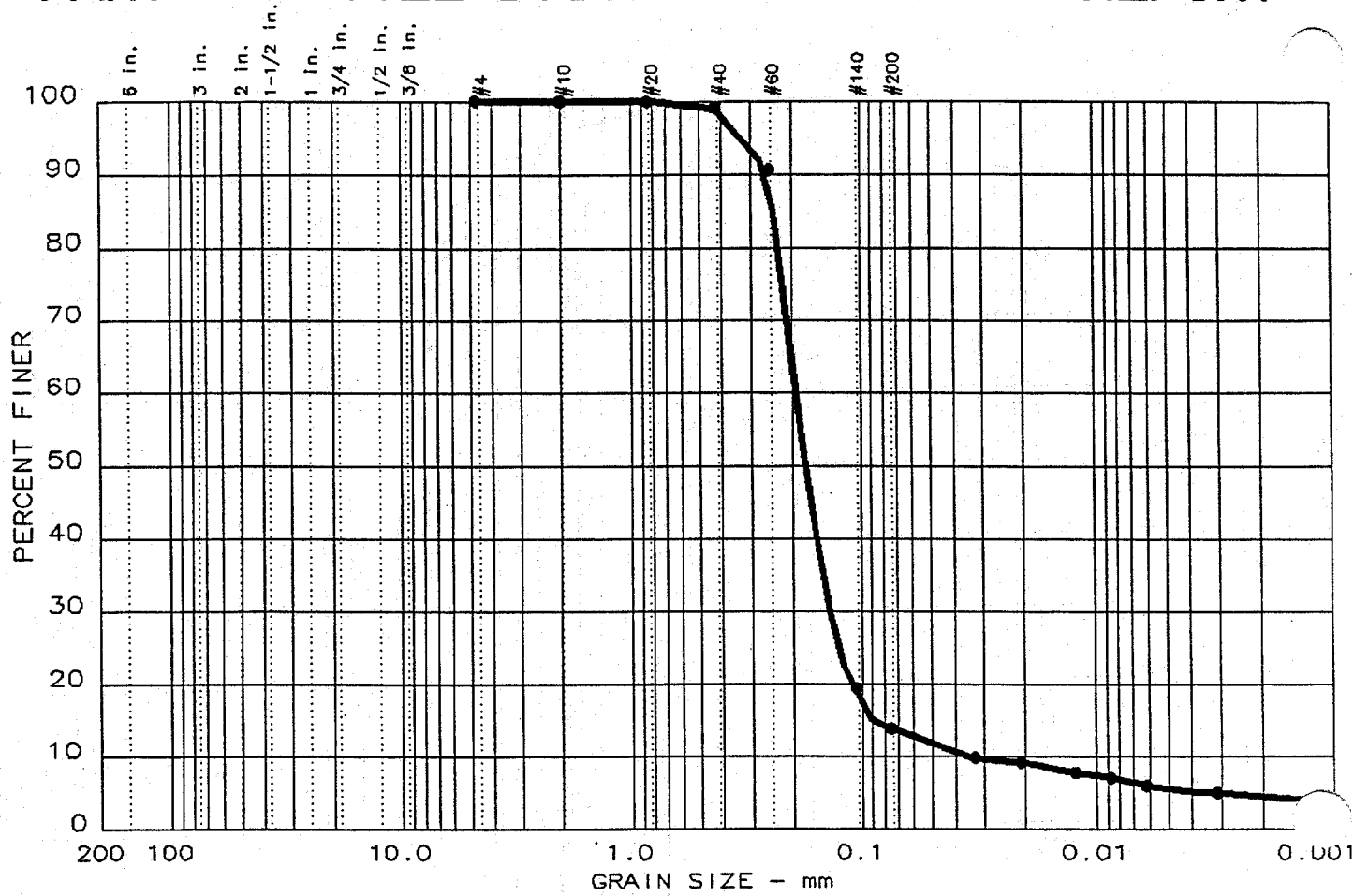
Date: 24 JULY 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	0.0	86.1	8.3	5.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.239	0.191	0.174	0.137	0.0894	0.0332	2.95	5.8

MATERIAL DESCRIPTION	USCS	AASHTO
● Orange Brown Silty Sand	SM	A-2-4(0.1)

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SB-004-02

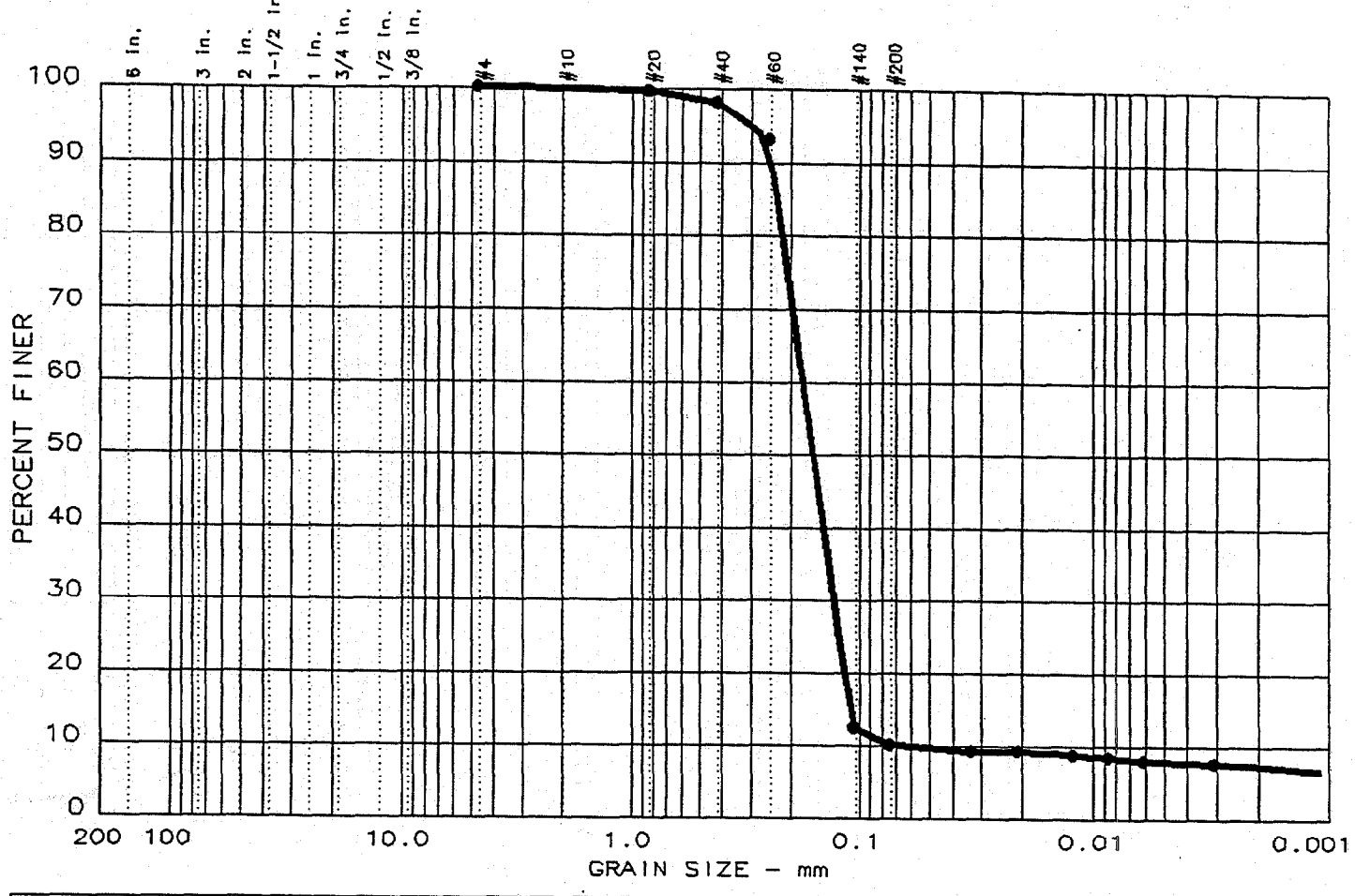
Date: 24 JULY 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	4	0.0	0.0	89.9	2.3	7.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.229	0.176	0.158	0.128	0.109	0.0591	1.57	3.0

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

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SB-004-06

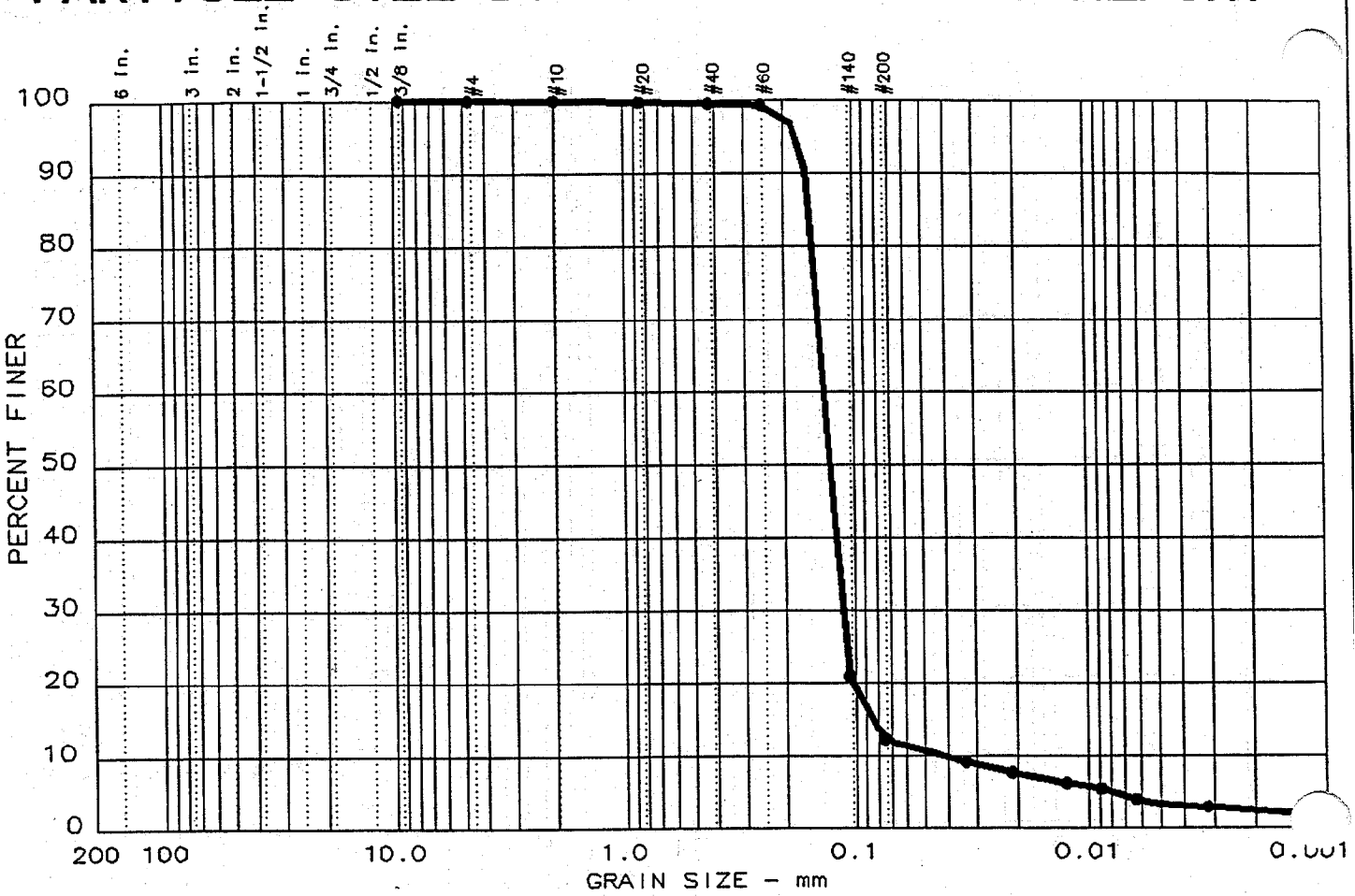
Date: 24 JULY 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	10	0.0	0.1	87.7	8.9	3.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.153	0.133	0.125	0.112	0.0838	0.0410	2.29	3.2

MATERIAL DESCRIPTION	USCS	AASHTO
● Light Brown Silty Sand	SM	A-2-4(0.3)

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SB-005-02

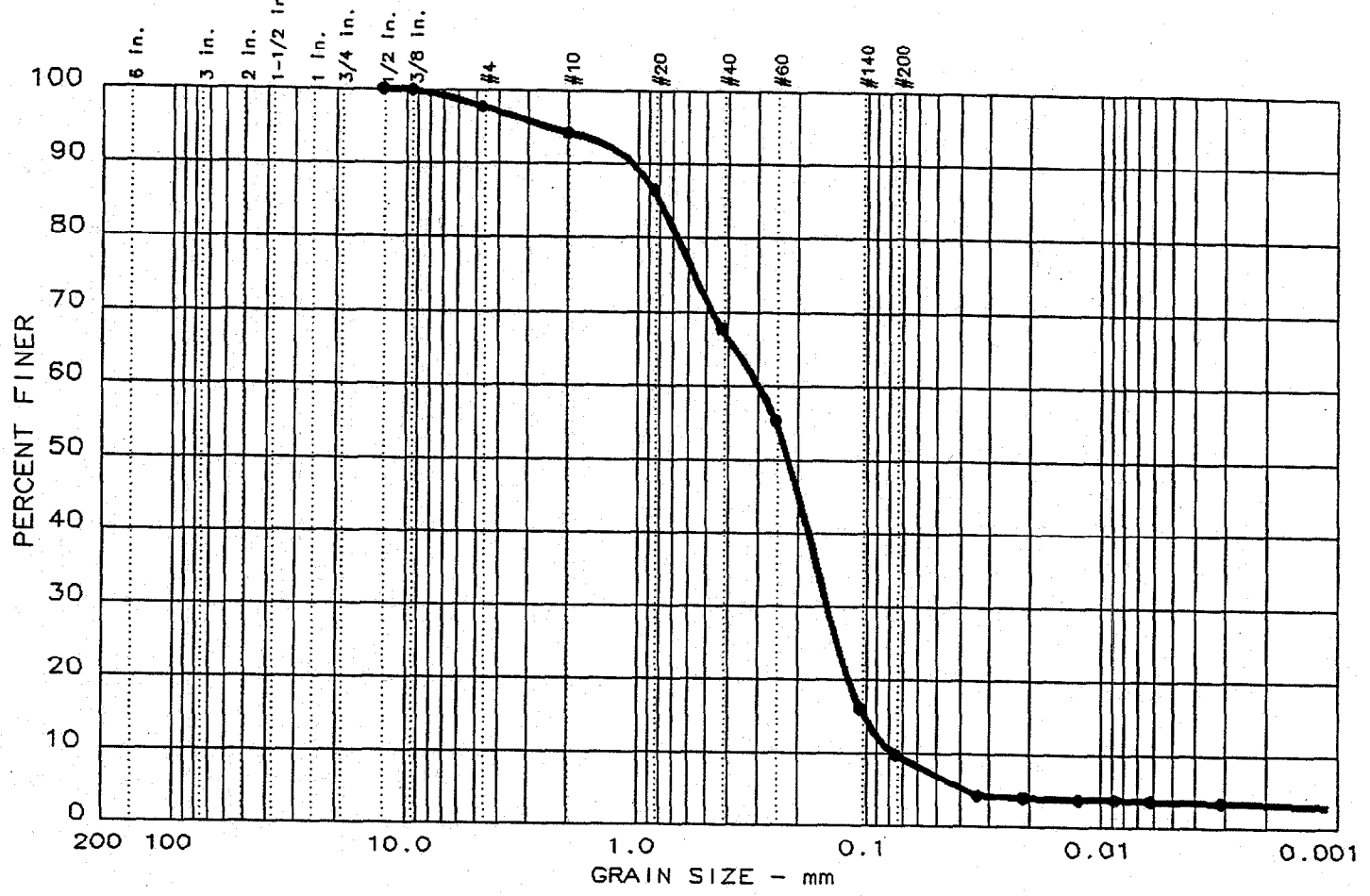
Date: 24 JULY 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	7	0.0	2.3	87.9	6.3	3.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.802	0.294	0.219	0.147	0.102	0.0764	0.97	3.8

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

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SB-005-24

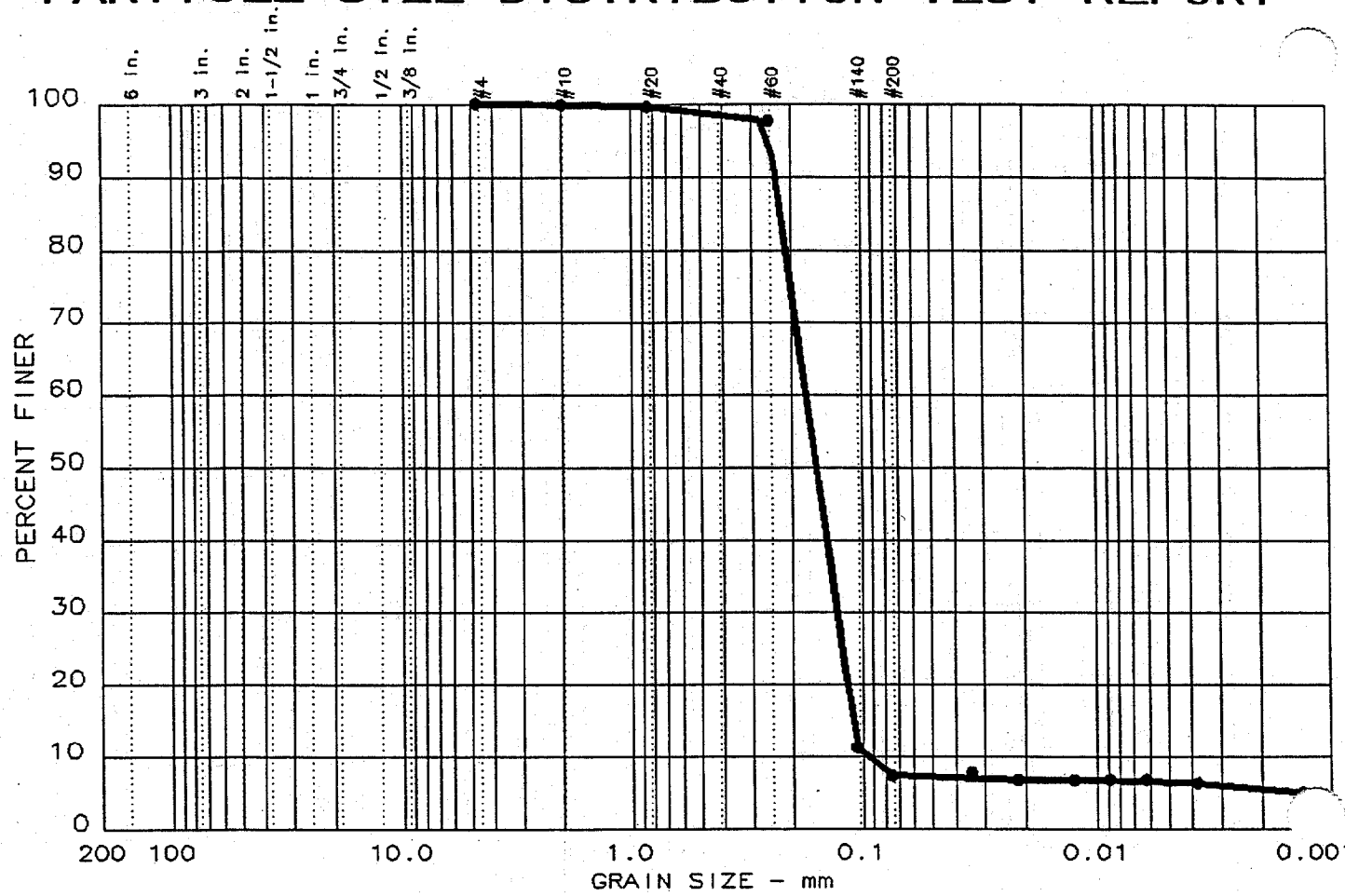
Date: 24 JULY 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	15	0.0	0.0	92.6	0.9	6.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.220	0.172	0.156	0.127	0.110	0.0934	1.01	1.8

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

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SB-006-06

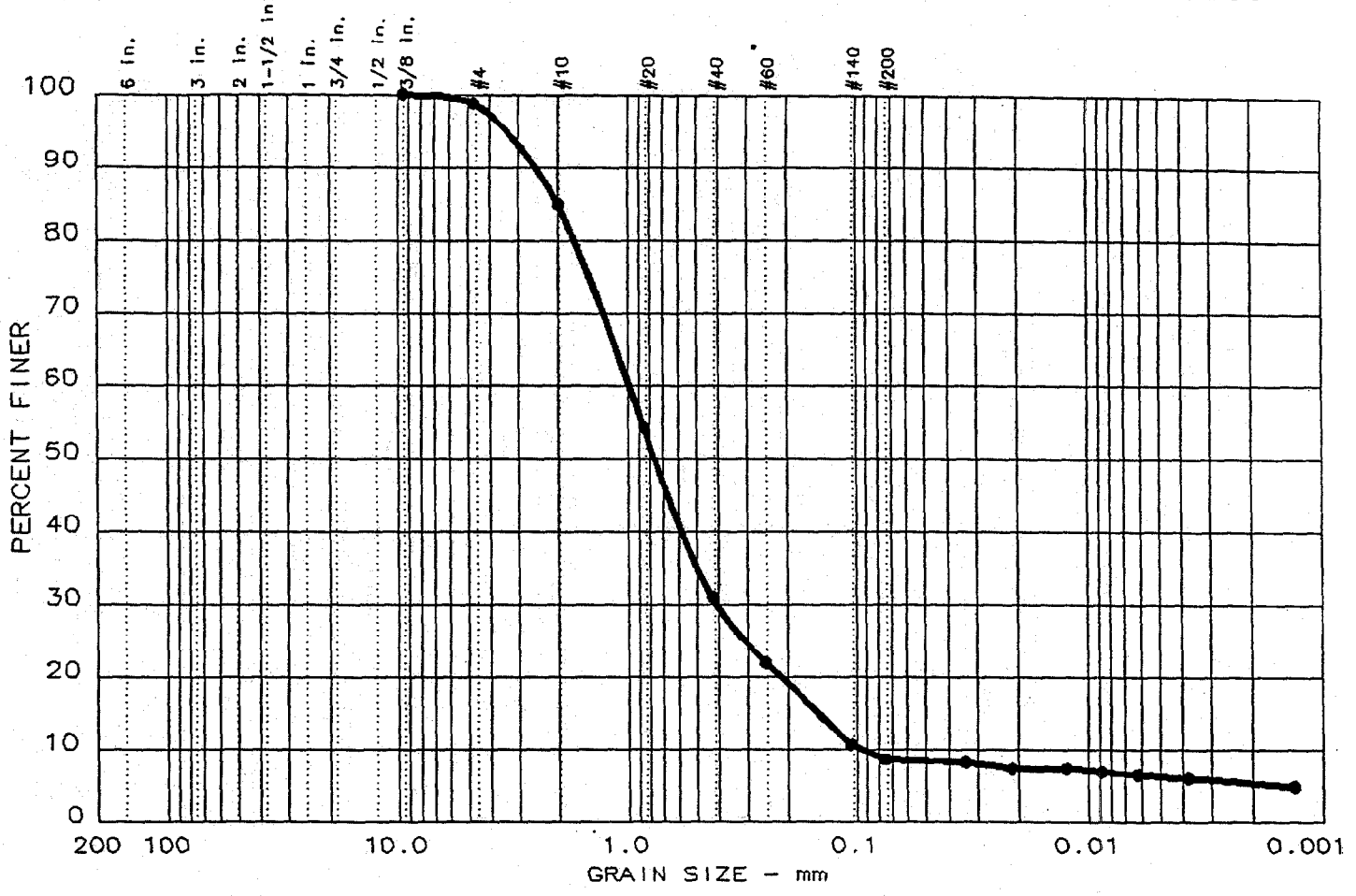
Date: 17 August 1998

KIBER
ENVIRONMENTAL
SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	1.2	90.2	2.3	6.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	2.00	0.984	0.762	0.405	0.149	0.0938	1.77	10.5

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

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SB-007-26

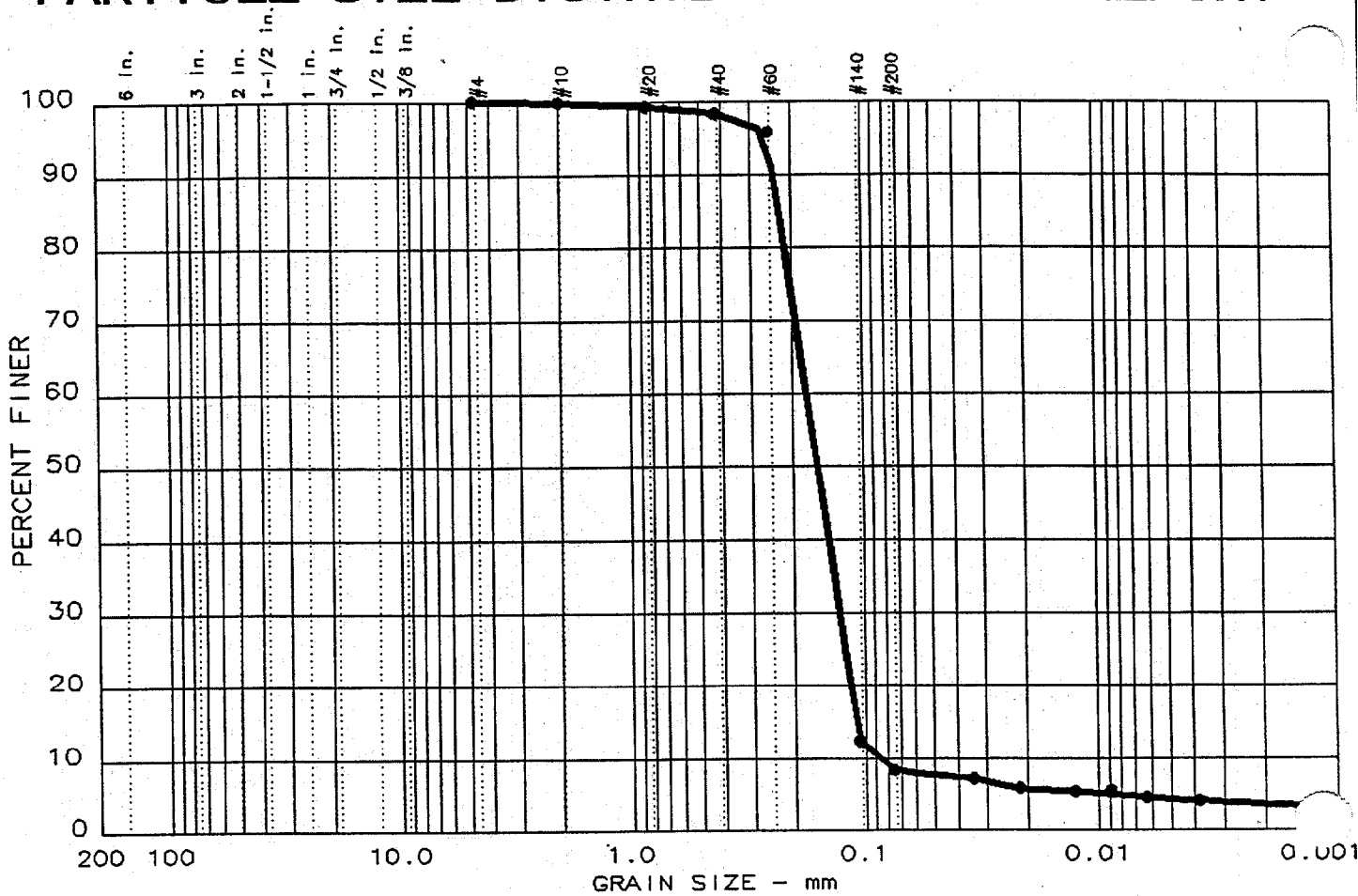
Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	18	0.0	0.0	91.6	4.1	4.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.224	0.173	0.156	0.127	0.109	0.0854	1.09	2.0

MATERIAL DESCRIPTION	USCS	AASHTO
● Dark Brown Sand		

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SD-001-01

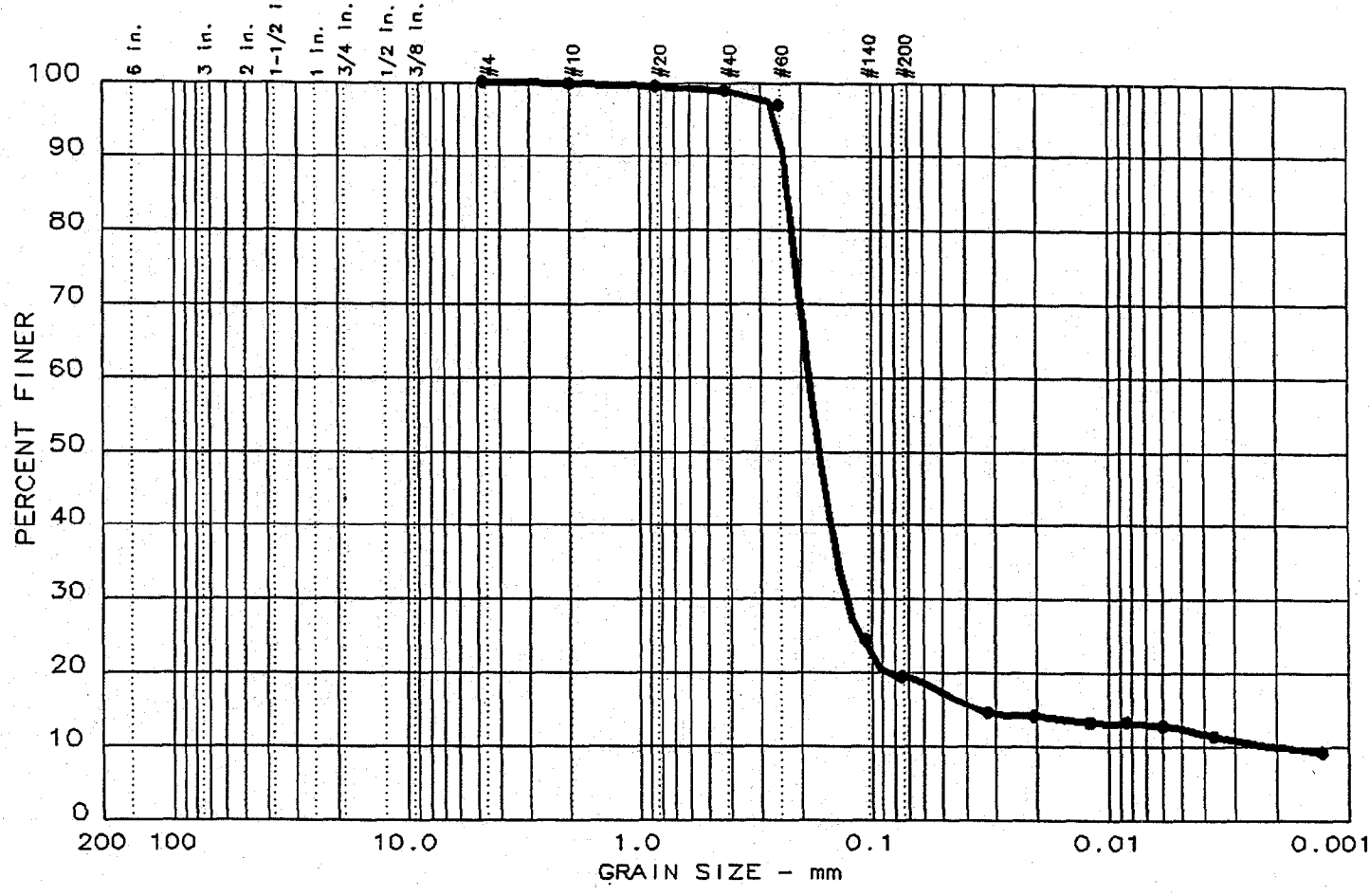
Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	14	0.0	0.0	80.5	7.2	12.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.226	0.183	0.166	0.127	0.0359	0.0018	48.70	100.6

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Sand		

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SD-003-01

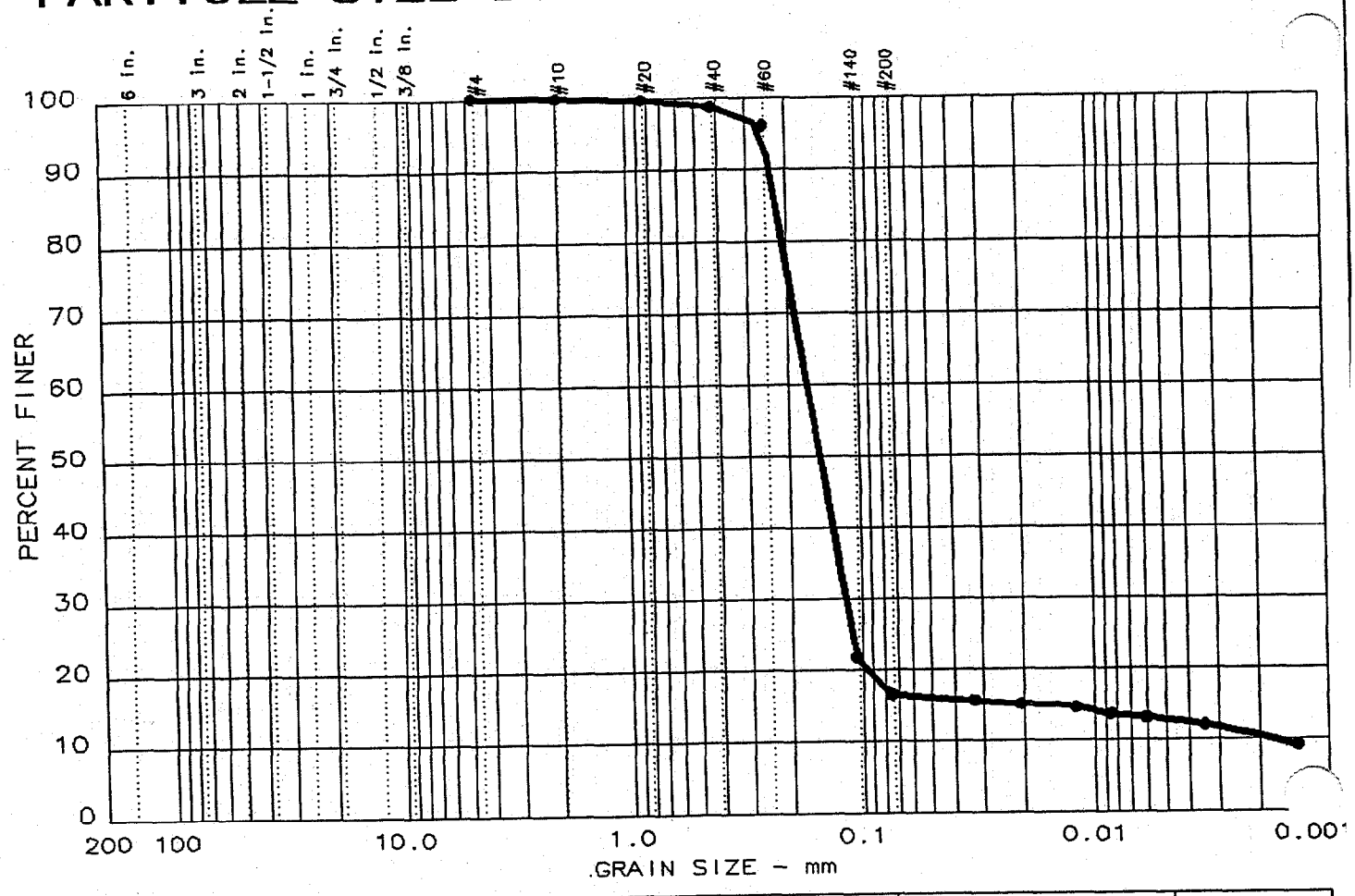
Date: 17 August 1998

KIBER
ENVIRONMENTAL
SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	14	0.0	0.0	83.4	3.9	12.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.220	0.165	0.147	0.117	0.0147	0.0017	48.36	96.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Sand		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-004-01

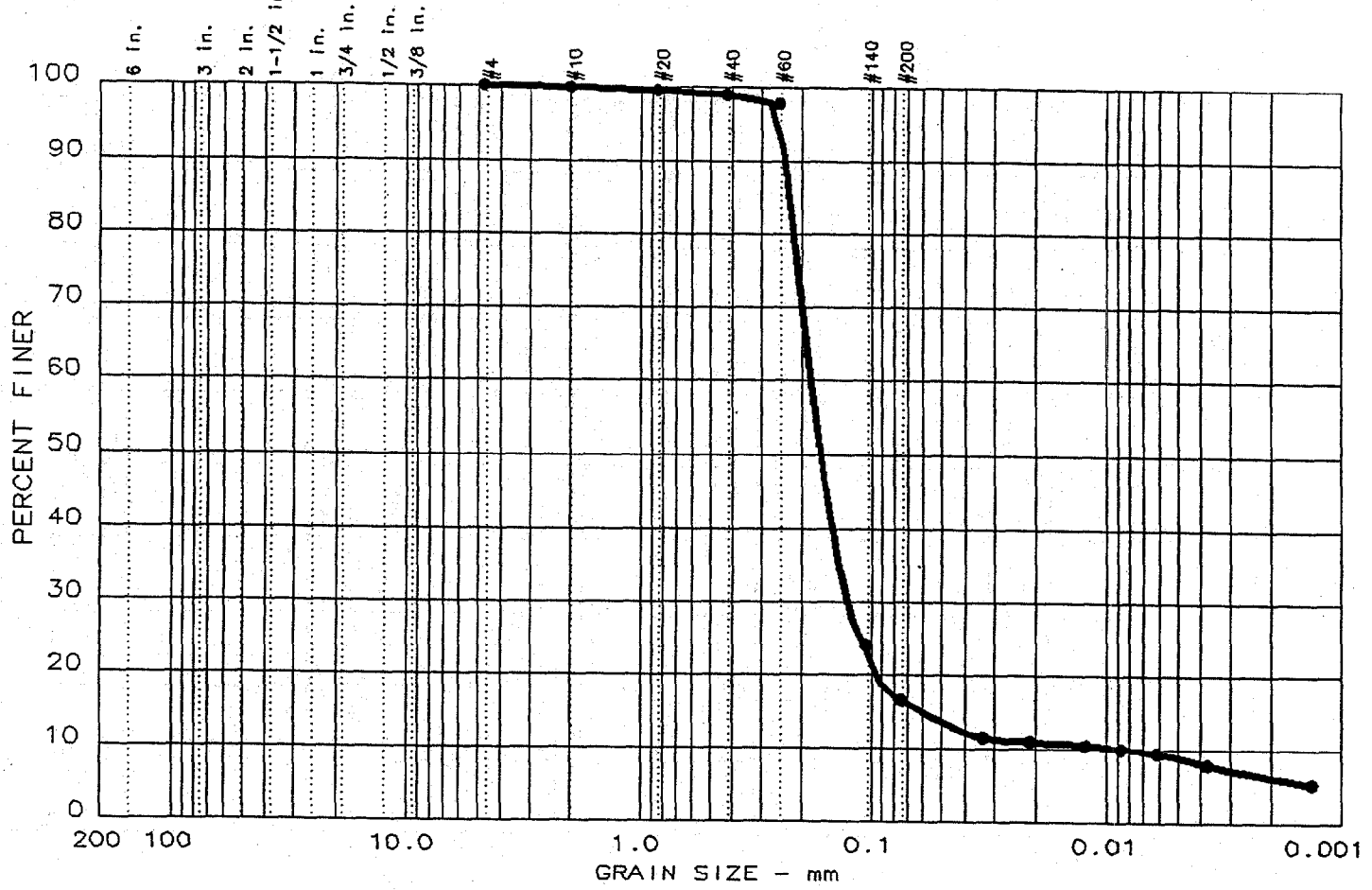
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	2	0.0	0.0	83.5	7.6	8.9

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
●			0.225	0.181	0.164	0.126	0.0610	0.0086	10.17	21.0

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Sand		

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SD-005-01

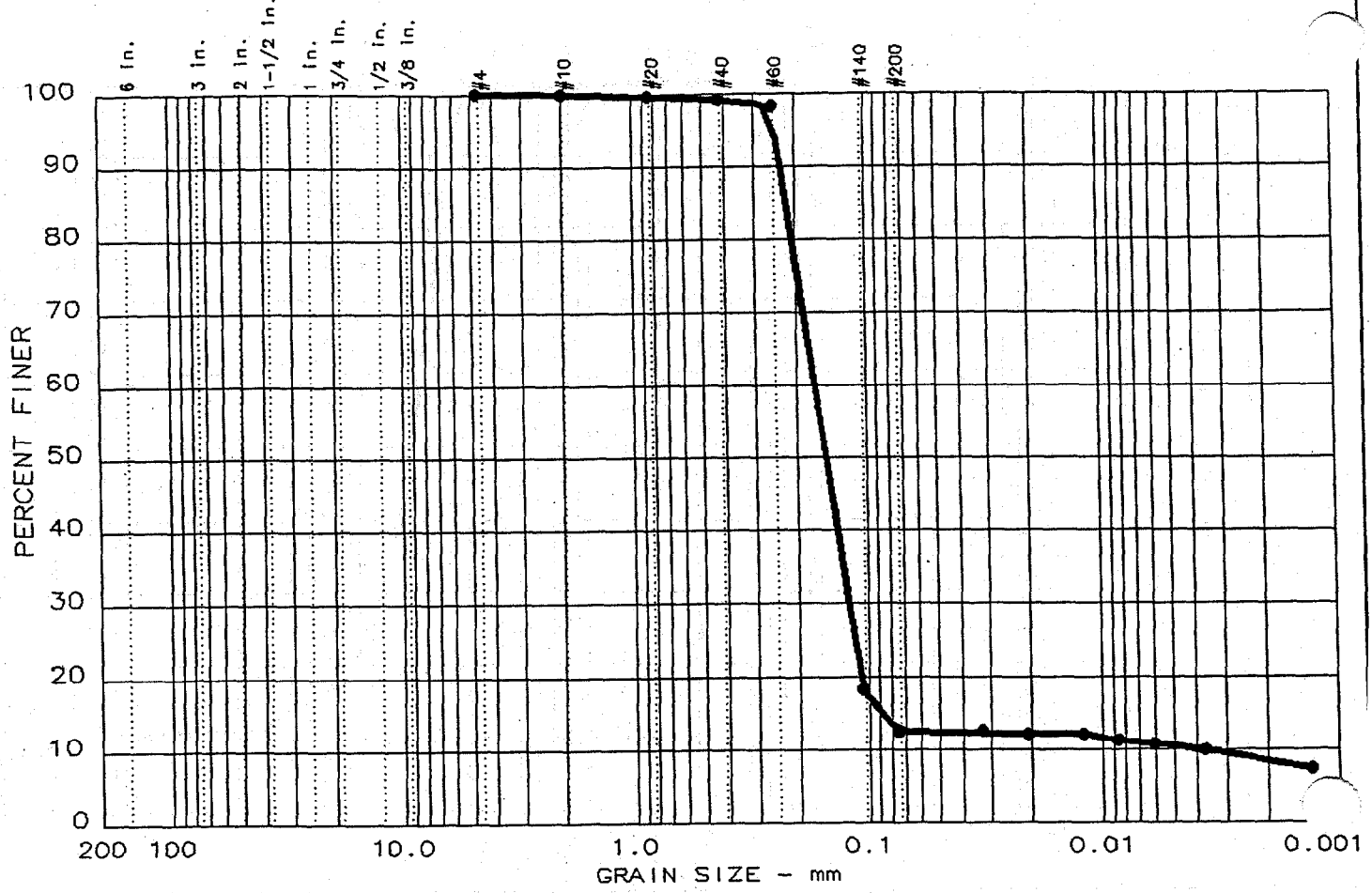
Date: 17 August 1998

KIBER
ENVIRONMENTAL
SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	4	0.0	0.0	87.5	2.0	10.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.217	0.166	0.149	0.120	0.0860	0.0038	22.91	43.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Sand		

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SD-006-01

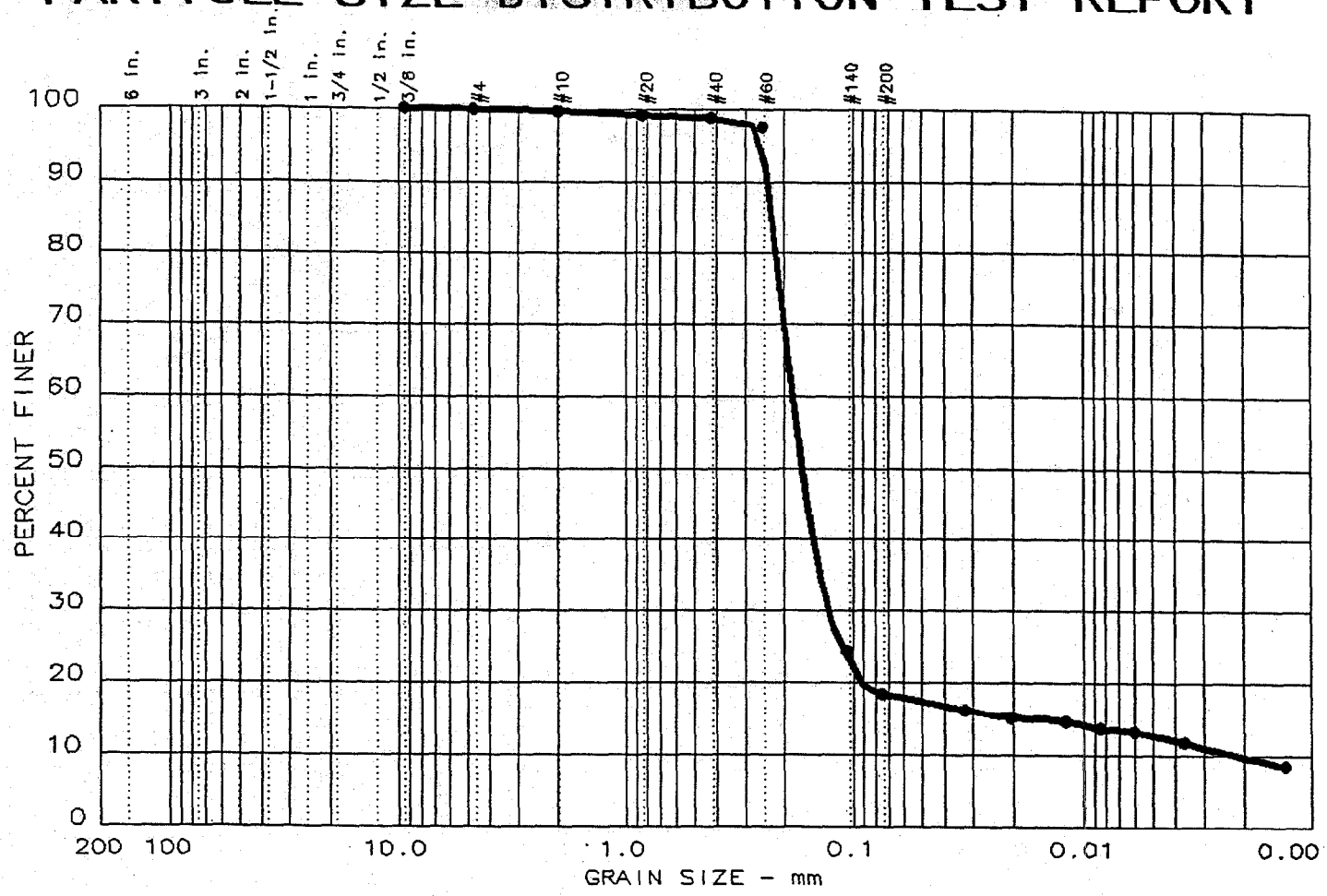
Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	17	0.0	0.1	81.5	5.6	12.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.226	0.182	0.165	0.126	0.0163	0.0021	42.90	88.6

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Sand		

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SD-007-01

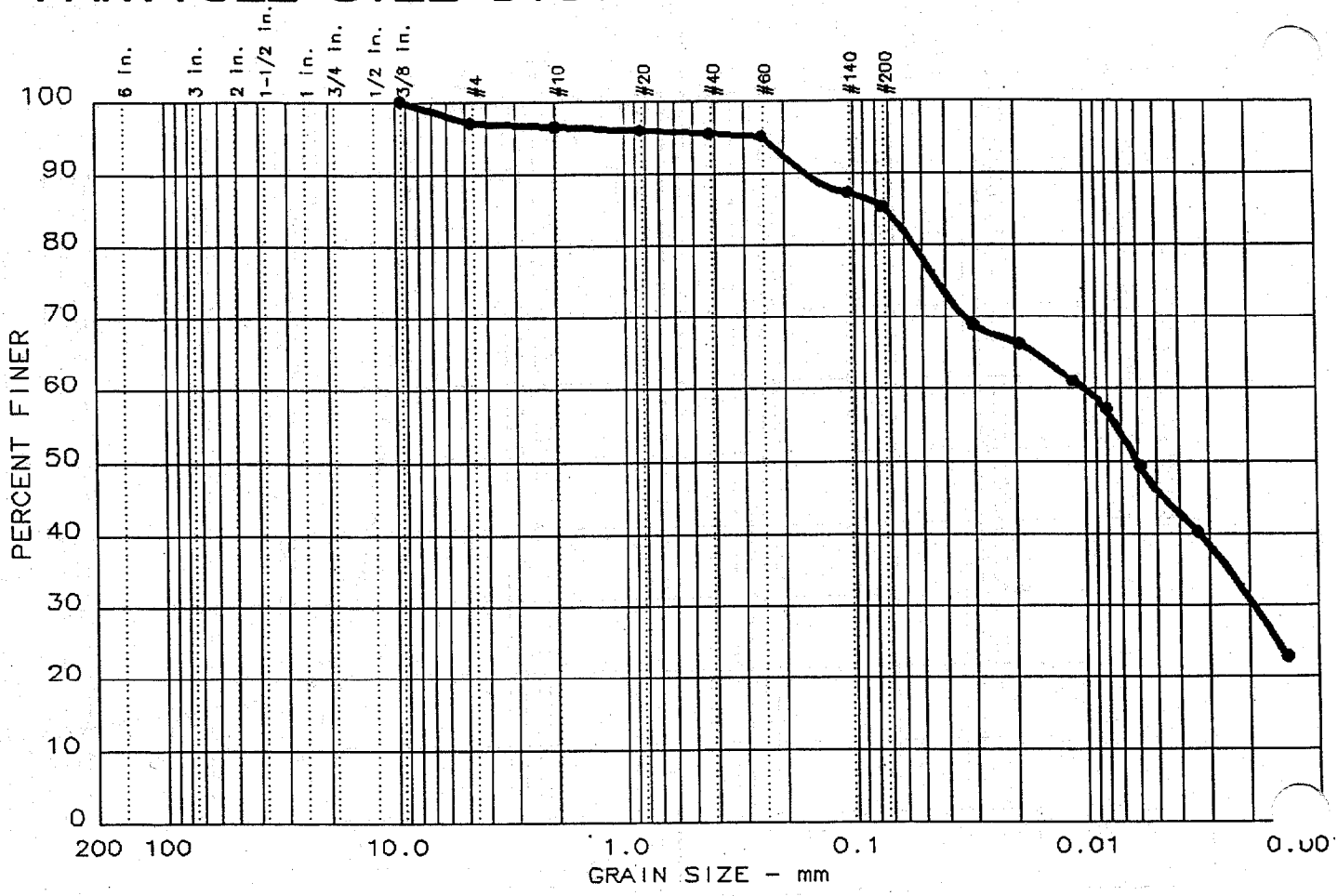
Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	17	0.0	3.0	11.8	39.1	46.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●					0.0060	0.0019				

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Sandy Silty Clay		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-008-01

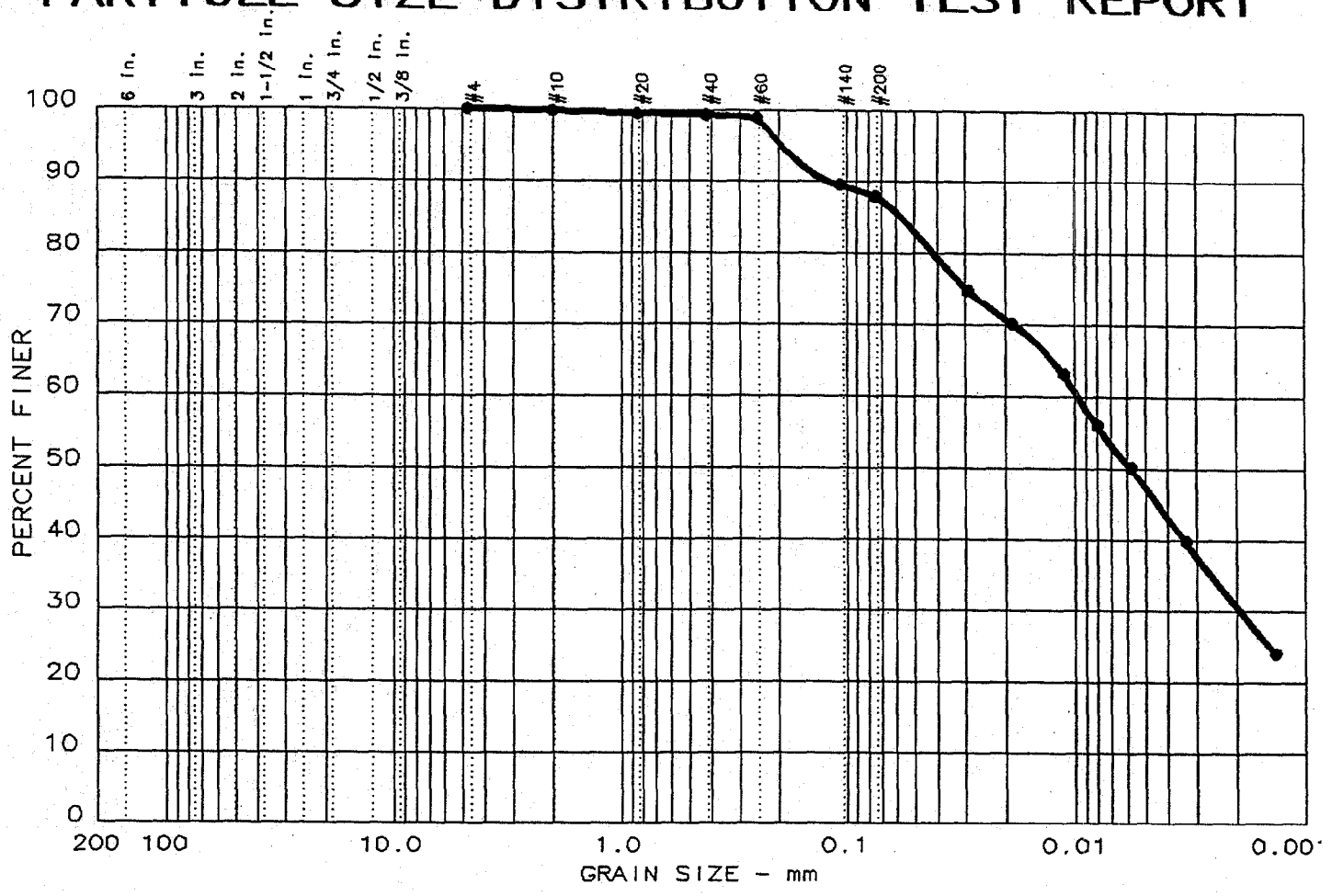
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	18	0.0	0.0	12.2	40.2	47.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●					0.0057	0.0019				

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Sandy Silty Clay		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-009-01

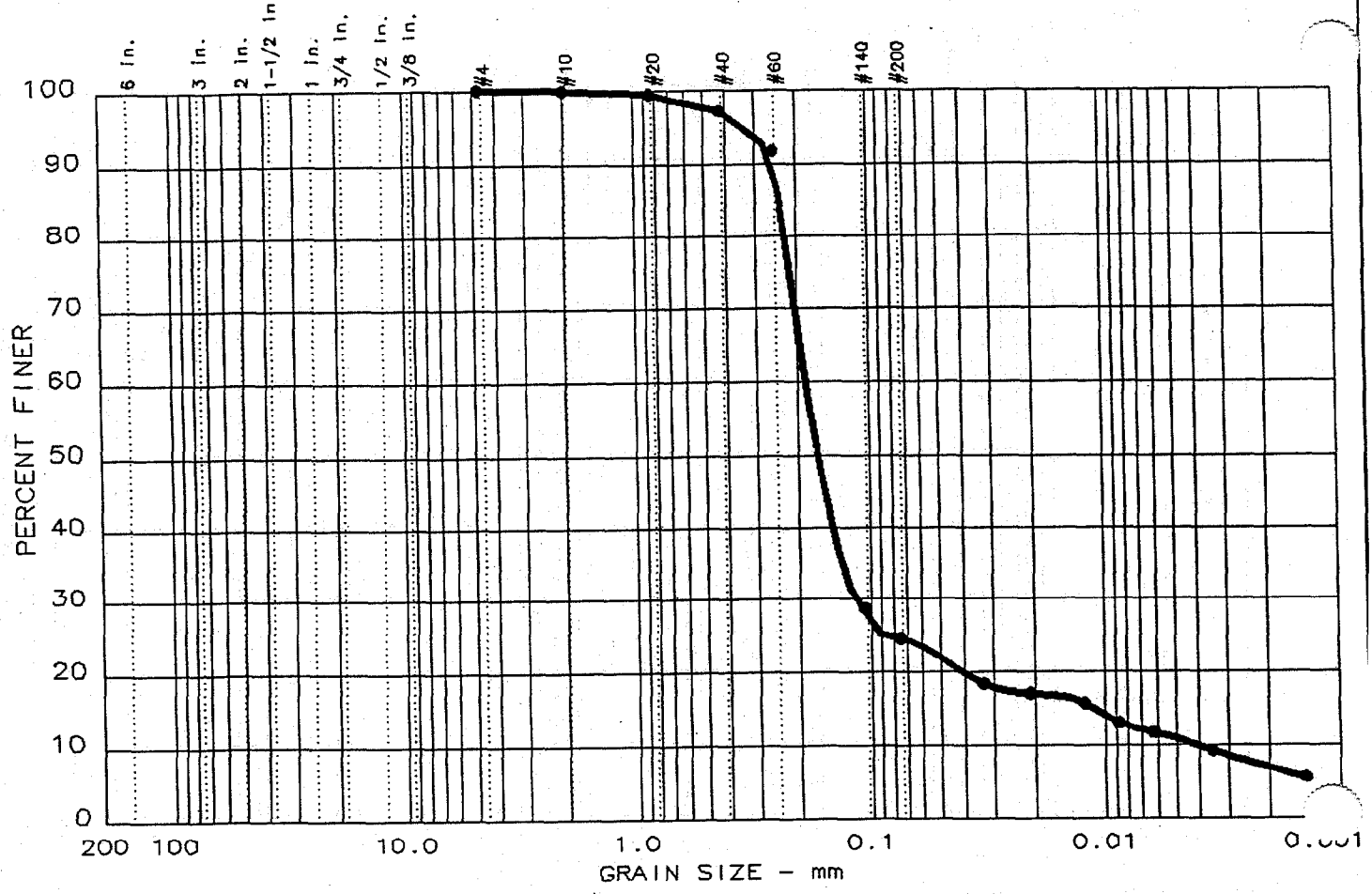
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	20	0.0	0.0	75.5	13.7	10.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.234	0.183	0.164	0.115	0.0111	0.0041	17.42	44.6

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Silty Sand		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-010-01

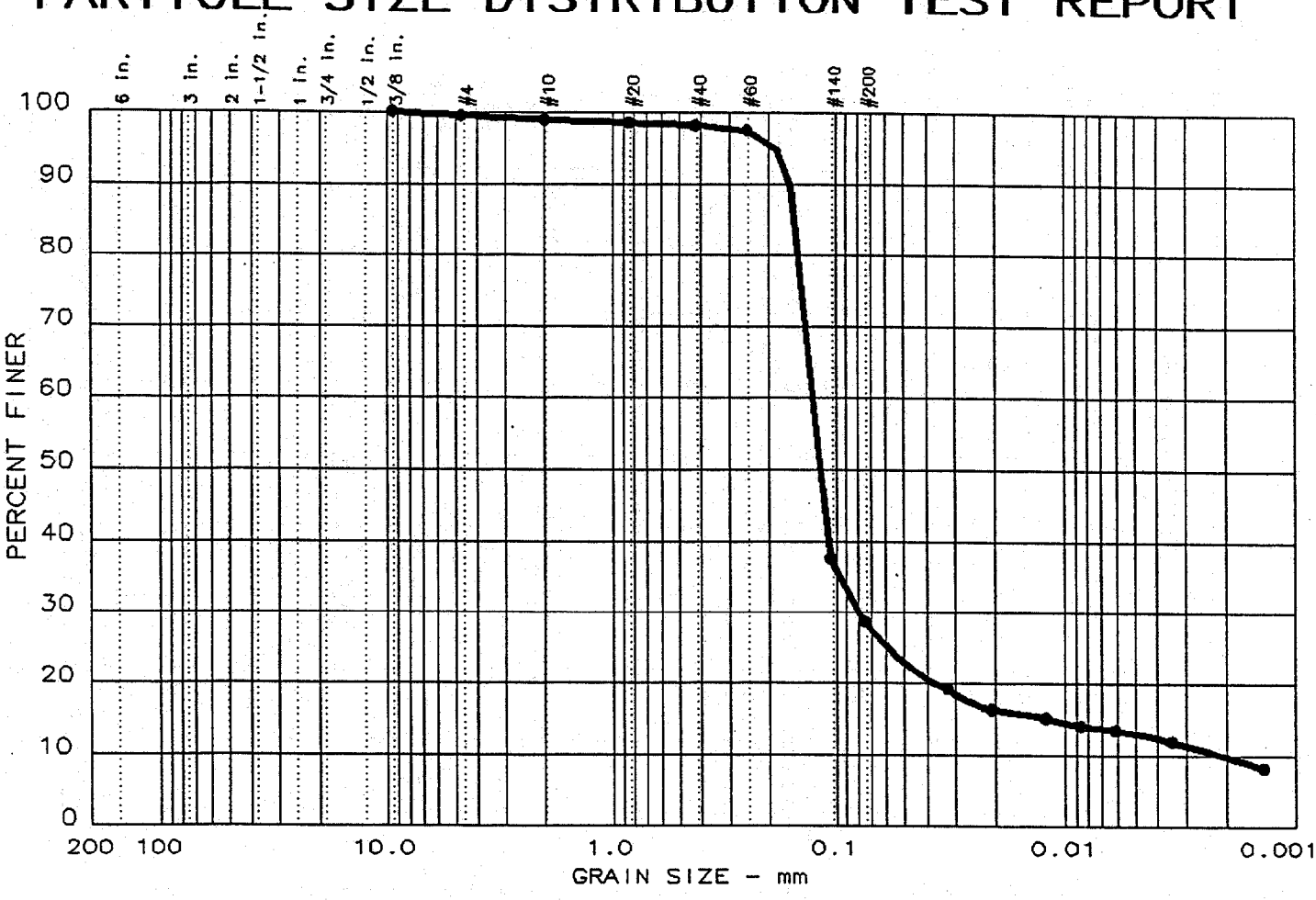
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	19	0.0	0.5	70.8	15.5	13.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.152	0.126	0.117	0.0788	0.0108	0.0021	23.52	60.0

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Silty Sand		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-011-01

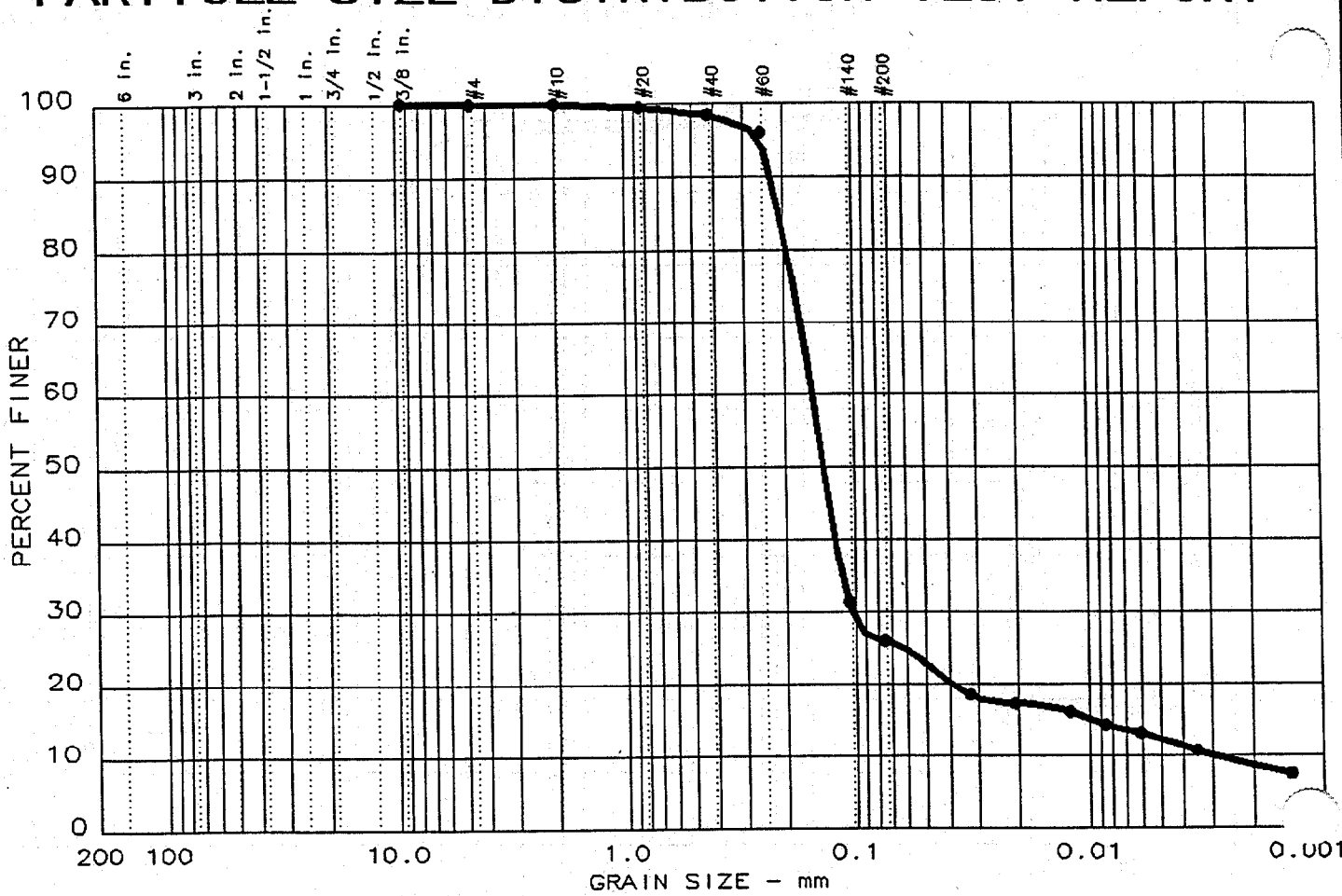
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	0.1	74.0	13.6	12.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.208	0.150	0.135	0.103	0.0096	0.0029	23.99	51.3

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Silty Sand		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-sd-012-01

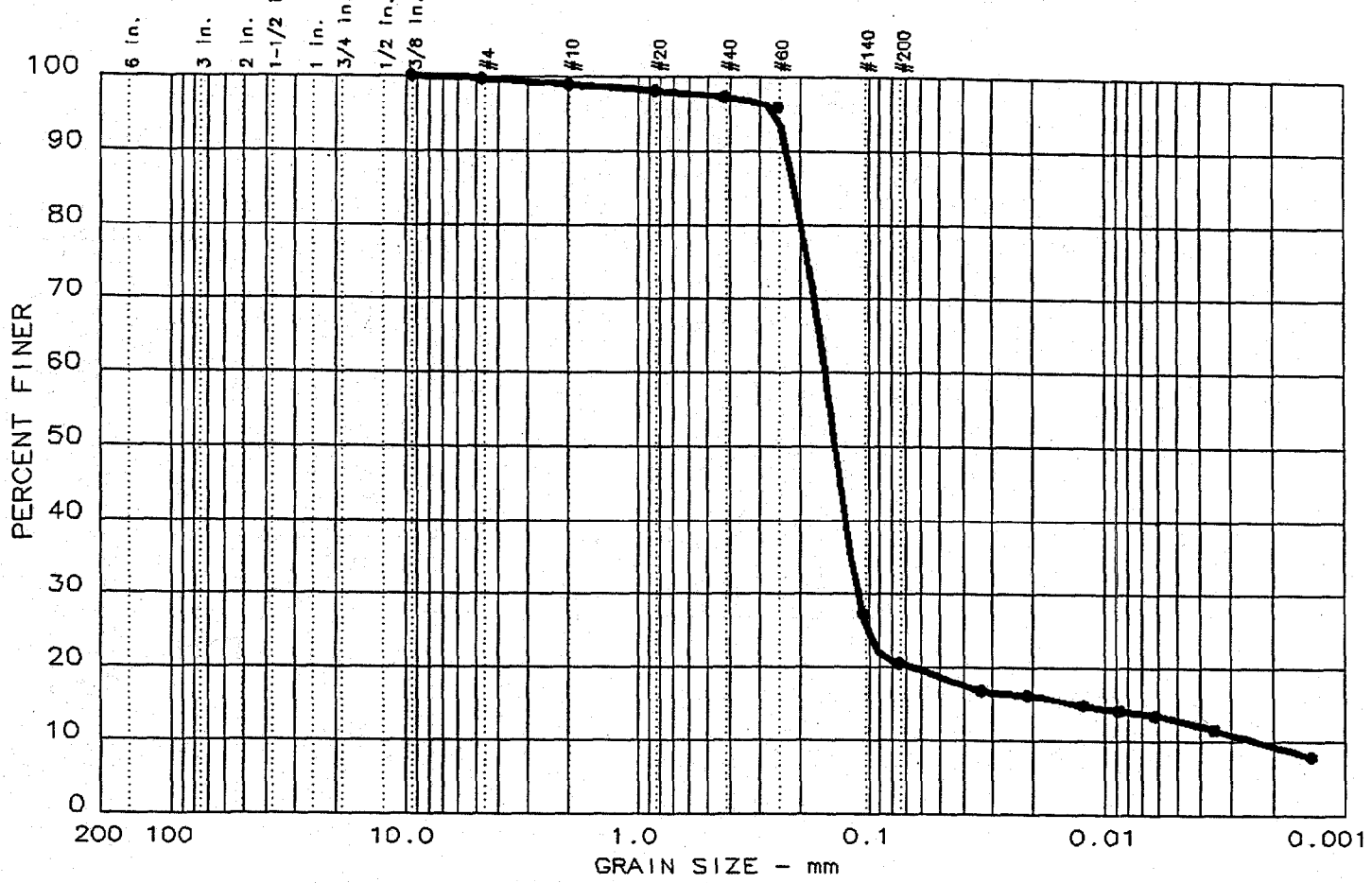
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	4	0.0	0.4	79.1	7.7	12.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.211	0.154	0.139	0.111	0.0130	0.0024	33.73	64.9

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Sand		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-013-01

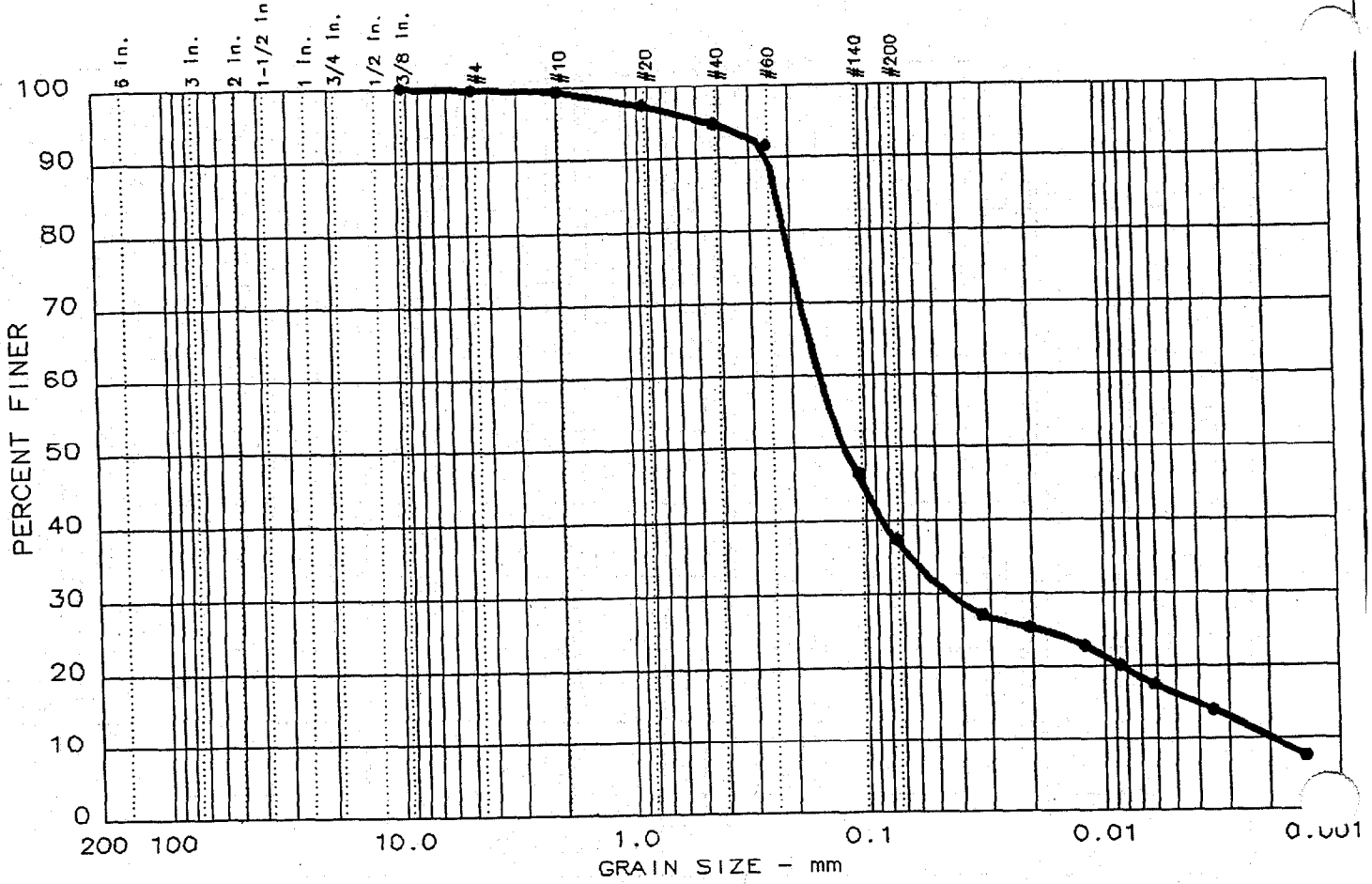
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	12	0.0	0.3	62.2	21.4	16.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	L		0.227	0.152	0.121	0.0451	0.0042	0.0020	6.80	77.2

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Silty Sand		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-014-01

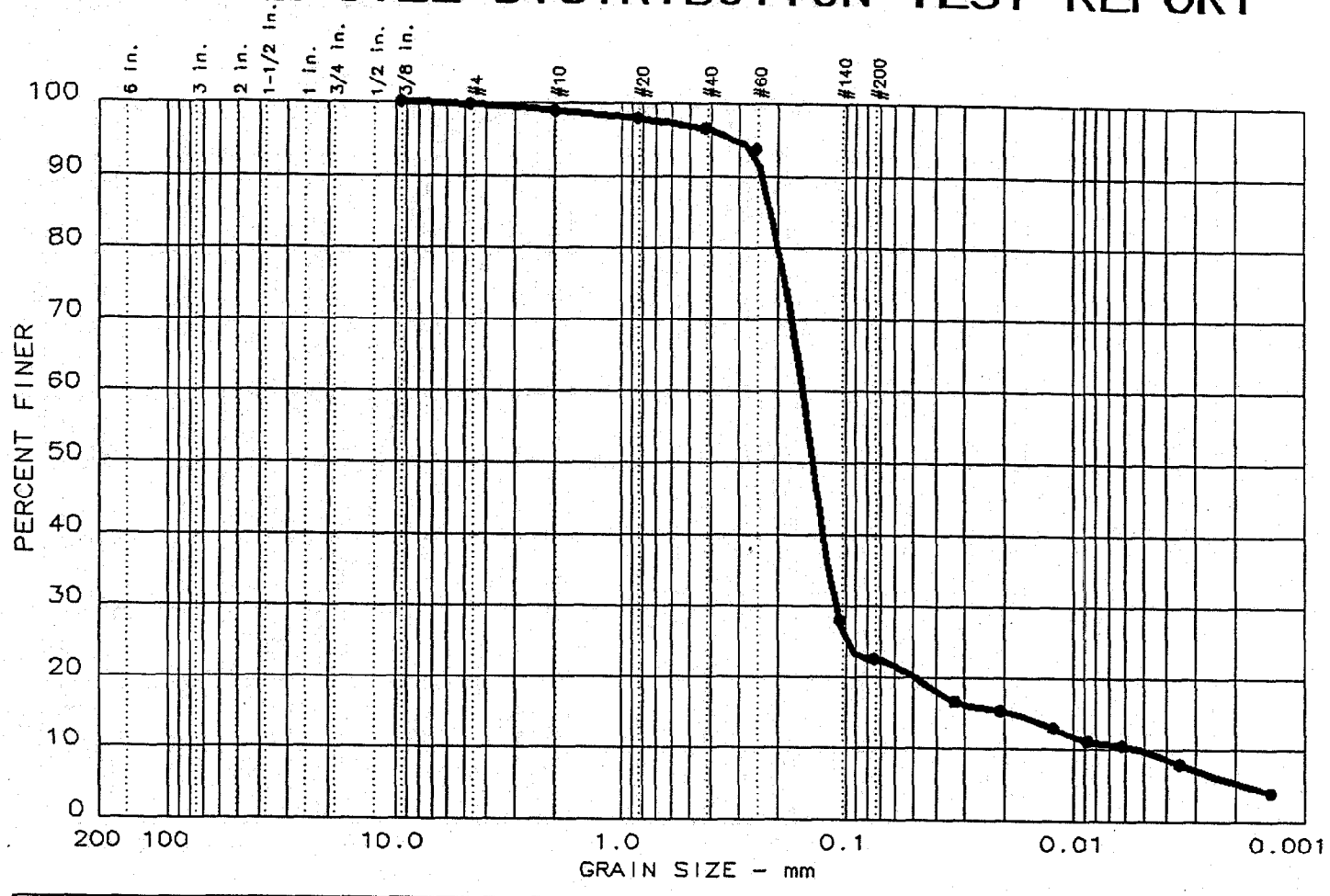
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	5	0.0	0.3	77.1	12.8	9.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.215	0.153	0.139	0.110	0.0185	0.0053	14.83	28.8

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Silty Sand		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-014-02

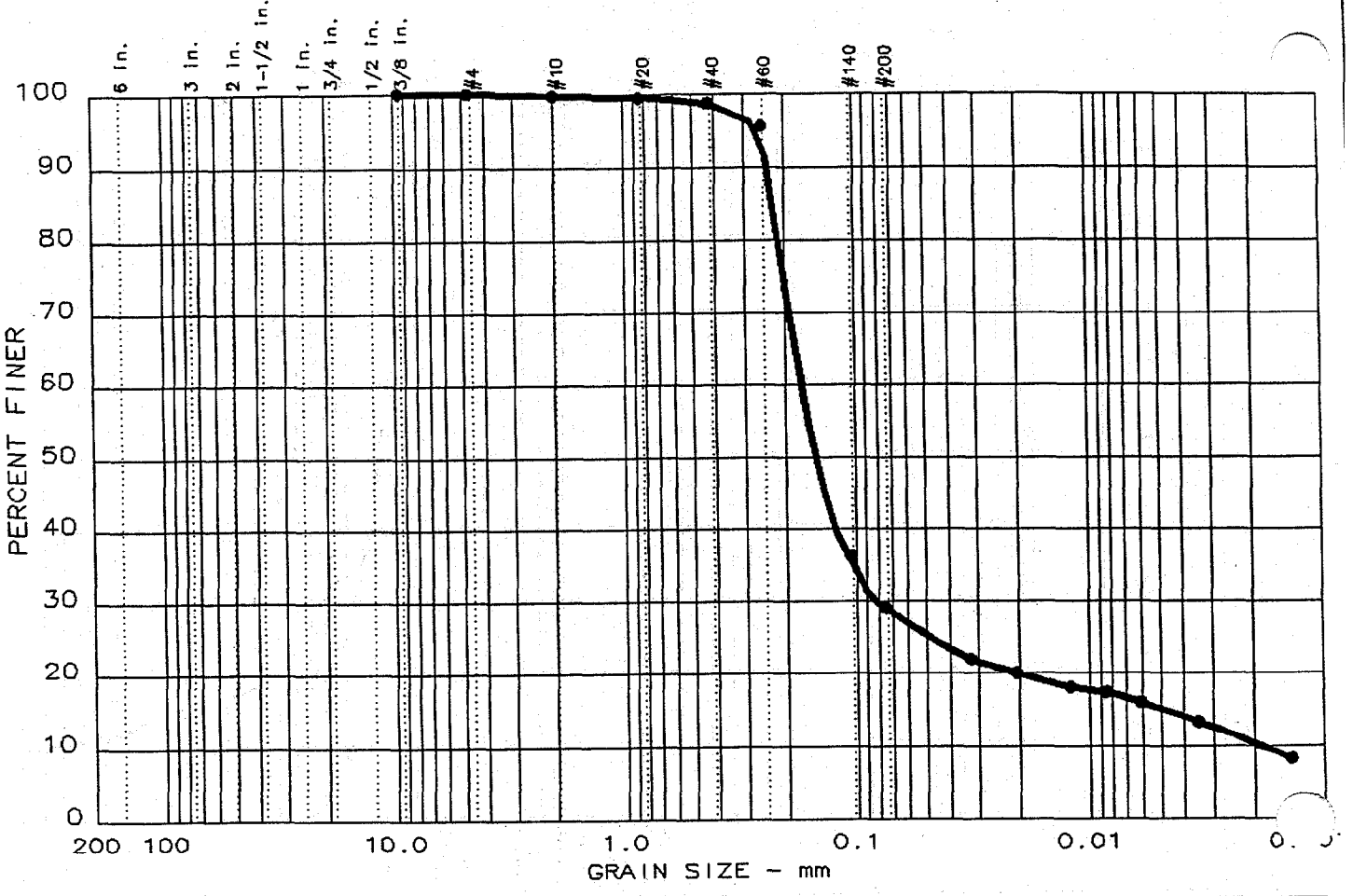
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	15	0.0	0.0	70.9	14.0	15.1

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.224	0.169	0.147	0.0818	0.0048	0.0019	21.38	91.2

MATERIAL DESCRIPTION	USCS	AASHTO
● Grayish Brown Clayey Silty Sand		

Project No.: 2914
Project: Jericho Island
● Location: PAI 10-SD-015-01

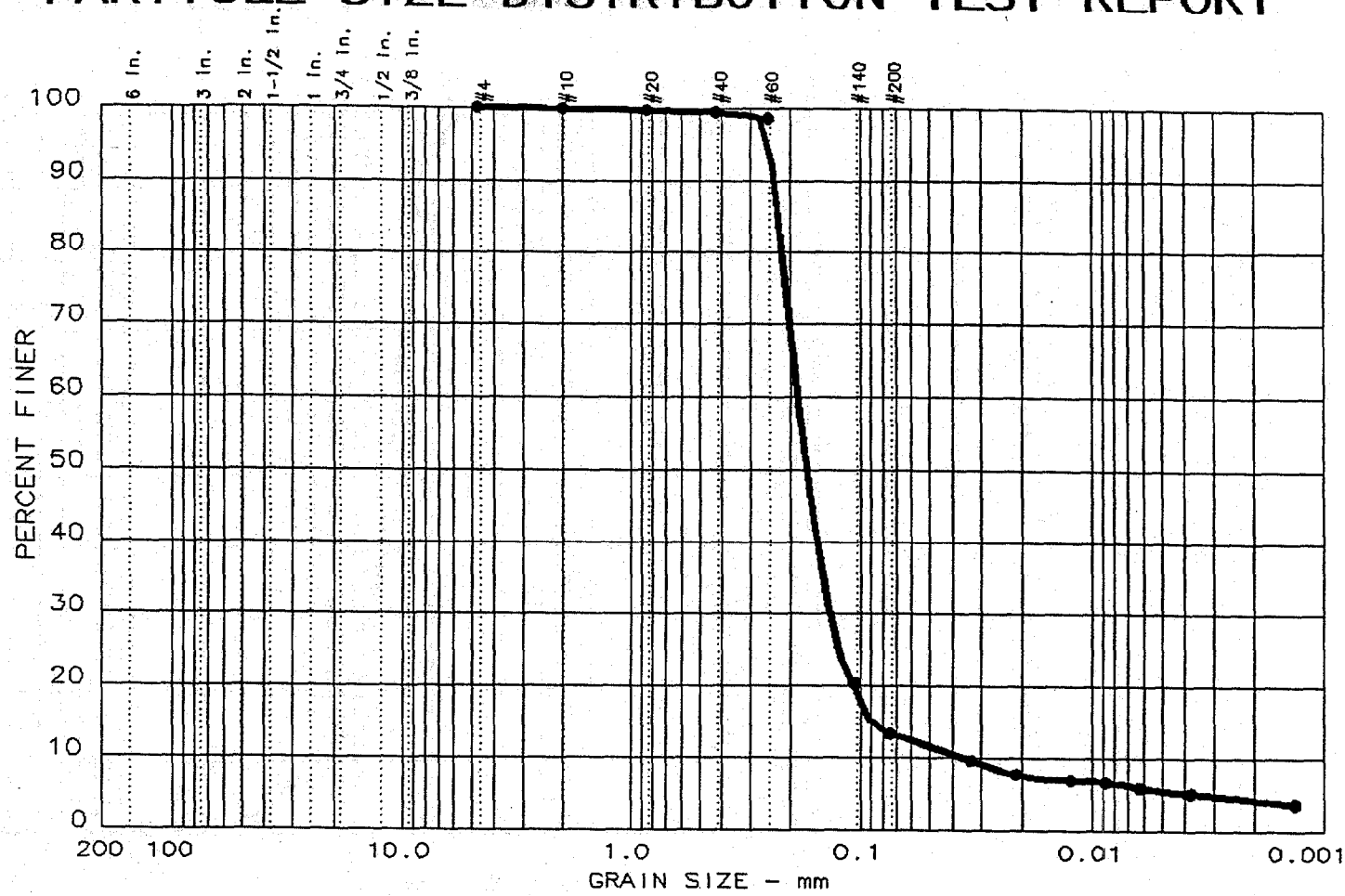
Date: 26 AUGUST 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	19	0.0	0.0	86.7	7.9	5.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_U
●			0.225	0.184	0.168	0.134	0.0896	0.0361	2.71	5.1

MATERIAL DESCRIPTION	USCS	AASHTO
● Dark Brown Sand		

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SS-007-01

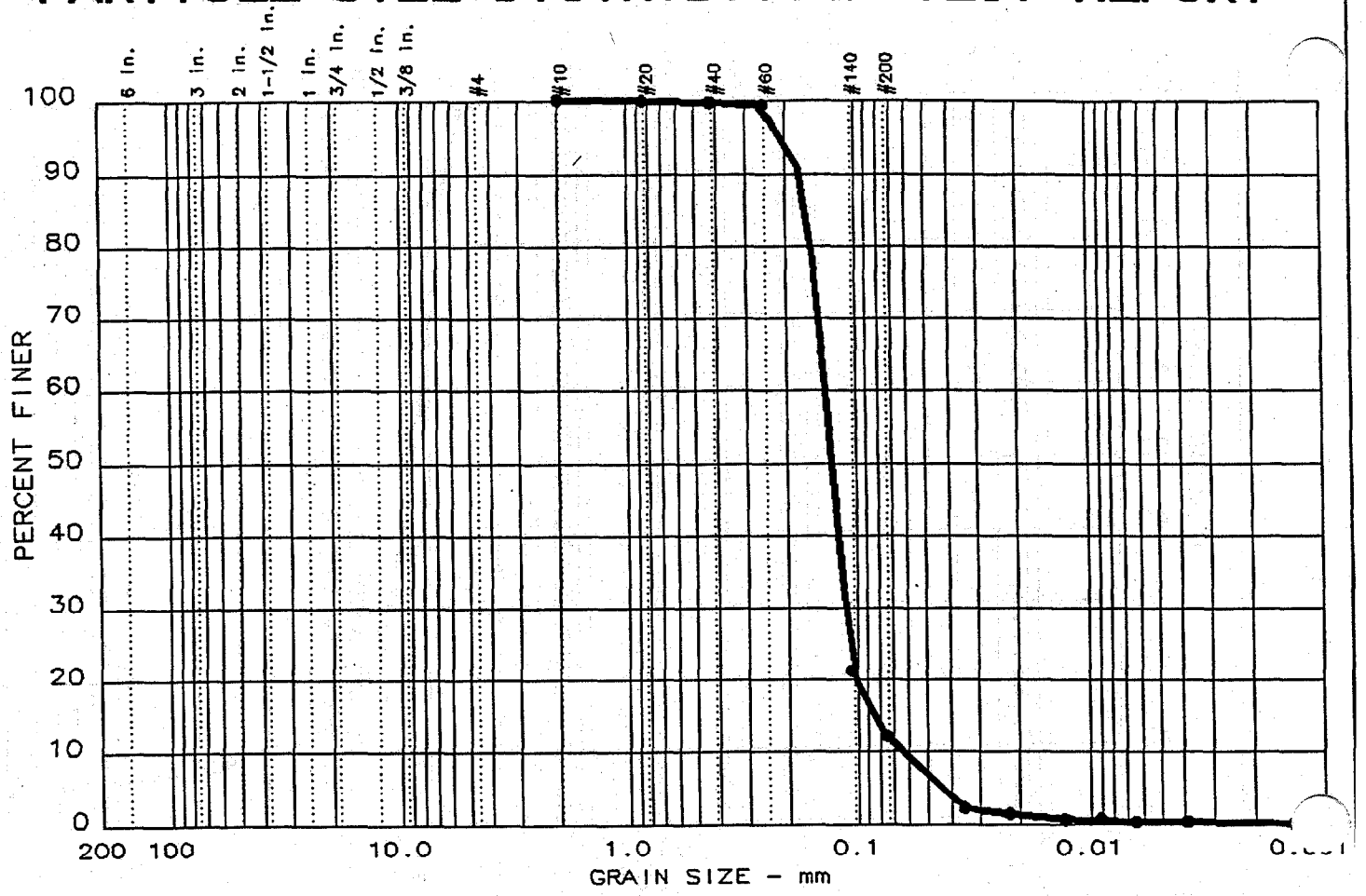
Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

Figure No. _____

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	1	0.0	0.0	87.9	11.7	0.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	NL	NP	0.158	0.135	0.127	0.112	0.0838	0.0635	1.46	2.1

MATERIAL DESCRIPTION	USCS	AASHTO
● Brown Silty Sand	SM	A-2-4(0.3)

Project No.: 2914
Project: JERICHO ISLAND
● Location: PAI-10-SS-010-01

Date: 17 August 1998

KIBER ENVIRONMENTAL SERVICES, INC.

Remarks:

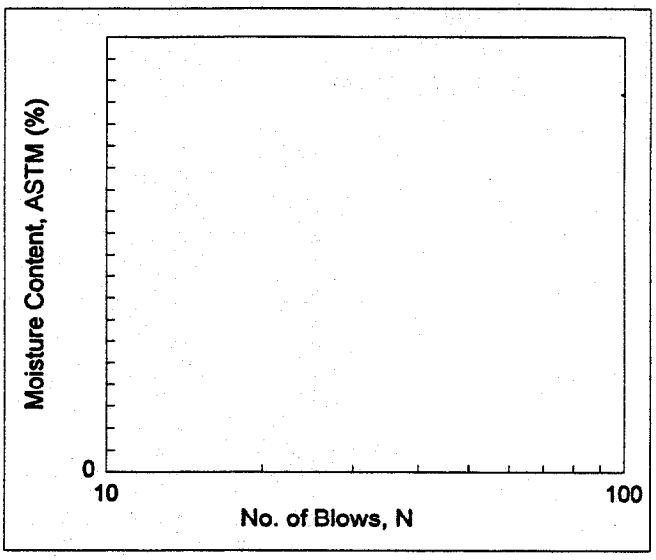
Figure No. _____

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	JERICHO ISLAND	Testing Date:	31 AUGUST 1998
Project No.:	2914	Tested By:	CG
Sample No.	PAI-10-SB-001-22	Tracking Code:	7892_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:	NL
Plastic Limit:	NP
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			
Wet Soil + Pan			
Dry Soil + Pan			
Wt of Dry Soil, Ws			
Wt of Water, Ww			
Moisture Content, ASTM			
Plastic Limit	***NP***		

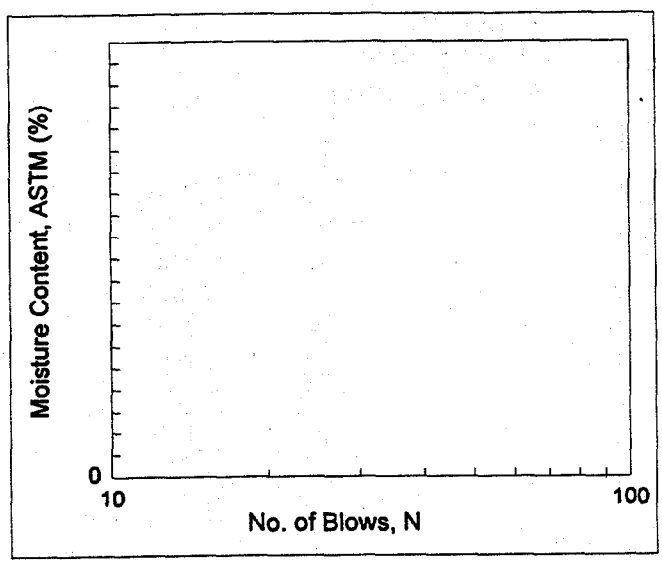
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: JERICHO ISLAND
Project No.: 2914
Sample No. PAI-10-SB-002-04
Description:

Testing Date: 24 JULY 1998
Tested By: DG
Tracking Code: 7813_AT

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: NL
Plastic Limit: NP
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

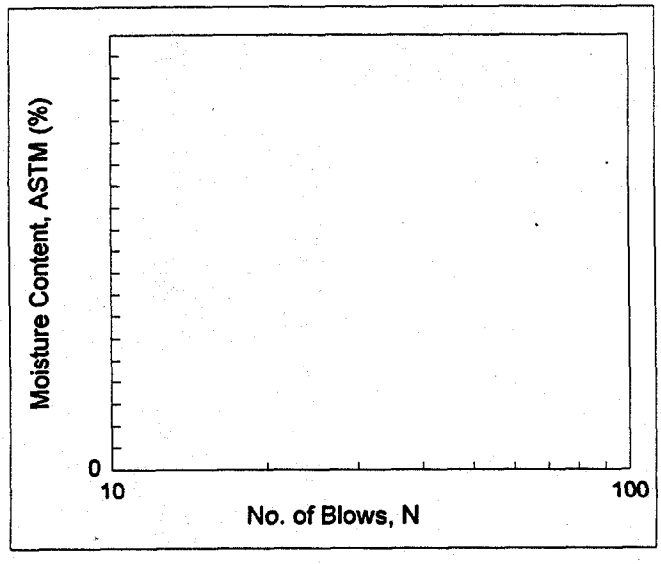
Plastic Limit Determination		
Pan No.		
Pan Weight		
Wet Soil + Pan		
Dry Soil + Pan		
Wt of Dry Soil, Ws		
Wt of Water, Ww		
Moisture Content, ASTM		
Plastic Limit	***NP***	

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	JERICHO ISLAND	Testing Date:	31 AUGUST 1998
Project No.:	2914	Tested By:	CLG
Sample No.	PAI-10-SB-002-10	Tracking Code:	7891_AT
Description:			

Liquid Limit Determination			
Pan No.	A	B	
Pan Weight	1.01 g	1.04 g	
Wet Soil + Pan	8.92 g	10.42 g	
Dry Soil + Pan	7.10 g	8.27 g	
Wt of Dry Soil, Ws	6.09 g	7.23 g	
Wt of Water, Ww	1.82 g	2.15 g	
Moisture Content, ASTM	29.89 %	29.74 %	
No. of Blows, N	23	23	
Correction Factor, K	0.990	0.990	
Liquid Limit	***30***	***29***	



Liquid Limit:	30
Plastic Limit:	18
Plasticity Index:	***12***

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

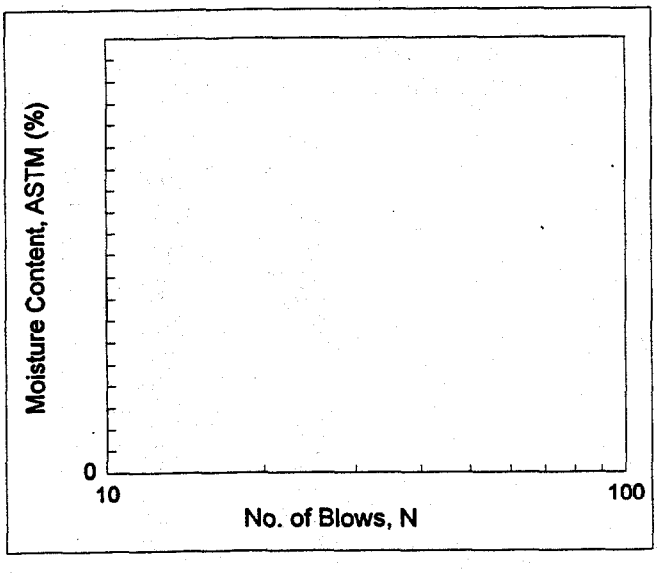
Plastic Limit Determination			
Pan No.	C	D	
Pan Weight	1.05 g	1.04 g	
Wet Soil + Pan	7.44 g	8.90 g	
Dry Soil + Pan	6.46 g	7.71 g	
Wt of Dry Soil, Ws	5.41 g	6.67 g	
Wt of Water, Ww	0.98 g	1.19 g	
Moisture Content, ASTM	18.11 %	17.84 %	
Plastic Limit	***18 %***	***18 %***	

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	JERICHO	Testing Date:	24 JULY 1998
Project No.:	2857	Tested By:	DG
Sample No.	PAI 10-SB-003-02	Tracking Code:	7810_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:	NL
Plastic Limit:	NP
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

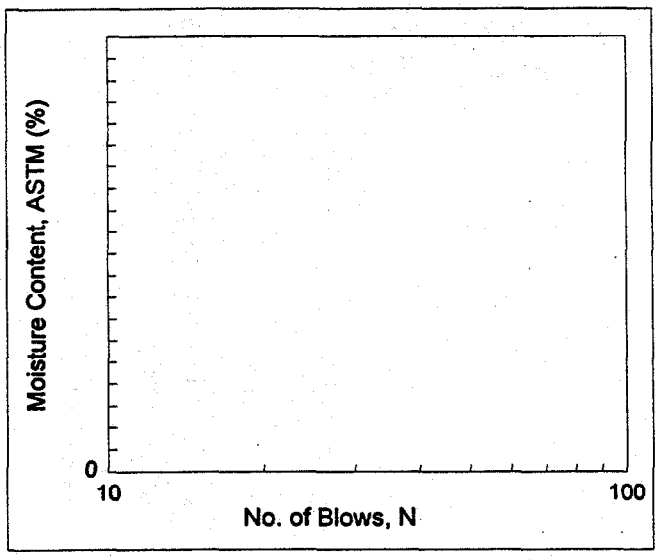
Plastic Limit Determination		
Pan No.		
Pan Weight		
Wet Soil + Pan		
Dry Soil + Pan		
Wt of Dry Soil, Ws		
Wt of Water, Ww		
Moisture Content, ASTM		
Plastic Limit	***NP***	

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	JERICHO ISLAND	Testing Date:	24 JULY 1998
Project No.:	2914	Tested By:	DG
Sample No.	PAI 10-SB-003-30	Tracking Code:	7805_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:	NL
Plastic Limit:	NP
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

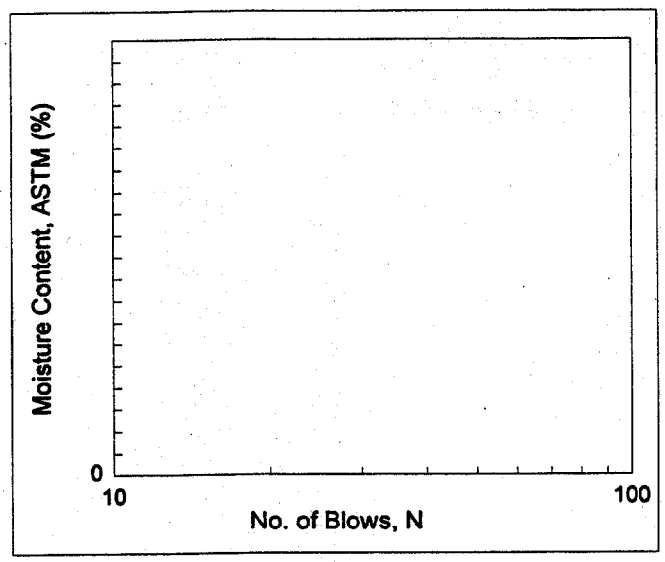
Plastic Limit Determination		
Pan No.		
Pan Weight		
Wet Soil + Pan		
Dry Soil + Pan		
Wt of Dry Soil, Ws		
Wt of Water, Ww		
Moisture Content, ASTM		
Plastic Limit	***NP***	

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	JERICHO	Testing Date:	24 JULY 1998
Project No.:	2857	Tested By:	DG
Sample No.	PAI 10-SB-004-02	Tracking Code:	7811_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:	NL
Plastic Limit:	NP
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***	

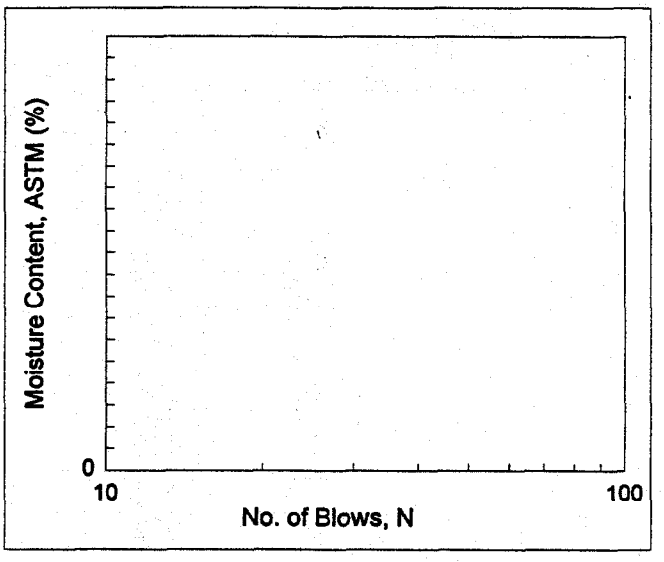
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: JERICHO ISLAND
Project No.: 2857
Sample No. PAI 10-SB-004-06
Description:

Testing Date: 24 JULY 1998
Tested By: DG
Tracking Code: 7806_AT

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: NL
Plastic Limit: NP
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***	

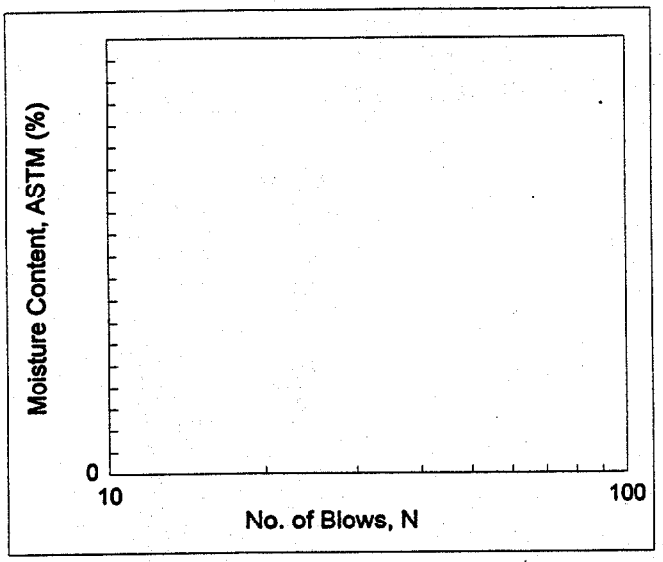
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: JERICHO
Project No.: 2857
Sample No. PAI 10-SB-005-02
Description:

Testing Date: 24 JULY 1998
Tested By: DG
Tracking Code: 7812_AT

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: NL
Plastic Limit: NP
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

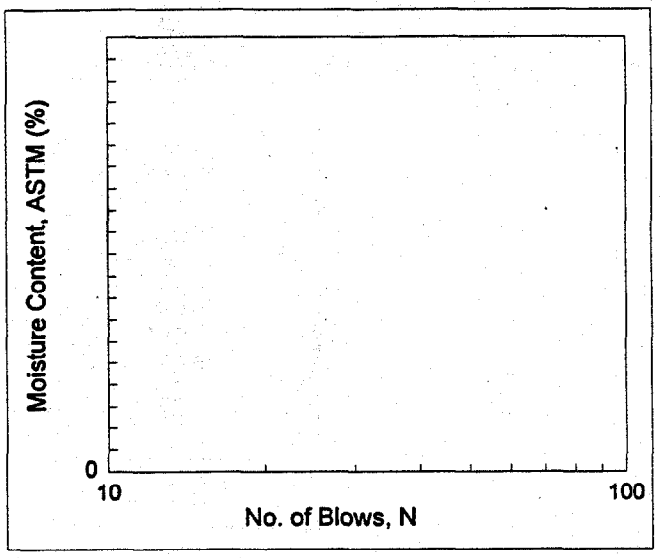
Plastic Limit Determination		
Pan No.		
Pan Weight		
Wet Soil + Pan		
Dry Soil + Pan		
Wt of Dry Soil, Ws		
Wt of Water, Ww		
Moisture Content, ASTM		
Plastic Limit	***NP***	

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	JERICHO	Testing Date:	24 JULY 1998
Project No.:	2857	Tested By:	DG
Sample No.	PAI 10-SB-005-24	Tracking Code:	7807_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:	NL
Plastic Limit:	NP
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

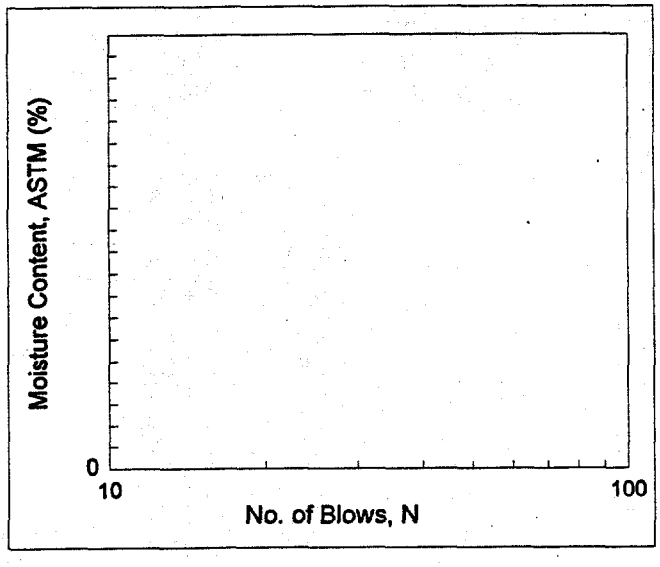
Plastic Limit Determination		
Pan No.		
Pan Weight		
Wet Soil + Pan		
Dry Soil + Pan		
Wt of Dry Soil, Ws		
Wt of Water, Ww		
Moisture Content, ASTM		
Plastic Limit	***NP***	

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	JERICHO ISLAND	Testing Date:	31 AUGUST 1998
Project No.:	2914	Tested By:	CG
Sample No.	PAI-10-SB-006-06	Tracking Code:	7890_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:	NL
Plastic Limit:	NP
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

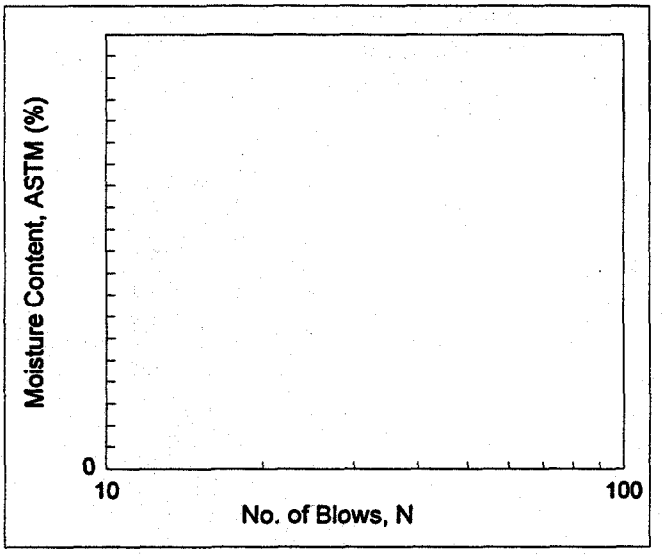
Plastic Limit Determination			
Pan No.			
Pan Weight			
Wet Soil + Pan			
Dry Soil + Pan			
Wt of Dry Soil, Ws			
Wt of Water, Ww			
Moisture Content, ASTM			
Plastic Limit	***NP***		

ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project:	JERICHO ISLAND	Testing Date:	31 AUGUST 1998
Project No.:	2914	Tested By:	CG
Sample No.	PAI-10-SB-007-26	Tracking Code:	7893_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:	NL
Plastic Limit:	NP
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			
Wet Soil + Pan			
Dry Soil + Pan			
Wt of Dry Soil, Ws			
Wt of Water, Ww			
Moisture Content, ASTM			
Plastic Limit	***NP***		

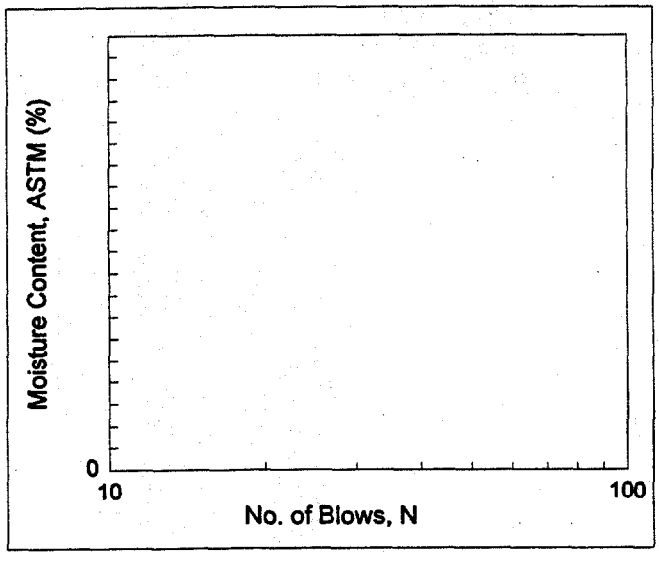
ATTERBERG LIMITS

REPORT FORM
ASTM D 4318

Project: JERICHO ISLAND
Project No.: 2914
Sample No. PAI-10-SS-010-01
Description:

Testing Date: 31 AUGUST 1998
Tested By: CG
Tracking Code: 7889_AT

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: NL
Plastic Limit: NP
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			
Wet Soil + Pan			
Dry Soil + Pan			
Wt of Dry Soil, Ws			
Wt of Water, Ww			
Moisture Content, ASTM			
Plastic Limit	***NP***		*%*

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-001-22
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7892_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	235.38	g
3. WT WET SOIL + TARE	386.10	g
4. WT DRY SOIL + TARE	351.16	g
5. WT WATER, Ww	34.94	g
6. WT DRY SOIL, Ws	115.78	g
7. ASTM MOISTURE CONTENT, W	30.18	%
8. EPA MOISTURE CONTENT, W	23.18	%

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-002-04
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7813_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	234.83	g
3. WT WET SOIL + TARE	378.54	g
4. WT DRY SOIL + TARE	366.89	g
5. WT WATER, Ww	11.65	g
6. WT DRY SOIL, Ws	132.06	g
7. ASTM MOISTURE CONTENT, W	8.82	%
8. EPA MOISTURE CONTENT, W	8.11	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-002-10
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7891_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	215.77	g
3. WT WET SOIL + TARE	318.56	g
4. WT DRY SOIL + TARE	296.40	g
5. WT WATER, Ww	22.16	g
6. WT DRY SOIL, Ws	80.63	g
7. ASTM MOISTURE CONTENT, W	27.48	%
8. EPA MOISTURE CONTENT, W	21.56	%

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-003-02
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7810_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	232.78	g
3. WT WET SOIL + TARE	374.72	g
4. WT DRY SOIL + TARE	361.26	g
5. WT WATER, Ww	13.46	g
6. WT DRY SOIL, Ws	128.48	g
7. ASTM MOISTURE CONTENT, W	10.48	%
8. EPA MOISTURE CONTENT, W	9.48	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-003-30
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7805_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	202.60	g
3. WT WET SOIL + TARE	351.64	g
4. WT DRY SOIL + TARE	318.74	g
5. WT WATER, Ww	32.90	g
6. WT DRY SOIL, Ws	116.14	g
7. ASTM MOISTURE CONTENT, W	28.33	%
8. EPA MOISTURE CONTENT, W	22.07	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-004-02
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7811_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	202.61	g
3. WT WET SOIL + TARE	350.00	g
4. WT DRY SOIL + TARE	344.11	g
5. WT WATER, Ww	5.89	g
6. WT DRY SOIL, Ws	141.50	g
7. ASTM MOISTURE CONTENT, W	4.16	%
8. EPA MOISTURE CONTENT, W	4.00	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-004-06
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7806_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	236.77	g
3. WT WET SOIL + TARE	386.59	g
4. WT DRY SOIL + TARE	358.50	g
5. WT WATER, Ww	28.09	g
6. WT DRY SOIL, Ws	121.73	g
7. ASTM MOISTURE CONTENT, W	23.08	%
8. EPA MOISTURE CONTENT, W	18.75	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-005-02
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7812_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	238.75	g
3. WT WET SOIL + TARE	386.71	g
4. WT DRY SOIL + TARE	373.06	g
5. WT WATER, Ww	13.65	g
6. WT DRY SOIL, Ws	134.31	g
7. ASTM MOISTURE CONTENT, W	10.16	%
8. EPA MOISTURE CONTENT, W	9.23	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-005-24
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7807_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	205.46	g
3. WT WET SOIL + TARE	356.79	g
4. WT DRY SOIL + TARE	327.19	g
5. WT WATER, Ww	29.60	g
6. WT DRY SOIL, Ws	121.73	g
7. ASTM MOISTURE CONTENT, W	24.32	%
8. EPA MOISTURE CONTENT, W	19.56	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-006-06
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7890_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	205.46	g
3. WT WET SOIL + TARE	337.99	g
4. WT DRY SOIL + TARE	306.51	g
5. WT WATER, Ww	31.48	g
6. WT DRY SOIL, Ws	101.05	g
7. ASTM MOISTURE CONTENT, W	31.15	%
8. EPA MOISTURE CONTENT, W	23.75	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-007-26
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7893_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	209.84	g
3. WT WET SOIL + TARE	355.11	g
4. WT DRY SOIL + TARE	330.23	g
5. WT WATER, Ww	24.88	g
6. WT DRY SOIL, Ws	120.39	g
7. ASTM MOISTURE CONTENT, W	20.67	%
8. EPA MOISTURE CONTENT, W	17.13	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-001-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7896_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	202.60	g
3. WT WET SOIL + TARE	351.02	g
4. WT DRY SOIL + TARE	311.36	g
5. WT WATER, Ww	39.66	g
6. WT DRY SOIL, Ws	108.76	g
7. ASTM MOISTURE CONTENT, W	36.47	%
8. EPA MOISTURE CONTENT, W	26.72	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-003-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7895_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	210.61	g
3. WT WET SOIL + TARE	360.21	g
4. WT DRY SOIL + TARE	319.01	g
5. WT WATER, Ww	41.20	g
6. WT DRY SOIL, Ws	108.40	g
7. ASTM MOISTURE CONTENT, W	38.01	%
8. EPA MOISTURE CONTENT, W	27.54	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-004-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7900_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	233.87	g
3. WT WET SOIL + TARE	381.81	g
4. WT DRY SOIL + TARE	328.42	g
5. WT WATER, Ww	53.39	g
6. WT DRY SOIL, Ws	94.55	g
7. ASTM MOISTURE CONTENT, W	56.47	%
8. EPA MOISTURE CONTENT, W	36.09	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-004-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7900_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	233.87	g
3. WT WET SOIL + TARE	381.81	g
4. WT DRY SOIL + TARE	328.42	g
5. WT WATER, Ww	53.39	g
6. WT DRY SOIL, Ws	94.55	g
7. ASTM MOISTURE CONTENT, W	56.47	%
8. EPA MOISTURE CONTENT, W	36.09	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-005-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7898_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	210.52	g
3. WT WET SOIL + TARE	361.18	g
4. WT DRY SOIL + TARE	304.88	g
5. WT WATER, Ww	56.30	g
6. WT DRY SOIL, Ws	94.36	g
7. ASTM MOISTURE CONTENT, W	59.67	%
8. EPA MOISTURE CONTENT, W	37.37	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-006-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7899_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	203.19	g
3. WT WET SOIL + TARE	353.57	g
4. WT DRY SOIL + TARE	312.53	g
5. WT WATER, Ww	41.04	g
6. WT DRY SOIL, Ws	109.34	g
7. ASTM MOISTURE CONTENT, W	37.53	%
8. EPA MOISTURE CONTENT, W	27.29	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-007-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7897_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	210.08	g
3. WT WET SOIL + TARE	356.40	g
4. WT DRY SOIL + TARE	311.08	g
5. WT WATER, Ww	45.32	g
6. WT DRY SOIL, Ws	101.00	g
7. ASTM MOISTURE CONTENT, W	44.87	%
8. EPA MOISTURE CONTENT, W	30.97	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-008-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7888_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	232.77	g
3. WT WET SOIL + TARE	380.67	g
4. WT DRY SOIL + TARE	270.69	g
5. WT WATER, Ww	109.98	g
6. WT DRY SOIL, Ws	37.92	g
7. ASTM MOISTURE CONTENT, W	290.03	%
8. EPA MOISTURE CONTENT, W	74.36	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-009-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7887_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	217.81	g
3. WT WET SOIL + TARE	362.02	g
4. WT DRY SOIL + TARE	259.88	g
5. WT WATER, Ww	102.14	g
6. WT DRY SOIL, Ws	42.07	g
7. ASTM MOISTURE CONTENT, W	242.79	%
8. EPA MOISTURE CONTENT, W	70.83	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-010-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7884_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	210.72	g
3. WT WET SOIL + TARE	332.09	g
4. WT DRY SOIL + TARE	285.12	g
5. WT WATER, Ww	46.97	g
6. WT DRY SOIL, Ws	74.40	g
7. ASTM MOISTURE CONTENT, W	63.13	%
8. EPA MOISTURE CONTENT, W	38.70	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-011-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7881_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	211.20	g
3. WT WET SOIL + TARE	354.04	g
4. WT DRY SOIL + TARE	297.54	g
5. WT WATER, Ww	56.50	g
6. WT DRY SOIL, Ws	86.34	g
7. ASTM MOISTURE CONTENT, W	65.44	%
8. EPA MOISTURE CONTENT, W	39.55	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-012-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7883_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	229.37	g
3. WT WET SOIL + TARE	365.95	g
4. WT DRY SOIL + TARE	312.23	g
5. WT WATER, Ww	53.72	g
6. WT DRY SOIL, Ws	82.86	g
7. ASTM MOISTURE CONTENT, W	64.83	%
8. EPA MOISTURE CONTENT, W	39.33	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-013-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7882_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	209.25	g
3. WT WET SOIL + TARE	350.55	g
4. WT DRY SOIL + TARE	281.19	g
5. WT WATER, Ww	69.36	g
6. WT DRY SOIL, Ws	71.94	g
7. ASTM MOISTURE CONTENT, W	96.41	%
8. EPA MOISTURE CONTENT, W	49.09	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-014-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7886_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	157.83	g
3. WT WET SOIL + TARE	277.71	g
4. WT DRY SOIL + TARE	214.22	g
5. WT WATER, Ww	63.49	g
6. WT DRY SOIL, Ws	56.39	g
7. ASTM MOISTURE CONTENT, W	112.59	%
8. EPA MOISTURE CONTENT, W	52.96	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-014-02
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7880_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	235.58	g
3. WT WET SOIL + TARE	375.25	g
4. WT DRY SOIL + TARE	315.59	g
5. WT WATER, Ww	59.66	g
6. WT DRY SOIL, Ws	80.01	g
7. ASTM MOISTURE CONTENT, W	74.57	%
8. EPA MOISTURE CONTENT, W	42.71	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-015-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7885_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	150.95	g
3. WT WET SOIL + TARE	282.56	g
4. WT DRY SOIL + TARE	224.94	g
5. WT WATER, Ww	57.62	g
6. WT DRY SOIL, Ws	73.99	g
7. ASTM MOISTURE CONTENT, W	77.88	%
8. EPA MOISTURE CONTENT, W	43.78	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SS-007-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7894_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	206.63	g
3. WT WET SOIL + TARE	348.78	g
4. WT DRY SOIL + TARE	335.16	g
5. WT WATER, Ww	13.62	g
6. WT DRY SOIL, Ws	128.53	g
7. ASTM MOISTURE CONTENT, W	10.60	%
8. EPA MOISTURE CONTENT, W	9.58	%

MOISTURE CONTENT DETERMINATION
REPORT FORM

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SS-010-01
TESTING DATE:	24 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7889_MC

MOISTURE CONTENT (Dry & Wet Basis)		
1. MOISTURE TIN NO.	A	
2. WT MOISTURE TIN (tare weight)	238.77	g
3. WT WET SOIL + TARE	381.87	g
4. WT DRY SOIL + TARE	369.68	g
5. WT WATER, Ww	12.19	g
6. WT DRY SOIL, Ws	130.91	g
7. ASTM MOISTURE CONTENT, W	9.31	%
8. EPA MOISTURE CONTENT, W	8.52	%

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-001-22
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7892_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.02 g	21.02 g	21.02 g
3. WT OF MOLD + SOIL	353.74 g	354.22 g	353.56 g
4. WT OF WET SOIL, W	332.72 g	333.20 g	332.54 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	100.9 pcf	101.0 pcf	100.8 pcf
9. BULK SPECIFIC GRAVITY	1.6	1.6	1.6

UNIT WEIGHT DETERMINATION
DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-002-10
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7891_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.01 g	21.01 g	21.01 g
3. WT OF MOLD + SOIL	380.89 g	380.51 g	381.09 g
4. WT OF WET SOIL, W	359.88 g	359.50 g	360.08 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	109.1 pcf	109.0 pcf	109.2 pcf
9. BULK SPECIFIC GRAVITY	1.7	1.7	1.7

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI 10-SB-003-30
TESTING DATE:	23 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7805_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	406.02 g	405.59 g	406.13 g
4. WT OF WET SOIL, W	384.98 g	384.55 g	385.09 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	116.7 pcf	116.6 pcf	116.7 pcf
9. BULK SPECIFIC GRAVITY	1.9	1.9	1.9

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI 10-SB-004-06
TESTING DATE:	23 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7806_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.03 g	21.03 g	21.03 g
3. WT OF MOLD + SOIL	421.46 g	420.96 g	421.64 g
4. WT OF WET SOIL, W	400.43 g	399.93 g	400.61 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	121.4 pcf	121.2 pcf	121.4 pcf
9. BULK SPECIFIC GRAVITY	1.9	1.9	1.9

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2857
SAMPLE No.:	PAI-10-SB-005-24
TESTING DATE:	23 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7807_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	427.50 g	426.93 g	426.09 g
4. WT OF WET SOIL, W	406.44 g	405.87 g	405.03 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	123.2 pcf	123.0 pcf	122.8 pcf
9. BULK SPECIFIC GRAVITY	2.0	2.0	2.0

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-006-06
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7890_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	244.14 g	245.01 g	244.53 g
4. WT OF WET SOIL, W	223.09 g	223.96 g	223.48 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	67.6 pcf	67.9 pcf	67.7 pcf
9. BULK SPECIFIC GRAVITY	1.1	1.1	1.1

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SB-007-26
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7893_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	447.76 g	447.96 g	448.25 g
4. WT OF WET SOIL, W	426.72 g	426.92 g	427.21 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	129.4 pcf	129.4 pcf	129.5 pcf
9. BULK SPECIFIC GRAVITY	2.1	2.1	2.1

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-003-01
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7895_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	386.40 g	378.65 g	380.97 g
4. WT OF WET SOIL, W	365.36 g	357.61 g	359.93 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	110.8 pcf	108.4 pcf	109.1 pcf
9. BULK SPECIFIC GRAVITY	1.8	1.7	1.7

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-004-01
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7900_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	361.56 g	356.23 g	360.85 g
4. WT OF WET SOIL, W	340.51 g	335.18 g	339.80 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	103.2 pcf	101.6 pcf	103.0 pcf
9. BULK SPECIFIC GRAVITY	1.7	1.6	1.7

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-005-01
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7898_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	356.74 g	356.60 g	356.90 g
4. WT OF WET SOIL, W	335.70 g	335.56 g	335.86 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	101.8 pcf	101.7 pcf	101.8 pcf
9. BULK SPECIFIC GRAVITY	1.6	1.6	1.6

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-006-01
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7899_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	392.04 g	390.02 g	393.48 g
4. WT OF WET SOIL, W	370.99 g	368.97 g	372.43 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	112.5 pcf	111.9 pcf	112.9 pcf
9. BULK SPECIFIC GRAVITY	1.8	1.8	1.8

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-007-01
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7897_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	373.43 g	368.32 g	369.84 g
4. WT OF WET SOIL, W	352.41 g	347.30 g	348.82 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	106.8 pcf	105.3 pcf	105.7 pcf
9. BULK SPECIFIC GRAVITY	1.7	1.7	1.7

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-008-01
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7888_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.07 g	21.07 g	21.07 g
3. WT OF MOLD + SOIL	265.54 g	265.31 g	265.23 g
4. WT OF WET SOIL, W	244.47 g	244.24 g	244.16 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	74.1 pcf	74.0 pcf	74.0 pcf
9. BULK SPECIFIC GRAVITY	1.2	1.2	1.2

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	POAI-10-SD-009-01
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7887_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	273.20 g	273.15 g	273.12 g
4. WT OF WET SOIL, W	252.18 g	252.13 g	252.10 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	76.4 pcf	76.4 pcf	76.4 pcf
9. BULK SPECIFIC GRAVITY	1.2	1.2	1.2

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-010-01
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7884_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	358.62 g	358.13 g	356.34 g
4. WT OF WET SOIL, W	337.57 g	337.08 g	335.29 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	102.3 pcf	102.2 pcf	101.6 pcf
9. BULK SPECIFIC GRAVITY	1.6	1.6	1.6

UNIT WEIGHT DETERMINATION
DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-011-01
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7881_UW

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	21.02 g	21.02 g	21.02 g
3. WT OF MOLD + SOIL	353.72 g	350.40 g	352.98 g
4. WT OF WET SOIL, W	332.70 g	329.38 g	331.96 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	100.9 pcf	99.9 pcf	100.6 pcf
9. BULK SPECIFIC GRAVITY	1.6	1.6	1.6

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-012-01
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7883_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	348.98 g	352.09 g	351.63 g
4. WT OF WET SOIL, W	327.93 g	331.04 g	330.58 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	99.4 pcf	100.4 pcf	100.2 pcf
9. BULK SPECIFIC GRAVITY	1.6	1.6	1.6

UNIT WEIGHT DETERMINATION
DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-013-01
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7882_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	323.05 g	325.13 g	326.58 g
4. WT OF WET SOIL, W	302.00 g	304.08 g	305.53 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	91.6 pcf	92.2 pcf	92.6 pcf
9. BULK SPECIFIC GRAVITY	1.5	1.5	1.5

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-014-01
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7886_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	313.42 g	311.98 g	312.56 g
4. WT OF WET SOIL, W	292.37 g	290.93 g	291.51 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	88.6 pcf	88.2 pcf	88.4 pcf
9. BULK SPECIFIC GRAVITY	1.4	1.4	1.4

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-014-02
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7880_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	338.27 g	341.13 g	341.38 g
4. WT OF WET SOIL, W	317.21 g	320.07 g	320.32 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	96.2 pcf	97.0 pcf	97.1 pcf
9. BULK SPECIFIC GRAVITY	1.5	1.6	1.6

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SD-015-01
TESTING DATE:	18 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7885_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	335.16 g	336.89 g	335.75 g
4. WT OF WET SOIL, W	314.10 g	315.83 g	314.69 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	95.2 pcf	95.7 pcf	95.4 pcf
9. BULK SPECIFIC GRAVITY	1.5	1.5	1.5

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SS-007-01
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7894_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	388.11 g	394.30 g	393.85 g
4. WT OF WET SOIL, W	367.09 g	373.28 g	372.83 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	111.3 pcf	113.2 pcf	113.0 pcf
9. BULK SPECIFIC GRAVITY	1.8	1.8	1.8

UNIT WEIGHT DETERMINATION

DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
SAMPLE No.:	PAI-10-SS-010-01
TESTING DATE:	12 AUGUST 1998
TESTED BY:	DG
TRACKING CODE:	7889_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	391.70 g	389.94 g	392.05 g
4. WT OF WET SOIL, W	370.66 g	368.90 g	371.01 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	112.4 pcf	111.8 pcf	112.5 pcf
9. BULK SPECIFIC GRAVITY	1.8	1.8	1.8

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
TESTING DATE:	30 JULY 1998
TESTED BY:	DG
TRACKING CODE:	7825-GS2

SOLID SPECIFIC GRAVITY			
1. SAMPLE NUMBER	10SB-005-24	10SB-003-30	10SB-004-06
2. FLASK NUMBER	1	2	3
3. TEMPERATURE	20.6 C	21.1 °C	20.6 °C
4. WT. FLASK & WATER	0.00 g	0.00 g	0.00 g
5. WT. WATER, FLASK & SOIL	28.86 g	27.20 g	23.71 g
6. WT OF SOIL	28.86 g	27.20 g	23.71 g
7. CALIBRATION WATER & FLASK	353.7677 g	353.3513 g	352.87 g
8. DEAIRED SAMPLE	371.90 g	370.44 g	367.71 g
9. SPECIFIC GRAVITY	2.69	2.69	2.67
10. CORRECTION FACTOR K	0.9999	0.9998	0.9999
11. Gs @ 20 °C	2.69	2.69	2.67

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
TESTING DATE:	25 AUGUST 1998
TESTED BY:	MC
TRACKING CODE:	7908-GS2

SOLID SPECIFIC GRAVITY			
1. SAMPLE NUMBER	10SS-010-01	10SS-007-01	10SB-007-26
2. FLASK NUMBER	1	2	3
3. TEMPERATURE	23.6 C	23.7 °C	23.6 °C
4. WT. FLASK & WATER	200.78 g	181.22 g	189.76 g
5. WT. WATER, FLASK & SOIL	231.14 g	212.25 g	220.45 g
6. WT OF SOIL	30.36 g	31.03 g	30.69 g
7. CALIBRATION WATER & FLASK	353.6132 g	353.2143 g	352.71 g
8. DEAIRED SAMPLE	372.62 g	372.66 g	371.94 g
9. SPECIFIC GRAVITY	2.67	2.68	2.68
10. CORRECTION FACTOR K	0.9992	0.9992	0.9992
11. Gs @ 20 °C	2.67	2.68	2.67

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	JERICHO ISLAND
PROJECT No.:	2914
TESTING DATE:	25 AUGUST 1998
TESTED BY:	MC
TRACKING CODE:	7916-GS2

SOLID SPECIFIC GRAVITY			
1. SAMPLE NUMBER	10SB-006-06	10SB-002-10	10SB-001-22
2. FLASK NUMBER	1	2	3
3. TEMPERATURE	21.6 C	21.1 °C	21.1 °C
4. WT. FLASK & WATER	200.18 g	194.77 g	201.46 g
5. WT. WATER, FLASK & SOIL	230.83 g	227.93 g	231.92 g
6. WT OF SOIL	30.65 g	33.16 g	30.46 g
7. CALIBRATION WATER & FLASK	353.7162 g	353.3513 g	352.85 g
8. DEAIRED SAMPLE	373.14 g	374.23 g	372.16 g
9. SPECIFIC GRAVITY	2.73	2.70	2.73
10. CORRECTION FACTOR K	0.9997	0.9998	0.9998
11. Gs @ 20 °C	2.73	2.70	2.73

A-6

SUBSURFACE SOIL SAMPLE LOG SHEETS

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7804~~ 7803

Sample ID No.: PAI-10-SB-01-22
Sample Location: PAI-10-SB01
Sampled By: GG
C.O.C. No.: 2262 / 2246

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

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

GRAB SAMPLE DATA:

Date: 7/24/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0930	22-24	Brn Gray	F Sand w Trace Silt
Method: SPLT Spoon	24-26	(same)	Clay F/C Sand
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

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

SAMPLE COLLECTION INFORMATION:

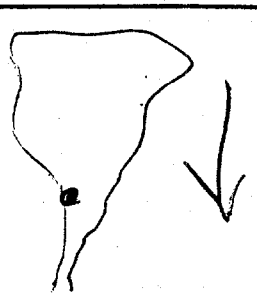
Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
TOC	> 1g	✓	
pH			
GEOTECH - NAT. MOIST			
Grain Size			
ATTERBURG	1 Quart Bag	✓	
POROSITY			
Bulk Density			

OBSERVATIONS / NOTES: SD Geo.

Had to Compositte 22-26 FT not enough Sample in 22-24 Spoon.

-NO Vadose-

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: PAE-10-SB-02-04
Sample Location: PAE-10-SB02
Sampled By: GG
C.O.C. No.: 2246

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

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

GRAB SAMPLE DATA:

Date: 7/30/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0730	4-6	Brn to Lbrn	F Sand w Tr. Silt
Method: Spl Spoon			
Monitor Reading (ppm): 11.4			

COMPOSITE SAMPLE DATA:

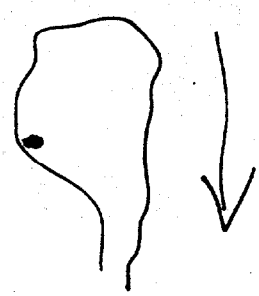
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	5 ENCORE SAMPLERS		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
GEOTECH - [redacted] NAT. MOIST			
Grain Size	1/2 Quart Bag	✓	
ATTERBURG			

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.: ~~7344~~ 7803

Sample ID No.: PAI-10-SB-02-10
Sample Location: PAI-10 SB02
Sampled By: GG
C.O.C. No.: ~~2248~~ MRD 2246 1014

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

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

GRAB SAMPLE DATA:

Date: 7/23/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: ~~0845~~ 0730	10-12	Brn to LT Brn	F SAND (WET) w/ Trace Silt
Method: Spl. Spoon			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

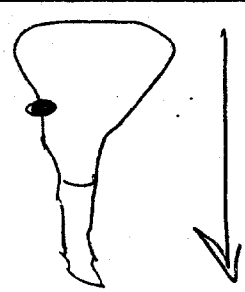
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
TOC	16 OZ	1	
PH			
GEOTECH - NAT. MOIST	1 QUART	1	
Grain Size			
ATTERBERG			
Porosity			
Bulk Density			

OBSERVATIONS / NOTES: Sp. Grg

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD - PARRIS ISL 2nd
Project No.: 7803

Sample ID No.: PAT-10-SB-03-02
Sample Location: PAT-10-SB003
Sampled By: GG
C.O.C. No.: 2249

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

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

GRAB SAMPLE DATA:

Date: 7/13/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1030	2-4	Tan-WH	F SAND MOIST
Method: SOT SPOON			
Monitor Reading (ppm): ~~DA~~			

COMPOSITE SAMPLE DATA:

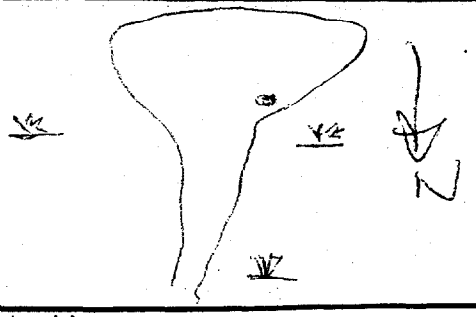
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
GEOTECH - NAT. MOIST - GRAIN SIZE - ATTERBERG	1-QUART	✓	

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.: 7603

Sample ID No.: PAI-10-SB-03-30
Sample Location: PAI-10-SB03
Sampled By: GG
C.O.C. No.: 2249

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

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

GRAB SAMPLE DATA:

Date: 7/13/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1115	30-32	Orange-Brn	F/med. SAND wet
Method: SAT Spoon			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

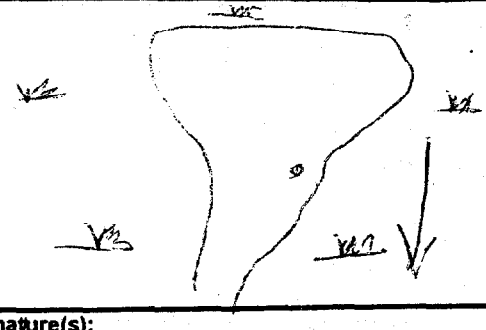
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
GEOTECH - NAT MOIST - SP GRAVITY - POROSITY - Grain Size - ATTERBERG - Bulk Density	1-Qt Bag	✓	

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.: ~~1344~~ 7803

Sample ID No.: PAI-10-SB-03-34
Sample Location: PAI-10SB03
Sampled By: GG
C.O.C. No.: 02260

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

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

GRAB SAMPLE DATA:

Date: 7/13/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1115	34-36	Brn & Grn	F/co Sand w/4 inches Clayey F Sand
Method: Spt Spoon			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

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

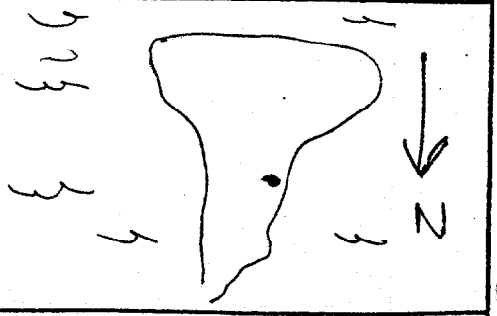
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
~~TCL SVOCs~~	~~4 oz Amber Glass~~		
~~TAL SVOCs~~	~~16 oz~~		
~~TAL Metals (TCLP)~~	~~16 oz~~		
~~TCL Pesticides/PCBs~~	~~16 oz~~		
TOC	16 oz 1 Bag	✓	
PH			
GEOTECH			
NAT. MOIST, Grain Size			
Porosity, Atterberg			
Sp. Gravity, Bulk Density			

OBSERVATIONS / NOTES:

Not Enough Sample for Both Analyses.

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: MCRD - PARRIS I.
Project No.: 7803

Sample ID No.: ~~PAI-10-SB-04-02~~ PAI-10-SB-04-02
Sample Location: ~~PAI-10-SB-04~~ PAI-10-SB-04
Sampled By: GE
C.O.C. No.: 2249

MCRD 1014

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

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

GRAB SAMPLE DATA:

Date: 7/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 11:00	2-4'	LT brn	F SAND - Damp
Method: SPOT SPOON			
Monitor Reading (ppm): - 0 -			

COMPOSITE SAMPLE DATA:

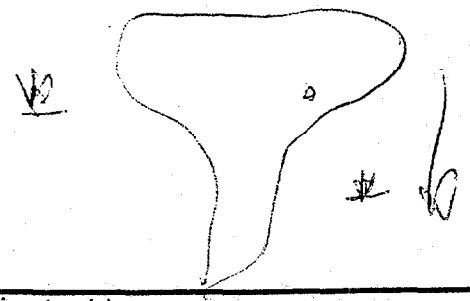
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
- GEOTECH -	1 Quart	✓	
- NAT MOIST			
GRAIN SIZE			
ATTERBERG			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A. Hunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Page ___ of ___

Project Site Name: MCRD - Parris Island
Project No.: 7903

Sample ID No.: PAT-10-SB-04-06
Sample Location: PAT-10-SB-04
Sampled By: GG
C.O.C. No.: 2249

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

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

GRAB SAMPLE DATA:

Date: 7/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 11:10	6-8'	LT Brn.	F SAND - wet
Method: SPT Spoon			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

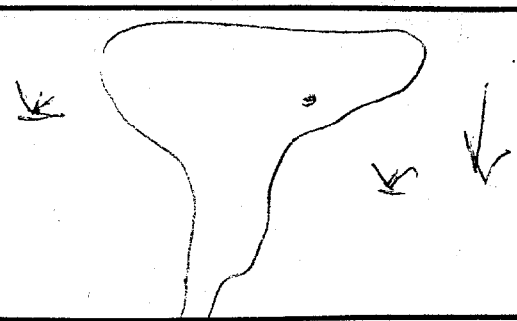
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
GEOTECH -	1 - QUART BAG	✓	
- Sp. Grav. TV			
- Nat. Moisture			
- Bulk Density			
- Porosity			
- ATTERBERG			
- Grain Size			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-151

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~1534~~ 7803

Sample ID No.: PAI-10-SB-04-08
Sample Location: PAI-10-SB04
Sampled By: GG
C.O.C. No.: 02261

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

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

GRAB SAMPLE DATA:

Date: 7/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 11:10	8-10	Brn & Gray	Clayey F Sand & F Sandy Clay
Method: Split Spoon			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

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

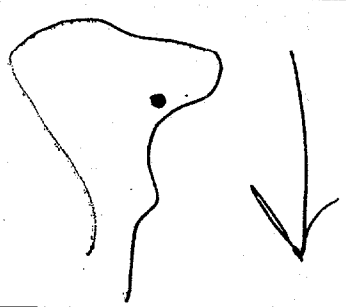
SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

Not Enough Sample for Geotech.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD - Parris Island
Project No.: 1803

Sample ID No.: PAI-10-SB-0550
Sample Location: PAI-10-SB05
Sampled By: GC
C.O.C. No.: ~~2247~~ 2249

MRB 1914

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

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

GRAB SAMPLE DATA:

Date: 7/15/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0730	2-4'	LT Brn	F Sand - damp
Method: Sp-Span			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

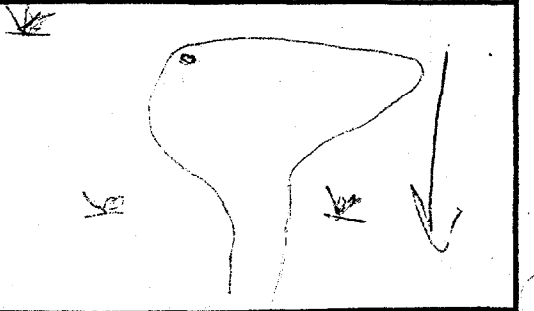
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
GEOTECH	1 QUART	✓	
- NAT MOIST	BAG		
- GRN SIZE			
- ATTERBERG			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page___ of ___

Project Site Name: MKID - Parris Island
Project No.: 7503

Sample ID No.: PAI-10 SB
Sample Location: PAI10-SB07
Sampled By: GC
C.O.C. No.: 2249

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

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

GRAB SAMPLE DATA:

Date: 7/15/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1115	24-26	Dm Gray	F/C Sand w/ Silt
Method: SS Sleeve			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

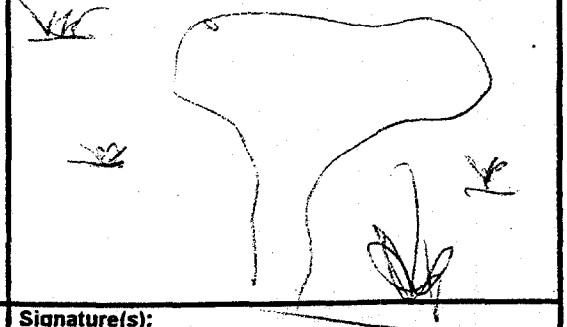
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
GRAIN-H	1 - QUART JAR	✓	
- WT. MOIST			
- ATTERBERG			
- GRAIN SIZE			
- PERMEAB			
- BULK DENSITY			
- SP. GRAVITY			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: AMRD Remediation
Project No.: T803

Sample ID No.: PAE-10-SB-05-26
Sample Location: PAE-10-SB05
Sampled By: GC
C.O.C. No.: 2261

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

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

GRAB SAMPLE DATA:

Date: 7/15/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 09:35	26-28	Brown/Gray	F/C Sand wet
Method: Split Spoon			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

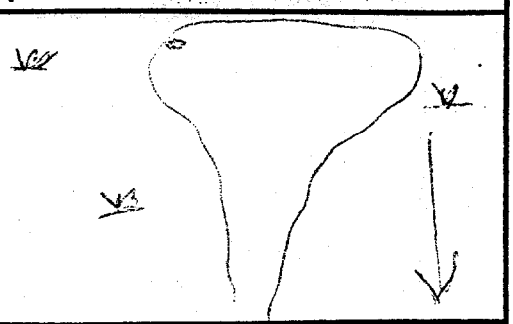
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TOC	1-16 oz	✓	
PH			

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7803

Sample ID No.: PAI-10-SB-06-06
Sample Location: PAI-10-SB06
Sampled By: GG
C.O.C. No.: 02250 02246

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

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

GRAB SAMPLE DATA:

Date: 7/22/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0730	6-8	Gray	Clayey F/med SAND - wet
Method: SPL Spoon			
Monitor Reading (ppm): 2.3			

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] (TOTAL)	[redacted]		
[redacted]	[redacted]		
TOC	16 oz	✓	
PH	[redacted]		
GEOTECH - NAT. MOIST			
Grain Size	1 Quart Bag	✓	
ATTERBURG			
Porosity			
Bulk Density			

OBSERVATIONS / NOTES: Sp. Gravity

= No Vadose Zone =

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Greg Lanier

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7805

Sample ID No.: PAI-10-SB-07-24
Sample Location: PAI-10-SB07
Sampled By: GG
C.O.C. No.: 02250

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

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

GRAB SAMPLE DATA:

Date: 7/22/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1834	24-26	LT Brn	F Sand w/Trace Silt
Method: Spl Spoon			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

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

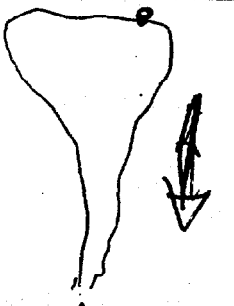
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
TOC	16 oz	✓	
PH	16 oz		
GEOTECH			

OBSERVATIONS / NOTES:

- No Vadose Zone Not Sampled
24-26 Ft. TOC, PH
26-28 - GeoTech Samples
NAT. MOIST
Grain Size
ATTERBERG
POROSITY
Bulk Density
Sp. Gr.
See separate sample sheet

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MARD Parris Island
Project No.:

Sample ID No.: PAE-10-SB-07-26
Sample Location: PAI-10-SB07
Sampled By: GG
C.O.C. No.: ~~0 [illegible]~~ 2246

MRB 10/4

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

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

GRAB SAMPLE DATA:

Date: 7/22/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1634	26 - 28	14" LT Brn 6" Gray	F/Co Sand w/ Tr. Silt WET
Method: SPT Split Spoon			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

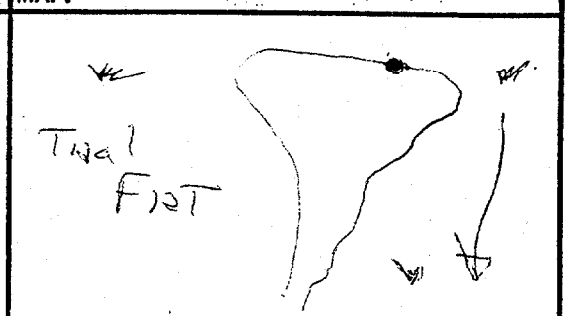
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
GEOTECH	1 QUART	✓	
- NAT MOISTURE			
- GRAIN SIZE			
- ATTERBERG			
- DENSITY			
- BULK DENSITY			
- SP. GRAVITY			

OBSERVATIONS / NOTES:

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.: 1803

Sample ID No.: PAI-10-SW-01-00
Sample Location: PAI-12-SW01
Sampled By: S. Barton
C.O.C. No.: 02272

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

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

SAMPLING DATA:

Date: 7/28/98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1405	Visual	Standard	µS/cm	Degrees C	NTU	mg/l	%	NA
Depth: surface								
Method: Grab	Cloudy	7.27	36.6	30.9	175	7.56	2.34	

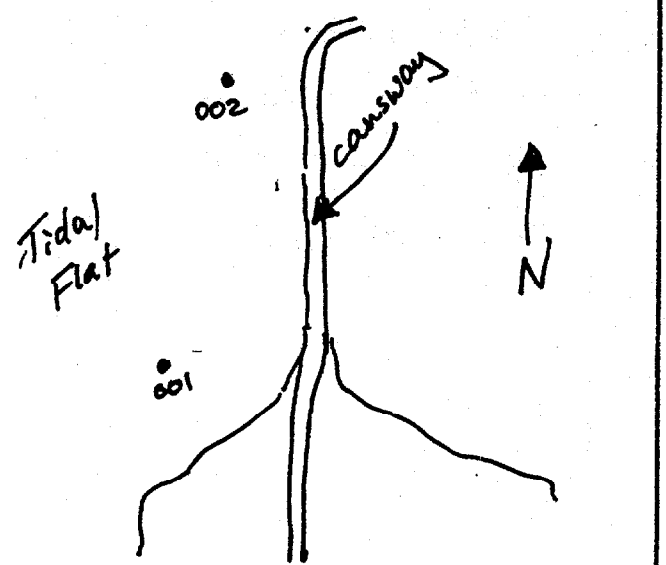
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	~~3~~ 4 ✓
SVOCs		1000 amber	2 ✓
Pest./PCBs		1000 Amber	2 ✓
Total Metals	HNO3	1000 plastic	1 ✓
Dissolved (Filtered) Metals	HNO3	1000 plastic	1 ✓
Cyanide	NAOH	~~250~~ plastic 1000	1 ✓
Hex Chromium		1000 plastic	1
TOC	H2SO4	~~1000 plastic~~ 250 amber	1 ✓
pH		1000 plastic	1

OBSERVATIONS / NOTES:

Total containers = 12

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Stuy Barton

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-10-SW-02-00
Sample Location: PAI-12-SW02
Sampled By: S. Barton
C.O.C. No.: 02272

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

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

SAMPLING DATA:

Date: 7/28/98 Time: 1352 Depth: surface Method: Grab	Color Visual	pH Standard	S.C. µS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	cloudy	7.31	33.6	30.5	mal-function	7.66	2.13	

SAMPLE COLLECTION INFORMATION:

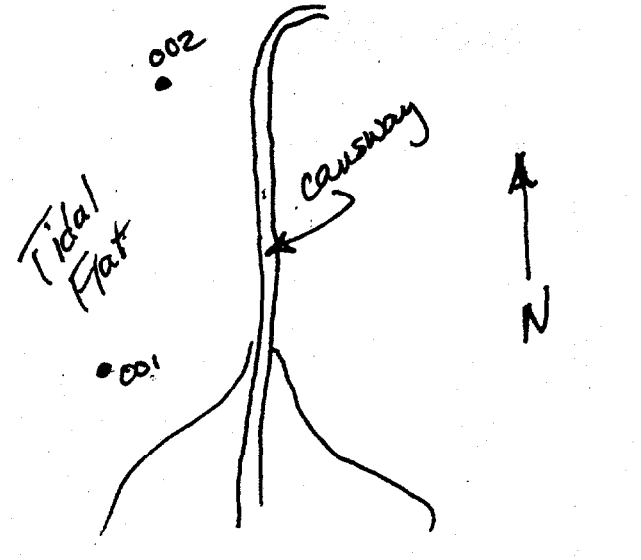
Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3 ✓
SVOCs		1000 amber	2 ✓
Pest./PCBs		1000 Amber	2 ✓
Total Metals	HNO_3	1000 plastic	1 ✓
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1 ✓
Cyanide	NAOH	~~250~~ plastic 1000	1 ✓
Hex Chromium		1000 plastic	1
TOC	H_2SO_4	~~1000 plastic~~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

OBSERVATIONS / NOTES:

Meter malfunctioned on 1st turbidity reading (-10 NTU); after recalibration = 200 NTU

Total containers = 12

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Stuart Barton

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-10-SW-03-00
Sample Location: PAI-12-SW03
Sampled By: S. Pelepko
C.O.C. No.: 02273

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

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

SAMPLING DATA:

Date: 7/29/98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1435	Visual	Standard	~~µS~~/cm	Degrees C	NTU	mg/l	%	NA
Depth: Surface								
Method: Grab	clear	7.6	48.5	37.9	33	5.90	3.18	

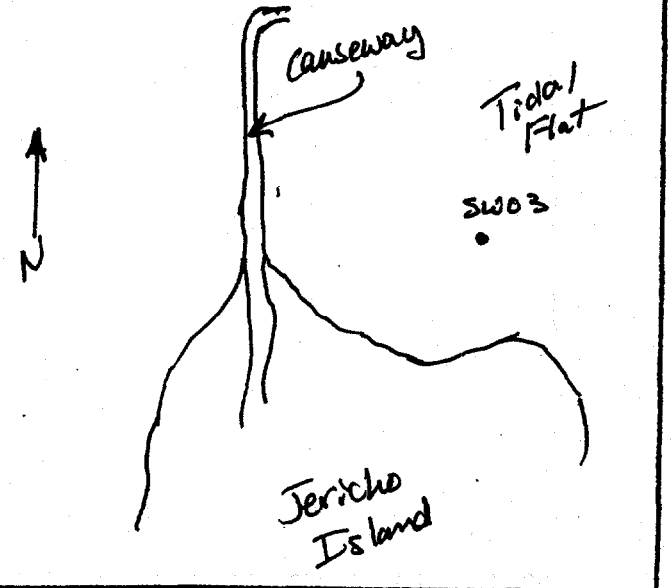
SAMPLE COLLECTION INFORMATION:

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 1000	1 ✓
Hex Chromium		1000 plastic	1
TOC	H_2SO_4	~~1000 plastic~~ 250 amber	1 ✓
pH		1000 plastic	1

OBSERVATIONS / NOTES:

Turbidity reading on meter was not stable (fluctuating)

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

04

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 4394 7803

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

Sample ID No.: PAI-ID-SW-04-00
Sample Location: PAI-ID-SW04
Sampled By: Seth Pelepko
C.O.C. No.: ~~02270~~ 9807676 MRB 10

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

SAMPLING DATA:

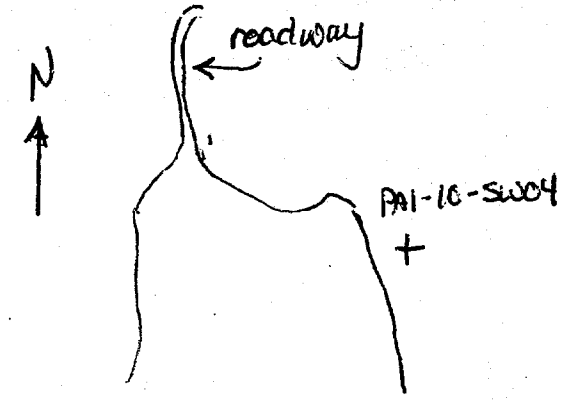
Date: 7/20/98 Time: 1227 Depth: Surface Method: Grab	Color Visual	pH Standard	S.C. ~~µS~~/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	clr.	7.31	4416	34.1	250	6.98	2.89	

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 1,000	1 ✓
~~Hex Chromium~~		~~1000 plastic~~	~~1~~
TOC	H_2SO_4	~~1000 plastic~~ 250 amber	1 ✓
~~pH~~		~~1000 plastic~~	~~1~~

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Seth Pelepko

05

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 4394 7803

Sample ID No.: PAI-10-SW-05-00
Sample Location: PAI-10-SW05
Sampled By: Skip Barton
C.O.C. No.: ~~02290~~ 9807676 MEB 1015

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

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

SAMPLING DATA:

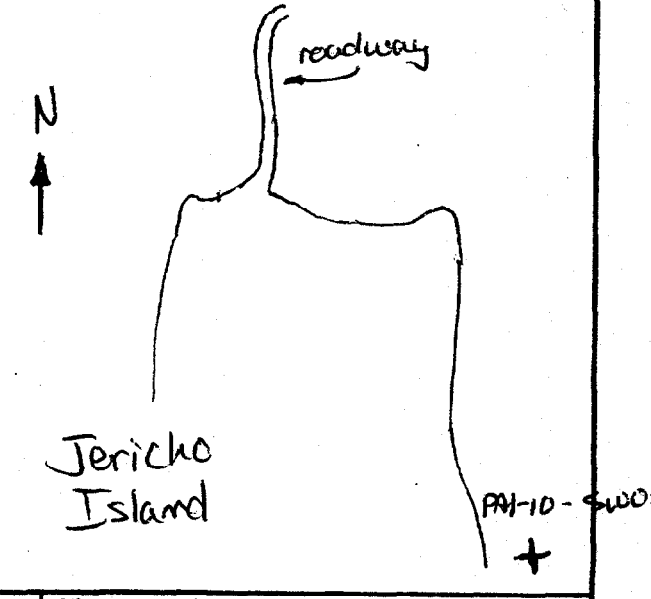
Date: 072648 / Time: 1242 / Depth: Surface / Method: Grab	Color Visual	pH Standard	S.C. ~~µS~~/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	Clr	7.40	44.1	33.6	75	6.48	2.85	

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 1,000	1 ✓
Hex Chromium		~~1000~~ plastic	+
TOC	H2SO4	~~1000~~ plastic 250 amber	1 ✓
pH		~~1000~~ plastic	+

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.: 1803

Sample ID No.: PAI-10-SW-06-00
Sample Location: PAI-12-SW06
Sampled By: S. Barton
C.O.C. No.: 02272

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

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

SAMPLING DATA:

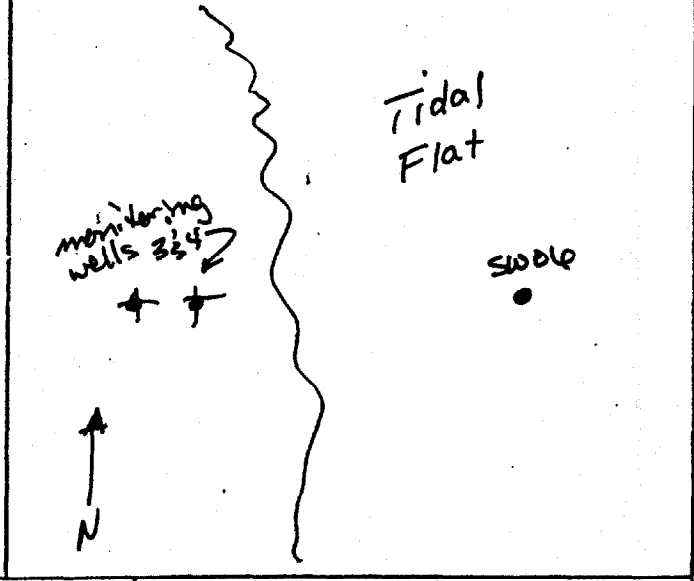
Date: 7/28/98 / Time: / Depth: / Method: Grab	Color Visual	pH Standard	S.C. ~~µS~~/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	clear	7.26	38.2	30.6	12	7.43	2.45	

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 1000	1 ✓
Hex Chromium		1000 plastic	1
TOC	H_2SO_4	~~1000 plastic~~ 250 amber	1 ✓
pH		1000 plastic	1

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shef Barton

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-10-SW-07-00
Sample Location: PAI-12-SW07
Sampled By: S. Barton
C.O.C. No.: 02273

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

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

SAMPLING DATA:

Date: 7/29/98 / Time: 1445	Color Visual	pH Standard	S.C. µS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: surface / Method: Grab	clr	7.38	38.1	33.9	~10	7.11	2.42	

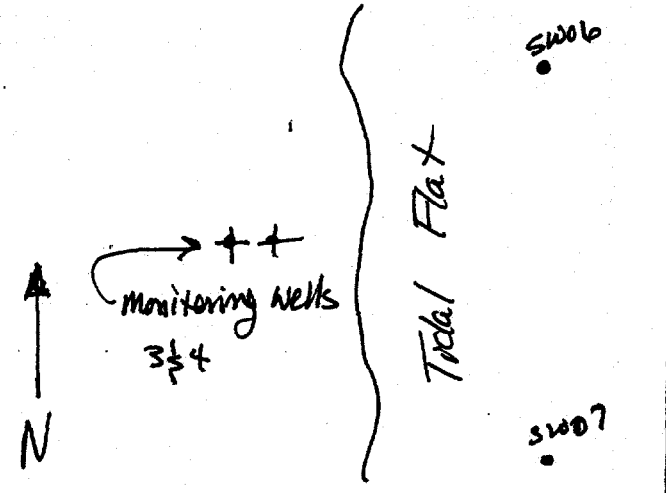
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	3 4 ✓
SVOCs		1000 amber	2 ✓
Pest./PCBs		1000 Amber	2 ✓
Total Metals	HNO3	1000 plastic	1 ✓
Dissolved (Filtered) Metals	HNO3	1000 plastic	1 ✓
Cyanide	NAOH	~~250~~ plastic 1000	1 ✓
Hex Chromium		~~1000 plastic~~ ~~25~~	1
TOC	H_2SO_4	~~1000 plastic~~ 250 amber	1 ✓
pH		1000 plastic	1

OBSERVATIONS / NOTES:

Heriba malfunctioned on turbidity reading, attempted recalibration twice, but meter continued to malfunction

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Stuart Barton

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-10-SW-08-
Sample Location: PAI-10-SW08
Sampled By: GG
C.O.C. No.: 2205

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

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

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 8/11/98	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Time: 1305								
Depth: Surface	Clear	7.33	45.3	30.9	9	11.87	2.95	
Method: Grab								

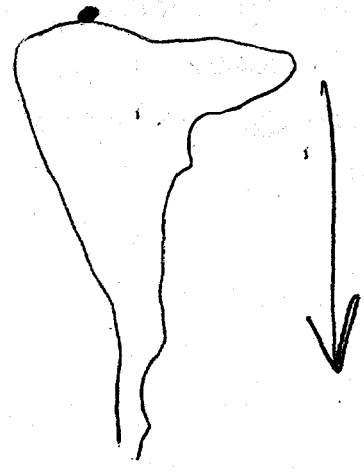
SAMPLE COLLECTION INFORMATION:

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 Chrom 1000~~		~~1000 plastic~~	1
TOC	H_2SO_4	1000 plastic	1
~~pH~~		~~1000 plastic~~	1

OBSERVATIONS / NOTES:

1307
08-12-98 SP
Secchi Disk measurement: 10"

MAP:



Circle If Applicable:
MS/MSD
Duplicate ID No.: PAI-10-SW-008-00D

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-10-SW-09-00
Sample Location: PAI-10-SW09
Sampled By: GG
C.O.C. No.: 2205

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

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

SAMPLING DATA:

Date: 8/11/98 Time: 13:20 Depth: Surface Method: Grab	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	Clear	7.24	45.3	29.9	50	13.19	2.95	

SAMPLE COLLECTION INFORMATION:

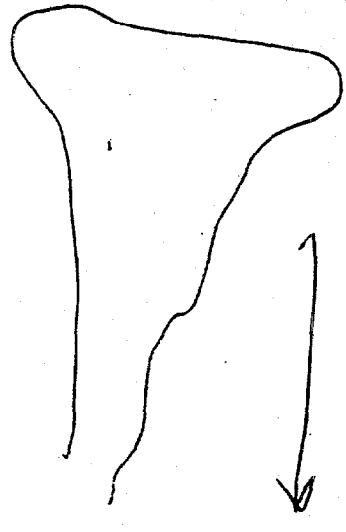
Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	~~3~~ 4
SVOCs		2-1000 amber	2
PEST./PCBs		1000 Amber	2
Total Metals	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
Hex Chromium		1000 plastic	1
TOC	H_2SO_4	1000 plastic	1
~~pH~~		~~1000 plastic~~	~~1~~

OBSERVATIONS / NOTES:

1304
08-12-98 EP

Secchi Disk Measurement: 12 7/8"

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Gunter

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-10-SW-10
Sample Location: PAI-10-SW10
Sampled By: SP
C.O.C. No.: 2205

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: - TIDAL
[] 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: 8/11/98								
Time: 1319								
Depth: Surface	Clear	7.07	45.2	30.4	36	11.06	2.94	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

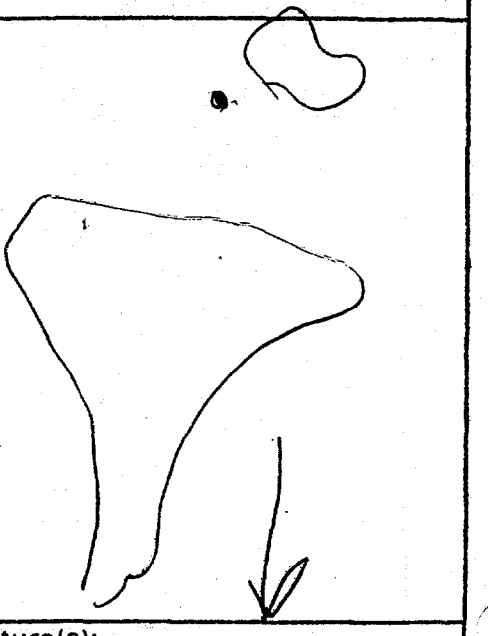
Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	4-40	4
SVOCs		2-1000 amber	2
Pest./PCBs		2-1000 Amber	2
Total Metals	HNO3	1000 plastic	1
Dissolved (Filtered) Metals	HNO3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
Hex Chromium		1000 plastic	1
TOC	H2SO4	1000 plastic	1
~~pH~~		~~1000 plastic~~	+

OBSERVATIONS / NOTES:

1258
08-12-98 SP

Secchi Disk measurement: 11 3/8"

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Pelgrin

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: PAI-10-SW-11-00
Sample Location: PAI-10-SW11
Sampled By: GG SP
C.O.C. No.: 2244

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

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

SAMPLING DATA:

Date: 060898	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1025	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: 4"	clear	6.40	48.7	26.8	27	6.5	3.19	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	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	500 plastic 8P00 08-98	1
~~Hex Chromium~~		~~1000 plastic~~	
TOC	H_2SO_4	~~1000 plastic~~ 125 Amber	1
~~pH~~		~~1000 plastic~~	

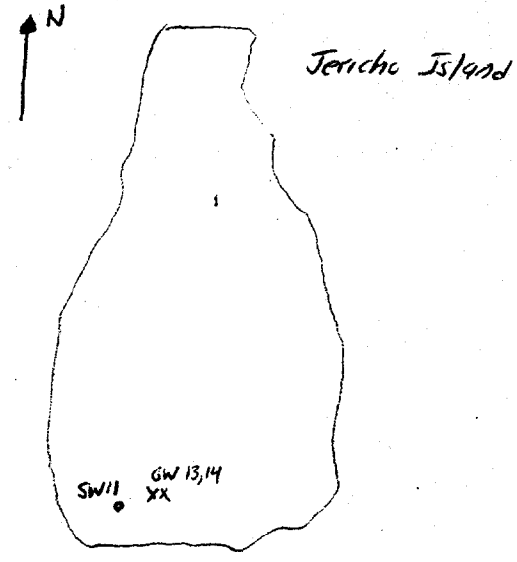
OBSERVATIONS / NOTES:

- light rain persistent during sample acquisition

1252
08-12-98 SP

Secchi Disk Measurement: to shallow

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Phebus

SURFACE WATER SAMPLE LOG SHEET

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

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

Sample ID No.: PAI-10-SW-12
Sample Location: PAI-10-SW12
Sampled By: SP
C.O.C. No.: 2205

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

SAMPLING DATA:

Date: 8/11/98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1258	Clear	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: Surface		6.75	44.9	30.9	48	8.82	2.91	
Method: Grab								

SAMPLE COLLECTION INFORMATION:

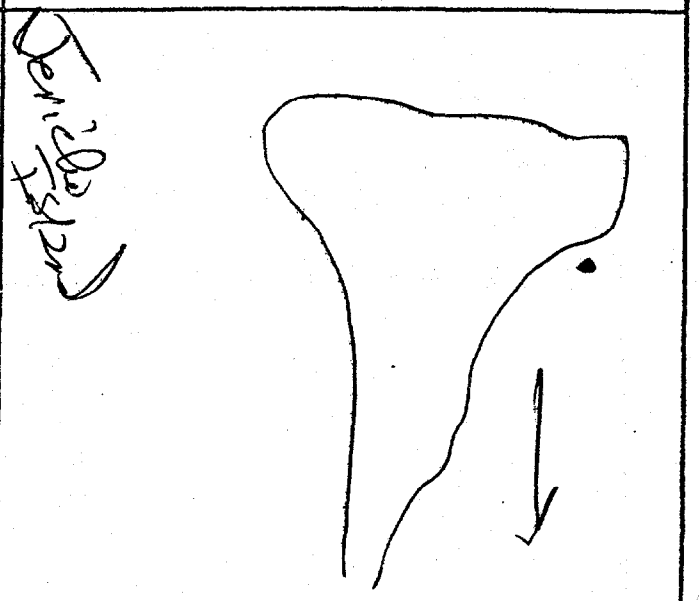
Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	4
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
~~Nitrate/Nitrite~~		~~1000 plastic~~	1
TOC	H_2SO_4	1000 plastic	1
~~pH~~		~~1000 plastic~~	1

OBSERVATIONS / NOTES:

1245 SP
08-12-98

Secchi Disk Measurement: 10"

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Pelepko

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-10-SW-13
Sample Location: PAI-10-SW13
Sampled By: SP
C.O.C. No.: 2205

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

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

SAMPLING DATA:

Date: 8/11/98 Time: 1245 Depth: Surface Method: Grab	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	Clear	7.37	45.0	30.2	15	12.76	2.93	

SAMPLE COLLECTION INFORMATION:

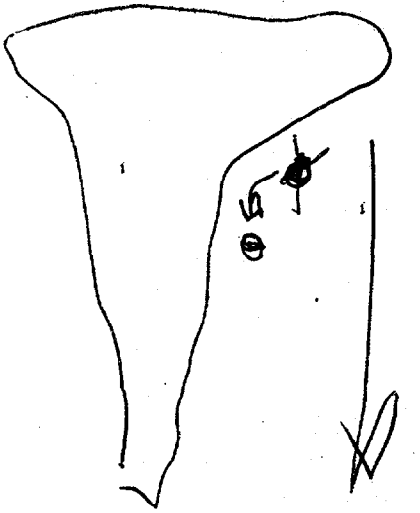
Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40	~~3~~ 4
SVOCs		2-1000 amber	2
Pest./PCBs		2 1000 Amber	2
Total Metals	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
Hex Chromium		1000 plastic	1
TOC	H_2SO_4	1000 plastic	1
~~pH~~		~~1000 plastic~~	1

OBSERVATIONS / NOTES:

1242
08-12-98 SP

Secchi Disk Measurement: 8"

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Polaplas

SURFACE WATER SAMPLE LOG SHEET

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

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

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

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

SAMPLING DATA:

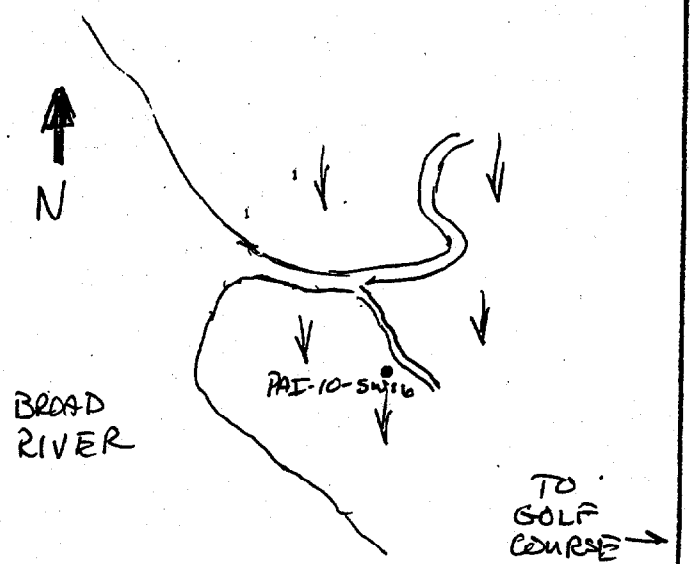
Date: 09/10/98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1242	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: Surface	cloudy	6.72	44.3	27.4	7	3.25	2.87	secchi disk 0.75 ft.
Method: Grab								

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): Stuf Santos

SURFACE WATER SAMPLE LOG SHEET

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

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

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

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

SAMPLING DATA:

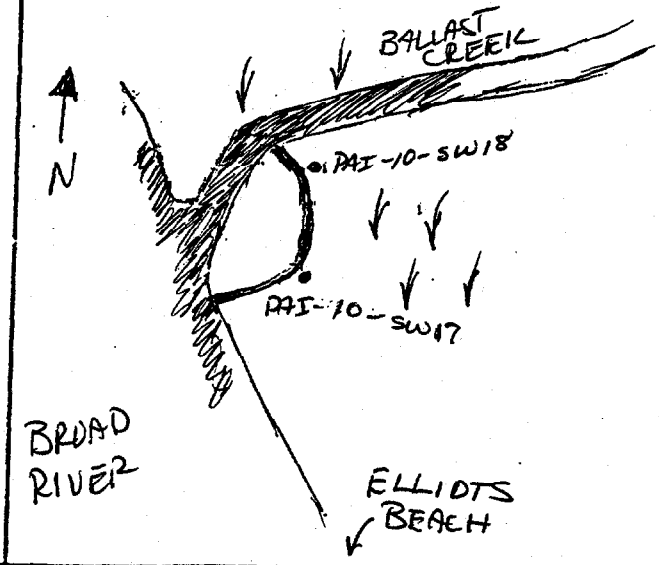
Date: 091098 / Time: 1421 / Depth: surface / Method: Grab	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	clear	7.65	44.7	28.7	-9	4.64	2.91	secchi disk 1.35 ft

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40 VOAs	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
~~Hexchromium~~		~~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 Barten

SURFACE WATER SAMPLE LOG SHEET

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

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

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

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

SAMPLING DATA:

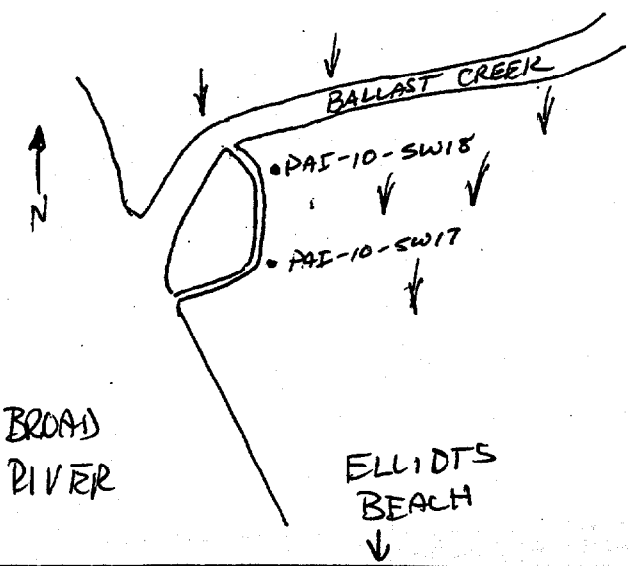
Date: / Time:	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: / Method: Grab	Cloudy	7.51	44.5	28.4	23	3.79	2.91	secci disk 0.25 ft.

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): Shuf Barton

A-8

SEDIMENT SAMPLE LOG SHEETS

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~1394~~ 7803
Jericho Island

Sample ID No.: PAI-10-SD-01-01 GG
~~PAI-10-SD-001-01~~
Sample Location: PAI-12-SD01
Sampled By: S. Barton
C.O.C. No.: 02271

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

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

GRAB SAMPLE DATA:

Date: 7/27/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1605	0-0.5ft	lt gray	med. grnd. sand w/ abundant plant roots, trace silt
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

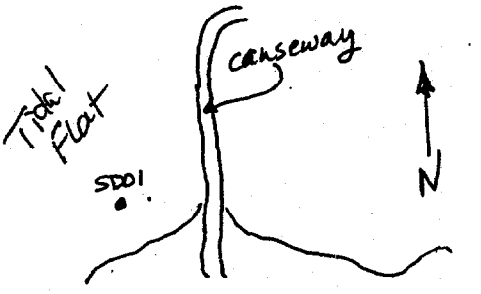
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE Samples	✓	
TCL SVOCs	8 ~~4~~ oz	✓	
TAL METALS (TOTAL) | AVS/SEM	8 ~~4~~ oz	✓	
CYANIDE	8 ~~4~~ oz	✓	
TCL PESTICIDES / PCBs	8 ~~4~~ oz	✓	
TOC	4 ~~16~~ oz	✓	
pH	4 ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz	—	
Geotech	gt. baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Shirja Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

PAL-10-SD-01-01A

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

Sample ID No.: ~~PAL-10-SD-001-01A~~
Sample Location: PAL-10-SD01
Sampled By: RD
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1305	0-0.5 Ft	lt gray	med grained Sand w/abundant Plant roots, Trace Si
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

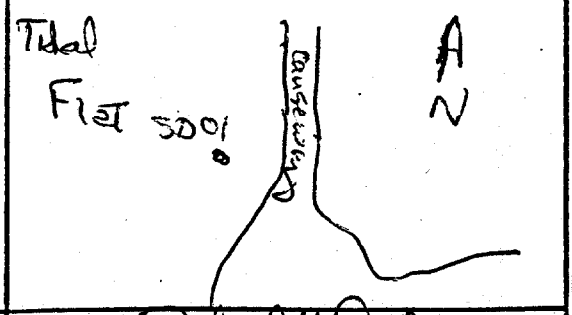
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Richard Ogden
Mary Hunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803
Jericho Island

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

Sample ID No.: PAI-10-SD-02-01 ~~PAI-10-SD-002-01~~
Sample Location: PAI-12-SD02
Sampled By: S. Pelepko
C.O.C. No.: 2212

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

GRAB SAMPLE DATA:

Date: 7/29/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0927	0 - 0.5 ft	dk gray	med Sand w/ Tr. Silt, abundant Root matl
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

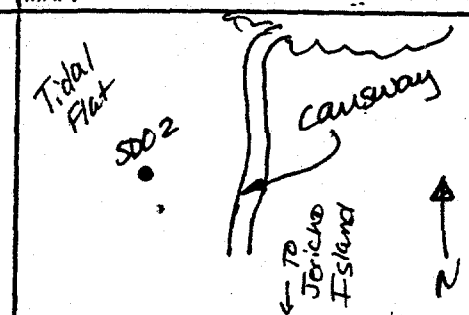
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	~~8 oz~~	✓	
TAL METALS (TOTAL), AVS/SEM	~~8 oz~~	✓	
CYANIDE	~~8 oz~~	✓	
TCL PESTICIDES / PCBs	~~8 oz~~	✓	
TOC	~~4 oz~~	✓	
PH	~~4 oz~~	✓	
HEXAVALENT CHROMIUM	~~4 oz~~	✓	
Geotech	qt. baggie		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable: MS/MSD

Duplicate ID No.: PAI-10-SD-02-01D ~~PAI-10-SD-002-01D~~

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

PAE-10-SD-02-01A

Project Site Name: MCRD - Jericho Island
Project No.: TB03

Sample ID No.: ~~PAE-10-SD-002-01~~
Sample Location: PAE-10-SD02
Sampled By: RD
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1240	0-0.5 FT	dark gray	med Sand abundant Plant Roots Tr. Silt
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

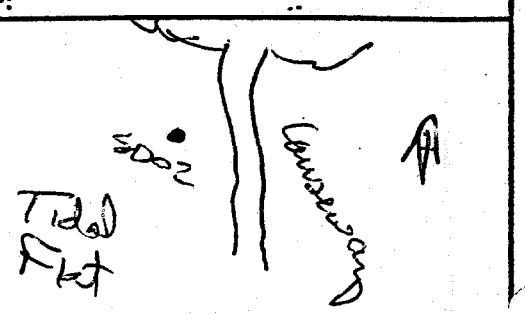
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH SW846-8310	4-8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable: MS/MSD

Duplicate ID No.: PAE-10-SD-02-01DA
~~PAE-10-SD-002-01DA~~

Signature(s): Richard D Rai

66

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~1394~~ 7803
Jericho Island

Sample ID No.: ~~PAI-10-SD-003-01~~ PAI-10-SD-03-01 66
Sample Location: ~~PAI-10-SD003~~ PAI-12-SD03
Sampled By: S. Delepko
C.O.C. No.: 92416

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

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

GRAB SAMPLE DATA:

Date: 7/29/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1045	0-0.5ft	~~black~~ gray	med. to coarse grnd. sand, abundant roots, trace silt
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

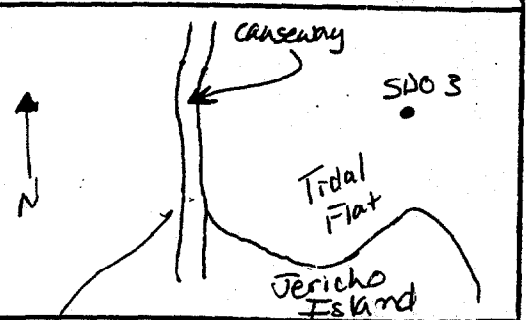
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	8 ~~16~~ oz	✓	
TAL METALS (TOTAL) AVS/SEM	8 ~~16~~ oz	✓	
CYANIDE	8 ~~16~~ oz	✓	
TCL PESTICIDES / PCBs	8 ~~16~~ oz	✓	
TOC	4 ~~16~~ oz	✓	
PH	4 ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz		
Geotech	qt baggie	✓	

OBSERVATIONS / NOTES:

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
Jericho Island

Sample ID No.: ~~PAI-10-SD-003-01~~ PAI-10-SD-03-01
Sample Location: PAI-12-SD03
Sampled By: S. Delepko
C.O.C. No.: 2246

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

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

GRAB SAMPLE DATA:

Date: 7/29/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1045	0-0.5ft	~~black~~ gray	med. to coarse grnd. sand, abundant roots, trace silt
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

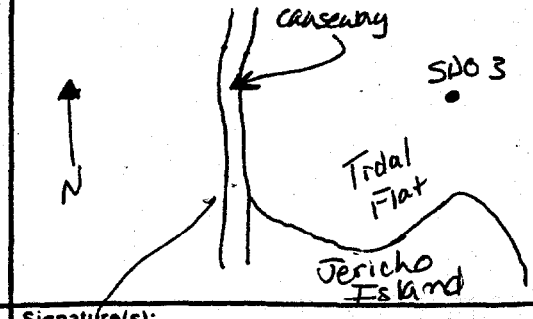
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE Samples	✓	
TCL SVOC.A	8 ~~16~~ oz	✓	
TAL METALS (TOTAL) AVS/SEM	8 ~~16~~ oz	✓	
CYANIDE	8 ~~16~~ oz	✓	
TCL PESTICIDES / PCBs	8 ~~16~~ oz	✓	
TOC	4 ~~16~~ oz	✓	
PH	4 ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	16 oz		
Geotech	qt baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: ~~PAI-10-SD-03-01A~~ PAI-10-SD03-01A
Sample Location: PAI-10-SD03
Sampled By: GG
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1251	0-0.5FT	gray	Med to Co Sand, abundant Roots, Trace Silt
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

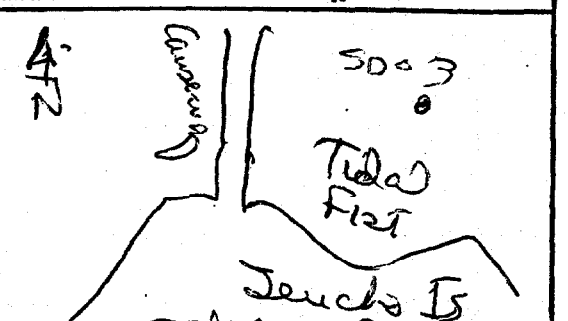
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH SW846 - 8310	1 - 8oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Richard Gilbert

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803
Jericho Island

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

Sample ID No.: PAI-10-SD-04-01
Sample Location: PAI-12-SD04
Sampled By: S. Peleplco
C.O.C. No.: 02271

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

GRAB SAMPLE DATA:

Date: 7/27/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1445	0-0.5 ft	black	silty fine-grnd. sand
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

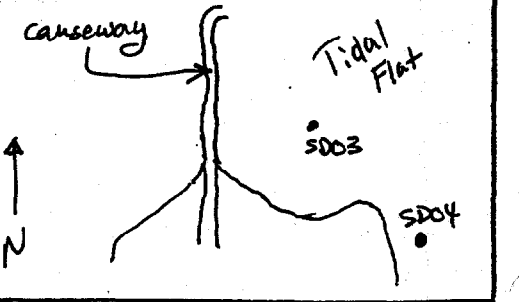
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE Samples	✓	
TCL SVOC.A	8 ~~4~~ 16oz	✓	
TAL METALS (TOTAL) /MS/SDM	8 ~~4~~ 16oz	✓	
CYANIDE	8 ~~4~~ 16oz	✓	
TCL PESTICIDES / PCBs	8 ~~4~~ 16oz	✓	
TOC	4 ~~16~~ oz	✓	
PH	4 ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz		
Geotech	qt baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Stephen Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Yerba Island
Project No.: 7803

Sample ID No.: PAE-10-SD-04-01A ~~PAE-10-SD-001-01A~~
Sample Location: PAE-D-SD04
Sampled By: GG
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1246	0-0.5FT	Black	Silt, f Sand
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

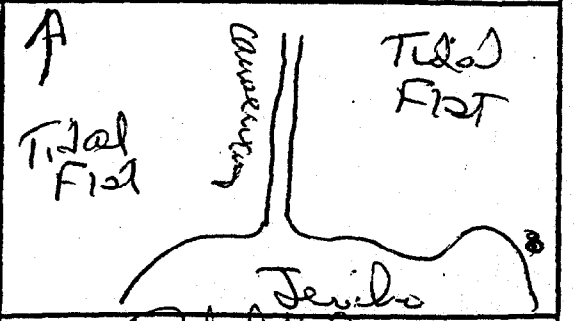
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH SW846 - 8310	1 - 8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Richard L. Davis

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-05-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7814~~ 7803
Jericho Island

Sample ID No.: ~~PAI-10-SD-005-01~~
Sample Location: PAI-12-SD05
Sampled By: S. Delepko
C.O.C. No.: 02271

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

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

GRAB SAMPLE DATA:

Date: 7/27/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1511	0-0.5 ft	black	silty, fine grad. sand, some clay and organic material
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

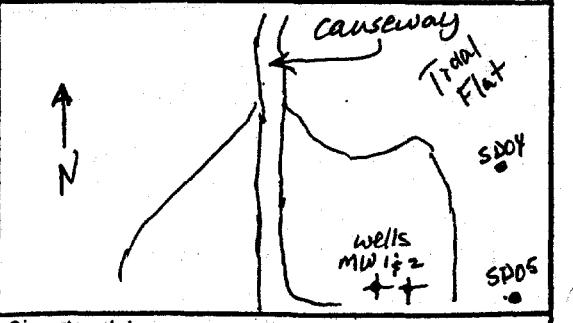
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.s	5 ENCORE Samples	✓	
TCL SVOC.s	8 ~~16~~ 8oz	✓	
TAL METALS (TOTAL) ARS/SEM	8 ~~16~~ 8oz	✓	
CYANIDE	8 ~~16~~ 8oz	✓	
TCL PESTICIDES / PCBs	8 ~~16~~ 8oz	✓	
TOC	4 ~~16~~ 4oz	✓	
pH	4 ~~16~~ 4oz	✓	
HEXAVALENT CHROMIUM	~~16~~ 8oz	✓	
Geotech	qt. baggie		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Stephen Bartem

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PAP Jarvis Isl
Project No.: 7803

Sample ID No.: ~~PAI-10-SD-05-01A~~ PAI-10-SD-05-01A GG
Sample Location: PAI-10-SD05
Sampled By: GG
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1310	0-0.5	Black	Silty F Sand, some clay and organic matter, roots
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

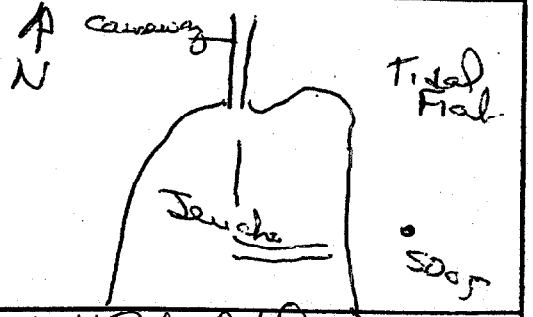
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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): Richard Gilbert, Gary Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-06-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7314~~ 7803
Jericho Island

Sample ID No.: ~~PAI-10-SD-0606-01~~
Sample Location: PAI-12-SD06
Sampled By: S. Barton
C.O.C. No.: 02271

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

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

GRAB SAMPLE DATA:

Date: 7/27/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1445	0-0.5 ft	black	silty, fine sand w/ clay, abundant organic material
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

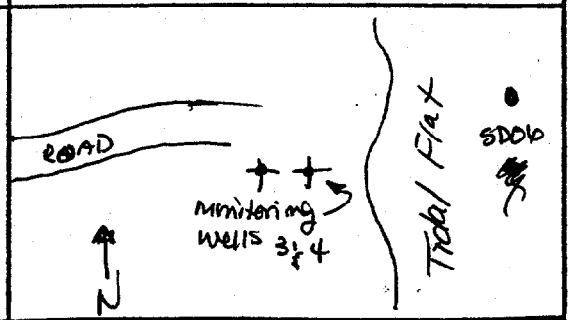
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE Samples	✓	
TCL SVOCs	8 ~~16~~ 8oz	✓	
TAL METALS (TOTAL) AVS/SEM	8 ~~16~~ 8oz	✓	
CYANIDE	8 ~~16~~ 8oz	✓	
TCL PESTICIDES / PCBs	8 ~~16~~ 8oz	✓	
TOC	4 ~~16~~ 4oz	✓	
PH	4 ~~16~~ 4oz	✓	
HEXAVALENT CHROMIUM	~~16~~ 8oz		
Geotech	gt. baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Steph Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name:	MCRD P Jericho Island	Sample ID No.:	PAF-10-SD-06-01A ~~PAF-10-SD-006-01A~~ G
Project No.:	7803	Sample Location:	PAI-10-SD 06
		Sampled By:	GG
		C.O.C. No.:	2213

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

Type of Sample:

- [x] Low Concentration
- [ ] High Concentration

GRAB SAMPLE DATA:

Date: 12/14/98 / Time: 1316 / Method: Grab / Monitor Reading (ppm): NA	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-0.5Ft	Black	Si F. Sand w/ clay abundant organics, roots

COMPOSITE SAMPLE DATA:

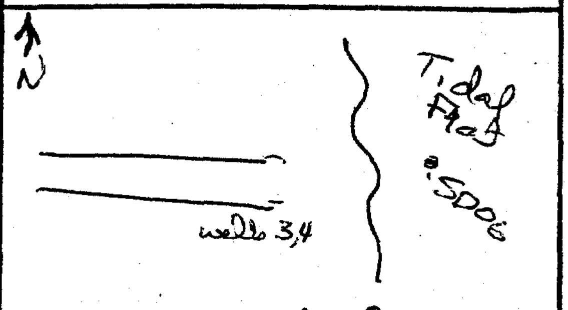
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAF - SW846 - 8310	1 - 8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Richard [illegible] Gary [illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-06-01

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

Sample ID No.: ~~PAI-10-SD-007-01~~
Sample Location: PAI-12-SD07
Sampled By: S. BARTON
C.O.C. No.: 02271

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

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

GRAB SAMPLE DATA:

Date: 7/27/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1504	0-0.5ft	black	silty fine sand w/ clay & organic material
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

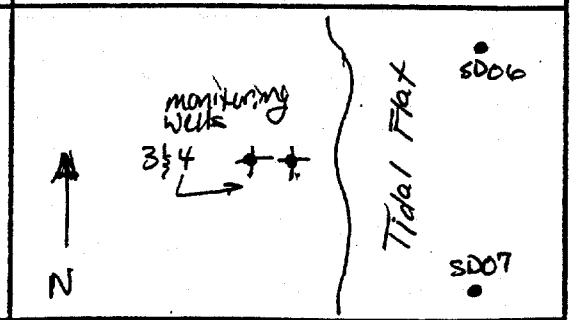
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE Samples	✓	
TCL SVOCs	8 ~~16~~ 02	✓	
TAL METALS (TOTAL) AVS/SEM	8 ~~16~~ 02	✓	
CYANIDE	8 ~~16~~ 02	✓	
TCL PESTICIDES / PCBs	8 ~~16~~ 02	✓	
TOC	4 ~~16~~ 02	✓	
pH	4 ~~16~~ 02	✓	
HEXAVALENT CHROMIUM	~~16~~ 02	✓	
GEOTECH	qt. baggie		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Stuart Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: ~~PAE-10-SD-07-01A~~ PAE-10-SD07
Sample Location: PAE-10-SD07
Sampled By: GG
C.O.C. No.: 2273

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

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

GRAB SAMPLE DATA:

Date: 12/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1319	0-0.5	Black	Si F Sand w/ Clay & Organics (Roots)
Method: Grab			
Monitor Reading (ppm): NA.			

COMPOSITE SAMPLE DATA:

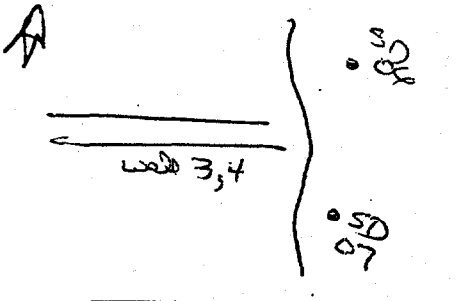
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH SW8270 - 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.: ~~PAI-10-SD-008-01~~ PAI-10-SD-08-01
Sample Location: PAI-10-SD08
Sampled By: SP GG
C.O.C. No.: 2245, 2206

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

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

GRAB SAMPLE DATA:

Date: 08/10/98 Time: 1500 Method: Grab Monitor Reading (ppm):	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-0.5'	dark gray	silty clay, root mat saturated

COMPOSITE SAMPLE DATA:

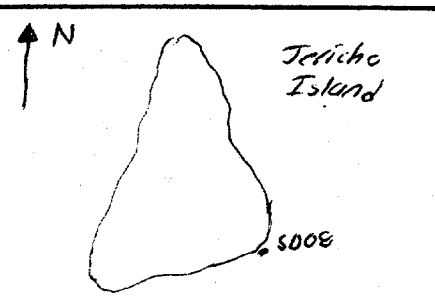
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC's	(5) ENCORE SAMPLES	✓	
TCL SVOC's / Pest. / PCBs	[redacted] (1) 8oz	✓	
TAL METALS (TOTAL) / CN / AVS / SEM	[redacted] (1) 8oz	✓	
CYANIDE	[redacted]	[redacted]	
TCL PESTICIDES / PCBs	[redacted]	[redacted] ✓	
TOC / pH	[redacted] (1) 4oz	✓	
pH	[redacted]		
HEXAVALENT CHROMIUM	[redacted]		
Grain size / Bulk Density	(1) Qt. Baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Seth Pleppo

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD- ~~PAI~~ Jarvis Is.
Project No.: T803

Sample ID No.: ~~PAI-10-SD-08-01A~~ PAI-10-SD-08-01A G
Sample Location: PAI-10-SD08
Sampled By: RD
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12/14/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1345	0-0.5	dark gray	Silty, Clay, root mat, saturated
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

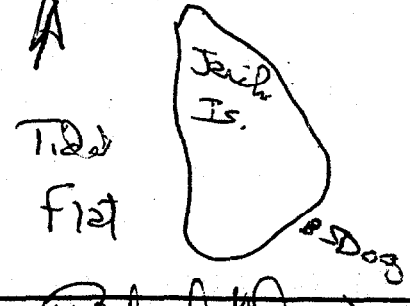
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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): Richard Wain

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-009-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7803

Sample ID No.: ~~PAI-10-SD-009-01~~
Sample Location: PAI-10-SD09
Sampled By: SP GG
C.O.C. No.: 2245, 2206

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

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

GRAB SAMPLE DATA:

Date: 08/09/08 Time: 1540 Method: Grab Monitor Reading (ppm):	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-0.5'	dark gray	clay, root mat, saturated

COMPOSITE SAMPLE DATA:

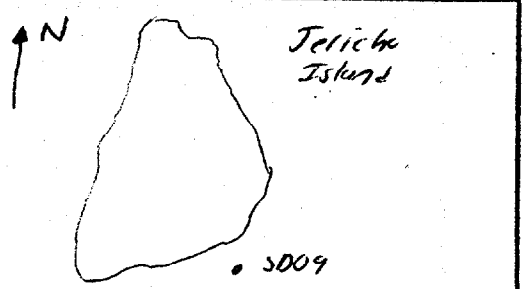
Date: Method: Monitor Readings (Range in ppm):	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(5) ENCORE Samples	✓	
TCL SVOCs / Pest. / PCBs	[redacted] (1) 8oz	✓	
TAL METALS (TOTAL) / CN / AVS / SEM	[redacted] (1) 8oz	✓	
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
TOC / pH / Cr (VI)	[redacted] (1) 4oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
Grain Size / Bulk Density	(1) QT. baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Pelepko

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAE-10-SD-09-01A 6
Sample Location: PAE-10-SD09
Sampled By: GG
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12/4/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1345	0-0.5	Dark Gray	Clay, root mat, saturated
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

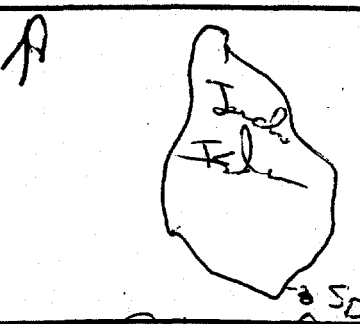
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH - SW846 - 8310	1	2	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Richard G. Davis Jr.

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-10-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7803

Sample ID No.: ~~PAI-10-SA-010-01~~
Sample Location: PAI-10-SD10
Sampled By: SP GG
C.O.C. No.: 2245, 2206

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

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

GRAB SAMPLE DATA:

Date: 081098 / Time: 1445 / Method: Grab / Monitor Reading (ppm):	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-0.5'	dark gray to black	silty clay, some f.g. sand, thick root mat, saturated

COMPOSITE SAMPLE DATA:

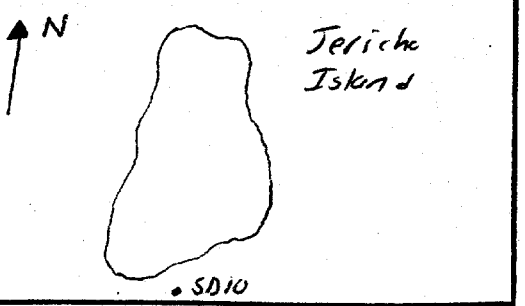
Date: / Method: / Monitor Readings (Range in ppm):	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)

SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Pelagio

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: ~~PAE-10-SD-010-01A~~ PAE-10-SD-10-01A GG
Sample Location: PAE-10-SD10
Sampled By: BD
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12-14-98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1500	0-0.5	dark gray to Black	Si Clay, Some Fg-g Sd Thick root mat - Saturated
Method: GRAB			
Monitor Reading (ppm): N/A			

COMPOSITE SAMPLE DATA:

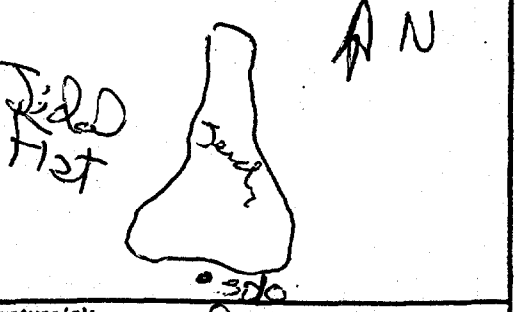
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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):

Richard D
Mary

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7803

Sample ID No.: ~~PAI-10-SD-011-01~~ PAI-10-SD-11-01
Sample Location: PAI-10-SD11
Sampled By: SP EF
C.O.C. No.: 2245, 2206

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

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

GRAB SAMPLE DATA:

Date: 081098 / Time: 0907 / Method: Grab / Monitor Reading (ppm):	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-0.5'	dark brown to black	trace clay, trace f.g.-m.g. sand, thick root mat, saturated

COMPOSITE SAMPLE DATA:

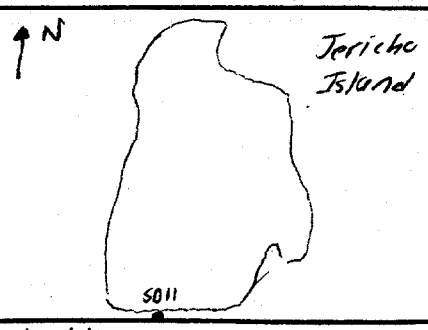
Date: / Method: / Monitor Readings (Range in ppm):	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	(5) ENCORE SAMPLES	✓	
TCL SVOC.A / Pest. / PCBs	[redacted] (1) 4oz	✓	
TAL METALS (TOTAL)(N/AVS)SEM	[redacted] (1) 8oz	✓	
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
TOC / pH	[redacted] (1) 4oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
Grain Size / Bulk Density	(1) Qt. baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Pilagko, [redacted]

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: ~~PAI-10-SD-01-01A~~ PAI-10-SD-11-01A G6
Sample Location: PAI-10-SD11
Sampled By: RD
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12-14-98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1510	0-0.5 Ft	dk brn to Black	Clay and F Sa. w/ Thick root mat saturated
Method: GRAB			
Monitor Reading (ppm): N/A			

COMPOSITE SAMPLE DATA:

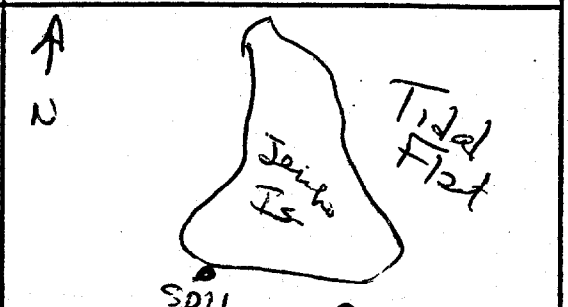
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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): Richard Hagan Jr.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7803

Sample ID No.: ~~PAE-10-SD-012-01~~ PAI-10-SD-12-01
Sample Location: PAI-10-SD12
Sampled By: SP GG
C.O.C. No.: 2245, 2206

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

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

GRAB SAMPLE DATA:

Date: 08/09/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0800	0-0.5'	dark grey	Clay, trace f-g. sand, thick root mass, saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

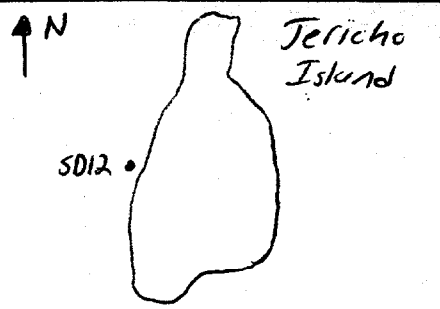
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(5) ENCORE SAMPLES	✓	
TCL SVOCs / Pest. / PCBs	[redacted] (1) 8oz	✓	
TAL METALS (TOTAL) / Al / Ag / SEM	[redacted] (1) 8oz	✓	
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
TOC / pH	[redacted] (1) 4oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
Grain Size / Bulk Density	(1) Qt. baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Pelphrey

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD / Iberia Is.
Project No.: 7803

Sample ID No.: ~~PAE-SD-12-01A~~ PAE-10-SD-12-01A GG
Sample Location: PAE-SD12
Sampled By: GG
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12-14-98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1526	0-0.5 FT	dark gray	Clay, w/ Tr. F Sand, Thick root mat, Saturated
Method: GRAB			
Monitor Reading (ppm): N/A			

COMPOSITE SAMPLE DATA:

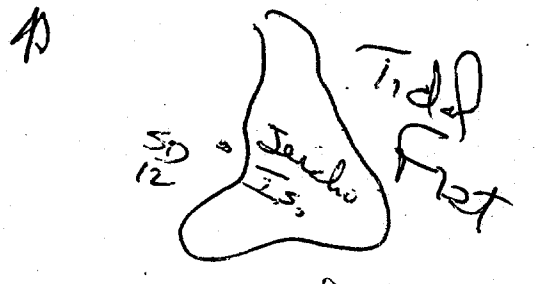
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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): Richard Gilday, Greg Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-13-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7803

Sample ID No.: ~~PAI-10-SD-013-01~~
Sample Location: PAI-10-SD13
Sampled By: SP GG
C.O.C. No.: 2245, 2206

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

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

GRAB SAMPLE DATA:

Date: 081098	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0743	0 - 0.5'	dark gray	silty clay / clayey silt, trace f.g. sand, thick root mat saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

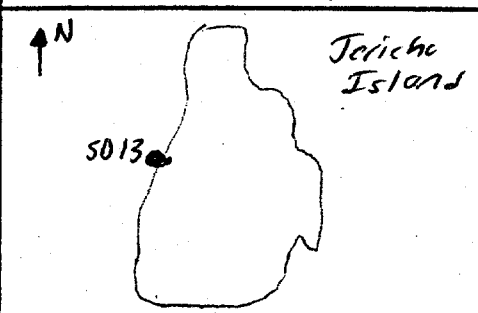
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	(5) ENCORE SAMPLERS	✓	
TCL SVOCs / Pest / PCBs	[redacted] (1) 8 oz	✓	
TAL METALS (TOTAL)/(CN/AVS/SEM	[redacted] (1) 8 oz	✓	
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
TOC / pH / Hexavalent Chromium	[redacted] (1) 4 oz	—	
[redacted]	[redacted]		
[redacted]	[redacted]		
Grain Size / Bulk Density	(1) Qt. baggie	—	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Pelayo

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Jericho IS
Project No.: 7803

Sample ID No.: PAE-10-SD-013-01A6
Sample Location: PAE-10-SD13
Sampled By: RD
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12-14-98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1530	0-0.5	dk gray	Si Clay / Clayey Silt. Tr. F Sand, Thick root mass saturated
Method: GRAB			
Monitor Reading (ppm): N/A			

COMPOSITE SAMPLE DATA:

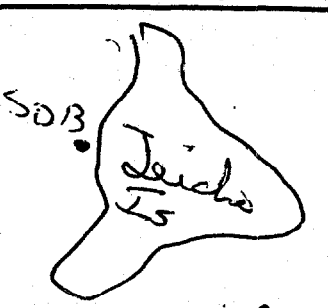
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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): Richard Wilson, Gary Linder

A-200

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-14-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: [redacted] 7803

Sample ID No.: ~~PAI-10-SD-014-01~~
Sample Location: PAI-10-SD14
Sampled By: SP, GG
C.O.C. No.: 2245, 2206

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

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

GRAB SAMPLE DATA:

Date: 08/10/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0908	0-0.5'	dark brown gray to black	silty clay, trace f.g. sand, thick root mat, saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

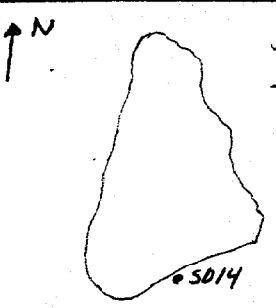
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC's	(5) ENCORE Samples	✓	
TCL SVOC's / Pest. / PCBs	[redacted] (1) 8oz	✓	
TAL METALS (TOTAL) KN/AVS/SEM	[redacted] (1) 8oz	✓	
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
TOC / PH	[redacted] (1) 4oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
Grain Size, Bulk Density	(1) Qt. baggie	✓	

OBSERVATIONS / NOTES:

Sheen noticed on surface puddles, most likely bacteria

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Scott Delapko

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Jarvis Is.
Project No.: 7803

Sample ID No.: ~~PAE-10-SD-14-01A~~ PAE-10-SD-14-01A GG
Sample Location: PAE-10-SD14
Sampled By: GG
C.O.C. No.: 2213

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

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

GRAB SAMPLE DATA:

Date: 12-14-98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1505	0-0.5 Ft	dark Brn gray to Black	Silty Clay Trace F Sand thin root mat Saturated
Method: GRAB			
Monitor Reading (ppm): N/A			

COMPOSITE SAMPLE DATA:

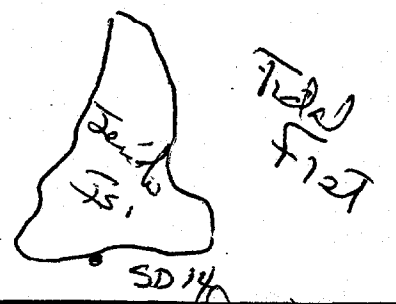
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH - 3510846-8310	1 -	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Richard H Davis

[redacted] SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

PAI-10-SD-14-02

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: ~~PAI-10-SD-014-02~~
Sample Location: PAI-10-SD14
Sampled By: GG, SP
C.O.C. No.: 2299

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

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

GRAB SAMPLE DATA:

Date: 081398	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0730	0.5 - 1'	dark gray	silty clay, clayey silt with some f.g. sand; thick root mat, saturated
Method: Grab			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

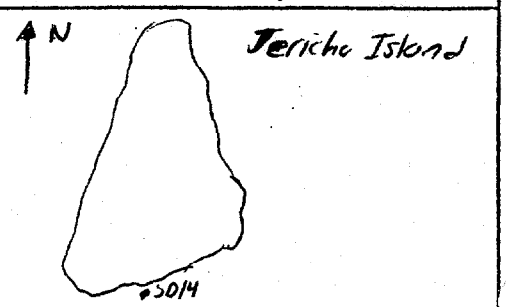
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC's	(5) ENCORE SAMPLERS	✓	
TCL SVOC's/Pest./PCBs	[redacted] (1) 8oz	✓	
TAL METALS (TOTAL)/(N)AVS/SEM	[redacted] (1) 8oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
TOC/pH	[redacted] (1) 4oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
Archive Sample Bulk Density, grain Size	1 Quart	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Seth Pleasants

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Jarvis IS
Project No.: 7803

Sample ID No.: ~~PAE-10-SD-14-02A~~ PAE-10-SD-14-02A
Sample Location: PAE-10-SD14
Sampled By: 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:

Date: 12-14-99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1507	0.5-1FT	dark gray	Silty Clay, Clayey Silt w Trace FG sand Thick Root mat Saturated
Method: GRAB			
Monitor Reading (ppm): N/A			

COMPOSITE SAMPLE DATA:

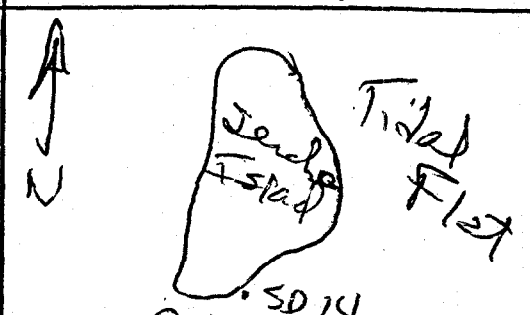
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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): Richard Blair

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-15-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7904~~ 7903

Sample ID No.: ~~PAI-10-SA-015-01~~
Sample Location: PAI-10-SD15
Sampled By: SP GG
C.O.C. No.: 2245, 2206

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

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

GRAB SAMPLE DATA:

Date: 081098	Depth	Color	Description (Sand, Silty, Clay, Moisture, etc.)
Time: 1514	0-0.5'	dark gray to black	silty clay, some f.g. sand thick root mat, saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

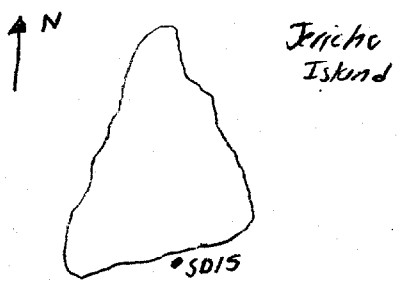
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	(5) ENCORE SAMPLES	✓	
TCL SVOC.A / Pest / PCBs	[redacted] (1) 8oz	✓	
TAL METALS (TOTAL) KN/ANS/SEM	[redacted] (1) 8oz	✓	
[redacted]	[redacted]	[redacted]	
[redacted]	[redacted]	[redacted]	
TOC / pH	[redacted] (1) 4oz	—	
[redacted]	[redacted]		
[redacted]	[redacted]		
Grain Size / Bulk Density	(1) Qt. baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Pilepko, Hunter

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: ~~PAE-10-SD-15-01~~ PAE-10-SD-15-01A
Sample Location: PAE-10-SD15
Sampled By: 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:

Date: 12-14-98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1458	0-0.5 FT	dark Grey to Black	Silty Clay, some F Sand, thick root mat, saturated
Method: GRAB			
Monitor Reading (ppm): N/A			

COMPOSITE SAMPLE DATA:

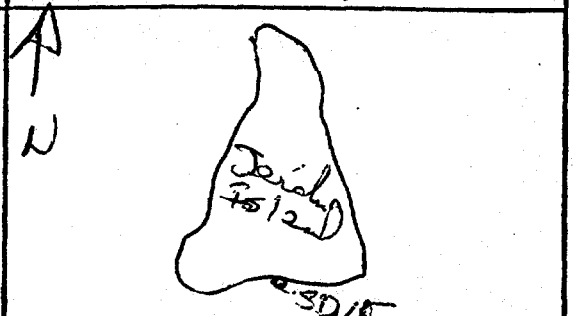
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7304~~ 7803

Sample ID No.: ~~PAI-10-SD-16-01~~ PAI-10-SD16-01
Sample Location: PAI-10-SD16
Sampled By: Shep Barton
C.O.C. No.: 2080

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

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

GRAB SAMPLE DATA:

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

COMPOSITE SAMPLE DATA:

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

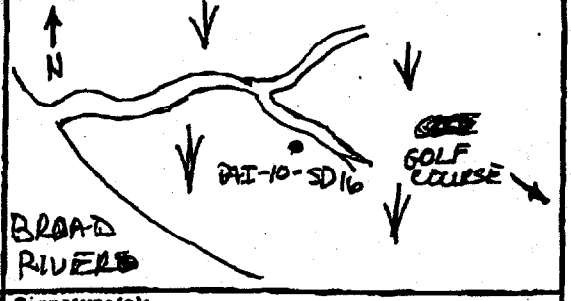
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC's	5 ENCORE SAMPLERS	5	
TCL SVOC's	8oz	TOTAL OF 3	
TAL METALS (TOTAL)	8oz	16 oz JARS	
CYANIDE	8oz		
TCL PESTICIDES / PCBs	8oz		
TOC	16 oz		
PH	8oz		
~~HEXAVALENT CHROMIUM~~	8oz		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES COLLECTED @ 0900 on 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

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

Sample ID No.: ~~PAI-10-SD-06-01A~~ PAI-10-SD-06-01A
Sample Location: PAI-10-SD16
Sampled By: GG, RD
C.O.C. No.: ~~2219~~ 2212

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

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

GRAB SAMPLE DATA:

Date: 12/15/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1245	0. - 0.5 Ft	Dark Gray	Silty Clay; V. moist
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

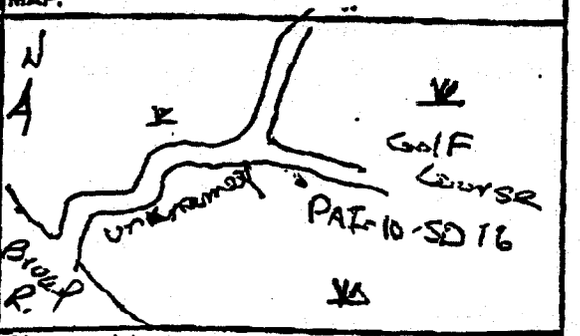
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH - SW846 - 8310	1	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

Sample ID No.: ~~PAI-10-SD-17-01~~ PAI-10-SD-17-01
Sample Location: ~~PAI-10-SD17~~ PAI-10-SD17
Sampled By: Shuf Bantry
C.O.C. No.: 1280

- [ ] Surface Soil
- [ ] Subsurface Soil
- [X] 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:	0-0.5 ft.	dk. gray/ black	clay mud, saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

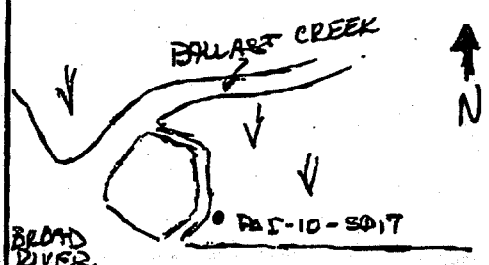
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	~~1~~ 8oz	Total of 3	
TAL METALS (TOTAL)	~~1~~ 8oz	16 OZ JARS	
CYANIDE	~~1~~ 8oz		
TCL PESTICIDES / PCBS	~~1~~ 8oz		
TOC	~~1~~ 8oz		
PH	~~1~~ 8oz		
~~HEXAVALENT CHROMIUM~~	~~1~~ 8oz		

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): Shuf Bantry

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: NTRD - Jericho Island
Project No.: 7503

Sample ID No.: PAI-10-SD-17-01A ~~PAI-10-SD-0170-1A~~
Sample Location: PAI-10-SD17
Sampled By: G6, RD
C.O.C. No.: 3312

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

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

GRAB SAMPLE DATA:

Date: 12/15/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1200	0-0.5ft	Ark Gray Black	Clay mud, saturated
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

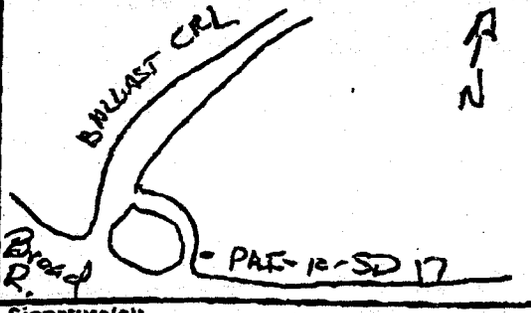
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Dan L Hunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7344~~ RO.3

Sample ID No.: ~~PAI-10-SD-018-01~~ PAI-10-SD-18-01
Sample Location: PAI-10-SD18
Sampled By: Shuff Barker
C.O.C. No.: 2280

[ ] Surface Soil
[ ] Subsurface Soil
[X] 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:			
Method: Grab	0-0.5 ft	dark. gray	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):				

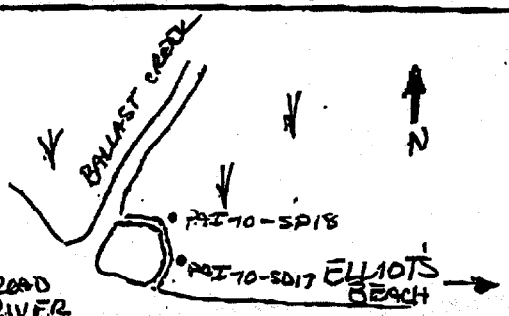
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	16oz	Total of 3	
TAL METALS (TOTAL)	16oz	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):

Shuff Barker

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

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

Sample ID No.: PAI-10-SD-18-01A ~~PAI-10-SD-18-01A~~
Sample Location: PAI-10-SD18
Sampled By: RD, GG
C.O.C. No.: 2212

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

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

GRAB SAMPLE DATA:

Date: 12/15/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1200	0-0.5 Ft	Dk Gray	Clay mud, Saturated
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

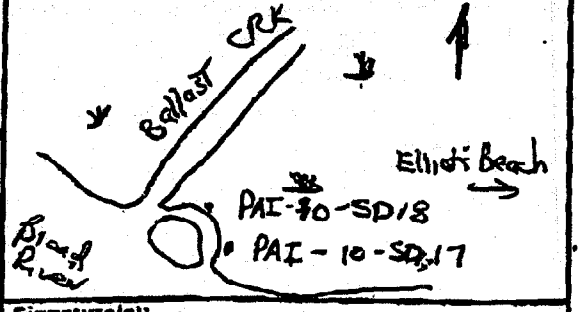
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island Site 12/SWMU 10 (Jericho Island)
Project No.: N0095

Sample ID No.: PAI-10-SD-19-01*
Sample Location: PAI-10-SD-19
Sampled By: J. Brown
C.O.C. No.: 02227

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

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

GRAB SAMPLE DATA:

Date: 12/15/99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0820	0-6"	Black/Gray	Clay with grass roots
Method:			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

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

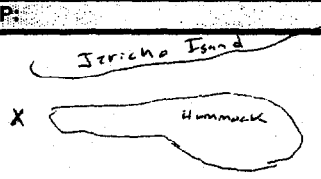
SAMPLE COLLECTION INFORMATION:

	Analysis	Container Requirements	Collected	Other
TCL	SVOCs, PCB/Pest, PAHs, TAL metals/CN	one - 8-oz Jar	✓	

OBSERVATIONS / NOTES:

* changed ID from PAI-10-SD-16 to PAI-10-SD-19. The Work Plan Addendum listed SD-16 with this location. However, this ID is associated with a background sample collected in 1998

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island Site 12 / SWMU 10 (Jericho Island)
Project No.: N0095

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

Sample ID No.: PAI-10-SD-20-01 *
Sample Location: PAI-10-SD-20
Sampled By: J. Brown
C.O.C. No.: 02227

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

GRAB SAMPLE DATA:

Date: 12/15/99	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0800	0-6"	Black/Gray	Clay with grass roots
Method:			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

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

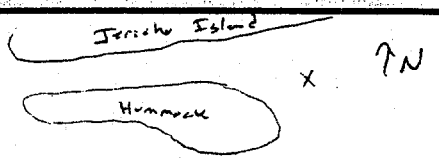
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL SVOCs, PCB/Pest, PAHs, TAL metals/CN	1-8oz	✓	

OBSERVATIONS / NOTES:

* changed ID from PAI-10-SD-17 to PAI-10-SD-20. The work Plan Addendum listed SD-17 with this location. However, this ID is associated with a background sample collected in 1998.

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-214

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Jericho Island - site 12 sample 10
Project No.: 7803
Sample ID No.: PAI-10-SS-12-02
Sample Location: PAI-10-SS-12
Sampled By: JJB + DDB
C.O.C. No.: 042701

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

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

GRAB SAMPLE DATA:

Date: 4/26/01 Time: 1230 Method: Monitor Reading (ppm):	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-1'	Orange/ Brown	Sand, Dry

COMPOSITE SAMPLE DATA:

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

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL PAHs	3 8 oz jar	✓	
Pentachlorophenol		✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): JJB - DNB

Tetra Tech NUS, Inc.

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Parris Island - Site 12 / Sum 10
Project No.: 7803

Sample ID No.: PAI-10-SS-08-02
Sample Location: PAI-10-SS-08
Sampled By: PDB & JJB
C.O.C. No.: 042701

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

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

GRAB SAMPLE DATA:

Date: 4/26/01 Time: 1150 Method: Monitor Reading (ppm):	Depth Interval	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-1'	Light Brown	Sandy, Dry

COMPOSITE SAMPLE DATA:

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

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL PAHs	8 oz	—	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

JJB

A-214B

A-9

SOIL SAMPLE LOG SHEETS

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803
Jericho Island

Sample ID No.: PAI-10-SS-01-01
Sample Location: PAI-12-SS01
Sampled By: S. Palepko
C.O.C. No.: 02272

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0920	0-1 ft	Brn	Fine Sand w/ Trace Silt, roots, damp to moist
Method: Grab			
Monitor Reading (ppm): 1.1			

COMPOSITE SAMPLE DATA:

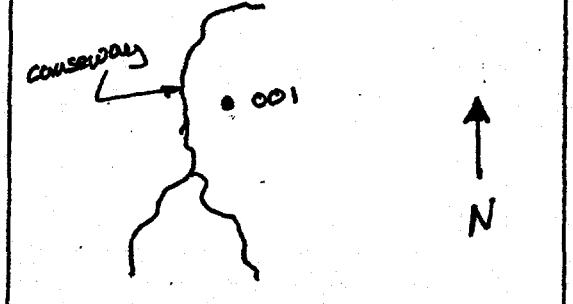
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	8 ~~16~~ oz	✓	
TAL METALS (TOTAL)	8 ~~16~~ oz	✓	
CYANIDE	8 ~~16~~ oz	✓	
TCL PESTICIDES / PCBs	8 ~~16~~ oz	✓	
TOC	4 ~~16~~ oz	✓	
pH	4 ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz		
AVS/SEM	8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

A-215

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803
Jericho Island

Sample ID No.: ~~PAI-10-SS-002-01~~ PAI-10-SS-02-01
Sample Location: PAI-12-SS02
Sampled By: S. Palepko
C.O.C. No.: 02272

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0940	0-1 ft	grey-brn	Fine Sand, damp, Thick root mat 2" D. Brn Humus @ Surface
Method: grab			
Monitor Reading (ppm): 7.5			

COMPOSITE SAMPLE DATA:

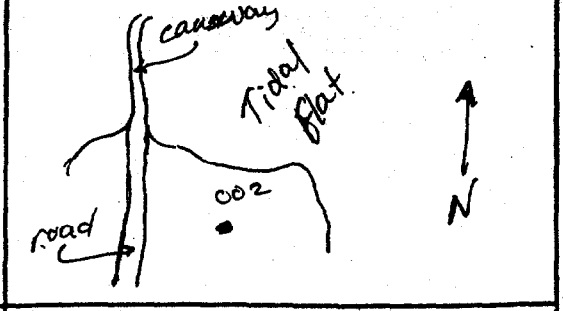
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	8 ~~16~~ oz	✓	
TAL METALS (TOTAL)	8 ~~16~~ oz	✓	
CYANIDE	8 ~~16~~ oz	✓	
TCL PESTICIDES / PCBs	8 ~~16~~ oz	✓	
TOC	4 ~~16~~ oz	✓	
PH	4 ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz	✓	
AVS/SEM	8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803
Jericho Island

Sample ID No.: PAI-10-SS-03-01
Sample Location: PAI-12-SS03
Sampled By: S. Polepko
C.O.C. No.: 02272

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1010	0-1 ft	Brn	Fine Sand w/Trace Silt damp to moist, roots. Trace D.Brn MOTTLING
Method: grab			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

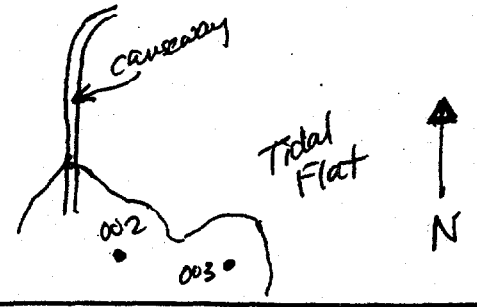
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	8 ~~16~~ oz	✓	
TAL METALS (TOTAL)	8 ~~16~~ oz	✓	
CYANIDE	8 ~~16~~ oz	✓	
TCL PESTICIDES / PCBS	8 ~~16~~ oz	✓	
TOC	4 ~~16~~ oz	✓	
PH	4 ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz		
AVS/SEV	8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shyp Bowden

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SS-04-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7344~~ 7803
Jericho Island

Sample ID No.: ~~PAI-10-SB-004-01~~
Sample Location: PAI-12-SS04
Sampled By: S. Palepko
C.O.C. No.: 02272

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1050	0-1 ft	gray Brn	F Sand w/Trace Silt Thick root matt 2" Surface Humus DBrn
Method: grab			
Monitor Reading (ppm): -0-			

COMPOSITE SAMPLE DATA:

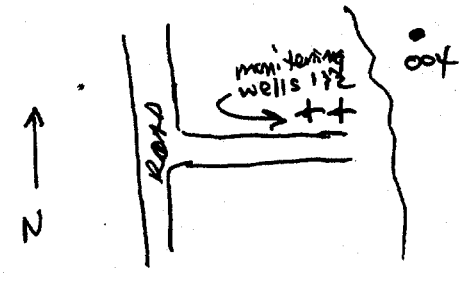
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	8 ~~16~~ oz	✓	
TAL METALS (TOTAL)	8 ~~16~~ oz	✓	
CYANIDE	8 ~~16~~ oz	✓	
TCL PESTICIDES / PCBS	8 ~~16~~ oz	✓	
TOC	~~4~~ 8 ~~16~~ oz	✓	
PH	4 ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz		
AVS/SEM	8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Guy Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SS-05-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803
Jericho Island

Sample ID No.: PAI-10-SS-005-01
Sample ~~Location~~: PAI-12-SS05
Sampled By: S. Barton
C.O.C. No.: 02272

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1259	0-1 ft		0-1" lt. gray, med. sand 1-12" brown, coarse to med. sand, moist
Method: grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

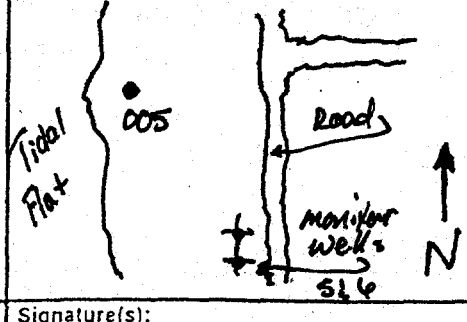
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A.	5 ENCORE SAMPLES	✓	
TCL SVOC.A	~~8~~ 16 oz	✓	
TAL METALS (TOTAL)	~~8~~ 16 oz	✓	
CYANIDE	~~8~~ 16 oz	✓	
TCL PESTICIDES / PCBS	~~8~~ 16 oz	✓	
TOC	~~4~~ 16 oz	✓	
PH	~~4~~ 16 oz	✓	
HEXAVALENT CHROMIUM	~~4~~ 16 oz	✓	
AVS/SEM	8 oz	✓	

OBSERVATIONS / NOTES:

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
Jericho Island

Sample ID No.: PAI-10-SS-06-01
Sample Location: PAI-12-SS06
Sampled By: S. Barton
C.O.C. No.: 02272

[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: 7/28/98	0-1 ft		0-1" lt. gray med.-grad. sand
Time: 0904			1"-12" brown med. to coarse grnd. sand, 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):				

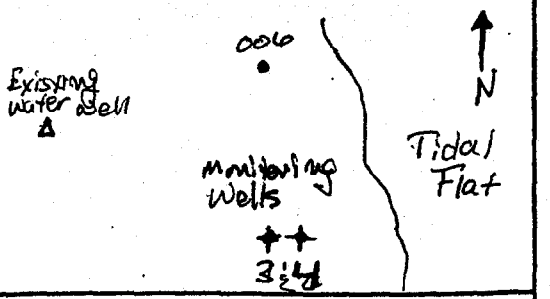
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE Samples	✓	
TCL SVOCs	~~8~~ 16 oz	✓	
TAL METALS (TOTAL)	~~8~~ 16 oz	✓	
CYANIDE	~~8~~ 16 oz	✓	
TCL PESTICIDES / PCBs	~~8~~ 16 oz	✓	
TOC	~~4~~ 16 oz	✓	
pH	~~4~~ 16 oz	✓	
HEXAVALENT CHROMIUM	16 oz	✓	
AVS/SEM	8 oz		

OBSERVATIONS / NOTES:

TOC / pH → 1 4oz.
SVOCs; Pest./PCBs → 1 8oz.
Tot. Metals; CN; AVS/SEM → 8oz

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Steve Barton

2 - 1352 3 - 1405 1 - 1425

A-220

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803
Jericho Island

Sample ID No.: PAI-10-SS-07-01 ~~PAI-10-SS-007-01~~ GC
Sample Location: PAI-12-SSC7
Sampled By: S Barton
C.O.C. No.: 01272

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0937	0-1 ft		0-2" lt. gray, med. sand 2"-12" brown, coarse to med. sand, moist
Method: grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

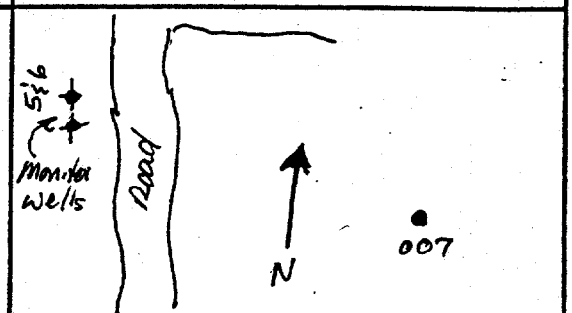
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	~~8~~ ~~16~~ oz	✓	
TAL METALS (TOTAL)	~~8~~ ~~16~~ oz	✓	
CYANIDE	~~8~~ ~~16~~ oz	✓	
TCL PESTICIDES / PCBs	~~8~~ ~~16~~ oz	✓	
TOC	~~4~~ ~~16~~ oz	✓	
pH	~~4~~ ~~16~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz		
AVS/SEM	8 oz	✓	
GeoTech (grn.sz, bulk dens, etc)	gt baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Steve Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SS-08-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: TBD3
Jericho Island

Sample ID No.: ~~PAI-10-SS-008-01~~
Sample Location: PAI-12-SS08
Sampled By: S. Barton
C.O.C. No.: 02872

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1205	0-1 ft		0-3" lt. gray, med. sand 3"-12" brown med. to coarse sand, moist
Method: grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

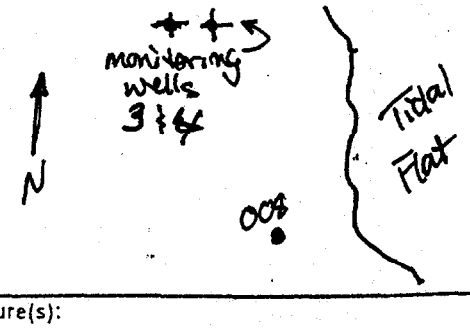
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE Samples	✓	
TCL SVOCs	~~8~~ 16 oz	✓	
TAL METALS (TOTAL)	~~8~~ 16 oz	✓	
CYANIDE	~~8~~ 16 oz	✓	
TCL PESTICIDES / PCBs	~~8~~ 16 oz	✓	
TOC	~~4~~ 16 oz	✓	
PH	~~4~~ 16 oz	✓	
HEXAVALENT CHROMIUM	16 oz		
AVS/SEM	8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

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Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803
Jericho Island

Sample ID No.: ~~PAI-10-SS-009-01~~ PAI-10-SS-009
Sample Location: ~~PAI-10-SS09~~
Sampled By: S. Barton
C.O.C. No.: 02272

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1230	0-1 ft		0-2" lt. gray, med. sand
Method: grab			2-12" brown, coarse to med. sand, moist
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

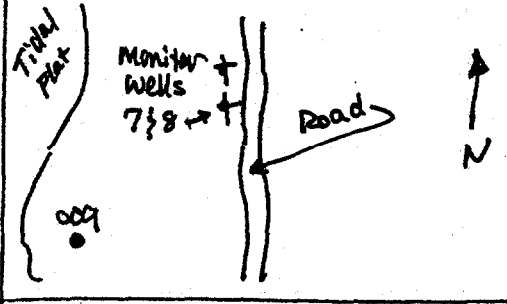
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A	~~8~~ oz	✓	
TAL METALS (TOTAL)	~~8~~ oz	✓	
CYANIDE	~~8~~ oz	✓	
TCL PESTICIDES / PCBS	~~8~~ oz	✓	
TOC	~~4~~ oz	✓	
PH	~~4~~ oz	✓	
HEXAVALENT CHROMIUM	~~16~~ oz		
AVS/SEM	~~AVS/SEM~~ 8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):
Skip Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SS-10-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ R03
Jericho Island

Sample ID No.: ~~PAI-10-SS-010-01~~
Sample Location: PAI-10-SS10
Sampled By: S. Barton
C.O.C. No.: 02272

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

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

GRAB SAMPLE DATA:

Date: 7/28/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0959	0 - 1ft		0-2" lt. gray, med. sand
Method: grab			2-12" brown, coarse to med. sand, moist
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

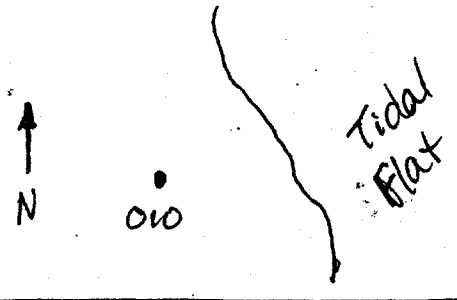
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	✓	
TCL SVOCs	~~8~~ 16 oz	✓	
TAL METALS (TOTAL)	~~8~~ 16 oz	✓	
CYANIDE	~~8~~ 16 oz	✓	
TCL PESTICIDES / PCBs	~~8~~ 16 oz	✓	
TOC	~~4~~ 16 oz	✓	
PH	~~4~~ 16 oz	✓	
HEXAVALENT CHROMIUM	16 oz		
AVS/SEM	8 oz	✓	
GeoTech (grn sz., bulk dens., etc.)	qt baggie	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shelly Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SS-11-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: ~~PAI-10-SS-11-01~~ GG
Sample Location: PAI-10-SS11
Sampled By: GG SP
C.O.C. No.: 2204

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

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

GRAB SAMPLE DATA:

Date: 080698	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1107	0-1'	light brown	f.g., dry sand
Method: grab			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

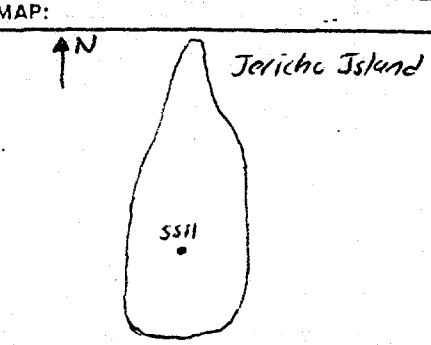
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC's	5 ENCORE Samples	✓	
TCL SVOC's/PESTICIDES/PCBS	8 oz	✓	
TAL METALS/CN/AVS/SEM	8 oz	✓	
[redacted]	[redacted]		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Pelepko

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SS-12-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: ~~PAI-10-SS-012-0~~
Sample Location: PAI-10-SS12
Sampled By: GG SP
C.O.C. No.: 2204

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

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

GRAB SAMPLE DATA:

Date: 080698	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1018	0 - 1'	light brown	f.g., dry sand
Method: grab			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

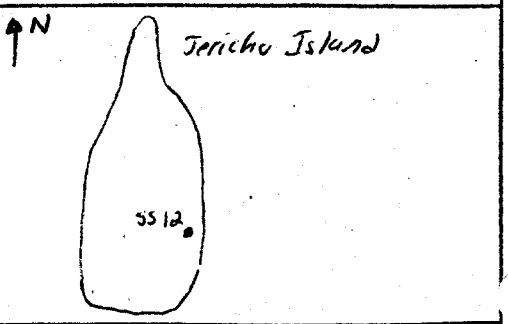
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	(20) ENCORE SAMPLES	✓	
TCL SVOC.A / PESTICIDES/PCBs	(4) 8 oz	✓	
TAL METALS/CN / AVS / SEM	(3) 8 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:
MS/MSD
Duplicate ID No.: PAI-10-SS-12-01D
~~PAI-10-SS-012-01D~~ GG

Signature(s):
Seth Pelegrin

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: ~~PAI-10-55-013-01~~ PAI-10-5513-01 GG
Sample Location: PAI-10-5513
Sampled By: GG SP
C.O.C. No.: 2204

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

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

GRAB SAMPLE DATA:

Date: 0E06 9E	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 091E	0 - 1'	light brown	f.y., dry sand
Method: grab			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

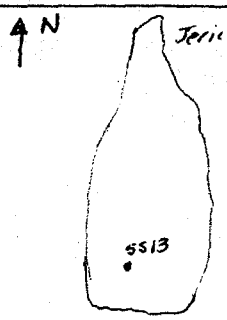
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A.	5 ENCORE SAMPLES	✓	
TCL SVOC.A./PESTICIDES/PCBs	8 oz	✓	
TAL METALS/CN/AVS/SEM	8 oz	✓	
[redacted]	[redacted]		
HEXAVALENT CHROMIUM	4 oz	✓	

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Seth Pelopida, J Hunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: ~~PAI-10-SS-014-01~~ PAI-10-SS-14-01
Sample Location: PAI-10-SS14
Sampled By: GG SP
C.O.C. No.: 2204

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

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

GRAB SAMPLE DATA:

Date: 080698	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 0943	0-1'	brown to rust colored	f.g., moist sand, some silt
Method: grab			
Monitor Reading (ppm): 0.6			

COMPOSITE SAMPLE DATA:

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

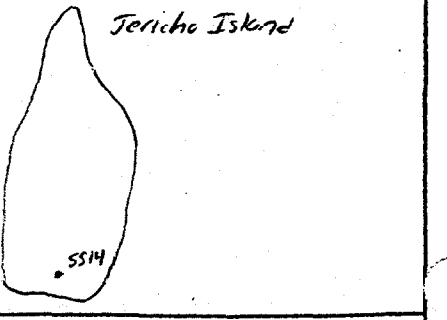
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A.	5 ENCORE SAMPLES	✓	
TCL SVOC.A./PESTICIDES/PCBs	8 oz	✓	
TAL METALS/CN/AVS/SEM	8 oz	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
HEXAVALENT CHROMIUM	4 oz	✓	

OBSERVATIONS / NOTES:

- black material noticed, possibly ash
- abundant glass

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Seth Pelepko, D. Gute

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7344~~ 7803

Sample ID No.: ~~PAE-10-SS-015-01~~ PAE-10-SS-15-01 BG
Sample Location: PAE-10-SS15
Sampled By: Stuy Barton
C.O.C. No.: 2250

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

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

GRAB SAMPLE DATA:

Date: 090998 / Time: 1419 / Method: disp. trowel / Monitor Reading (ppm):	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-1 ft.	lt. gray	v. silty fine sand, dry, no odor

COMPOSITE SAMPLE DATA:

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

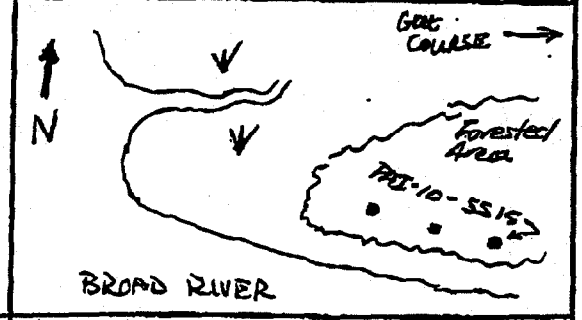
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE Samples	5	
TCL SVOC.A	1x 8oz	Total of 3	
TAL METALS (TOTAL) AVS/SEM	1x 8oz	16oz jars	
CYANIDE	1/2 8oz		
TCL PESTICIDES / PCBs	1/2 8oz		
TOC	1/2 8oz		
PH	1/2 8oz		
~~HEXAVALENT CHROMIUM~~	~~1/2 8oz~~		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES WERE COLLECTED @ ~~1444~~ 0813 ON 090198 EBG 9/10/98

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Stuy Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

Sample ID No.: 10-SS-15A-01 / PAI-10-SS-015-01
Sample Location: PAI-10-SS15
Sampled By: GG SP
C.O.C. No.: 2204

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

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

GRAB SAMPLE DATA:

Date: 060698	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1128	0-1'	light rust colored (brown-orange)	f.g., dry sand, trace silt
Method: 9106			
Monitor Reading (ppm): 0			

COMPOSITE SAMPLE DATA:

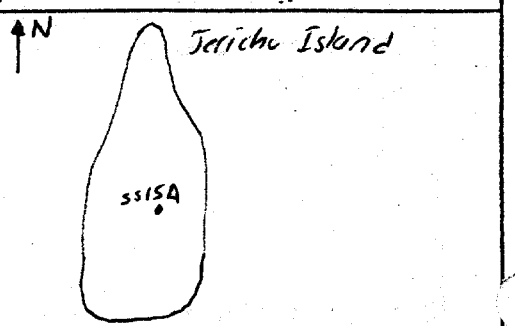
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	✓	
TCL SVOC.A/PESTICIDES/PCBs	02	✓	
TAL METALS/CN/AVS/SEM	02	✓	
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		
[redacted]	[redacted]		

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Seth Pelegrin, [illegible]

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7344~~ 7803

Sample ID No.: PAI-10-SS-16-01 ~~PAI-10-SS-016-01~~
Sample Location: ~~PAI-10-SS16~~
Sampled By: ~~Skip Bankert~~
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 / Time: 1440 / Method: disp. trowel / Monitor Reading (ppm): -	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	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):				

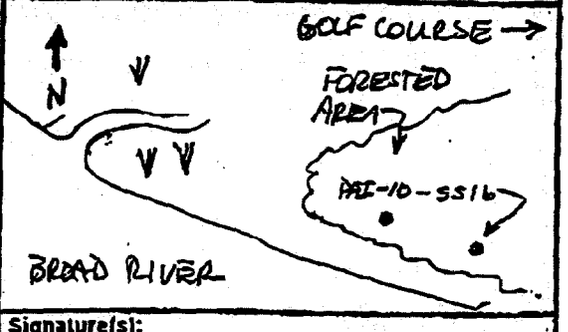
SAMPLE COLLECTION INFORMATION:

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 @ 0835 ON 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.

Signature(s): Skip Bankert

SOIL & SEDIMENT SAMPLE LOG SHEET

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7344~~ 7803

Sample ID No.: PAI-10-SS-17-01 ~~PAI-10-SS-017-01~~
Sample Location: PAIYO-SS17
Sampled By: Skip Barkley
C.O.C. No.: 2280

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

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

GRAB SAMPLE DATA:

Date: 090998	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1455	0-1 ft.	lt. gray	silty fine sand, dry, no odor
Method: disp. trowel			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

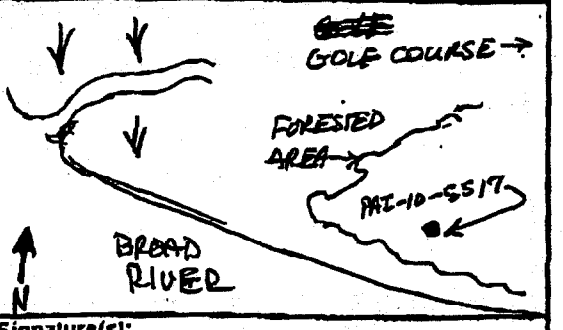
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	1x 8 oz	TOTAL OF 3	
TAL METALS (TOTAL) AVS/SEM	1x 8 oz	16 oz JARS	
CYANIDE	1/2 8 oz		
TCL PESTICIDES / PCBs	1/2 8 oz		
TOC	1/2 8 oz		
PH	1/2 8 oz		
~~HEXAVALENT CHROMIUM~~	1/2 8 oz		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES WERE COLLECTED @ (2) 0835 ON 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barkley

A-10

TEST PIT LOG SHEETS

TEST PIT LOG

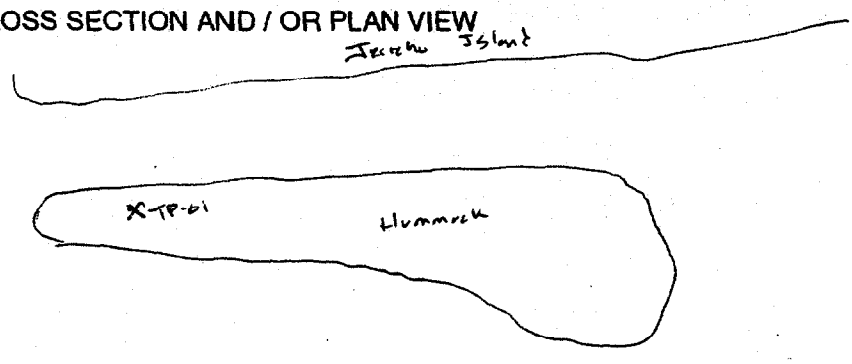
Tetra Tech NUS, Inc.

PAH-10

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N6095
LOCATION: Jericho Island (SWMU 10)
TEST PIT No.: VTP-01
DATE: 12/15/99
GEOLOGIST: J Brown / R. 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)
1'		Brown Silty sand		No evidence of	0	0
2'	▼ 2'			debris		

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of waste debris
The test pit was hand dug with a shovel. The 1-foot diameter test pit (approximate) was dug to the water table.

PHOTO LOG:

TEST PIT LOG

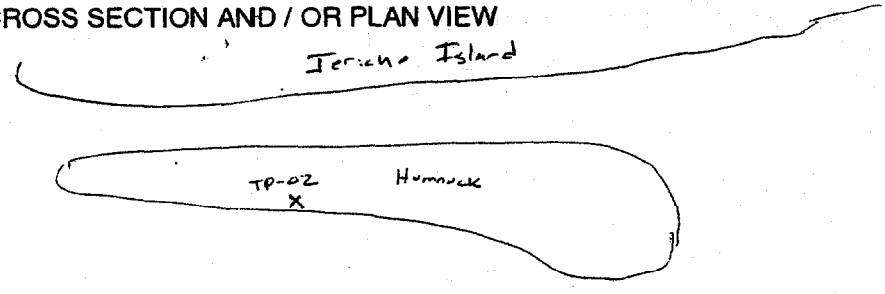
Tetra Tech NUS, Inc.

PAI-10

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N0095
LOCATION: Jericho Island (Site 12/SWMU 10)
TEST PIT No.: TP-02
DATE: 12/15/99
GEOLOGIST: T. Brown / R. 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)
1'	1.5'	Brown sand		No evidence of	0	0
2'				debris		

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of waste

The test pit was hand dug with a shovel. The 1-foot diameter test pit (approximate) was dug to the water table.

PHOTO LOG:

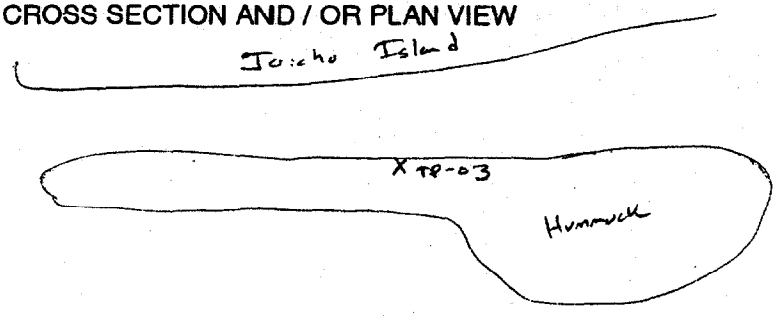
TEST PIT LOG

Tetra Tech NUS, Inc.

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N0095
LOCATION: Jericho Island (Site 12/SWMU 10)
TEST PIT No.: PAI-10-TP-03
DATE: 12/15/94
GEOLOGIST: J. Brown / R. 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)
1'		White sand.		No evidence of	0	0
2'		Brown - silty sand		waste		

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of waste debris
The test pit was hand dug with a shovel. The 1-foot diameter test pit (approximate) was dug to the water table.

PHOTO LOG:

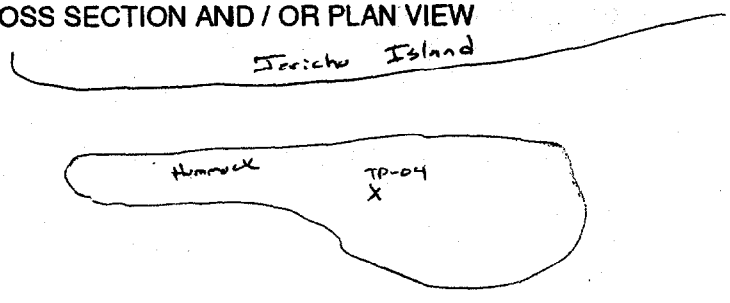
TEST PIT LOG

Tetra Tech NUS, Inc.

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N0095
LOCATION: Jericho Island (Site 12/SWMU 101)
TEST PIT No.: PAI-10-TP-04
DATE: 12/15/99
GEOLOGIST: J. Brown / R. 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)
1'	0	Brown to White sand		No evidence of waste	0	0
2½'	▽ =					

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of waste material
The test pit was hand dug with a shovel. The 1-foot diameter test pit (approximately) was dug to the water table

PHOTO LOG:

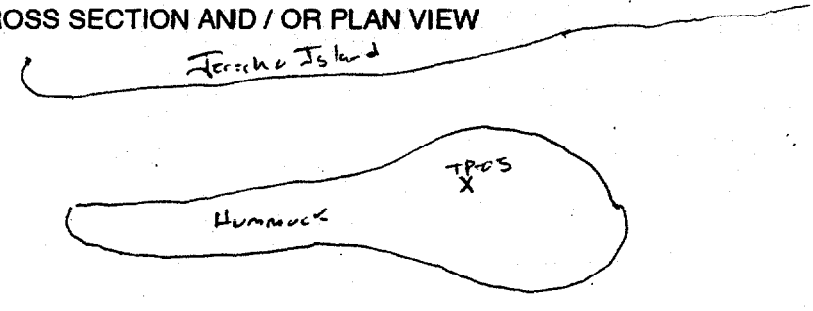
Tetra Tech NUS, Inc.

TEST PIT LOG

PROJECT NAME: McRD Parris Island TEST PIT No.: PAI-10-TP-05
PROJECT NUMBER: Navy 5 (12/SWMU 10) DATE: 12/15/99
LOCATION: Jericho Island (Site 10) GEOLOGIST: Engineer: J. Brown

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)
1'	Brown Silty Sand	No evidence of debris		Water Table hit	0	0
2'				at 2' bgs		

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of waste Debris
The test pit was hand dug with a shovel. The 1-foot diameter test pit (approximate) was dug to the water table.

PHOTO LOG:

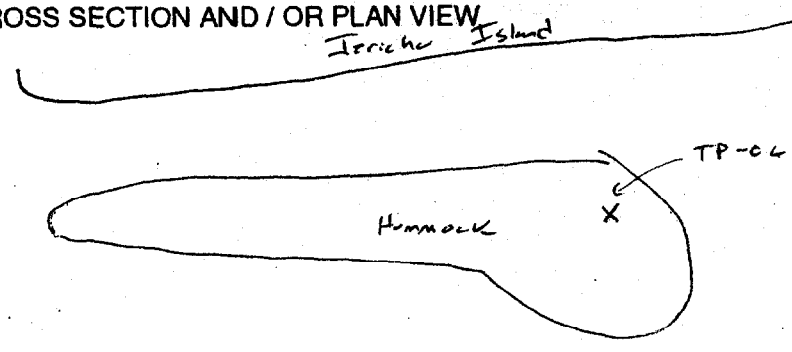
TEST PIT LOG

Tetra Tech NUS, Inc.

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N0095
LOCATION: Jericho Island CS:tz R/sw no 10
TEST PIT No.: PAI-10-TP-06
DATE: 12/15/99
GEOLOGIST: J. Brown / R. Hill

Depth (Ft.)	Lithology Change (Depth/Ft.)	MATERIAL DESCRIPTION: Soil/Waste Characteristics (lithology, density, color, etc.)	USCS	Remarks	PID/FID READING: Source (ppm)	BZ (ppm)
1'	6'	White sand			0	0
2'	=					

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of waste debris

The test pit was hand dug with a shovel. The 1-foot diameter pit (approximate) was dug to the water table.

PHOTO LOG:

TEST PIT LOG

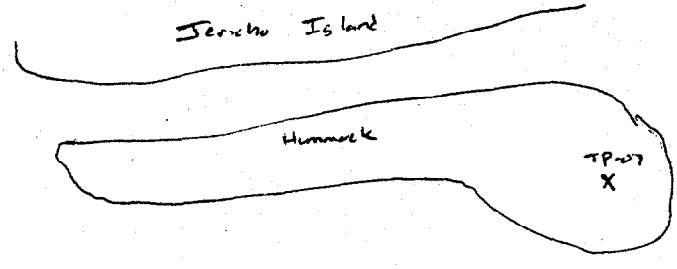
Tetra Tech NUS, Inc.

PAI-10-TP-07

PROJECT NAME: MCRD Parris Island
TEST PIT No.: ~~PAI-10-TP-07~~ JJB 10/5/00
PROJECT NUMBER: N0095
DATE: 12/15/99
LOCATION: Jericho Island (Site 12 / SWMU 10)
GEOLOGIST: J. Brown / R. 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)
		Brown-to-White silty sand		No evidence of	0	0
1'				debris		

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No evidence of waste debris

The test pit was hand dug with a shovel. The 1-foot diameter test pit (approximate) was dug to the water table.

PHOTO LOG:

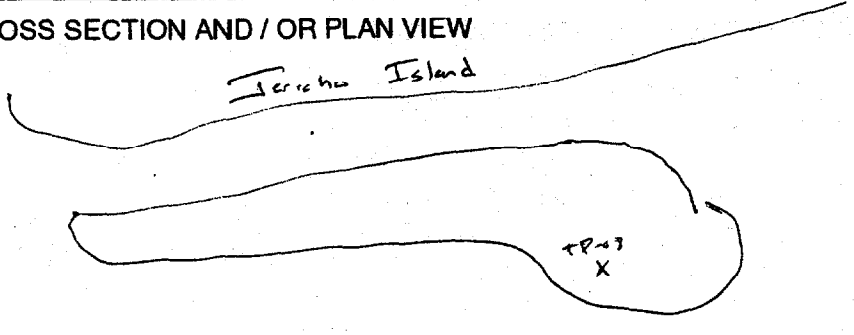
TEST PIT LOG

Tetra Tech NUS, Inc.

PROJECT NAME: MCRD Parris Island
PROJECT NUMBER: N0095 12/SWMU 63
LOCATION: Jericho Island CS:17 #1
TEST PIT No.: PAI-10-TP-08
DATE: 12/15/99
~~GEOLOGIST~~: Eng. J. Brown / 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)
1'		White sand		No evidence	0	0
2'				of waste		
3'	Base of Trench	Brown-silty sand				

TEST PIT CROSS SECTION AND / OR PLAN VIEW



REMARKS: No Evidence of Waste Debris
The TEST PIT WAS hand dug WITH A SHOVEL. The 1-FOOT diameter TEST PIT (APPROXIMATE) WAS dug TO THE WATER TABLE.

PHOTO LOG:

A-11

GROUNDWATER SAMPLE LOG SHEETS

GROUNDWATER SAMPLE LOG SHEET

#1

Project Site Name: Jericho Island
Project No.: 7803

Sample ID No.: PAI-10-GW-01-01
Sample Location: PAI-10-GW01
Sampled By: Skip Barton
C.O.C. No.: 2297

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

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

SAMPLING DATA:

Date: 082098 / Time: 1650	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Method: peri. pump-low flow	~~clear~~ yellow	5.71	20.4	24.3	-10	0.61	1.23	

PURGE DATA:

Date: 082098	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peri. pump - low flow	Initial	5.90	22.0	24.1	-10	0.35	1.33	
Monitor Reading (ppm):	1	5.63	19.9	24.9	-10	0.65	1.19	
Well Casing Diameter & Material	2	5.56	20.3	24.6	-10	0.55	1.22	
Type: 2-in. PVC	3	5.56	20.4	24.3	-10	0.52	1.23	
Total Well Depth (TD):								
Static Water Level (WL): 5.68								
One ~~Casing~~ Screen Volume (gal)/L): 1.6								
Start Purge (hrs): 1500								
End Purge (hrs): 1640								
Total Purge Time (min): 100								
Total Vol. Purged (gal)/L): 5.31								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	40 mL glass	4
TCL SVOCs	-	1,000 mL amber	2
TCL Pest./PCBs	-	1,000 mL amber	2
TAL Total Metals/Hardness	HNO_3	1,000 mL plastic	1
TAL DISSOLVED Metals	HNO_3	1,000 mL plastic	1
CN	NaOH	500 mL plastic	1
TOC	H_2SO_4	125 mL amber	1
NO_3/NO_2	H_2SO_4	1,000 mL plastic	1
TDS, TSS, Cl, F, SO_4, Alk	-	1,000 mL plastic	1
		1 L PLASTIC	1

OBSERVATIONS / NOTES:

Turbidity sensor malfunctioning.

ALL measurements from top of casing (TOC).

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton

5.68 #1

10 x .16 = 1.6 x 3 = 4.8

1 VOL = 6400 mL

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Jericho Island

PROJECT NUMBER: 7803

WELL I.D.: PAI-10-MW-01(S)

DATE: 082098

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. mS/cm	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
(1501) initial	5.68	-	24.1	590	22.0	0.35	1.33	-10	
1506	6.34	~~300~~	24.5	5.56	21.8	0.52	1.31	-10	Turb. not working
1511	6.12	~~250~~ 50	23.9	5.63	21.5	0.50	1.31	-10	properly
1516	6.08	200	24.4	5.61	21.1	0.40	1.27	-10	
1521	~~5.67~~ 6.06	200	24.8	5.54	20.4	0.49	1.22	-10	
1526	~~6.00~~ 6.10	220	24.9	5.59	19.9	0.60	1.19	-10	~~1st bot~~
1531	6.10	200	24.9	5.63	19.9	0.65	1.19	-10	1st VOL
1536	6.12	170	24.8	5.66	19.9	0.75	1.20	-10	Strong sea water
1541	6.14	200	24.9	5.56	19.9	0.46	1.19	-10	odor
1546	6.12	200	25.0	5.53	20.1	0.47	1.20	-10	
1551	6.10	200	24.8	5.58	20.1	0.53	1.21	-10	
1556	6.09	190	24.9	5.52	20.1	0.48	1.21	-10	
1601	6.10	190	24.8	5.56	20.3	0.57	1.22	-10	
1606	~~6.09~~ 6.09	190	24.6	5.56	20.3	0.55	1.22	-10	2nd Vol
1611	6.09	190	24.5	5.61	20.4	0.66	1.23	-10	
1616	6.09	190	24.3	5.58	20.4	0.47	1.22	-10	
1621	6.09	190	24.4	5.57	20.4	0.58	1.23	-10	
1626	6.08	180	24.3	5.58	20.4	0.40	1.23	-10	
1631	6.10	190	24.2	5.62	20.4	0.56	1.23	-10	
1636	6.09	180	24.3	5.56	20.4	0.52	1.23	-10	
1641	6.09	190	24.2	5.56	20.4	0.57	1.23	-10	Purge done
1046									
1651									
1656									

SIGNATURE(S) Steve Barton

PAGE of 1

GROUNDWATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-ID-GW-02-01
Sample Location: PAI-ID-GW02
Sampled By: Stuf Bartow
C.O.C. No.: 2297

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

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

SAMPLING DATA:

Date: 082098 / Time: 1402	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Method: peri. pump-low flow	clear	6.10	27.3	21.3	~10	0.49	1.68	

PURGE DATA:

Date: 082098	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: peri. pump-low flow	Initial	6.15	26.9	23.0	~10	0.29	1.66	
Monitor Reading (ppm):	1	5.57	26.7	23.5	~10	0.65	1.65	
Well Casing Diameter & Material	2	6.06	27.2	23.1	~10	0.50	1.68	
Type: 2-in. PVC	3	6.08	27.2	22.2	~10	0.39	1.68	
Total Well Depth (TD):								
Static Water Level (WL): 5.								
One ~~Casing~~ Screen Volume (gal/L): 0.8								
Start Purge (hrs): 1304								
End Purge (hrs): 1354								
Total Purge Time (min): 50								
Total Vol. Purged (gal/L): 2.67								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	40 ml VOA	4
TCL SVOCs	-	1,000 ml amber	2
TCL Pest/PCBs	-	1,000 ml amber	2
TAL Total Metals/Hardness	HNO_3	1,000 ml plastic	1
TAL Dissolved Metals	HNO_3	1,000 ml plastic	1
CN	NaOH	1,000 ml plastic	1
TOC	H_2SO_4	250 ml amber	1
NO_3/NO_2	H_2SO_4	1,000 ml plastic	1
TDS, TSS, Cl, F, SO_4, Cr+6	-	1,000 ml plastic	1
	-	1,000 ml plastic	1

OBSERVATIONS / NOTES:

Turbidity sensor malfunctioning?
Water levels referenced to top of casing (TOC).

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Stuf Bartow

Purge Vol. = 08gls x 3 = 2.4 gals.

#2

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: Jericho Island
PROJECT NUMBER: 7803

WELL I.D.: PAI-10-MW02(D)
DATE: 08 2098

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. ~~mS/cm~~ (Celcius)	pH (S.U.)	Cond. mS/m	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1304									
900mL	~~1259~~	5.37	180	23.0	6.15	26.9	0.27	1.66	10	
800	1309	5.57	160	22.8	6.17	28.9	0.31	1.80	10	
1,000	1314	5.58	200	23.4	6.23	29.5	0.59	1.84	NA (-10)	Turb off? = -10
1,000	1319	5.55	200	23.5	5.57	26.7	0.65	1.65	NA (-10)	1st vol.
850	1324	5.56	170	24.6	5.97	26.4	0.81	1.63	-10	
850 ~~850~~	1329	5.55	170	23.4	6.05	27.1	0.57	1.68	-10	
900	1334	~~6.05~~ 5.55	180	23.1	6.06	27.2	0.50	1.68	-10	2nd vol.
900	1339	5.57	180	22.6	6.07	27.0	0.36	1.67	-10	
900	1344	5.57	180	22.1	6.10	27.2	0.38	1.68	-10	
1000	1349	5.56	200	22.2	6.10	27.2	0.39	1.68	-10	
1000	1354	5.56	200	22.2	6.08	27.2	0.39	1.68	-10	
	1359									

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SIGNATURE(S) Skip Bowles

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: ~~MCRD~~ ~~MCSD~~ Parris Island
Project No.: 7803

Sample ID No.: PAI-10-GW-03-01
Sample Location: PAI-10-GW03
Sampled By: Skip Barton
C.O.C. No.: 2209

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

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

SAMPLING DATA:

Date: 082498 / Time: 1746	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Method: peristaltic pump	Clear	5.88	24.2	22.8	~10	0.48	1.47	

PURGE DATA:

Date: 082498	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow peristaltic pump	Initial	5.47	24.3	23.9	~10	0.40	1.47	
Monitor Reading (ppm): -	1	5.79	25.1	23.2	39	0.44	1.53	
Well Casing Diameter & Material	2	5.87	24.2	23.0	~10	0.49	1.47	
Type: 2-in. PVC	3							
Total Well Depth (TD): 16.69								
Static Water Level (WL): 10.65								
One Casing Volume (gal/L): 0.97								
Start Purge (hrs): 1630								
End Purge (hrs): 1740								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 2.96								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	40 ml VOA (glass)	4
TCL SVOCs	-	1 L amber (glass)	2
TCL Pest./PCBs	-	1 L amber (glass)	2
TAL Diss. Metals	HNO_3	1 L HDPE	1
TAL Total Metals/Hardness	HNO_3	1 L HDPE	1
TAL CN	NaOH	500 ml HDPE	1
TOC	H_2SO_4	250 ml amber (glass)	1
NO_3/NO_2	H_2SO_4	1 L HDPE	1
TDS, Tss, Cl, F, SO_4	-	1 L HDPE	1

OBSERVATIONS / NOTES:

Water Level & Total Depth are BTOC.

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Skip Barton

W.L. = 10.65' T.D. = 16.69 WELL SCREEN = 10' VOLUME = ~~lbs gallons~~
W.C. = 6.04 = 0.97 gallons = 1 volume = 3671.5 ML

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: 7803

WELL I.D.: PAI-10-MW03(S)
DATE: 082498

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. mS/cm	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
	START 1630	10.65	-	23.9	5.47	24.3	0.40	1.47	-10	
900	1635	10.88	180	24.4	5.48	24.5	0.47	1.48	168	
800	1640	10.89	160	24.1	5.64	24.9	0.46	1.53	286	
775	1645	10.94	155	23.5	5.74	25.1	0.47	1.53	179	
775	1650	10.94	155	23.3	5.78	25.1	0.45	1.54	110	
* 750	1655	10.97	150	23.2	5.99	25.1	0.44	1.53	39	1st volume
775	1700	10.98	155	23.1	5.75	25.1	0.42	1.53	-10	
800	1705	10.98	160	23.0	5.80	25.1	0.48	1.53	-10	
800	1710	11.00	160	23.2	5.45	23.7	0.48	1.43	-10	
800	1715	11.01	160	22.9	5.80	24.1	0.48	1.45	-10	
* 800	1720	11.00	160	23.0	5.87	24.2	0.49	1.47	-10	2nd volume
800	1725	11.01	160	22.9	5.66	24.2	0.50	1.47	-10	
800	1730	11.02	160	22.9	5.81	24.3	0.48	1.47	-10	
850	1735	11.02	170	22.8	5.88	24.2	0.50	1.47	-10	
800	1740	11.02	160	22.8	5.88	24.2	0.48	1.47	-10	end purge
	1745									
	1750									
	1755									
	1800									
	1816									

SIGNATURE(S) Skip Bartley

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7803

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

Sample ID No.: PAI-10-GW-04-0
Sample Location: PAI-10-GW04
Sampled By: Skip Barton
C.O.C. No.: 0209
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 082498 / Time: 1936	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Method: peristaltic pump	clear	6.58	21.8	21.3	-10	0.49	1.31	

PURGE DATA:

Date: 082498	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow peristaltic pump	Initial	6.53	15.6	22.8	-10	0.50	0.91	
Monitor Reading (ppm): —	1	6.67	20.3	21.7	-10	0.47	1.22	
Well Casing Diameter & Material	2	6.57	21.8	21.3	-10	0.44	1.24	
Type: 2-in. PVC	3							
Total Well Depth (TD): 38.08								
Static Water Level (WL): 10.25								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 1830								
End Purge (hrs): 1935								
Total Purge Time (min): 65								
Total Vol. Purged (gal/L): 3.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	40ml VOA (glass)	4
TCL SVOCs	—	1L amber (glass)	2
TCL Pest./PCBs	—	1L amber (glass)	2
TAL Diss. Metals	HNO_3	1L HDPE	1
TAL Total Metals / Hardness	HNO_3	1L HDPE	1
TAL CN	NaOH	500ml HDPE	1
TOC	H_2SO_4	250ml amber (glass)	1
NO_3/NO_2	H_2SO_4	1L HDPE	1
TDS, TSS, Cl, F, SO4	—	1L HDPE	1

OBSERVATIONS / NOTES:

Water Level & Total Depth are BTOC.
Gravel Pack interval is 7 ft; 1 volume = 1.12 gallons

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton

10.25 3809 5' 0.8 = 3028
1.12 = 4239

LOW FLOW PURGE DATA SHEET

PAI-10-MW-04(D)
GWOY GC

PROJECT SITE NAME: MCRD Parris Island
PROJECT NUMBER: 7803
WELL I.D.: ~~PAI-10-MW-04~~
DATE: 082498

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. mS/cm	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1830	10.25	—	22.8	6.53	15.6	0.50	0.91	-10	I can not purge
1000 1835	11.53	~~200~~	21.9	6.69	16.3	0.45	0.95	-10	at a lower rate because
850 1840	11.72	190	21.9	6.73	18.3	0.49	1.08	-10	of the pump.
950 1845	11.85	190	21.7	6.70	20.0	0.53	1.19	-10	
* 800 1850	11.80	160 ~~180~~	21.7	6.62	20.3	0.57	1.21	-10	~~1st~~ 2nd DOT. (SB) 8/24/98
* 900 1855	11.88	180	21.7	6.67	20.3	0.47	1.22	-10	1st volume
900 ~~1900~~	11.89	180	21.5	6.64	20.3	0.49	1.22	-10	
950 1905	11.92	190	21.5	6.65	20.2	0.48	1.21	-10	
950 1910	11.98	190	21.3	6.60	20.2	0.41	1.21	-10	
950 1915	11.97	190	21.3	6.57	20.5	0.45	1.23	-10	~~2nd volume~~ (SB) 8/24/98
* 900 1920	11.97	180	21.3	6.57	~~20.8~~	0.44	1.24	-10	2nd volume
900 1925	11.97	180	21.3	6.58	21.8	0.51	1.31	-10	
975 1930	12.03	195	21.3	6.57	21.8	0.55	1.31	-10	
950 1935	12.03	190	21.3	6.58	21.8	0.49	1.31	-10	
1940					~~21.9~~				
1945									
1950									
		200							

SIGNATURE(S) Steve Barclay

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

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

Sample ID No.: PAI-10-GW-05-01
Sample Location: PAI-10-GW05
Sampled By: SP
C.O.C. No.: 2209
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 082598 / Time: 1805 / Method: low flow	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	clear	5.98	7.59	22.9	0	7.53	0.41	—

PURGE DATA:

Date: 082598 / Method: low flow / Monitor Reading (ppm): / Well Casing Diameter & Material / Type: 2" PVC / Total Well Depth (TD): 16.61' / Static Water Level (WL): 8.03' / One Casing Volume (gal/L): 1.42 / Start Purge (hrs): 1626 / End Purge (hrs): 1749 / Total Purge Time (min): 83 / Total Vol. Purged (gal/L): 3.1	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
	Initial	5.81	7.49	24.9	0	4.97	0.40	—
	1	5.92	7.58	23.2	0	4.37	0.41	—
	2	5.97	7.59	23.0	0	7.33	0.41	—
	3							

SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

- TD and WL values referenced to top of PVC casing
Screened Interval Volume Calculation: (16.61' - 8.03') * 0.165 = 1.42 gallons

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Scott Pelagho

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD PARRIS ISLAND
PROJECT NUMBER: 7903

WELL I.D.: PAI-10-GW-05(S)
DATE: 082598

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1629	8.39	240	24.9	5.81	7.49	4.97	0.40	0*	* below detection limit
1634	8.48	150	24.3	5.87	7.59	6.86	0.41	0	
1639	8.56	120	24.2	5.90	7.61	7.01	0.41	0	consistent pump rate
1644	8.60	150	24.0	5.89	7.61	6.09	0.41	0	very hard to maintain
1649	8.62	100	23.7	5.92	7.61	8.25	0.41	0	slowest rate possible
1654	8.68	140	23.6	5.92	7.60	2.88	0.41	0	~100 mL/min, but
1659	8.76	140	23.4	5.90	7.57	2.19	0.41	0	W.L still dropping
1704	8.80	175	23.2	5.92	7.58	4.37	0.41	0	and pump stalling.
1709	8.82	150	23.4	5.92	7.60	7.18	0.41	0	pump rate fluctuating
1714	8.82	150	23.3	5.94	7.59	9.24	0.41	0	and pump continues to
1719	8.84	150	23.3	5.94	7.54	3.24	0.41	0	stall even at high
1724	8.81	150	23.2	5.96	7.57	5.15	0.41	0	rates (~200 mL/min)
1729	8.80	150	23.3	5.97	7.60	6.25	0.41	0	Decide to switch
1734	8.81	150	23.2	5.93	7.61	6.84	0.41	0	batteries @ 1702
1739	8.83	150	23.0	5.97	7.59	7.33	0.41	0	
1744	8.84	150	23.0	5.97	7.61	4.63	0.41	0	
1749	8.85	150	22.9	5.98	7.59	7.53	0.41	0	
1805	Sample								Extra volume to be purged based on drawdown = 0.1353 Gal

Volume

Volumes

SIGNATURE(S) Seth Pelletier

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: PARRIS ISLAND
Project No.: 7803

Sample ID No.: PAI-10-GW-06-01
Sample Location: PAI-10-GW06
Sampled By: SP
C.O.C. No.: 2275

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

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

SAMPLING DATA:

Date: 083198 / Time: 1000	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Method: low flow	clear	5.11	13.7	21.5	0	4.06	0.79	-

PURGE DATA:

Date: 083198	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow	Initial	5.78	7.72	22.0	0	-	0.42	-
Monitor Reading (ppm): -	1	5.11	13.5	21.8	53	3.72	0.77	-
Well Casing Diameter & Material Type: 2" PVC	2	5.11	13.7	21.5	0	4.06	0.79	-
	3							
Total Well Depth (TD): 37.07'								
Static Water Level (WL): 8.13'								
One Casing Volume (gal/L): 1.16								
Start Purge (hrs): 0855								
End Purge (hrs): 0951								
Total Purge Time (min): 56								
Total Vol. Purged (gal/L): 2.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	(4) 40mL glass	✓
TCL SVOCs	-	(2) 1L amber	✓
TCL Pest. / PCBs	-	(2) 1L amber	✓
TAL Total Metals, Hardness	HNO_3	(1) 1L HDPE	✓
TAL Dissolved Metals	HNO_3	(1) 1L HDPE	✓
TAL CN	NaOH	(1) 500mL HDPE	✓
[redacted] NO_3 / NO_2	H_2SO_4	(1) 1L HDPE	✓
[redacted] TOC	H_2SO_4	(1) 125mL amber	✓
TDS, TSS, Cl, F, SO_4	-	(1) 1L HDPE	✓

SP 0825-98

OBSERVATIONS / NOTES:

- TD and WL measurements referenced to top of PVC casing.
Screened interval volume calculation: (5' screen + 2' sand) * 0.165 = 1.16 gal

Circle if Applicable:
MS/MSD | Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: MCRD PARRIS ISLAND
PROJECT NUMBER: 7803

WELL I.D.: PAI-10-MW-06(D)
DATE: [redacted] 08-31-98
SP 08-25-98

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
0859	8.19	220	22.0	5.78	7.72	—	0.42	0 *	* below detection
0904	8.19	175	21.9	5.79	7.94	1.12	0.43	0	limit (Turb. ≠ -10)
0909	8.19	150	21.8	5.71	8.42	3.17	0.46	0	
0914	8.20	150	21.7	5.34	11.6	4.02	0.66	25	pump rate fluctuating
0919	8.19	150	21.8	5.11	13.5	3.72	0.77	53	1 Volume
0924	8.19	150	21.8	5.11	13.7	4.97	0.78	35	
0929	8.19	150	21.6	5.13	13.7	4.78	0.79	15	
0934	8.20	150	21.7	5.12	13.7	2.72	0.79	5	
0939	8.20	150	21.6	5.12	13.7	3.96	0.79	0 (-1)	
0944	8.20	150	21.6	5.11	13.7	4.08	0.79	0 (-4)	
0949	8.21	150	21.5	5.11	13.7	4.06	0.79	0*	3 Volumes
1000	Sample								

4-25a

SIGNATURE(S) Scott Delapho

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7803

Sample ID No.: ~~PAI-10-GW-07-01~~
Sample Location: PAI-10-GW07
Sampled By: Ship Barton
C.O.C. No.: 2275/2276

- ☐ Domestic Well Data
- ■ Monitoring Well Data
- ☐ Other Well Type:
- ☐ QA Sample Type:

Type of Sample:
- ■ Low Concentration
- ☐ High Concentration

SAMPLING DATA:

Date: 083198 / Time: 1010	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Method: peristaltic Pump		5.28	1.19	22.0	-10	0.53	0.05	

PURGE DATA:

Date: 083198	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow peristaltic pump	Initial	4.96	1.22	22.4	63	1.38	0.05	
Monitor Reading (ppm): -	1	4.99	1.20	21.9	-8	0.47	0.05	
Well Casing Diameter & Material	2	5.28	1.19	22.0	-10	0.53	0.05	
Type: 2-in. PVC	3							
Total Well Depth (TD): 16.48								
Static Water Level (WL): 9.96								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 0900								
End Purge (hrs): 1010								
Total Purge Time (min): 70								
Total Vol. Purged (gal/L): 3.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	40 mL VOA (glass)	16
TCL SVOCs	-	1L amber (glass)	8
TCL Pest./PCBs	-	1L amber (glass)	6
TAL Diss. metals	HNO_3	1L HDPE	3
TAL Total Metals/Hard.	HNO_3	1L HDPE	3
TAL CN	NaOH	500mL HDPE	3
TOC	H_2SO_4	250mL amber (glass)	4
NO_3/NO_2	H_2SO_4	1L HDPE	3
TDS, TSS, Cl, F, SO4	-	1L HDPE	3

OBSERVATIONS / NOTES:

Water Level & Total Depth are BTOC
Purge volume calculated using screen length of 10 ft. = 1.6 gallons
6 1L ambers collected on 090198 to complete MS/MSD

Circle if Applicable: (MS) (MSD)
Duplicate ID No.: 1055 PAI-10-GW-07-01D

Signature(s): Ship Barton

1 vol = 1.6 gals. = 6,056 mL

LOW FLOW PURGE DATA SHEET

PAF-10-MW-07(S)

PROJECT SITE NAME: MCRD Parris Island / Jericho Island
PROJECT NUMBER: 7803
WELL I.D.: ~~PAI-10-6W07~~
DATE: 083198

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. mS/Cm	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
0900	9.96	-	22.4	4.96	1.22	1.38	0.05	63	approx. 190 ml/min. is the lowest flow I can use, pump gets @ rate below this rate
950 0905	10.01	190	22.2	5.21	1.19	0.63	.05	5	
1000 0910	10.14	200	22.0	5.21	1.16	0.41	.05	5	
990 0915	10.14	198	22.0	5.26	1.16	0.46	.05	-9	
975 0920	10.14	195	22.1	5.27	1.15	0.41	.05	-10	
1000 0925	10.16	200	22.0	5.32	1.15	0.57	.05	-10	
1000 0930	10.16	200	21.9	4.99	1.20	0.47	0.05	-8	recalibrated Horiba due to flushing Tubs 1st vol.
1000 0935	10.17	200	21.9	5.11	1.16	0.54	.05	-6	
~~950~~ 100 0940	10.17	180	21.9	5.20	1.18	0.39	.05	-9	
950 0945	10.17	190	21.9	5.22	1.18	0.45	.06	-10	
990 0950	10.17	198	21.8	5.24	1.19	0.46	.05	-10	
1000 0955	10.18	200	21.9	5.26	1.19	0.49	.05	-10	
990 1000	10.18	198	22.0	5.28	1.19	0.53	.05	-10	2nd volume
1000 1005	10.18	200	22.0	5.29	1.19	0.52	.05	-10	
1000 1010	10.18	200	22.0	5.29	1.19	0.51	.05	-10	DONE!
1015									
1020									
1025									
1030									

SIGNATURE(S) Shea Ramsey

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

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

Sample ID No.: PAI-10-GW-08-01
Sample Location: PAI-10-GW08
Sampled By: SB, SP
C.O.C. No.: 2275
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 08 31 98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1228	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: low flow	clear	5.78	1.50	22.1	0	2.50	0.06	-

PURGE DATA:

Date: 083198	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow	Initial	5.80	0.606	23.1	0	3.06	0.02	-
Monitor Reading (ppm): -	1	5.76	1.45	22.3	0	5.82	0.06	-
Well Casing Diameter & Material	2	5.78	1.49	21.9	0	5.12	0.06	-
Type: 2" PVC	3							
Total Well Depth (TD):	310.86'							
Static Water Level (WL):	10.16'							
One Casing Volume (gal/L):	1.19							
Start Purge (hrs):	1109							
End Purge (hrs):	1228							
Total Purge Time (min):	79							
Total Vol. Purged (gal/L):	3.1							

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCl	(4) 40 ml glass	✓
TCL SVOCs	-	(2) ~~#~~ 1L amber	✓
TCL Pest. /PCBs	-	(2) 1L amber	✓
TAL Total Metals, Hardness	HNO_3	(1) 1L HDPE	✓
TAL Dissolved Metals	HNO_3	(1) 1L HDPE	✓
TAL CN	NaOH	(1) 500 mL HDPE	✓
NO_3 /NO_2	H_2SO_4	(1) 1L HDPE	✓
TOC	H_2SO_4	(1) 125 mL amber	✓
TDS, TSS, Cl, F, SO_4	-	(1) 1L HDPE	✓

OBSERVATIONS / NOTES:

TD and WL measurements referenced to top of PVC casing.
Screened interval volume calculation (5' screen + 2.2' sand) * 0.165 = 1.19 gal

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Seth Pelopidas

LOW FLOW PURGE DATA SHEET

PAI-10-MW-08(D)

PROJECT SITE NAME: MCRD PARRIS ISLAND
PROJECT NUMBER: 7803

WELL I.D.: PAI-10-GW-008-01
DATE: 083198

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1114	10.46	180	23.1	5.80	0.606	3.06	0.02	0*	* below detection
1119	10.41	150	22.4	5.76	0.538	3.16	0.02	0	limit (Turb = -10)
1124	10.41	115	22.4	5.77	0.562	6.25	0.02	0	
1129	10.42	135	22.4	5.74	0.710	5.40	0.03	0	pump rate highly
1134	10:43	130	22.4	5.75	1.19	2.98	0.05	0	variable b/c of
1139	10.43	140	22.3	5.80	1.40	2.72	0.06	0	DC power source
1 Volume 1144	10.43	140	22.3	5.76	1.45	5.82	0.06	0	
1149	10.44	150	22.0	5.76	1.46	6.95	0.06	0	Flow rates represent
1154	10.47	145	22.0	5.76	1.48	4.84	0.06	0	averages calculated
1159	10.49	145	21.9	5.78	1.48	5.43	0.06	0	over each 5 minute
1204	10.49	165	21.8	5.78	1.48	3.74	0.06	0	purge interval
1209	10.49	145	21.8	5.79	1.49	6.22	0.06	0	
2 Volumes 1214	10.48	160	21.9	5.78	1.49	5.12	0.06	0	
1219	10.47	160	22.2	5.76	1.51	2.81	0.06	0	
1224	10.48	130	22.2	5.79	1.50	2.5	0.06	0	
1228	10.48	150	22.1	5.78	1.50	2.5	0.06	0	Sample

25C-4

SIGN.)RE(S) Seth Pelletier

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7803

Sample ID No.: ~~PAI-10-GW-~~ 09-01
Sample Location: PAI-10-GW09
Sampled By: Skip Barton
C.O.C. No.: 2276/2277

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

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

SAMPLING DATA:

Date: 090198 / Time: 1148	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Method: Peristaltic pump	Clear	6.01	32.7	23.6	4	0.70	2.0‰	

PURGE DATA:

Date: 090198	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow peristaltic pump	Initial	5.35	35.4	23.1	99	0.37	2.20	
Monitor Reading (ppm): -	1	6.01	33.3	23.5	43	0.57	2.09	
Well Casing Diameter & Material	2	6.01	32.7	23.6	4	0.59	2.0‰	
Type: 2-in. PVC	3							
Total Well Depth (TD): 16.76								
Static Water Level (WL): 8.07								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 1025								
End Purge (hrs): 1150								
Total Purge Time (min): 85								
Total Vol. Purged (gal/L): 3.98								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	40 mL VOA (glass)	4
TCL SVOCs	-	1L amber (glass)	2
TCL Pest./PCBs	-	1L amber (glass)	2
TAL Diss. Metals	HNO_3	1L HDPE	1
TAL Total Metals/Hardness	HNO_3	1L HDPE	1
TAL CN	NaOH	500 ml HDPE	1
TOC	H_2SO_4	250 ml amber (glass)	1
NO_3, NO_2	H_2SO_4	1L HDPE	~~1~~ *
TDS, TSS, Cl, F, SO_4	-	1L HDPE	1

OBSERVATIONS / NOTES:

Water Level & Total Depth measured from TOC.
Gravel pack interval = 12 ft.; 1 volume = 1.92 gallons
NO_3/NO_2 sample collected @ 1222 on 090298
Appendix IV samples collected: VOCs, NOCs, Pest./PCBs, Organic Pest. & Herbicides, Diss. Metals, Tot. Metals, CN Total = 18

Circle if Applicable:
MS/MSD | Duplicate ID No.:

Signature(s): Skip Barton

Start @ 1025

W.L. = 8.07' T.D. = 16.70 1 vol. = 1.92 gals = 7267.2 mL

LOW FLOW PURGE DATA SHEET

PAE-10-MW-09(S)

PROJECT SITE NAME: MCRD Paris Is. - Jericho Is. WELL ID.: ~~PAE-10-GW-009-01~~

PROJECT NUMBER: ~~7394~~ 7803 DATE: 090198

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
~~1020~~ 1025	8.07'								
1030	8.30	180	5.35	35.4	99	0.37	23.1	2.20	Pursing @ as low a rate as pump will maintain.
1035	8.44	200	5.59	35.4	109	0.48	23.0	2.24	
1040	8.46	180	5.77	34.5	65	0.45	23.2	2.18	
1045	8.48	190	5.77	34.3	81	0.50	23.2	2.17	
1050	8.50	180	5.84	33.9	108	0.48	23.4	2.13	
1055	8.51	200	5.90	33.6	75	0.55	23.4	2.11	
1100	8.51	150	5.94	33.4	54	0.60	23.5	2.10	
* 1105	8.49	180	6.01	33.3	43	0.57	23.5	2.09	1st volume (7300)
1110	8.50	180	5.98	33.2	35	0.53	23.5	2.09	
1115	8.51	185	6.01	33.1	26	0.54	23.4	2.09	
1120	8.51	180	5.99	33.0	20	0.56	23.5	2.06	
1125	8.51	190	5.98	32.9	14	0.54	23.6	2.07	
1130	8.51	190	6.02	32.7	10	0.63	23.6	2.06	4625 mL
1135	8.52	160	6.01	32.7	11	0.55	23.6	2.06	
1140	8.53	180	6.01	32.7	6	0.56	23.6	2.06	6325 mL
* 1145	8.54	190	6.01	32.7	4	0.59	23.6	2.06	2nd Volume
~~1150~~ 1155	8.54		6.01	32.7	4	0.70	23.6	2.06	
1200									
1205									
1210									

SIGNATURE(S): Steve Barton

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7803

Sample ID No.: PAI-10-GW-10-01
Sample Location: PAI-10-GW10
Sampled By: Slup-Barton
C.O.C. No.: 2277

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

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

SAMPLING DATA:

Date: 090298 / Time: 1130 / Method: peristaltic pump	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	clear	6.76	21.0	21.3	~10	4.45	1.26	

PURGE DATA:

Date: 090298 / Method: low flow peristaltic pump / Monitor Reading (ppm): - / Well Casing Diameter & Material / Type: 2-in. PVC / Total Well Depth (TD): 31.80 / Static Water Level (WL): 8.28 / One Casing Volume(gal/L): NA / Start Purge (hrs): 1025 / End Purge (hrs): 1130 / Total Purge Time (min): 55 / Total Vol. Purged (gal/L): 3.3	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
	Initial	6.85	13.9	22.0	~10	3.80	0.79	
	1	6.80	21.8	21.4	3	4.76	1.33	
	2	6.74	22.0	21.3	~10	3.57	1.33	
	3							

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	40 ml VOAs (glass)	4
TCL SVOCs	-	1 L amber (glass)	2
TCL Pest. / PCBs	-	1 L amber (glass)	2
TAL Diss. Metals	HNO_3	1 L HDPE	1
TAL Total Metals / Hardness	HNO_3	1 L HDPE	1
TAL CN	NaOH	500 ml HDPE	1
NO_3 / NO_2	H_2SO_4	1 L HDPE	1
TOC	H_2SO_4	250 ml amber (glass)	1
TDS, TSS, Cl, F, SO_4	-	1 L HDPE	1

OBSERVATIONS / NOTES:

Water Level & Total Depth measured from TOC
Gravel Pack interval = 7.9 ft ; 1 volume = 1.26 gallons

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): Slup Barton

Gravel = 1.70T 1 vol = 1.26 gals = 4,769 mL

LOW FLOW PURGE DATA SHEET

PAI-10-MW-10 (D)

PROJECT SITE NAME: MCRD Parris Island; Jericho Island
PROJECT NUMBER: 7803

WELL I.D.: ~~PAI-10-MW10~~
DATE: 090298

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1025	8.28								
1030	9.35	210	22.0	6.85	13.9	3.80	0.79	-10	Pump @ @ lowest
1035	9.58	200	21.9	6.106	14.1	3.96	0.83	-10	sustainable rate
1040	9.60	200	21.6	6.88	15.7	3.35	0.93	-10	
1045	9.70	200	21.5	6.73	18.1	3.89	1.09	-10	mixed sand w/ water
1050	9.62	190	21.4	6.80	21.8	4.76	1.32	3	& checked Turb reading.
1055	9.62	180	21.3	6.76	22.9	4.10	1.39	11	sensor is operating
1100	9.68	200	21.3	6.72	22.9	3.30	1.39	9	correctly (reading ~289)
1105	9.64	195	21.3	6.78	22.7	4.16	1.38	2	
1110	9.68	200	21.3	6.74	22.4	3.51	1.36	-5	
1115	9.66	190	21.3	6.74	22.0	3.87	1.33	-10	2nd Volume
1120	9.70	200	21.31	6.78	21.5	4.54	1.33	-10	
1125	9.66	170	21.3	6.74	21.0	4.80	1.27	-10	
1130	9.66	170	21.3	6.76	21.0	4.45	1.26	-10	Purge completed

SIGNATURE(S) Steve Barton

Final volume: 1.78 x 4.3 x 4.221 x 3785 = 836.5 mL

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Jericho Island
Project No.: 7803

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

Sample ID No.: PAI-10-GW-11-01
Sample Location: PAI-10-GW11
Sampled By: Skip Barton
C.O.C. No.: 2295
Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 082498	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1712	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: peristaltic pump	clear	6.62	40.5	23.8	0	0.33	2.60	

PURGE DATA:

Date: 082498	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow	Initial	6.93	43.7	26.1	0	0.29	2.83	
Monitor Reading (ppm):	1	6.81	40.7	24.7	0	0.42	2.62	
Well Casing Diameter & Material	2	6.77	40.6	24.5	2	0.39	2.61	
Type: 2-in. PVC	3							
Total Well Depth (TD): 16.57								
Static Water Level (WL): 4.57								
One ~~Casing~~ screen Volume (gal)/L): 1.6								
Start Purge (hrs): 1550								
End Purge (hrs): 1710 / 1705 SB								
Total Purge Time (min): 80								
Total Vol. Purged (gal)/L): 4.1								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
App. IX VOCs	HCL	40 ML VOA	4
App IX NOCs	HCL	40 ML VOA	4
App. IX SVOCs	–	1L amber	2
App. IX Diss. Metals	HNO_3	1L plastic	1
App. IX CN	NaOH	500 mL plastic	1
App. IX Total Metals / Hardness	HNO_3	1L plastic	1
App. IX Pest. / PCBs	–	1L amber	2
App IX organic Pest.	–	1L amber	1
App IX Herbicides	–	1L amber	1
Hexavalent Chromium	–	1L plastic	1
TOC	H_2SO_4	250 mL	1
TDS, TSS, Cl, F, SO4		1L plastic	1
OBSERVATIONS / NOTES:			
NO_3 / NO_2	H_2SO_4	1L plastic	1

S.C. in mS/cm
DO in mg/L
Water Level & Total Depth measured from TOC.

Circle if Applicable:
MS/MSD | Duplicate ID No.:

Signature(s): Skip Barton

TD = 16.57 WL = 4.57' Screen = 10'

1 vol. = 1.6 gal = 6056 mL

LOW FLOW PURGE DATA SHEET

PAI-10-MW-11(S)

PROJECT SITE NAME: Jericho Island
PROJECT NUMBER: 7803

WELL I.D.: ~~PAI-10-GW11~~
DATE: 082498

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond. mS/cm	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
~~1549~~	~~4.57~~	~~—~~	~~26.1~~	~~6.93~~	~~48.9~~	~~0.28~~	~~2.83~~	~10	
START 1550	4.57	—	26.1	6.93	43.7	0.29	2.83	0	
1000 1555	4.77	200 mL	26.0	5.98	40.1	0.22	2.57	0	
950 1600	4.84	190	25.8	6.42	40.5	0.29	2.60	1	
800 1605	4.80	160	25.5	6.61	40.8	0.31	2.63	0	
1000 1610	4.90	200	25.2	6.74	40.7	0.28	2.62	0	
1000 950 1615	4.91	190	25.0	6.75	40.7	0.33	2.63	2	
925 1620	4.93	185	24.9	6.73	40.7	0.42	2.62	0	
* 900 1625	4.93	180	24.7	6.81	40.7	0.42	2.62	0	Vol. #1
950 1630	4.95	190	24.7	6.80	40.7	0.45	2.61	6	
950 1635	4.95	190	24.7	6.82	40.6	0.37	2.60	0	
975 1640	4.96	190	24.7	6.77	40.6	0.34	2.61	0	
950 1645	4.96	195	24.6	6.82	40.7	0.41	2.61	0	
1000 1650	4.95	200	24.6	6.82	40.7	0.38	2.61	3	
* 1000 1655	4.96	200	24.5	6.77	40.6	0.39	2.61	2	Vol. #2
1000 1700	5.00	200	24.5	6.70	40.5	0.33	2.60	0	
1000 1705	5.00	200	24.5	6.70	40.6	0.35	2.61	0	
1000 1710	5.00	200	24.5	6.70	40.6	0.41	2.61	0	
1715									
			23.8	6.62	40.5	0.33	2.60	0	
1800									

SIGNATURE(S) Stuart Barton

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7803

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

Sample ID No.: PAI-10-GW-12-01
Sample Location: PAI-10-GW12
Sampled By: Skip Barton
C.O.C. No.: 2289
Type of Sample:
[■] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 091198 / Time: 0907	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Method: peristaltic Pump	Clear	6.28	25.9	21.5	-10	3.38	1.60	

PURGE DATA:

Date: 091198	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: slow flow (P. pump)	Initial	5.90	24.1	21.4	0	4.38	1.50	
Monitor Reading (ppm): NA	1	6.19	24.5	21.7	-10	3.57	1.50	
Well Casing Diameter & Material	2	6.28	25.9	21.5	-10	3.38	1.60	
Type: 2-in. PVC	3							
Total Well Depth (TD): 4.								
Static Water Level (WL): 4.75								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 0820								
End Purge (hrs): 0905								
Total Purge Time (min): 45								
Total Vol. Purged (gal/L): 2.54								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	40 ML VOA (glass)	4
TCL SVOCs	4°	1 L amber (glass)	2
TCL Pest./PCBs	4°	1 L amber (glass	2
TAL Diss. Metals	HNO_3	1 L HDPE	1
TAL Total Metals/Hardness	HNO_3	1 L HDPE	1
TAL CN	NaOH	500 ml HDPE	1
NO_3/NO_2	H_2SO_4	1 L HDPE	1
TOC	H_2SO_4	250 mL amber (glass)	1
TDS, TSS, Cl, F, SO_4	4°	1 L HDPE	1

OBSERVATIONS / NOTES:

Circle if Applicable:
MS/MSD | Duplicate ID No.:

Signature(s): Skip Barton

gravel = 7.7' / vol = 1.23 gallons = 4,663 mL

LOW FLOW PURGE DATA SHEET

PAI-10-MW-12(D)

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: ~~7344~~ 7803

WELL ID.: ~~PAI-10-GW12~~
DATE: 091198

Time (Hrs)	Water Level (Ft. Below TOC)	Flow (mL/Min.)	pH	Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Sal. (%)	Comments
0820	4.75			24.1	0	4.38	21.4	1.5	
0824	4.75	220	5.90	↓	↓	↓	↓	1.5	
0830	4.98	200	6.14	25.0	0	3.52	21.3	1.53	
0835	4.99	200	5.89	22.7	-10	3.61	21.5	1.38	
0840	5.00	205	6.18	24.6	-10	3.60	21.5	1.50	
0845	5.01	200	6.19	24.5	-10	3.57	21.7	1.50	1st vol. (4538)
0850	5.02	205	6.27	26.1	-10	3.84	21.7	1.61	
0855	5.03	205	6.28	26.2	-10	3.75	21.5	1.61	
0900	5.03	205	6.28	25.9	-10	3.64	21.5	1.60	
0905	5.04	205	6.28	25.9	-10	3.38	21.5	1.60	2nd vol.
0910		200							
0915									

SIGNATURE(S): Rhyl Barton

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: MCRD Parris Island
Project No.: 7803

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

Sample ID No.: PAI-10-GW-13-01
Sample Location: PAI-10-GW13
Sampled By: Skip Barton
C.O.C. No.: 2277
Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

SAMPLING DATA:

Date: 090298	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1420	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method: peristaltic pump	Clear	6.31	42.2	23.8	-10	3.74	2.73	

PURGE DATA:

Date: 090298	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: low flow peristaltic pump	Initial	6.60	41.9	24.9	133	3.06	2.71	
Monitor Reading (ppm): -	1	6.80	42.0	24.3	-10	1.46	2.72	
Well Casing Diameter & Material	2	6.81	42.2	23.8	-10	3.74	2.73	
Type: 2-in. PVC	3							
Total Well Depth (TD): 17.72								
Static Water Level (WL): 5.51								
One Casing Volume(gal/L): NA								
Start Purge (hrs): 1300								
End Purge (hrs): 1420								
Total Purge Time (min): 80								
Total Vol. Purged (gal)/L): 4.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOCs	HCL	40ml VOAs (glass)	4
TCL SVOCs	-	1L amber (glass)	2
TCL Pest. / PCBs	-	1L amber (glass)	2
TAL Diss. Metals	HNO_3	1L HDPE	1
TAL Total Metals / Hardness	HNO_3	1L HDPE	1
TAL CN	NaOH	500ml HDPE	1
TOC	H_2SO_4	250ml amber (glass)	1
NO_3 / NO_2	H_2SO_4	1L HDPE	1
TDS, TSS, Cl, F, SO_4	-	1L HDPE	1

OBSERVATIONS / NOTES:

Water Level & Total Depth measured from TOC
Gravel Pack interval = 13 ft.; & volume = 21 gallons

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton

W.L. = 5.51 T.D = 17.72 ~~T.D.~~ 2= gravel = 13'

1 vol. = 2.1 gal. = 7948.5

LOW FLOW PURGE DATA SHEET

PAL-10-MW-13(S)

PROJECT SITE NAME: MCRD Parris Is.
PROJECT NUMBER: ~~7394~~ 7803

WELL ID.: ~~PAL-10-GW13~~
DATE: 090298

	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
	1300	5.51								
900	1305	5.62	180	6.60	41.9	133	3.06	24.9	2.71	
975	1310	5.63	195	6.70	42.1	163	2.45	24.5	2.71	
975	1315	5.63	195	6.74	42.1	72	2.38	24.4	2.71	
850	1320	5.62	170	6.75	42.1	72	5.05	24.5	2.71	
900	1325	5.64	180	6.75	42.0	43	3.18	24.5	2.71	
1000	1330	5.65	200	6.77	42.1	4	2.54	24.4	2.72	
1000	1335	5.66	200	6.77	42.0	-2	2.54	24.3	2.72	
1150	1340	5.67	230	6.78	42.1	-9	3.0	24.3	2.72	
1100*	1345	5.67	220	6.80	42.0	-10	1.46	24.3	2.72	1st volume (901)
1100	1350	5.68	220	6.80	42.1	-10	2.89	24.3	2.72	
1300	1355	5.71	260	6.80	42.0	-10	2.97	24.0	2.72	
1300	1400	5.70	260	6.79	~~42.1 41.9~~	-10	2.89	24.0	2.72	
1300	1405	5.74	260	6.80	42.1	-10	2.03	24.0	2.72	
1400	1410	5.74	320	6.80	42.1	-10	3.9	24.0	2.72	
1500	1415	5.76	300	6.80	42.2	-10	1.67	23.9	2.73	
1500	1420	5.76	300	6.81	42.2	-10	3.74	23.8	2.73	2nd volume, Purge completed

SIGNATURE(S): Shyp Baxter

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Parris Is/2nd - Jericho Is/
Project No.: 7803

Sample ID No.: PAI-10-GW-14-01
Sample Location: PAI-10-GW14
Sampled By: GG
C.O.C. No.: 2205

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

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

SAMPLING DATA:

Date: 8/11/98 Time: 1750 Method: Low Flow	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
	Clear	6.52	45.9	24.2	6	1.02	3.03	

PURGE DATA:

Date: 8/11/98	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Low Flow	Initial	5.93	46.9	24.2	124	1.62	3.06	
Monitor Reading (ppm): NA	1	6.40	47.0	22.2	10	1.14	3.06	
Well Casing Diameter & Material	2	6.39	48.2	22.8	8	0.82	3.16	
Type: 2" SCH 40 PVC	3	6.52	45.9	24.2	6	1.02	3.03	
Total Well Depth (TD): 32.15								
Static Water Level (WL): 4.98								
One Casing Volume (gal/L): 1.2								
Start Purge (hrs): 1636								
End Purge (hrs): 1744								
Total Purge Time (min): 68								
Total Vol. Purged (gal/L): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL SVOCs	~~HCl~~	2 - 1LA	✓
TCL VOCs	HCl	4 - 40mL A	✓
TCL Pest/PCBs	—	2 - 1LA	✓
NO3/NO2	H_2SO_4	1 - 1LP	✓
Cyanide	NaOH	1 - 500mL P	✓
TAL Tot. Metals Hardness	HNO_3	1 - 1LP	✓
TAL Diss. metals	HNO_3	1 - 1LP	✓
TDS, TSS, Cl, F, SO4	—	1 - 1LP	✓
TOC	H_2SO_4	1 - 125mL A	✓

OBSERVATIONS / NOTES:

See Low Flow Purge Sheet

Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s):

A-207

SWPK 4.98 TOC
TD 32.15 TOC
1.29 = 1 VOL

LOW FLOW PURGE DATA SHEET

PAF-10-MW14(D)
R6

PROJECT SITE NAME: Jericho Island
PROJECT NUMBER: 7803

WELL I.D.: ~~PAF-10-GW-0140~~
DATE: 8/10/98

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	Temp. (Celcius)	pH (S.U.)	Cond.	DO (mg/L)	Sal. %	Turb. (NTU)	Comments
1636	4.98	200	24.2	5.93	46.9	1.62	3.06	124	INITIAL
1643	5.09	200	23.3	6.25	47.3	0.74	3.08	82	
1646	5.10	200	22.7	6.31	47.9	0.89	3.12	47	
1650	5.10	200	22.2	6.30	47.8	0.52	3.13	31	
1654	5.10	200	22.4	6.35	47.9	0.71	3.14	18	
1658	5.10	200	22.2	6.40	47.0	1.14	3.06	10	1 VOL
1701	5.10	200	22.2	6.39	48.0	0.95	3.13	12	
1709	5.10	200	22.4	6.43	46.7	0.84	3.04	9	
1706	5.12	200	22.1	6.47	45.7	0.91	2.97	9	
1711	5.13	200	22.8	6.36	48.1	0.51	3.15	8	
1714	5.13	200	22.8	6.39	48.2	0.82	3.16	8	2 VOL
1719	5.11	180	24.1	6.44	46.1	0.52	3.00	8	
1725	5.11	180	24.4	6.45	47.1	1.09	3.07	8	
1729	5.11	180	24.1	6.46	42.9	1.00	3.13	8	
1734	5.11	180	24.0	6.49	47.9	1.06	3.12	8	
1740	5.11	180	24.1	6.53	45.8	1.10	2.98	7	
1744	5.11	180	24.2	6.52	45.9	1.02	3.03	6	3 VOL
1750 - Sample									
	Clear								

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SIGNATURE(S)

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CHAIN OF CUSTODY RECORDS

CHAIN OF CUSTODY RECORD

022

PROJECT NO.:	SITE NAME:
7803	MCRD Parris Island Jericho Island

SAMPLERS (SIGNATURE): Gary Gunter

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TOC + pH Hg & gkw	REMARKS
1	7/13/98	11:15		X	PAI-10-SB003-34	1	✓	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	7/13/98 1838				
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: 2.5 c	
		[signature]	7/14/98 1410		

Order No. 70440 (0693)

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CHAIN OF CUSTODY RECORD

02202

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TOC, PH	REMARKS
1	7/24/98	93	X		PAE-10-58-001-~~24~~ GS -22	1		~~24~~ 22-26 FT NOT ENOUGH SOIL REC. FROM ANY SPOON @ HAD TO COMPOSITE W/IN SCREEN INTERVAL

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
	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:	
			7-25-98 1410	5.9	

Order No. 70440 (0693)

A-270

CHAIN OF CUSTODY RECORD

9808175

022

PROJECT NO.:	SITE NAME:
7803	MCRD PARRIS ISLAND JERICHO ISLAND

SAMPLERS (SIGNATURE): Seth Pelopa

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs, Pest./PCBs, TCL Metals, CN, AVS/SEM	Hexavalent Cr			REMARKS
1	8/6/96	0916		✓	PAI-10-SS-013-01	8	5	1	1	1		
2	8/6/96	0943		✓	PAI-10-SS-014-01	8	5	1	1	1		
3	8/6/96	1016		✓	PAI-10-SS-012-01	20	15	3	2			Includes MS/MSD for organics and MS for inorganics
4	8/6/96	1016		✓	PAI-10-SS-012-01D	7	5	1	1			Duplicate
5	8/6/96	1107		✓	PAI-10-SS-011-01	7	5	1	1			
6	8/6/96	1126		✓	PAI-10-SS-015-01	7	5	1	1			
7				✓	trip blank	3	3					
												* All samples very reactive with preservative.

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Seth Pelopa	8/6/96 1704				
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:	
		Jose A Smith	8/7/96 9:00		

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Order No. 70440 (0693)

CHAIN OF CUSTODY RECORD

7808300

02205

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): A. Hunter Scott Plumley

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL SVOCs	TCL VOCs	TCL Pest/PCBs	NO3/NO2	Cyanide	TAL Total metals HARD/NORM	TAL Dissolved METALS	TDS; TSS; Cl, F, SO4	TOC	Cr+6	REMARKS
1,2	8/11/98	1750		X	PAE-10-GW-014-01	14	✓	✓	✓	✓	✓	✓	✓	✓	✓		
3,4	8/11/98	1258		X	PAE-10-GW-012-00	12	✓	✓	✓		✓	✓	✓		✓		
5,6	8/11/98	1311		X	PAE-10-SW-010-00	13	✓	✓	✓		✓	✓	✓		✓	✓	
7,8	8/11/98	1320		X	PAE-10-SW-009-00	13	✓	✓	✓		✓	✓	✓		✓	✓	
9,10	8/11/98	1245		X	PAE-10-SW-013-00	13	✓	✓	✓		✓	✓	✓		✓	✓	
11,12	8/11/98	1305		X	PAE-10-SW-008-00	12	✓	✓	✓		✓	✓	✓		✓	✓	MS
13,14	8/11/98	1305		X	PAE-10-SW-008-00D	12	✓	✓	✓		✓	✓	✓		✓	✓	MSD (ORGANICS ONLY)
15					trip blank	2		✓									
					temp blank	6											

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
A. Hunter					
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): Joe A Smith	DATE / TIME: 8/12/98 8:3X	REMARKS:	

Order No. 70440 (0693)

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X

02206

CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7803	JERICHO ISLAND

SAMPLERS (SIGNATURE): J Hunter Seth Pelepko

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Grain Size	Bulk Density					REMARKS
	8/10/98	1540		X	PAI-10-SD-009-01	1	✓	✓					
	8/14/98	1514		X	PAI-10-SD-015-01	1	✓	✓					
		0908		X	PAI-10-SD-014-01	1	✓	✓					
		1500		X	PAI-10-SD-008-01	1	✓	✓					
		0743		X	PAI-10-SD-013-01	1	✓	✓					
		1445		X	PAI-10-SD-010-01	1	✓	✓					
		0800		X	PAI-10-SD-012-01	1	✓	✓					
	↓	0907		X	PAI-10-SD-011-01	1	✓	✓					
	8/13/98	0730		X	PAI-10-SD-014-02	1	✓	✓					
	~~8/14/98~~	~~0855~~		~~X~~	~~UNKNOWN~~								~~DUP~~

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
J Hunter	8/13/98 1700	8/14/98			
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 Jason Brown, TENUS, Pittsburgh 412-921-8401	

Order No. 70440 (0693)

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CHAIN OF CUSTODY RECORD 4808337 02208

PROJECT NO.:	SITE NAME:
7394 / 7803	MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): H Hunter Seth Peloquin

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 Hunter					
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:	
		John A Smutz	8/13/98 8:35		

Order No. 70440 (0693)

CHAIN OF CUSTODY RECORD

9808632

02209

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): Scott Ogden Steve Barker

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Tal VOCs	Tal SVOCs	Tal PAH/PCBs	Tal Diss. Metals	Tal Total Metals Hardness	Tal CN	TOC	NO3/NO2	TDS TSS, Cl, F, SO4	REMARKS
1,2	8/24/98	1744		✓	PAI-10-GW-003-01	14	4	2	2	1	1	1	1	1	1	
3,4	8/24/98	1936		✓	PAI-10-GW-004-01	14	4	2	2	1	1	1	1	1	1	
5,6	8/24/98	1806		✓	PAI-10-GW-005-01	14	4	2	2	1	1	1	1	1	1	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Steve Barker	8/25/98 1300	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: Fed Ex Air Bill # 804098597 003	
		Jana Smith	8/27/98 8:45		

Order No. 70440 (0693)

A-375

X

02212

9812418

CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): Gary L. Gunter, Richard [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH SW846 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	1455		X	PAI-10-SD-015-01A	1	✓						
20	12/15/98	1200		X	PAI-10-SD-018-01A	1	✓						
21	12/15/98	1200		X	PAI-10-SD-017-01A	1	✓						
22	12/15/98	1245		X	PAI-10-SD-016-01A	1	✓						

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Gary L. Gunter	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:
		Josie A Sm[illegible]	12/16/98 8:40	Questions to DAVE Brayack TetraTech - Pittsburgh 412-9[illegible] 3375

A-276

10

CHAIN OF CUSTODY RECORD 98/24/18 02213 ∞

PROJECT NO.:	SITE NAME:
7803	JERICHO ISLAND

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH-SW846 8310						REMARKS
1	12/14/98	1305		X	PAI-10-SD-001-01A	1	✓						
2	12/14/98	1240		X	PAI-10-SD-002-01A	1	✓						Duplicate PAI-10-SD-002-01BA MS/MSD
3	12/14/98	1251		X	PAI-10-SD-003-01A	1	✓						
4	12/14/98	1246		X	PAI-10-SD-004-01A	1	✓						
5	12/14/98	1310		X	PAI-10-SD-005-01A	1	✓						
6	12/14/98	1316		X	PAI-10-SD-006-01A	1	✓						
7	12/14/98	1319		X	PAI-10-SD-007-01A	1	✓						
8	12/14/98	1345		X	PAI-10-SD-008-01A	1	✓						
9	12/14/98	1345		X	PAI-10-SD-009-01A	1	✓						
10	12/14/98	1500		X	PAI-10-SD-010-01A	1	✓						
11	12/14/98	1510		X	PAI-10-SD-011-01A	1	✓						
12	12/14/98	1526		X	PAI-10-SD-012-01A	1	✓						
13	12/14/98	1530		X	PAI-10-SD-013-01A	1	✓						
14	12/14/98	1505		X	PAI-10-SD-014-01A	1	✓						

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(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: Questions TO DAVE Brayer	
			12/16/98 8:40	TETRA TECH - Pittsburgh 412-921-8375	

A-277

CHAIN OF CUSTODY RECORD

9808182

02244

PROJECT NO.:	SITE NAME:
7603	MCRD Parris Island

SAMPLERS (SIGNATURE): Seth Polepka

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	TOC	REMARKS
07	8/6/98	1025		✓	PAI-10-SW-011-00	12	4	2	2	1	1	1	1	
				✓	temperature blank	2	2							
08				✓	trip blank									

A-278

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Seth Polepka	8/8/98 1227				
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	8/10/98 8:43		

Order No. 70440

CHAIN OF CUSTODY RECORD 9808286 02245

PROJECT NO.:	SITE NAME:
7903	MCRD PARRIS ISLAND JERICHO ISLAND

SAMPLERS (SIGNATURE): Mark Kenyon Seth Pelopko

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs, Pest/PCBs	TAL Total Metals (N), AVS/SEM	TOC/pH	TOC/[Cr+3]/Cr(VI)	REMARKS
1	8/10/98	0743		✓	PAI-10-SD-013-01	8	5	1	1	1		
2	8/10/98	0800		✓	PAI-10-SD-012-01	8	5	1	1	1		
3	8/10/98	0907		✓	PAI-10-SD-011-01	8	5	1	1	1		
4	8/10/98	0908		✓	PAI-10-SD-014-01	8	5	1	1	1		
5	8/10/98	1445		✓	PAI-10-SD-010-01	8	5	1	1		1	
6	8/10/98	1500		✓	PAI-10-SD-008-01	8	5	1	1	1		
7	8/10/98	1514		✓	PAI-10-SD-015-01	8	5	1	1	1		
8	8/10/98	1540		✓	PAI-10-SD-009-01	8	5	1	1		1	
				✓	temperature blank	1						
9				✓	trip blank	2	2					
												All sediment samples are very reactive with preservative.

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Seth Pelopko	08/10/98 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:	
		Jane E. Smith	8/11/98 9:50		

Order No. 70440 (0693)

17

02246

CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): [signature] Seth Pachpler

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Grain Size	Bulk Density	Porosity	Specific Gravity	Natural Moisture Content	Atterburg Limits	REMARKS
	7/28/98	0959		✓	PAI-10-SS-010-01	1	✓	✓	✓	✓	✓	✓	
	7/24/98	0730		✓	PAI-10-SB-006-06	1	✓	✓	✓	✓	✓	✓	
	7/24/98	0730		✓	PAI-10-SB-001-22	1	✓	✓	✓	✓	✓	✓	22-26 INTERVAL
	7/23/98	~~0930~~ 0945		✓	PAI-10-SB-002-10	1	✓	✓	✓	✓	✓	✓	
	7/24/98	1045		✓	PAI-10-SD-003-01	1	✓	✓					
	7/28/98	0937		✓	PAI-10-~~SS~~ SD-007-01	1	✓	✓	✓	✓			
	7/24/98	1504		✓	PAI-10-SD-007-01	1	✓	✓					
	7/27/98	~~0830~~	0730	✓	PAI-10-SB-002-04	1	✓				✓	✓	
	7/27/98	1445		✓	PAI-10-SD-004-01	1	✓	✓					
	7/27/98	1511		✓	PAI-10-SD-005-01	1	✓	✓					
	7/27/98	1445		✓	PAI-10-SD-006-01	1	✓	✓					
	7/27/98	1634		✓	PAI-10-SB-007-26	1	✓	✓	✓	✓	✓	✓	NOT ENOUGH SOIL 24-26
													AFTER ANALYTICAL: Sample 26-28

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	8/10/98 1800	[signature] 8/11/98			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	

Order No. 70440 ((

A-280

X

CHAIN OF CUSTODY RECORD

02249

PROJECT NO.:	SITE NAME:
1803	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-004-06	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	1115		X	PAI-10-SB-003-30	1	✓	✓	✓	✓	✓		
7	7/11/98	1030		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								

182-A

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 (0693)

02260

CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7803	MCRD Parris Island Jericho Island

SAMPLERS (SIGNATURE): Dary Dister

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TOC & PH 1 liter glass	REMARKS
1	7/13/98	11:15		X	PAI-10-SB003-34	1	✓	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
	7/13/98 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: 2.5°	
			7/14/98 1100		

Order No. 70440 (0693)

A-281-B

CHAIN OF CUSTODY RECORD

~~02311~~ 02311

PROJECT NO.:	SITE NAME:
7803	MCRD Parris Island / Jericho Island

SAMPLERS (SIGNATURE): Darryl Hunter

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TOC & pH (602 & 625)	REMARKS
1	7/14/98	1110		X	PAI-10-SB-004-~~08~~	1	X	
2	7/15/98	0935		X	PAI-10-SB-~~0~~05-26	1	X	

↑ Changed from 025 to 005. V. Sibeto 1/15/99.

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	7/15/98 1400				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	7/16/98 1505		

Order No. 70440 (0693)

52311 2.0

A-282

X

CHAIN OF CUSTODY RECORD

9807666

: 02271

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): Shep Barker, Seth Pelopa

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOCs (EPA 8260B)	SVOCs (EPA 8270C)	TPH-DRO/RRO (AK102/AK103)	TOC (PSEP)			REMARKS
1	7/27/18	1605		✓	PAI-10-SD-001-01	8	5	1	1	1			
2	7/27/18	1445		✓	PAI-10-SD-004-01	8	5	1	1	1			
3	7/27/18	1511		✓	PAI-10-SD-005-01	8	5	1	1	1			
4	7/27/18	1445		✓	PAI-10-SD-006-01	8	5	1	1	1			
5	7/27/18	1504		✓	PAI-10-SD-007-01	8	5	1	1	1			

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Shep Barker	7/27/18 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:	
		Lorri A Smith	7/28/18 9:20		

4-283

CHAIN OF CUSTODY RECORD

9807692

: 022

PROJECT NO.:	SITE NAME:
7803	Jericho Is.

SAMPLERS (SIGNATURE): Steve Barton Scott Palmer

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOCs	SVOCs	Pest/PCBs	Total Metals	Diss. Metals	TOC	PH	AVS/SEM	Hex Cr.	REMARKS
	7/28/98	0920		✓	PAI-10-SS-001-01	8	5	✓	✓	✓		✓	✓	✓		
		0940			PAI-10-SS-002-01			✓	✓	✓		✓	✓	✓		
		1010			PAI-10-SS-003-01			✓	✓	✓		✓	✓	✓		Trip Blank - 1
		1030			PAI-10-SS-004-01			✓	✓	✓		✓	✓	✓		Temp Blank - 3
		1254			PAI-10-SS-005-01			✓	✓	✓		✓	✓	✓	✓	
		0904			PAI-10-SS-0010-01			✓	✓	✓		✓	✓	✓		
		0937			PAI-10-SS-007-01			✓	✓	✓		✓	✓	✓		
		1205			PAI-10-SS-008-01			✓	✓	✓		✓	✓	✓		
		1230			PAI-10-SS-009-01			✓	✓	✓		✓	✓	✓		
		0959			PAI-10-SS-010-01			✓	✓	✓		✓	✓	✓		
		1405			PAI-10-SW-001-00	12	4	✓	✓	✓	✓	✓				
		0852			PAI-10-SW-002-00			✓	✓	✓	✓	✓				
		1425		✓	PAI-10-SW-006-00			✓	✓	✓	✓	✓				

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Steve Barton	2000 7/28/98				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
			7/29/98 0845		

der No. 70440 (0693)

CHAIN OF CUSTODY RECORD

98077724

02273

23

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): Steve Baxter Scott Phelps

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOCs	SVOCs	Pest/PCBs	Total Metals	Dis. Metals	CN	TOC	pH	AVS/SEM	REMARKS
	7/28/98	0927		✓	PAI-10-SD-002-01	21	15	✓	✓	✓		✓	✓	✓	✓	
	7/28/98	0927		✓	PAI-10-SD-002-01D	7	5	✓	✓	~~✓~~		~~✓~~	✓	✓		Do not
	7/28/98	1045		✓	PAI-10-SD-003-01	8	5	✓	✓	✓		✓	✓	✓	✓	preserve
	7/28/98	1435		✓	PAI-10-SW-003-00	12	4	2	2	1	1	1	1			soils w/
	7/28/98	1445		✓	PAI-10-SW-007-00	12	4	2	2	1	1	1	1			sodium
																bisulfate.
					Trip Blank	1										
					Temp Blank	2										REACTNE

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Steve Baxter	1900 7/28/98				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
			7/30/98 0840		

(93)

A-285

CHAIN OF CUSTODY RECORD

9809011

02275

PROJECT NO.:	SITE NAME:
7803	MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Pelopher, Shay Banks

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest. PCBs	TAL Tot. Metals, Hardness	TAL Diss. Metals	TAL CN	NO3/NO2	TDS, TSS, Cl, F, SO4	TOC	REMARKS
1,2	8/31/98	1000		✓	PAI-10-GW-006-01	14	4	2	2	1	1	1	1	1	1	
3,4	8/31/98	1010		✓	PAI-10-GW-007-01	29	12	2	2	2	2	2	2	2	3	MS-morganics MS/MSD – organics *
5,6	8/31/98	1010		✓	PAI-10-GW-007-01D	14	4	2	2	1	1	1	1	1	1	duplicate
7,8	8/31/98	1228		✓	PAI-10-GW-008-01	14	4	2	2	1	1	1	1	1	1	
					temperature blank											
9					trip blank											

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth Pelopher	8/31/98 1530				
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: * hold PAI-10-GW-007-01 for 24 hours please.	
		Paul A Smith	9/1/98 8:30		

A-86

9804054

02276 . 2

CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): Steve 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	TAL CN	TOC	XXXXXXXX TCL TICs, C.F., SG	App. IX VOCs	App. IX SVOCs	App. IX Ref. Mats	App. IX Org. Pest.	App. IX Pesticides	App. IX Diss. Metals	App. IX Total Metals	MS/MSD CN
1,2	9/1/98	1148		✓	PAI-10-GW-009-01	32	4	2	2	1	1	1	1	1	1	4	4	2	2	1	2	1	1	1
	9/1/98	1325		✓	PAI-10-GW-007-01	6		4	2	◄				Completes aliquot requirements for MS/MSD										
					Temp Blank	2																		
					Trip Blank	2																		

(31)

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Steve Barton	9/1/98 1600	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:	
		Jean A Smith	9/2/98 8:30	Fed Ex Air Bill # 804098596990	

Order No. 70440 (0693)

A-287

X

CHAIN OF CUSTODY RECORD 980904 02277

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): Shya 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	TAL CN	IDC	NO3/NO2	TDS, TSS, Cl, F, SO4	REMARKS
	9/2/98	1130		✓	PAI-10-GW-010-01	13	4	2	2	1	1	1	1	1		
1)	9/2/98	1222		✓	PAI-10-GW-009-01	1							1	1		completes GW09 set
	9/2/98	1240		✓	PAI-10-GW-013-01	13	4	2	2	1	1	1	1	1		
					Trip Blank	2										
					Temp. Blank	1										

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Shya Barton	090298 1721	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:	
		Rose A Smith			

31

BBE-H

X

CHAIN OF CUSTODY RECORD

9809264

02278

24

PROJECT NO.:	SITE NAME:
7803	MCRD PARRIS ISLAND
SAMPLERS (SIGNATURE): Seth Pelopter / Martin Day	

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest./PCBs	TAL Metals	TCLP Metals	Reactivity	BOD	Corrosivity (pH only)	TDS, TSS	COD	Oil and Grease	Fecal Coliform	REMARKS
	9/10/96	~~1630~~ 1550		✓	PAI-10-IDW-S	5	5												
	9/11/96	1630	✓		PAI-10-IDW-S	6		1	1	1	1	1		1					
7	9/11/96	1630	✓		PAI-10-IDW-W	13	3	2	2	1		1	1	1	1	1	1		

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Seth Pelopter	9/10/96 1647				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): Abell Smith	DATE / TIME: 9/12 8:15	REMARKS: Soils reactive with preservative	

CHAIN OF CUSTODY RECORD 9809203 02280

PROJECT NO.:	SITE NAME:
7803	MCRD Parris Island, SC

SAMPLERS (SIGNATURE): Steve Barton

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pes/PCBs	TAL Diss. Metals	TAL Total Metals	CN	AVS/SEM	TOC	Pit	REMARKS
1)	9/9/98	1419	1	✓	~~PAI-10-SS-015-01~~ BACKGROUND SAMPLE	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	✓	✓		✓	✓	✓	✓	✓	
~~DUP~~ 7)	9/9/98	1242		✓	PAI-10-SW-016-01	12	4	2	2	1	1	1		1		
		1421		✓	PAI-10-SW-017-01	12	4	2	2	1	1	1		1		
	↓	1503		✓	PAI-10-SW-018-01	12	4	2	2	1	1	1		1		
					Trip Blanks	2										
					Temp Blanks	4										

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Steve Barton	9/10/98 2000	Fed Ex			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: for soil & sediment samples 16oz jars were collected on 9/9/98, encores on 9/10/98 due to holding time constraints.	
		Jane A Smith	9/11/98 8:55		

Order No. 70440 (0693)

4-250

CHAIN OF CUSTODY RECORD

9809294

02289

PROJECT NO.:	SITE NAME:
7803	MCRD Parris Island

SAMPLERS (SIGNATURE): Skip Barton

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	TCL Pest/PCBs	TAL Dis. Metals	TAL Total Metals Hardness	CN	NO3/NO2	TOC	TDS TSS Cl F SO4	REMARKS
	9/11/98	0907		✓	PAE-70-GW-012-01	14	4	2	2	1	1	1	1	1	1	
					Trip Blank	2										
					Temp Blank	2										

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Skip Barton	09/11/98	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:	
			98		

02290 16

9808370

CHAIN OF CUSTODY RECORD

PROJECT NO.: 7394

SITE NAME: MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth [signature], [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs, Pest./PCBs	TAL Total Metals, (N) AVS/SEM	TOC, pH, Cr (VI), diesel fuel extractables			REMARKS
2	8/13/98	0605		✓	PAI-unknown	4	1	1	1	1			no preservative, samples are reactive

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth [signature]	8/13/98 0605				

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] Smith	8/14/98 1845	

Order No. 70440 (0693)

A-292

CHAIN OF CUSTODY RECORD

9808616

02295

PROJECT NO.:	SITE NAME:
7803	PARRIS ISLAND

SAMPLERS (SIGNATURE): Sarah Barker

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	App. IX VOCs	App. IX SVOCs	App. IX Diss. Metals	App. IX Tot. CN	App. IX Tot. Metals (Hardness)	App. IX Tot. PCBs	App. IX organo. pesticides	App. IX Herbicides	App. IX NOCs	TOC	TDS/TSS, Cl, F, SO4, NO3/NO2	REMARKS
1,2	8/04/98	1112		G	PAL-10-GW-980804	22	4	2	1	1	1	2	1	2	4	1	1	1	1	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Seth Pelz	8/04/98 1639				
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:	
		Paul Smith	8/5/98 8:45		

Order No. 70440 (0693)

4-23

X

CHAIN OF CUSTODY RECORD

9808552

02297

PROJECT NO.:	SITE NAME:
7803	MCRD PARRIS ISLAND / JERICHO ISLAND

SAMPLERS (SIGNATURE): Skip Barlem

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
1/2	8/20/98	1650		✓	PAI-10-GW-001-01	15	4	2	2	1	1	1	1	1	1	1
3/4	8/20/98	1402		✓	PAI-10-GW-002-01	15	4	2	2	1	1	1	1	1	1	1
5				✓	trip blank	2	2									
				✓	temperature blank	3										

A-294

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Seth Pelham	8/20/98 1619				
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:	
			8/21/98 0915		

Order No. 704[illegible](0693)

CHAIN OF CUSTODY RECORD

9808370

02299

14

PROJECT NO.:	SITE NAME:
7803	MCRD PARRIS ISLAND

SAMPLERS (SIGNATURE): Seth Pelepko

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs, Pest./PCBs, TAL Total Metals (N), AVS/SEM	TOC/pH			REMARKS
1)	8/13/98	0730		✓	PAI-10-SD-014-02	8	5	1 / 1	1			no preservative, samples are reactive
					temperature blank	1						
3)					trip blank	2	2					

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
Seth Pelepko	8/13/98 0907				
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]	8/14/98 8:45		

4-25

CHAIN OF CUSTODY RECORD

9807676

13

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): Skip Barton Seth Pelgen

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOCs	TCL SVOCs	Pest./PCBs	Total Metals/ Hardness	Dissolved Metals	Cyanide	TOC	REMARKS
1, 2	7/24/98	1227		✓	PAI-10-SW-004-00	11	3	2	2	1	1	1	1	
3, 4	7/24/98	1242		✓	PAI-10-SW-005-00	11	3	2	2	1	1	1	1	

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
	7/27/98 0600				
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	7/28/98 9:20		

Order No 70440 (0693)

A-226

X

02250

6

CHAIN CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7803	Jericho Island

SAMPLERS (SIGNATURE): [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	pH, TOC	REMARKS
1	7/23/98	0730		X	PAI-10-SB-006-06	1	✓	1-16oz
2	7/23/98	0730/1634		X	PAI-10-SB-007-24	1	✓	1-16oz

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
[signature]	7/23/98 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	7/23/98 1600		

Order No. 70440 (0693)

nc seal 3.8°

X

02246

CHAIN CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7803	JERICHO Island

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TOC	pH					REMARKS
1	7/23/98	0815		X	PAL-10-SB-002-10	1	✓						1-16 OZ JAR

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	7/23/98 1442				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	7-24-98 18:30		

Order No. 70440 (0693)

A-298

02227

CHAIN OF CUSTODY RECORD

9912S253

PROJECT NO.:	SITE NAME:
N 0095	MCRD Parris Island

SAMPLERS (SIGNATURE): Larry Gunter / Jeanne R. [illegible]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TAL metals Cyanide	TAL metals	PAH	Tot. Dis. Solids	TCL PCBs	TCL SVOCs	TCL Pest/PCBs	TCL VOCs	TCL PAHs	Add. App. IX VOCs	All App. IX SVOCs	All App. IX Pest	App. IX SVOCs	App. IX Pest Herbicides	REMARKS	App. IX Non-Hal. VOCs
1	12/14/99	1155		✓	PAI-35-GW-01-01	3	X	X	X	X												
2	12/14/99	1000		✓	PAI-27-SS-03-01	1				X												
3	12/14/99	1025		✓	PAI-27-SS-04-01	1				X												
4	12/14/99	1010		✓	PAI-27-SS-05-01	1				X												
5	12/14/99	0835		✓	PAI-35-SS-04-01	1	X	X	X													
6	12/14/99	0820		✓	PAI-35-SS-05-01	1	X	X	X													
7	12/14/99	0845		✓	PAI-35-SS-06-01	1	X	X	X													
8	12/15/99	0800		✓	PAI-10-SD-~~08~~20 66-01	1	X	X			X	X	X									
9	12/15/99	0820		✓	PAI-10-SD-19-01	1	X	X			X	X	X									
002 10	12/14/99	1300		✓	PAI-07-GW-04-01	11	X	X	X	MS/MSD	X	X		X	X	X	X	X	X	X			X
003 11	12/14/99	1800		✓	PAI-07-GW-DU04-01	11	X	X	X	MS/MSD	X	X		X	X	X	X	X	X	X			X
004 12	12/14/99	1345		✓	PAI-04-GW-01-01	11	X	X	X	MS/MSD	X	X		X	X	X	X	X	X	X			X
005 13	12/14/99	1400		✓	PAI-13C-GW-01-01		X	X	X	X				X	X								
006 14	12/14/99	-		-	Trip Blank	2								X								

A-299

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Larry Gunter	12/14/99 1730				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS: Results & Questions to: Dave Brzyack 412-921-8315	
		Jeffrey A. Jones	12/17/99 1640		

Order No. 70440 (0693)

2 1 2.4 2.0

WR1345

FRA TECH NUS, INC. — CHAIN OF CUSTODY — NUMBER 042701 — PAGE 1 OF

PROJECT NO: 7803 a 7394	SITE NAME: Jericho Island a site 1
PROJECT MANAGER AND PHONE NUMBER: Dave Brayack 412-921-8375	LABORATORY NAME AND CONTACT: Katahdin, Andrea Colby 207-874-2400
SAMPLERS (SIGNATURE): David Brayack	FIELD OPERATIONS LEADER AND PHONE NUMBER: Jason Brown 412-921-8401
ADDRESS: 340 County Road No. 5	CARRIER/WAYBILL NUMBER: 8 FEDEX 8216-5043-9127
CITY, STATE: Westbrook, ME 04098	STANDARD TAT [X] RUSH TAT [ ] 24 hr. [ ] 48 hr. [ ] 72 hr. [ ] 7 day [ ] 14 day

DATE (YEAR 2001)	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: TCL PAHs (346 8310)	TCL Pesticides	Copper, Lead, Mercury	Arsenic	TOC	Pentachlorophenol	COMMENTS
						G	—							
4/26	1230	PA1-10-SS-12-02	~~Solid~~ Soil	G	1			X				X		
4/26	1150	PA1-10-SS-08-02	~~Solid~~ Soil	G	1			X						
4/26	1550	PA1-01-SD-26-01	Soil	G	3			X		X				
4/26	1605	PA1-01-SD-23-01	Soil	G	3			X		X				
4/26	1625	PA1-01-SD-25-01		G	3			X		X				
4/26	1615	PA1-01-SD-24-01		G	3			X		X				
4/26	1735	PA1-01-SD-22-01		G	1				X					
4/26	1739	PA1-01-SD-21-01		G	1				X					
4/26	1754	PA1-01-SD-20-01		G	4			X	X	X		X		
4/26	1805	PA1-01-SD-19-01		G	4			X	X	X		X		
4/26	1815	PA1-01-SD-18-01		G	4			X	X	X		X		

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	4/27	1300	1. RECEIVED BY Shelly Will	04-28-01	1030
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: Call Dave Brayack with questions

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

A-2994

WK1345

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 042701 | PAGE 1 OF 1

PROJECT NO: 7803a 7394	SITE NAME: Jericho Island a site 1	PROJECT MANAGER AND PHONE NUMBER: Dave Bragack 412-921-8375	LABORATORY NAME AND CONTACT: Katahdin, Andrea Colby 207-874-2400
SAMPLERS (SIGNATURE): David Byrk		FIELD OPERATIONS LEADER AND PHONE NUMBER: Jason Brown 412-921-8401	ADDRESS: 340 County Road No. 5
		CARRIER/WAYBILL NUMBER: FEDEX 8216-5043-9127	CITY, STATE: Westbrook, ME 04098

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (Year 2001)	TIME	SAMPLE ID	MATRIX	GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: TCL PAHs (8270 8310)	TCL Pesticides	Copper, Lead, Mercury	Arsenic	TOC	Pentachlorophenol	COMMENTS
						G	—							
4/26	1230	PAI-10-SS-12-02	~~Solid~~ Soil	G	1			X				X		
4/26	1150	PAI-10-SS-08-02	~~Solid~~ Soil	G	1			X						
4/26	1550	PAI-01-SD-26-01	Soil	G	3			X		X		X		
4/26	1605	PAI-01-SD-23-01	Soil	G	3			X		X		X		
4/26	1625	PAI-01-SD-25-01		G	3			X		X		X		
4/26	1615	PAI-01-SD-24-01		G	3			X		X		X		
4/26	1735	PAI-01-SD-22-01		G	1						X			
4/26	1739	PAI-01-SD-21-01		G	1						X			
4/26	1754	PAI-01-SD-20-01		G	4			X	X	X		X		
4/26	1805	PAI-01-SD-19-01		G	4			X	X	X		X		
4/26	1815	PAI-01-SD-18-01		G	4			X	X	X		X		

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	4/27	1300	1. RECEIVED BY Shelly Lilley	04-28-01	1030
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: Call Dave Bragack with Questions

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

3/99

A-294 B

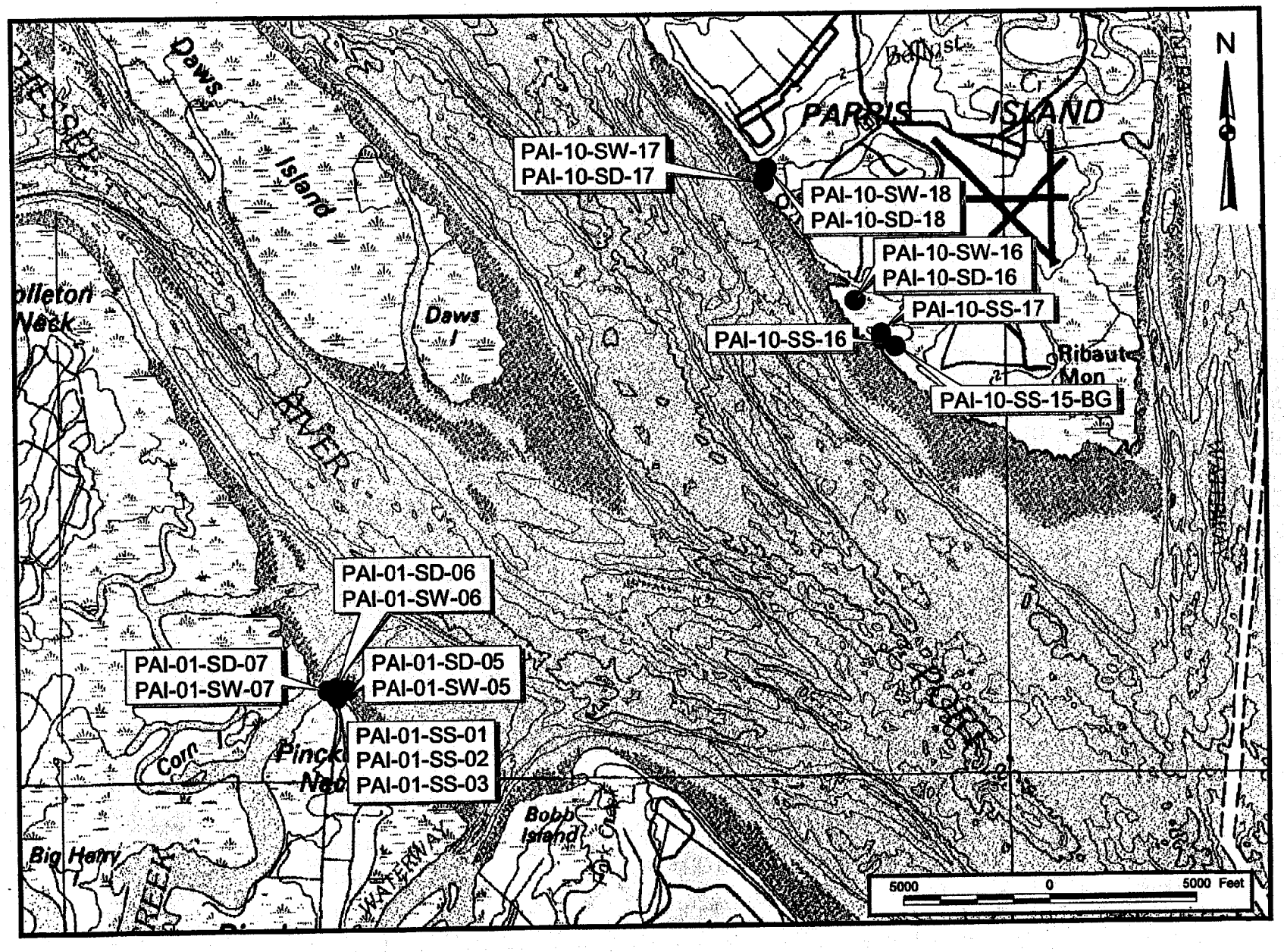
A-13

BACKGROUND SAMPLE DESCRIPTION, LOCATION, AND SUPPORTING COLLECTION DATA

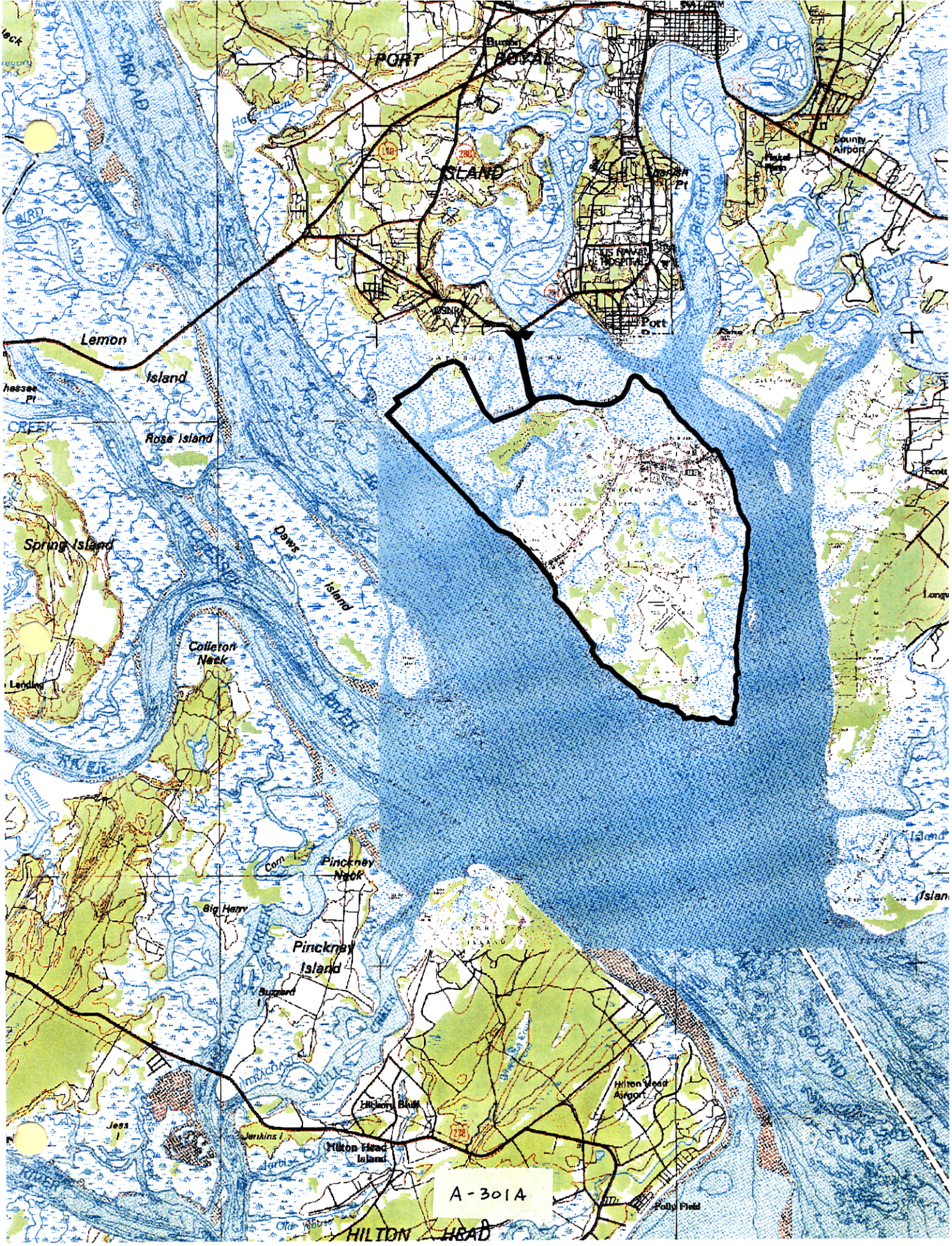
BACKGROUND SAMPLE DESCRIPTION
PARRIS AND PINCKNEY ISLANDS
MCRD PARRIS ISLAND, SOUTH CAROLINA

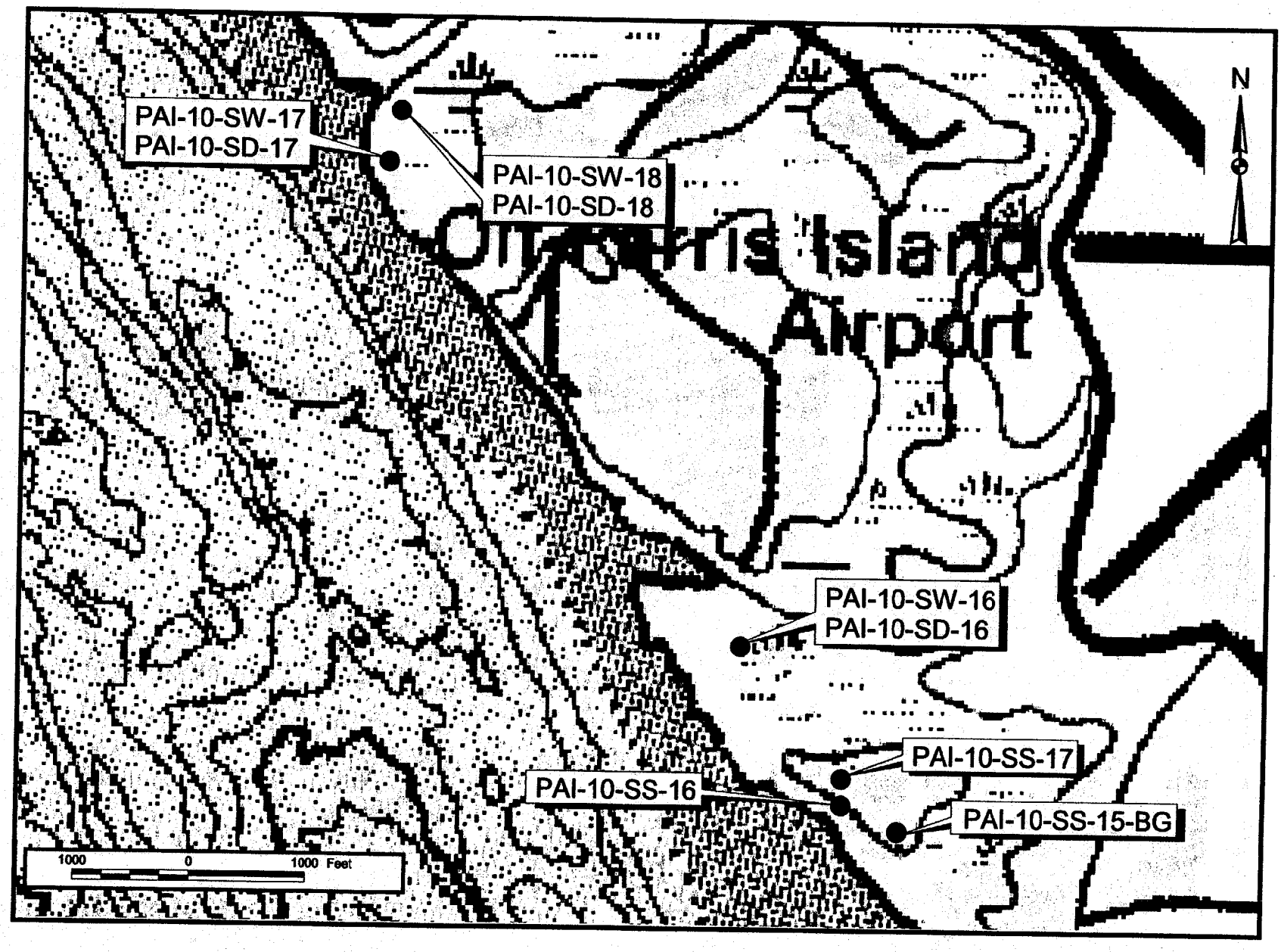
Sample Location	Sample Description
Surface Water	
PAI-01-SW-05*	Saline surface water sample collected on the northern edge of Pinckney Island at a submerged low tide elevation point.
PAI-01-SW-06*	Saline surface water sample collected in an intertidal area approximately 50 ft west of PAI-01-SW-05.
PAI-01-SW-07*	Saline surface water sample collected from flowing water at a point southwest of PAI-01-SW-05 and PAI-01-SW-06 over a high tide tidal flat in the marsh area.
PAI-10-SW-16	Saline surface water sample collected from a tidal stream adjacent to the Broad River, along the southwestern edge of Parris Island.
PAI-10-SW-17	Saline surface water sample collected from a tidal stream adjacent to the Broad River, along the southwestern edge of Parris Island.
PAI-10-SW-18	Saline surface water sample collected from a tidal stream adjacent to the Broad River, along the southwestern edge of Parris Island.
Sediment	
PAI-01-SD-05*	Sediment sample collected from the northern edge of Pinckney Island at a submerged low tide elevation point. Sample consisted of fine/medium grain sand.
PAI-01-SD-06*	Fine, medium grain sand sample collected in an intertidal area approximately 50 ft west of PAI-01-SD-05.
PAI-01-SD-07*	Collected from flowing water at a point west of PAI-01-SD-05 and PAI-01-SD-06, over a high tide tidal flat in the marsh area. Sample consisted of fine/medium grain sand.
PAI-10-SD-16	Silty clay sediment sample collected on the southwestern edge of Parris Island, near the Broad River
PAI-10-SD-17	Sediment sample with clay mud consistency collected approximately 500 ft south of the Ballast Creek on the southwestern edge of Parris Island.
PAI-10-SD-18	Sediment sample with clay mud consistency collected approximately 500 ft northeast of location PAI-10-SD-17.
Surface Soil	
PAI-01-SS-01*	Soil sample with fine/medium grain sand collected on the northern edge of Pinckney Island.
PAI-01-SS-02*	Located east of PAI-01-SS-01, consisting of fine/medium grain sand.
PAI-01-SS-03*	Fine/medium grain sand sample located southeast of PAI-01-SS-01.
PAI-10-SS-15	Silty, fine sand sample collected in a forest area on the southwestern edge of Parris Island.
PAI-10-SS-16	Collected in a forest area on the southwestern edge of Parris Island, approximately 600 ft northwest of PAI-01-SS-15. Surface soil sample consisted of silty fine sand.
PAI-10-SS-17	Silty, fine sand sample collected in a forest area on the southwestern edge of Parris Island, approximately 250 ft north of PAI-10-SS-16.

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

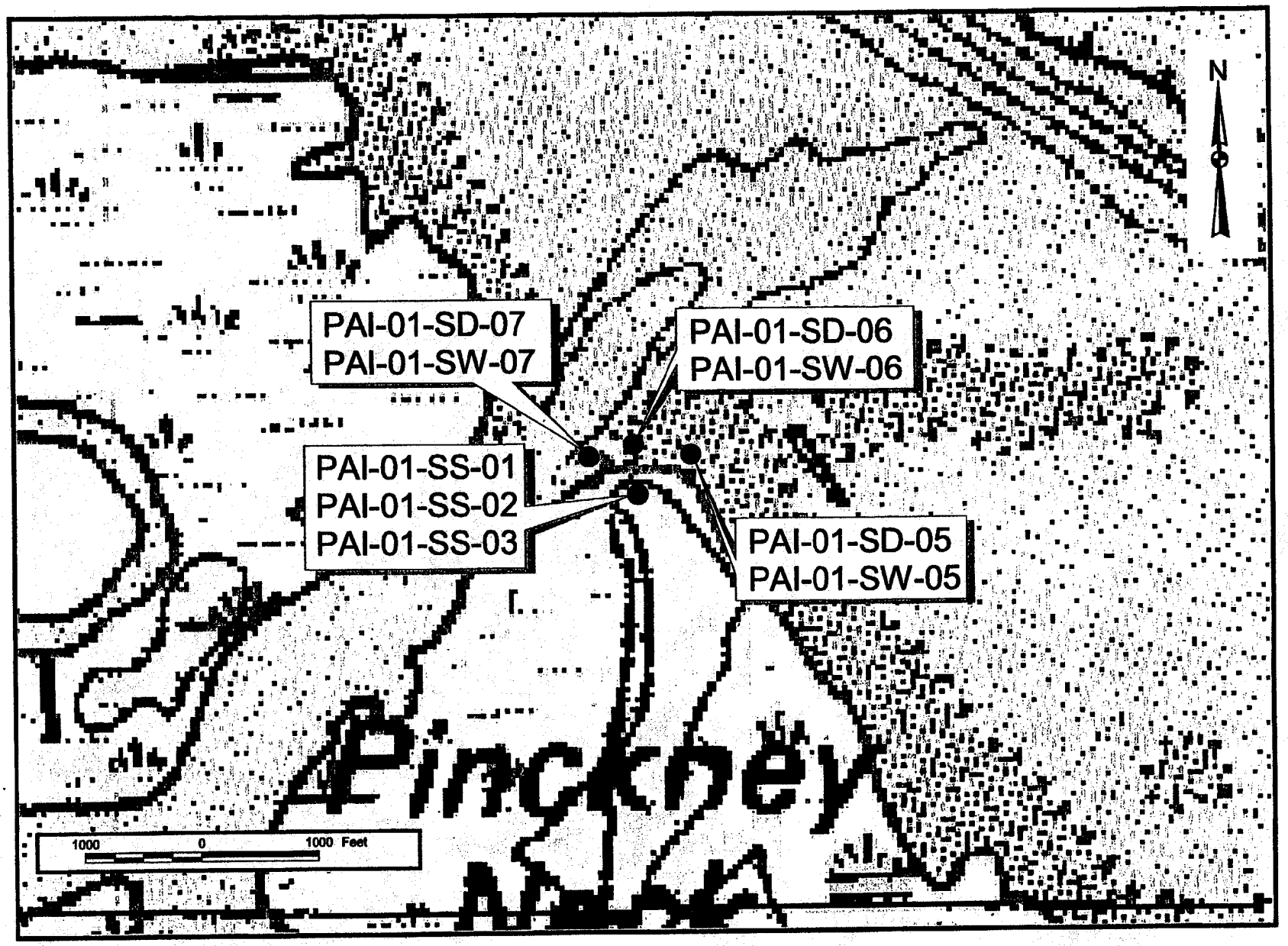

PAI-10-SW-17
PAI-10-SD-17
PAI-10-SW-18
PAI-10-SD-18
PAI-10-SW-16
PAI-10-SD-16
PAI-10-SS-17
PAI-10-SS-16
PAI-10-SS-15-BG
PAI-01-SD-06
PAI-01-SW-06
PAI-01-SD-07
PAI-01-SW-07
PAI-01-SD-05
PAI-01-SW-05
PAI-01-SS-01
PAI-01-SS-02
PAI-01-SS-03
PARRIS
ISLAND
Daws
Island
RIVER
Daws
I
Ribaut
Mon
Corn
Bobb
Island
Big Harry
N
5000
0
5000 Feet

A-301


PORT
ROYAL
ISLAND
Lemon
Island
Rose Island
Spring Island
Daws
Island
Colleton
Neck
Pinckney
Neck
Pinckney
Island
Big Harry
Buzzard
Jess
Jenkins I.
Hilton Head
Island
Hilton Head
Airport
Polly Field
HILTON HEAD
A-3014


PAI-10-SW-17
PAI-10-SD-17
PAI-10-SW-18
PAI-10-SD-18
Christmas Island
Airport
N
PAI-10-SW-16
PAI-10-SD-16
PAI-10-SS-17
PAI-10-SS-16
PAI-10-SS-15-BG
1000 0 1000 Feet

A-302


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
N
1000 0 1000 Feet
Pinckbey

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:

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

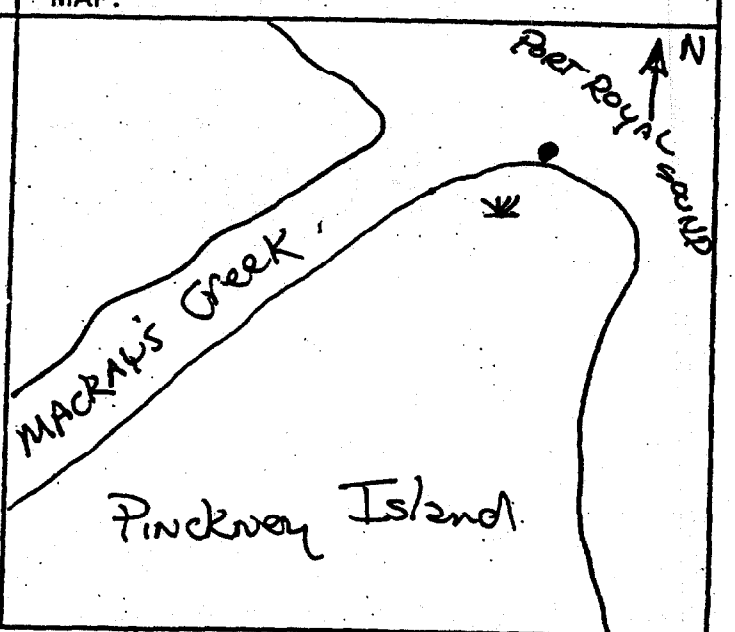
SAMPLE COLLECTION INFORMATION:

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):

A-306

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI01 SW06
Sample Location: PINCKNEY Is.
Sampled By: 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:

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

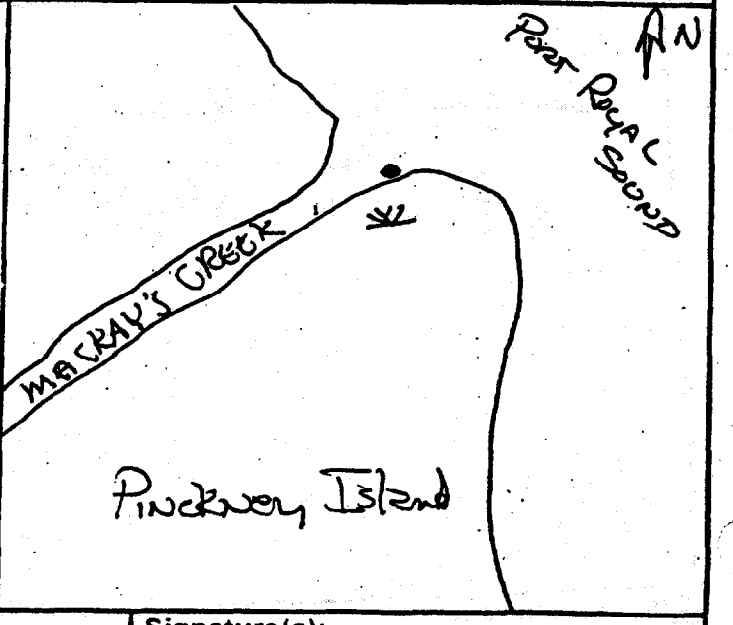
SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

Sample area chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 1394

Sample ID No.: PAI 01 SW 07
Sample Location: PINCKNEY IS.
Sampled By: RLM / JFL
C.O.C. No.: 01366

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

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

SAMPLING DATA:

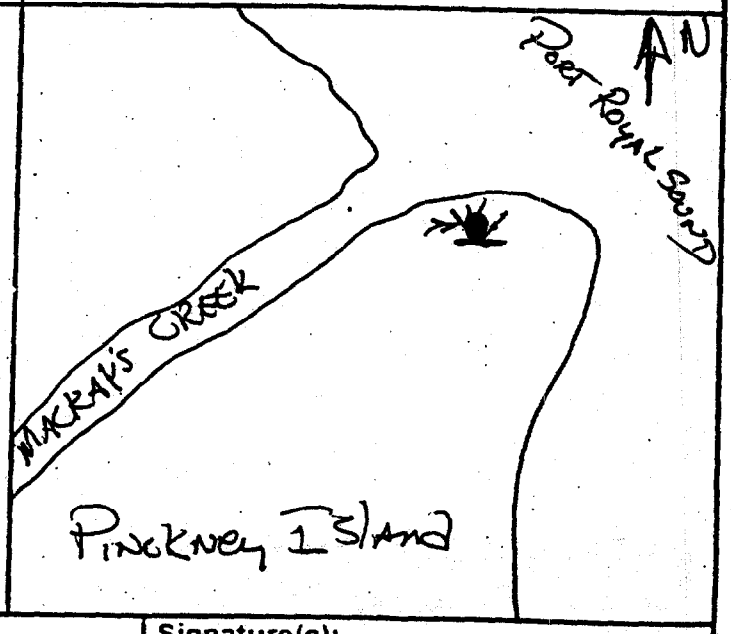
Date: / Time: / Depth: / Method:	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Grab		6.8	38.0	31	18	11.4	2.4	

SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: 7803

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

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

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

SAMPLING DATA:

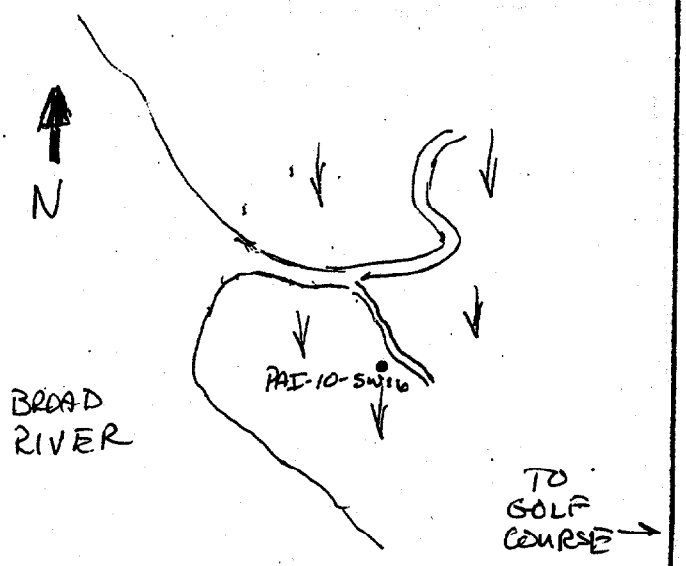
Date: 091098 / Time: 1242	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: Surface / Method: Grab	cloudy	6.72	44.3	27.4	7	3.25	2.87	secchi disk 0.75 ft.

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements (ml)	Collected
VOCs	HCL	40 VOAs	3 4
SVOCs		1000 amber	2
Pest./PCBs		1000 Amber	2
Total Metals/Hardness	HNO_3	1000 plastic	1
Dissolved (Filtered) Metals	HNO_3	1000 plastic	1
Cyanide	NAOH	250 plastic	1
Hexchromium		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): Stephanie Barton

SURFACE WATER SAMPLE LOG SHEET

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

Sample ID No.: PAI-10-SW-17-01
Sample Location: PAI-10-SW17
Sampled By: Skip Barten
C.O.C. No.: 2280

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

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

SAMPLING DATA:

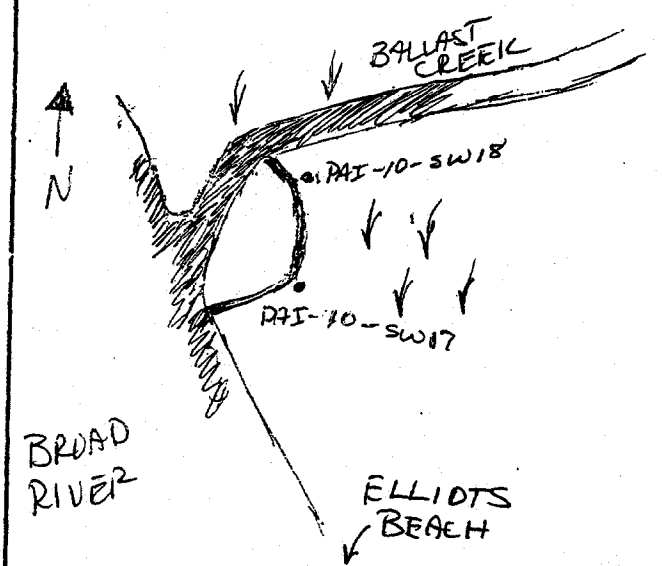
Date: 09/09/98	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1421	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Depth: Surface	Clear	7.65	44.7	28.7	-9	4.64	2.91	Secchi disk 1.35 ft
Method: Grab								

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): Skip Barten

SURFACE WATER SAMPLE LOG SHEET

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

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

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

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

SAMPLING DATA:

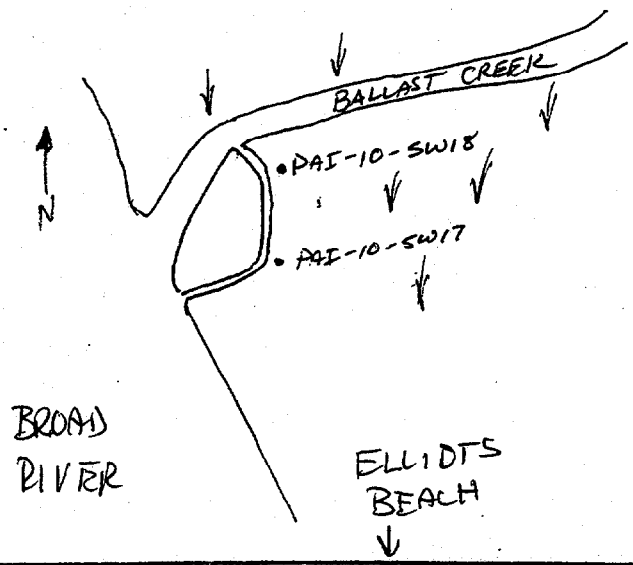
Date: / Time:	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA
Depth: / Method: Grab	Cloudy	7.51	44.5	28.4	23	3.79	2.9	secci disk 0.25 ft.

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	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): Shuf Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI 01 SD05
Sample Location: Pinckney Is.
Sampled By: RCM / JH
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: 052798	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1240	0-6"	lt. br. - 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):				

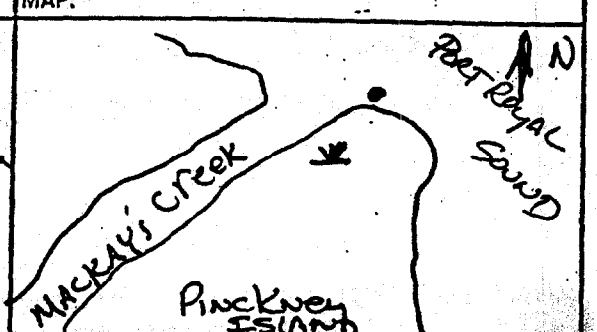
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE Samples	✓	
TCL SVOCs	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: RAM/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"	Mbr.-blk.	fn.-med. gr. sd.
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

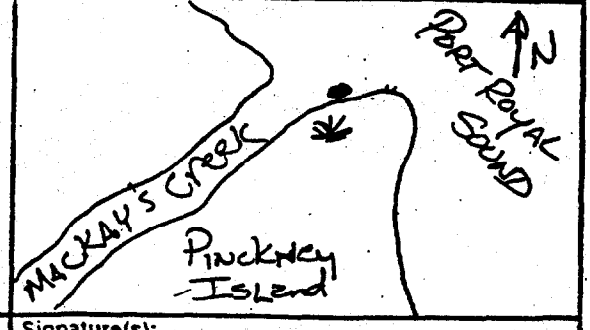
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.s	5 ENCORE SAMPLES	✓	
TCL SVOC.s	1/602	✓	
TAL METALS (TOTAL)	1/602	✓	
CYANIDE	1/602	✓	
TCL PESTICIDES / PCBs	1/602	✓	
TOC	1/602	✓	
PH	1/602	✓	
~~HEXAVALENT CHROMIUM~~	~~1/602~~		

OBSERVATIONS / NOTES:

Sample Area chosen by Diane Duncan SC Fish & Wildlife

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

SOIL & SEDIMENT SAMPLE LOG SHEET

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

Sample ID No.: PAI01SD07
Sample Location: Pinckney Isl.
Sampled By: RLM/JCL
C.O.C. No.: 01307

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

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

GRAB SAMPLE DATA:

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

COMPOSITE SAMPLE DATA:

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

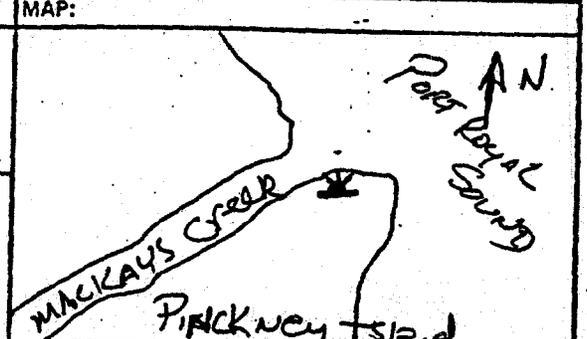
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE Samples	✓	
TCL SVOC.A	1602	✓	
TAL METALS (TOTAL)	1602	✓	
CYANIDE	1602	✓	
TCL PESTICIDES/PCBS	1602	✓	
TOC	1602	✓	
PH	1602	✓	
~~HEXAVALENT CHROMIUM~~	~~1602~~		

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

Page 1 of 1

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

Sample ID No.: ~~PAI-10-SD-016-01~~ PAI-10-SD16-01
Sample Location: PAI-10-SD16
Sampled By: Shep Barton
C.O.C. No.: 2080

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

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

GRAB SAMPLE DATA:

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

COMPOSITE SAMPLE DATA:

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

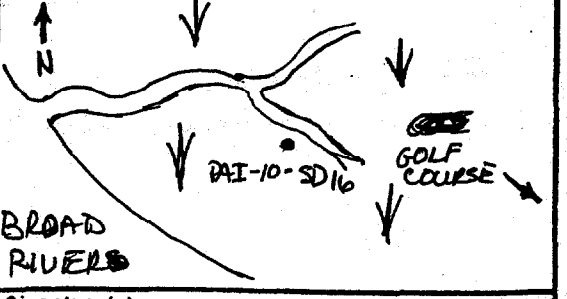
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOCs	5 ENCORE SAMPLES	5	
TCL SVOCs	1 x 8oz	TOTAL OF 3	
TAL METALS (TOTAL)	1 x 8oz	16 OZ JARS	
CYANIDE	1 x 8oz		
TCL PESTICIDES / PCBs	1 x 8oz		
TOC	1 x 8oz		
PH	1 x 8oz		
~~HEXAVALENT CHROMIUM~~	1 x 8oz		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES COLLECTED @ 0900 on 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Barton

SOIL & SEDIMENT SAMPLE LOG SHEET

PAI-10-SD-16-01A

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

Sample ID No.: ~~PAI-10-SD-01A~~
Sample Location: PAI-10-SD16
Sampled By: GG, RD
C.O.C. No.: ~~2213~~ 2212

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

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

GRAB SAMPLE DATA:

Date: 12/15/98 Time: 1245 Method: Grab Monitor Reading (ppm): NA	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0. - 0.5 FT	Dark Gray	Silty Clay, V. moist

COMPOSITE SAMPLE DATA:

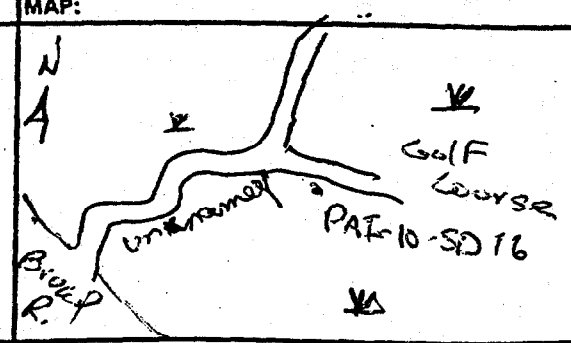
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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

Sample ID No.: ~~PAI-10-SD-17-01~~ PAI-10-SD-17-01
Sample Location: ~~PAI-10-SD17~~ PAI-10-SD17
Sampled By: Greg Bentley
C.O.C. No.: 2280

[] Surface Soil
[] Subsurface Soil
[X] 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:	0-0.5 ft.	dk. gray/ black	clay mud, saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

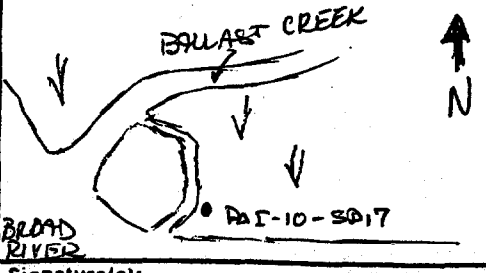
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A.	5 ENCORE SAMPLES	5	
TCL SVOC.A	1602	Total of 3	
TAL METALS (TOTAL)	1602	1602 jars	
CYANIDE	1602		
TCL PESTICIDES / PCBS	1602		
TOC	1602		
PH	1602		
~~HEXAVALENT CHROMIUM~~	1602		

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): Greg Bentley

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD - Jericho Island
Project No.: T803

Sample ID No.: ~~PAI-10-SD-017-01A~~ PAI-10-SD-17-01A
Sample Location: PAI-10-SD17
Sampled By: GG, RD
C.O.C. No.: 2212

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

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

GRAB SAMPLE DATA:

Date: 12/15/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1200	0-0.5FT	Dark Gray/Black	Clay mud, saturated
Method: GRAB			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

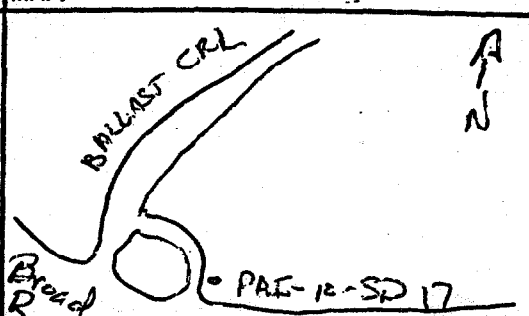
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Gary L Gunter

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~7394~~ 7803

Sample ID No.: ~~PAI-10-SD-018-01~~ PAI-10-SD-18-01
Sample Location: PAI-10-SD18
Sampled By: Shep Bowman
C.O.C. No.: 2280

- [ ] Surface Soil
- [ ] Subsurface Soil
- [X] 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:	0-0.5 ft	drk. gray	clay mud, saturated
Method: Grab			
Monitor Reading (ppm):			

COMPOSITE SAMPLE DATA:

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

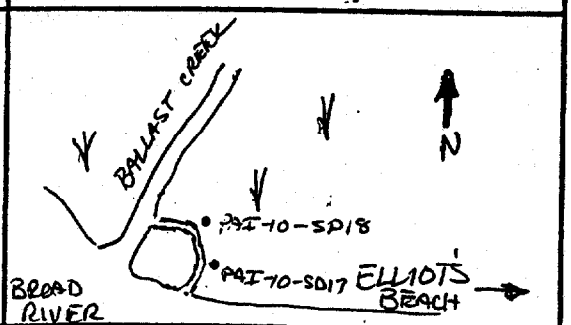
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.A	5 ENCORE SAMPLES	5	
TCL SVOC.A	1/6 oz	Total of 3	
TAL METALS (TOTAL)	1/6 oz	16 oz Jars	
CYANIDE	1/6 oz		
TCL PESTICIDES / PCBS	1/6 oz		
TOC	1/6 oz		
PH	1/6 oz		
~~HEXAVALENT CHROMIUM~~	1/6 oz		

OBSERVATIONS / NOTES:

Due to shipping constraints VOC samples were collected @ 1515 on 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Shep Bowman

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-18-01A
Sample Location: PAI-10-SD18
Sampled By: RD, GG
C.O.C. No.: 2212

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

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

GRAB SAMPLE DATA:

Date: 12/15/98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1200	0-0.5 Ft	dark Gray	Clay mud, Saturated
Method: Grab			
Monitor Reading (ppm): NA			

COMPOSITE SAMPLE DATA:

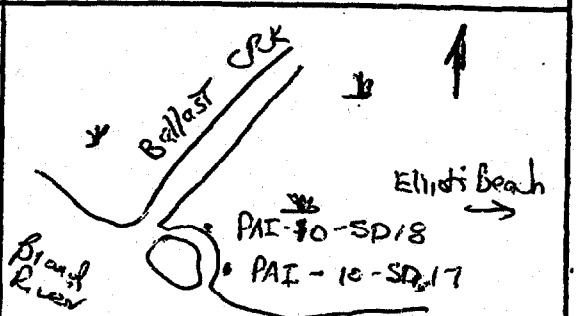
Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

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:

Date: 060198	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1015	0-1'	H.br.	fn.-med. sd., dry
Method: Grab			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

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

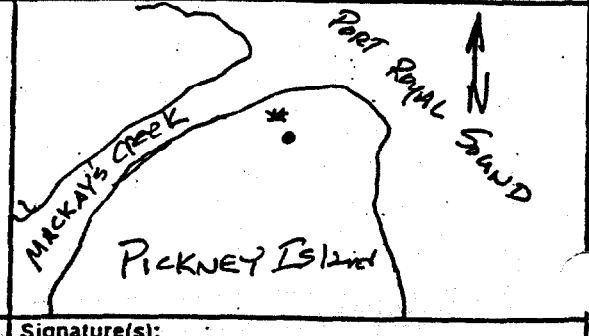
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.s	5 ENCORE Samples	✓	
TCL SVOC.s	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBs	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~PH~~	~~4 oz~~		
~~HEXAVALENT CHROMIUM~~	~~4 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.: PAI 015S00201
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:

Date: 060198	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1030	0-1'	H.Br.	fn.-med. sd. dry
Method: Grab			
Monitor Reading (ppm): —			

COMPOSITE SAMPLE DATA:

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

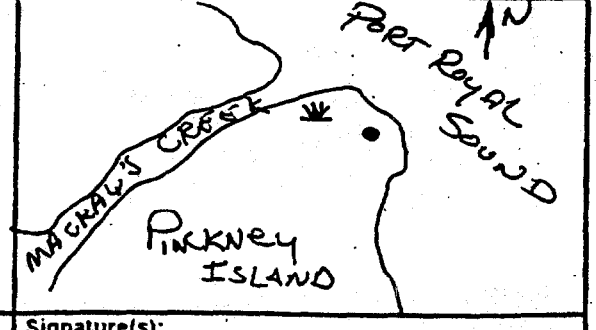
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL 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.: 7394

Sample ID No.: PAI055 00301
Sample Location: Pinckney Is.
Sampled By: RLM LHL
C.O.C. No.: 00263

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

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

GRAB SAMPLE DATA:

Date: 060198 / Time: 1055 / Method: Grab / Monitor Reading (ppm):	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-1'	lt. br.	fn.-med. sd. dry

COMPOSITE SAMPLE DATA:

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

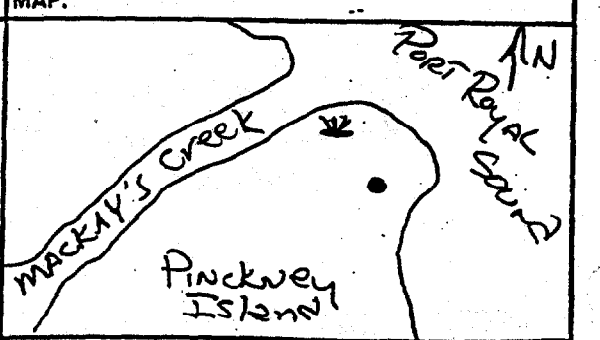
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC's	5 ENCORE SAMPLES	✓	
TCL SVOC's	16 oz	✓	
TAL METALS (TOTAL)	16 oz	✓	
CYANIDE	16 oz	✓	
TCL PESTICIDES / PCBs	16 oz	✓	
~~TOC~~	~~16 oz~~		
~~OIL~~	~~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

PAI-10-SS-15-01

Project Site Name: MCRD PARRIS ISLAND
Project No.: ~~9314~~ 7803

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

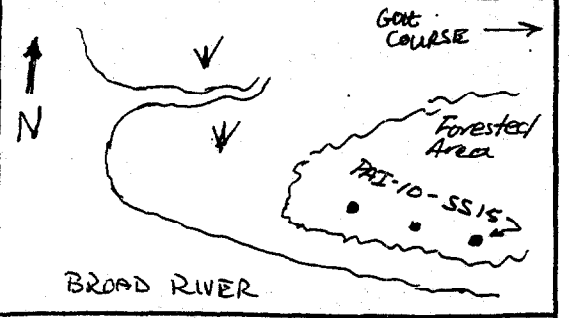
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC's	5 ENCORE SAMPLES	5	
TCL SVOC's	16 oz	Total of 3	
TAL METALS (TOTAL) MS/SOM	16 oz	16oz jars	
CYANIDE	16 oz		
TCL PESTICIDES / PCBS	16 oz		
TOC	16 oz		
PH	16 oz		
~~HEXAVALENT CHROMIUM~~	16 oz		

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES WERE COLLECTED @ ~~1444~~ 0813 ON 09/10/98 SB 09/10/98

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: ~~Shyf 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: 09 09 98	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1440	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):				

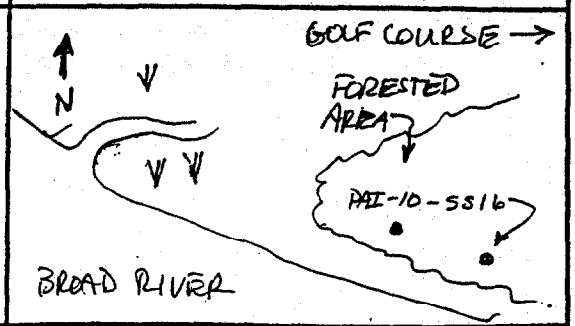
SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TCL VOC.s	5 ENCORE SAMPLES	5	
TCL SVOC.s	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 09/09/98

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Shyf 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: Skip 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 / Time: 1455 / Method: dise. trowel / Monitor Reading (ppm):	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
	0-1 ft.	lt. gray	silty fine sand, dry, no odor

COMPOSITE SAMPLE DATA:

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

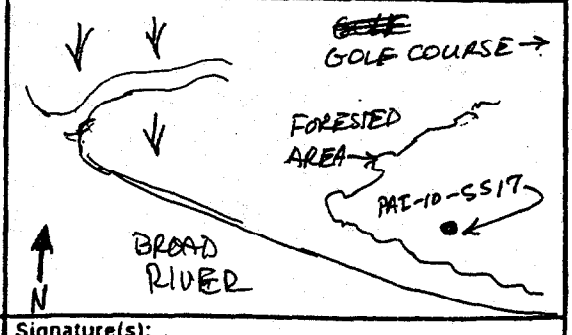
SAMPLE COLLECTION INFORMATION:

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

OBSERVATIONS / NOTES:

DUE TO SHIPPING CONSTRAINTS VOC SAMPLES WERE COLLECTED @ 0835 on 091098

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Skip Barton

00263

CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7394	MCRD Parris Is.

SAMPLERS (SIGNATURE):

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC	TCL SVOC (5 Encores)	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~~ 10 ~~12~~ 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 1900				
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) 56324; no seals	

Order No. 70440 (0693)

A-327

01306

29

CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7394	Pine Knoll Island

SAMPLERS (SIGNATURE): [signature] / [signature]

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC FIRST 40 ml.	TCL SVOC 1000 ml. Amber	TAL Metals + HNO3 Hardness 1000 ml. plastic	TAL Metals HNO3 Filtered 1000 ml plastic	TCL Pest/PCB 1000 ml. Amber	TOC + H2SO4 1000 ml. plastic	Cn + NaOH 250 ml. plastic	pH 1000 ml. plastic	REMARKS
	0527 98	12 40		✓	PAI 01 SW05	12	✓	✓	✓	✓	✓	✓	✓	✓	
	0527 98	13 30		✓	PAI 01 SW06	12	✓	✓	✓	✓	✓	✓	✓	✓	
	0527 98	14 00		✓	PAI 01 SW 07	12	✓	✓	✓	✓	✓	✓	✓	✓	
					Temp. BLANK	2									each Cooler
					Trip Blank	2	✓								Cooler # 1 of 2

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	052798 1845				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	5/28/98 1120		

Order No. 70440 (0693)

56356, 56304, 56360
(12.9, 1.6, 7.3)(8.4, 7.0, 6.0), 6.0

A-328

01307 29

CHAIN OF CUSTODY RECORD

PROJECT NO.:	SITE NAME:
7394	Pinckney Island

SAMPLERS (SIGNATURE): [signature] Jana K Laffey

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	TCL VOC (5) Bottles	TCL SVOC 16oz.	TAL Metals + CN 16oz.	TCL Pest/PCB 16oz.	TOC, PH 16oz.		REMARKS
	0527 98	12 40		✓	PAI 01 SD 05	6	✓	✓	✓	✓	✓		
	0527 98	13 30		✓	PAI 01 SD 06	6	✓	✓	✓	✓	✓		
	0527 98	14 00		✓	PAI 01 SD 07	6	✓	✓	✓	✓	✓		

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
[signature]	052798 1845				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY(SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		[signature]	5/28/98 1420		

Order No. 78440 (0693)

56352, 52304, 52360 (12.9, 1.6, 7.8)(8.4, 7.0,), 6.0°C

A-329

CHAIN OF CUSTODY RECORD

9810118

02212

A-330

PROJECT NO.: 7803	SITE NAME: Jericho Island
SAMPLERS (SIGNATURE): Gary L Gunter [signature]	

STATION NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	PAH SW846 8310						REMARKS
15	12/14/98	1240		X	PAI-10-SD-002-01DA	1	✓						Duplicate
16	12/14/98	1240		X	PAI-10-SD-002-01A	1	✓						MS
17	12/14/98	1240		X	PAI-10-SD-002-01DA	1	✓						MSD
18	12/14/98	1507		X	PAI-10-SD-014-02A	1	✓						
19	12/14/98	1458		X	PAI-10-SD-015-01A	1	✓						
20	12/15/98	1200		X	PAI-10-SD-018-01A	1	✓						
21	12/15/98	1200		X	PAI-10-SD-017-01A	1	✓						
22	12/15/98	1245		X	PAI-10-SD-016-01A	1	✓						

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Gary L Gunter	12/15/98 1500				
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): Josie A Smith	DATE / TIME: 12/16/98 840	REMARKS: Questions To DAVE Brayack TETRATECH - Pittsburgh 412-921-8375	

Order No. 70440 (0693)

CHAIN OF CUSTODY RECORD

9809265

02280

PROJECT NO.:	SITE NAME:
7803	MCRD Parris Island, SC

SAMPLERS (SIGNATURE): Steve 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	CN	AVS/SEM	TOC	PH	REMARKS
1)	9/9/98	1419	1	✓	PAI-10-SS-015-01	8	5	✓	✓		✓	✓	✓			VOCs (encores)
2)		1440		✓	PAI-10-SS-016-01	8	5	✓	✓		✓	✓	✓			collected on 9/10/98
3)	↓	1455		✓	PAI-10-SS-017-01	8	5	✓	✓		✓	✓	✓			
4)	9/9/98	1527		✓	PAI-10-SD-016-01	8	5	✓	✓		✓	✓	✓	✓	✓	soils are
5)		1623		✓	PAI-10-SD-017-01	8	5	✓	✓		✓	✓	✓	✓	✓	reactive
6)	↓	1641		✓	PAI-10-SD-018-01	8	5	✓	✓		✓	✓	✓	✓	✓	
DUP 1)	9/10/98	1242		✓	PAI-10-SW-016-01	12	4	2	2	1	1	1		1		
		1421		✓	PAI-10-SW-017-01	12	4	2	2	1	1	1		1		
	↓	1503		✓	PAI-10-SW-018-01	12	4	2	2	1	1	1		1		
					Trip Blanks	2										
					Temp Blanks	4										

RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
Steve Barton	9/10/98 2000	Fed Ex			
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE / TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE / TIME:	REMARKS:	
		Steve A Smith	9/11/98 8:55	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-330A

A-14

MONITORING WELL INSTALLATION RECORDS

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: JERICHO ISLAND
County: BEAUFORT System Name: PAI - 10
MW: 01(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) 14.0 ft. Date Started: 7/23/98
Date Completed: 7/23/98

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 4.0 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: .010 Length: 10.0'
Set Between: 14.0 ft. and 4.0 ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
1.0 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 15.0 ft. to 3.0 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 upon completion ☐ Yes ☐ No Type: Amount:

16. PUMP: Date installed: ☑ Not installed
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT - WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: Authorized Representative Cert. No.: 1361

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF A-321 IRONMENTAL CONTROL (ADDRESS ABOVE)

PAT-10-MW-01(S) / PAT-10-MW-02(D)
PORT ROYAL ISLAND
PAT-10-MW-03(S) / PAT-10-MW-04(D)
PAT-10-MW-05(S)
PAT-10-MW-06(D)
Dogpile Island
Jericho Island
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)
ARCHERS
Scout Island
PAT-10-MW-13(S)
PAT-10-MW-14(D)
PAT-02-MW-04(S)
PAT-02-MW-05(D)
Horse
PAT-03-MW-04(S)
PAT-03-MW-03(D)
PAT-03-MW-01(S)
PAT-03-MW-02(D)
MARINE RECRUIT
BALDHEAD
2 of 2
A-322

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: JERICHO ISLAND
County: BEAUFORT System Name: PARRIS ISLAND
MW02Z(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) 26.0 ft. Date Started: 7/24/98 Date Completed: 7/24/98

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 21.0 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: 26.0 ft. and 21.0 ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL 1.5 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 26.0 ft. to 19.0 ft.
Effective size Uniformity Coefficient

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 17.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type well disinfected upon completion ☐ Yes ☐ No Type: Amount:

16. PUMP: Date installed: ☑ Not installed
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/1/99
Address: 501 MILLSTONE DR. HILLSBOROUGH, NC 27278
Signed: Authorized Representative Cert. No. 1361

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF ENVIRONMENTAL CONTROL (ADDRESS ABOVE) A-323

PAE-10-MW-01(S)/PAE-10-MW-02(D)
PORT ROYAL ISLAND
PAE-10-MW-03(S)/PAE-10-MW-04(D)
PAE-10-MW-05(S)
PAE-10-MW-06(D)
Doggie Island
Jericho Island
PAE-10-MW-09(S)/PAE-10-MW-10(D)
PAE-10-MW-11(S)
PAE-10-MW-12(D)
PAE-10-MW-07(S)
PAE-10-MW-08(D)
ARCHERS
Scout Island
PAE-10-MW-13(S)
PAE-10-MW-14(D)
PAE-02-MW-04(S)
PAE-02-MW-05(D)
Horse
PAE-03-MW-04(S)
PAE-03-MW-03(D)
MARINE RECRUIT
PAE-03-MW-01(S)
PAE-03-MW-02(D)
BALLAST
2 of 2
A-324

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: JERICHO ISLAND
County: BEAUFORT System Name: PAI-10 MW-03(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

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) 14.0 ft.
Date Started: 7/23/98
Date Completed: 7/23/98

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 4.0 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: .010 Length: 10.0'
Set Between: 14.0 ft. and 4.0 ft. NOTE: MULTIPLE SCREENS
______ ft. and ______ ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
6.0 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 15.0 ft. to 3.0 ft.
Effective size ______ Uniformity Coefficient ______

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☑ Other ☐ ______
Depth: From 1.0 ft. to SURFACE ft.

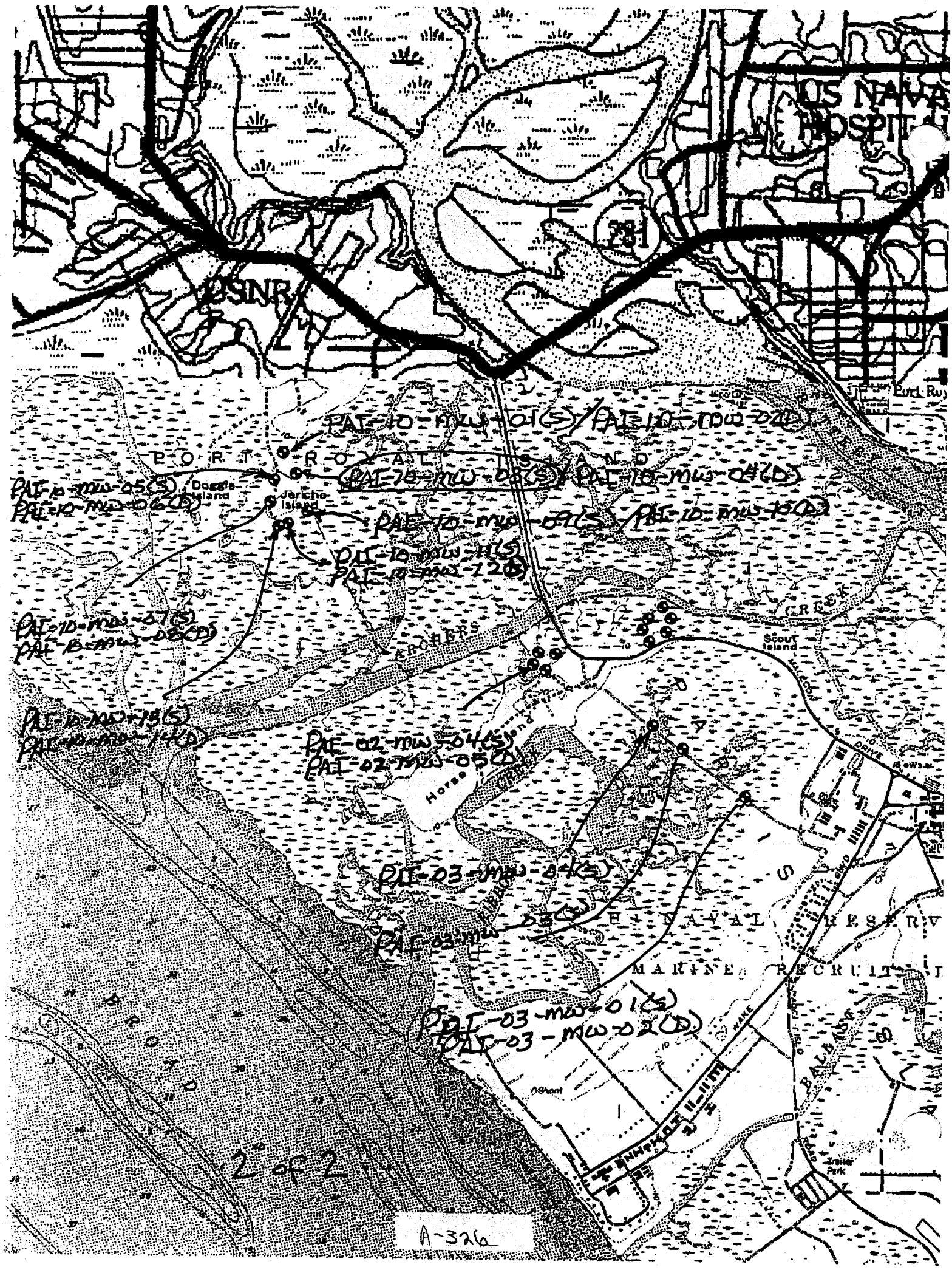
15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ___ ft. ___ direction
______ Type well disinfected ☐ Yes Type: ______
upon completion ☐ No Amount: ______

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: 4/2/99
Address: 501 MILLSTONE DR. HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTME[NT OF HEALTH AND ENVIR]ONMENTAL CONTROL (ADDRESS ABOVE)

A-325


PAE-10-mw-01(S)/PAE-10-mw-02(D)
PORT ROYAL ISLAND
(PAE-10-mw-03(S)/PAE-10-mw-04(D))
PAE-10-mw-05(S)
PAE-10-mw-06(D)
Doggie Island
Jericho Island
PAE-10-mw-08(S)/PAE-10-mw-10(D)
PAE-10-mw-11(S)
PAE-10-mw-12(D)
PAE-10-mw-07(S)
PAE-10-mw-09(D)
ARCHERS
Scout Island
PAE-10-mw-13(S)
PAE-10-mw-14(D)
PAE-02-mw-04(S)
PAE-02-mw-05(D)
Horse
PAE-03-mw-04(S)
PAE-03-mw-03(D)
MARINE RECRUIT
PAE-03-mw-01(S)
PAE-03-mw-02(D)
WAKE
BALLAST
2 of 2
A-326

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: JERICHO ISLAND
County: BEAUFORT System Name: PAI-410 MW-04(D)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum

* Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:

Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 38.0 ft.
Date Started: 7/23/98
Date Completed: 7/23/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ______ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ______

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized
☐ Steel ☐ Other
2 in. to 33.0 ft. depth
______ in. to ______ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ______ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .020 Length: 5.0
Set Between: 38.0 ft. and 33.0 ft.
______ ft. and ______ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
6.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
______ ft. after ______ hrs. Pumping ______ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 38.0 ft. to 31.0 ft.
Effective size ______ Uniformity Coefficient ______

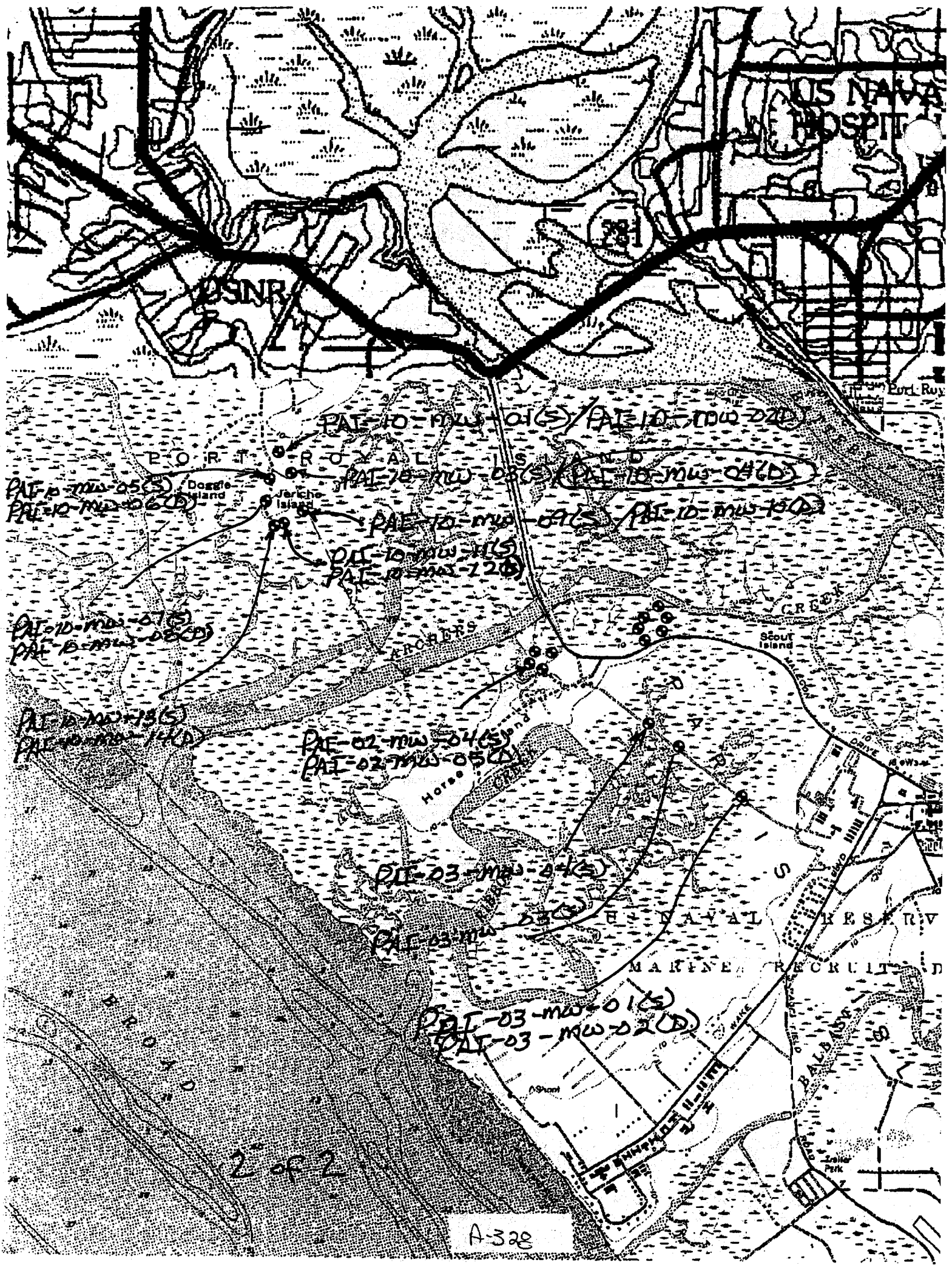
14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 29.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ______ ft. ______ direction
______ Type well disinfected ☐ Yes Type: ______
upon completion ☐ No Amount: ______

16. PUMP: Date installed: ______ Not installed ☑
Mfr. Name: ______ Model No.: ______
H.P. ______ Volts ______ Length of drop pipe ______ ft. Capacity ______ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine
☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/2/99
Address: 501 HILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: [signature] Cert. No.: 1361
Authorized Representative

A-327


PAE-10-mw-01(S)/PAE-10-mw-02(D)
PORT ROYAL ISLAND
PAE-10-mw-03(S)/PAE-10-mw-04(D)
PAE-10-mw-05(S)
PAE-10-mw-06(D)
Doggie Island
Jericho Island
PAE-10-mw-09(S)/PAE-10-mw-13(D)
PAE-10-mw-11(S)
PAE-10-mw-12(D)
PAE-10-mw-07(S)
PAE-10-mw-08(D)
ARCHERS
Scout Island
PAE-10-mw-15(S)
PAE-10-mw-14(D)
PAE-02-mw-04(S)
PAE-02-mw-05(D)
Horse
PAE-03-mw-04(S)
PAE-03-mw
PAE-03-mw-01(S)
PAE-03-mw-02(D)
MARINE
RECRUIT
BALDHEAD
2 of 2
A-328

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: JERICHO ISLAND
County: BEAUFORT System Name: PAL-10 (SWMU 10)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

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) 14.0 ft. Date Started: 7/13/98 Date Completed: 7/13/98

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 4.0 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

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)		

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .010 Length: 10.0
Set Between: 13.9 ft. and 3.9 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL 4.0 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 3.0 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: 4/2/99
Address: 501 MILLSTONE DR. HILLSBOROUGH, NC 27278
Signed: ____ Cert. No. 1361
Authorized Representative

3. REMARKS:

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF HE[illegible]ENTAL CONTROL (ADDRESS ABOVE)

A-329

PAE-10-mw-01(S)/PAE-10-mw-02(D)
PORT ROYAL ISLAND
PAE-10-mw-03(S)/PAE-10-mw-04(D)
PAE-10-mw-05(S)
PAE-10-mw-06(D)
Dauphin Island
Jericho Island
PAE-10-mw-09(S)/PAE-10-mw-10(D)
PAE-10-mw-11(S)
PAE-10-mw-12(D)
PAE-10-mw-07(S)
PAE-10-mw-08(D)
ARCHERS
Scout Island
PAE-10-mw-13(S)
PAE-10-mw-14(D)
PAE-02-mw-04(S)
PAE-02-mw-05(D)
Horse
PAE-03-mw-24(S)
PAE-03-mw-23(D)
MARINE
PAE-03-mw-01(S)
PAE-03-mw-02(D)
BAY
2 of 2

A-330

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: JERICHO ISLAND
County: BEAUFORT System Name: PAI-10 MW-06(D)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum

* Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:

Engineer: TETRA TECH, NUS, INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 35.0 ft.
Date Started: 7/13/98
Date Completed: 7/13/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug
☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ______ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ______

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized
☐ Steel ☐ Other
2 in. to 30.0 ft. depth
______ in. to ______ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ______ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .020 Length: 5.0'
Set Between: 35.0 ft. and 30.0 ft.
______ ft. and ______ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
4.0 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 35.0 ft. to 28.0 ft.
Effective size ______ Uniformity Coefficient ______

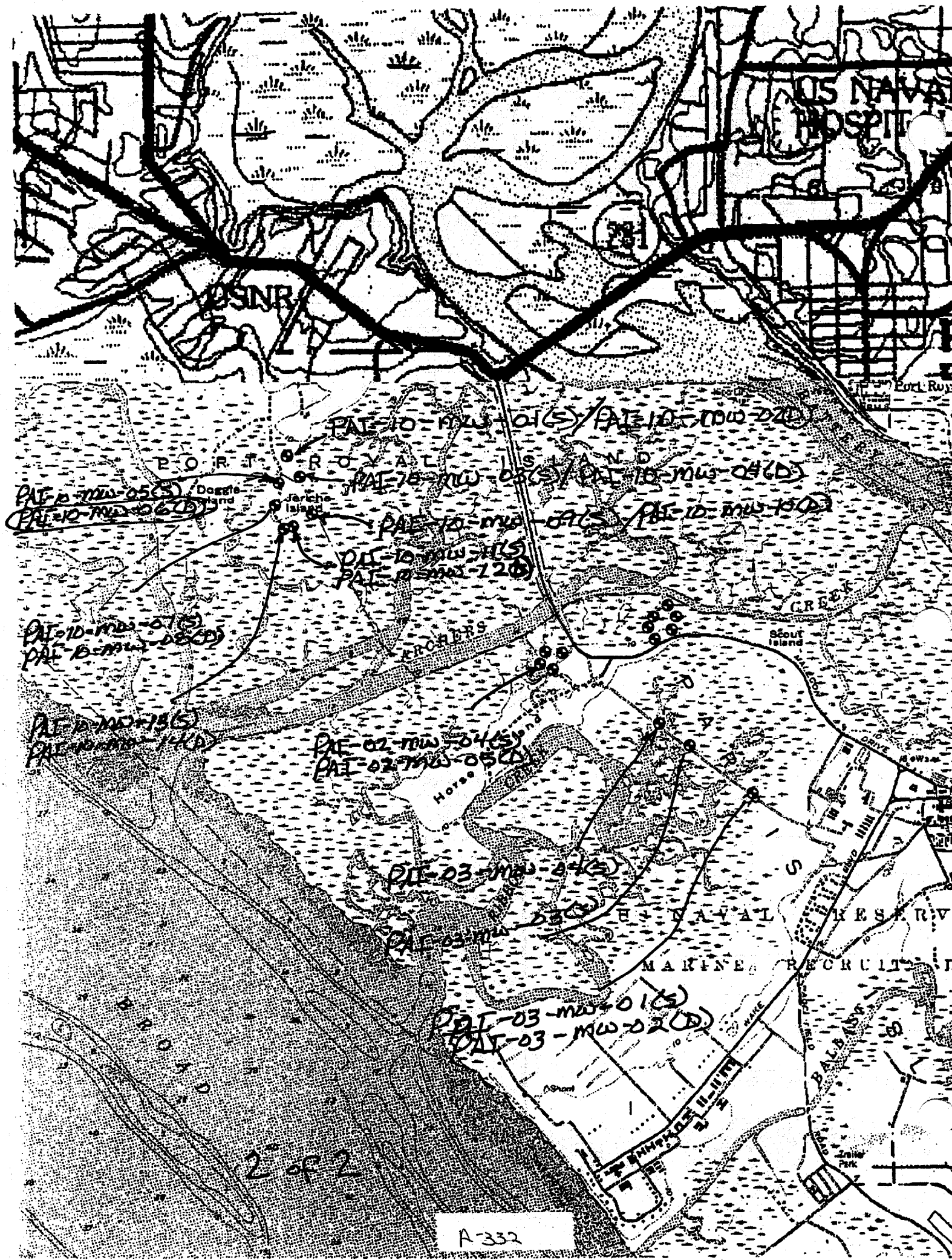
14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 26.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ______ ft. ______ direction
Type well disinfected ☐ 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: 4/2/99
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 A-331 RONMENTAL CONTROL (ADDRESS ABOVE)


PAE-10-MW-01(S)/PAE-10-MW-02(D)
PORT ROYAL ISLAND
PAE-10-MW-03(S)/PAE-10-MW-04(D)
PAE-10-MW-05(S)
PAE-10-MW-06(D)
Dogfish Island
Jericho Island
PAE-10-MW-09(S)/PAE-10-MW-10(D)
PAE-10-MW-11(S)
PAE-10-MW-12(D)
PAE-10-MW-07(S)
PAE-10-MW-08(D)
CREEK
ARCHERS
Scout Island
PAE-10-MW-13(S)
PAE-10-MW-14(D)
PAE-02-MW-04(S)
PAE-02-MW-05(D)
Horse
PAE-03-MW-04(S)
PAE-03-MW-03(S)
MARINE RECRUIT
PAE-03-MW-01(S)
PAE-03-MW-02(D)
BROAD
BALBAS
2 of 2
A-332

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: JERICHO ISLAND
County: BEAUFORT System Name: PAT-10 MW-07(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum
* Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:

*Engineer: TETRA TECH NUS, INC.
*Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
*Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 13.9 ft. Date Started: 7/14/98 Date Completed: 7/14/98

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 4.0 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 3.0 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 upon completion ☐ Yes ☐ No Type: ____ Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/2/99
Address: 506 HOUSTONE DR. HILLSBOROUGH, NC 27278
Signed: ____ Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF R-333 ONMENTAL CONTROL (ADDRESS ABOVE)

US NAVAL HOSPITAL
PORT ROYAL ISLAND
Parris Island
Jericho Island
Scout Island
Horse Creek
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(S)
PAT-03-MW-01(S)
PAT-03-MW-02(D)
2 of 2
A334

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: JERICHO ISLAND
County: BEAUFORT System Name: PAT. NO. 1400105 (PW)
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) 29.0 ft. Date Started: 7/14/98 Date Completed: 7/14/98

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 24.0 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: 29.0 ft. and 24.0 ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL 4.0 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 29.2 ft. to 22.0 ft.
Effective size Uniformity Coefficient

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 20.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type well disinfected upon completion ☐ Yes ☐ No Type: Amount:

16. PUMP: Date installed: ☐ Not installed ☑
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF INC. Date: 4/2/99
Address: 511 FLAGSTONE DR. HILLSBOROUGH, NC 27278
Signed: (Authorized Representative) Cert. No.: 1361

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-335

PAE-10-MW-01(S)/PAE-10-MW-02(D)
PORT ROYAL ISLAND
PAE-10-MW-03(S)/PAE-10-MW-04(D)
PAE-10-MW-05(S)
PAE-10-MW-06(D)
Dogfish Island
Jericho Island
PAE-10-MW-09(S)/PAE-10-MW-10(D)
PAE-10-MW-11(S)
PAE-10-MW-12(D)
PAE-10-MW-07(S)
PAE-10-MW-08(D)
PAE-10-MW-13(S)
PAE-10-MW-14(D)
PAE-02-MW-04(S)
PAE-02-MW-05(D)
Horse Creek
Scout Island
PAE-03-MW-01(S)
PAE-03-MW-02(D)
PAE-03-MW-03(S)
PAE-03-MW-04(S)
2 of 2
A-336

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: JERICHO ISLAND
County: BEAUFORT System Name: PAT-10 MW-05(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

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) 14.0 ft. Date Started: 7/21/98 Date Completed: 7/21/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ____ ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐ ____

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 4.0 ft. depth
____ in. to ____ ft. depth
Height: Above/Below Surface 3.0 ft.
Weight ____ lbs./ft.
Drive Shoe? ☐ Yes ☑ No

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)		

9. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .010 Length: 10.0
Set Between: 14.0 ft. and 4.0 ft. NOTE: MULTIPLE SCREENS
____ ft. and ____ ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL 4.0 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 15.0 ft. to 3.0 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 upon completion ☐ Yes ☐ No Type: ____ Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

3. REMARKS:

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: 4/2/99
Address: 501 MILLSTONE DR. HILLSBOROUGH, NC 27278
Signed: ____ Cert. No.: 1361
Authorized Representative

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF A-33> IRONMENTAL CONTROL (ADDRESS ABOVE)

PAE-10-MW-01(S) / PAE-10-MW-02(D)
PORT ROYAL ISLAND
PAE-10-MW-03(S) / PAE-10-MW-04(D)
PAE-10-MW-05(S)
PAE-10-MW-06(D)
Dogpile Island
Jericho Island
PAE-10-MW-09(S) / PAE-10-MW-10(D)
PAE-10-MW-11(S)
PAE-10-MW-12(D)
PAE-10-MW-07(S)
PAE-10-MW-08(D)
PAE-10-MW-13(S)
PAE-10-MW-14(D)
PAE-02-MW-04(S)
PAE-02-MW-05(D)
Horse Creek
PAE-03-MW-04(S)
PAE-03-MW-03(D)
PAE-03-MW-01(S)
PAE-03-MW-02(D)
ARCHERS
Scout Island
MARINE
BALLAST
2 of 2
A-338

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: JERICHO ISLAND
County: BEAUFORT System Name: PAT-10 MCAS
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) 29.0 ft. Date Started: 7/15/98 Date Completed: 7/15/98

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 24.0 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: 29.0 ft. and 24.0 ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL 4.0 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 29.0 ft. to 22.0 ft.
Effective size Uniformity Coefficient

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 20.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type well disinfected upon completion ☐ Yes ☐ No Type: Amount:

16. PUMP: Date installed: Not installed ☑
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF INC. Date: 4/2/99
Address: 509 HILLSTONE DR. HILLSBOROUGH, NC 27278
Signature of Authorized Representative Cert. No.: 1361

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT A-339 VIRONMENTAL CONTROL (ADDRESS ABOVE)

PAE-10-MW-01(S)/PAE-10-MW-02(D)
PORT ROYAL ISLAND
PAE-10-MW-03(S)/PAE-10-MW-04(D)
PAE-10-MW-05(S)
PAE-10-MW-06(D)
Doggie Island
Jericho Island
PAE-10-MW-09(S)/PAE-10-MW-10(D)
PAE-10-MW-11(S)
PAE-10-MW-12(D)
PAE-10-MW-07(S)
PAE-10-MW-08(D)
PAE-10-MW-13(S)
PAE-10-MW-14(D)
PAE-02-MW-04(S)
PAE-02-MW-05(D)
Horse Island
PAE-03-MW-04(S)
PAE-03-MW-03(D)
PAE-03-MW-01(S)
PAE-03-MW-02(D)
Scout Island
MARINE RECRUIT
Trailer Park
2 of 2
A-340

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: JERICHO ISLAND
County: BEAUFORT System Name: PARRIS ISLAND (MCRD)
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) 14.0 ft. Date Started: 7/21/98 Date Completed: 7/21/98

6. ☐ Mud Rotary ☐ Jetted ☑ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. USE:
☐ Domestic ☐ Public Supply-Permit No. ☐ Industry
☐ Irrigation ☐ Air Conditioning ☐ Commercial
☐ Test Well ☑ Monitor Well ☐

8. CASING: ☑ Threaded ☐ Welded
Diam.: 2"
Type: ☑ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 4.0 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: .010 Length: 10.0'
Set Between: 14.0 ft. and 4.0 ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL 2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
ft. after hrs. Pumping G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 15.0 ft. to 3.0 ft.
Effective size Uniformity Coefficient

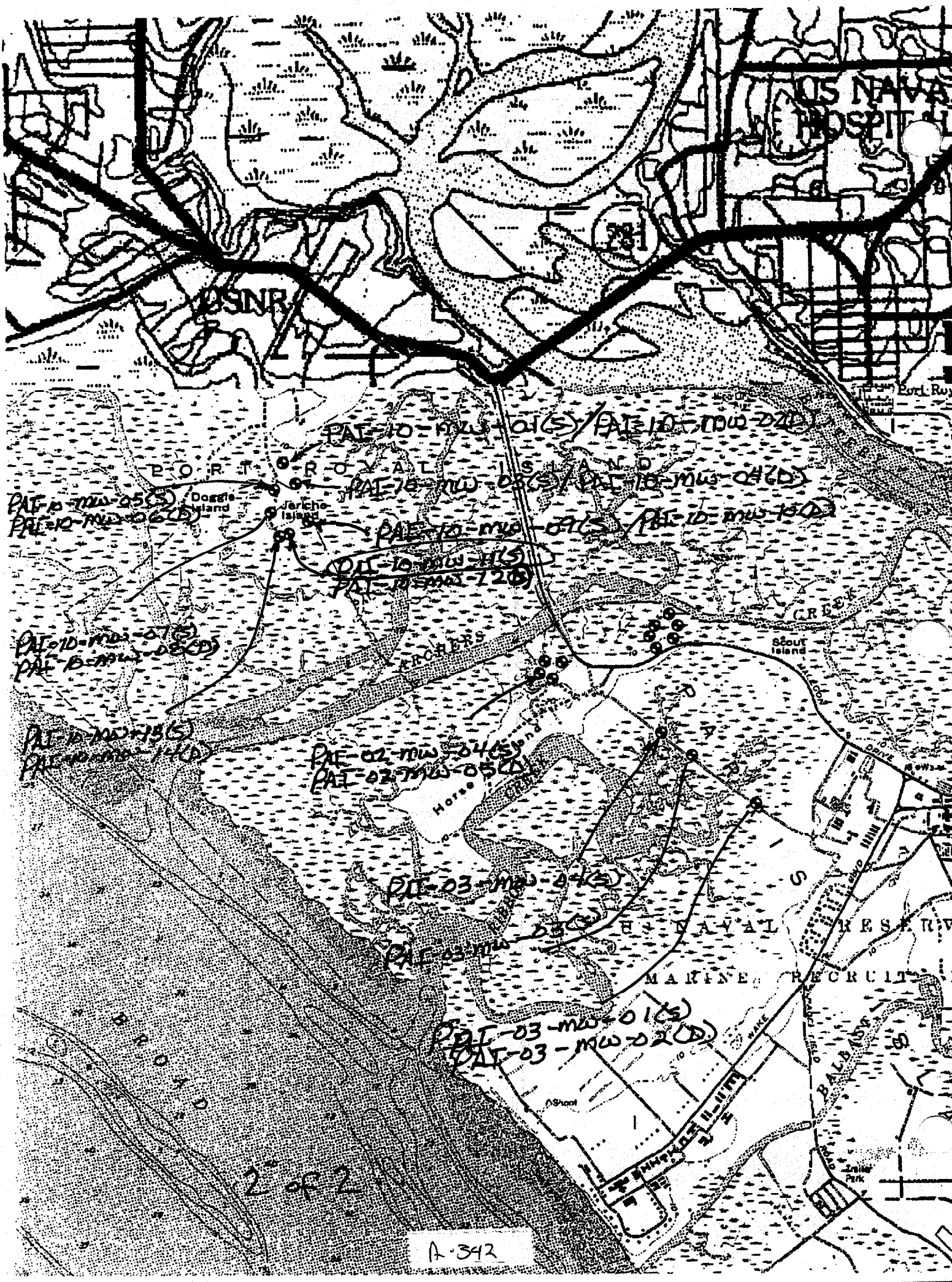
14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☑ Other ☐
Depth: From 1.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type well disinfected upon completion ☐ Yes ☐ No Type: Amount:

16. PUMP: Date installed: ☑ Not installed
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/2/99
Address: 501 FLAGSTONE DR. HILLSBOROUGH, NC 27278
Signature: Authorized Representative Cert. No.: 1341

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT A-341 /IRONMENTAL CONTROL (ADDRESS ABOVE)


PAE-10-MW-01(S)/PAE-10-MW-02(D)
PAE-10-MW-03(S)/PAE-10-MW-04(D)
PAE-10-MW-05(S)
PAE-10-MW-06(D)
PAE-10-MW-09(S)/PAE-10-MW-10(D)
PAE-10-MW-11(S)
PAE-10-MW-12(D)
PAE-10-MW-07(S)
PAE-10-MW-08(D)
PAE-10-MW-13(S)
PAE-10-MW-14(D)
PAE-02-MW-04(S)
PAE-02-MW-05(D)
PAE-03-MW-04(S)
PAE-03-MW-03(S)
PAE-03-MW-01(S)
PAE-03-MW-02(D)
PORT ROYAL ISLAND
Doggie Island
Jericho Island
Scout Island
Horse Creek
MARINE RECRUIT
BALBOA
2 of 2
A-342

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: JERICHO ISLAND
County: BEAUFORT System Name: PAT-10
Well Number: MW-12(D)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum

* Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: MSMC
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) 29.0 ft. Date Started: 7/22/98 Date Completed: 7/22/98

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 24.0 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: 29.0 ft. and 24.0 ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
2.0 ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
ft. after hrs. Pumping G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

12. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

13. ARTIFICIAL FILTER (gravel pack) ☑ Yes ☐ No
Installed from 30.0 ft. to 22.0 ft.
Effective size Uniformity Coefficient

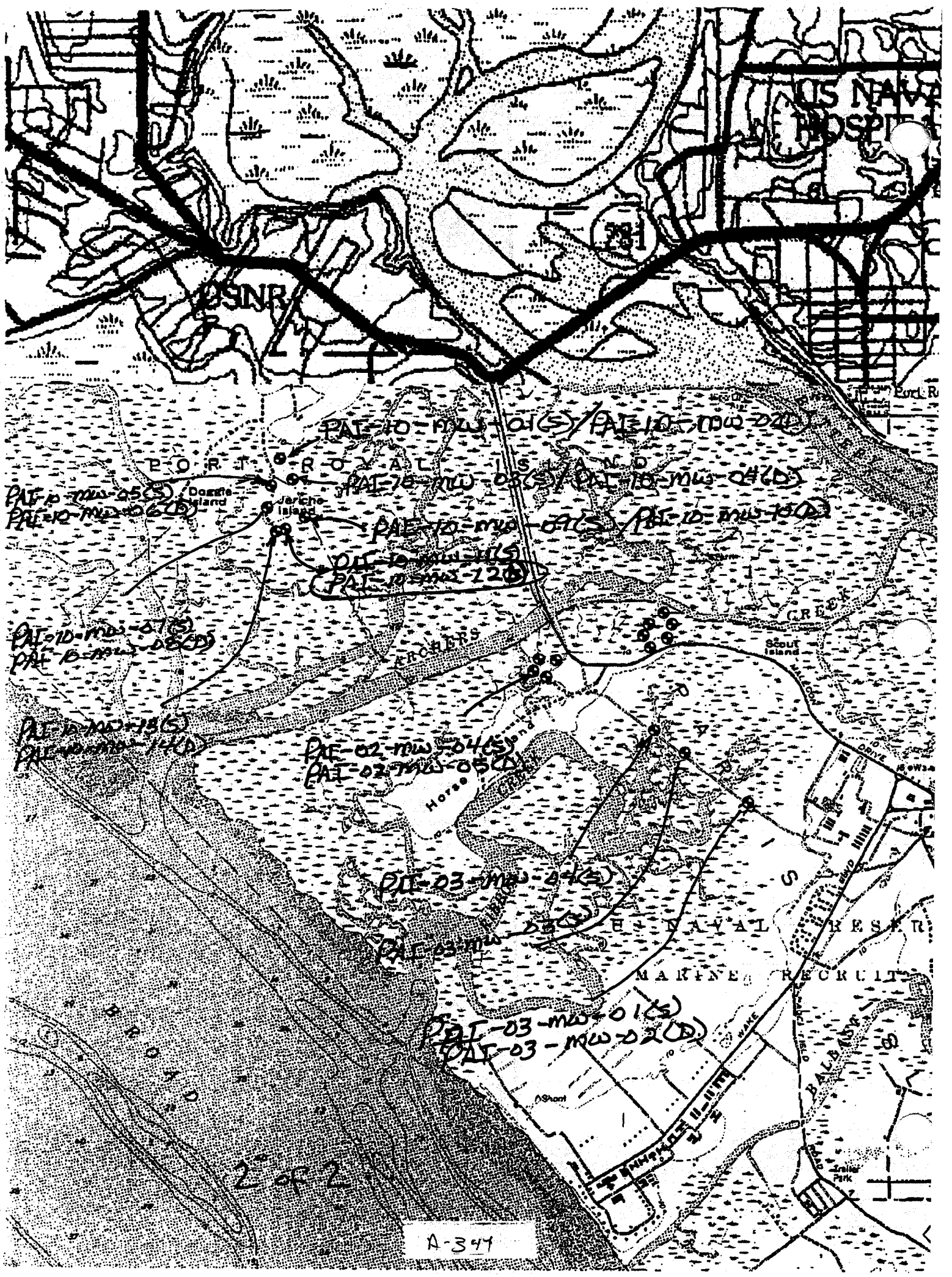
14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 20.0 ft. to SURFACE ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type well disinfected upon completion ☐ Yes ☐ No Type: Amount:

16. PUMP: Date installed: Not installed ☑
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 9/2/99
Address: 501 MILLSTONE DR, HILLSBOROUGH, NC 27278
Signed: Authorized Representative Cert. No.: 1361

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF A-343 ...NMENTAL CONTROL (ADDRESS ABOVE)


PAE-10-mw-01(S)/PAE-10-mw-02(D)
PORT ROYAL ISLAND
PAE-10-mw-03(S)/PAE-10-mw-04(D)
PAE-10-mw-05(S)
PAE-10-mw-06(D)
Doggie Island
Jericho Island
PAE-10-mw-09(S)/PAE-10-mw-10(D)
PAE-10-mw-11(S)
PAE-10-mw-12(D)
PAE-10-mw-07(S)
PAE-10-mw-08(D)
PAE-10-mw-13(S)
PAE-10-mw-14(D)
PAE-02-mw-04(S)
PAE-02-mw-05(D)
PAE-03-mw-04(S)
PAE-03-mw-03(D)
PAE-03-mw-01(S)
PAE-03-mw-02(D)
Scout Island
MARINE RECRUIT
BROAD
2 of 2
A-341

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: JERICHO ISLAND
County: BEAUFORT System Name: PAD-10 MW-13(S)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:

Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth To Bottom of Stratum*

* Indicate Water Bearing Zones

(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:

Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 14.0 ft. Date Started: 7/22/98 Date Completed: 7/22/98

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 4.0 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: .010 Length: 10.0'
Set Between: 14.0 ft. and 4.0 ft. NOTE: MULTIPLE SCREENS
ft. and ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL 1.0 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 15.0 ft. to 3.0 ft.
Effective size Uniformity Coefficient

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☑ Other ☐
Depth: From 1.0 ft. to SURFACE ft.

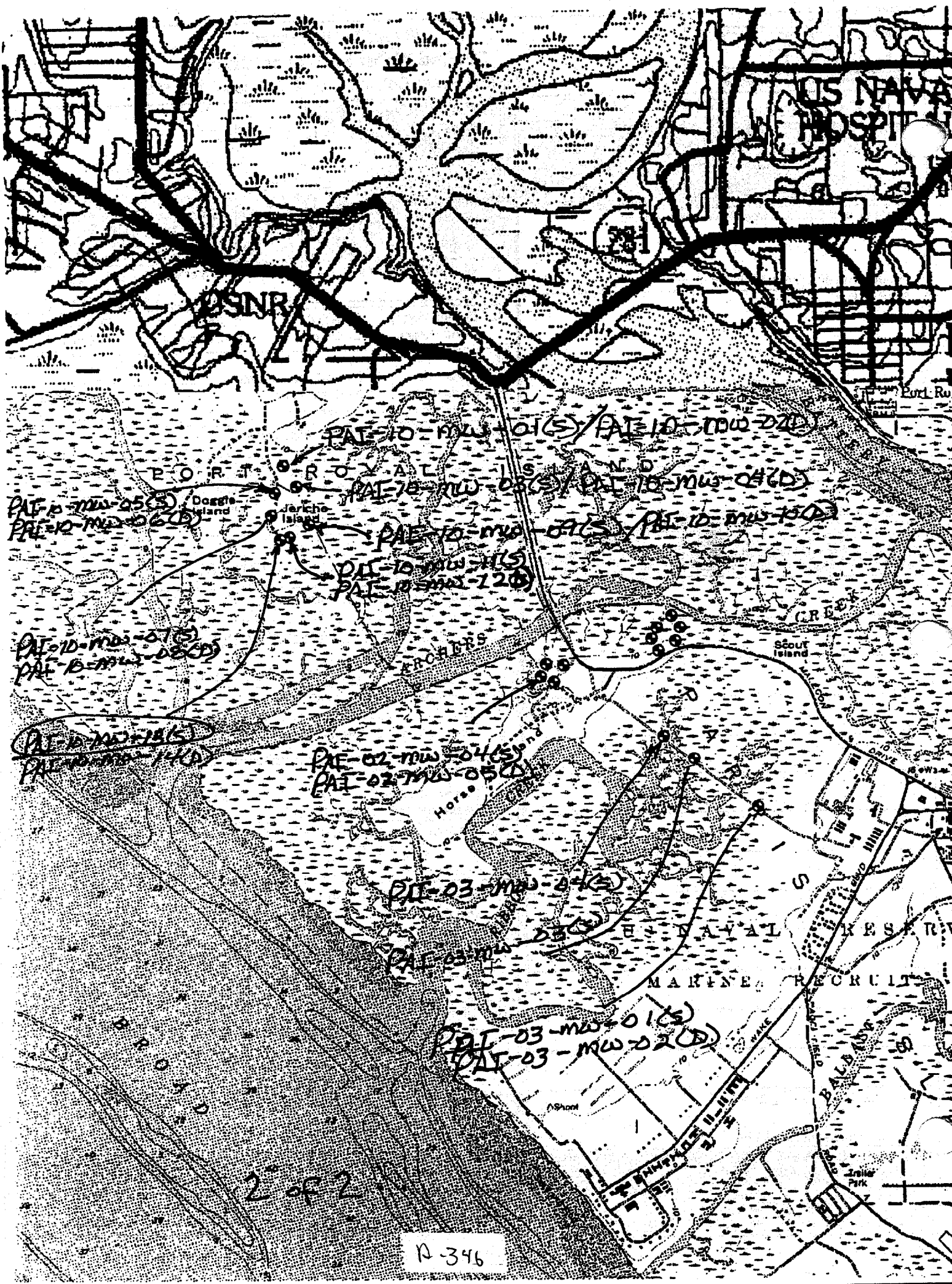
15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type well disinfected ☐ Yes Type:
upon completion ☐ No Amount:

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: 9/2/99
Address: 501 MILLSTONE DR. HILLSBOROUGH, NC 27278
Signed: Authorized Representative Cert. No.: 1361

DHEC 1903 (7/93) COPY 1 MAIL TO: S. C. DEPARTMENT OF ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

A-345


PAE-10-mw-01(S)/PAE-10-mw-02(D)
PORT ROYAL ISLAND
PAE-10-mw-03(S)/PAE-10-mw-04(D)
PAE-10-mw-05(S)
PAE-10-mw-06(D)
Doggie Island
Jericho Island
PAE-10-mw-09(S)/PAE-10-mw-10(D)
PAE-10-mw-11(S)
PAE-10-mw-12(D)
PAE-10-mw-07(S)
PAE-10-mw-08(D)
PAE-10-mw-13(S)
PAE-10-mw-14(D)
PAE-02-mw-04(S)
PAE-02-mw-05(D)
Horse Creek
Scout Island
PAE-03-mw-04(S)
PAE-03-mw-05(S)
PAE-03-mw-01(S)
PAE-03-mw-02(D)
MARINE RECRUIT
BALDWIN
2 of 2
R-346

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: JERICHO ISLAND
County: BEAUFORT System Name: PAI-10
(D)
Latitude: Longitude:
Distance and Direction from Road Intersections:

Street Address & City of Well Location:
Sketch Map:

SEE BACK

2. CUTTING SAMPLES: ☐ Yes ☑ No
Geophysical Logs: ☑ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum

* Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

3. REMARKS:

4. OWNER OF WELL: USMC
Address: PARRIS ISLAND, SC
Telephone No.:

Engineer: TETRA TECH NUS, INC.
Address: 661 ANDERSON DRIVE
PITTSBURGH, PA 15220-2745
Telephone No.: (412) 921-7090

5. WELL DEPTH (completed) 29.0 ft.
Date Started: 7/22/98
Date Completed: 7/22/98

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 24.0 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: 29.0 ft. and 24.0 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☑ No

10. STATIC WATER LEVEL
4.0 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 30.0 ft. to 22.0 ft.
Effective size ____ Uniformity Coefficient ____

14. WELL GROUTED? ☑ Yes ☐ No
Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other ☑ BENT. CEMENT
Depth: From 20.0 ft. to SURFACE ft.

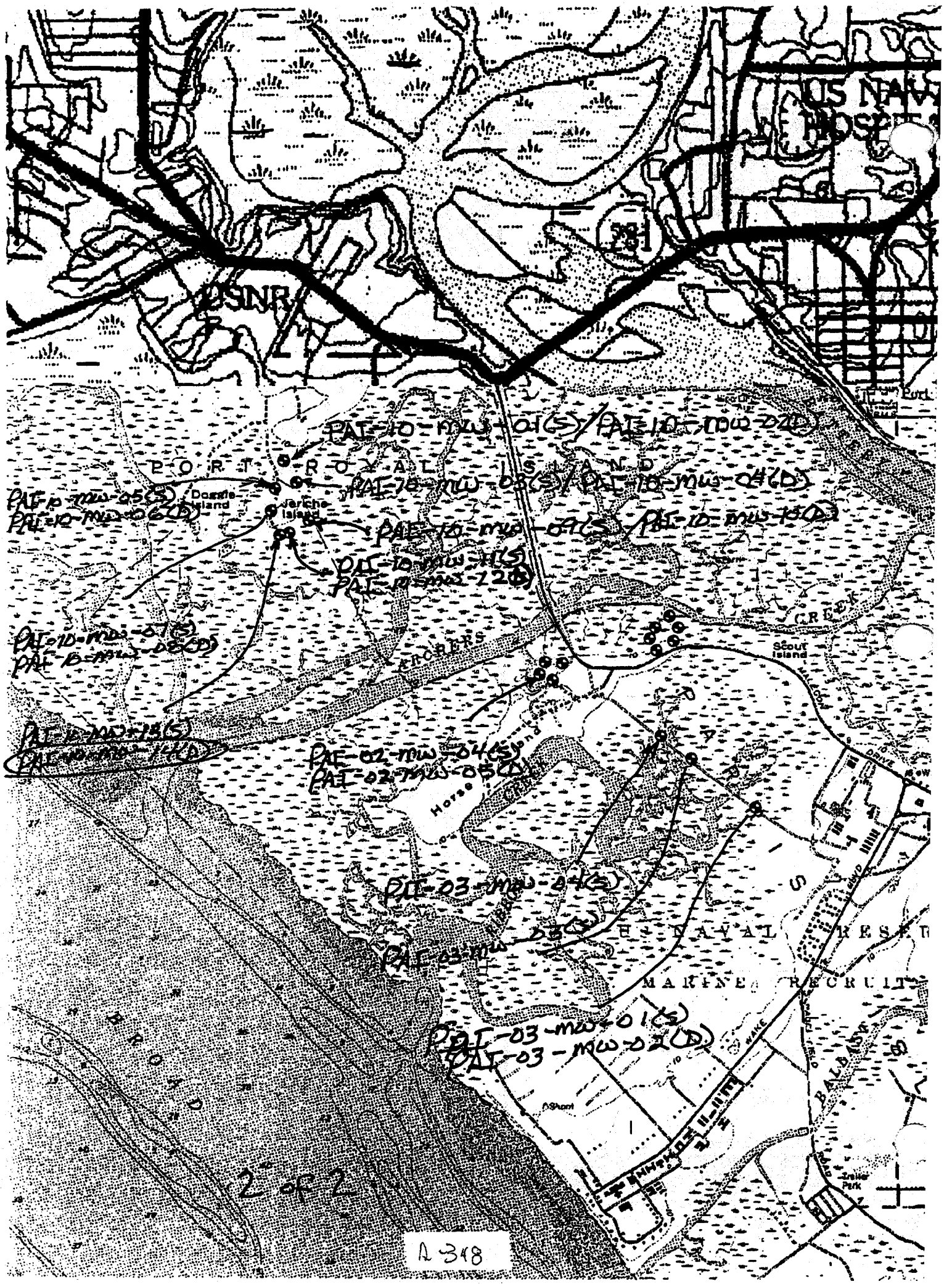
15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
____ Type well disinfected upon completion ☐ Yes ☐ No Type: ____ Amount: ____

16. PUMP: Date installed: ____ Not installed ☑
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: PARRATT-WOLFF, INC. Date: 4/2/99
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-347


PAT-10-MW-01(S)/PAT-10-MW-02(D)
PORT ROYAL ISLAND
PAT-10-MW-03(S)/PAT-10-MW-04(D)
PAT-10-MW-05(S)
PAT-10-MW-06(D)
Dauphin Island
Jericho Island
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)
Horse Creek
PAT-03-MW-04(S)
PAT-03-MW-03(S)
PAT-03-MW-01(S)
PAT-03-MW-02(D)
Scout Island
MARINE RECRUIT
BALDWIN
2 of 2
A-348

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 7803		
SUBJECT PAF-10-MW-01(S) RISING HEAD TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GLG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well Casing
R = RADIUS of well Screen
L = Length of well Screen
T_o = Time For water Level to Rise or Fall 37% of initial Change

r = 0.083 FT
R = 0.083 FT
L = 10 FT
T_o = 1.8 min

$$K = \frac{r^2 \ln L/R}{2LT_o} = \frac{(0.083\,Ft)^2 \ln 10\,Ft/0.083\,Ft}{2(10\,Ft)(1.8\,min)}$$

$$= 9.17 \times 10^{-4}\ Ft/min$$

9.17×10^{-4} ft/min x 1440 min/day = 1.32 ft/day

1.32 Ft/day x 3.528×10^{-4} Cm/Sec = 4.66×10^{-4} Cm/Sec.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Is., SC - Jericho Is. (Site 4) WELL/BORING NO.: PAI-10-mw-0(

PROJECT NO.: 7803 GEOLOGIST: Mack Damington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft. TEST NO.: 3, Step 2

STATIC WATER LEVEL (Depth/Elevation): 5.71 / TWD = 16.91 / LWC = 11.20 DATE: 8/24/98

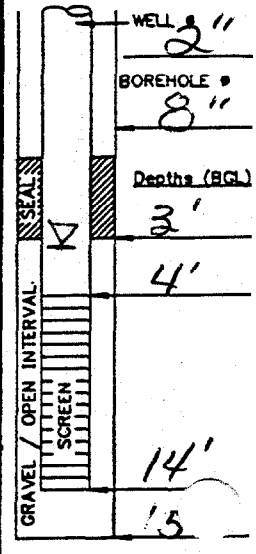
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED: GC

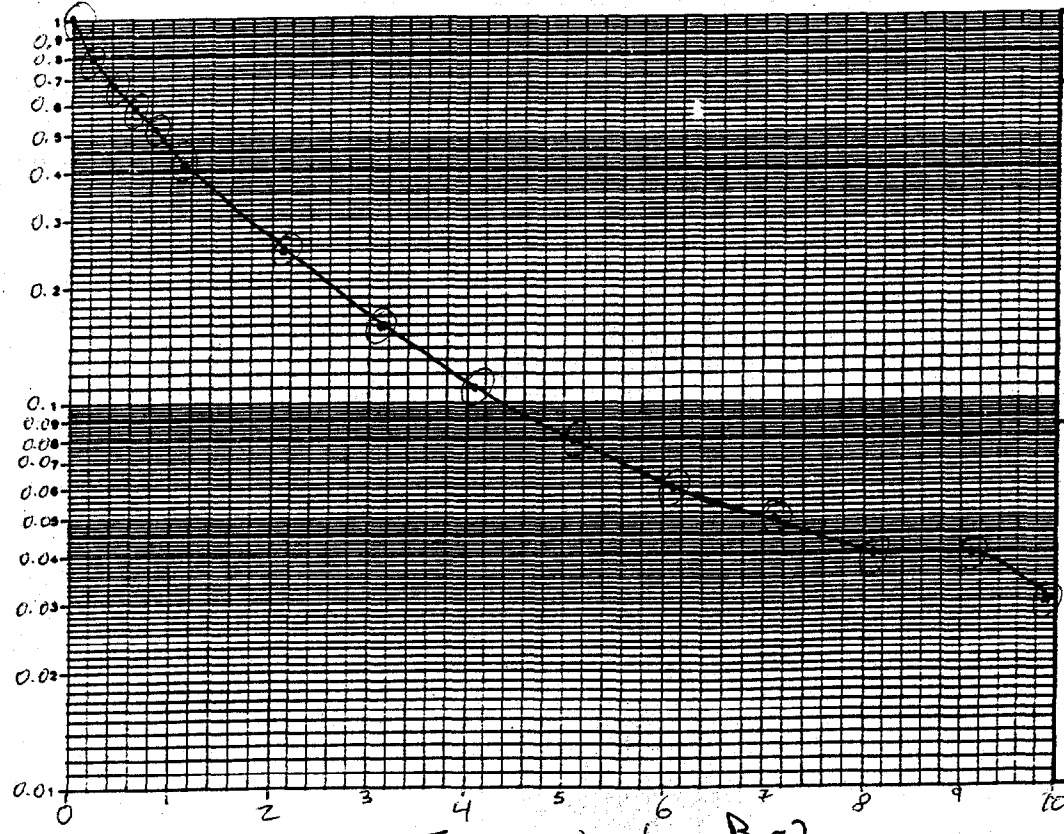
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 2 OF 2

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	2.504	1	8.16	0.108	0.043
0.2	1.970	0.79	9.16	0.095	0.028
0.41	1.684	0.67	9.96	0.082	0.033
0.61	1.481	0.59			
0.81	1.309	0.52			
1.16	1.048	0.42			
2.16	0.616	0.25			
3.16	0.394	0.16			
4.16	0.267	0.11			
5.16	0.197	0.08			
6.16	0.158	0.063			
7.16	0.127	0.051			

WELL SCHEMATIC



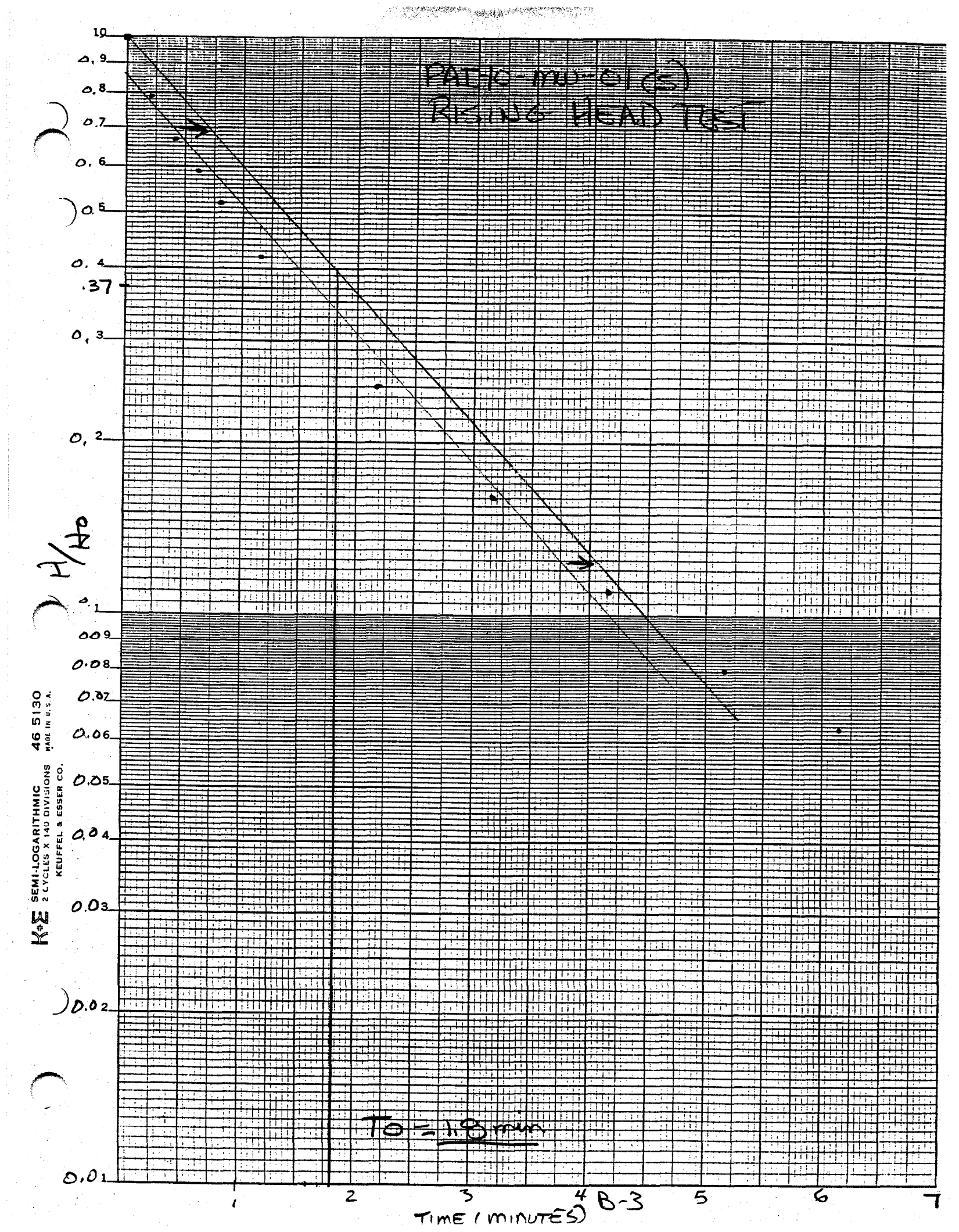


REMARKS:

YD.: 10.68 FT

CALCS, SKETCH MAPS, ETC.:

B-2


PATH-MW-01(S)
RISING HEAD TEST
H/Ho
10
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1
2
3
4
5
6
7
TIME (MINUTES)
T0 = 1.8 min
B-3
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

PAT-10-MW-01(2)
TEST 3, STEP 3 ✓
SLUG OUT (RISE)

SE1000C
Environmental Logger
08/24 16:29

Unit# 00145 Test 3

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 3 08/24 14:47:33

Elapsed Time	INPUT 1
0.0000	3.158
0.0033	2.580
0.0066	0.349
0.0100	1.640
0.0133	3.025
0.0166	2.707
0.0200	2.536
0.0233	2.605
0.0266	2.586
0.0300	2.548
0.0333	2.453
0.0366	2.504
0.0400	2.504 T0
0.0433	2.472
0.0466	2.447
0.0500	2.447
0.0533	2.428
0.0566	2.415
0.0600	2.402
0.0633	2.389
0.0666	2.377
0.0700	2.364
0.0733	2.358
0.0766	2.345
0.0800	2.332
0.0833	2.319
0.0866	2.313
0.0900	2.300
0.0933	2.294
0.0966	2.288
0.1000	2.275
0.1033	2.262
0.1066	2.256
0.1100	2.250
0.1133	2.237
0.1166	2.230
0.1200	2.224

PHI-10-MW01(S)
Test 3, Step 3
Slug Out (Rise)

0.1233	2.211
0.1266	2.205
0.1300	2.192
0.1333	2.192
0.1366	2.180
0.1400	2.173
0.1433	2.161
0.1466	2.161
0.1500	2.148
0.1533	2.142
0.1566	2.129
0.1600	2.122
0.1633	2.122
0.1666	2.110
0.1700	2.110
0.1733	2.097
0.1766	2.091
0.1800	2.091
0.1833	2.078
0.1866	2.065
0.1900	2.065
0.1933	2.059
0.1966	2.046
0.2000	2.046
0.2033	2.040
0.2066	2.034
0.2100	2.027
0.2133	2.014
0.2166	2.014
0.2200	2.008
0.2233	2.002
0.2266	2.002
0.2300	1.989
0.2333	1.983
0.2366	1.983
0.2400	1.970
0.2433	1.970
0.2466	1.957
0.2500	1.957
0.2533	1.951
0.2566	1.945
0.2600	1.938
0.2633	1.932
0.2666	1.932
0.2700	1.926
0.2733	1.919
0.2766	1.919
0.2800	1.906
0.2833	1.906
0.2866	1.900
0.2900	1.894
0.2933	1.887
0.2966	1.881
0.3000	1.881
0.3033	1.875
0.3066	1.868
0.3100	1.862
0.3133	1.862
0.3166	1.856
0.3200	1.849

FAI - 10 - minor(s)
Test 3, Step 3
Slug Out (Rise)

	0.3333	1.843
	0.3666	1.843
	0.3900	1.837
	0.3333	1.830
0.31 -	0.3500	1.805
	0.3666	1.786
	0.3833	1.767
	0.4000	1.741
	0.4166	1.716
	0.4333	1.703
0.41 -	0.4500	1.684
	0.4666	1.665
	0.4833	1.648
	0.5000	1.627
	0.5166	1.608
	0.5333	1.595
0.51 -	0.5500	1.576
	0.5666	1.557
	0.5833	1.544
	0.6000	1.525
	0.6166	1.506
	0.6333	1.493
0.61 -	0.6500	1.481
	0.6666	1.462
	0.6833	1.449
	0.7000	1.436
	0.7166	1.423
	0.7333	1.411
0.71 -	0.7500	1.392
	0.7666	1.379
	0.7833	1.366
	0.8000	1.347
	0.8166	1.334
	0.8333	1.322
0.81 -	0.8500	1.309
	0.8666	1.296
	0.8833	1.290
	0.9000	1.277
	0.9166	1.265
	0.9333	1.245
0.91 -	0.9500	1.233
	0.9666	1.226
	0.9833	1.214
	1.0000	1.201
1.16 -	1.2000	1.048
	1.4000	0.940
	1.6000	0.839
	1.8000	0.756
	2.0000	0.686
2.16 -	2.2000	0.616
	2.4000	0.565
	2.6000	0.514
	2.8000	0.470
	3.0000	0.432
3.16 -	3.2000	0.394
	3.4000	0.362
	3.6000	0.336
	3.8000	0.317
	4.0000	0.292
4.16 -	4.2000	0.267

PAT-10-MW01(S)
Test 3, Step 3
Slug Out (Rise)

	4.4000	0.247
	4.6000	0.235
	4.8000	0.228
	5.0000	0.209
5.16 -	5.2000	0.197
	5.4000	0.190
	5.6000	0.178
	5.8000	0.171
	6.0000	0.158
6.16 -	6.2000	0.158
	6.4000	0.152
	6.6000	0.139
	6.8000	0.133
	7.0000	0.127
7.16 -	7.2000	0.127
	7.4000	0.114
	7.6000	0.114
	7.8000	0.108
	8.0000	0.101
8.16 -	8.2000	0.108
	8.4000	0.101
	8.6000	0.101
	8.8000	0.095
	9.0000	0.095
9.16 -	9.2000	0.095
	9.4000	0.095
	9.6000	0.089
	9.8000	0.082
9.96 -	10.0000	0.082
	12.0000	0.076
	14.0000	0.069
	16.0000	0.076
	18.0000	0.076
	20.0000	0.076
	22.0000	0.076
	24.0000	0.082

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-01(S) FALLING HEAD TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GLG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well Casing — r = 0.083 FT
R = Radius of well Screen — R = 0.083 FT
L = Length of well Screen — L = 10 FT
T_0 = Time For water Level to Rise or Fall 37% of initial Change. — T_0 = 1.8 min.

$$K = \frac{r^2 \ln L/R}{2 L T_0} = \frac{(0.083\,Ft)^2 \ln 10\,FT/0.083\,FT}{2(10\,Ft)(1.8\,min)}$$

$$= 9.17 \times 10^{-4}\ Ft/min$$

$9.17 \times 10^{-4}\ Ft/min \times 1440\ min/day = 1.32\ Ft/day$

$1.32\ Ft/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{ft/day} = \underline{4.66 \times 10^{-4}\ cm/sec}$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Is., SC - Jericho Is. (Site 4) WELL/BORING NO.: PAI-10-MW-01C

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft. TEST NO.: 3, Step 2

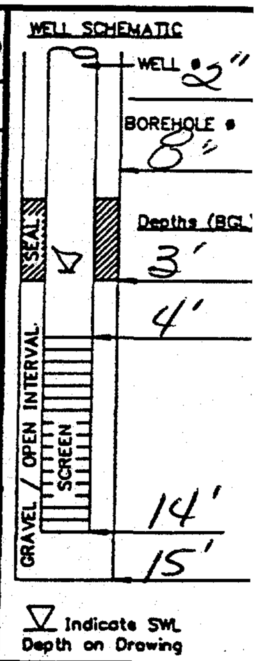
STATIC WATER LEVEL (Depth/Elevation): 5.71 / TWD = 16.91 / LWC = 11.20 DATE: 8/24/98

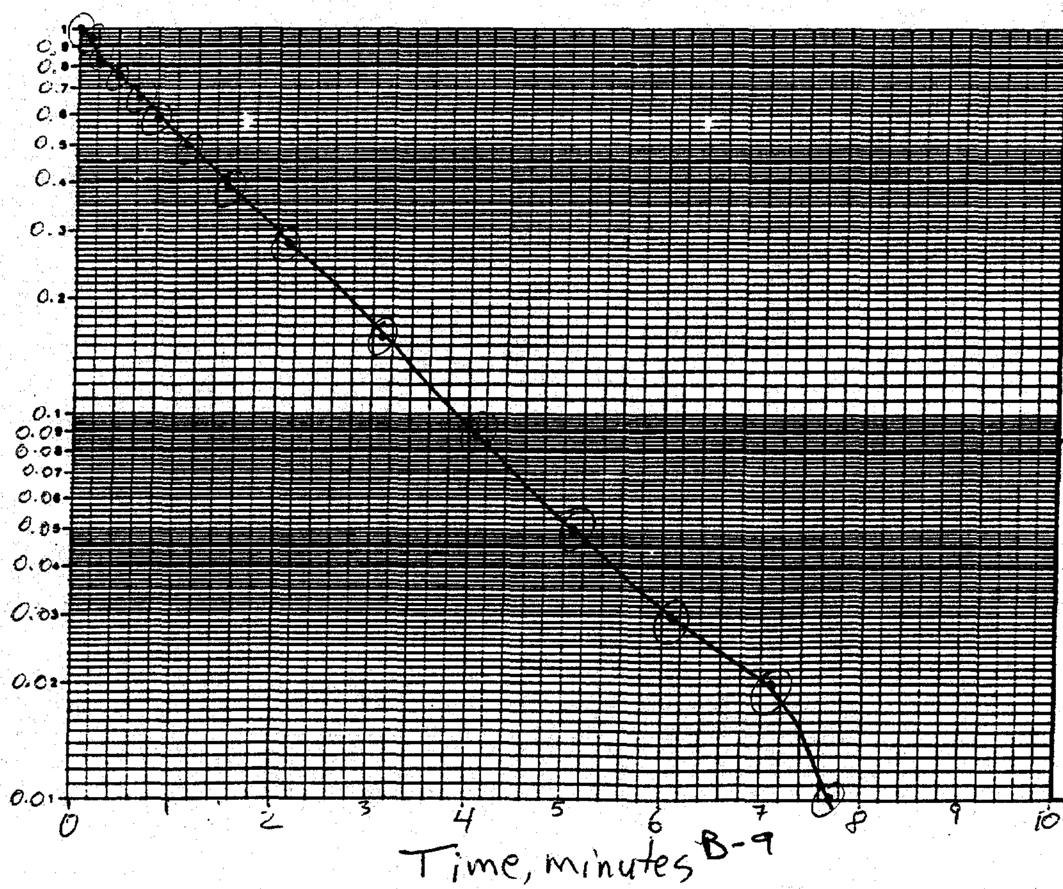
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) CHECKED: GG

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	-1.977	1	6.09	-0.063	0.03
0.1	-1.831	0.93	7.09	-0.031	0.02
0.2	-1.710	0.86	* 8.09	-0.006	0.003
0.4	-1.500	0.76	* 7.69	-0.012	0.006
0.6	-1.322	0.67			
0.8	-1.170	0.59			
1.09	-0.960	0.49			
1.49	-0.769	0.39			
2.09	-0.546	0.28			
3.09	-0.317	0.16			
4.09	-0.184	0.09			
5.09	-0.108	0.05			



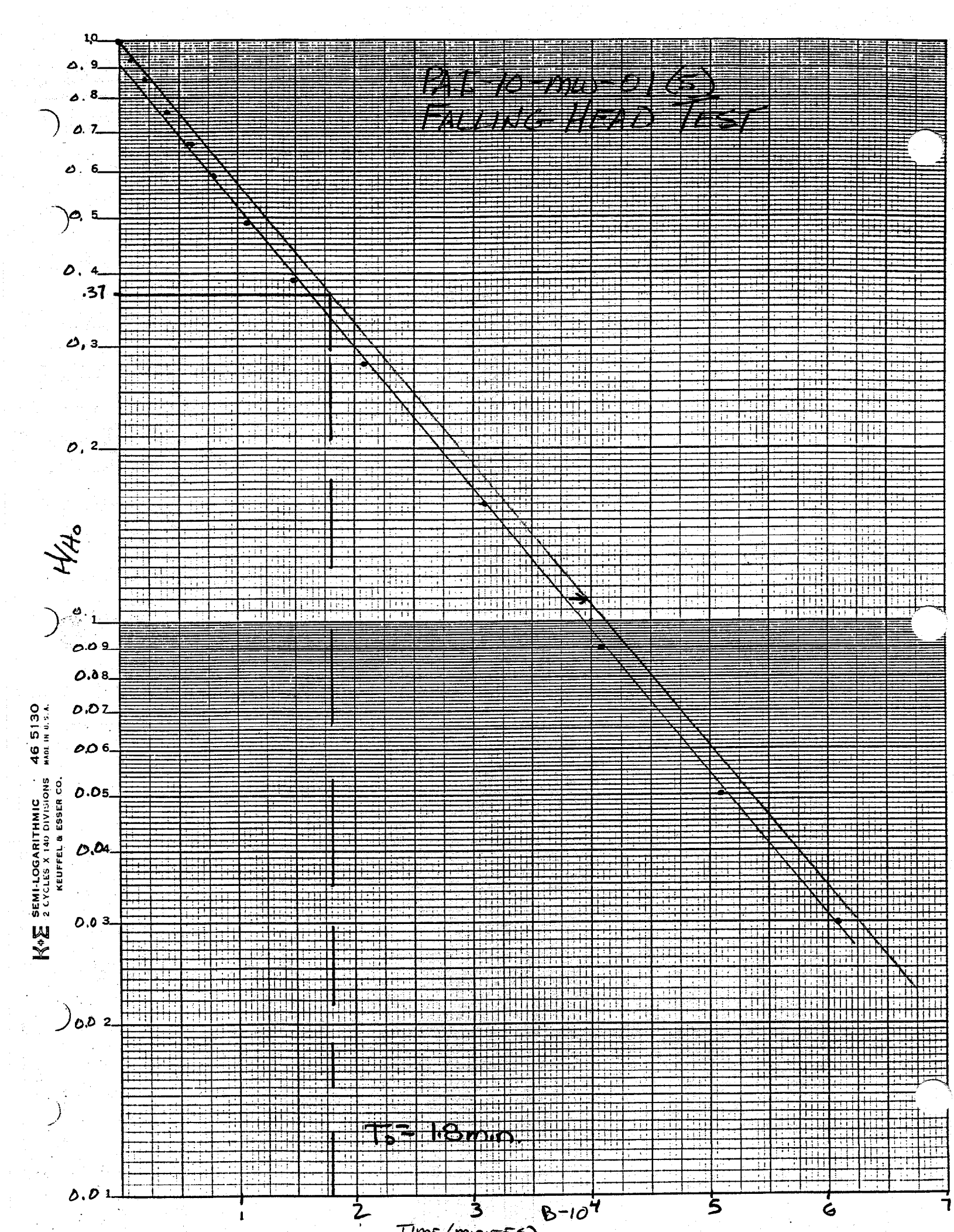


B-9

REMARKS:

XD 10.68

CALCS, SKETCH MAPS, ETC.:


PAT-10-MW-01(S)
FALLING-HEAD TEST
H/H0
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1
2
3
B-10^4
5
6
7
T0 = 18min.
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
MADE IN U.S.A.
46 5130

HH-10-MW-01(S)
TEST 3, STEP 2
SLUG IN (FALL)

SE1000C
Environmental Logger
08/24 16:27

Unit# 00145 Test 3

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 2 08/24 14:30:33

Elapsed Time	INPUT 1
0.0000	0.038
0.0033	-0.534
0.0066	-1.131
0.0100	-1.857
0.0133	-1.290
0.0166	-1.736
0.0200	-2.302
0.0233	-3.212
0.0266	-3.536
0.0300	-3.358
0.0333	-2.798
0.0366	-2.276
0.0400	-1.551
0.0433	-0.585
0.0466	-1.112
0.0500	-1.844
0.0533	-2.493
0.0566	-2.715
0.0600	-2.543
0.0633	-2.066
0.0666	-1.710
0.0700	-1.691
0.0733	-2.009
0.0766	-2.187
0.0800	-2.200
0.0833	-2.054
0.0866	-1.920
0.0900	-1.926
0.0933	-2.003
0.0966	-2.047
0.1000	-2.022
0.1033	-1.971
0.1066	-1.958
0.1100	-1.971
0.1133	-1.977
0.1166	-1.965
0.1200	-1.952

Test 3, Step 2
Slug In (Fall)

	0.1233	-1.952
	0.1266	-1.946
	0.1300	-1.946
	0.1333	-1.939
	0.1366	-1.933
	0.1400	-1.926
	0.1433	-1.920
	0.1466	-1.920
	0.1500	-1.914
	0.1533	-1.907
	0.1566	-1.907
	0.1600	-1.901
	0.1633	-1.895
	0.1666	-1.895
	0.1700	-1.888
	0.1733	-1.882
	0.1766	-1.876
	0.1800	-1.869
	0.1833	-1.869
	0.1866	-1.863
	0.1900	-1.863
	0.1933	-1.857
	0.1966	-1.850
	0.2000	-1.844
	0.2033	-1.837
	0.2066	-1.837
	0.2100	-1.837
0.1	-0.2133	-1.831
	0.2166	-1.825
	0.2200	-1.818
	0.2233	-1.818
	0.2266	-1.812
	0.2300	-1.812
	0.2333	-1.806
	0.2366	-1.806
	0.2400	-1.799
	0.2433	-1.793
	0.2466	-1.787
	0.2500	-1.787
	0.2533	-1.780
	0.2566	-1.774
	0.2600	-1.774
	0.2633	-1.767
	0.2666	-1.761
	0.2700	-1.761
	0.2733	-1.761
	0.2766	-1.755
	0.2800	-1.755
	0.2833	-1.742
	0.2866	-1.742
	0.2900	-1.742
	0.2933	-1.736
	0.2966	-1.736
	0.3000	-1.729
	0.3033	-1.723
	0.3066	-1.723
	0.3100	-1.717
0.2	-0.3133	-1.710
	0.3166	-1.710
	0.3200	-1.710

PMI-10-MW01(S)
Test 3, Step 2
Slug In (Fall)

	0.3233	-1.698
	0.3266	-1.698
	0.3300	-1.698
	0.3333	-1.698
	0.3500	-1.672
	0.3666	-1.653
	0.3833	-1.628
	0.4000	-1.615
0.3	-0.4166	-1.602
	0.4333	-1.583
	0.4500	-1.564
	0.4666	-1.551
	0.4833	-1.532
	0.5000	-1.519
0.4	-0.5166	-1.500
	0.5333	-1.481
	0.5500	-1.469
	0.5666	-1.456
	0.5833	-1.437
	0.6000	-1.424
0.5	-0.6166	-1.405
	0.6333	-1.392
	0.6500	-1.373
	0.6666	-1.360
	0.6833	-1.348
	0.7000	-1.335
0.6	-0.7166	-1.322
	0.7333	-1.303
	0.7500	-1.290
	0.7666	-1.278
	0.7833	-1.265
	0.8000	-1.252
0.7	-0.8166	-1.240
	0.8333	-1.227
	0.8500	-1.220
	0.8666	-1.208
	0.8833	-1.189
	0.9000	-1.182
0.8	-0.9166	-1.170
	0.9333	-1.163
	0.9500	-1.144
	0.9666	-1.131
	0.9833	-1.125
	1.0000	-1.112
1.09	-1.2000	-0.960
	1.4000	-0.858
1.49	-1.6000	-0.769
	1.8000	-0.686
	2.0000	-0.610
2.09	-2.2000	-0.548
	2.4000	-0.489
	2.6000	-0.432
	2.8000	-0.394
	3.0000	-0.356
3.09	-3.2000	-0.317
	3.4000	-0.286
	3.6000	-0.260
	3.8000	-0.228
	4.0000	-0.203
4.09	-4.2000	-0.184

FHL - 10 - Minutes(s)
Test 3, Step 2
Slug In (Fall)

	4.4000	-0.171
	4.6000	-0.152
	4.8000	-0.139
	5.0000	-0.120
5.09	-5.2000	-0.108
	5.4000	-0.095
	5.6000	-0.089
	5.8000	-0.076
	6.0000	-0.070
6.09	-6.2000	-0.063
	6.4000	-0.057
	6.6000	-0.050
	6.8000	-0.038
	7.0000	-0.038
7.09	-7.2000	-0.031
	7.4000	-0.031
	7.6000	-0.025
7.69	-7.8000	-0.012
	8.0000	-0.006
8.09	-8.2000	-0.006
	8.4000	-0.006
	8.6000	-0.006
	8.8000	0.000
	9.0000	0.000
9.09	-9.2000	0.000
	9.4000	0.006
	9.6000	0.006
	9.8000	0.012
9.89	-10.0000	0.012
	12.0000	0.038
	14.0000	0.038
	16.0000	0.044

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-02(D) RISING HEAD SLUG TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/4/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time For water level to Rise or Fall to 37% of Initial Change

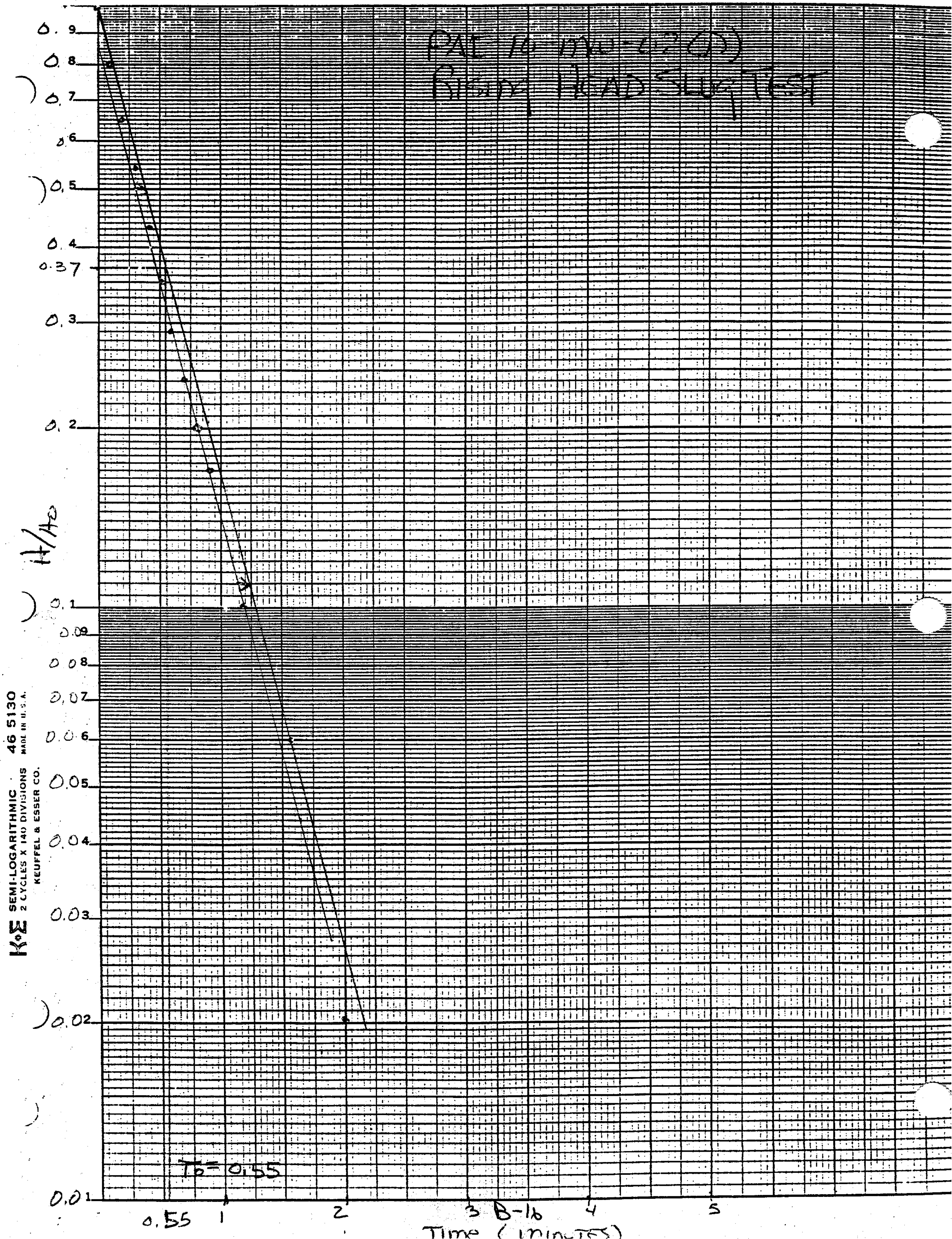
r = 0.083FT
R = 0.083 FT
L = 5 FT
T_0 = 0.55 min

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,Ft)^2 \ln\left(\frac{5FT}{0.083\,FT}\right)}{2(5FT)(0.55\,min)}$$

$$= 5.13 \times 10^{-3}\,FT/min$$

$5.13 \times 10^{-3}\,FT/min \times 1440\,min/day = 7.39\,Ft/day$

$7.39\,Ft/day \times 3.528 \times 10^{-4} \frac{cm/sec}{Ft/day} = 2.61 \times 10^{-3}\,cm/sec$


Rising Head Slug Test
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
H/Ho
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
To = 0.55
0.55
1
2
3
4
5
B-16
Time (minutes)
K+E SEMI-LOGARITHMIC 2 CYCLES X 140 DIVISIONS KEUFFEL & ESSER CO.
46 5130 MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Island, SC - Jericho Is. (Site 4) WELL/BORING NO.: PAI-10-MW0

PROJECT NO.: 7803 GEOLOGIST: Mark Damington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: ~~10ft~~ 5ft. TEST NO.: 2, Step 1

STATIC WATER LEVEL (Depth/Elevation): 5.26/TWD=27.65/LWC=22.39 DATE: 8/24/98

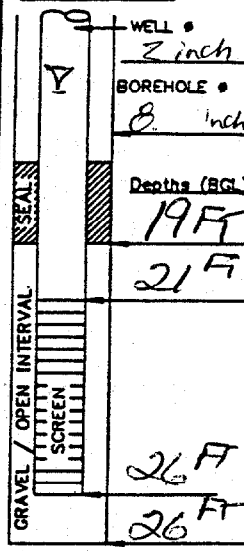
TEST TYPE (Rising/Falling/Constant Head): Rising (Slug Out) CHECKED: GG

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

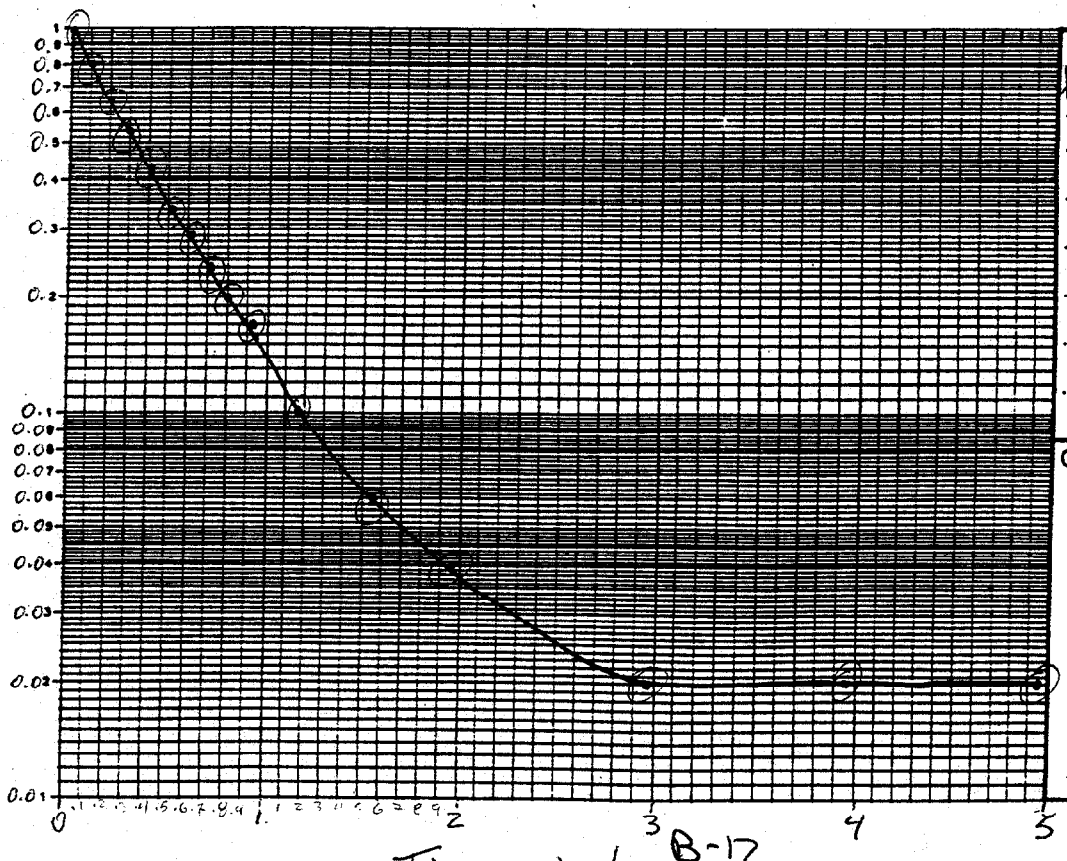
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.695	0	1.98	0.095	0.04
0.1	2.147	0.80	2.98	0.051	0.02
0.2	1.759	0.65	3.98	0.044	0.02
0.3	1.459	0.54	4.98	0.044	0.02
0.41	1.160	0.43			
0.51	0.956	0.35			
0.61	0.790	0.29			
0.71	0.656	0.24			
0.81	0.548	0.20			
0.91	0.465	0.17			
1.18	0.274	0.10			
1.58	0.159	0.06			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

KD 21.85

CALCS, SKETCH MAPS, ETC.:

4/11/c

~~PA10-GW2~~ PA1-10-1110-02(D)
TEST 2, STEP 1
SLUG OUT (RISE) ✓

Rising Head Slug Test

SE1000C
Environmental Logger
08/24 16:14

Unit# 00145 Test 2

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

Step 1 08/24 12:58:10

Elapsed Time	INPUT 1
0.0000	1.287
0.0033	0.631
0.0066	2.224
0.0100	2.963
0.0133	2.899
0.0166	2.863
0 0.0200	2.695 T_0
0.0233	2.651
0.0266	2.638
0.0300	2.631
0.0333	2.593
0.0366	2.568
0.0400	2.549
0.0433	2.530
0.0466	2.510
0.0500	2.491
0.0533	2.472
0.0566	2.453
0.0600	2.434
0.0633	2.415
0.0666	2.402
0.0700	2.383
0.0733	2.364
0.0766	2.351
0.0800	2.332
0.0833	2.313
0.0866	2.294
0.0900	2.281
0.0933	2.268
0.0966	2.249
0.1000	2.237
0.1033	2.217
0.1066	2.205
0.1100	2.192
0.1133	2.173
0.1166	2.160
0.1 - 0.1200	2.147

~~PAI-10-MW-02C~~ PAI-10-MW-02(D)

Test 2, Step 1

Slug Out (Rise)

Rising Head Slug Test

0.1233	2.128
0.1266	2.115
0.1300	2.103
0.1333	2.084
0.1366	2.071
0.1400	2.058
0.1433	2.045
0.1466	2.033
0.1500	2.020
0.1533	2.007
0.1566	1.994
0.1600	1.975
0.1633	1.969
0.1666	1.956
0.1700	1.937
0.1733	1.931
0.1766	1.918
0.1800	1.905
0.1833	1.892
0.1866	1.880
0.1900	1.867
0.1933	1.854
0.1966	1.841
0.2000	1.829
0.2033	1.816
0.2066	1.810
0.2100	1.797
0.2133	1.784
0.2166	1.771
0.2 — 0.2200	1.759
0.2233	1.746
0.2266	1.746
0.2300	1.727
0.2333	1.714
0.2366	1.708
0.2400	1.695
0.2433	1.689
0.2466	1.676
0.2500	1.663
0.2533	1.650
0.2566	1.644
0.2600	1.638
0.2633	1.625
0.2666	1.612
0.2700	1.606
0.2733	1.593
0.2766	1.580
0.2800	1.574
0.2833	1.561
0.2866	1.555
0.2900	1.542
0.2933	1.536
0.2966	1.523
0.3000	1.510
0.3033	1.504
0.3066	1.497
0.3100	1.485
0.3133	1.478
0.3166	1.465
0.3 — 0.3200	1.459

~~TH1-10-11000~~ TH1-10-MW-02(D)
Test 2, Step 1
Slug Out (Rise)

Rising Head Slug Test

	0.3233	1.453
	0.3266	1.440
	0.3300	1.434
	0.3333	1.421
	0.3500	1.376
	0.3666	1.332
	0.3833	1.287
	0.4000	1.242
	0.4166	1.204
0.41 -	0.4333	1.160
	0.4500	1.128
	0.4666	1.090
	0.4833	1.058
	0.5000	1.019
	0.5166	0.988
0.51 -	0.5333	0.956
	0.5500	0.924
	0.5666	0.898
	0.5833	0.866
	0.6000	0.841
	0.6166	0.815
0.61 -	0.6333	0.790
	0.6500	0.764
	0.6666	0.745
	0.6833	0.720
	0.7000	0.694
	0.7166	0.675
0.71 -	0.7333	0.656
	0.7500	0.637
	0.7666	0.618
	0.7833	0.599
	0.8000	0.580
	0.8166	0.567
0.81 -	0.8333	0.548
	0.8500	0.529
	0.8666	0.516
	0.8833	0.503
	0.9000	0.490
	0.9166	0.478
0.91 -	0.9333	0.465
	0.9500	0.446
	0.9666	0.439
	0.9833	0.420
	1.0000	0.414
1.18 -	1.2000	0.274
	1.4000	0.204
1.58 -	1.6000	0.159
	1.8000	0.121
1.98 -	2.0000	0.095
	2.2000	0.082
	2.4000	0.070
	2.6000	0.063
	2.8000	0.057
2.98 -	3.0000	0.051
	3.2000	0.051
	3.4000	0.051
	3.6000	0.044
	3.8000	0.044
3.98 -	4.0000	0.044
	4.2000	0.044

~~HAI-10-MW02~~ HAI-10-MW-02(D)
Test 2, Step 1
Slug Out (Rise)

4.4000	0.044
4.6000	0.044
4.8000	0.044
4.98 - 5.0000	0.044
5.2000	0.044
5.4000	0.044
5.6000	0.044
5.8000	0.044
6.0000	0.044
6.2000	0.044
6.4000	0.044
6.6000	0.044
6.8000	0.044
7.0000	0.044
7.2000	0.044
7.4000	0.044
7.6000	0.044
7.8000	0.044
8.0000	0.044
8.2000	0.044
8.4000	0.044
8.6000	0.044
8.8000	0.044
9.0000	0.044
9.2000	0.044
9.4000	0.051
9.6000	0.044
9.8000	0.051
10.0000	0.051
12.0000	0.057
14.0000	0.057
16.0000	0.057
18.0000	0.063
20.0000	0.070
22.0000	0.070

END

Rising Head Slug Test

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

CLIENT	JOB NUMBER 7803	
SUBJECT PAI-10-MW-02(D) FALLING HEAD SLUG TEST		
BASED ON HVORSLEV	DRAWING NUMBER	
BY GG / CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time for water level to rise or fall to 37 percent of initial Change.

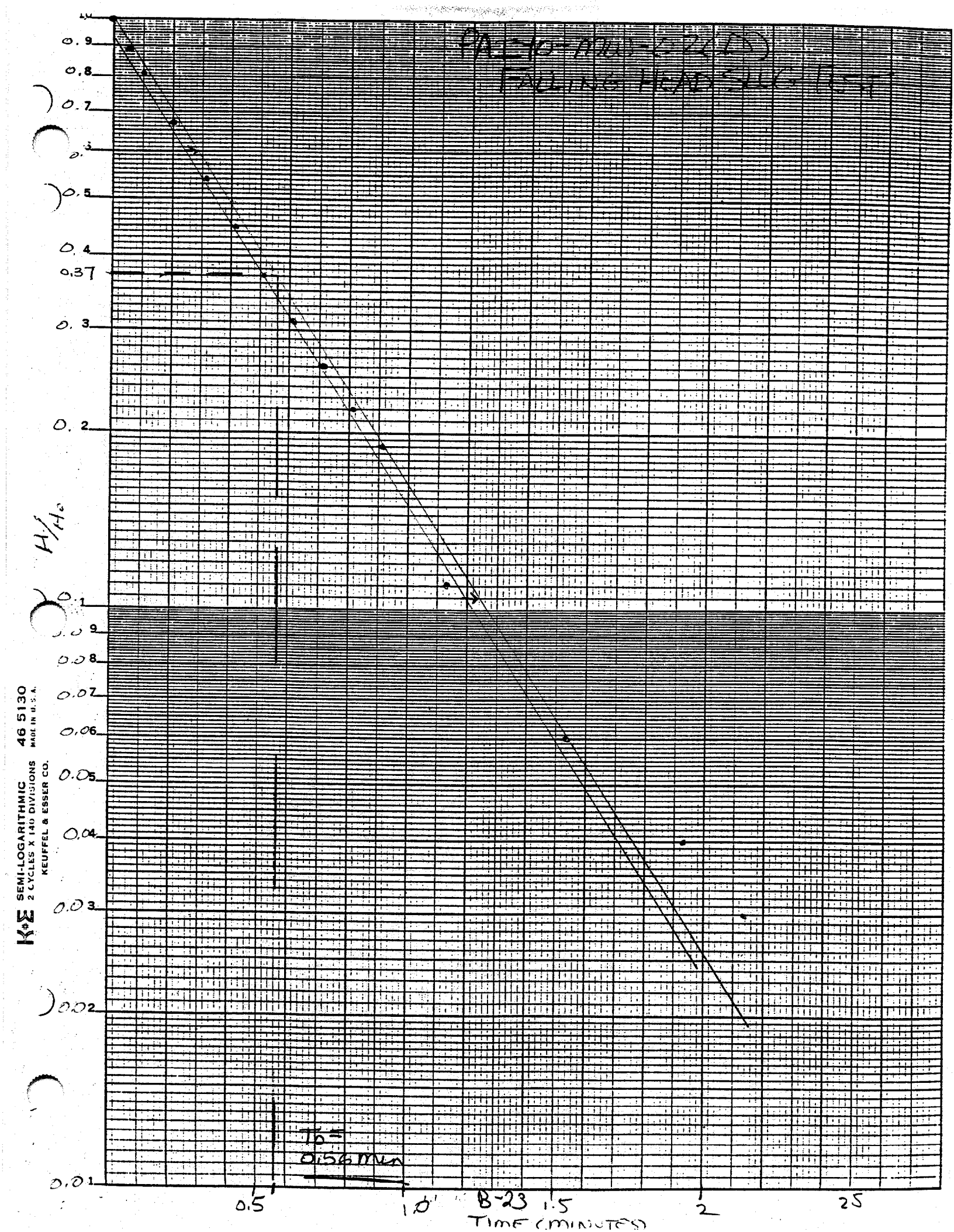
r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_0 = 0.56 min.

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,FT)^2 \ln (5\,Ft/0.083\,FT)}{2(5\,FT)(0.56\,min)}$$

$$= 5.04 \times 10^{-3}\ FT/min$$

5.04×10^{-3} FT/min x 1440 min/day = 7.26 Ft/day

7.26 Ft/day x 3.528×10^{-4} Cm/Sec / Ft/day = 2.56×10^{-3} cm/sec

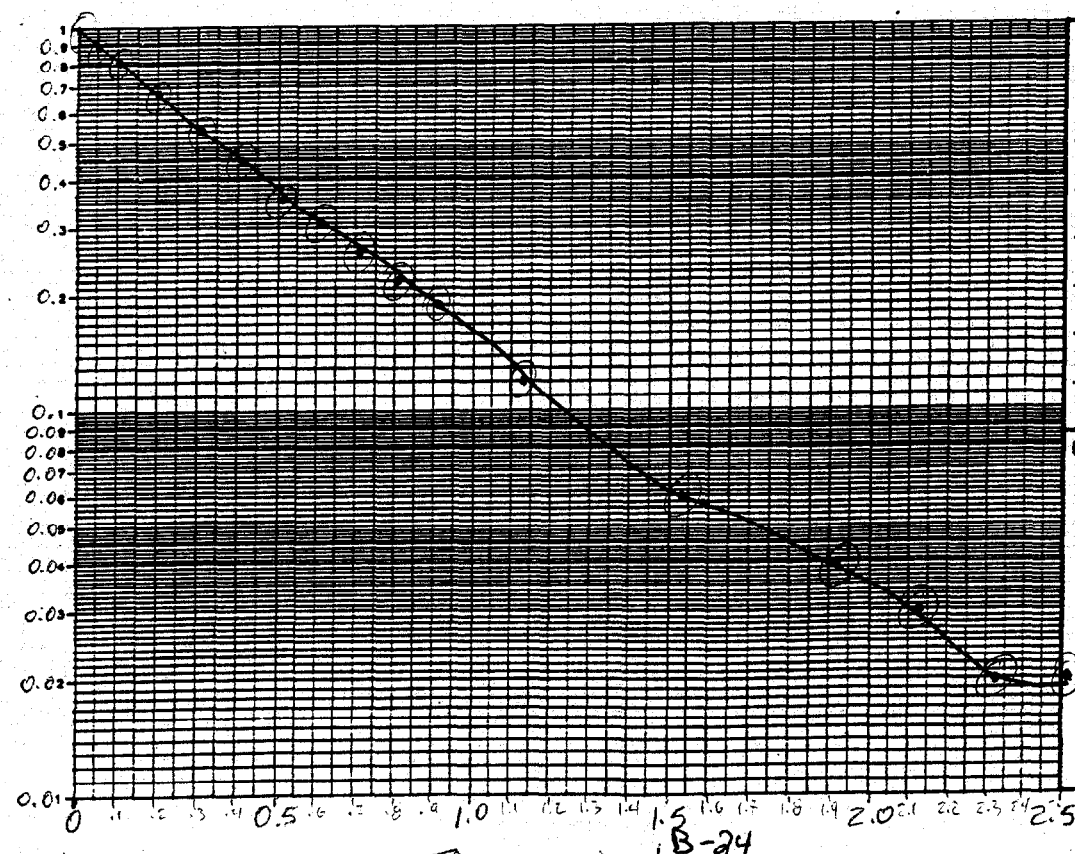

H/H₀
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.5
1.0
1.5
2
2.5
TIME (MINUTES)
To = 0.56 MIN
B-23
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Is., SC - Jericho Is. (Site 4) WELL/BORING NO.: PAI-10-MW-0
PROJECT NO.: 7803 GEOLOGIST: Mark Dannington
WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10ft @ 5ft TEST NO.: 2, Step 0
STATIC WATER LEVEL (Depth/Elevation): 5.26 / TWD = 27.65 / LWC = 22.39 DATE: 8/24/98
TEST TYPE (Rising/Falling/Constant Head): Falling (Slug In) CHECKED:
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5ft.) 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	-2.110	1	1.53	-0.133	0.06
0.05	-1.887	0.89	1.93	-0.076	0.04
0.10	-1.708	0.81	2.13	-0.057	0.03
0.20	-1.415	0.67	2.33	-0.044	0.02
0.31	-1.147	0.54	2.53	-0.038	0.02
0.41	-0.943	0.45			
0.51	-0.777	0.37			
0.61	-0.650	0.31			
0.71	-0.548	0.26			
0.81	-0.465	0.22			
0.91	-0.395	0.19			
1.13	-0.254	0.12			

WELL SCHEMATIC
WELL • 2 inch
BOREHOLE • 8 - inch
SEAL
Depths (BGL)
19 Ft
21 Ft
GRAVEL / OPEN INTERVAL
SCREEN
26 Ft
2
▽ Indicate SWL Depth on Drawing



REMARKS:
XD = 21.85

CALCS, SKETCH MAPS, ETC.:

H/Ab

~~RAIO-ONE~~ PAI-10-MW00-02(D)
TEST 2 STEP 0
SLUG IN (~~RISE~~) (Fall)

Falling Head Slug Test

SE1000C
Environmental Logger
08/24 16:11

Unit# 00145 Test 2

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

Step 0 08/24 12:43:44

Elapsed Time	INPUT 1
0.0000	-0.688
0.0033	-1.064
0.0066	-1.644
0.0100	-2.321
0.0133	-3.041
0.0166	-3.564
0.0200	-3.743
0.0233	-3.545
0.0266	-2.996
0.0300	-2.148
0.0333	-1.523
0.0366	-1.173
0.0400	-1.421
0.0433	-1.900
0.0466	-2.295
0.0500	-2.512
0.0533	-2.512
0.0566	-2.378
0.0600	-2.148
0.0633	-1.995
0.0666	-1.989
0.0700	-2.065
0.0733	-2.110
0.0766	-2.103
0.0800	-2.065
0.0833	-2.027
0.0866	-2.008
0.0900	-2.002
0.0933	-1.995
0.0966	-1.989
0.1000	-1.976
0.1033	-1.957
0.1066	-1.951
0.1100	-1.938
0.1133	-1.931
0.1166	-1.919
0.1200	-1.900

0 To

PNL - 10 - [illegible] U4(D)
Test 2, Step 0
Slug In (Fall)

Falling Head Slug Test

0.05	-0.1233	-1.887
	0.1266	-1.874
	0.1300	-1.862
	0.1333	-1.848
	0.1366	-1.836
	0.1400	-1.823
	0.1433	-1.817
	0.1466	-1.804
	0.1500	-1.791
	0.1533	-1.778
	0.1566	-1.766
	0.1600	-1.753
	0.1633	-1.740
	0.1666	-1.734
	0.1700	-1.721
0.10	-0.1733	-1.708
	0.1766	-1.702
	0.1800	-1.689
	0.1833	-1.676
	0.1866	-1.670
	0.1900	-1.657
	0.1933	-1.651
	0.1966	-1.638
	0.2000	-1.625
	0.2033	-1.619
	0.2066	-1.606
	0.2100	-1.593
	0.2133	-1.587
	0.2166	-1.574
	0.2200	-1.568
	0.2233	-1.555
	0.2266	-1.549
	0.2300	-1.536
	0.2333	-1.530
	0.2366	-1.517
	0.2400	-1.510
	0.2433	-1.498
	0.2466	-1.492
	0.2500	-1.479
	0.2533	-1.472
	0.2566	-1.459
	0.2600	-1.453
	0.2633	-1.440
	0.2666	-1.434
	0.2700	-1.421
0.20	-0.2733	-1.415
	0.2766	-1.408
	0.2800	-1.396
	0.2833	-1.389
	0.2866	-1.383
	0.2900	-1.370
	0.2933	-1.364
	0.2966	-1.358
	0.3000	-1.345
	0.3033	-1.338
	0.3066	-1.326
	0.3100	-1.326
	0.3133	-1.313
	0.3166	-1.307
	0.3200	-1.300

Test 2, Step 0
Slug In (Fall)

Falling Head Slug Test

	0.3333	-1.287
	0.3666	-1.287
	0.3900	-1.275
	0.3333	-1.268
	0.3500	-1.224
	0.3666	-1.185
0.31 -	0.3833	-1.147
	0.4000	-1.109
	0.4166	-1.071
	0.4333	-1.039
	0.4500	-1.007
	0.4666	-0.975
0.41 -	0.4833	-0.943
	0.5000	-0.911
	0.5166	-0.886
	0.5333	-0.854
	0.5500	-0.828
	0.5666	-0.803
0.51 -	0.5833	-0.777
	0.6000	-0.758
	0.6166	-0.733
	0.6333	-0.714
	0.6500	-0.688
	0.6666	-0.669
0.61 -	0.6833	-0.650
	0.7000	-0.631
	0.7166	-0.612
	0.7333	-0.592
	0.7500	-0.580
	0.7666	-0.567
0.71 -	0.7833	-0.548
	0.8000	-0.529
	0.8166	-0.516
	0.8333	-0.503
	0.8500	-0.490
	0.8666	-0.471
0.81 -	0.8833	-0.465
	0.9000	-0.452
	0.9166	-0.439
	0.9333	-0.427
	0.9500	-0.414
	0.9666	-0.401
0.91 -	0.9833	-0.395
	1.0000	-0.382
1.13 -	1.2000	-0.254
	1.4000	-0.184
1.53 -	1.6000	-0.133
	1.8000	-0.102
1.93 -	2.0000	-0.076
2.13 -	2.2000	-0.057
2.33 -	2.4000	-0.044
2.53 -	2.6000	-0.038
	2.8000	-0.025
	3.0000	-0.019
3.13 -	3.2000	-0.019
	3.4000	-0.012
	3.6000	-0.006
	3.8000	-0.006
	4.0000	-0.006
	4.2000	0.000

PW-10-MW02(D)
Test 2, Step 0
Slug In (Fall)

4.4000	0.000
4.6000	0.000
4.8000	0.000
5.0000	0.000
5.2000	0.000
5.4000	0.000
5.6000	0.006
5.8000	0.006
6.0000	0.000
6.2000	0.006
6.4000	0.006
6.6000	0.006
6.8000	0.012
7.0000	0.006
7.2000	0.012
7.4000	0.006
7.6000	0.012
7.8000	0.012
8.0000	0.012
8.2000	0.012
8.4000	0.012
8.6000	0.012
8.8000	0.012
9.0000	0.019
9.2000	0.019
9.4000	0.019
9.6000	0.019
9.8000	0.019
10.0000	0.019
12.0000	0.019

END

Falling Head Slug Test

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-mw-03(S) Rising Head Slug Test			
BASED ON HVORSIEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

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 = 6.25FT
T_o = Time for water level to rise or Fall To 37% of Initial change — T_o = 0.56 min

$$K = \frac{r^2 \ln L/R}{2 L T_o} = \frac{(0.083FT)^2 \ln\left(\frac{6.25FT}{0.083FT}\right)}{2(6.25FT)(0.56\ min.)}$$

$$= 4.23 \times 10^{-3}\ Ft/min$$

4.23×10^{-3} Ft/min × 1440 min/day = 6.1 Ft/day

6.1 Ft/day × $\frac{3.528 \times 10^{-4}\ Cm/Sec}{Ft/day}$ = 2.15×10^{-3} cm/Sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: Mare Pollution Islands (Verano Island) WELL/BORING NO.: PAI-10-GM-03S

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington / Seth Pelle

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 10' / 4.0' - 14.0' TEST NO.: 4 / Slug - 1

STATIC WATER LEVEL (Depth/Elevation): 10.54' / TWD = 16.79' / LWD = 6.25' DATE: 09/12/98

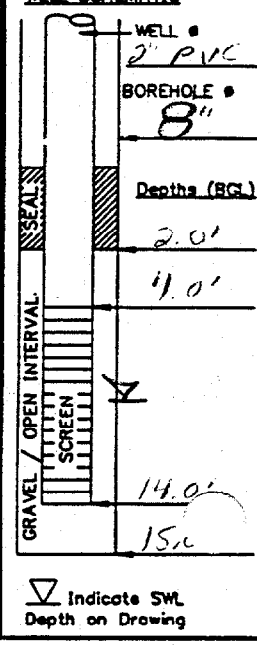
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid slug (2.5') PAGE 2 OF 2

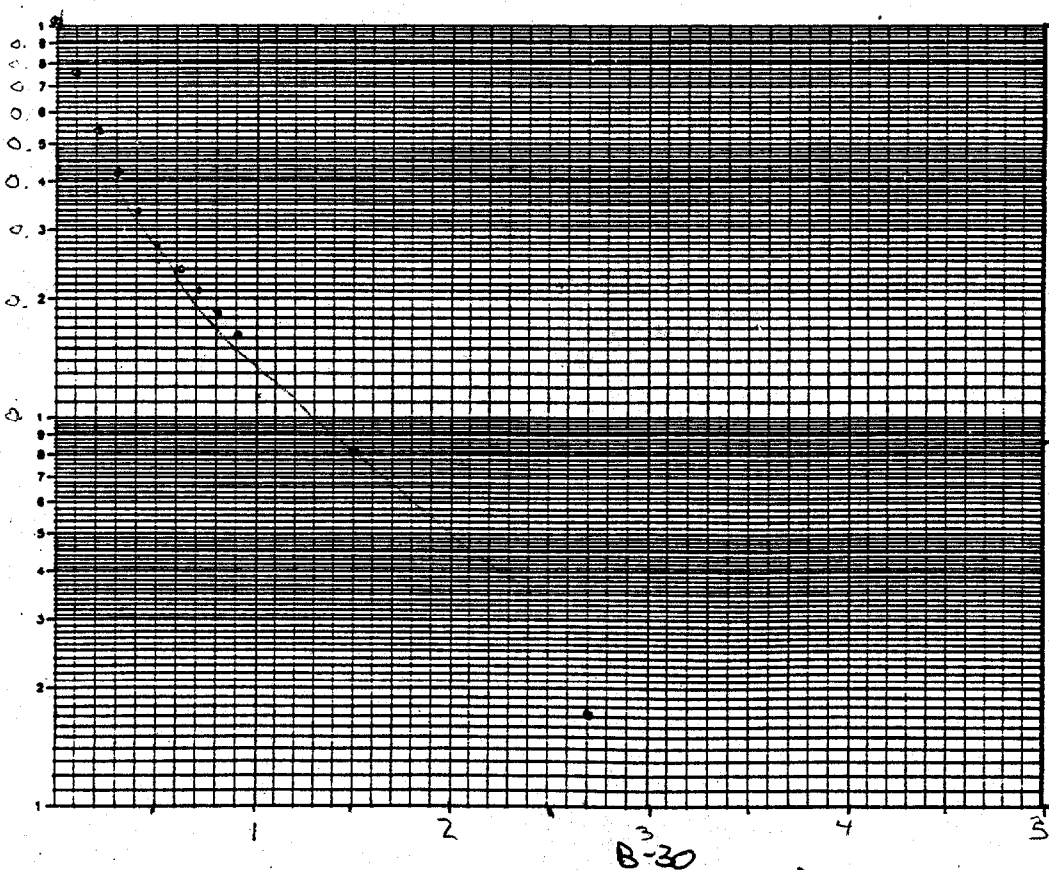
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	0.692	1	3.32	0	0
.1	0.527	.762			
.2	0.393	.568			
.3	0.304	.439			
.4	0.234	.338			
.5	0.190	.275			
.6	0.165	.238			
.7	0.146	0.211			
.8	0126	.182			
.9	0.114	.165			
1.51	0.057	.082			
2.72	0.012	.017			

WELL SCHEMATIC



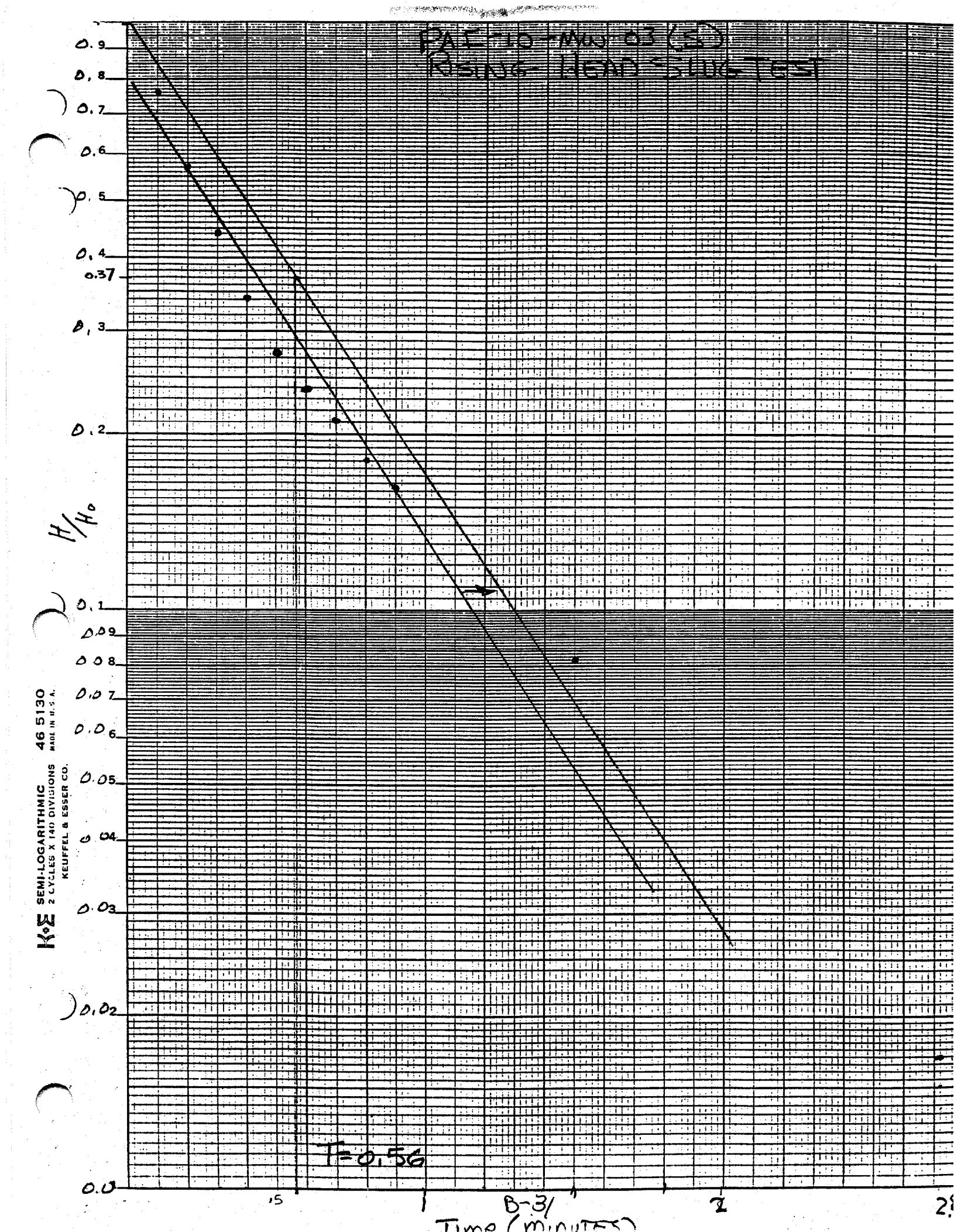
▽ Indicate SWL Depth on Drawing



REMARKS:

ID: 00003

CALCS, SKETCH MAPS, ETC.:


PAL-10-MW-03 (S)
RISING-HEAD SLUG TEST
H/H0
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
0.0
T=0.56
.5
1
2
Time (minutes)
B-31
K+E SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

~~PAI-10-GW03~~

PAI-10-MW-03(S)
Rising Head Slug Test

SE1000C
Environmental Logger
09/12 15:29

Unit# 00145 Test 4

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 09/12 12:25:31

Elapsed Time	INPUT 1
0.0000	1.280
0.0033	-0.130
0.0066	1.638
0.0100	0.841
0.0133	0.920
0.0166	0.825
0.0200	0.819
0.0233	0.819
0.0266	0.806
0.0300	0.800
0.0333	0.793
0.0366	0.787
0.0400	0.774
0.0433	0.768
0.0466	0.762
0.0500	0.755
0.0533	0.743
0.0566	0.736
0.0600	0.736
0.0633	0.730
0.0666	0.717
0.0700	0.717
0.0733	0.704
0.0766	0.698
0.0800	0.685
0.0833	0.692 — To
0.0866	0.679
0.0900	0.679
0.0933	0.666
0.0966	0.666
0.1000	0.660
0.1033	0.654
0.1066	0.654
0.1100	0.635
0.1133	0.635
0.1166	0.628
0.1200	0.622

PAE-10-MW-03(S)
Rising Head Slug Test

0.1233	0.615
0.1266	0.609
0.1300	0.603
0.1333	0.596
0.1366	0.596
0.1400	0.590
0.1433	0.584
0.1466	0.571
0.1500	0.571
0.1533	0.571
0.1566	0.565
0.1600	0.558
0.1633	0.552
0.1666	0.552
0.1700	0.546
0.1733	0.533
0.1766	0.533
0.1800	0.527
0.1833	0.527
0.1866	0.514
0.1900	0.514
0.1933	0.508
0.1966	0.501
0.2000	0.501
0.2033	0.488
0.2066	0.495
0.2100	0.488
0.2133	0.482
0.2166	0.476
0.2200	0.469
0.2233	0.463
0.2266	0.463
0.2300	0.463
0.2333	0.450
0.2366	0.450
0.2400	0.444
0.2433	0.444
0.2466	0.438
0.2500	0.438
0.2533	0.431
0.2566	0.425
0.2600	0.425
0.2633	0.419
0.2666	0.412
0.2700	0.412
0.2733	0.406
0.2766	0.406
0.2800	0.400
0.2833	0.393
0.2866	0.393
0.2900	0.387
0.2933	0.381
0.2966	0.381
0.3000	0.381
0.3033	0.374
0.3066	0.368
0.3100	0.374
0.3133	0.361
0.3166	0.361
0.3200	0.355

PAI-10-MW-03(S)
Rising Head Slug Test

	0.3233	0.355
	0.3266	0.355
	0.3300	0.340
	0.3333	0.340
	0.3500	0.330
	0.3666	0.317
.3 –	0.3833	0.304
	0.4000	0.292
	0.4166	0.273
	0.4333	0.260
	0.4500	0.253
	0.4666	0.241
.4 –	0.4833	0.234
	0.5000	0.228
	0.5166	0.222
	0.5333	0.215
	0.5500	0.203
	0.5666	0.196
.5 –	0.5833	0.190
	0.6000	0.190
	0.6166	0.184
	0.6333	0.177
	0.6500	0.171
	0.6666	0.171
.6 –	0.6833	0.165
	0.7000	0.158
	0.7166	0.152
	0.7333	0.152
	0.7500	0.146
	0.7666	0.152
.7 –	0.7833	0.146
	0.8000	0.130
	0.8166	0.130
	0.8333	0.126
	0.8500	0.126
	0.8666	0.126
.8 –	0.8833	0.126
	0.9000	0.126
	0.9166	0.120
	0.9333	0.120
	0.9500	0.120
	0.9666	0.114
.9	0.9833	0.114
	1.0000	0.114
	1.2000	0.088
	1.4000	0.063
1.51 –	1.6000	0.057
	1.8000	0.050
	2.0000	0.038
	2.2000	0.031
	2.4000	0.031
	2.6000	0.019
2.72 –	2.8000	0.012
	3.0000	0.006
	3.2000	0.006
3.3 –	3.4000	0.000
	3.6000	0.000
3.72 –	3.8000	-0.006
	4.0000	-0.006
	4.2000	-0.006

PAI-10-MW-03(S)
Rising Head Slug Test.

4.4000	-0.012
4.6000	-0.019
4.8000	-0.019
5.0000	-0.019
5.2000	-0.019
5.4000	-0.019
5.6000	-0.025
5.8000	-0.031
6.0000	-0.031
6.2000	-0.031
6.4000	-0.038
6.6000	-0.038
6.8000	-0.031
7.0000	-0.038
7.2000	-0.038
7.4000	-0.038
7.6000	-0.044
7.8000	-0.044
8.0000	-0.044
8.2000	-0.050
8.4000	-0.050
8.6000	-0.050
8.8000	-0.050
9.0000	-0.050
9.2000	-0.057
9.4000	-0.050
9.6000	-0.057
9.8000	-0.057
10.0000	-0.057
12.0000	-0.063

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-04(D) RISING HEAD SLUG TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GLG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well Screen
L = length of well Screen
T_0 = Time for water level to Rise to Fall to 37% of Initial Change

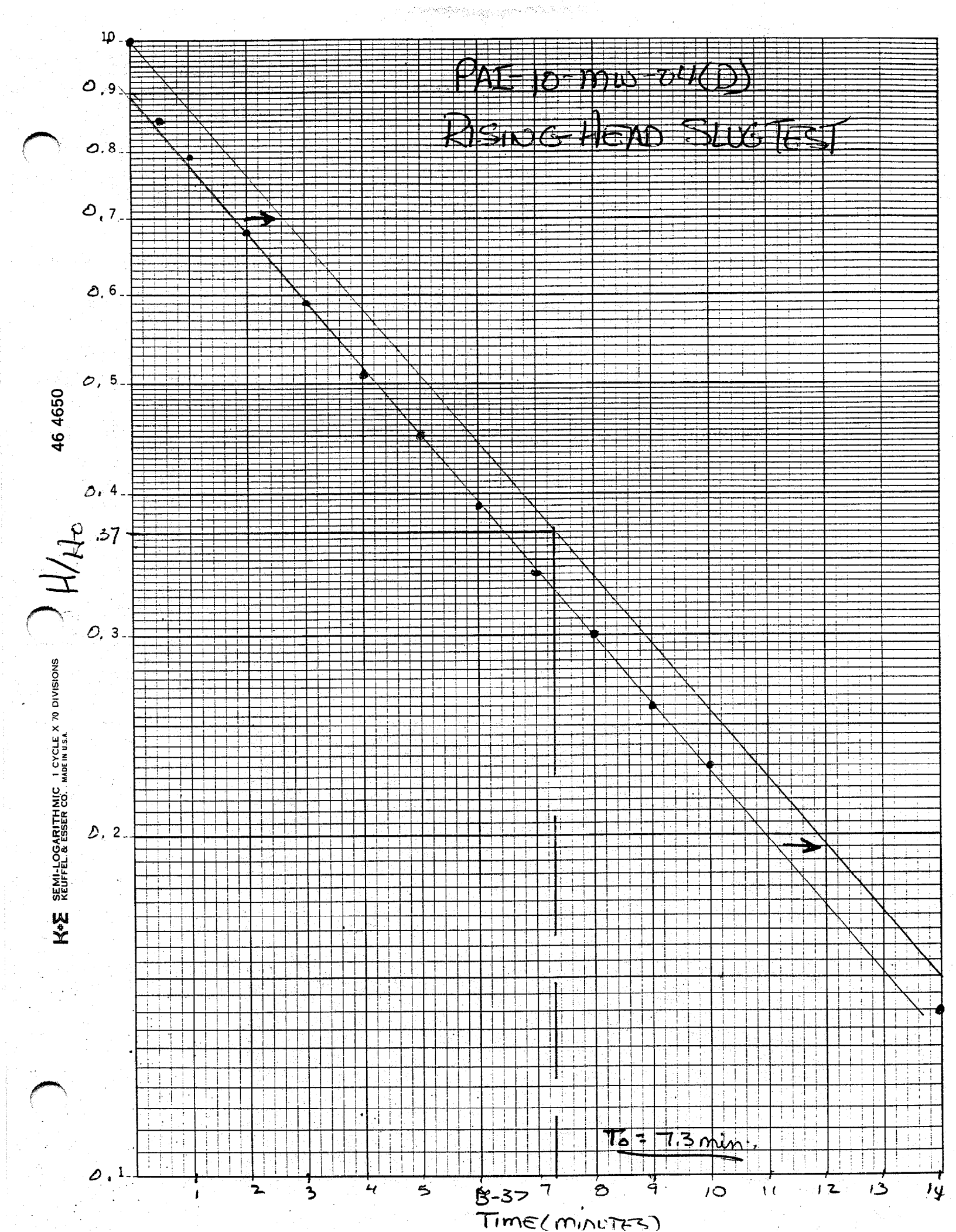
r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_0 = 7.3 min.

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\,Ft)^2 \ln(5FT/0.083Ft)}{2(5FT)(7.3\,min)}$$

$$= 3.87 \times 10^{-4}\ Ft/min$$

$3.87 \times 10^{-4}\ Ft/min \times 1440\ min/day = 0.56\ Ft/day$

$0.56\ Ft/day \times 3.528 \times \frac{10^{-4}\ cm/sec}{Ft/day} = 1.97 \times 10^{-4}\ cm/sec$


PAL-10-MW-04(D)
RISING-HEAD SLUG TEST
H/Ho
1.0
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
1
2
3
4
5
B-37
7
8
9
10
11
12
13
14
TIME (MINUTES)
To = 7.3 min.
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD PARRIS ISLAND (JERICHO ISLAND) WELL/BORING NO.: PAI-10 ~~PAI-10~~ MW-

PROJECT NO.: 7403 GEOLOGIST: MARK DARRINGTON / SETH FELLER

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 5.0' / 33.0' - 38.0' TEST NO.: 5 / Step 1

STATIC WATER LEVEL (Depth/Elevation): 9.73' / TWO = 38.20' / LWC = 28.47' DATE: 01/12/95

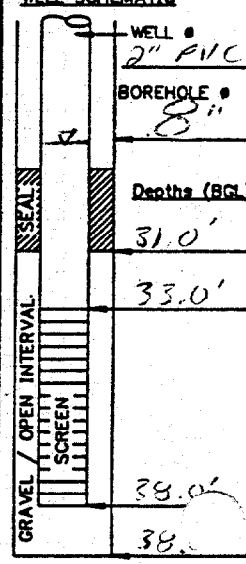
TEST TYPE (Rising/Falling/Constant Head): Rising (Slug out) CHECKED:

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

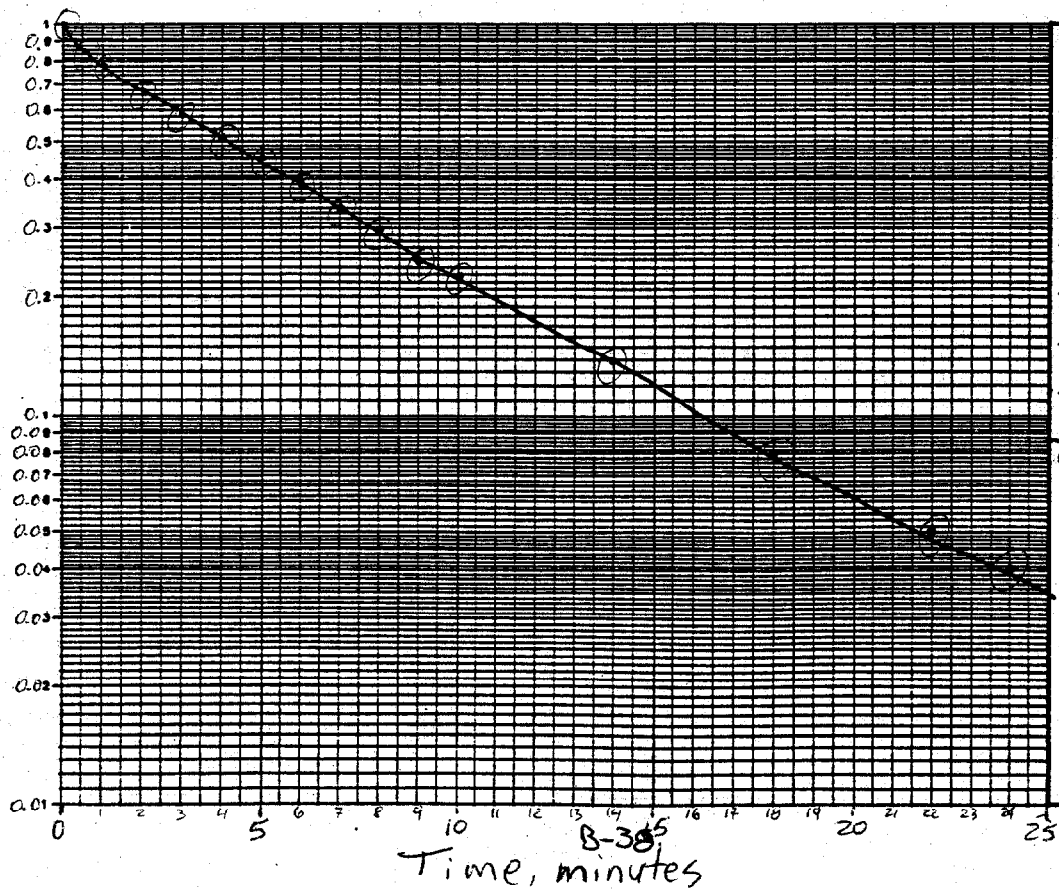
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.827	1	14.0	0.389	0.14
0.5	2.412	0.85	18.0	0.236	0.08
1.0	2.227	0.79	22.0	0.153	0.05
2.0	1.914	0.68	24.0	0.127	0.04
3.0	1.659	0.59			
4.0	1.448	0.51			
5.0	1.263	0.45			
6.0	1.104	0.39			
7.0	0.963	0.34			
8.0	0.842	0.30			
9.0	0.734	0.26			
10.0	0.651	023			

WELL SCHEMATIC



Indicate SWL Depth on Drawing



REMARKS:

ID = 00004

XD @ bottom = 28.38'

CALCS, SKETCH MAPS, ETC.:

H/Ho

~~PAI-10 G0404~~ MW-24(A)

Test 5, Step 1
Slug out (Rise)

SE1000C
Environmental Logger
09/12 15:35

Unit# 00145 Test 5

RISE Head Slug Test

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 09/12 13:21:02

Elapsed Time	INPUT 1
0.0000	2.827 — To
0.0033	2.827
0.0066	2.827
0.0100	2.814
0.0133	2.821
0.0166	2.833
0.0200	2.808
0.0233	2.795
0.0266	2.776
0.0300	2.763
0.0333	2.769
0.0366	2.757
0.0400	2.750
0.0433	2.744
0.0466	2.738
0.0500	2.731
0.0533	2.731
0.0566	2.725
0.0600	2.718
0.0633	2.718
0.0666	2.712
0.0700	2.706
0.0733	2.699
0.0766	2.699
0.0800	2.693
0.0833	2.693
0.0866	2.686
0.0900	2.680
0.0933	2.674
0.0966	2.674
0.1000	2.667
0.1033	2.661
0.1066	2.661
0.1100	2.655
0.1133	2.655
0.1166	2.648
0.1200	2.648

PAL - 10 - [illegible]
Test 5, Step 1
Slug Out (Rise)

Rising Head Slug Test

0.1233	2.642
0.1266	2.642
0.1300	2.635
0.1333	2.629
0.1366	2.629
0.1400	2.629
0.1433	2.623
0.1466	2.623
0.1500	2.616
0.1533	2.610
0.1566	2.610
0.1600	2.610
0.1633	2.604
0.1666	2.604
0.1700	2.597
0.1733	2.597
0.1766	2.591
0.1800	2.591
0.1833	2.584
0.1866	2.584
0.1900	2.578
0.1933	2.584
0.1966	2.578
0.2000	2.578
0.2033	2.571
0.2066	2.571
0.2100	2.565
0.2133	2.565
0.2166	2.565
0.2200	2.559
0.2233	2.559
0.2266	2.553
0.2300	2.553
0.2333	2.553
0.2366	2.553
0.2400	2.546
0.2433	2.540
0.2466	2.540
0.2500	2.540
0.2533	2.540
0.2566	2.540
0.2600	2.533
0.2633	2.533
0.2666	2.533
0.2700	2.527
0.2733	2.527
0.2766	2.527
0.2800	2.520
0.2833	2.520
0.2866	2.514
0.2900	2.514
0.2933	2.514
0.2966	2.514
0.3000	2.508
0.3033	2.508
0.3066	2.508
0.3100	2.508
0.3133	2.508
0.3166	2.501
0.3200	2.501

MW-4 - Nov 94 (D)
Test 5, Step 1
Slug Out (Rise)

Rising Head Slug Test

	0.3233	2.501
	0.3266	2.501
	0.3300	2.495
	0.3333	2.495
	0.3500	2.482
	0.3666	2.476
	0.3833	2.470
	0.4000	2.457
	0.4166	2.450
	0.4333	2.444
	0.4500	2.438
	0.4666	2.425
	0.4833	2.419
0.50	0.5000	2.412
	0.5166	2.406
	0.5333	2.399
	0.5500	2.393
	0.5666	2.386
	0.5833	2.380
	0.6000	2.374
	0.6166	2.368
	0.6333	2.361
	0.6500	2.355
	0.6666	2.342
	0.6833	2.342
	0.7000	2.335
	0.7166	2.329
	0.7333	2.316
	0.7500	2.316
	0.7666	2.310
	0.7833	2.304
	0.8000	2.297
	0.8166	2.297
	0.8333	2.285
	0.8500	2.278
	0.8666	2.272
	0.8833	2.265
	0.9000	2.265
	0.9166	2.259
	0.9333	2.253
	0.9500	2.246
	0.9666	2.240
	0.9833	2.233
1.0	- 1.0000	2.227
	1.2000	2.144
	1.4000	2.087
	1.6000	2.023
	1.8000	1.965
2.0	- 2.0000	1.914
	2.2000	1.857
	2.4000	1.806
	2.6000	1.755
	2.8000	1.710
3.0	-3.0000	1.659
	3.2000	1.615
	3.4000	1.570
	3.6000	1.525
	3.8000	1.487
4.0	-4.0000	1.448
	4.2000	1.410

PTL-10-Mw04(D)
Test 5, Step 1
Slug out (Rise)

Rising Head Slug Test

	4.4000	1.366
	4.6000	1.333
	4.8000	1.295
5.0	-5.0000	1.263
	5.2000	1.225
	5.4000	1.193
	5.6000	1.161
	5.8000	1.130
6.0	-6.0000	1.104
	6.2000	1.072
	6.4000	1.047
	6.6000	1.021
	6.8000	0.996
7.0	-7.0000	0.963
	7.2000	0.938
	7.4000	0.912
	7.6000	0.893
	7.8000	0.868
8.0	-8.0000	0.842
	8.2000	0.823
	8.4000	0.798
	8.6000	0.778
	8.8000	0.759
9.0	-9.0000	0.734
	9.2000	0.715
	9.4000	0.695
	9.6000	0.683
	9.8000	0.670
10.0	-10.0000	0.651
	12.0000	0.497
14.0	-14.0000	0.389
	16.0000	0.300
18.0	-18.0000	0.236
	20.0000	0.191
22.0	-22.0000	0.153
24.0	-24.0000	0.127
	26.0000	0.102
	28.0000	0.089
	30.0000	0.076
	32.0000	0.076
	34.0000	0.064
	36.0000	0.064
	38.0000	0.057
	40.0000	0.057
	42.0000	0.057
	44.0000	0.064

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-04(D) FALLING HEAD SLUG TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

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_o = Time For water level to Rise or fall to 37% of Initial Change. — T_o = 7.5 min.

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(0.083\,Ft)^2 \ln(5\,Ft/0.083\,Ft)}{2(5\,Ft)(7.5\,min)}$$

$$= 3.76 \times 10^{-4}\ Ft/min$$

3.76×10^{-4} Ft/min * 1440 min/day = 0.54 Ft/day

$0.54\ Ft/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{Ft/day} = 1.91 \times 10^{-4}\ cm/sec$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Island (Tierico Island) WELL/BORING NO.: MW-10-MW-04

PROJECT NO.: 7803 GEOLOGIST: Mark Barrington / Seth Pelfrey

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 5.0'/33.0'-38.0' TEST NO.: 5/slug

STATIC WATER LEVEL (Depth/Elevation): 9.73'/TWD=38.20'/LWC=28.47' DATE: 09/12/96

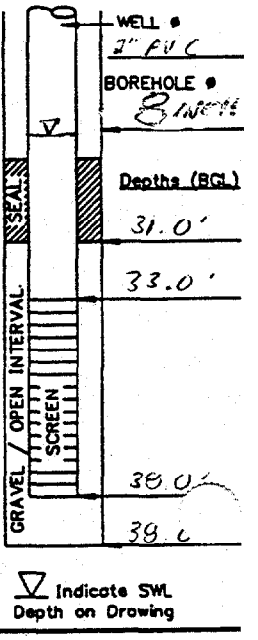
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) CHECKED:

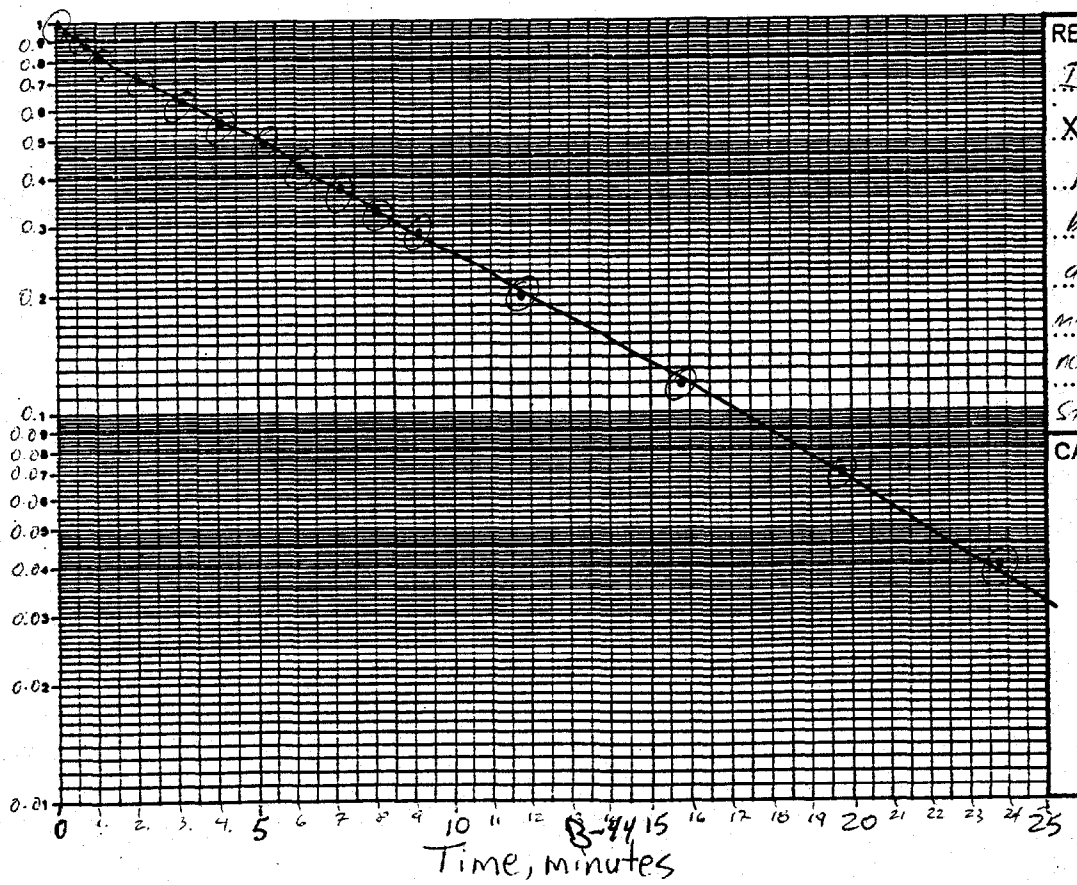
METHOD OF INDUCING WATER LEVEL CHANGE: Solid slug (7.5') PAGE 1 OF 2

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	-2.586	1	9.06	-0.746	0.29
0.31	-2.426	0.94	11.86	-0.523	0.20
0.51	-2.343	0.91	15.86	-0.306	0.12
0.71	-2.273	0.88	19.86	-0.178	0.07
1.06	-2.145	0.83	23.86	-0.102	0.04
2.06	-1.864	0.72			
3.06	-1.634	0.63			
4.06	-1.436	0.56			
5.06	-1.257	0.49			
6.06	-1.104	0.43			
7.06	-0.970	0.38			
8.06	-0.849	0.33			

WELL SCHEMATIC





REMARKS:

ID = 0000'1

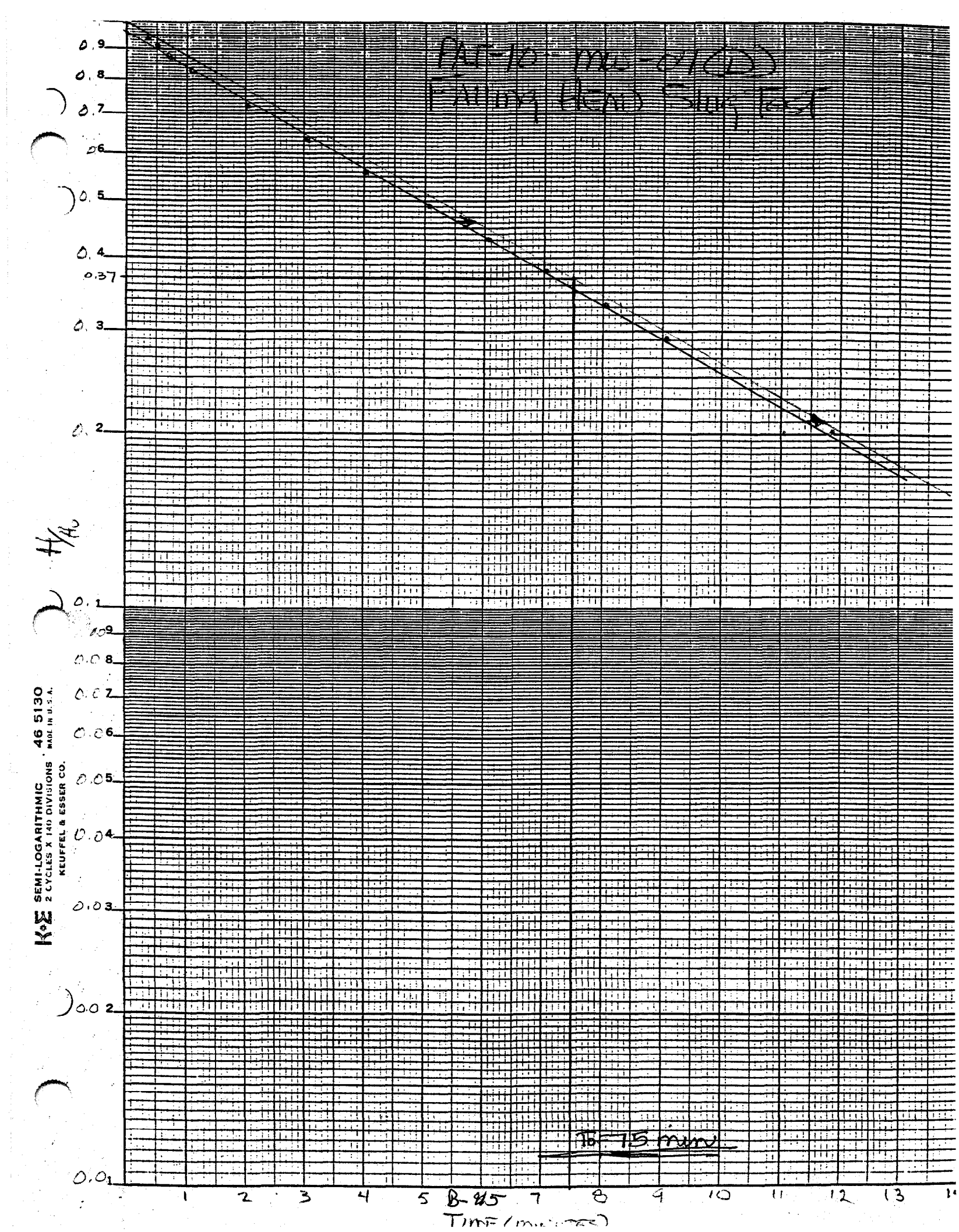
XD @ bottom = 28.38'

Discrepancy noted between well tag and TWD measured apparently manually. Will not account for ~2.5' of stick-up

CALCS, SKETCH MAPS, ETC.:

B-94

N/A


PAT-10 MW-01(D)
FALLING HEAD SLUG TEST
H/H0
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
11
12
13
T0=7.5 min
B-115
TIME (minutes)
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

PAI-10-MW-04 (D)
Test 5, Step 0
Slug In (Fall)

SE1000C
Environmental Logger
09/12 15:33

Unit# 00145 Test 5

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00004
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 09/12 12:48:38

Elapsed Time	INPUT 1
0.0000	-2.714
0.0033	-2.528
0.0066	-2.714
0.0100	-2.777
0.0133	-2.707
0.0166	-2.675
0.0200	-2.695
0.0233	-2.688
0.0266	-2.688
0.0300	-2.695
0.0333	-2.682
0.0366	-2.675
0.0400	-2.669
0.0433	-2.669
0.0466	-2.662
0.0500	-2.662
0.0533	-2.656
0.0566	-2.656
0.0600	-2.650
0.0633	-2.643
0.0666	-2.643
0.0700	-2.637
0.0733	-2.637
0.0766	-2.631
0.0800	-2.624
0.0833	-2.631
0.0866	-2.624
0.0900	-2.624
0.0933	-2.618
0.0966	-2.611
0.1000	-2.611
0.1033	-2.611
0.1066	-2.605
0.1100	-2.599
0.1133	-2.599
0.1166	-2.599
0.1200	-2.599

Falling Head Slug Test

Test 5, Step 0
Slug In (Fall)

	0.1233	-2.592
	0.1266	-2.592
	0.1300	-2.586
	0.1333	-2.586
	0.1366	-2.579
	0.1400	-2.579
0	0.1433	-2.586 — To
	0.1466	-2.573
	0.1500	-2.573
	0.1533	-2.573
	0.1566	-2.573
	0.1600	-2.567
	0.1633	-2.567
	0.1666	-2.567
	0.1700	-2.560
	0.1733	-2.560
	0.1766	-2.554
	0.1800	-2.554
	0.1833	-2.554
	0.1866	-2.548
	0.1900	-2.548
	0.1933	-2.548
	0.1966	-2.548
	0.2000	-2.541
	0.2033	-2.541
	0.2066	-2.541
	0.2100	-2.535
	0.2133	-2.535
	0.2166	-2.535
	0.2200	-2.535
	0.2233	-2.528
	0.2266	-2.528
	0.2300	-2.522
	0.2333	-2.522
	0.2366	-2.522
	0.2400	-2.522
0.1	0.2433	-2.516
	0.2466	-2.522
	0.2500	-2.516
	0.2533	-2.509
	0.2566	-2.509
	0.2600	-2.509
	0.2633	-2.509
	0.2666	-2.503
	0.2700	-2.503
	0.2733	-2.503
	0.2766	-2.503
	0.2800	-2.496
	0.2833	-2.496
	0.2866	-2.496
	0.2900	-2.490
	0.2933	-2.490
	0.2966	-2.490
	0.3000	-2.490
	0.3033	-2.490
	0.3066	-2.490
	0.3100	-2.484
	0.3133	-2.484
	0.3166	-2.484
	0.3200	-2.484

Falling Head Test

Test 5, step 0
Slug In (Fall)

Falling Head Test

	0.3233	-2.477
	0.3266	-2.477
	0.3300	-2.477
	0.3333	-2.471
0.21	-0.3500	-2.464
	0.3666	-2.458
	0.3833	-2.452
	0.4000	-2.445
	0.4166	-2.432
	0.4333	-2.426
0.31	-0.4500	-2.426
	0.4666	-2.413
	0.4833	-2.407
	0.5000	-2.401
	0.5166	-2.394
	0.5333	-2.388
0.41	-0.5500	-2.381
	0.5666	-2.369
	0.5833	-2.369
	0.6000	-2.362
	0.6166	-2.356
	0.6333	-2.343
0.51	-0.6500	-2.343
	0.6666	-2.330
	0.6833	-2.330
	0.7000	-2.324
	0.7166	-2.318
	0.7333	-2.311
0.61	-0.7500	-2.305
	0.7666	-2.298
	0.7833	-2.292
	0.8000	-2.285
	0.8166	-2.285
	0.8333	-2.279
0.71	-0.8500	-2.273
	0.8666	-2.266
	0.8833	-2.260
	0.9000	-2.254
	0.9166	-2.254
	0.9333	-2.241
0.81	-0.9500	-2.241
	0.9666	-2.228
	0.9833	-2.228
	1.0000	-2.222
1.06	-1.2000	-2.145
	1.4000	-2.088
	1.6000	-2.030
	1.8000	-1.973
	2.0000	-1.915
2.06	-2.2000	-1.864
	2.4000	-1.819
	2.6000	-1.768
	2.8000	-1.724
	3.0000	-1.679
3.06	-3.2000	-1.634
	3.4000	-1.590
	3.6000	-1.551
	3.8000	-1.513
	4.0000	-1.468
4.06	-4.2000	-1.436

PHI-10-11MW4(D)
Test 5, Step 0
Slug In (Fall)

Falling Head Test

	4.4000	-1.391
	4.6000	-1.353
	4.8000	-1.321
	5.0000	-1.289
5.06	-5.2000	-1.257
	5.4000	-1.226
	5.6000	-1.194
	5.8000	-1.161
	6.0000	-1.130
6.06	-6.2000	-1.104
	6.4000	-1.078
	6.6000	-1.047
	6.8000	-1.021
	7.0000	-0.996
7.06	-7.2000	-0.970
	7.4000	-0.944
	7.6000	-0.919
	7.8000	-0.900
	8.0000	-0.874
8.06	-8.2000	-0.849
	8.4000	-0.830
	8.6000	-0.804
	8.8000	-0.785
	9.0000	-0.766
9.06	-9.2000	-0.746
	9.4000	-0.728
	9.6000	-0.708
	9.8000	-0.689
	-10.0000	-0.670
11.86	-12.0000	-0.523
	14.0000	-0.402
15.86	-16.0000	-0.306
	18.0000	-0.236
19.86	-20.0000	-0.178
	22.0000	-0.134
23.86	-24.0000	-0.102
	26.0000	-0.076
27.86	-28.0000	-0.057
	30.0000	-0.038
31.86	-32.0000	-0.031

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-05(S) Rising Head Slug Test			
BASED ON HYDRSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RmB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well screen
L = length of well screen
T_0 = Time for water level to rise or Fall to 37% of initial change.

r = 0.083 Ft
R = 0.083 Ft
L = 8.45 Ft
T_0 = 0.85 min.

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,Ft)^2 \ln\left(\frac{8.45\,Ft}{0.083\,Ft}\right)}{2(8.45\,Ft)(0.85\,min)}$$

$$= 2.2 \times 10^{-3}\ Ft/min$$

2.2×10^{-3} Ft/min × 1440 min/day = 3.17 Ft/day

3.17 Ft/day × 3.528×10^{-1} cm/sec / Ft/day = 1.12×10^{-3} cm/sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Island (Jericho Tunnel) WELL/BORING NO.: PMT-10-[illegible]

PROJECT NO.: 7303 GEOLOGIST: Mark Darrington, Seth Pelekko

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 10.0'/3.9'-13.9' TEST NO.: 3/Step 1

STATIC WATER LEVEL (Depth/Elevation): 8.17'/TWD=16.62'/TWC=8.45' DATE: 09/12/98

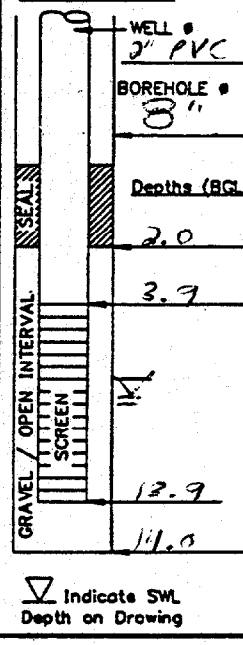
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid slug (5.0') PAGE 2 OF 2

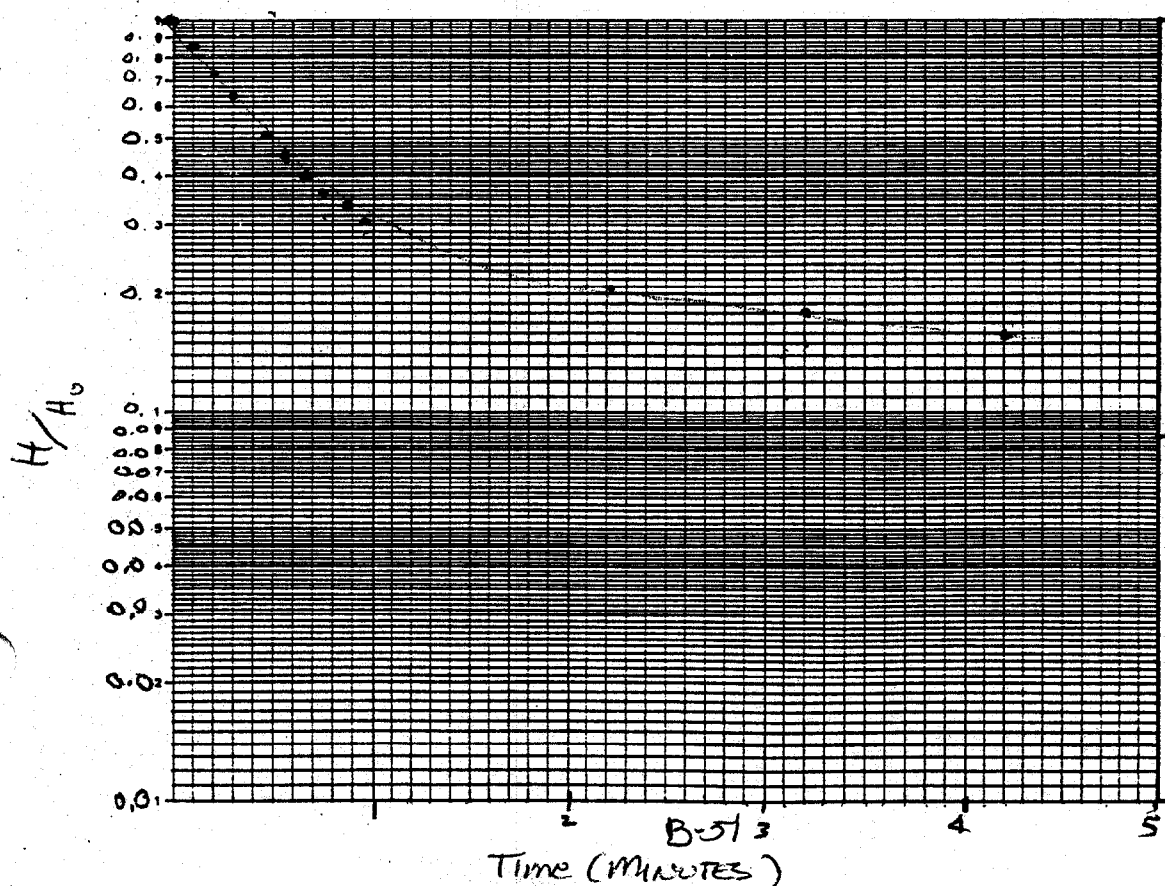
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	1.620	1	4.2	0.260	.16
.1	1.372	.85	5.2	0.241	.15
.2	1.181	.73	6.2	0.222	.14
.3	1.029	.64	10	.171	.11
.46	0.832	.51			
.56	0.730	.45			
.66	0.654	.40			
.76	0.597	.37			
.86	0.546	.34			
.96	0.508	.31			
2.2	0.336	.21			
3.2	0.292	.18			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

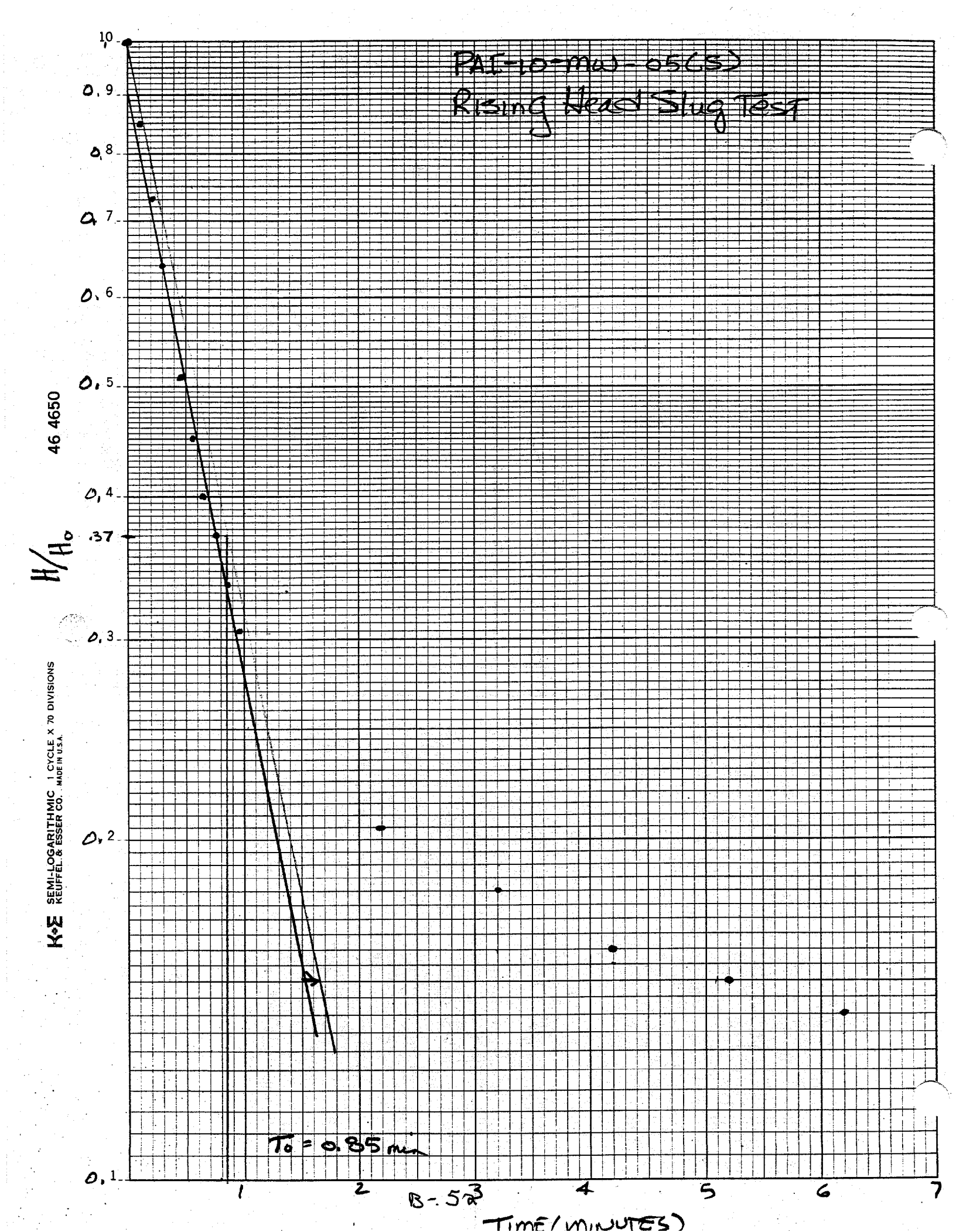


REMARKS:

ID=.00005

XD @ bottom=8.23'

CALCS, SKETCH MAPS, ETC.:


PAL-10-MW-05(S)
Rising Head Slug Test
H/Ho
10
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
1
2
3
4
5
6
7
To = 0.85 min
TIME (MINUTES)
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

~~PAI-10-GW05~~

PAI-10-MW-05(S)
Rising Head SLUG TEST

SE1000C
Environmental Logger
09/12 15:20

Unit# 00145 Test 3

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

Step 1 09/12 10:52:08

Elapsed Time	INPUT 1
0.0000	1.575
0.0033	1.607
0.0066	1.620 — T0
0.0100	1.600
0.0133	1.588
0.0166	1.580
0.0200	1.560
0.0233	1.550
0.0266	1.543
0.0300	1.531
0.0333	1.531
0.0366	1.518
0.0400	1.505
0.0433	1.505
0.0466	1.493
0.0500	1.486
0.0533	1.480
0.0566	1.473
0.0600	1.461
0.0633	1.461
0.0666	1.448
0.0700	1.442
0.0733	1.442
0.0766	1.429
0.0800	1.429
0.0833	1.416
0.0866	1.404
0.0900	1.404
0.0933	1.391
0.0966	1.391
0.1000	1.378
0.1033	1.372
0.1066	1.372 — .1
0.1100	1.353
0.1133	1.346
0.1166	1.346
0.1200	1.340

PAI-10-MW-05(S)
RISING HEAD SLUG TEST

0.1233	1.334
0.1266	1.321
0.1300	1.321
0.1333	1.315
0.1366	1.308
0.1400	1.302
0.1433	1.296
0.1466	1.289
0.1500	1.283
0.1533	1.283
0.1566	1.270
0.1600	1.264
0.1633	1.257
0.1666	1.251
0.1700	1.245
0.1733	1.238
0.1766	1.232
0.1800	1.226
0.1833	1.219
0.1866	1.219
0.1900	1.213
0.1933	1.207
0.1966	1.200
0.2000	1.188
0.2033	1.188
.2 - 0.2066	1.181
0.2100	1.175
0.2133	1.169
0.2166	1.162
0.2200	1.156
0.2233	1.149
0.2266	1.143
0.2300	1.137
0.2333	1.137
0.2366	1.137
0.2400	1.130
0.2433	1.118
0.2466	1.118
0.2500	1.111
0.2533	1.105
0.2566	1.099
0.2600	1.105
0.2633	1.092
0.2666	1.092
0.2700	1.080
0.2733	1.080
0.2766	1.073
0.2800	1.067
0.2833	1.067
0.2866	1.054
0.2900	1.048
0.2933	1.048
0.2966	1.041
0.3000	1.041
0.3033	1.035
.3 - 0.3066	1.029
0.3100	1.022
0.3133	1.016
0.3166	1.016
0.3200	1.016

PAI-10-MW-05(S)
RISING HEAD SLUG TEST

0.3233	1.003
0.3266	1.003
0.3300	0.997
0.3333	0.997
0.3500	0.978
0.3666	0.946
0.3833	0.933
0.4000	0.908
0.4166	0.883
0.4333	0.870
0.4500	0.851
0.4666	0.832
0.4833	0.806
0.5000	0.794
0.5166	0.781
0.5333	0.768
0.5500	0.743
0.5666	0.730
0.5833	0.717
0.6000	0.711
0.6166	0.698
0.6333	0.679
0.6500	0.667
0.6666	0.654
0.6833	0.646
0.7000	0.635
0.7166	0.629
0.7333	0.609
0.7500	0.603
0.7666	0.597
0.7833	0.590
0.8000	0.578
0.8166	0.571
0.8333	0.565
0.8500	0.559
0.8666	0.546
0.8833	0.540
0.9000	0.533
0.9166	0.527
0.9333	0.521
0.9500	0.521
0.9666	0.508
0.9833	0.508
1.0000	0.501
1.2000	0.444
1.4000	0.419
1.6000	0.387
1.8000	0.368
2.0000	0.355
2.2000	0.336
2.4000	0.330
2.6000	0.317
2.8000	0.305
3.0000	0.298
3.2000	0.292
3.4000	0.285
3.6000	0.279
3.8000	0.273
4.0000	0.273
4.2000	0.260

4.4000	0.260
4.6000	0.247
4.8000	0.254
5.0000	0.247
5.2000	0.241
5.4000	0.241
5.6000	0.235
5.8000	0.235
6.0000	0.228
6.2000	0.222
6.4000	0.222
6.6000	0.216
6.8000	0.216
7.0000	0.209
7.2000	0.209
7.4000	0.203
7.6000	0.196
7.8000	0.196
8.0000	0.196
8.2000	0.184
8.4000	0.196
8.6000	0.190
8.8000	0.184
9.0000	0.177
9.2000	0.184
9.4000	0.177
9.6000	0.177
9.8000	0.177
10.0000	0.171
12.0000	0.152
14.0000	0.139
16.0000	0.133
18.0000	0.114
20.0000	0.114
22.0000	0.095
24.0000	0.088
26.0000	0.088
28.0000	0.082
30.0000	0.076
32.0000	0.063
34.0000	0.069
36.0000	0.063
38.0000	0.063
40.0000	0.044
42.0000	0.044
44.0000	0.044
46.0000	0.031

END

PAI-10-MW-05(S)
Rising Head Slug Test.

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE_____ OF_____

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-06(D) Rising Head Slug Test			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY BMB 3/9/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

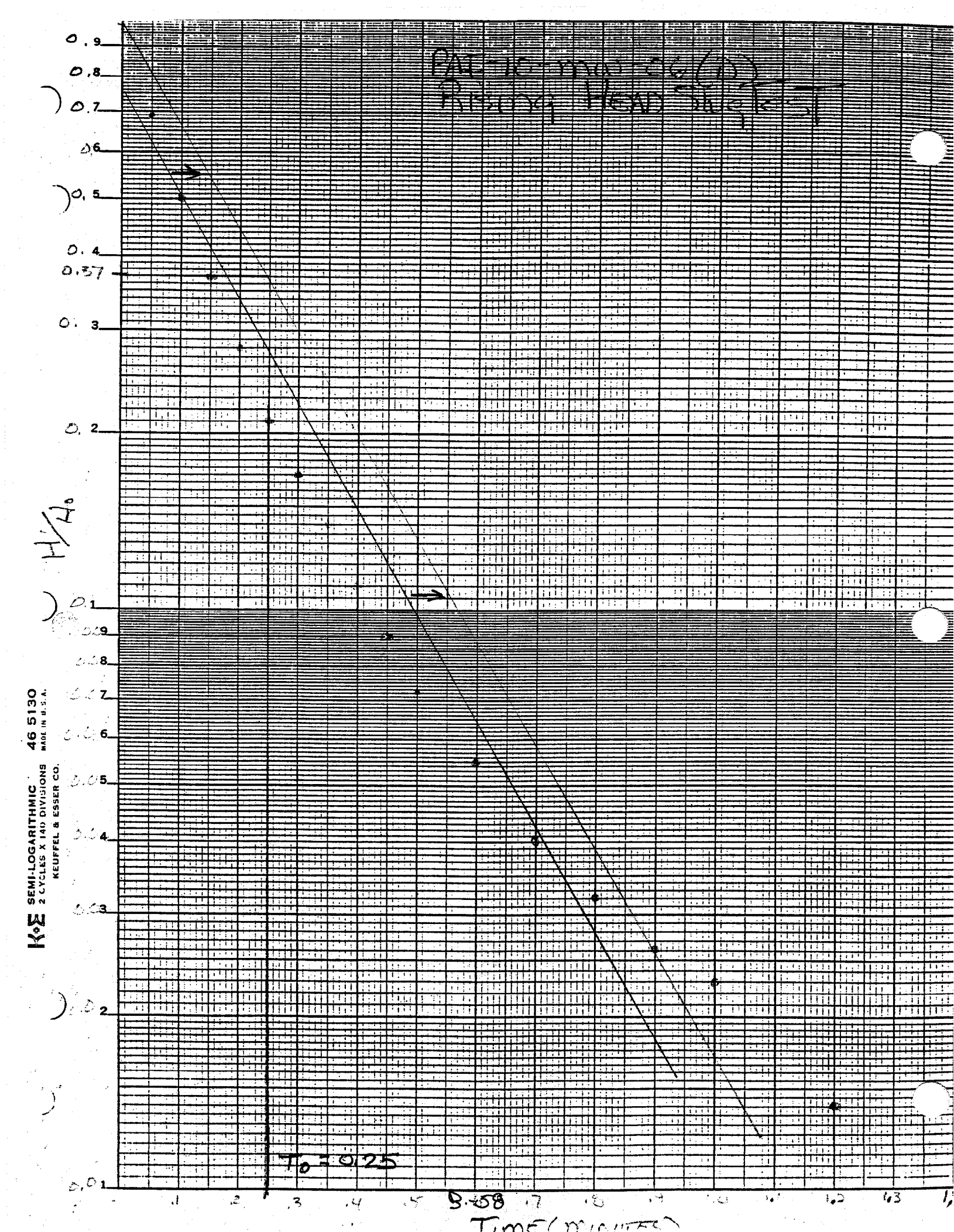
K = Hydraulic Conductivity
r = Radius of well Casing — r = 0.083 FT
R = Radius of well Screen — R = 0.083 FT
L = Length of well Screen — L = 5 FT
T_o = Time for Water Level to Rise or Fall to 37% of Initial Change — T_o = 0.25 min

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(0.083\text{Ft})^2 \ln\left(\frac{5\text{FT}}{0.083\text{FT}}\right)}{2(5\text{FT})(0.25\text{min})}$$

$$= 1.13 \times 10^{-2} \text{ Ft/min}$$

1.13×10^{-2} Ft/min $\times$ 1440 min/day = 16.3 Ft/day

16.3 Ft/day $\times \frac{3.528 \times 10^{-4} \text{ cm/sec}}{\text{Ft/day}}$ = 5.75×10^{-3} Cm/Sec.


PAT-IC-mw-26(d)
Rising Head Slug Test
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
H/H0
0.2
0.1
T0 = 0.25
0.58
TIME (MINUTES)
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Island (Jericho Island) WELL/BORING NO.: PMI-10-MW06

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington, Seth Pelepko

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 5.0' / 30'-35' TEST NO.: 2 (Step = 1

STATIC WATER LEVEL (Depth/Elevation): 9.06' / TWD = 37.05' / WC = 28.99' DATE: 09/12/98

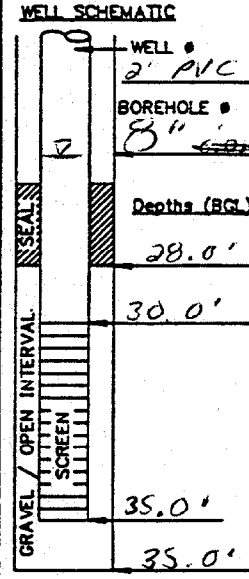
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED:

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

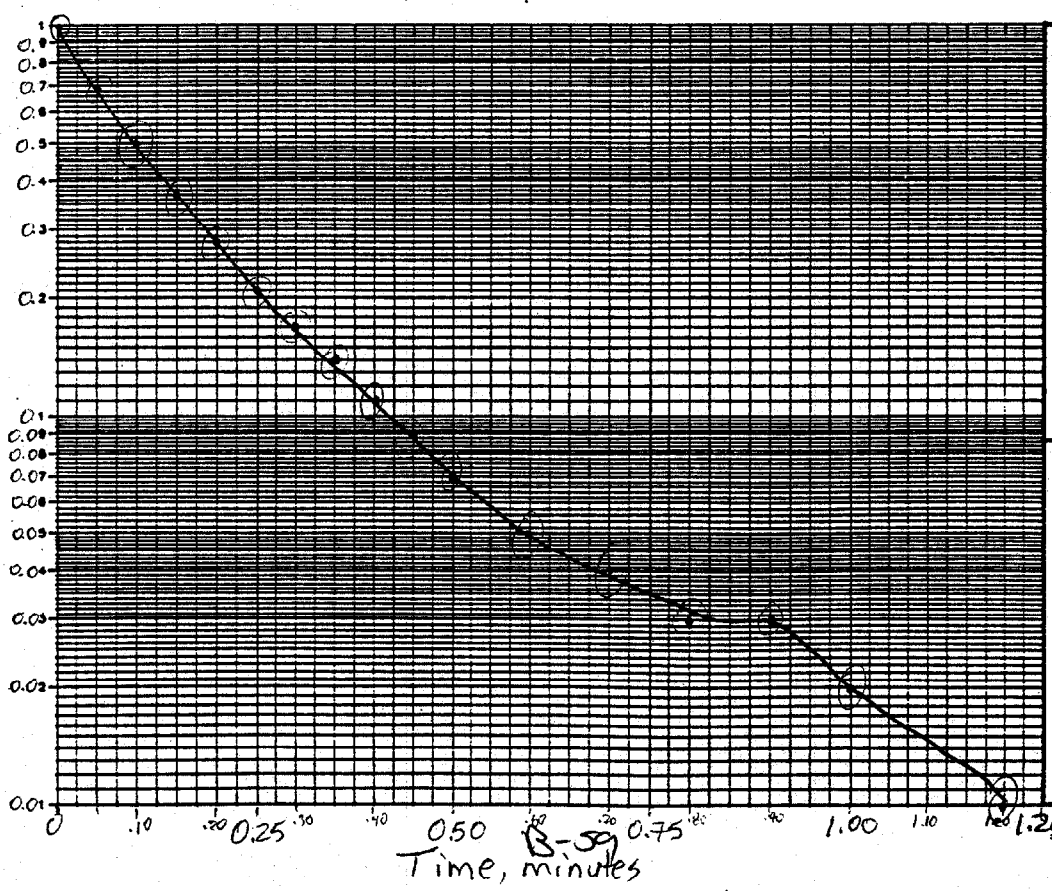
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.202	1	0.70	0.089	0.040
0.05	1.525	0.69	0.80	0.070	0.032
0.10	1.098	0.50	0.90	0.057	0.026
0.15	0.817	0.37	1.00	0.051	0.023
0.20	0.619	0.28	1.20	0.031	0.014
0.25	0.472	0.21			
0.30	0.376	0.17			
0.35	0.300	0.14			
0.40	0.236	0.11			
0.45	0.198	0.09			
0.50	0.159	0.072			
0.60	0.121	0.055			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

ID = 0.0046

XD = 28.99'

CALCS, SKETCH MAPS, ETC.:

B-59

PAI-10-MW06(D)
Test 2, Step 1
Slug Out (Rise)

Rising Head Slug Test

SE1000C
Environmental Logger
09/12 15:12

Unit# 00145 Test 2

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00008
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 09/12 09:44:42

	Elapsed Time	INPUT 1
0	0.0000	2.202 ← To
	0.0033	2.144
	0.0066	2.100
	0.0100	2.023
	0.0133	1.991
	0.0166	1.946
	0.0200	1.889
	0.0233	1.838
	0.0266	1.806
	0.0300	1.761
	0.0333	1.710
	0.0366	1.672
	0.0400	1.634
	0.0433	1.596
	0.0466	1.557
0.05 -	0.0500	1.525
	0.0533	1.487
	0.0566	1.455
	0.0600	1.423
	0.0633	1.398
	0.0666	1.359
	0.0700	1.327
	0.0733	1.308
	0.0766	1.276
	0.0800	1.251
	0.0833	1.225
	0.0866	1.193
	0.0900	1.174
	0.0933	1.140
	0.0966	1.123
0.10 -	0.1000	1.098
	0.1033	1.079
	0.1066	1.059
	0.1100	1.034
	0.1133	1.014
	0.1166	0.996
	0.1200	0.976

FMI - 10 - Minnow (1)
Test 2, Step 1
Slug Out (Rise)

Rising Head Slug Test.

	0.3233	0.344
	0.3266	0.338
	0.3300	0.332
	0.3333	0.325
0.35 -	0.3500	0.300
	0.3666	0.280
	0.3833	0.255
0.40 -	0.4000	0.236
	0.4166	0.223
	0.4333	0.210
0.45 -	0.4500	0.198
	0.4666	0.185
	0.4833	0.172
0.50 -	0.5000	0.150
	0.5166	0.153
	0.5333	0.140
	0.5500	0.134
	0.5666	0.127
	0.5833	0.121
0.60 -	0.6000	0.121
	0.6166	0.114
	0.6333	0.102
	0.6500	0.095
	0.6666	0.095
	0.6833	0.089
0.70 -	0.7000	0.089
	0.7166	0.083
	0.7333	0.083
	0.7500	0.076
	0.7666	0.076
	0.7833	0.070
0.80 -	0.8000	0.070
	0.8166	0.063
	0.8333	0.063
	0.8500	0.063
	0.8666	0.057
	0.8833	0.057
0.90 -	0.9000	0.057
	0.9166	0.051
	0.9333	0.051
	0.9500	0.051
	0.9666	0.051
	0.9833	0.045
1.0 -	1.0000	0.051
1.2 -	1.2000	0.031
1.4 -	1.4000	0.019
1.6 -	1.6000	0.019
1.8 -	1.8000	0.012
2.0 -	2.0000	0.006
	2.2000	0.012
	2.4000	0.006
	2.6000	0.006
	2.8000	0.006
	3.0000	0.000
	3.2000	0.006
	3.4000	0.000
	3.6000	0.000
	3.8000	0.000
	4.0000	0.000
	4.2000	0.000

YAL-IU-MW06(D)
Test 2, Step 1
Slug Out (Rise)

Rising Head Slug Test

0.1233	0.957
0.1266	0.938
0.1300	0.912
0.1333	0.900
0.1366	0.880
0.1400	0.868
0.1433	0.842
0.1466	0.829
0.15 - 0.1500	0.817
0.1533	0.798
0.1566	0.785
0.1600	0.772
0.1633	0.753
0.1666	0.746
0.1700	0.721
0.1733	0.715
0.1766	0.702
0.1800	0.689
0.1833	0.676
0.1866	0.664
0.1900	0.651
0.1933	0.638
0.1966	0.632
0.20 - 0.2000	0.619
0.2033	0.613
0.2066	0.600
0.2100	0.587
0.2133	0.574
0.2166	0.568
0.2200	0.555
0.2233	0.549
0.2266	0.542
0.2300	0.529
0.2333	0.523
0.2366	0.510
0.2400	0.504
0.2433	0.491
0.2466	0.485
0.25 - 0.2500	0.472
0.2533	0.472
0.2566	0.466
0.2600	0.453
0.2633	0.446
0.2666	0.440
0.2700	0.434
0.2733	0.427
0.2766	0.421
0.2800	0.415
0.2833	0.408
0.2866	0.402
0.2900	0.395
0.2933	0.389
0.2966	0.383
0.30 - 0.3000	0.376
0.3033	0.370
0.3066	0.370
0.3100	0.357
0.3133	0.357
0.3166	0.351
0.3200	0.344

FAL-10-MW06(D)
Test 2, Step 1
Slug Out (Rise)

4.4000	0.006
4.6000	0.000
4.8000	0.000
5.0000	0.000
5.2000	0.000
5.4000	0.000
5.6000	0.000
5.8000	0.000
6.0000	0.000
6.2000	0.000
6.4000	0.006
6.6000	0.000
6.8000	0.000
7.0000	0.000
7.2000	0.000
7.4000	0.000
7.6000	0.000
7.8000	0.000
8.0000	0.000
8.2000	0.000
8.4000	0.000
8.6000	0.000
8.8000	0.000
9.0000	0.000
9.2000	0.000
9.4000	0.000
9.6000	0.000
9.8000	0.000
10.0000	0.000
12.0000	-0.006
14.0000	0.000
16.0000	0.000
18.0000	0.000

END

Rising Head Slug Test

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

CLIENT	JOB NUMBER		
SUBJECT PAI-10-MW-06(D) FALLING HEAD SLUG TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_o = Time for water level to Rise or Fall to 37% of Initial Charge

r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_o = 0.25 min

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(0.083\text{FT})^2 \ln(5\text{FT}/0.083\text{FT})}{2(5\text{FT})(0.25\text{min})}$$

$$= 1.13 \times 10^{-2} \text{ FT/min}$$

1.13×10^{-2} FT/min × 1440 min/day = 16.3 Ft/day

16.3 FT/day × 3.528×10^{-1} cm/sec / Ft/day = 5.75×10^{-3} cm/sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Island (Jericho Island) WELL/BORING NO.: PMW-10

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington, Seth Peikert

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 5.0'/30'-35' TEST NO.: 2/Slug-0

STATIC WATER LEVEL (Depth/Elevation): 8.06'/TWA-37.05'/LWC=28.99' DATE: 09/12/95

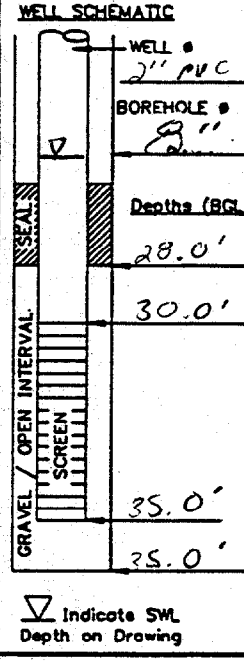
TEST TYPE (Rising/Falling/Constant Head): Falling (Slug in) CHECKED:

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

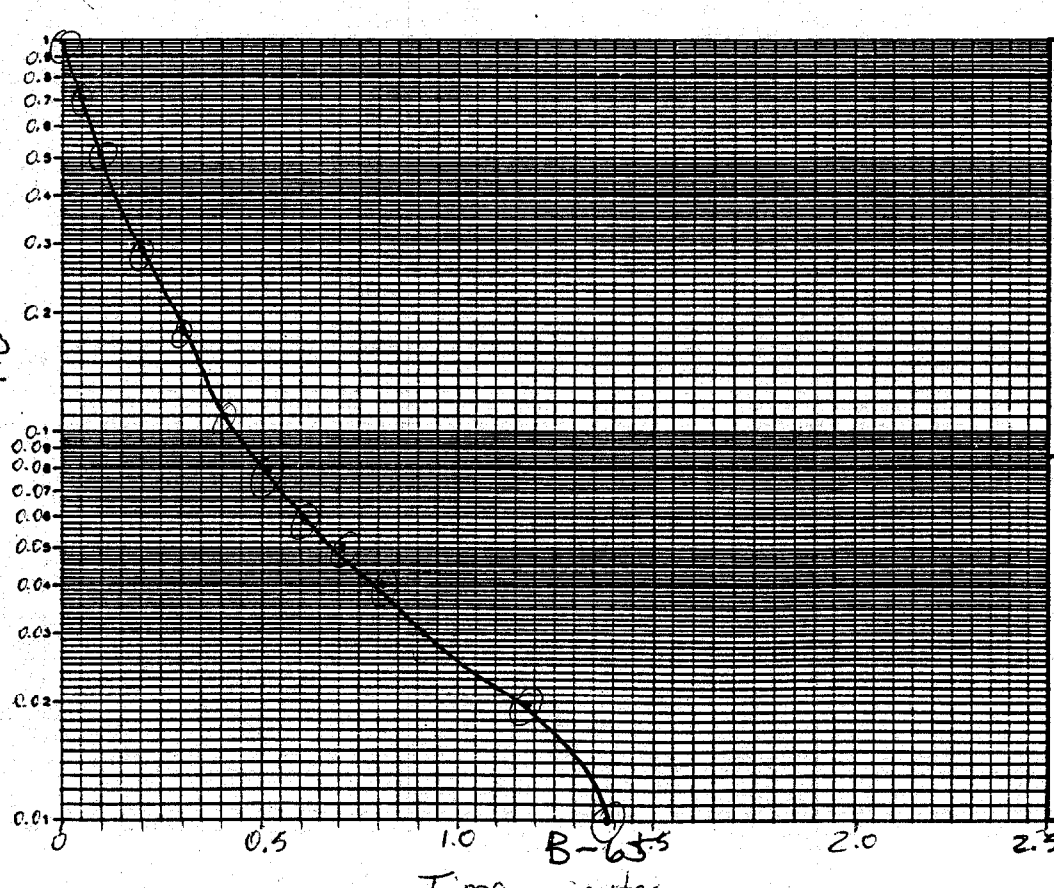
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	-1.947	1	1.39	-0.025	0.013
0.1	-0.996	0.511	1.59	-0.019	0.010
0.2	-0.568	0.292	1.79	-0.012	0.006
0.3	-0.351	0.180	1.99	-0.012	0.006
0.41	-0.223	0.115	2.19	-0.006	0.003
0.51	-0.153	0.078	0.05	-1.366	0.70
0.61	-0.114	0.058			
0.71	-0.089	0.045			
0.81	-0.070	0.036			
0.91	-0.057	0.029			
~~0.99~~	~~-0.051~~	~~0.03~~			
1.19	-0.032	0.016			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

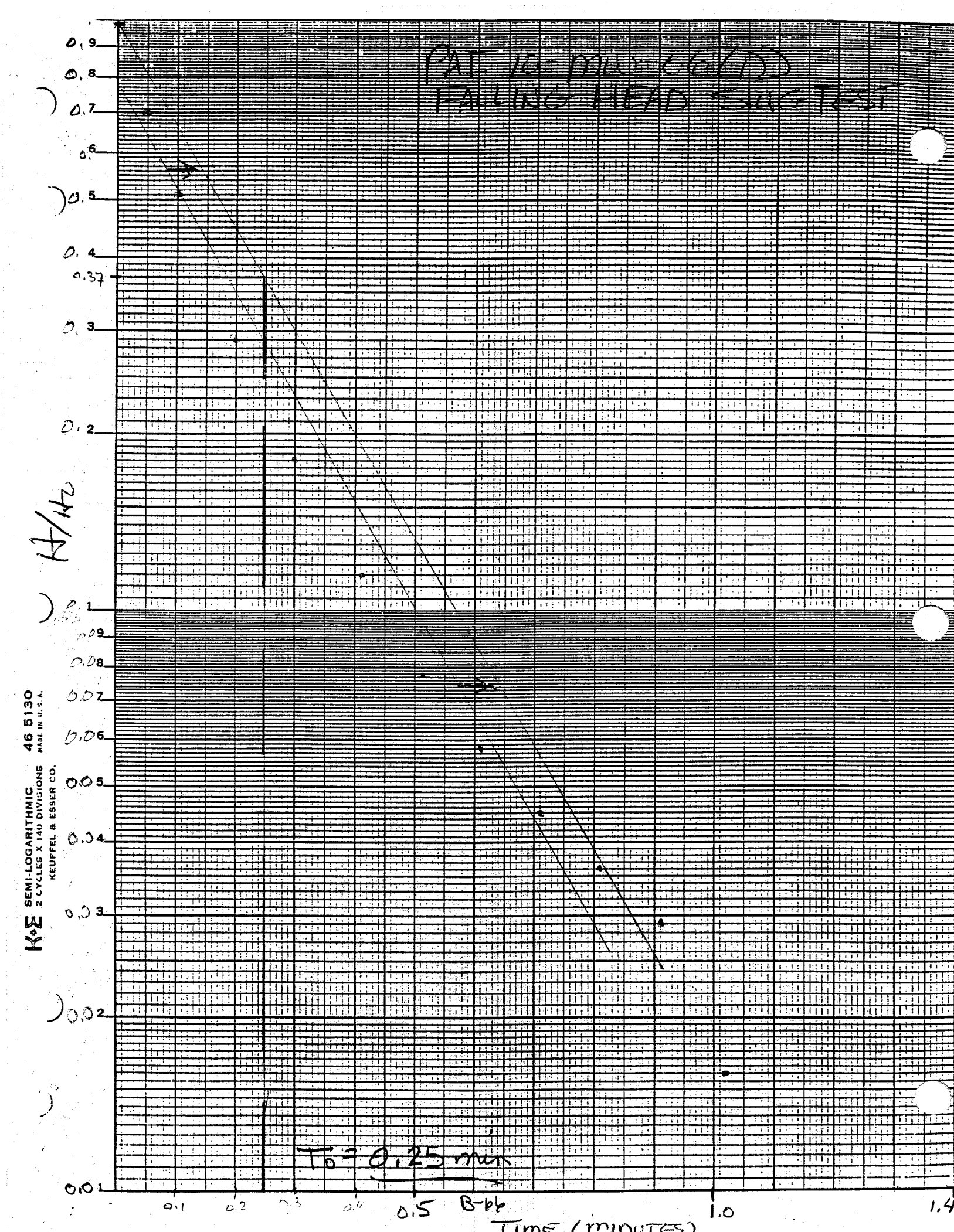


REMARKS:

ID = 0.0006

XD @ bottom = 28.42'

CALCS, SKETCH MAPS, ETC.:


FALLING HEAD SLUG TEST
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
K ft/hr
To = 0.125 min
0.1
0.2
0.3
0.4
0.5
1.0
1.4
TIME (MINUTES)
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

PAI-10 ~~GW06~~ MW-06(U)

Test 2, step 0
Slug In (Fall)

Falling Head Test

SE1000C
Environmental Logger
09/12 15:08

Unit# 00145 Test 2

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00006
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 09/12 09:32:04

Elapsed Time	INPUT 1	
0.0000	-1.749	
0.0033	-1.915	To
0.0066	-1.947	
0.0100	-1.928	
0.0133	-1.858	
0.0166	-1.807	
0.0200	-1.762	
0.0233	-1.711	
0.0266	-1.673	
0.0300	-1.634	
0.0333	-1.596	
0.0366	-1.558	
0.0400	-1.519	
0.0433	-1.488	
0.0466	-1.462	
0.0500	-1.430	
0.0533	-1.398	
0.0566	-1.366	
0.0600	-1.340	
0.0633	-1.308	
0.0666	-1.283	
0.0700	-1.251	
0.0733	-1.226	
0.0766	-1.200	
0.0800	-1.174	
0.0833	-1.149	
0.0866	-1.123	
0.0900	-1.098	
0.0933	-1.078	
0.0966	-1.060	
0.1000	-1.040	
0.1033	-1.015	
0.1066	-0.996	
0.1100	-0.976	
0.1133	-0.957	
0.1166	-0.938	
0.1200	-0.919	

0

0.05

0.1

RW-10-MW06(D)
Test2, Step 0
Slug In (Fall)

Falling Head Slug Test

0.1233	-0.900
0.1266	-0.881
0.1300	-0.868
0.1333	-0.840
0.1366	-0.830
0.1400	-0.817
0.1433	-0.804
0.1466	-0.785
0.1500	-0.772
0.1533	-0.753
0.1566	-0.746
0.1600	-0.734
0.1633	-0.715
0.1666	-0.702
0.1700	-0.689
0.1733	-0.677
0.1766	-0.663
0.1800	-0.657
0.1833	-0.645
0.1866	-0.632
0.1900	-0.619
0.1933	-0.612
0.1966	-0.600
0.2000	-0.587
0.2033	-0.581
0.2 -0.2066	-0.568
0.2100	-0.561
0.2133	-0.549
0.2166	-0.542
0.2200	-0.523
0.2233	-0.523
0.2266	-0.510
0.2300	-0.504
0.2333	-0.498
0.2366	-0.491
0.2400	-0.478
0.2433	-0.472
0.2466	-0.466
0.2500	-0.459
0.2533	-0.453
0.2566	-0.440
0.2600	-0.440
0.2633	-0.427
0.2666	-0.427
0.2700	-0.415
0.2733	-0.408
0.2766	-0.408
0.2800	-0.402
0.2833	-0.389
0.2866	-0.383
0.2900	-0.383
0.2933	-0.376
0.2966	-0.370
0.3000	-0.363
0.3033	-0.357
0.3 -0.3066	-0.351
0.3100	-0.351
0.3133	-0.344
0.3166	-0.338
0.3200	-0.331

Test 2, Step 0

Falling Head Slug Test

	0.3233	-0.325
	0.3266	-0.325
	0.3300	-0.319
	0.3333	-0.313
	0.3500	-0.293
	0.3666	-0.274
	0.3833	-0.255
	0.4000	-0.236
0.41 –	0.4166	-0.223
	0.4333	-0.210
	0.4500	-0.197
	0.4666	-0.185
	0.4833	-0.172
	0.5000	-0.166
0.51 –	0.5166	-0.153
	0.5333	-0.146
	0.5500	-0.140
	0.5666	-0.134
	0.5833	-0.127
	0.6000	-0.121
0.61 –	0.6166	-0.114
	0.6333	-0.108
	0.6500	-0.108
	0.6666	-0.102
	0.6833	-0.095
	0.7000	-0.095
0.71 –	0.7166	-0.089
	0.7333	-0.082
	0.7500	-0.082
	0.7666	-0.076
	0.7833	-0.076
	0.8000	-0.070
0.81 –	0.8166	-0.070
	0.8333	-0.070
	0.8500	-0.063
	0.8666	-0.063
	0.8833	-0.063
	0.9000	-0.057
0.91 –	0.9166	-0.057
	0.9333	-0.057
	0.9500	-0.057
	0.9666	-0.051
	0.9833	-0.051
0.99 –	1.0000	-0.051
1.19 –	1.2000	-0.032
1.39 –	1.4000	-0.025
1.59 –	1.6000	-0.019
1.79 –	1.8000	-0.012
1.99 –	2.0000	-0.012
2.19 –	2.2000	-0.006
	2.4000	-0.012
	2.6000	-0.006
	2.8000	-0.006
	3.0000	-0.006
	3.2000	-0.006
	3.4000	-0.006
	3.6000	-0.006
	3.8000	-0.006
	4.0000	0.000
	4.2000	0.000

TH2 - 10 - MW06(LD)
Test 2, Step 0
Slug In (Fall)

Falling Head Slug Test

4.4000	0.000
4.6000	0.000
4.8000	-0.006
5.0000	-0.006
5.2000	0.000
5.4000	-0.006
5.6000	0.000
5.8000	0.000
6.0000	0.000
6.2000	0.000
6.4000	0.000
6.6000	0.000
6.8000	0.000
7.0000	-0.006
7.2000	0.000
7.4000	-0.006
7.6000	0.000
7.8000	0.000
8.0000	0.000
8.2000	0.000
8.4000	0.000
8.6000	0.000
8.8000	0.000
9.0000	0.000
9.2000	0.000
9.4000	0.000
9.6000	0.006
9.8000	0.000
10.0000	0.000
12.0000	0.000

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-07(S) RISING HEAD SLUG TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

K = Hydraulic Conductivity
r = radius of well casing
R = radius of well screen
L = Length of well screen
T_o = Time for water level to rise or fall 37% of initial change

r = 0.083 FT
R = 0.083 FT
L = 6.48 FT
T_o = 0.54 min

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(0.083\,FT)^2 \ln\left(\frac{6.48\,FT}{0.083\,FT}\right)}{2(6.48\,FT)(0.54\,min)}$$

$$= 4.29 \times 10^{-3}\ Ft/min$$

$$4.29 \times 10^{-3}\ Ft/min \times 1440\ min/day = 6.18\ Ft/day$$

$$6.18\ Ft/day \times 3.528 \times 10^{-4} \frac{Cm/sec}{Ft/day} = 2.18 \times 10^{-3}\ Cm/sec$$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Is. (Jericho Is.) WELL/BORING NO.: PAI-10-mw07

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington/Emily H

WELL DIAMETER: 2-in. SCREEN LENGTH/DEPTH: 10 FT / 13.5 TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 9.97 / TD = 16.45 / Loc. 648 DATE: 8/31/98

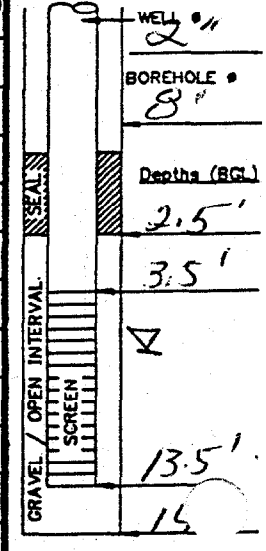
TEST TYPE (Rising/Falling/Constant Head): Rising Slug - 2nd CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug PAGE 1 OF

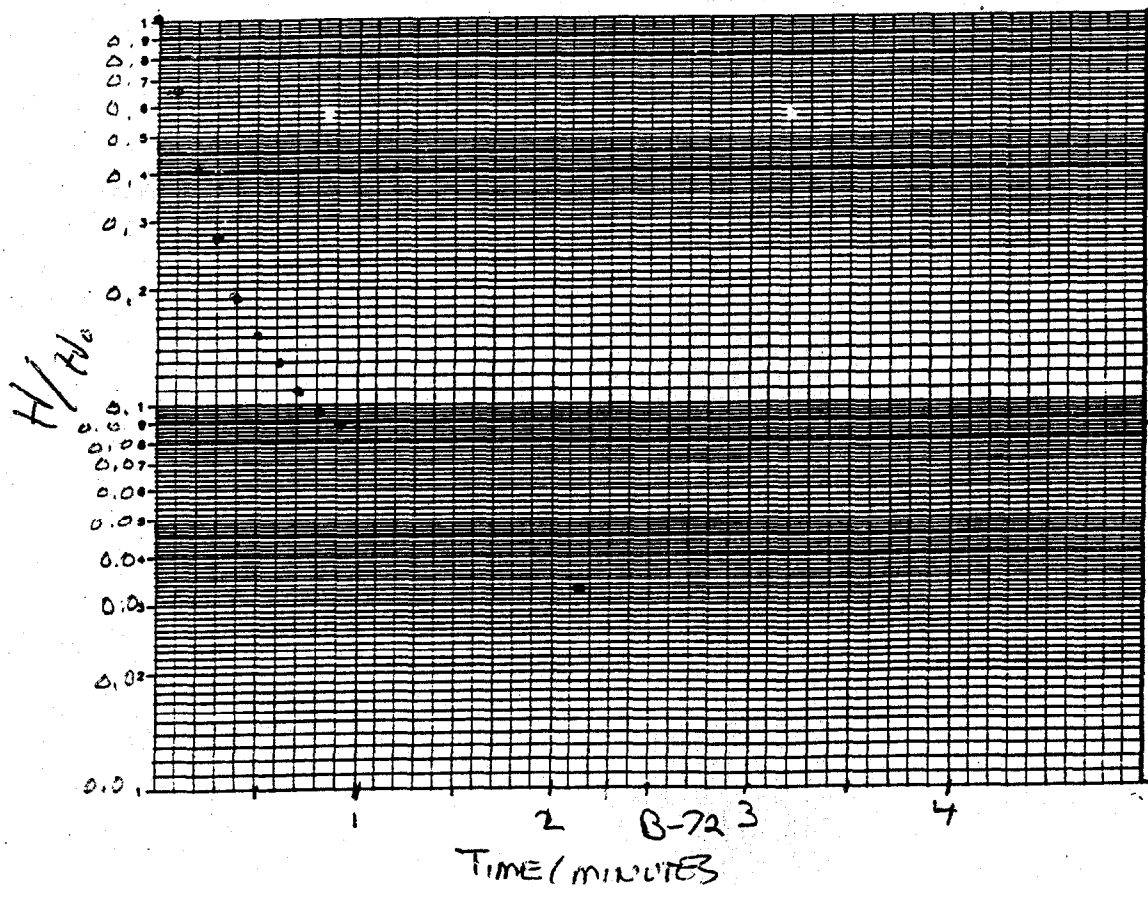
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	1.498	1	3.73	0.006	.004
.1	0.990	.66			
.2	0.616	.41			
.3	0.400	.27			
.4	0.292	.19			
.5	0.228	.15			
.6	0.190	.013			
.7	0.165	.11			
.8	0.146	.097			
.9	0.133	.089			
2.13	0.050	.033			
3.13	0.029	.013			

WELL SCHEMATIC



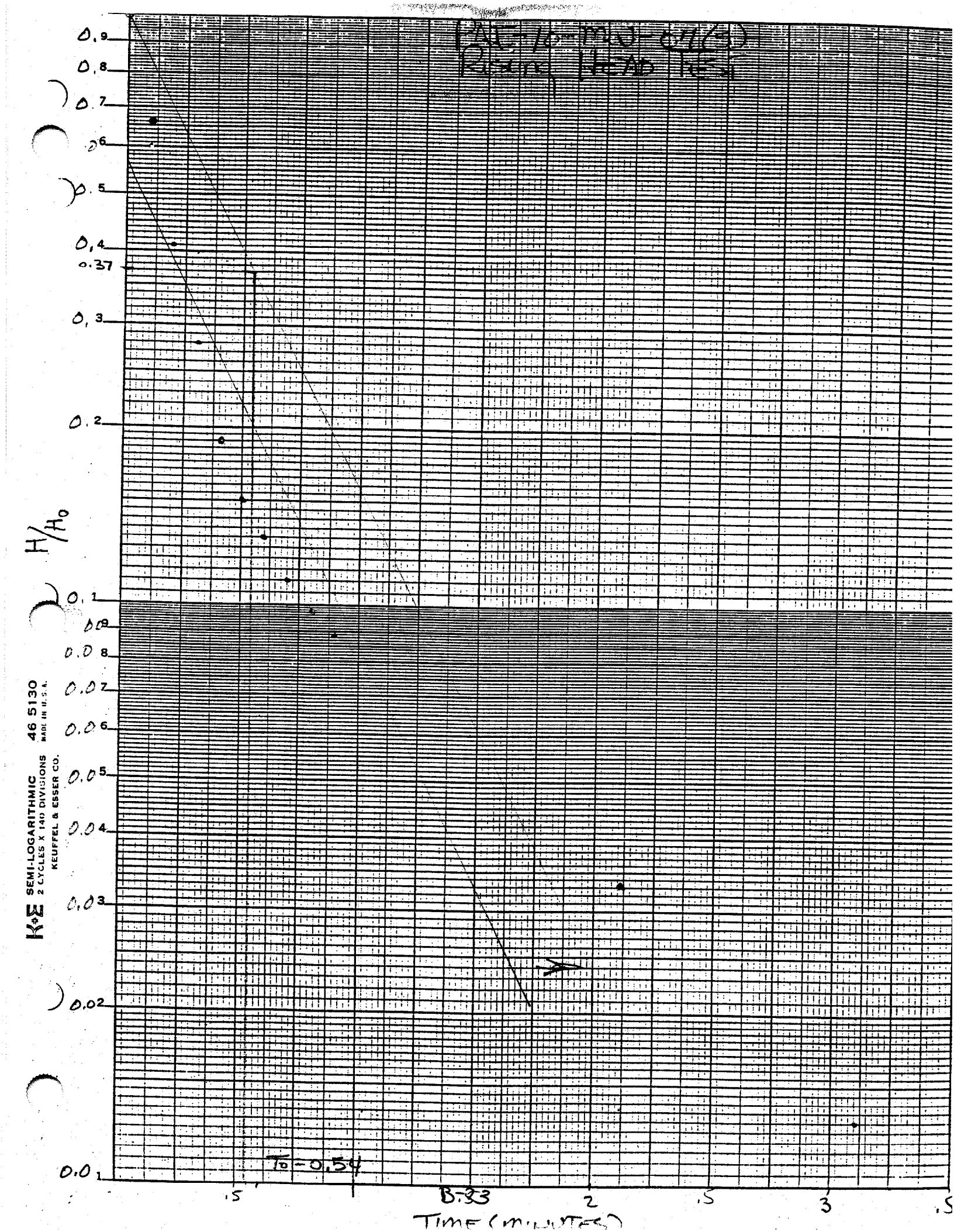
▽ Indicate SWL Depth on Drawing



REMARKS:

XD = 612

CALCS, SKETCH MAPS, ETC.:


(AT-10 MW-6)
RISING HEAD TEST
H/H0
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T0 = 0.54
.5
1
2
3
TIME (MINUTES)
B-33
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

PAI-10-MW07(S)
Test 2 / Step 3
slug out (Rise) ✓

Rising Head Slug Test

SE1000C
Environmental Logger
09/12 14:54

Unit# 00145 Test 0

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00007
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 3 08/31 13:48:50

Elapsed Time	INPUT 1
0.0000	-0.050
0.0033	0.082
0.0066	1.028
0.0100	2.038
0.0133	0.838
0.0166	1.092
0.0200	1.847
0.0233	1.771
0.0266	1.739
0.0300	1.758
0.0333	1.708
0.0366	1.670
0.0400	1.651
0.0433	1.803
0.0466	1.530
0.0500	1.606
0.0533	1.568
0.0566	1.555
0.0600	1.524
0.0633	1.485
T0 → 0.0666	1.498 ← T0
0.0700	1.466
0.0733	1.454
0.0766	1.435
0.0800	1.416
0.0833	1.397
0.0866	1.378
0.0900	1.358
0.0933	1.339
0.0966	1.320
0.1000	1.308
0.1033	1.289
0.1066	1.276
0.1100	1.257
0.1133	1.244
0.1166	1.225
0.1200	1.206

PAI-10-mw-07(5)
Rising Head Slug Test

0.1233	1.187
0.1266	1.174
0.1300	1.155
0.1333	1.136
0.1366	1.130
0.1400	1.111
0.1433	1.098
0.1466	1.079
0.1500	1.060
0.1533	1.047
0.1566	1.035
0.1600	1.016
0.1633	1.003
0.1666	0.990
0.1700	0.971
0.1733	0.958
0.1766	0.939
0.1800	0.927
0.1833	0.914
0.1866	0.895
0.1900	0.889
0.1933	0.870
0.1966	0.863
0.2000	0.844
0.2033	0.831
0.2066	0.819
0.2100	0.806
0.2133	0.793
0.2166	0.781
0.2200	0.768
0.2233	0.749
0.2266	0.743
0.2300	0.730
0.2333	0.717
0.2366	0.711
0.2400	0.698
0.2433	0.685
0.2466	0.673
0.2500	0.666
0.2533	0.654
0.2566	0.647
0.2600	0.635
0.2633	0.622
0.2666	0.616
0.2700	0.603
0.2733	0.590
0.2766	0.584
0.2800	0.577
0.2833	0.565
0.2866	0.558
0.2900	0.552
0.2933	0.546
0.2966	0.533
0.3000	0.527
0.3033	0.520
0.3066	0.514
0.3100	0.501
0.3133	0.501
0.3166	0.489
0.3200	0.482

PAT-10-MW-07(S)
Rising Head Slug Test

0.3233	0.482
0.3266	0.469
0.3300	0.463
0.3333	0.457
0.3500	0.431
.3 - 0.3666	0.400
0.3833	0.381
0.4000	0.355
0.4166	0.336
0.4333	0.323
0.4500	0.304
.4 - 0.4666	0.292
0.4833	0.279
0.5000	0.266
0.5166	0.254
0.5333	0.247
0.5500	0.241
.5 - 0.5666	0.228
0.5833	0.222
0.6000	0.215
0.6166	0.209
0.6333	0.203
0.6500	0.196
.6 - 0.6666	0.190
0.6833	0.190
0.7000	0.184
0.7166	0.177
0.7333	0.177
0.7500	0.171
.7 - 0.7666	0.165
0.7833	0.165
0.8000	0.158
0.8166	0.152
0.8333	0.152
0.8500	0.152
.8 - 0.8666	0.146
0.8833	0.139
0.9000	0.139
0.9166	0.146
0.9333	0.139
0.9500	0.133
.9 - 0.9666	0.133
0.9833	0.133
1.0000	0.127
1.2000	0.101
1.4000	0.088
1.6000	0.069
1.8000	0.063
2.0000	0.057
2.13 - 2.2000	0.050
2.4000	0.038
2.6000	0.038
2.8000	0.025
- 3.0000	0.019
3.13 - 3.2000	0.019
3.4000	0.012
3.6000	0.006
3.73 - 3.8000	0.006
- 4.0000	0.000
4.2000	0.000

PAI-10-MW-07(S)
Rising Head Slug Test

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

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-08 (D) Rising Head Slug Test			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = length of well Screen
T_o = Time For water level to rise or Fall 37% of initial Change

r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_o = 1.56 min

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(0.083\,Ft)^2 \ln\left(\frac{5\,Ft}{0.083\,Ft}\right)}{2(5\,Ft)(1.56\,min)}$$

$$= 1.81 \times 10^{-3}\ Ft/min$$

1.81×10^{-3} Ft/min x 1440 min/day = 2.61 Ft/day

2.61 Ft/day x 3.528×10^{-4} cm/sec / Ft/day = 9.21×10^{-4} cm/sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Island (Jericho Island) WELL/BORING NO.: PAI-10 MW-

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington / Seth Pelepko

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 5.0' / 24' → 29' TEST NO.: 6 / Strata = 0

STATIC WATER LEVEL (Depth/Elevation): 9.99' / TWD = 31.86' / LWC = 21.87' DATE: 09/13/95

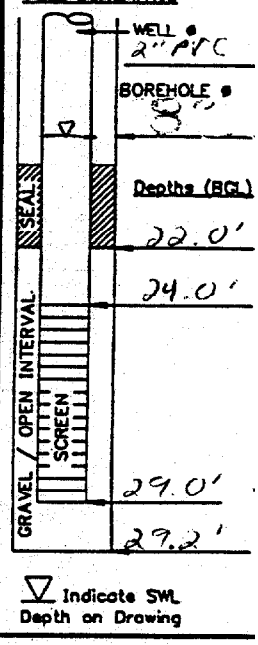
TEST TYPE (Rising/Falling/Constant Head): ~~Falling~~ Rising (slug out) CHECKED:

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

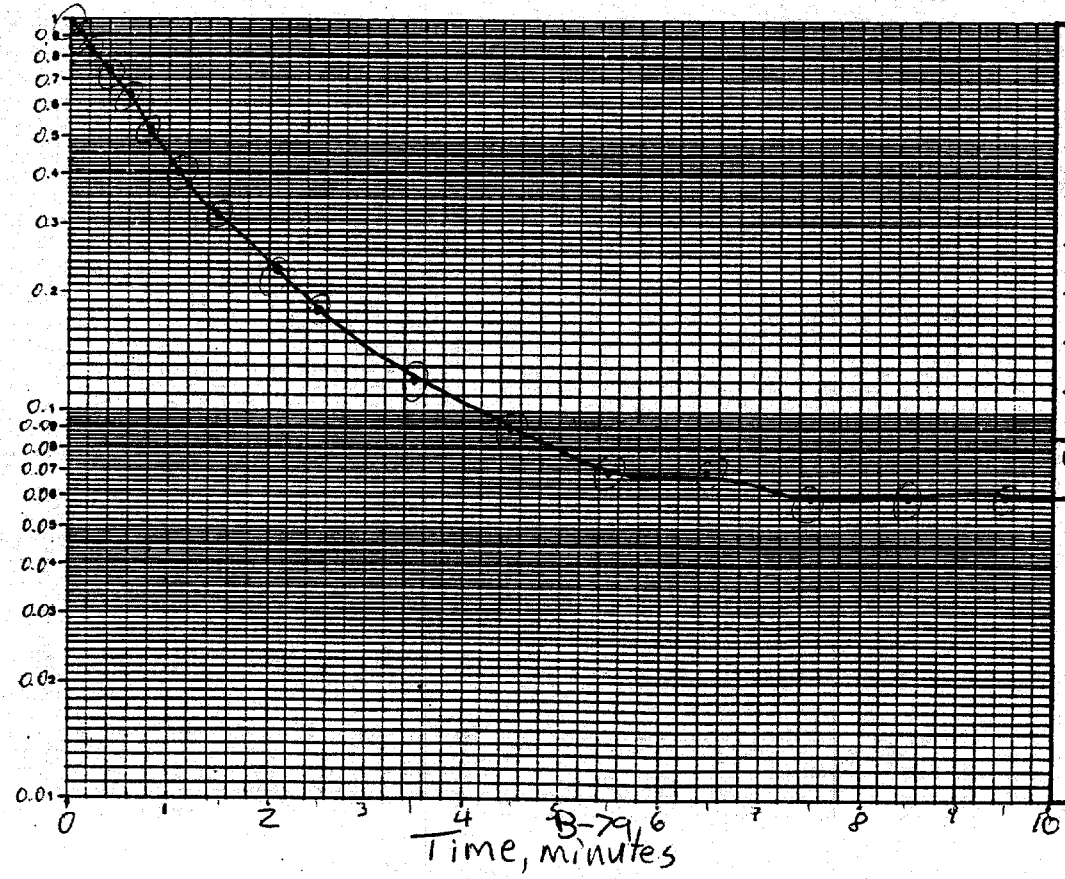
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.644	1	552	0.191	0.072
0.1	2.402	0.91	6.52	0.172	0.065
0.2	2.223	0.84	7.52	0.153	0.058
0.4	1.899	0.72	8.52	0.153	0.058
0.6	1.637	0.62	9.52	0.146	0.055
0.8	1.414	0.53			
1.12	1.096	0.41			
1.52	0.847	0.32			
2.12	0.599	0.23			
2.52	0.484	0.18			
3.52	0.312	0.12			
4.52	0.235	0.089			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

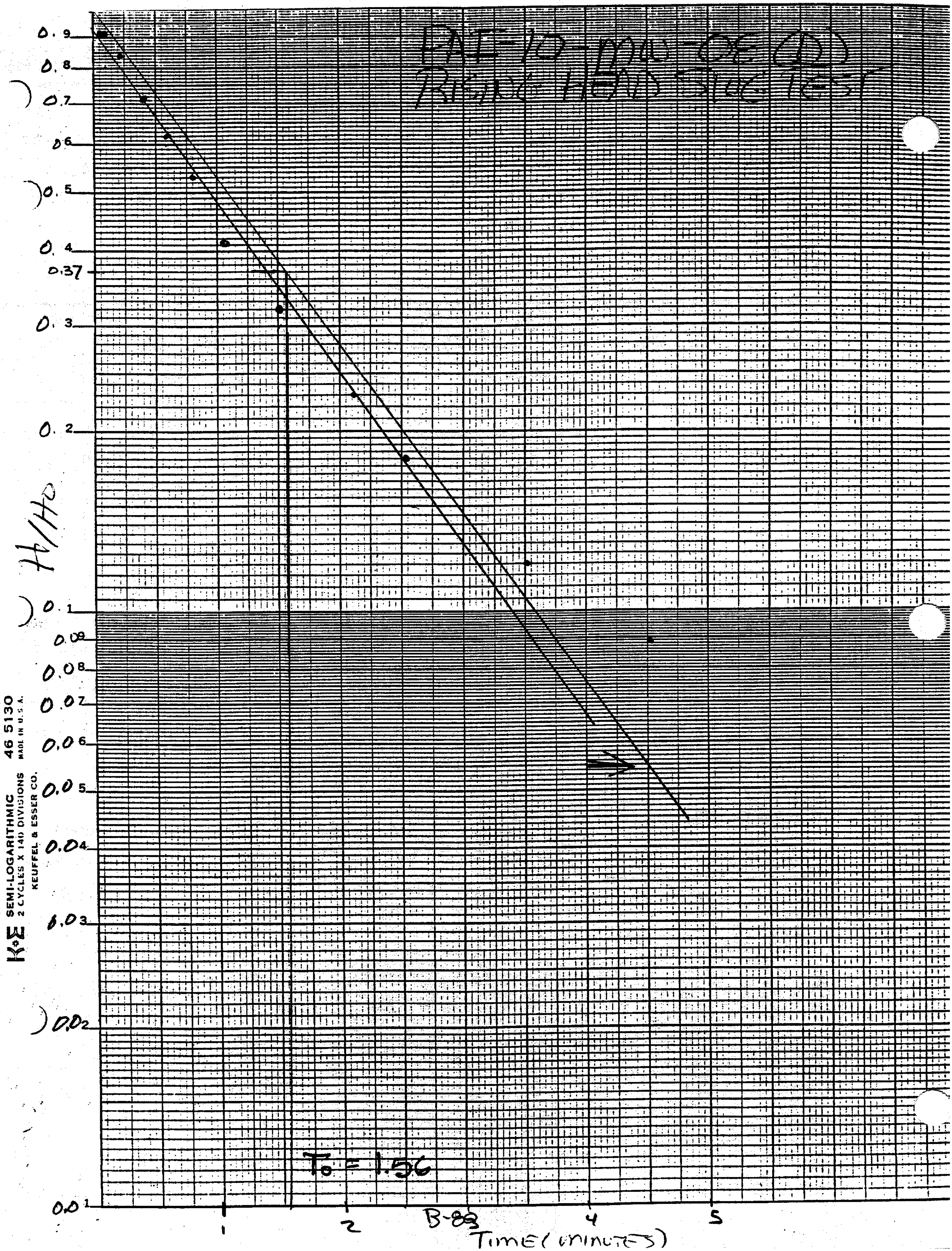
ID = 0.0005

XD @ bottom = 21.32'

Rising head completed first because Hermit did not stand when inserting slug

CALCS, SKETCH MAPS, ETC.:

B-79


RISING HEAD SLUG TEST
H/Ho
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
4
5
TIME (MINUTES)
T0 = 1.56
K&E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

B-89

~~PAI-10-6W08~~

Rising Head
Test 6, Step 0

SE1000C
Environmental Logger
09/13 08:39

Unit# 00145 Test 6

Rising Head Slug Test

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00008
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 09/13 07:23:33

Elapsed Time	INPUT 1
0.0000	0.082
0.0033	0.312
0.0066	1.727
0.0100	4.102
0.0133	2.848
0.0166	0.713
0.0200	1.172
0.0233	3.631
0.0266	3.956
0.0300	2.319
0.0333	2.618
0.0366	3.026
0.0400	2.644
0.0433	2.708
0.0466	2.778
0.0500	2.688
0.0533	2.701
0.0566	2.682
0.0600	2.676
0.0633	2.663
0.0666	2.688
0.0700	2.637
0.0733	2.631
0.0766	2.631
0.0800	2.644 — To 0
0.0833	2.612
0.0866	2.606
0.0900	2.593
0.0933	2.587
0.0966	2.580
0.1000	2.574
0.1033	2.567
0.1066	2.555
0.1100	2.548
0.1133	2.542
0.1166	2.536
0.1200	2.523

PW2-10-1000(0)
Test 6, Step 0
(Rising) Slug Out

RISING HEAD SLUG TEST

0.1233	2.516
0.1266	2.510
0.1300	2.504
0.1333	2.497
0.1366	2.485
0.1400	2.478
0.1433	2.478
0.1466	2.472
0.1500	2.459
0.1533	2.453
0.1566	2.446
0.1600	2.440
0.1633	2.434
0.1666	2.427
0.1700	2.421
0.1733	2.415
0.1766	2.408
0.1 - 0.1800	2.402
0.1833	2.395
0.1866	2.395
0.1900	2.389
0.1933	2.376
0.1966	2.370
0.2000	2.357
0.2033	2.357
0.2066	2.351
0.2100	2.344
0.2133	2.338
0.2166	2.332
0.2200	2.325
0.2233	2.325
0.2266	2.319
0.2300	2.313
0.2333	2.306
0.2366	2.300
0.2400	2.294
0.2433	2.281
0.2466	2.281
0.2500	2.274
0.2533	2.268
0.2566	2.262
0.2600	2.262
0.2633	2.255
0.2666	2.249
0.2700	2.243
0.2733	2.236
0.2766	2.230
0.2 - 0.2800	2.223
0.2833	2.217
0.2866	2.211
0.2900	2.204
0.2933	2.198
0.2966	2.198
0.3000	2.192
0.3033	2.185
0.3066	2.179
0.3100	2.172
0.3133	2.166
0.3166	2.166
0.3200	2.160

PZ-10-PIEZO(D)
Test 6, Step 0
(Rising) Slug Out

RISING HEAD SLUG TEST

	0.3333	2.153
	0.3366	2.147
	0.3300	2.147
	0.3333	2.141
	0.3500	2.109
	0.3666	2.083
0.30	0.3833	2.051
	0.4000	2.026
	0.4166	2.000
	0.4333	1.975
	0.4500	1.949
	0.4666	1.924
0.40	0.4833	1.899
	0.5000	1.879
	0.5166	1.854
	0.5333	1.828
	0.5500	1.809
	0.5666	1.784
0.5	0.5833	1.765
	0.6000	1.733
	0.6166	1.720
	0.6333	1.695
	0.6500	1.676
	0.6666	1.656
0.6	0.6833	1.637
	0.7000	1.612
	0.7166	1.593
	0.7333	1.580
	0.7500	1.561
	0.7666	1.542
0.7	0.7833	1.523
	0.8000	1.503
	0.8166	1.484
	0.8333	1.465
	0.8500	1.453
	0.8666	1.427
0.8	0.8833	1.414
	0.9000	1.395
	0.9166	1.382
	0.9333	1.363
	0.9500	1.351
	0.9666	1.338
0.9	0.9833	1.319
	1.0000	1.306
1.12	1.2000	1.096
	1.4000	0.962
1.52	1.6000	0.847
	1.8000	0.752
	2.0000	0.669
2.12	2.2000	0.599
	2.4000	0.535
2.52	2.6000	0.484
	2.8000	0.439
	3.0000	0.401
	3.2000	0.369
	3.4000	0.337
3.52	3.6000	0.312
	3.8000	0.293
	4.0000	0.274
	4.2000	0.261

Test 6, Step 0
(Rising) Slug Out

RISING HEAD SLUG TEST

	4.4000	0.248
4.52-	4.6000	0.235
	4.8000	0.223
	5.0000	0.210
	5.2000	0.203
	5.4000	0.197
5.52-	5.6000	0.191
	5.8000	0.184
	6.0000	0.178
	6.2000	0.178
	6.4000	0.172
6.52-	6.6000	0.172
	6.8000	0.165
	7.0000	0.165
	7.2000	0.159
	7.4000	0.159
7.52-	7.6000	0.153
	7.8000	0.159
	8.0000	0.153
	8.2000	0.146
	8.4000	0.153
8.52-	8.6000	0.153
	8.8000	0.146
	9.0000	0.146
	9.2000	0.146
	9.4000	0.146
9.52-	9.6000	0.146
	9.8000	0.146
9.92-	10.0000	0.146
	12.0000	0.140
	14.0000	0.140
	16.0000	0.146
	18.0000	0.146
	20.0000	0.146
	22.0000	0.146
	24.0000	0.146
	26.0000	0.146

END

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

CLIENT	JOB NUMBER 7803	
SUBJECT PAE-10-MW-08(D) Falling Head Slug Test		
BASED ON H. JORSLEV	DRAWING NUMBER	
BY GG	CHECKED BY RMB 3/4/99	APPROVED BY / DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

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
To = Time for water level to rise or fall to 37% of initial change — To = 1.15 min.

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(0.083\,Ft)^2 \ln\left(\frac{5\,Ft}{0.083\,Ft}\right)}{2(5\,FT)(1.15\,min.)}$$

$$= 2.46 \times 10^{-3}\ Ft/min$$

2.46×10^{-3} Ft/min x 1440 min/day = 3.54 Ft/day

3.54 Ft/day x 3.528×10^{-4} cm/sec / Ft/day = 1.25×10^{-3} cm/sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCAS BARRIS ISLAND (TERRICHO ISLAND) WELL/BORING NO.: MW-5 (MW-5R)

PROJECT NO.: 7803 GEOLOGIST: MARK DORRINGTON / SETH KELLY

WELL DIAMETER: 2" PVC SCREEN LENGTH/DEPTH: 5.0' / 24'-29' TEST NO.: 6 / Stage 1

STATIC WATER LEVEL (Depth/Elevation): 9.99' / TWD = 31.86' / LWC = 21.87' DATE: 09/13/98

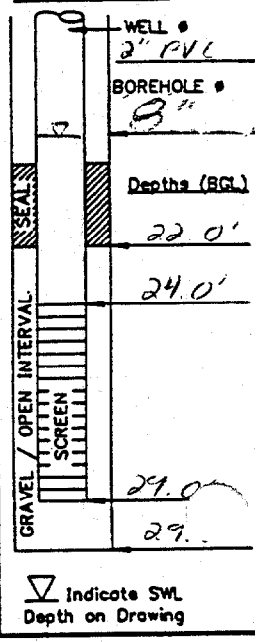
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) CHECKED:

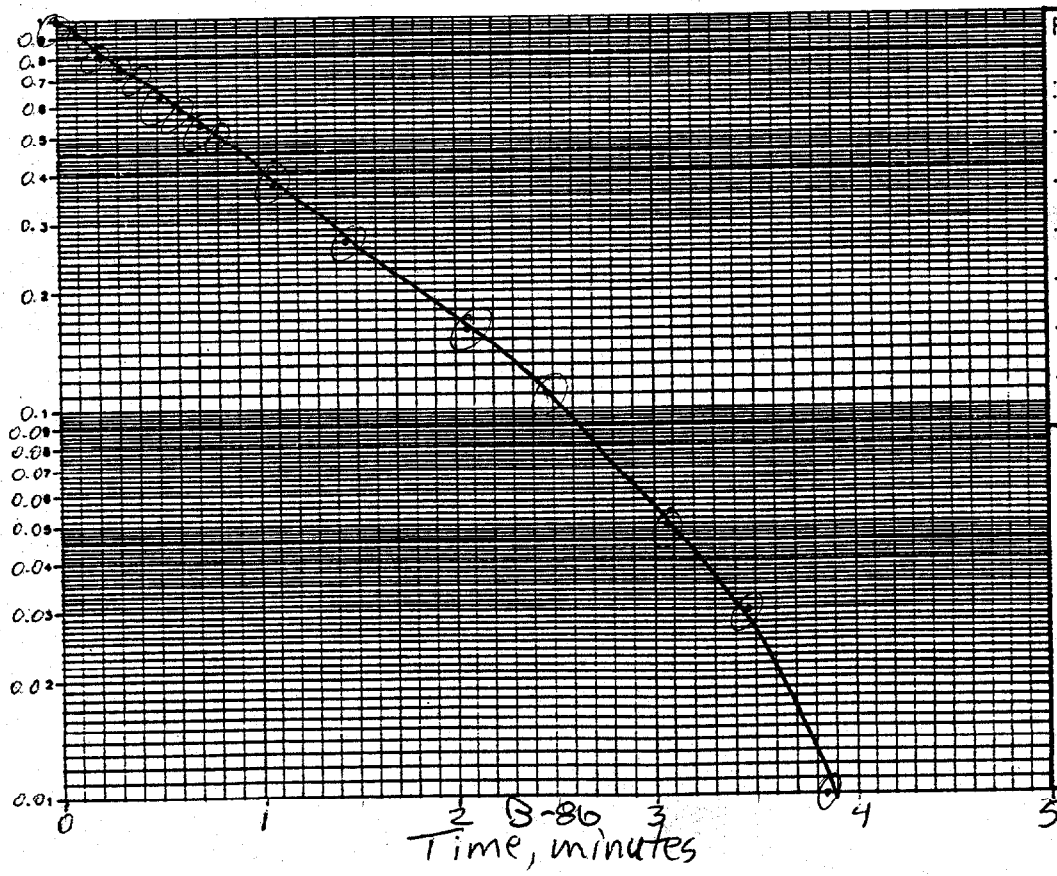
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5') PAGE 2 OF 2

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	-2.161	1	2.47	-0.235	0.109
0.1	-1.963	0.968	3.07	-0.114	0.053
0.2	-1.810	0.837	3.47	-0.063	0.029
0.31	-1.651	0.764	3.87	-0.019	0.009
0.41	-1.517	0.702	4.07	-0.006	0.003
0.51	-1.380	0.638			
0.61	-1.275	0.590			
0.71	-1.173	0.543			
0.81	-1.077	0.50			
1.07	-0.822	0.380			
1.47	-0.580	0.268			
2.07	-0.344	0.159			

WELL SCHEMATIC





REMARKS:

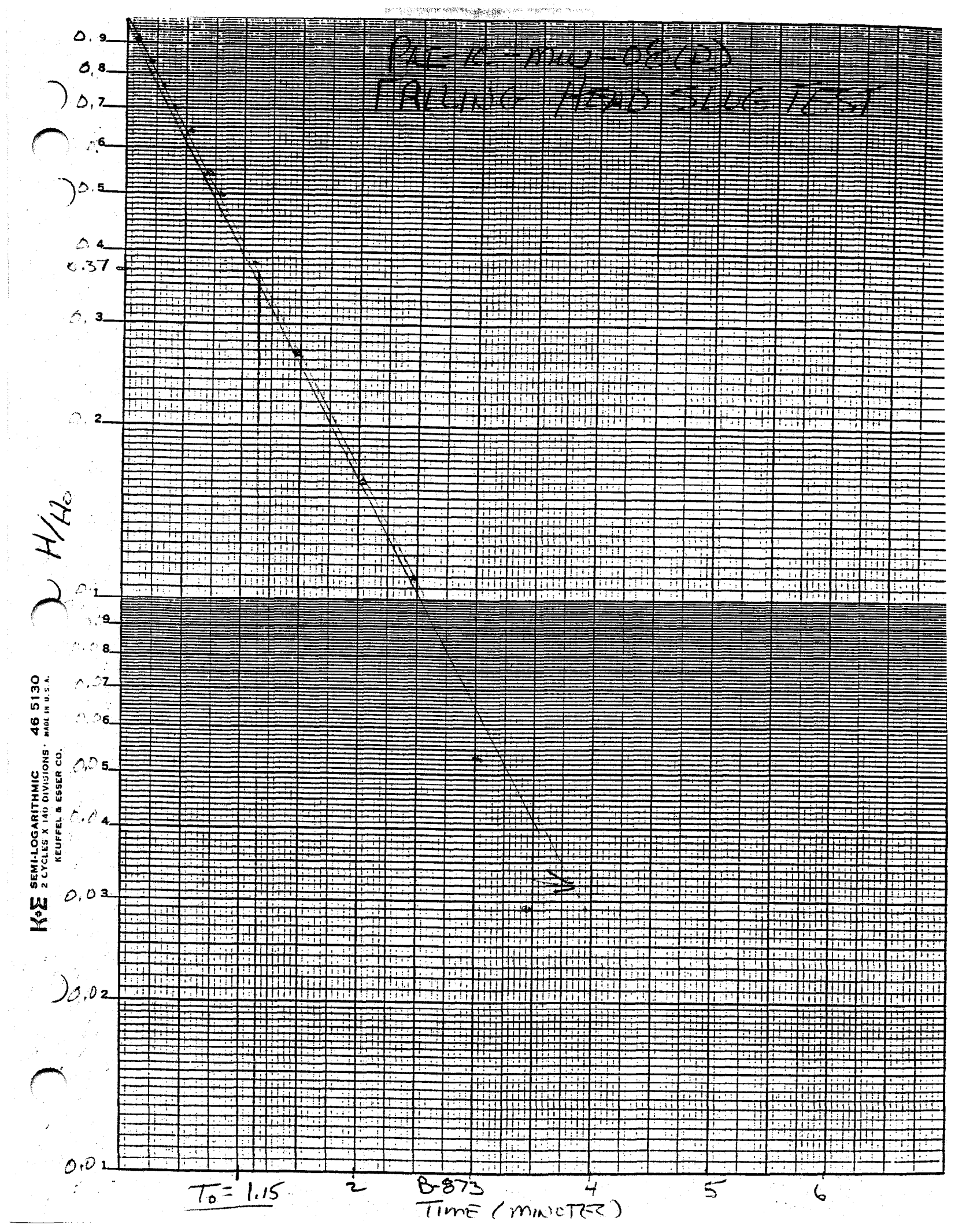
ID = .00005

XD @ bottom = 21.32'

CALCS, SKETCH MAPS, ETC.:

A/12

B-80


PRESSURE RECOVERY TEST
H/H0
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T0 = 1.15
2
B-873
4
5
6
TIME (MINUTES)
K&E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS · MADE IN U.S.A.
KEUFFEL & ESSER CO.

MW-10-GW08(D)
Falling Head
Test 6, Step 1

Falling Head Slug Test

SE1000C
Environmental Logger
09/13 08:48

Unit# 00145 Test 6

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00008
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 09/13 07:50:27

Elapsed Time	INPUT 1
0.0000	0.146
0.0033	-0.038
0.0066	-0.739
0.0100	-1.581
0.0133	-2.487
0.0166	-3.207
0.0200	-3.621
0.0233	-3.915
0.0266	-3.902
0.0300	-3.334
0.0333	-2.607
0.0366	-1.510
0.0400	-0.388
0.0433	-0.688
0.0466	-1.638
0.0500	-2.512
0.0533	-3.092
0.0566	-3.258
0.0600	-2.958
0.0633	-2.371
0.0666	-1.874
0.0700	-1.676
0.0733	-1.880
0.0766	-2.205
0.0800	-2.460
0.0833	-2.531
0.0866	-2.416
0.0900	-2.205
0.0933	-2.052
0.0966	-2.040
0.1000	-2.154
0.1033	-2.244
0.1066	-2.260
0.1100	-2.218
0.1133	-2.161
0.1166	-2.116

PAI-10-MW08(D)
Test 6, Step 1
(Falling) Slug In

Falling Head Slug Test

	0.1233	-2.148
0	0.1266	-2.161 — To
	0.1300	-2.154
	0.1333	-2.135
	0.1366	-2.116
	0.1400	-2.110
	0.1433	-2.110
	0.1466	-2.103
	0.1500	-2.103
	0.1533	-2.097
	0.1566	-2.084
	0.1600	-2.078
	0.1633	-2.072
	0.1666	-2.065
	0.1700	-2.065
	0.1733	-2.059
	0.1766	-2.052
	0.1800	-2.046
	0.1833	-2.040
	0.1866	-2.033
	0.1900	-2.027
	0.1933	-2.021
	0.1966	-2.021
	0.2000	-2.008
	0.2033	-2.001
	0.2066	-2.001
	0.2100	-1.995
	0.2133	-1.989
	0.2166	-1.982
	0.2200	-1.976
	0.2233	-1.970
0.1	-0.2266	-1.963
	0.2300	-1.957
	0.2333	-1.950
	0.2366	-1.950
	0.2400	-1.944
	0.2433	-1.944
	0.2466	-1.931
	0.2500	-1.925
	0.2533	-1.918
	0.2566	-1.918
	0.2600	-1.906
	0.2633	-1.906
	0.2666	-1.900
	0.2700	-1.893
	0.2733	-1.887
	0.2766	-1.880
	0.2800	-1.880
	0.2833	-1.874
	0.2866	-1.867
	0.2900	-1.861
	0.2933	-1.855
	0.2966	-1.848
	0.3000	-1.848
	0.3033	-1.842
	0.3066	-1.836
	0.3100	-1.836
	0.3133	-1.829
	0.3166	-1.829

PAI-10 - MW08(D)
Test 6, Step 1
(Falling) Slug In

Falling Head Slug Test

	0.3233	-1.810
0.2	-0.3266	-1.810
	0.3300	-1.804
	0.3333	-1.797
	0.3500	-1.778
	0.3666	-1.753
	0.3833	-1.721
	0.4000	-1.695
	0.4166	-1.676
0.31	-0.4333	-1.651
	0.4500	-1.625
	0.4666	-1.606
	0.4833	-1.581
	0.5000	-1.561
	0.5166	-1.536
0.41	-0.5333	-1.517
	0.5500	-1.491
	0.5666	-1.472
	0.5833	-1.447
	0.6000	-1.428
	0.6166	-1.408
0.51	-0.6333	-1.380
	0.6500	-1.370
	0.6666	-1.351
	0.6833	-1.332
	0.7000	-1.313
	0.7166	-1.294
0.61	-0.7333	-1.275
	0.7500	-1.262
	0.7666	-1.236
	0.7833	-1.224
	0.8000	-1.204
	0.8166	-1.192
0.71	-0.8333	-1.173
	0.8500	-1.160
	0.8666	-1.141
	0.8833	-1.128
	0.9000	-1.109
	0.9166	-1.096
0.81	-0.9333	-1.077
	0.9500	-1.070
	0.9666	-1.051
	0.9833	-1.032
	1.0000	-1.026
1.07	-1.2000	-0.822
	1.4000	-0.688
1.47	-1.6000	-0.580
	1.8000	-0.490
	2.0000	-0.408
2.07	-2.2000	-0.344
	2.4000	-0.286
2.47	-2.6000	-0.235
	2.8000	-0.191
	3.0000	-0.153
3.07	-3.2000	-0.114
	3.4000	-0.080
3.47	-3.6000	-0.063
	3.8000	-0.038
3.87	-4.0000	-0.019

PAI-10-MW08(D)
Test 6, step 1
(Falling) Slug In

4.4000	0.012
4.6000	0.019
4.8000	0.038
5.0000	0.044
5.2000	0.057
5.4000	0.063
5.6000	0.070
5.8000	0.076
6.0000	0.082
6.2000	0.089
6.4000	0.089
6.6000	0.095
6.8000	0.101
7.0000	0.101
7.2000	0.108
7.4000	0.108
7.6000	0.108
7.8000	0.114
8.0000	0.114
8.2000	0.121
8.4000	0.121
8.6000	0.127
8.8000	0.127
9.0000	0.127
9.2000	0.127
9.4000	0.127
9.6000	0.133
9.8000	0.127
10.0000	0.133
12.0000	0.140
14.0000	0.146
16.0000	0.153
18.0000	0.153

END

Falling Head Slug Test

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

CLIENT	JOB NUMBER 7803	
SUBJECT PAI-10-MW-09(S) RISING HEAD SLUG TEST		
BASED ON HVORSLEV ✓	DRAWING NUMBER	
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY / DATE

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

K = Hydraulic Conductivity
r = radius of well Casing
R = RADIUS OF well Screen
L = Length of well Screen
T_0 = Time For water level to Rise or Fall to 37% of initial Change.

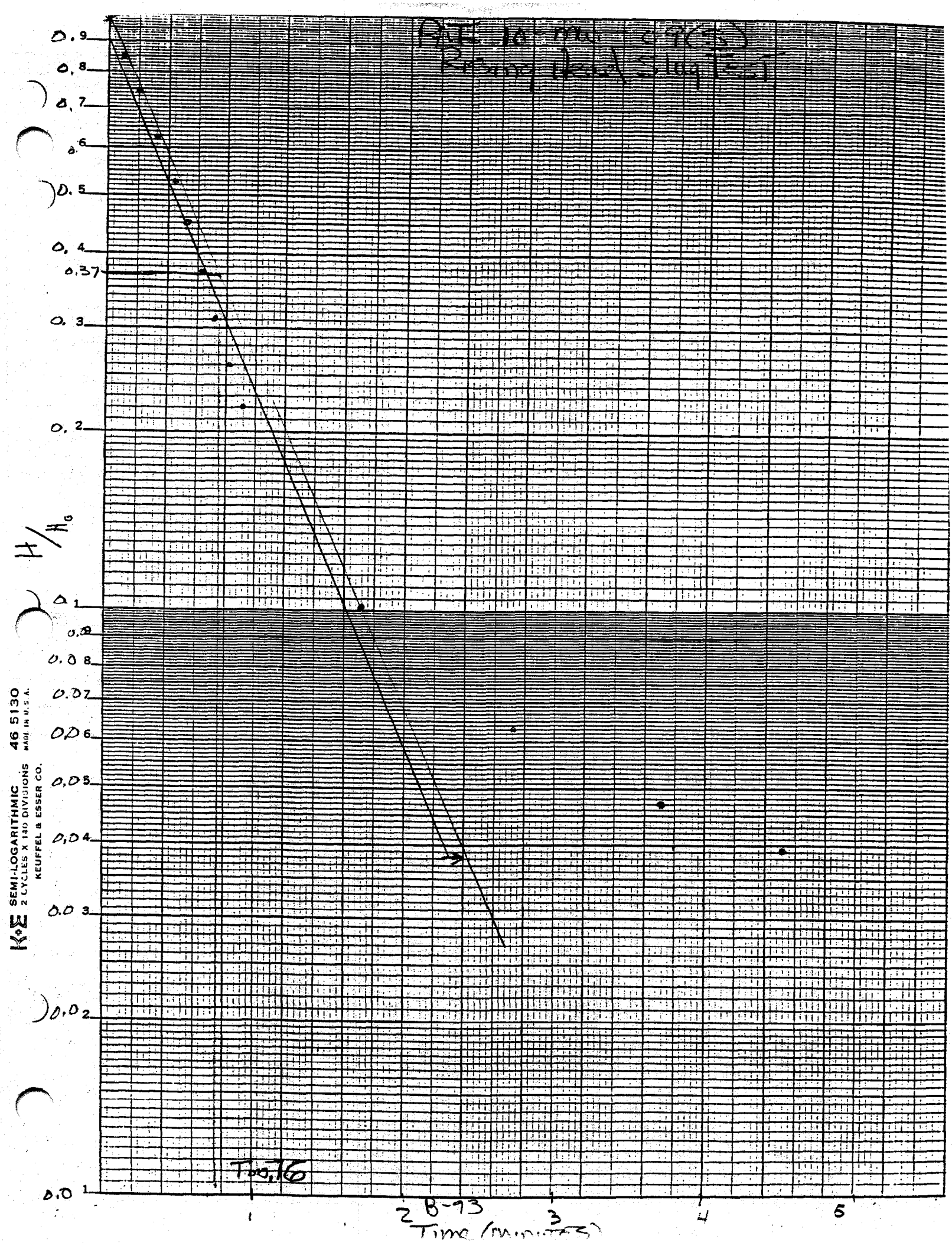
r = 0.083 FT
R = 0.083 FT
L = 8.96 FT
T_0 = 0.76

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\,Ft)^2 \ln\left(\frac{8.96\,Ft}{0.083\,FT}\right)}{2(8.96\,FT)(0.76\,min)}$$

$$\approx 2.37 \times 10^{-3}\ Ft/min$$

$2.37 \times 10^{-3}\ Ft/min \times 1440\ min/day = \underline{3.41\ Ft/day}$

$3.41\ Ft/day \times \frac{3.528 \times 10^{-4}\ Cm/Sec}{Ft/day} = \underline{1.20 \times 10^{-3}\ Cm/Sec}$


Falling Head Slug Test
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
H/H0
1
2
3
4
5
Time (minutes)
Too.76
B-93
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: Jerome Field WELL/BORING NO.: PZ-16 (MW-96)

PROJECT NO.: 7803 GEOLOGIST: M. Darrington

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 10FT / 14FT TEST NO.: 5

STATIC WATER LEVEL (Depth/Elevation): 7.70' / TD = 16.66 / LWL: 8.96 DATE: 09/25/98

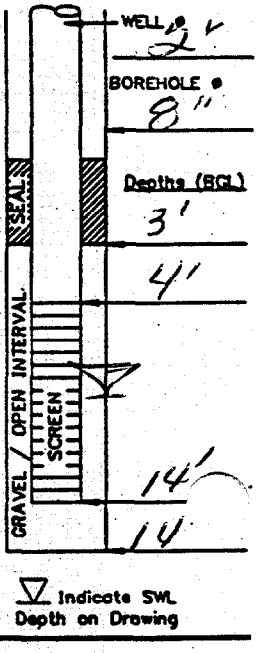
TEST TYPE (Rising/Falling/Constant Head): Rising Head CHECKED:

METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug PAGE .... OF ....

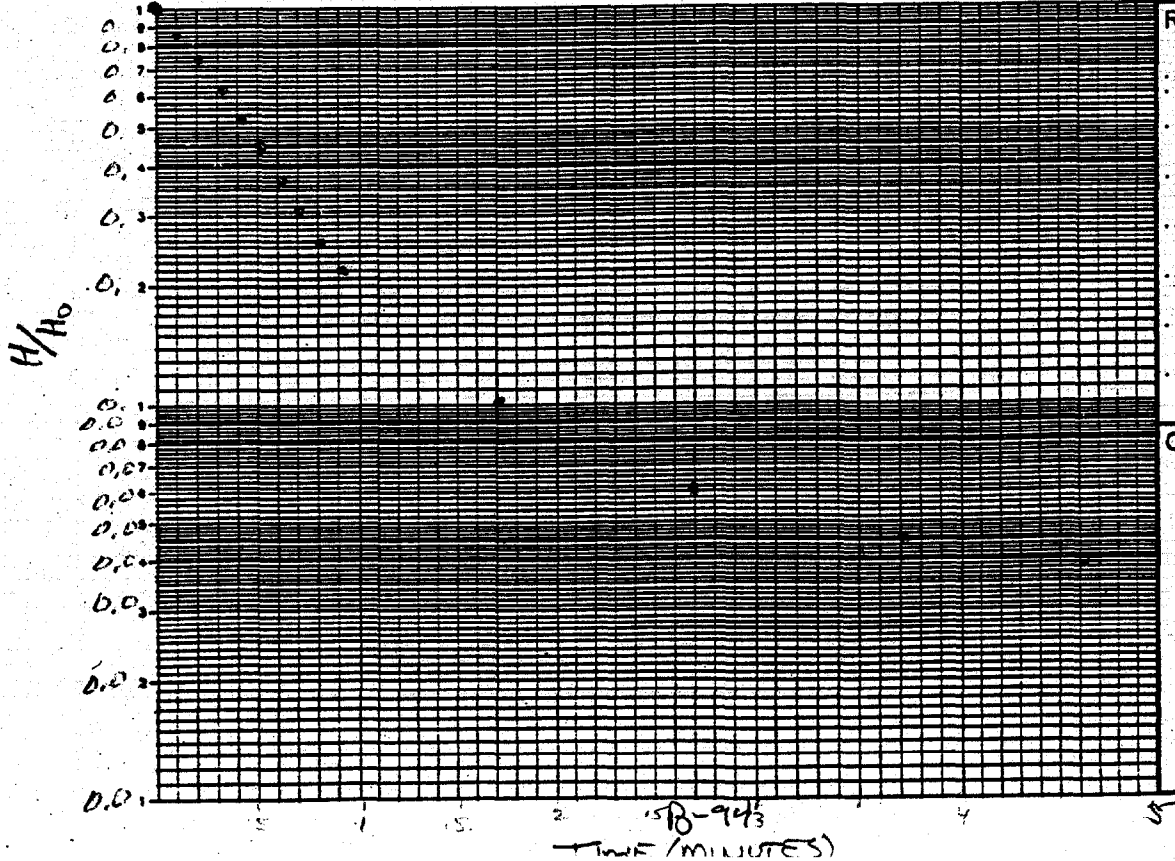
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): Top, Transducer

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	1.607	1	3.73	0.076	.047
.1	1.372	.854	4.73	0.063	.039
.2	1.194	.743	5.73	0.050	.031
.32	1.003	.624	6.73	0.044	.027
.42	0.851	.529			
.52	0.724	.451			
.62	0.603	.375			
.72	0.501	.312			
.82	0.419	.261			
.92	0.355	.221			
1.73	0.165	.103			
2.73	0.101	.063			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



REMARKS:

XD 8.41

CALCS, SKETCH MAPS, ETC.:

~~PAI-10-MW9~~
TEST 5, STEP 3
SLUG OUT (RISE)

PAI-10-MW-09(S)
RISING HEAD SLUG TEST

SE1000B
Environmental Logger
08/25 16:58

Unit# 00145 Test 5

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00009
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 3 08/25 15:01:49

Elapsed Time	INPUT 1
0.0000	2.407
0.0033	0.508
0.0066	0.724
0.0100	2.331
0.0133	1.467
0.0166	1.043
0.0200	1.683
0.0233	1.766
0.0266	1.683
0.0300	1.721
0.0333	1.715
0.0366	1.696
0.0400	1.702
0.0433	1.677
0.0466	1.658
0.0500	1.651
0.0533	1.639
0.0566	1.626
0.0600	1.620
0.0633	1.613
0.0666	1.601
0.0700	1.607 — To 0
0.0733	1.582
0.0766	1.575
0.0800	1.569
0.0833	1.562
0.0866	1.550
0.0900	1.537
0.0933	1.531
0.0966	1.524
0.1000	1.518
0.1033	1.512
0.1066	1.505
0.1100	1.493
0.1133	1.493
0.1166	1.486
0.1200	1.480

PAI-10-MW-09 (S)
RISING HEAD SLUG TEST

	0.1233	1.467
	0.1266	1.461
	0.1300	1.454
	0.1333	1.448
	0.1366	1.442
	0.1400	1.435
	0.1433	1.429
	0.1466	1.416
	0.1500	1.416
	0.1533	1.410
	0.1566	1.397
	0.1600	1.397
	0.1633	1.391
	0.1666	1.385
.1 –	0.1700	1.372
	0.1733	1.365
	0.1766	1.359
	0.1800	1.353
	0.1833	1.346
	0.1866	1.334
	0.1900	1.340
	0.1933	1.327
	0.1966	1.321
	0.2000	1.315
	0.2033	1.308
	0.2066	1.302
	0.2100	1.296
	0.2133	1.289
	0.2166	1.283
	0.2200	1.277
	0.2233	1.270
	0.2266	1.264
	0.2300	1.257
	0.2333	1.257
	0.2366	1.251
	0.2400	1.245
	0.2433	1.238
	0.2466	1.226
	0.2500	1.219
	0.2533	1.219
	0.2566	1.213
	0.2600	1.207
	0.2633	1.200
	0.2666	1.194
.2 –	0.2700	1.194
	0.2733	1.188
	0.2766	1.181
	0.2800	1.175
	0.2833	1.169
	0.2866	1.162
	0.2900	1.156
	0.2933	1.149
	0.2966	1.143
	0.3000	1.143
	0.3033	1.130
	0.3066	1.130
	0.3100	1.124
	0.3133	1.118
	0.3166	1.118
	0.3200	1.111

PAE-D-MW-09(S)
Rising Head Slug Test

	0.3233	1.099
	0.3266	1.099
	0.3300	1.092
	0.3333	1.086
	0.3500	1.061
	0.3666	1.035
.32	0.3833	1.003
	0.4000	0.978
	0.4166	0.953
	0.4333	0.934
	0.4500	0.902
	0.4666	0.876
42	0.4833	0.851
	0.5000	0.832
	0.5166	0.813
	0.5333	0.787
	0.5500	0.768
	0.5666	0.749
.52	0.5833	0.724
	0.6000	0.705
	0.6166	0.686
	0.6333	0.660
	0.6500	0.641
	0.6666	0.620
.62	0.6833	0.603
	0.7000	0.584
	0.7166	0.571
	0.7333	0.552
	0.7500	0.533
	0.7666	0.521
.72	0.7833	0.501
	0.8000	0.480
	0.8166	0.476
	0.8333	0.457
	0.8500	0.444
	0.8666	0.432
.82	0.8833	0.419
	0.9000	0.413
	0.9166	0.400
	0.9333	0.387
	0.9500	0.381
	0.9666	0.368
.92	0.9833	0.355
	1.0000	0.349
	1.2000	0.260
	1.4000	0.216
	1.6000	0.184
1.73	1.8000	0.165
	2.0000	0.146
	2.2000	0.133
	2.4000	0.120
	2.6000	0.114
2.73	2.8000	0.101
	3.0000	0.101
	3.2000	0.088
	3.4000	0.088
3.73	3.6000	0.076
	3.8000	0.076
	4.0000	0.076
	4.2000	0.069

PAE-10-MW-09(S)
Rising Head Slug Test

4.4000	0.063
4.6000	0.063
4.73 4.8000	0.063
5.0000	0.057
5.2000	0.050
5.4000	0.057
5.6000	0.050
5.73 5.8000	0.050
6.0000	0.050
6.2000	0.050
6.4000	0.044
6.6000	0.044
6.73 6.8000	0.044
7.0000	0.044
7.2000	0.038
7.4000	0.038
7.6000	0.038
7.73 7.8000	0.038
8.0000	0.038
8.2000	0.031
8.4000	0.031
8.6000	0.038
8.8000	0.031
9.0000	0.031
9.2000	0.031
9.4000	0.031
9.6000	0.025
9.8000	0.031
10.0000	0.025
12.0000	0.038
14.0000	0.031
16.0000	0.019
18.0000	0.019

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-10(D) RISING HEAD SLUG TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY PmB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time For water level to rise or Fall to 37% of initial change.

r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_0 = 8.3 min

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\,FT)^2 \ln\left(\frac{5FT}{0.083FT}\right)}{2(5FT)(8.3\,min)}$$

$$= 3.40 \times 10^{-4}\ Ft/Min$$

$3.40 \times 10^{-4}\ Ft/min \times 1440\ min/day = 0.49\ Ft/day$

$0.49\ Ft/day \times 3.528 \times 10^{-4}\ \frac{cm/sec}{Ft/day} = 1.73 \times 10^{-4}\ cm/sec$

HYDRAULIC CONDUCTIVITY TESTING DATA SHE

PROJECT NAME: Jericho Island WELL/BORING NO.: PAT-IN-MW4

PROJECT NO.: 7803 GEOLOGIST: M. Darrington

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 5FT / 29 FT TEST NO.: 4

STATIC WATER LEVEL (Depth/Elevation): 7.36 / TD = 32 FT / TOC = 24.64 DATE: 8/25/98

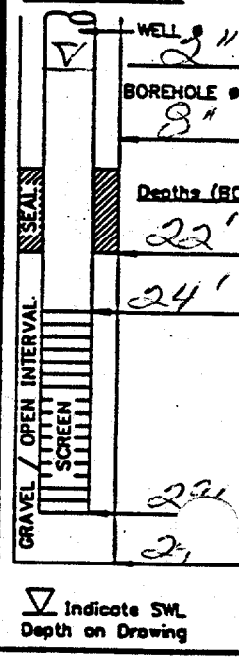
TEST TYPE (Rising/Falling/Constant Head): Rising Head CHECKED:

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

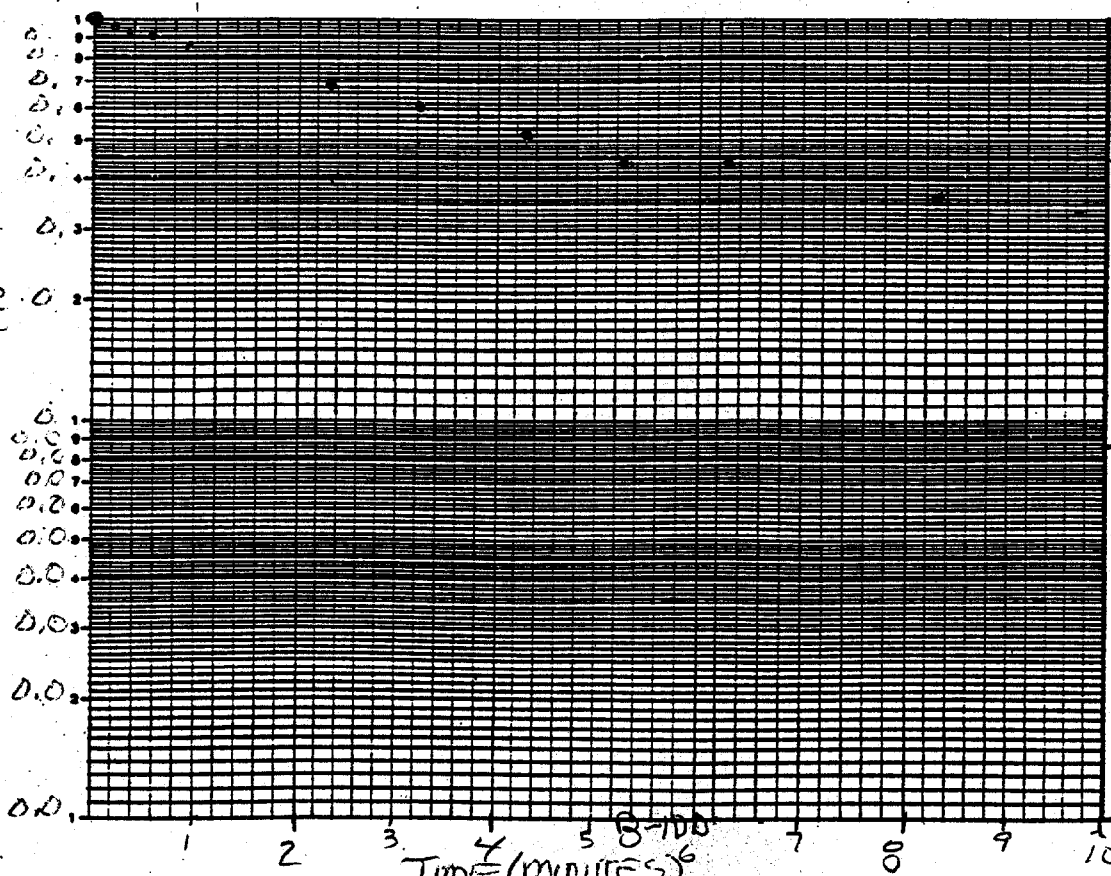
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, Transducer

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	2.951	1	17.7	0.784	.27
.21	2.837	.96	21.7	0.765	.26
.36	2.767	.94	23.7	0.758	.256
.56	2.677	.91			
.89	2.524	.86			
2.3	2.059	.70			
3.2	1.810	.61			
4.3	1.606	.54			
5.3	1.434	.49			
6.3	1.300	.44			
8.3	1.103	.37			
9.7	1.007	.34			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

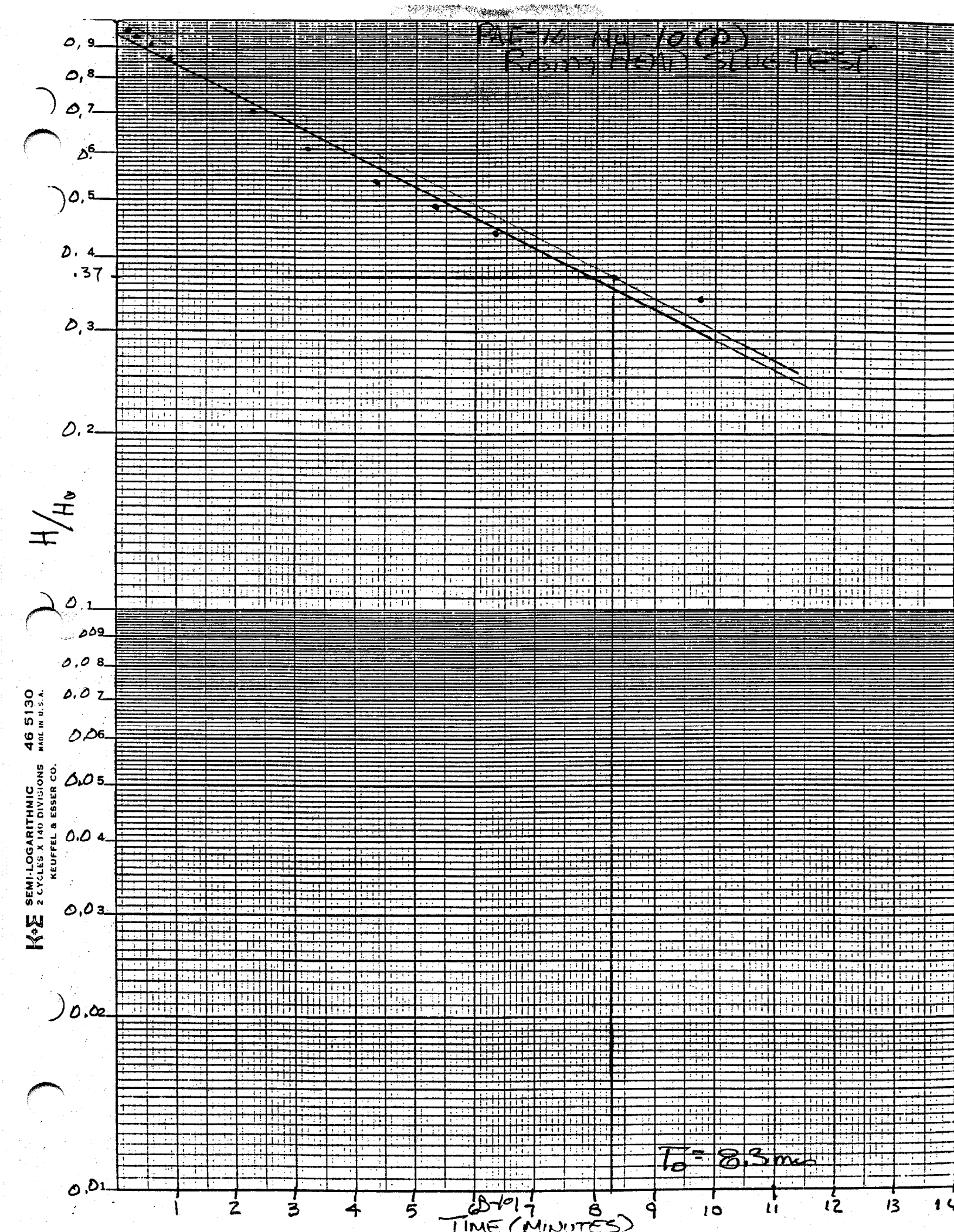


REMARKS:

XD = 24.14

Soils w/in Screen SANDS BUT NOT - mink water.

CALCS, SKETCH MAPS, ETC.:


PAE 16-MW-10 (D)
RISING HEAD SLUG TEST
H/H0
0,9
0,8
0,7
0,6
0,5
0,4
.37
0,3
0,2
0,1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T0 = 8.3 min
1
2
3
4
5
6
7
8
9
10
11
12
13
TIME (MINUTES)
K+E SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
46 5130
MADE IN U.S.A.

~~PAIO-GWIO~~
TEST 4, STEP 3
SLUG OUT (RISE)

PAE-10-MW-10(D)
Rising Head Slug Test

SE1000C
Environmental Logger
08/25 16:47

Unit# 00145 Test 4

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00010
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 3 08/25 13:25:04

Elapsed Time	INPUT 1
0.0000	0.433
0.0033	0.427
0.0066	1.268
0.0100	4.270
0.0133	4.308
0.0166	1.326
0.0200	1.170
0.0233	3.799
0.0266	4.296
0.0300	2.798
0.0333	3.200
0.0366	3.372
0.0400	3.072
0.0433	3.200
0.0466	3.194
0.0500	3.143
0.0533	3.136
0.0566	3.155
0.0600	3.130
0.0633	3.143
0.0666	3.130
0.0700	3.130
0.0733	3.123
0.0766	3.117
0.0800	3.117
0.0833	3.111
0.0866	3.104
0.0900	3.098
0.0933	3.098
0.0966	3.092
0.1000	3.092
0.1033	3.085
0.1066	3.079
0.1100	3.079
0.1133	3.079
0.1166	3.072
0.1200	3.066

PAI-10 - MW-10(D)
Rising Head Slug Test

0.1233	3.066
0.1266	3.060
0.1300	3.060
0.1333	3.053
0.1366	3.053
0.1400	3.053
0.1433	3.047
0.1466	3.047
0.1500	3.041
0.1533	3.041
0.1566	3.041
0.1600	3.034
0.1633	3.034
0.1666	3.034
0.1700	3.028
0.1733	3.028
0.1766	3.021
0.1800	3.021
0.1833	3.021
0.1866	3.015
0.1900	3.015
0.1933	3.015
0.1966	3.009
0.2000	3.009
0.2033	3.009
0.2066	3.002
0.2100	3.002
0.2133	3.002
0.2166	2.996
0.2200	2.996
0.2233	2.996
0.2266	2.996
0.2300	2.990
0.2333	2.990
0.2366	2.983
0.2400	2.983
0.2433	2.983
0.2466	2.983
0.2500	2.977
0.2533	2.977
0.2566	2.977
0.2600	2.970
0.2633	2.970
0.2666	2.970
0.2700	2.970
0.2733	2.964
0.2766	2.964
0.2800	2.964
0.2833	2.958
0.2866	2.958
0.2900	2.958
0.2933	2.951
0.2966	2.951
0.3000	2.951
0.3033	2.945
0.3066	2.951
0.3100	2.945
0.3133	2.945
0.3166	2.945
0.3200	2.939

T_0

	0.3233	2.939
	0.3266	2.930
	0.3300	2.939
	0.3333	2.932
	0.3500	2.926
	0.3666	2.913
	0.3833	2.907
	0.4000	2.900
	0.4166	2.888
	0.4333	2.881
	0.4500	2.869
	0.4666	2.862
	0.4833	2.849
	0.5000	2.843
.21 –	0.5166	2.837
	0.5333	2.830
	0.5500	2.824
	0.5666	2.811
	0.5833	2.805
	0.6000	2.798
	0.6166	2.792
	0.6333	2.786
	0.6500	2.773
.36 –	0.6666	2.767
	0.6833	2.760
	0.7000	2.754
	0.7166	2.747
	0.7333	2.735
	0.7500	2.728
	0.7666	2.722
	0.7833	2.716
	0.8000	2.709
	0.8166	2.703
	0.8333	2.690
	0.8500	2.684
.56 –	0.8666	2.677
	0.8833	2.671
	0.9000	2.665
	0.9166	2.658
	0.9333	2.652
	0.9500	2.639
	0.9666	2.630
	0.9833	2.633
	1.0000	2.620
.89 –	1.2000	2.524
	1.4000	2.448
	1.6000	2.378
	1.8000	2.308
	2.0000	2.237
	2.2000	2.180
	2.4000	2.116
2.3 –	2.6000	2.050
	2.8000	2.008
	3.0000	1.951
	3.2000	1.900
	3.4000	1.855
3.2 –	3.6000	1.810
	3.8000	1.766
	4.0000	1.721
	4.2000	1.683

PAT-10-MW-10(D)
Rising Head Slug Test

PAI-10-MW-10(D)
Rising Head Slug Test

4.4000	1.645
4.6000	1.606
4.8000	1.568
5.0000	1.536
5.2000	1.498
5.4000	1.466
5.6000	1.434
5.8000	1.400
6.0000	1.377
6.2000	1.351
6.4000	1.332
6.6000	1.300
6.8000	1.275
7.0000	1.256
7.2000	1.237
7.4000	1.217
7.6000	1.192
7.8000	1.173
8.0000	1.154
8.2000	1.135
8.4000	1.115
8.6000	1.103
8.8000	1.090
9.0000	1.071
9.2000	1.058
9.4000	1.045
9.6000	1.032
9.8000	1.020
10.0000	1.007
12.0000	0.911
14.0000	0.848
16.0000	0.800
18.0000	0.784
20.0000	0.771
22.0000	0.765
24.0000	0.758
26.0000	0.758
28.0000	0.758
30.0000	0.765
32.0000	0.771
34.0000	0.771
36.0000	0.778
38.0000	0.784

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-10(D) FALLING HEADSLUG TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RmB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time For water Level to Rise or Fall to 37% of Initial Charge

r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_0 = 3.3 min

$$K = \frac{r^2 \ln L/R}{2LT_0} = \frac{(0.083\,Ft)^2 \ln \left(\frac{5\,Ft}{0.083\,Ft}\right)}{2(5\,Ft)(3.3\,min)}$$

$$= 8.56 \times 10^{-4}\ Ft/min$$

8.56×10^{-4} Ft/min × 1440 min/day = 1.23 Ft/day

1.23 Ft/day × 3.528×10^{-4} cm/sec / Ft/day = 4.34×10^{-4} cm/sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: Jericho Island WELL/BORING NO.: PAI-10 mw 10

PROJECT NO.: 7803 GEOLOGIST: M. Davenport

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 5FT/29FT TEST NO.: 4

STATIC WATER LEVEL (Depth/Elevation): 7.36'/TD 31.73 Ft / Twc 24.64' DATE: 8/25/95

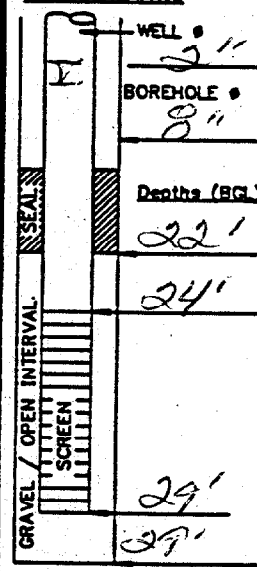
TEST TYPE (Rising/Falling/Constant Head): Falling Head CHECKED:

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

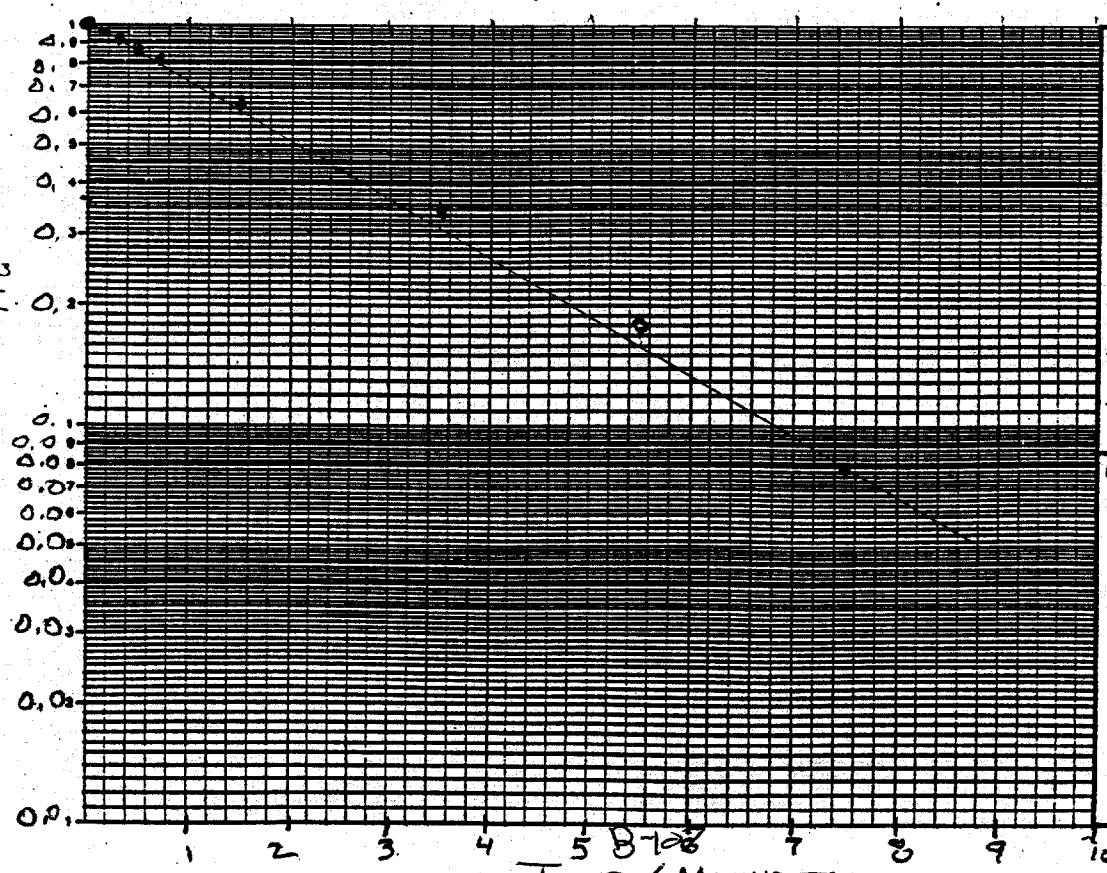
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC, Transducer

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-2.354	1			
.15	-2.232	0.95			
.29	-2.143	0.91			
.49	-2.022	0.86			
.69	-1.907	0.81			
1.5	-1.492	0.63			
3.5	-0.835	0.35			
5.5	-0.433	0.18			
7.5	-0.185	0.079			
9.5	-0.019	0.008			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing



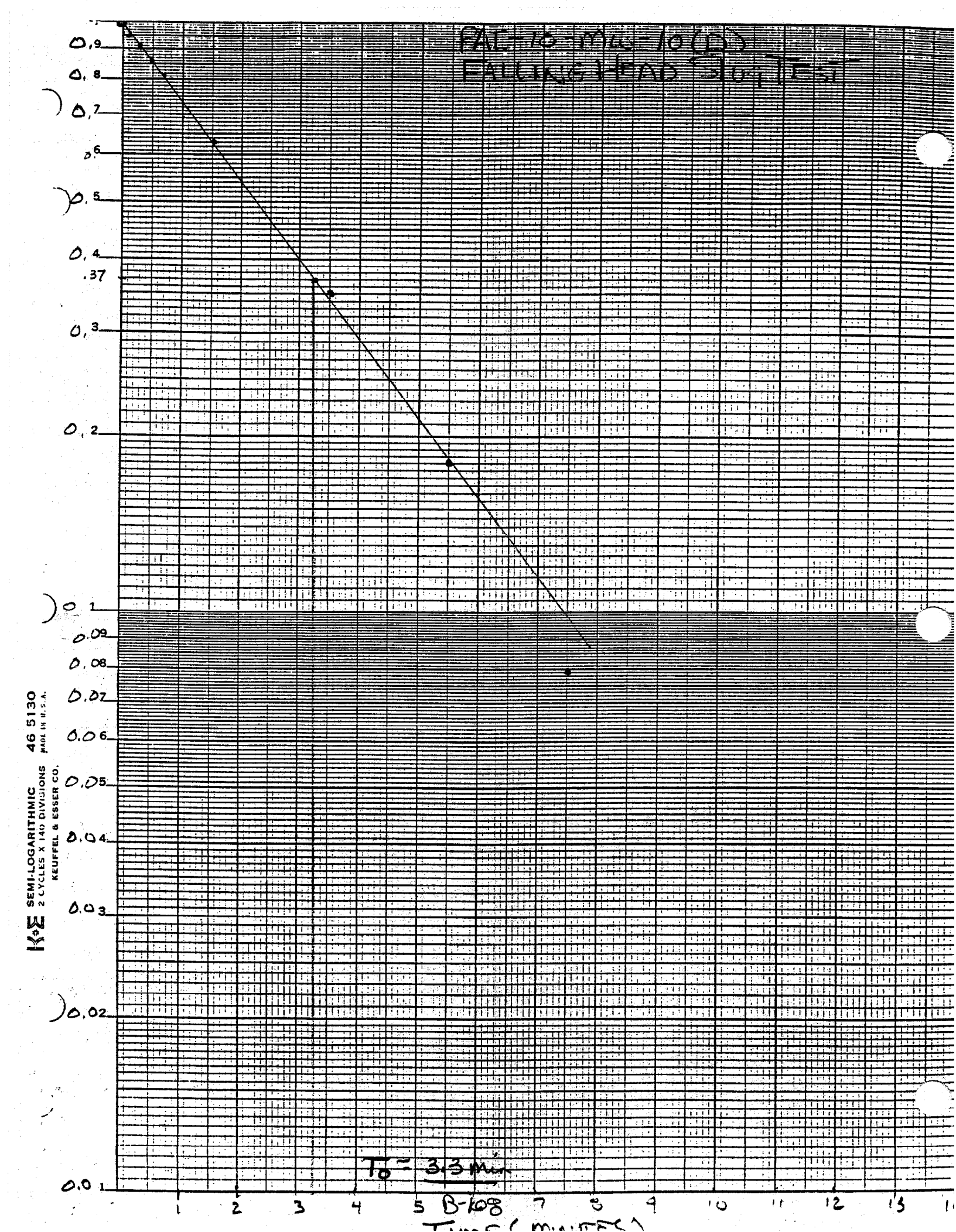
REMARKS:

XD = 24.14'

Some w/in Screen

Sand but not much water

CALCS, SKETCH MAPS, ETC.:


FALLING-HEAD PERMEABILITY TEST
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
1
2
3
4
5
6
7
8
9
10
11
12
13
$T_0 = 3.3$ min
TIME (MINUTES)
SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
MADE IN U.S.A.
46 5130

B-108

~~PAE10-GW10~~
TEST 4, STEP 0
SLUG IN (FALL)

PAE-10-MW-10(D)
Falling Head Slug Test

SE1000C
Environmental Logger
08/25 16:39

Unit# 00145 Test 4

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00010
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/25 12:09:26

Elapsed Time	INPUT 1
0.0000	-0.089
0.0033	-0.802
0.0066	-1.013
0.0100	-3.439
0.0133	-5.028
0.0166	-5.220
0.0200	-3.171
0.0233	-2.086
0.0266	-2.130
0.0300	-2.111
0.0333	-2.028
0.0366	-2.015
0.0400	-2.405
0.0433	-2.794
0.0466	-2.845
0.0500	-2.673
0.0533	-2.488
0.0566	-2.462
0.0600	-2.552
0.0633	-2.622
0.0666	-2.600
0.0700	-2.558
0.0733	-2.526
0.0766	-2.526
0.0800	-2.530
0.0833	-2.545
0.0866	-2.539
0.0900	-2.526
0.0933	-2.526
0.0966	-2.520
0.1000	-2.520
0.1033	-2.513
0.1066	-2.507
0.1100	-2.500
0.1133	-2.507
0.1166	-2.494
0.1200	-2.500

PAI-10-mw-10(D)
Falling Head Slug Test

0.1233	-2.494
0.1266	-2.494
0.1300	-2.488
0.1333	-2.481
0.1366	-2.481
0.1400	-2.475
0.1433	-2.475
0.1466	-2.469
0.1500	-2.462
0.1533	-2.469
0.1566	-2.462
0.1600	-2.456
0.1633	-2.456
0.1666	-2.449
0.1700	-2.449
0.1733	-2.449
0.1766	-2.443
0.1800	-2.437
0.1833	-2.437
0.1866	-2.430
0.1900	-2.430
0.1933	-2.430
0.1966	-2.430
0.2000	-2.424
0.2033	-2.424
0.2066	-2.418
0.2100	-2.418
0.2133	-2.411
0.2166	-2.411
0.2200	-2.405
0.2233	-2.405
0.2266	-2.399
0.2300	-2.399
0.2333	-2.399
0.2366	-2.392
0.2400	-2.392
0.2433	-2.392
0.2466	-2.385
0.2500	-2.385
0.2533	-2.379
0.2566	-2.379
0.2600	-2.373
0.2633	-2.373
0.2666	-2.373
0.2700	-2.367
0.2733	-2.367
0.2766	-2.360
0.2800	-2.347
0.2833	-2.354
0.2866	-2.360
0.2900	-2.354
0.2933	-2.347
0.2966	-2.354 T0
0.3000	-2.347
0.3033	-2.341
0.3066	-2.341
0.3100	-2.341
0.3133	-2.335
0.3166	-2.335
0.3200	-2.328

PAL-10-mw-10(D)
Falling Head Slug Test

	0.3233	-2.328
	0.3266	-2.328
	0.3300	-2.322
	0.3333	-2.322
	0.3500	-2.309
	0.3666	-2.296
	0.3833	-2.277
	0.4000	-2.271
	0.4166	-2.258
	0.4333	-2.245
.15 —	0.4500	-2.232
	0.4666	-2.226
	0.4833	-2.213
	0.5000	-2.200
	0.5166	-2.188
	0.5333	-2.175
	0.5500	-2.169
	0.5666	-2.156
.29 —	0.5833	-2.143
	0.6000	-2.137
	0.6166	-2.124
	0.6333	-2.111
	0.6500	-2.105
	0.6666	-2.092
	0.6833	-2.079
	0.7000	-2.073
	0.7166	-2.060
	0.7333	-2.054
	0.7500	-2.041
	0.7666	-2.035
.49 —	0.7833	-2.022
	0.8000	-2.009
	0.8166	-2.003
	0.8333	-1.990
	0.8500	-1.984
	0.8666	-1.971
	0.8833	-1.964
	0.9000	-1.952
	0.9166	-1.945
	0.9333	-1.933
	0.9500	-1.926
	0.9666	-1.920
.69 —	0.9833	-1.907
	1.0000	-1.900
	1.2000	-1.773
	1.4000	-1.671
	1.6000	-1.575
1.5 —	1.8000	-1.492
	2.0000	-1.409
	2.2000	-1.326
	2.4000	-1.256
	2.6000	-1.186
	2.8000	-1.122
	3.0000	-1.059
	3.2000	-0.995
	3.4000	-0.937
	3.6000	-0.886
3.5 —	3.8000	-0.835
	4.0000	-0.784
	4.2000	-0.740

PAE-10-mw-10 (D)
Falling Head Slug Test

4.4000	-0.695
4.6000	-0.650
4.8000	-0.612
5.0000	-0.574
5.2000	-0.535
5.4000	-0.504
5.6000	-0.465
5.8000	-0.433
6.0000	-0.408
6.2000	-0.376
6.4000	-0.344
6.6000	-0.325
6.8000	-0.300
7.0000	-0.274
7.2000	-0.248
7.4000	-0.223
7.6000	-0.204
7.8000	-0.185
8.0000	-0.159
8.2000	-0.147
8.4000	-0.127
8.6000	-0.108
8.8000	-0.096
9.0000	-0.076
9.2000	-0.063
9.4000	-0.044
9.6000	-0.032
9.8000	-0.010
10.0000	-0.006
12.0000	0.101
14.0000	0.178
16.0000	0.236
18.0000	0.274
20.0000	0.305
22.0000	0.337
24.0000	0.363
26.0000	0.370

END

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

CLIENT		JOB NUMBER 7803	
SUBJECT PAI-10-MW-11(S) Rising Head Slug Test			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

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_o = Time for water level to Rise or Fall To 37% of initial Charge — T_o = 1.07 min.

$$K = \frac{r^2 \ln(L/R)}{2LT_o} = \frac{(0.083\,Ft)^2 \ln\left(\frac{10\,FT}{0.083\,FT}\right)}{2(10\,FT)(1.07\,min)}$$

$$= 1.54 \times 10^{-3}\ Ft./min$$

$1.54 \times 10^{-3}\ Ft/min \times 1440\ min/day = 2.22\ Ft/day$

$2.22\ Ft/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{Ft/day} = 7.83 \times 10^{-4}\ cm/sec$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Is., SC - Jericho Ts. (Grp 4) WELL/BORING NO.: PAI-10-MW1

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington

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

STATIC WATER LEVEL (Depth/Elevation): 4.68/TWD=16.60/LWC=11.92 DATE: 08/25/98

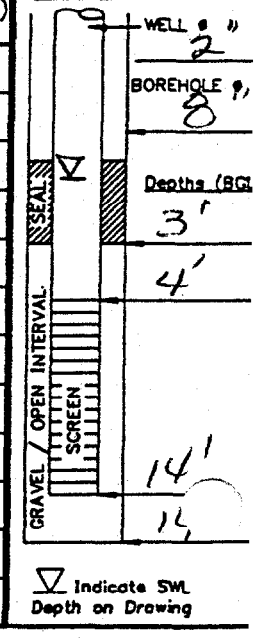
TEST TYPE (Rising/Falling/Constant Head): Rising (Slug out) CHECKED:

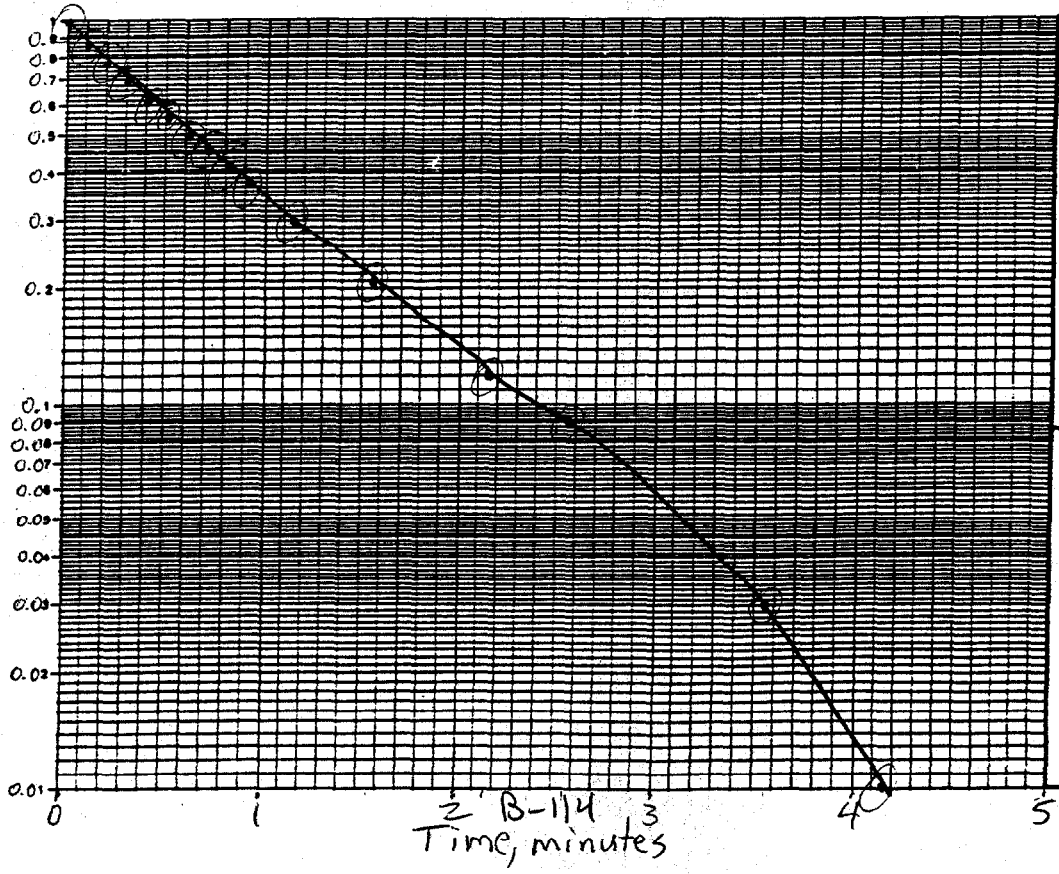
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 2 OF 2

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	2.104	1	2.14	0.260	0.124
0.1	1.831	0.87	2.54	0.184	0.087
0.2	1.634	0.78	3.54	0.070	0.033
0.31	1.456	0.69	4.54	0.000	0.00
0.41	1.303	0.62	4.14	0.025	0.012
0.51	1.176	0.56			
0.61	1.061	0.50			
0.71	0.972	0.46			
0.81	0.883	0.42			
0.91	0.801	0.38			
1.14	0.623	0.30			
1.54	0.438	0.21			

WELL SCHEMATIC





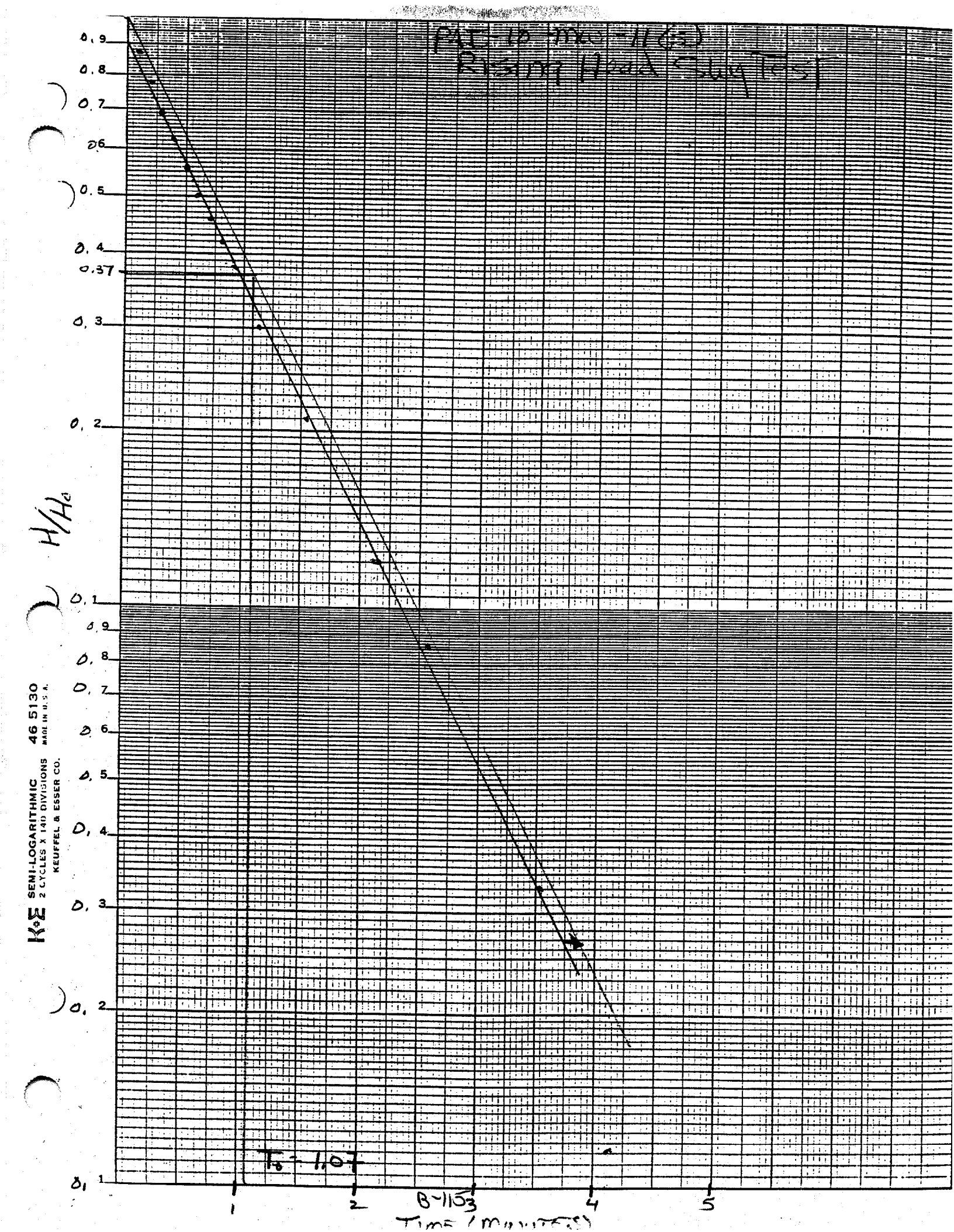
REMARKS:

KD = 11.9 ft

CALCS, SKETCH MAPS, ETC.:

B-114

4/142


PAT-10 mw-11(5)
Rising Head Slug Test
H/H1
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
1
2
4
5
T0 = 1.07
B-1153
TIME (MINUTES)
KE SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
MADE IN U.S.A.

~~PA10~~ ~~OW1~~ MW
TEST 2, STEP 1
SLUG OUT (RISE)

PAE-10-mw-11(s)
Rising Head Slug Test

SE1000C
Environmental Logger
08/25 16:18

Unit# 00145 Test 2

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00011
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 08/25 09:57:41

Elapsed Time	INPUT 1	
0.0000	2.650	
0.0033	2.180	
0.0066	0.807	
0.0100	0.559	
0.0133	2.218	
0.0166	3.216	
0.0200	2.256	
0.0233	1.824	
0.0266	2.447	
0.0300	2.328	
0.0333	2.091	
0.0366	2.206	
0.0400	2.212	
0.0433	2.104	
0.0466	2.142	
0.0500	2.161	
0.0533	2.104	
0.0566	2.098	
0.0600	2.104	T_0
0.0633	2.079	
0.0666	2.066	
0.0700	2.059	
0.0733	2.047	
0.0766	2.040	
0.0800	2.028	
0.0833	2.021	
0.0866	2.015	
0.0900	1.996	
0.0933	1.996	
0.0966	1.989	
0.1000	1.977	
0.1033	1.964	
0.1066	1.958	
0.1100	1.951	
0.1133	1.930	
0.1166	1.939	
0.1200	1.926	

0

TRI-10 - minutes)
Test 2, Step 1
Slug Out (Rise)

0.1233	1.926
0.1266	1.913
0.1300	1.900
0.1333	1.894
0.1366	1.888
0.1400	1.875
0.1433	1.875
0.1466	1.862
0.1500	1.850
0.1533	1.850
0.1566	1.837
0.1600	1.831
0.1633	1.824
0.1666	1.812
0.1700	1.805
0.1733	1.805
0.1766	1.799
0.1800	1.792
0.1833	1.780
0.1866	1.773
0.1900	1.767
0.1933	1.761
0.1966	1.754
0.2000	1.748
0.2033	1.742
0.2066	1.735
0.2100	1.729
0.2133	1.716
0.2166	1.716
0.2200	1.710
0.2233	1.703
0.2266	1.691
0.2300	1.691
0.2333	1.678
0.2366	1.678
0.2400	1.672
0.2433	1.659
0.2466	1.659
0.2500	1.653
0.2533	1.646
0.2566	1.640
0.2600	1.634
0.2633	1.627
0.2666	1.621
0.2700	1.614
0.2733	1.614
0.2766	1.602
0.2800	1.602
0.2833	1.595
0.2866	1.589
0.2900	1.576
0.2933	1.576
0.2966	1.570
0.3000	1.564
0.3033	1.564
0.3066	1.551
0.3100	1.545
0.3133	1.545
0.3166	1.538
0.3200	1.532

PW-10 - Trial #3
Test 2, Step 1
Slug Out (Rise)

Rising Head Slug Test

	0.3233	1.519
	0.3266	1.519
	0.3300	1.513
	0.3333	1.513
	0.3500	1.481
0.31 -	0.3666	1.456
	0.3833	1.430
	0.4000	1.405
	0.4166	1.379
	0.4333	1.360
	0.4500	1.328
0.41 -	0.4666	1.303
	0.4833	1.284
	0.5000	1.258
	0.5166	1.239
	0.5333	1.220
	0.5500	1.201
0.51 -	0.5666	1.176
	0.5833	1.157
	0.6000	1.138
	0.6166	1.119
	0.6333	1.100
	0.6500	1.087
0.61 -	0.6666	1.061
	0.6833	1.055
	0.7000	1.036
	0.7166	1.017
	0.7333	0.998
	0.7500	0.979
0.71 -	0.7666	0.972
	0.7833	0.953
	0.8000	0.934
	0.8166	0.922
	0.8333	0.902
	0.8500	0.890
0.81 -	0.8666	0.883
	0.8833	0.871
	0.9000	0.852
	0.9166	0.839
	0.9333	0.833
	0.9500	0.807
0.91 -	0.9666	0.801
	0.9833	0.788
	1.0000	0.782
1.14 -	1.2000	0.623
	1.4000	0.521
1.54 -	1.6000	0.438
	1.8000	0.368
	2.0000	0.311
2.14 -	2.2000	0.260
	2.4000	0.222
2.54 -	2.6000	0.184
	2.8000	0.152
	3.0000	0.127
	3.2000	0.108
	3.4000	0.089
3.54 -	3.6000	0.070
	3.8000	0.059
	4.0000	0.031
4.14 -	4.2000	0.025

PHL - 10 - MW11(S)
Test 2, Step 1
Slug Out (Rise)

Rising Head Slug Test

4.4000	0.012
4.54 - 4.6000	0.000
4.8000	-0.006
5.0000	-0.012
5.2000	-0.025
5.4000	-0.025
5.6000	-0.031
5.8000	-0.050
6.0000	-0.050
6.2000	-0.057
6.4000	-0.063
6.6000	-0.076
6.8000	-0.082
7.0000	-0.082
7.2000	-0.082
7.4000	-0.089
7.6000	-0.095
7.8000	-0.095
8.0000	-0.095
8.2000	-0.101
8.4000	-0.108
8.6000	-0.101
8.8000	-0.114
9.0000	-0.120
9.2000	-0.120
9.4000	-0.127
9.6000	-0.120
9.8000	-0.127
10.0000	-0.133

END

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE_____ OF_____

CLIENT		JOB NUMBER 7803	
SUBJECT PAI-10-MW-11(S) Falling HEAD Slug Test			
BASED ON HVORSLEV		DRAWING NUMBER	
BY GLG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well Screen
L = Length of well Screen (wetted)
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 = 1.54 min

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\,Ft)^2 \ln\left(\frac{10\,Ft}{0.083\,Ft}\right)}{2(10\,Ft)(1.54\,min)}$$

$$= 1.07 \times 10^{-3}\ Ft/min$$

1.07×10^{-3} Ft/min × 1440 min/day = 1.54 Ft/day

1.54 FT/day × $\frac{3.528 \times 10^{-4}\ Cm/sec}{Ft/day}$ = 5.43×10^{-4} Cm/Sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: MCRD Parris Is., SC-Jericho Is., (Sirk4) WELL/BORING NO.: PAI-10-MW1

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft. TEST NO.: 2,Step2

STATIC WATER LEVEL (Depth/Elevation): 4.68/TWD=16.60/Lwc=11.92 DATE: 8/25/98

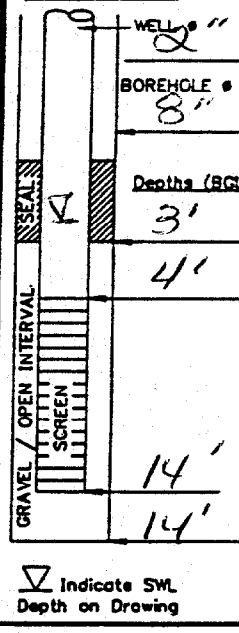
TEST TYPE (Rising/Falling/Constant Head): Falling(Slug in.) CHECKED:

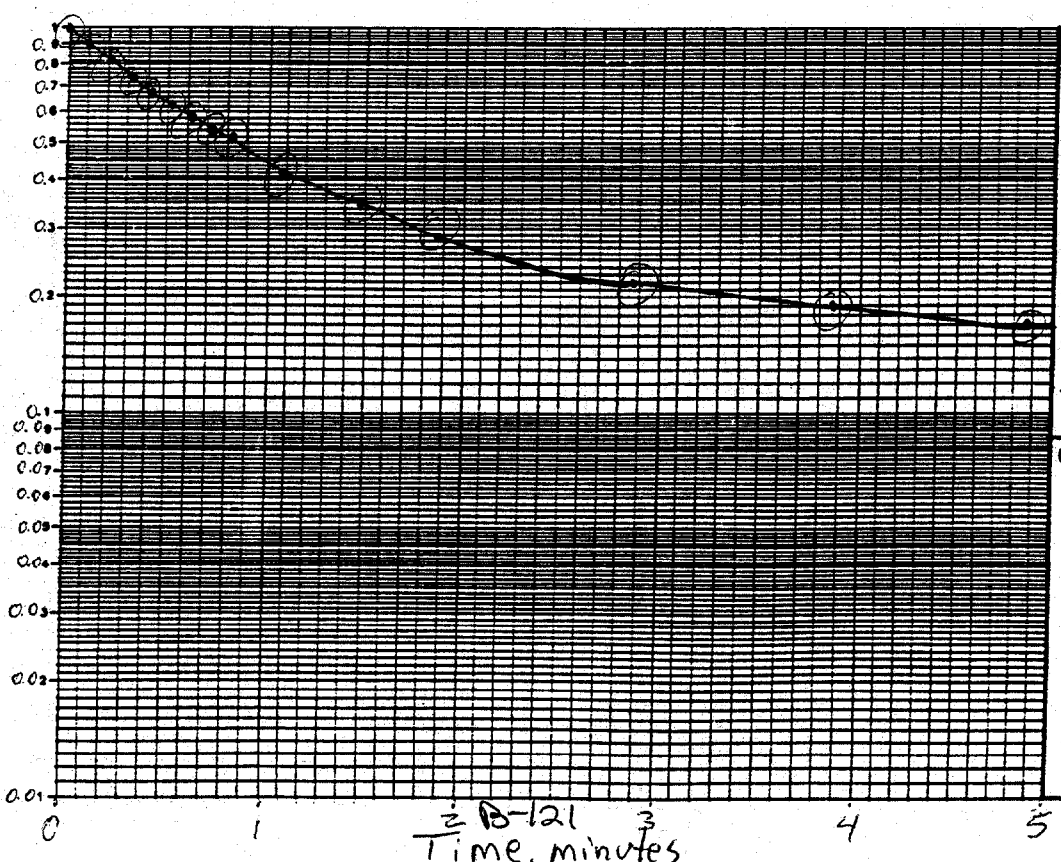
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 1 OF 2

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

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-2.035	1	2.88	-0.451	0.22
0.1	-1.825	0.90	3.88	-0.381	0.14
0.2	-1.666	0.82	4.88	-0.343	0.17
0.31	-1.501	0.74	5.08	-0.337	0.17
0.41	-1.380	0.68			
0.51	-1.278	0.63			
0.61	-1.189	0.58			
0.71	-1.106	0.54			
0.81	-1.036	0.51			
1.08	-0.858	0.42			
1.48	-0.706	0.35			
1.88	-0.597	0.29			

WELL SCHEMATIC



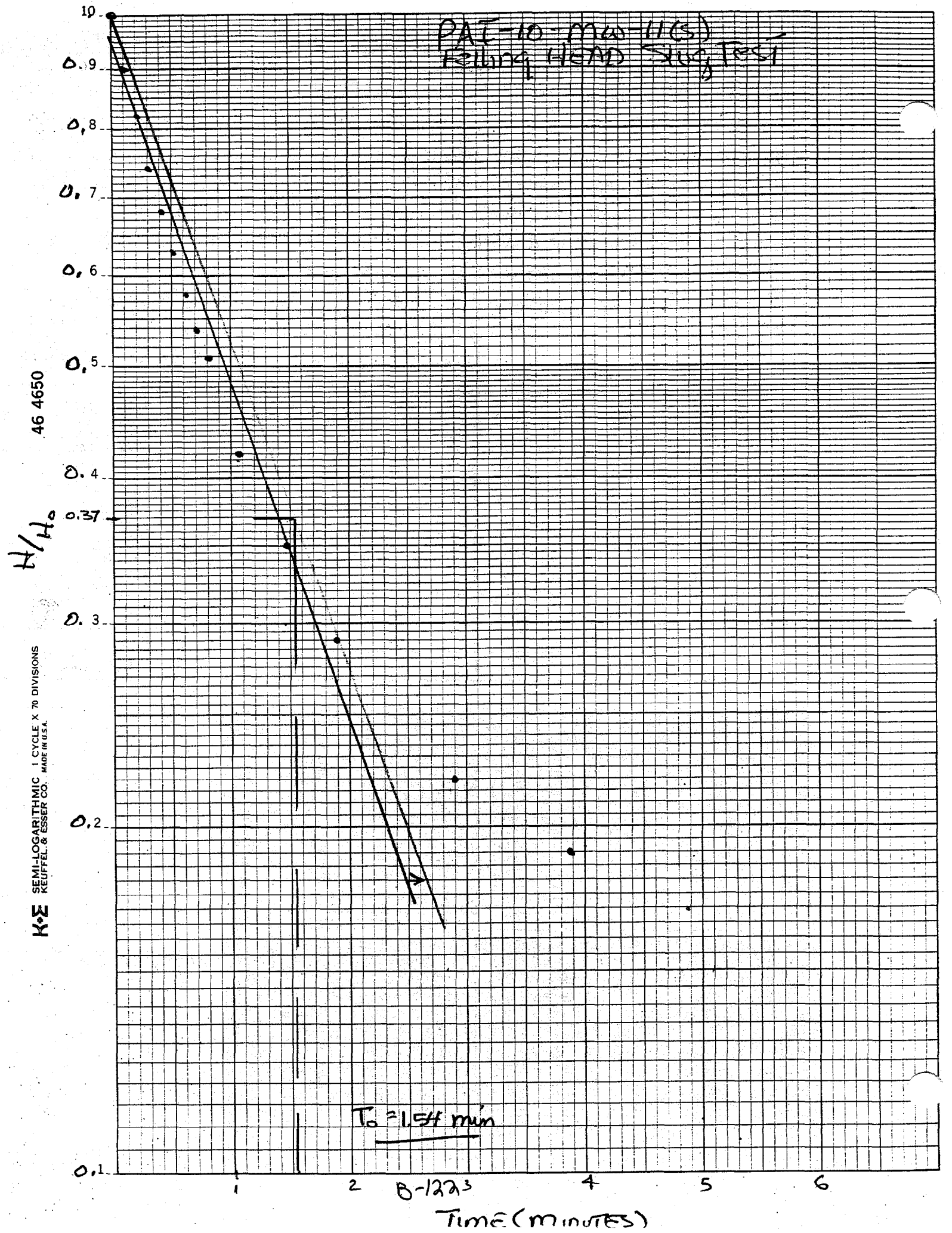


REMARKS:

XD: 11.99

CALCS, SKETCH MAPS, ETC.:

B-121


PAT-10-MW-11(S)
Falling Head Slug Test
H/Ho
10
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
1
2
3
4
5
6
B-1223
Time (minutes)
To = 1.54 min
46 4650
K+E SEMI-LOGARITHMIC 1 CYCLE X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

~~PAI10-DWH~~
TEST 2, STEP 2
SLUG IN (FALL)

PAI-10-MW-11 (S)
Falling Head Slug Test

SE1000C
Environmental Logger
08/25 16:21

Unit# 00145 Test 2

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00011
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 2 08/25 10:08:57

Elapsed Time	INPUT 1
0.0000	-1.227
0.0033	-1.520
0.0066	-2.232
0.0100	-3.085
0.0133	-3.740
0.0166	-3.683
0.0200	-3.085
0.0233	-2.506
0.0266	-2.010
0.0300	-1.679
0.0333	-1.481
0.0366	-1.564
0.0400	-1.933
0.0433	-2.366
0.0466	-2.684
0.0500	-2.646
0.0533	-2.417
0.0566	-2.130
0.0600	-1.952
0.0633	-1.965
0.0666	-2.099
0.0700	-2.245
0.0733	-2.296
0.0766	-2.258
0.0800	-2.156
0.0833	-2.073
0.0866	-2.035
0.0900	-2.054
0.0933	-2.098
0.0966	-2.124
0.1000	-2.118
0.1033	-2.086
0.1066	-2.054
0.1100	-2.029
0.1133	-2.022
0.1166	-2.029
0.1200	-2.035

TO

~~PAI-10-MW-11(S)~~
Test 2, Step 2
Slug In (Fall)

PAI-10-MW-11(S)
Falling Head Slug Test

	0.1233	-2.029
	0.1266	-2.022
	0.1300	-2.010
	0.1333	-1.990
	0.1366	-1.984
	0.1400	-1.984
	0.1433	-1.971
	0.1466	-1.965
	0.1500	-1.959
	0.1533	-1.952
	0.1566	-1.940
	0.1600	-1.933
	0.1633	-1.927
	0.1666	-1.920
	0.1700	-1.914
	0.1733	-1.914
	0.1766	-1.901
	0.1800	-1.895
	0.1833	-1.889
	0.1866	-1.882
	0.1900	-1.882
	0.1933	-1.870
	0.1966	-1.857
	0.2000	-1.857
	0.2033	-1.850
	0.2066	-1.844
	0.2100	-1.838
	0.2133	-1.831
	0.2166	-1.825
0.1	-0.2200	-1.825
	0.2233	-1.819
	0.2266	-1.812
	0.2300	-1.806
	0.2333	-1.800
	0.2366	-1.793
	0.2400	-1.787
	0.2433	-1.780
	0.2466	-1.780
	0.2500	-1.774
	0.2533	-1.768
	0.2566	-1.761
	0.2600	-1.761
	0.2633	-1.749
	0.2666	-1.749
	0.2700	-1.736
	0.2733	-1.730
	0.2766	-1.723
	0.2800	-1.723
	0.2833	-1.717
	0.2866	-1.711
	0.2900	-1.704
	0.2933	-1.704
	0.2966	-1.691
	0.3000	-1.691
	0.3033	-1.685
	0.3066	-1.679
	0.3100	-1.679
	0.3133	-1.666
	0.3166	-1.666
0.2	-0.3200	-1.666

PAL-10-MW-11 (S)
Test 2, Step 2
Slug In (Fall)

PAL-10-MW-11 (S)
Falling Head Slug Test

	0.3233	-1.660
	0.3266	-1.647
	0.3300	-1.647
	0.3333	-1.647
	0.3500	-1.615
	0.3666	-1.590
	0.3833	-1.564
	0.4000	-1.545
	0.4166	-1.520
0.31 –	0.4333	-1.501
	0.4500	-1.481
	0.4666	-1.456
	0.4833	-1.437
	0.5000	-1.418
	0.5166	-1.399
0.41 –	0.5333	-1.380
	0.5500	-1.361
	0.5666	-1.342
	0.5833	-1.322
	0.6000	-1.310
	0.6166	-1.297
0.51 –	0.6333	-1.278
	0.6500	-1.265
	0.6666	-1.246
	0.6833	-1.227
	0.7000	-1.214
	0.7166	-1.202
.61 –	0.7333	-1.189
	0.7500	-1.170
	0.7666	-1.157
	0.7833	-1.144
	0.8000	-1.132
	0.8166	-1.119
0.71 –	0.8333	-1.106
	0.8500	-1.093
	0.8666	-1.081
	0.8833	-1.068
	0.9000	-1.062
	0.9166	-1.049
0.81 –	0.9333	-1.036
	0.9500	-1.024
	0.9666	-1.017
	0.9833	-1.004
	1.0000	-0.998
1.08 –	1.2000	-0.858
	1.4000	-0.769
1.48 –	1.6000	-0.706
	1.8000	-0.648
1.88 –	2.0000	-0.597
	2.2000	-0.553
	2.4000	-0.521
	2.6000	-0.489
	2.8000	-0.470
.88 –	3.0000	-0.451
	3.2000	-0.426
	3.4000	-0.413
	3.6000	-0.394
	3.8000	-0.394
3.88 –	4.0000	-0.381
	4.2000	-0.368

Test 2, step 2
Slug In (Fall)

PAE-10-mw-11 (S)
Falling Head Slug Test

	4.4000	-0.362
	4.6000	-0.356
	4.8000	-0.349
4.88	-5.0000	-0.343
5.08	-5.2000	-0.337
	5.4000	-0.337
	5.6000	-0.337
	5.8000	-0.330
	6.0000	-0.330
	6.2000	-0.324
	6.4000	-0.324
	6.6000	-0.324
	6.8000	-0.318
	7.0000	-0.311
	7.2000	-0.318
	7.4000	-0.318
	7.6000	-0.318
	7.8000	-0.311
	8.0000	-0.311
	8.2000	-0.311
	8.4000	-0.311
	8.6000	-0.305
	8.8000	-0.311
	9.0000	-0.311
	9.2000	-0.311
	9.4000	-0.318
	9.6000	-0.311
	9.8000	-0.311
	10.0000	-0.311
	12.0000	-0.311
	14.0000	-0.305
	16.0000	-0.324
	18.0000	-0.324
	20.0000	-0.330
	22.0000	-0.337

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAE-10-MW-12 (D) RISING HEAD SLUG TEST			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

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_o = Time for water level to rise or fall to 37% of initial level — T_o = 1.4 min

$$K = \frac{r^2 \ln L/R}{2LT_o} = \frac{(0.083\text{Ft})^2 \ln(5\text{FT}/0.083\text{FT})}{2(5\text{FT})(1.4\text{ min})}$$

$$= 2.02 \times 10^{-3}\ \text{FT/min}$$

2.02×10^{-3} Ft/min $\times$ 1440 min/day = 2.91 Ft/day

2.91 Ft/day $\times \frac{3.528 \times 10^{-4}\ \text{cm/sec}}{\text{Ft/day}} = 1.03 \times 10^{-3}$ cm/sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEE

PROJECT NAME: Jericho Island WELL/BORING NO.: PAT-10-MW-12

PROJECT NO.: 7803 GEOLOGIST: M. Darrington

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 5FT/29FT TEST NO.: 3

STATIC WATER LEVEL (Depth/Elevation): 4.87/TD=32.38/TOC=27.55 DATE: 8/25/98

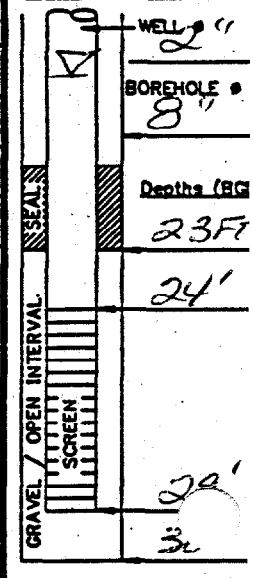
TEST TYPE (Rising/Falling/Constant Head): Rising Head CHECKED:

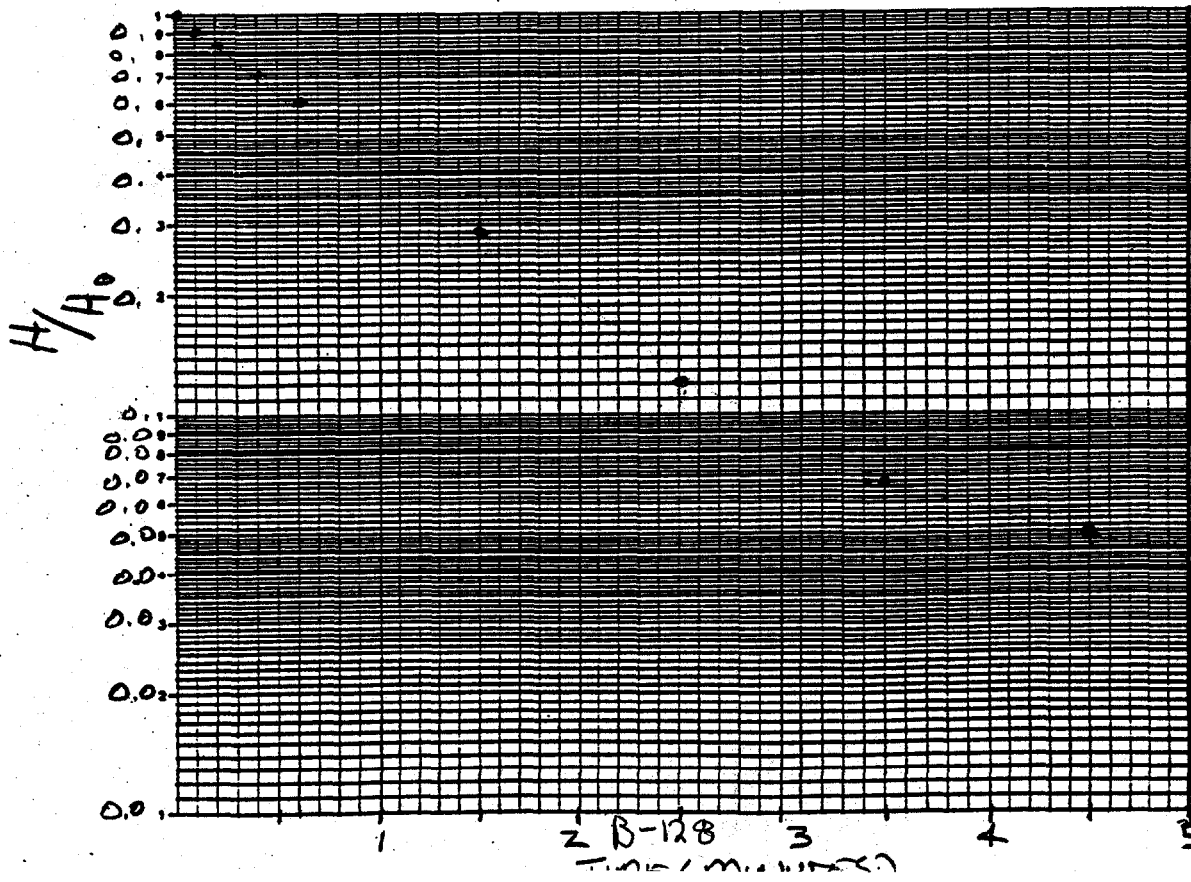
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5Ft) PAGE .... OF .....

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

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	1.825	1	8.51	0.044	0.024
.11	1.646	0.90			
.21	1.506	0.83			
.41	1.289	0.71			
.61	1.116	0.61			
1.51	0.529	0.29			
2.51	0.217	0.12			
3.51	0.127	0.069			
4.51	0.089	0.049			
5.51	0.070	0.058			
6.51	0.063	0.035			
7.51	0.057	0.031			

WELL SCHEMATIC



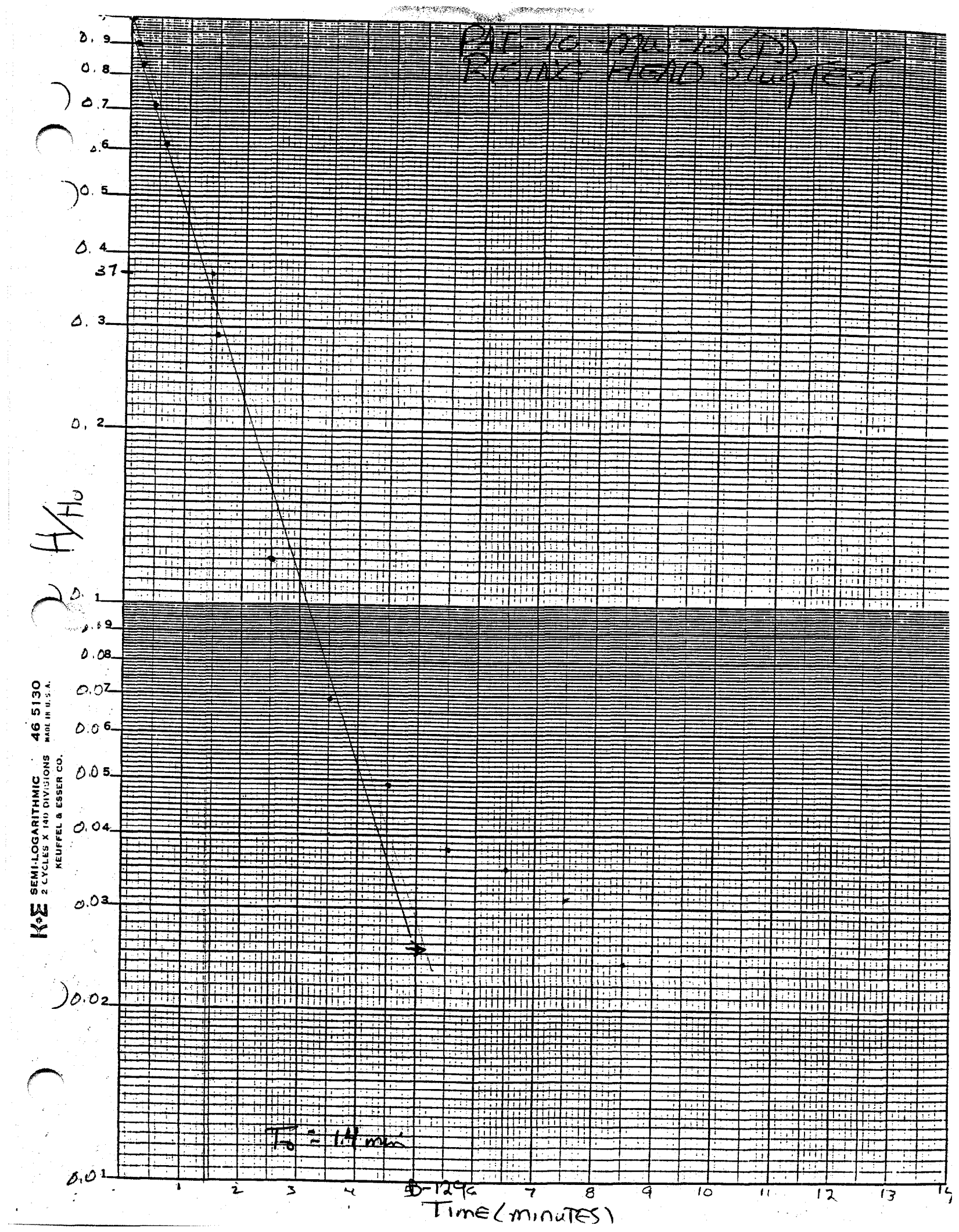


REMARKS:

XD - 27.62

ID 000 12

CALCS, SKETCH MAPS, ETC.:


0.9
0.8
0.7
0.6
0.5
0.4
37
0.3
0.2
H/H0
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
11
12
13
14
Time (minutes)
T0 = 1.4 min
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

~~PAI10-GW12~~

TEST 3, STEP 1

SLUG OUT (RISE)

PAE-10-MW-12(D)

Rising Head Slug Te

SE1000C
Environmental Logger
08/25 16:34

Unit# 00145 Test 3

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00012
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 08/25 11:05:32

Elapsed Time	INPUT 1
0.0000	2.405
0.0033	2.603
0.0066	2.029
0.0100	1.582
0.0133	2.029
0.0166	2.348
0.0200	2.743
0.0233	2.903
0.0266	2.852
0.0300	2.641
0.0333	2.507
0.0366	2.386
0.0400	2.373
0.0433	2.399
0.0466	2.392
0.0500	2.373
0.0533	2.348
0.0566	2.341
0.0600	2.329
0.0633	2.316
0.0666	2.310
0.0700	2.297
0.0733	2.291
0.0766	2.278
0.0800	2.259
0.0833	2.259
0.0866	2.252
0.0900	2.239
0.0933	2.233
0.0966	2.214
0.1000	2.207
0.1033	2.207
0.1066	2.201
0.1100	2.188
0.1133	2.176
0.1166	2.176
0.1200	2.163

PAI-10-MW-12(D)
Rising Head Slug Test

0.1233	2.150
0.1266	2.137
0.1300	2.144
0.1333	2.137
0.1366	2.124
0.1400	2.124
0.1433	2.112
0.1466	2.099
0.1500	2.093
0.1533	2.086
0.1566	2.080
0.1600	2.080
0.1633	2.067
0.1666	2.061
0.1700	2.054
0.1733	2.042
0.1766	2.042
0.1800	2.035
0.1833	2.022
0.1866	2.022
0.1900	2.010
0.1933	2.003
0.1966	2.003
0.2000	1.997
0.2033	1.978
0.2066	1.971
0.2100	1.965
0.2133	1.965
0.2166	1.959
0.2200	1.952
0.2233	1.952
0.2266	1.939
0.2300	1.933
0.2333	1.927
0.2366	1.914
0.2400	1.914
0.2433	1.908
0.2466	1.901
0.2500	1.888
0.2533	1.882
0.2566	1.863
0.2600	1.888
0.2633	1.882
0.2666	1.863
0.2700	1.850
0.2733	1.850
0.2766	1.844
0.2800	1.837
0.2833	1.831
0.2866	1.818
0.2900	1.825
0.2933	1.818
0.2966	1.805
0.3000	1.799
0.3033	1.793
0.3066	1.793
0.3100	1.786
0.3133	1.780
0.3166	1.780
0.3200	1.774

0 To

PAI-10-MW-12(D)
Rising Head Slug Test

	0.3233	1.767
	0.3266	1.754
	0.3300	1.754
	0.3333	1.748
	0.3500	1.723
	0.3666	1.691
	0.3833	1.671
.11 -	0.4000	1.646
	0.4166	1.620
	0.4333	1.595
	0.4500	1.582
	0.4666	1.550
	0.4833	1.531
.21 -	0.5000	1.506
	0.5166	1.487
	0.5333	1.467
	0.5500	1.448
	0.5666	1.429
	0.5833	1.410
	0.6000	1.391
	0.6166	1.372
	0.6333	1.352
	0.6500	1.340
	0.6666	1.321
	0.6833	1.301
.41 -	0.7000	1.280
	0.7166	1.270
	0.7333	1.256
	0.7500	1.238
	0.7666	1.225
	0.7833	1.206
	0.8000	1.190
	0.8166	1.180
	0.8333	1.167
	0.8500	1.155
	0.8666	1.142
	0.8833	1.129
.61 -	0.9000	1.116
	0.9166	1.104
	0.9333	1.091
	0.9500	1.085
	0.9666	1.065
	0.9833	1.053
	1.0000	1.040
	1.2000	0.868
	1.4000	0.753
	1.6000	0.644
1.51 -	1.8000	0.529
	2.0000	0.421
	2.2000	0.344
	2.4000	0.287
	2.6000	0.248
2.51 -	2.8000	0.217
	3.0000	0.191
	3.2000	0.172
	3.4000	0.153
	3.6000	0.140
3.51 -	3.8000	0.127
	4.0000	0.121
	4.2000	0.108

PAF-10-MW-12(D)
Rising Head Slug Test

4.4000	0.102
4.6000	0.095
4.8000	0.089
5.0000	0.089
5.2000	0.082
5.4000	0.082
5.6000	0.076
5.8000	0.070
6.0000	0.070
6.2000	0.063
6.4000	0.063
6.6000	0.063
6.8000	0.063
7.0000	0.063
7.2000	0.057
7.4000	0.057
7.6000	0.051
7.8000	0.057
8.0000	0.051
8.2000	0.051
8.4000	0.051
8.6000	0.051
8.8000	0.044
9.0000	0.044
9.2000	0.044
9.4000	0.044
9.6000	0.044
9.8000	0.044
10.0000	0.044
12.0000	0.031
14.0000	0.031
16.0000	0.031
18.0000	0.031

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-12(D) Falling Head Slug Test			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time for water level to Rise or Fall to 37% of initial Change

r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_0 = 1.15 min

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\,FT)^2 \ln(5\,FT / 0.083\,FT)}{2(5\,FT)(1.15\,min)}$$

$$= 2.46 \times 10^{-3}\ Ft/min$$

$2.46 \times 10^{-3}\ Ft/min \times 1440\ min/day = \underline{3.54\ Ft/day}$

$3.54\ Ft/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{Ft/day} = \underline{1.25 \times 10^{-3}\ cm/sec}$

HYDRAULIC CONDUCTIVITY TESTING DATA SHE

PROJECT NAME: Jericho Field WELL/BORING NO.: PAE-10 mw-4

PROJECT NO.: T903 GEOLOGIST: M. Derrington

WELL DIAMETER: 2" SCREEN LENGTH/DEPTH: 5Ft/29 FT TEST NO.:

STATIC WATER LEVEL (Depth/Elevation): 4.87 TD: 32.38(ta) TOC 27.5 DATE: 8/25/98

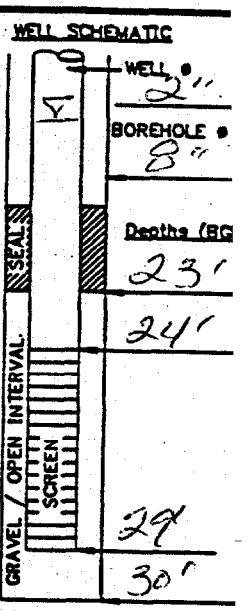
TEST TYPE (Rising/Falling/Constant Head): Falling Head CHECKED:

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

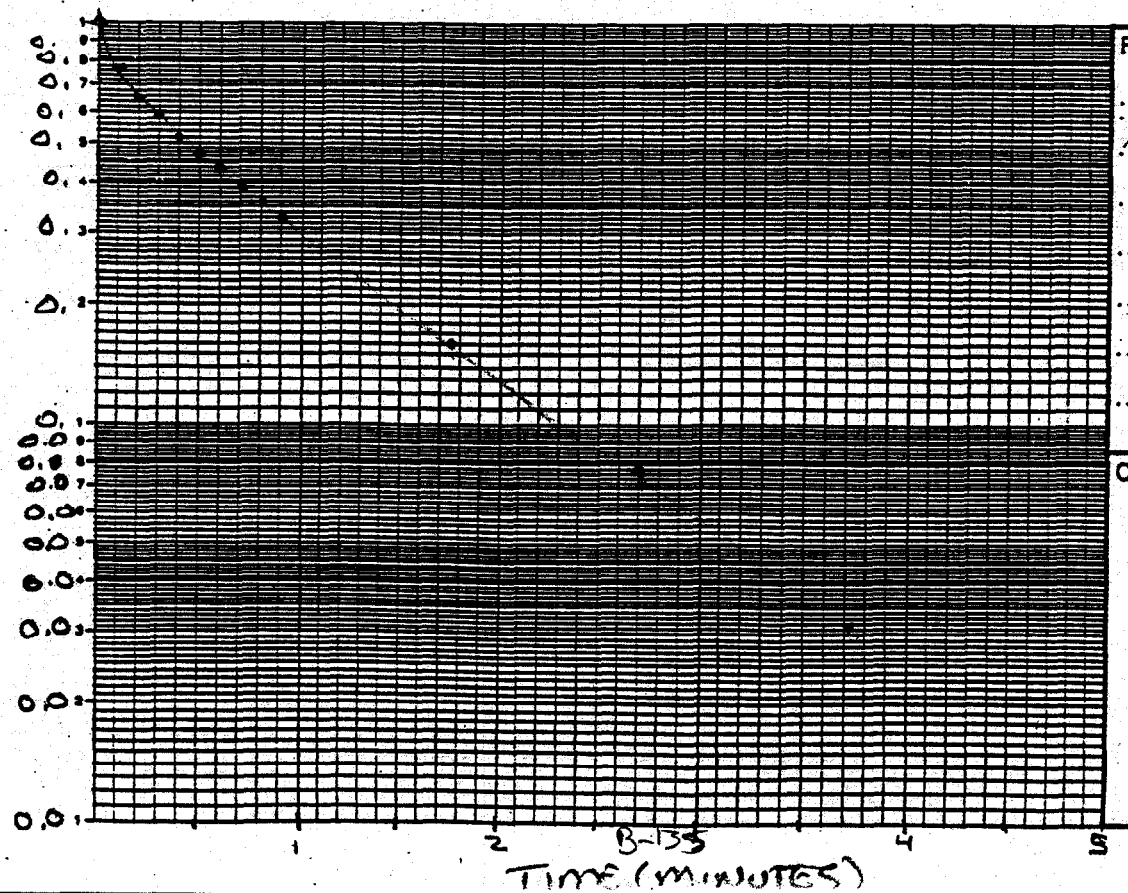
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): Toc, Transducer

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-2.222	1	3.74	-0.070	.032
.1	-1.685	0.76	4.74	-.012	.005
.2	-1.474	0.66			
.31	-1.302	0.59			
.41	-1.161	0.52			
.51	-1.053	0.47			
.61	-0.957	0.43			
.71	-0.868	0.39			
.81	-0.798	0.36			
.91	-0.734	0.33			
1.74	-0.363	0.16			
2.74	-0.172	0.077			

WELL SCHEMATIC



▽ Indicate SWL Depth on Drawing

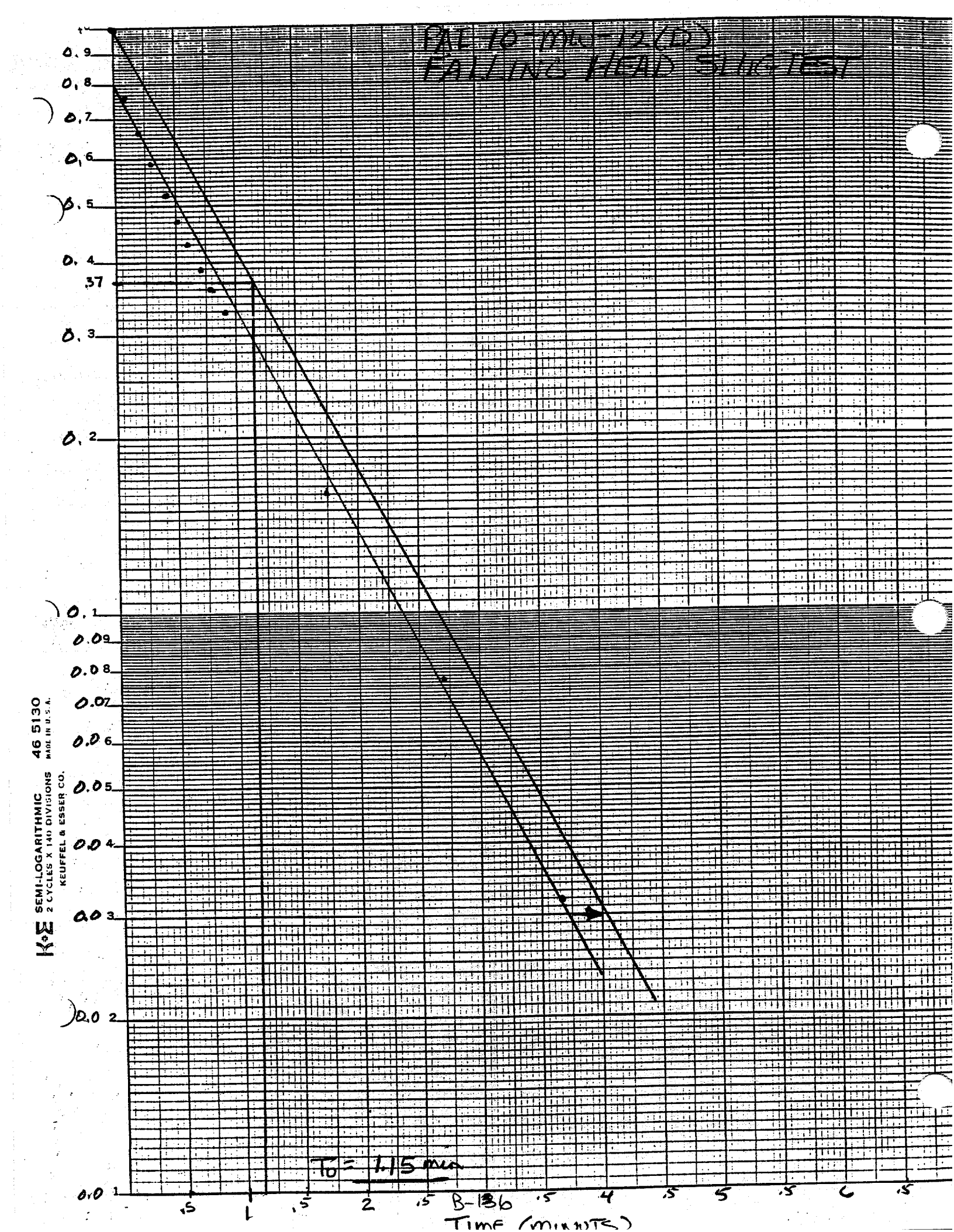


REMARKS:

MEASUREMENTS (TOC)

XD - 27.62

CALCS, SKETCH MAPS, ETC.:


PAL-10-MW-12(D)
FALLING HEAD SLUG TEST
0.9
0.8
0.7
0.6
0.5
0.4
37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T0 = 1.15 min
B-136
.5
1
2
4
5
6
TIME (MINUTES)
K+E SEMI-LOGARITHMIC
2 CYCLES X 140 DIVISIONS
KEUFFEL & ESSER CO.
MADE IN U.S.A.
46 5130

~~PAI-10-GW12~~
TEST 3, STEP 0
SLUG IN (FALL) ✓

SE1000C
Environmental Logger
08/25 16:27

Unit# 00145 Test 3

PAI-10-MW-12 (D)
Falling Head Slug Test

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00012
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/25 10:40:42

Elapsed Time	INPUT 1
0.0000	-0.408
0.0033	-0.900
0.0066	-1.740
0.0100	-2.809
0.0133	-3.480
0.0166	-3.774
0.0200	-3.630
0.0233	-3.205
0.0266	-2.535
0.0300	-2.119
0.0333	-2.087
0.0366	-1.864
0.0400	-1.417
0.0433	-1.519
0.0466	-1.762
0.0500	-1.998
0.0533	-2.158
0.0566	-2.222 <To
0.0600	-2.202
0.0633	-2.132
0.0666	-2.049
0.0700	-1.979
0.0733	-1.934
0.0766	-1.909
0.0800	-1.900
0.0833	-1.909
0.0866	-1.902
0.0900	-1.896
0.0933	-1.883
0.0966	-1.870
0.1000	-1.858
0.1033	-1.845
0.1066	-1.832
0.1100	-1.819
0.1133	-1.806
0.1166	-1.794
0.1200	-1.787

PAE-10-MW-12(D)
Falling Head Slug Test

0.1233	-1.775
0.1266	-1.775
0.1300	-1.762
0.1333	-1.749
0.1366	-1.736
0.1400	-1.730
0.1433	-1.724
0.1466	-1.710
0.1500	-1.704
0.1533	-1.692
0.1566	-1.685
0.1600	-1.679
0.1633	-1.672
0.1666	-1.660
0.1700	-1.653
0.1733	-1.647
0.1766	-1.634
0.1800	-1.628
0.1833	-1.621
0.1866	-1.615
0.1900	-1.602
0.1933	-1.596
0.1966	-1.589
0.2000	-1.583
0.2033	-1.576
0.2066	-1.570
0.2100	-1.564
0.2133	-1.557
0.2166	-1.551
0.2200	-1.538
0.2233	-1.538
0.2266	-1.532
0.2300	-1.525
0.2333	-1.513
0.2366	-1.506
0.2400	-1.500
0.2433	-1.494
0.2466	-1.494
0.2500	-1.487
0.2533	-1.481
0.2566	-1.474
0.2600	-1.468
0.2633	-1.462
0.2666	-1.455
0.2700	-1.449
0.2733	-1.442
0.2766	-1.442
0.2800	-1.436
0.2833	-1.430
0.2866	-1.423
0.2900	-1.417
0.2933	-1.411
0.2966	-1.404
0.3000	-1.398
0.3033	-1.391
0.3066	-1.391
0.3100	-1.385
0.3133	-1.378
0.3166	-1.378
0.3200	-1.372

	0.3233	-1.366
	0.3266	-1.360
	0.3300	-1.353
	0.3333	-1.347
	0.3500	-1.321
.31 -	0.3666	-1.302
	0.3833	-1.277
	0.4000	-1.251
	0.4166	-1.232
	0.4333	-1.206
	0.4500	-1.187
.41 -	0.4666	-1.161
	0.4833	-1.143
	0.5000	-1.130
	0.5166	-1.104
	0.5333	-1.085
	0.5500	-1.066
.51 -	0.5666	-1.053
	0.5833	-1.040
	0.6000	-1.021
	0.6166	-1.002
	0.6333	-0.989
	0.6500	-0.970
.61 -	0.6666	-0.957
	0.6833	-0.938
	0.7000	-0.931
	0.7166	-0.912
	0.7333	-0.900
	0.7500	-0.887
.71 -	0.7666	-0.868
	0.7833	-0.862
	0.8000	-0.849
	0.8166	-0.829
	0.8333	-0.823
	0.8500	-0.811
.81 -	0.8666	-0.798
	0.8833	-0.785
	0.9000	-0.778
	0.9166	-0.766
	0.9333	-0.753
	0.9500	-0.746
.91 -	0.9666	-0.734
	0.9833	-0.721
	1.0000	-0.708
	1.2000	-0.580
	1.4000	-0.498
	1.6000	-0.427
1.74 -	1.8000	-0.363
	2.0000	-0.312
	2.2000	-0.268
	2.4000	-0.229
	2.6000	-0.197
2.74 -	2.8000	-0.172
	3.0000	-0.147
	3.2000	-0.121
	3.4000	-0.102
	3.6000	-0.083
3.74 -	3.8000	-0.070
	4.0000	-0.057
	4.2000	-0.044

PAE-10-mw-12(D)
Falling Head Slug Test

4.4000	-0.032
4.6000	-0.025
4.8000	-0.012
5.0000	-0.006
5.2000	-0.006
5.4000	0.006
5.6000	0.006
5.8000	0.012
6.0000	0.012
6.2000	0.019
6.4000	0.019
6.6000	0.025
6.8000	0.025
7.0000	0.025
7.2000	0.025
7.4000	0.031
7.6000	0.031
7.8000	0.031
8.0000	0.031
8.2000	0.038
8.4000	0.038
8.6000	0.038
8.8000	0.038
9.0000	0.038
9.2000	0.038
9.4000	0.038
9.6000	0.031
9.8000	0.038
10.0000	0.038
12.0000	0.038
14.0000	0.019

END

4.74-

PAL-10-MW-12(D)
Falling Head Slug Test

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-13(S) Rising Head Slug Test			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

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

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_0 = Time For water level to rise or fall To 37% of initial Change.

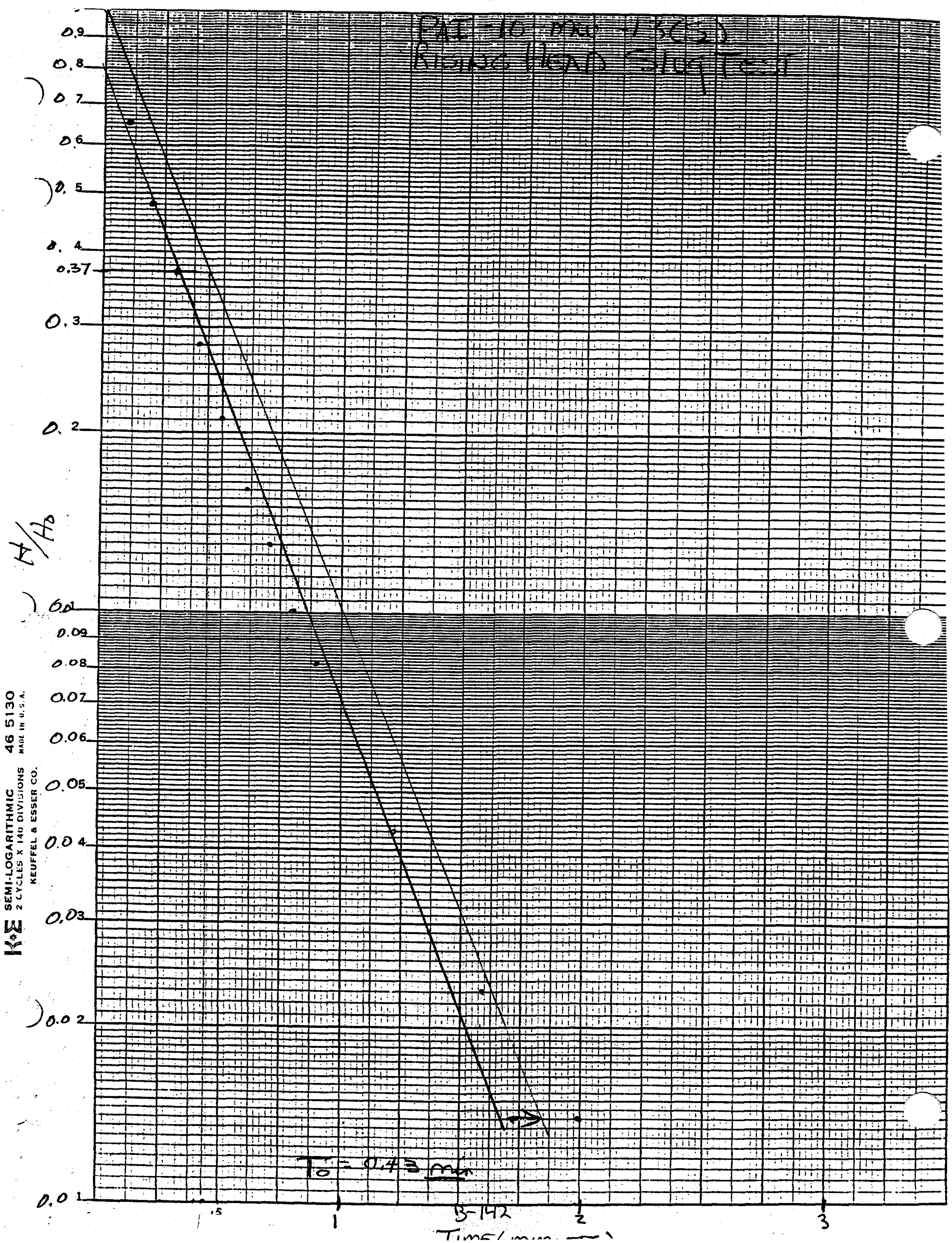
r = 0.083 Ft
R = 0.083 Ft
L = 10 Ft
T_0 = 0.43 Min.

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\text{FT})^2 \ln\left(\frac{10\text{FT}}{0.083\text{FT}}\right)}{2(10\text{FT})(0.43\text{ min})}$$

$$= 3.84 \times 10^{-3} \text{ Ft/min}$$

3.84×10^{-3} Ft/min × 1440 min/day = 5.53 Ft/day

5.53 Ft/day × 3.528×10^{-4} cm/sec / Ft/day = 1.95×10^{-3} cm/sec


PAI-10-MW-13(S2)
Rising Head Slug Test
H/Ho
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
.5
1
2
3
To = 0.43 min
B-142
K&E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Is., SC – Jericho Is. (Site 4) WELL/BORING NO.: PAI-10 MW-13C

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington

WELL DIAMETER: 2 inch SCREEN LENGTH/DEPTH: 10 ft. TEST NO.: 0/Step 3

STATIC WATER LEVEL (Depth/Elevation): 5.21/TWD=17.68/LWC=12.47 DATE: 8/25/98

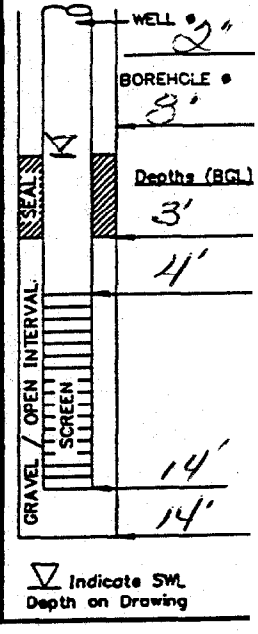
TEST TYPE (Rising/Falling/Constant Head): Rising (slug out) CHECKED:

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

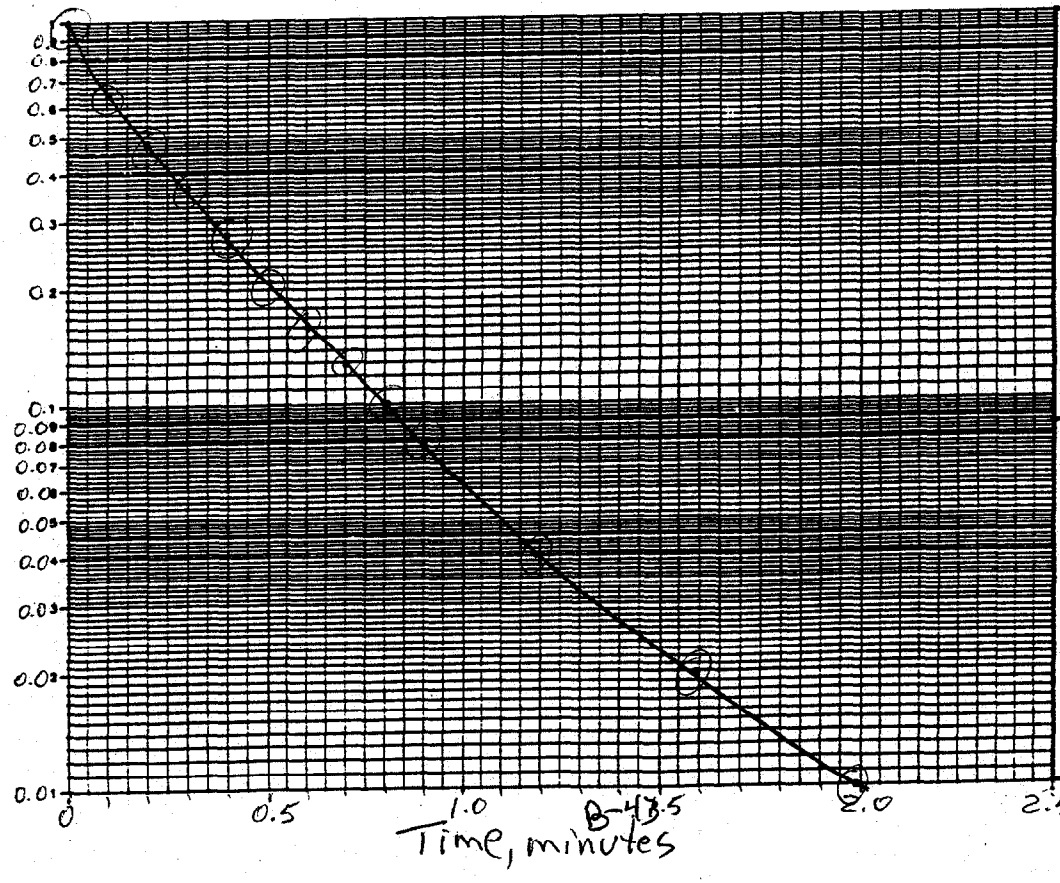
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

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	2.771	1	1.99	0.038	0.014
0.1	1.805	0.65	2.99	0.025	0.001
0.2	1.341	0.48	3.99	0.019	0.007
0.3	1.023	0.37			
0.4	0.769	0.28			
0.5	0.591	0.21			
0.6	0.457	0.16			
0.7	0.356	0.13			
0.8	0.286	0.10			
0.9	0.228	0.082			
1.19	0.120	0.043			
1.59	0.063	0.023			

WELL SCHEMATIC



Indicate SWL Depth on Drawing



REMARKS:

xD = 11.93

CALCS, SKETCH MAPS, ETC.:

~~PA10 ENG~~
TEST 0, STEP 3
SLUG OUT (RISE)

PAF-10-MW-13(NS)
Rising Head Slug Test

SE1000C
Environmental Logger
08/25 16:03

Unit# 00145 Test 0

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00013
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 3 08/25 08:06:36

Elapsed Time	INPUT 1
0.0000	3.064
0.0033	2.307
0.0066	0.635
0.0100	1.557
0.0133	2.771 — T0
0.0166	2.613
0.0200	2.517
0.0233	2.447
0.0266	2.403
0.0300	2.371
0.0333	2.333
0.0366	2.314
0.0400	2.282
0.0433	2.257
0.0466	2.231
0.0500	2.199
0.0533	2.174
0.0566	2.149
0.0600	2.123
0.0633	2.104
0.0666	2.085
0.0700	2.060
0.0733	2.034
0.0766	2.015
0.0800	1.996
0.0833	1.971
0.0866	1.945
0.0900	1.926
0.0933	1.907
0.0966	1.894
0.1000	1.869
0.1033	1.850
0.1066	1.831
0.1100	1.818
0.1133	1.805
0.1166	1.780
0.1200	1.761

0 — 0.1

Test 0/Step 3
Slug out (Rise)

Rising Head Slug Test

0.1233	1.742
0.1266	1.729
0.1300	1.719
0.1333	1.691
0.1366	1.678
0.1400	1.653
0.1433	1.640
0.1466	1.627
0.1500	1.608
0.1533	1.595
0.1566	1.583
0.1600	1.564
0.1633	1.545
0.1666	1.538
0.1700	1.513
0.1733	1.507
0.1766	1.487
0.1800	1.475
0.1833	1.468
0.1866	1.449
0.1900	1.437
0.1933	1.424
0.1966	1.405
0.2000	1.392
0.2033	1.379
0.2066	1.373
0.2100	1.354
0.2133	1.341
0.2166	1.328
0.2200	1.316
0.2233	1.303
0.2266	1.297
0.2300	1.278
0.2333	1.271
0.2366	1.259
0.2400	1.246
0.2433	1.233
0.2466	1.220
0.2500	1.214
0.2533	1.201
0.2566	1.195
0.2600	1.176
0.2633	1.163
0.2666	1.157
0.2700	1.150
0.2733	1.138
0.2766	1.125
0.2800	1.119
0.2833	1.106
0.2866	1.100
0.2900	1.087
0.2933	1.081
0.2966	1.074
0.3000	1.061
0.3033	1.049
0.3066	1.042
0.3100	1.036
0.3133	1.023
0.3166	1.011
0.3200	1.004

Test 0, Step 3
Slug out (Rise)

Rising Head Slug Test

	0.3233	0.991
	0.3266	0.991
	0.3300	0.985
	0.3333	0.966
	0.3500	0.934
	0.3666	0.883
	0.3833	0.845
	0.4000	0.807
0.4	-0.4166	0.760
	0.4333	0.731
	0.4500	0.699
	0.4666	0.674
	0.4833	0.648
	0.5000	0.616
0.5	-0.5166	0.591
	0.5333	0.565
	0.5500	0.540
	0.5666	0.521
	0.5833	0.502
	0.6000	0.483
0.6	-0.6166	0.457
	0.6333	0.438
	0.6500	0.426
	0.6666	0.407
	0.6833	0.394
	0.7000	0.375
0.7	-0.7166	0.356
	0.7333	0.356
	0.7500	0.330
	0.7666	0.318
	0.7833	0.311
	0.8000	0.292
0.8	-0.8166	0.286
	0.8333	0.279
	0.8500	0.273
	0.8666	0.260
	0.8833	0.248
	0.9000	0.241
0.9	-0.9166	0.228
	0.9333	0.222
	0.9500	0.216
	0.9666	0.203
	0.9833	0.197
	1.0000	0.190
1.19	-1.2000	0.120
	1.4000	0.082
1.59	-1.6000	0.063
	1.8000	0.050
1.99	-2.0000	0.038
	2.2000	0.031
	2.4000	0.031
	-2.6000	0.025
	2.8000	0.019
2.99	-3.0000	0.025
	3.2000	0.019
	3.4000	0.019
	3.6000	0.019
	3.8000	0.019
3.99	-4.0000	0.019
	4.2000	0.012

FRL-10-MW-13(S)
Test 0, step 3
Slug out (Rise)

Rising Head Slug Test

4.4000	0.019
4.6000	0.019
4.8000	0.019
5.0000	0.019
5.2000	0.019
5.4000	0.019
5.6000	0.012
5.8000	0.012
6.0000	0.006
6.2000	0.019
6.4000	0.012
6.6000	0.006
6.8000	0.012
7.0000	0.012
7.2000	0.012
7.4000	0.012
7.6000	0.012
7.8000	0.012
8.0000	0.012
8.2000	0.012
8.4000	0.006
8.6000	0.012
8.8000	0.019
9.0000	0.012
9.2000	0.006
9.4000	0.006
9.6000	0.006
9.8000	0.019
10.0000	0.012
12.0000	0.012
14.0000	0.019
16.0000	0.012
18.0000	0.019
20.0000	14.830
22.0000	14.830

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-13(S) Falling Head Slug Test			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/4/99	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 = 0.5 min

$$K = \frac{r^2 \ln(L/R)}{2LT_0} = \frac{(0.083\,Ft)^2 \ln\left(\frac{10\,Ft}{0.083\,Ft}\right)}{2(10\,Ft)(0.5\,min)}$$

$$= 3.3 \times 10^{-3}\ Ft/min$$

$3.3 \times 10^{-3}\ Ft/min \times 1440\ min/day = 4.75\ Ft/day$

$4.75\ Ft/day \times 3.528 \times 10^{-4}\ \frac{Cm/sec}{Ft/day} = 1.68 \times 10^{-3}\ Cm/sec$

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Is., SC - Jericho Is. (Site 4) WELL/BORING NO.: PAIJ0 mw-73

PROJECT NO.: 7803 GEOLOGIST: Mark Dannington

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

STATIC WATER LEVEL (Depth/Elevation): 5.21/TWD=17.68/LWC=12.47 DATE: 8/25/98

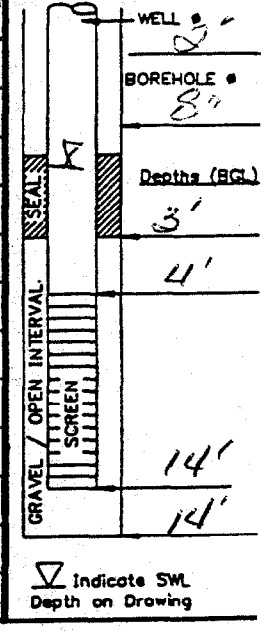
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) CHECKED:

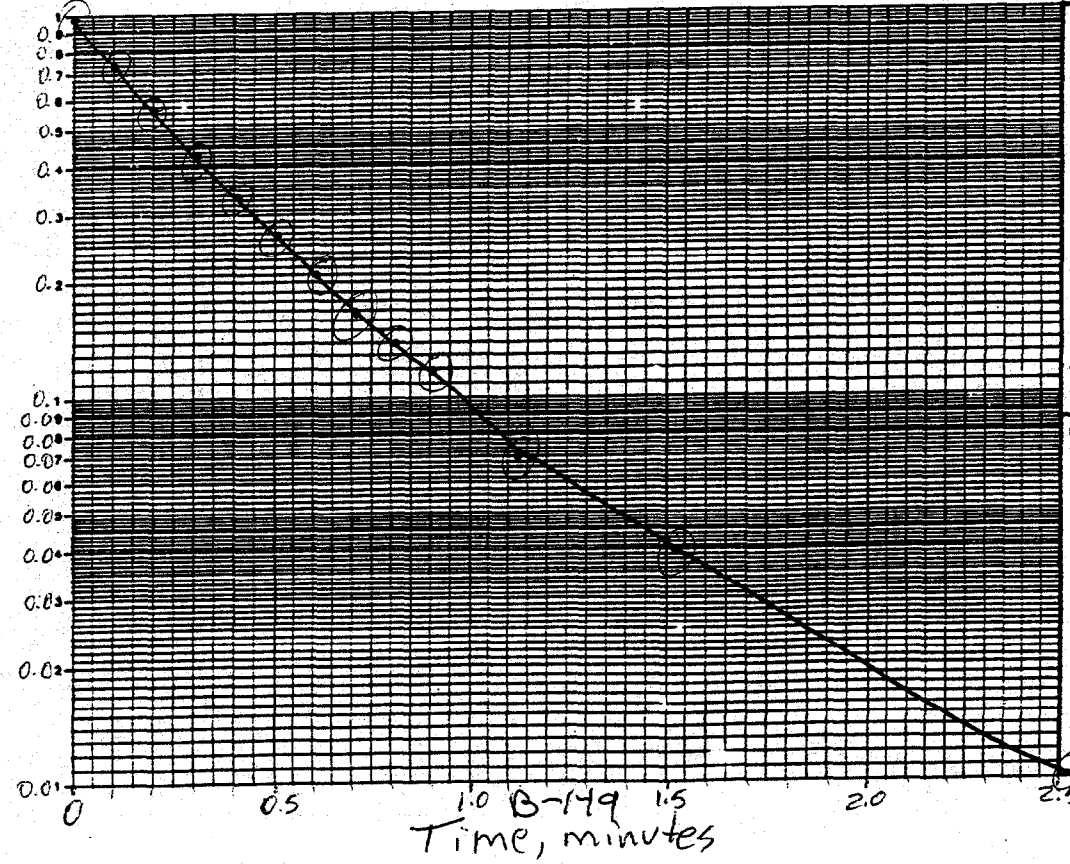
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 1 OF 2

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

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-1.908	1	2.53	-0.025	0.013
0.1	-1.412	0.74	3.53	-0.025	0.013
0.2	-1.094	0.57	4.53	-0.012	0.006
0.31	-0.826	0.43			
0.41	-0.655	0.34			
0.51	-0.515	0.27			
0.61	-0.407	0.21			
0.71	-0.330	0.17			
0.81	-0.273	0.14			
0.91	-0.222	0.12			
1.13	-0.140	0.073			
1.53	-0.076	0.04			

WELL SCHEMATIC



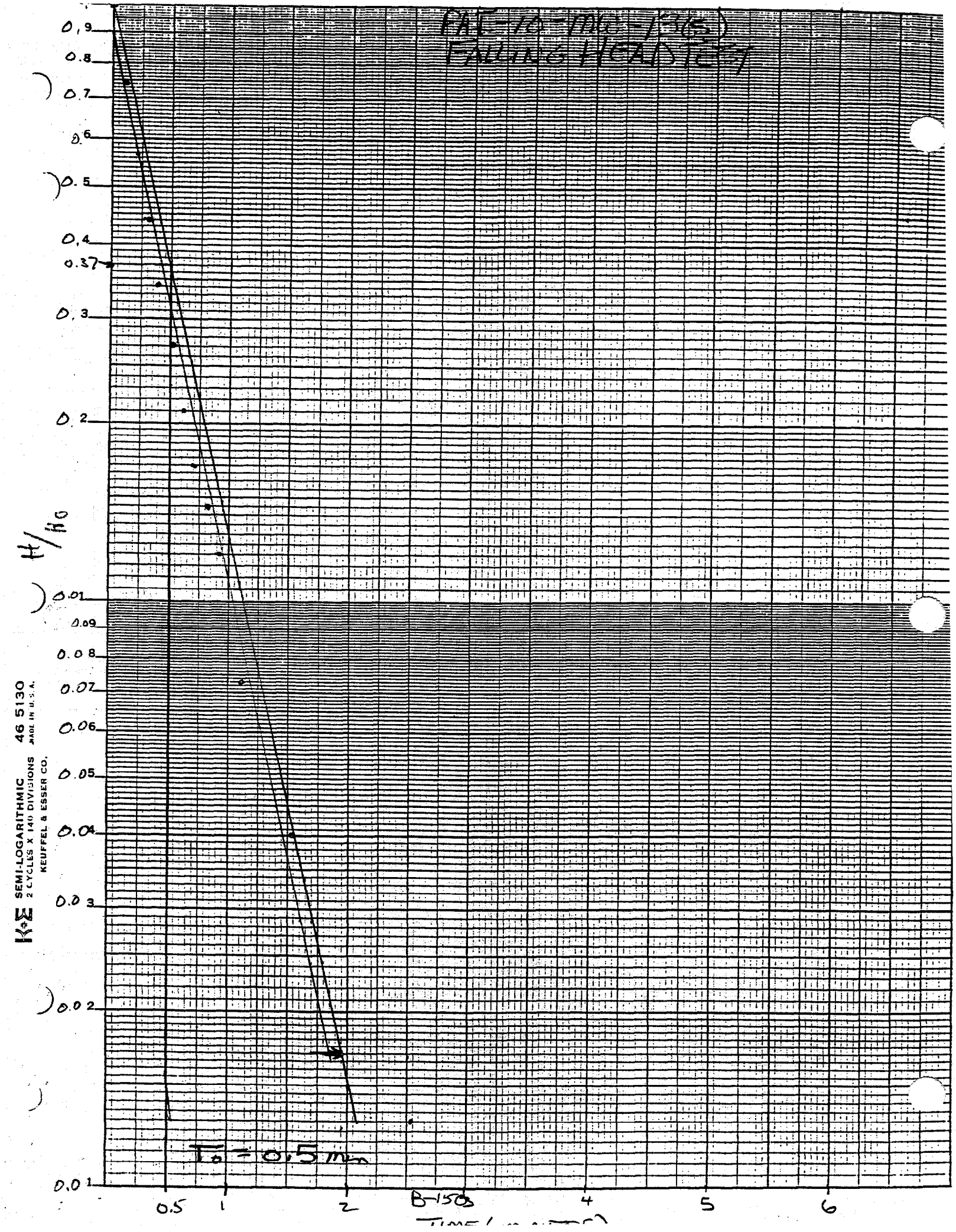


REMARKS:

$X_D = 11.93$

CALCS, SKETCH MAPS, ETC.:

B-149


PAE-10-MW-1-3(S)
FALLING HEAD TEST
H/ho
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.01
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
To = 0.5 min
0.5
1
2
4
5
6
B-150
TIME (minutes)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

~~PAT-10-MW-13~~
TEST 0, STEP 2
SLUG IN (FALL)

PAT-10-MW-13(S)
Falling Head Slug Test

0.3233
SE1000C
Environmental Logger
08/25 16:00

Unit# 00145 Test 0

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00013
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 2 08/25 07:53:35

Elapsed Time	INPUT 1
0.0000	-0.559
0.0033	-1.113
0.0066	-1.641
0.0100	-2.455
0.0133	-2.907
0.0166	-3.060
0.0200	-3.072
0.0233	-2.882
0.0266	-2.328
0.0300	-1.953
0.0333	-1.393
0.0366	-0.992
0.0400	-1.483
0.0433	-1.933
0.0466	-2.245
0.0500	-2.360
0.0533	-2.252
0.0566	-2.003
0.0600	-1.832
0.0633	-1.787
0.0666	-1.863
0.0700	-1.908
0 0.0733	-1.908 — To
0.0766	-1.870
0.0800	-1.825
0.0833	-1.793
0.0866	-1.787
0.0900	-1.781
0.0933	-1.768
0.0966	-1.743
0.1000	-1.730
0.1033	-1.711
0.1066	-1.698
0.1100	-1.679
0.1133	-1.666
0.1166	-1.653
0.1200	-1.634

~~PAT-10-MW13~~
Test 0, Step 2
Slug in (Fall)

PAT-10-MW-13(S)
Falling Head Slug Test

0.1233	-1.615
0.1266	-1.603
0.1300	-1.590
0.1333	-1.571
0.1366	-1.558
0.1400	-1.545
0.1433	-1.526
0.1466	-1.520
0.1500	-1.501
0.1533	-1.494
0.1566	-1.482
0.1600	-1.463
0.1633	-1.450
0.1666	-1.437
0.1700	-1.424
0.1733	-1.412
0.1766	-1.399
0.1800	-1.393
0.1833	-1.374
0.1866	-1.361
0.1900	-1.348
0.1933	-1.342
0.1966	-1.329
0.2000	-1.310
0.2033	-1.304
0.2066	-1.297
0.2100	-1.284
0.2133	-1.272
0.2166	-1.265
0.2200	-1.253
0.2233	-1.240
0.2266	-1.227
0.2300	-1.221
0.2333	-1.214
0.2366	-1.202
0.2400	-1.189
0.2433	-1.183
0.2466	-1.170
0.2500	-1.164
0.2533	-1.151
0.2566	-1.138
0.2600	-1.132
0.2633	-1.119
0.2666	-1.113
0.2700	-1.100
0.2733	-1.094
0.2766	-1.081
0.2800	-1.075
0.2833	-1.075
0.2866	-1.062
0.2900	-1.055
0.2933	-1.043
0.2966	-1.036
0.3000	-1.024
0.3033	-1.017
0.3066	-1.005
0.3100	-0.998
0.3133	-0.992
0.3166	-0.985
0.3200	-0.973

~~[illegible]~~
Test 0, Step 2
Slug in (F911)

PAT-10-MW-13(S)
Falling Head Slug Test.

	0.3233	-0.966
	0.3266	-0.960
	0.3300	-0.941
	0.3333	-0.947
	0.3500	-0.903
	0.3666	-0.865
0.31	-0.3833	-0.826
	0.4000	-0.795
	0.4166	-0.763
	0.4333	-0.731
	0.4500	-0.706
	0.4666	-0.680
0.41	-0.4833	-0.655
	0.5000	-0.623
	0.5166	-0.604
	0.5333	-0.578
	0.5500	-0.553
	0.5666	-0.534
0.51	-0.5833	-0.515
	0.6000	-0.489
	0.6166	-0.477
	0.6333	-0.457
	0.6500	-0.445
	0.6666	-0.426
0.61	-0.6833	-0.407
	0.7000	-0.394
	0.7166	-0.381
	0.7333	-0.368
	0.7500	-0.356
	0.7666	-0.337
0.71	-0.7833	-0.330
	0.8000	-0.318
	0.8166	-0.311
	0.8333	-0.292
	0.8500	-0.286
	0.8666	-0.273
0.81	-0.8833	-0.273
	0.9000	-0.260
	0.9166	-0.248
	0.9333	-0.241
	0.9500	-0.235
	0.9666	-0.229
0.91	-0.9833	-0.222
	1.0000	-0.216
1.13	-1.2000	-0.140
	1.4000	-0.101
1.53	-1.6000	-0.076
	1.8000	-0.063
	2.0000	-0.050
	2.2000	-0.038
	2.4000	-0.031
2.53	2.6000	-0.025
	2.8000	-0.031
	3.0000	-0.025
	3.2000	-0.019
	3.4000	-0.025
3.53	-3.6000	-0.025
	3.8000	-0.012
	4.0000	-0.012
	4.2000	-0.012

MW-10-11003(S)
Test 0 step 2
Slug in (Fall)

4.4000	-0.010
4.53 -4.6000	-0.012
4.8000	-0.012
5.0000	-0.012
5.2000	-0.006
5.4000	-0.012
5.6000	-0.006
5.8000	-0.012
6.0000	-0.006
6.2000	-0.006
6.4000	0.000
6.6000	-0.006
6.8000	0.000
7.0000	-0.012
7.2000	-0.012
7.4000	-0.006
7.6000	0.000
7.8000	-0.006
8.0000	-0.012
8.2000	-0.006
8.4000	-0.006
8.6000	0.000
8.8000	0.000
9.0000	0.000
9.2000	-0.006
9.4000	-0.006
9.6000	-0.006
9.8000	-0.012
10.0000	-0.006
12.0000	0.000

END

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

CLIENT	JOB NUMBER 7803		
SUBJECT PAI-10-MW-14(D) RISING HEAD Slug Test			
BASED ON HVORSLEV	DRAWING NUMBER		
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY	DATE

$$K = \frac{r^2 \ln(L/R)}{2LT_o}$$

K = Hydraulic Conductivity
r = Radius of well Casing
R = Radius of well Screen
L = Length of well Screen
T_o = Time for water level to Rise or Fall To 37% of initial Change

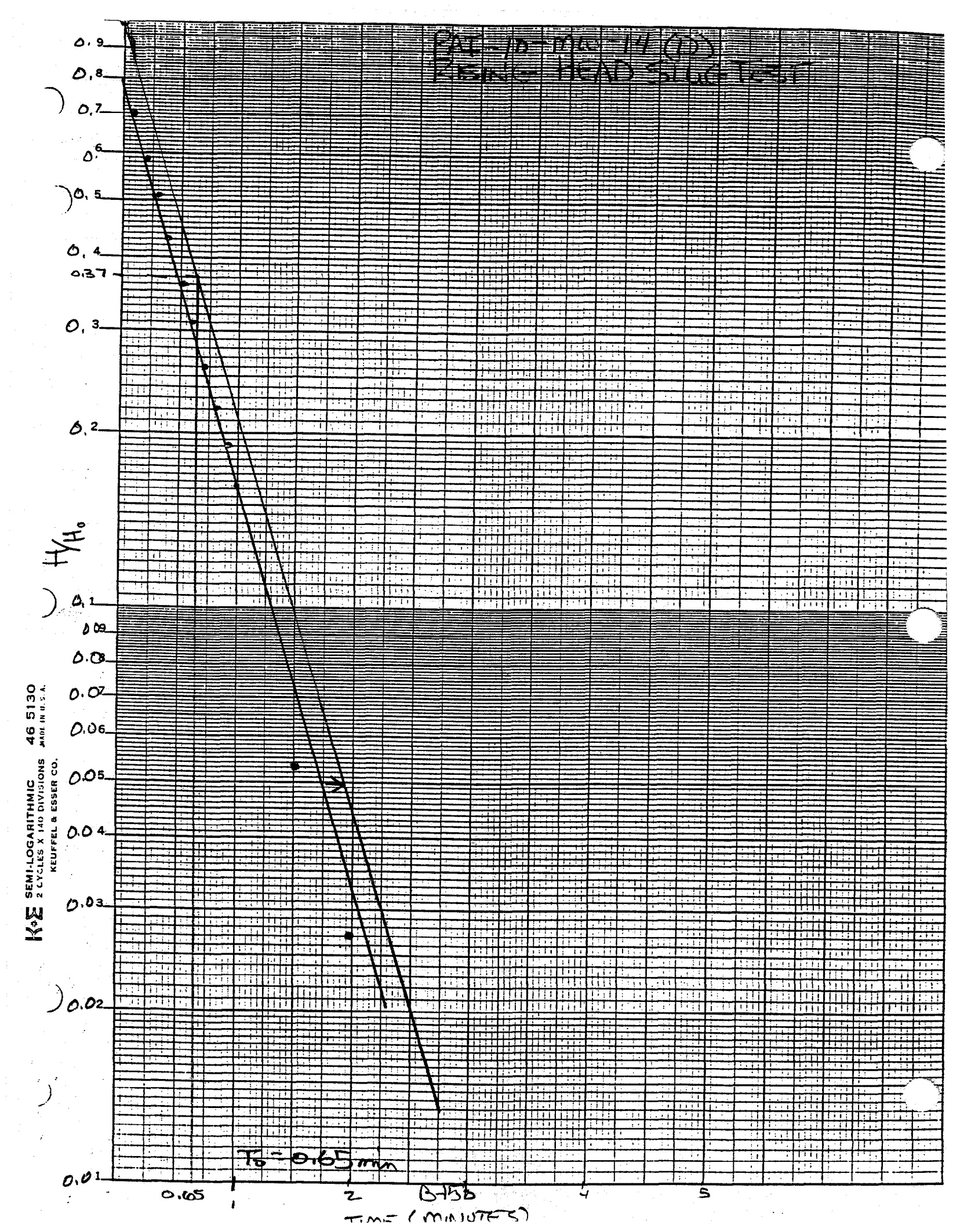
r = 0.083 FT
R = 0.083 FT
L = 5 FT
T_o = 0.65 min

$$K = r^2 \frac{\ln(L/R)}{2LT_o} = (0.083\,Ft)^2 \frac{\ln\left(\frac{5\,Ft}{0.083\,Ft}\right)}{2(5\,Ft)(0.65\,min)}$$

$$= 4.34 \times 10^{-3}\ Ft/min$$

$4.34 \times 10^{-3}\ Ft/min \times 1440\ min/day = 6.25\ Ft/day$

$6.25\ Ft/day \times \frac{3.528 \times 10^{-4}\ cm/sec}{Ft/day} = 2.21 \times 10^{-3}\ cm/Sec$


FAT-1D-MW-14 (D)
FALLING HEAD SLUG TEST
H/H₀
0.9
0.8
0.7
0.6
0.5
0.4
0.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
T₀ = 0.65 min
0.65
1
2
3.58
4
5
TIME (MINUTES)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: NCRD Parris Is, SC - Jericho Is (Site 4) WELL/BORING NO.: PAI-10-MW1

PROJECT NO.: 7803 GEOLOGIST: Mark Dennington

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

STATIC WATER LEVEL (Depth/Elevation): 5.37/TWD=32.11/LWC=26.74 DATE: 8/25/96

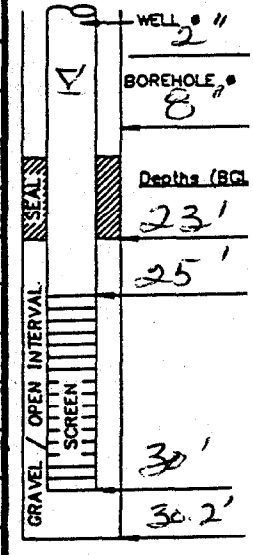
TEST TYPE (Rising/Falling/Constant Head): Rising (Slug out) CHECKED:

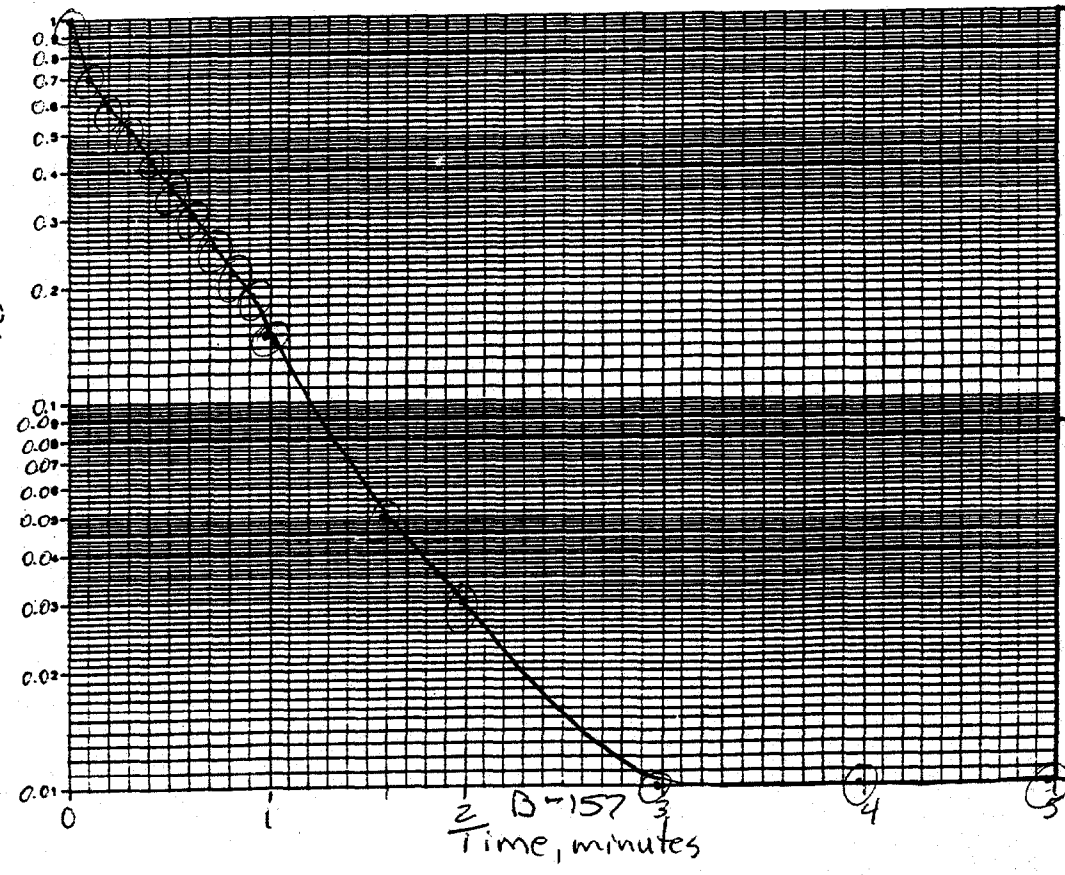
METHOD OF INDUCING WATER LEVEL CHANGE: Solid Slug (7.5 ft.) PAGE 2 OF 2

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	3.017	1	1.99	0.082	0.027
0.1	2.118	0.70	2.99	0.025	0.008
0.2	1.792	0.59	3.99	0.012	0.004
0.3	1.537	0.51	4.99	0.006	0.002
0.41	1.289	0.43			
0.51	1.097	0.36			
0.61	0.931	0.31			
0.71	0.791	0.26			
0.81	0.669	0.22			
0.91	0.567	0.19			
0.99	0.491	0.163			
1.59	0.159	0.053			

WELL SCHEMATIC





REMARKS:

TOC = 2.57'

CALCS, SKETCH MAPS, ETC.:

~~PAI10-BW14~~
TEST 1, STEP 1
SLUG OUT (RISE) ✓

PAI-10-MW-14(D)
RISING HEAD SLUG TEST

SE1000C
Environmental Logger
08/25 18:08

Unit# 00145 Test 1

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00014
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 1 08/25 08:45:12

Elapsed Time	INPUT 1
0.0000	1.843
0.0033	1.346
0.0066	2.315
0 0.0100	3.017 — T0
0.0133	2.928
0.0166	2.685
0.0200	2.577
0.0233	2.551
0.0266	2.532
0.0300	2.526
0.0333	2.500
0.0366	2.481
0.0400	2.449
0.0433	2.430
0.0466	2.404
0.0500	2.386
0.0533	2.366
0.0566	2.347
0.0600	2.335
0.0633	2.315
0.0666	2.303
0.0700	2.290
0.0733	2.271
0.0766	2.258
0.0800	2.239
0.0833	2.226
0.0866	2.213
0.0900	2.200
0.0933	2.188
0.0966	2.169
0.1000	2.156
0.1033	2.143
0.1066	2.130
0.1 -0.1100	2.118
0.1133	2.111
0.1166	2.092
0.1200	2.079

PHI-10-MW47(U)
Test 1, Step 1
Slug out (Rise)

Rising Head Slug Test

0.1233	2.067
0.1266	2.054
0.1300	2.048
0.1333	2.035
0.1366	2.022
0.1400	2.009
0.1433	2.003
0.1466	1.984
0.1500	1.977
0.1533	1.965
0.1566	1.952
0.1600	1.945
0.1633	1.933
0.1666	1.920
0.1700	1.914
0.1733	1.901
0.1766	1.894
0.1800	1.882
0.1833	1.869
0.1866	1.862
0.1900	1.850
0.1933	1.843
0.1966	1.831
0.2000	1.824
0.2033	1.811
0.2066	1.799
0.2 - 0.2100	1.792
0.2133	1.780
0.2166	1.773
0.2200	1.767
0.2233	1.754
0.2266	1.748
0.2300	1.735
0.2333	1.729
0.2366	1.716
0.2400	1.716
0.2433	1.703
0.2466	1.697
0.2500	1.684
0.2533	1.677
0.2566	1.665
0.2600	1.658
0.2633	1.652
0.2666	1.639
0.2700	1.633
0.2733	1.626
0.2766	1.620
0.2800	1.608
0.2833	1.601
0.2866	1.595
0.2900	1.582
0.2933	1.575
0.2966	1.563
0.3000	1.556
0.3033	1.550
0.3066	1.544
0.3 - 0.3100	1.537
0.3133	1.531
0.3166	1.524
0.3200	1.512

FILL-TO-MW4(D)
Test 1, Step 1
Slug out (Rise)
Rising Head Slug Test

	0.3233	1.505
	0.3266	1.499
	0.3300	1.493
	0.3333	1.486
	0.3500	1.441
	0.3666	1.397
	0.3833	1.365
	0.4000	1.327
0.41 -	0.4166	1.289
	0.4333	1.257
	0.4500	1.225
	0.4666	1.186
	0.4833	1.154
	0.5000	1.122
0.51 -	0.5166	1.097
	0.5333	1.065
	0.5500	1.033
	0.5666	1.008
	0.5833	0.982
	0.6000	0.957
0.61 -	0.6166	0.931
	0.6333	0.906
	0.6500	0.880
	0.6666	0.854
	0.6833	0.829
	0.7000	0.810
0.71 -	0.7166	0.791
	0.7333	0.765
	0.7500	0.746
	0.7666	0.727
	0.7833	0.708
	0.8000	0.689
0.81 -	0.8166	0.669
	0.8333	0.650
	0.8500	0.631
	0.8666	0.612
	0.8833	0.600
	0.9000	0.580
0.91 -	0.9166	0.567
	0.9333	0.548
	0.9500	0.536
	0.9666	0.523
	0.9833	0.510
0.99 -	1.0000	0.491
	1.2000	0.319
	1.4000	0.223
1.59 -	1.6000	0.159
	1.8000	0.115
1.99 -	2.0000	0.082
	2.2000	0.057
2.39 -	2.4000	0.051
	2.6000	0.038
	2.8000	0.031
2.99 -	3.0000	0.025
	3.2000	0.019
	3.4000	0.012
	3.6000	0.012
	3.8000	0.012
3.99 -	4.0000	0.012
	4.2000	0.006

PMI-10-mw14(0)
Test1, Step 1
Slug out (Rise)
Rising Head Slug Test

4.4000	0.006
4.6000	0.006
4.8000	0.006
4.99-5.0000	0.006
5.2000	0.006
5.4000	0.006
5.6000	0.006
5.8000	0.006
6.0000	0.000
6.2000	0.006
6.4000	0.000
6.6000	0.000
6.8000	0.006
7.0000	0.006
7.2000	0.006
7.4000	0.006
7.6000	0.006
7.8000	0.006
8.0000	0.006
8.2000	0.006
8.4000	0.000
8.6000	0.006
8.8000	0.000
9.0000	0.000
9.2000	0.000
9.4000	0.006
9.6000	0.006
9.8000	0.006
10.0000	0.000

END

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

CLIENT	JOB NUMBER 7803	
SUBJECT PAL-10-MW-14(D) Falling Head Slug Test		
BASED ON HVORSLEV	DRAWING NUMBER	
BY GG	CHECKED BY RMB 3/9/99	APPROVED BY / DATE

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

K = Hydraulic Conductivity
r = Radius of Well Casing — r = 0.083 Ft
R = Radius of well Screen — R = 0.083 Ft
L = Length of well Screen — L = 5 FT
T_0 = Time For water level to Rise or Fall To 37% of initial Change — T_0 = 0.45 min.

$$K = \frac{r^2 \ln L/R}{2L T_0} = \frac{(0.083\,Ft)^2 \ln\left(\frac{5\,Ft}{0.083\,Ft}\right)}{2(5\,Ft)(0.45\,min)}$$

$$= 6.27 \times 10^{-3}\ Ft/min$$

6.27×10^{-3} Ft/min x 1440 min/day = 9.03 Ft/day

9.03 Ft/day x $\frac{3.528 \times 10^{-4}\ cm/sec}{Ft/day}$ = 3.19×10^{-3} cm/sec

HYDRAULIC CONDUCTIVITY TESTING DATA SHEET

PROJECT NAME: MCRD Parris Is., SC - Jericho Is. (Site 4) WELL/BORING NO.: PRE-MW-14

PROJECT NO.: 7803 GEOLOGIST: Mark Darrington

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

STATIC WATER LEVEL (Depth/Elevation): 5.37/TWD=32.11/LWC=26.74 DATE: 8/25/98

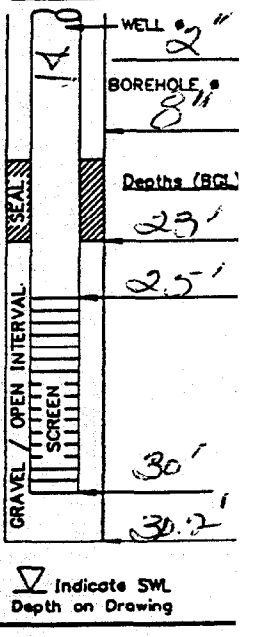
TEST TYPE (Rising/Falling/Constant Head): Falling (slug in) CHECKED:

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

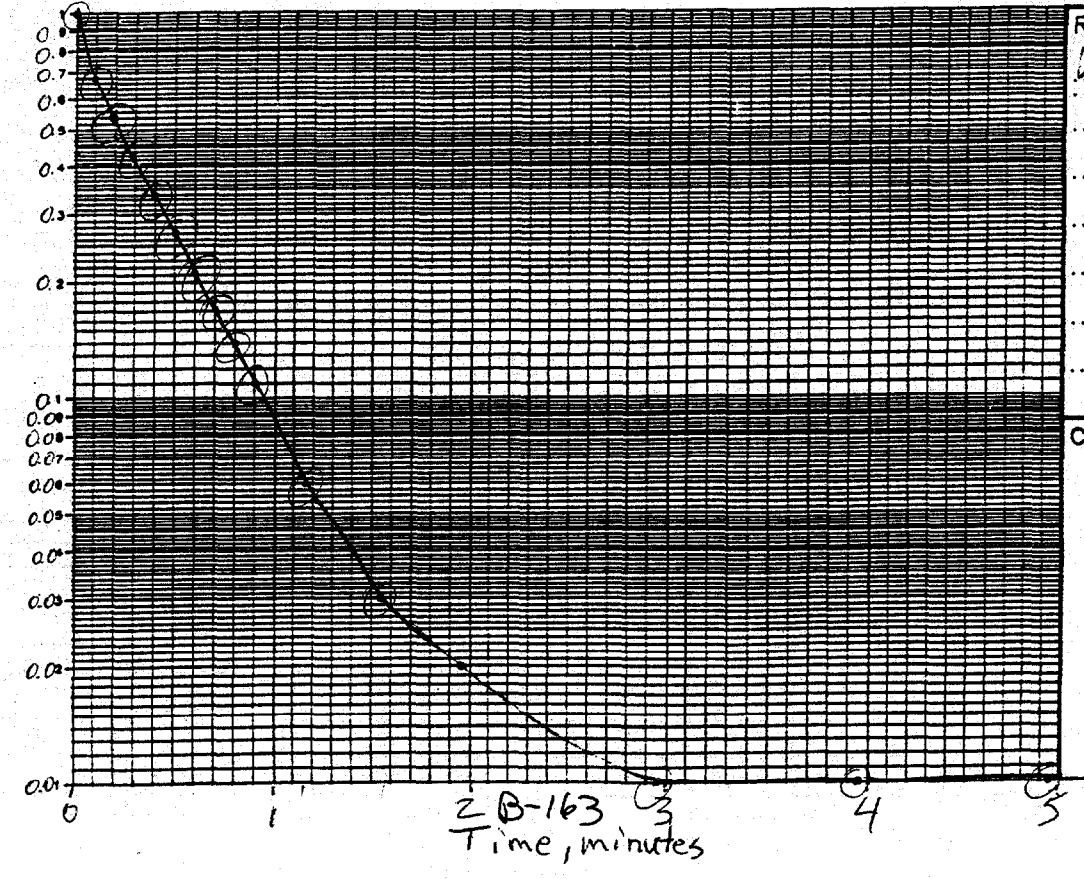
REFERENCE PT. FOR WL MEAS. (Top of Casing, Transducer, etc.): TOC

ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)	ELAPSED TIME (min. or sec.)	MEASURED WATER LEVEL (feet)	DRAWDOWN OR HEAD (ΔH) (feet)
0	-2.432	1	1.95	-0.051	0.021
0.1	-1.653	0.68	2.95	-0.025	0.010
0.2	-1.308	0.54	3.95	-0.019	0.008
0.3	-1.046	0.43	4.95	-0.019	0.008
0.4	-0.823	0.34			
0.5	-0.651	0.27			
0.6	-0.516	0.21			
0.7	-0.415	0.17			
0.8	-0.331	0.14			
0.9	-0.268	0.11			
1.15	-0.146	0.060			
1.55	-0.076	0.031			

WELL SCHEMATIC



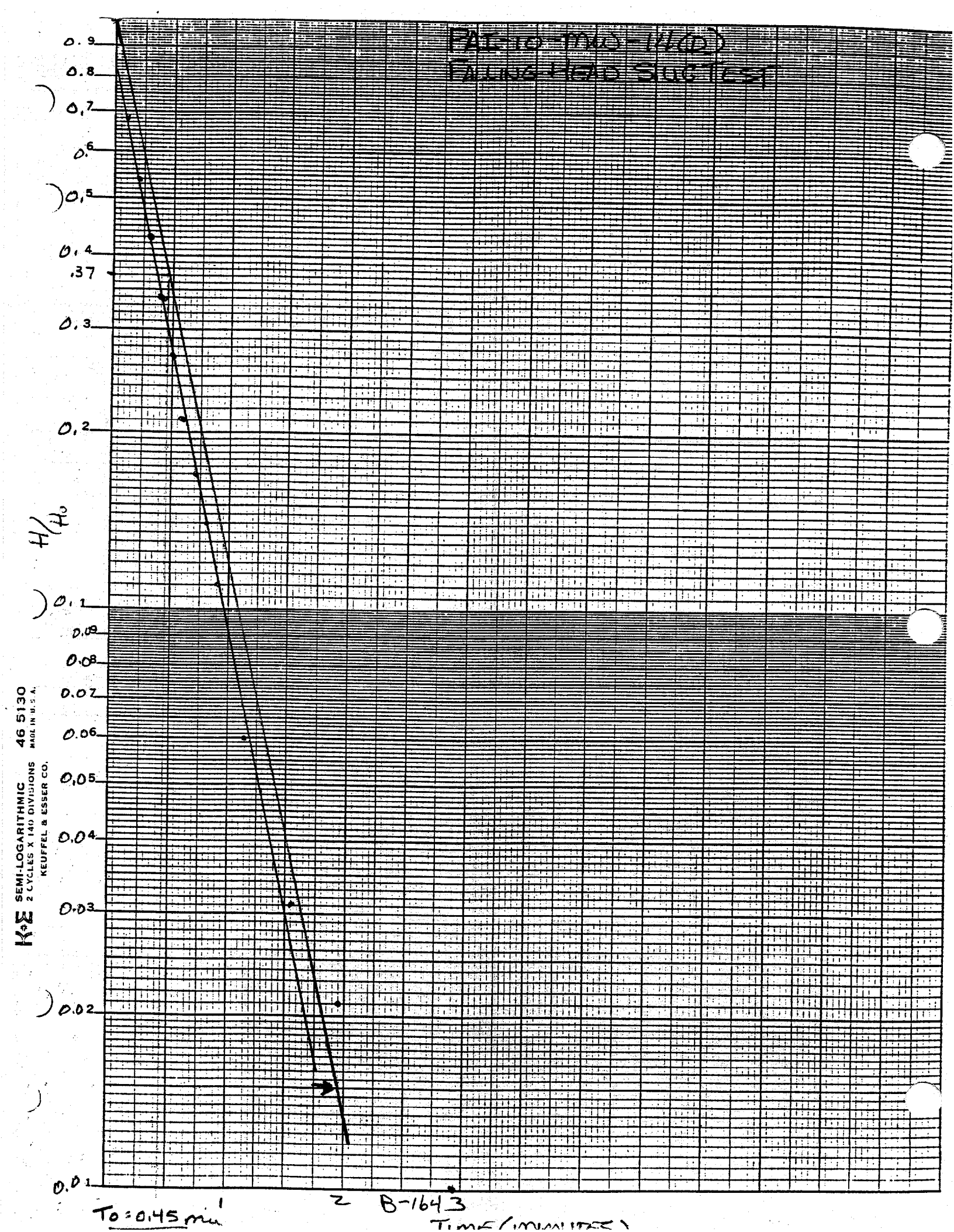
▽ Indicate SWL Depth on Drawing



REMARKS:

TD: 26.57'

CALCS, SKETCH MAPS, ETC.:


FALLING-HEAD SLUG TEST
0.9
0.8
0.7
0.6
0.5
0.4
.37
0.3
0.2
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
H/H0
T0 = 0.45 min
1
2
B-1643
TIME (MINUTES)
K+E SEMI-LOGARITHMIC 46 5130
2 CYCLES X 140 DIVISIONS MADE IN U.S.A.
KEUFFEL & ESSER CO.

~~PATIO SUL14~~
TEST 1, STEP 0
SLUG IN (FALL)

PAI-10-MW-14 (D)
Falling Head Slug Test

SE1000C
Environmental Logger
08/25 16:06

Unit# 00145 Test 1

Setups:	INPUT 1
Type	Level (F)
Mode	TOC
I.D.	00014
Reference	0.000
Linearity	0.110
Scale factor	20.120
Offset	-0.020
Delay mSEC	50.000

Step 0 08/25 08:31:53

Elapsed Time	INPUT 1	
0.0000	-0.140	
0.0033	-0.625	
0.0066	-1.238	
0.0100	-1.907	
0.0133	-2.853	
0.0166	-3.543	
0.0200	-3.754	
0.0233	-3.517	
0.0266	-2.955	
0.0300	-2.478	
0.0333	-1.859	
0.0366	-1.046	
0.0400	-1.578	
0.0433	-2.087	
0.0466	-2.400	
0.0500	-2.432	T_0
0.0533	-2.272	
0.0566	-2.144	
0.0600	-2.087	
0.0633	-2.081	
0.0666	-2.081	
0.0700	-2.061	
0.0733	-2.029	
0.0766	-2.017	
0.0800	-1.991	
0.0833	-1.972	
0.0866	-1.953	
0.0900	-1.940	
0.0933	-1.902	
0.0966	-1.895	
0.1000	-1.883	
0.1033	-1.870	
0.1066	-1.851	
0.1100	-1.832	
0.1133	-1.819	
0.1166	-1.800	
0.1200	-1.787	

THI-10-MW-17(D)
Test 1 / Step 2
Slug in (Falling)
Falling Head Slug Test

	0.1233	-1.768
	0.1266	-1.755
	0.1300	-1.736
	0.1333	-1.723
	0.1366	-1.710
	0.1400	-1.698
	0.1433	-1.678
	0.1466	-1.666
0.1 –	0.1500	-1.653
	0.1533	-1.640
	0.1566	-1.621
	0.1600	-1.614
	0.1633	-1.602
	0.1666	-1.589
	0.1700	-1.576
	0.1733	-1.563
	0.1766	-1.551
	0.1800	-1.538
	0.1833	-1.525
	0.1866	-1.512
	0.1900	-1.500
	0.1933	-1.487
	0.1966	-1.480
	0.2000	-1.468
	0.2033	-1.455
	0.2066	-1.442
	0.2100	-1.429
	0.2133	-1.423
	0.2166	-1.410
	0.2200	-1.397
	0.2233	-1.391
	0.2266	-1.378
	0.2300	-1.366
	0.2333	-1.359
	0.2366	-1.346
	0.2400	-1.340
	0.2433	-1.327
	0.2466	-1.314
0.2 –	0.2500	-1.308
	0.2533	-1.295
	0.2566	-1.289
	0.2600	-1.283
	0.2633	-1.270
	0.2666	-1.263
	0.2700	-1.250
	0.2733	-1.244
	0.2766	-1.231
	0.2800	-1.225
	0.2833	-1.212
	0.2866	-1.206
	0.2900	-1.193
	0.2933	-1.187
	0.2966	-1.180
	0.3000	-1.168
	0.3033	-1.161
	0.3066	-1.149
	0.3100	-1.142
	0.3133	-1.129
	0.3166	-1.129
	0.3200	-1.116

PMW-10 - MW04 (D)
Test 1 / Step 8
Slug in (Falling)
Falling Head Slug Test

	0.3233	-1.110
	0.3266	-1.104
	0.3300	-1.098
	0.3333	-1.085
0.3	-0.3500	-1.046
	0.3666	-1.002
	0.3833	-0.964
	0.4000	-0.925
	0.4166	-0.887
	0.4333	-0.855
0.4	-0.4500	-0.823
	0.4666	-0.791
	0.4833	-0.759
	0.5000	-0.727
	0.5166	-0.708
	0.5333	-0.676
0.5	-0.5500	-0.651
	0.5666	-0.625
	0.5833	-0.606
	0.6000	-0.580
	0.6166	-0.555
	0.6333	-0.536
0.6	-0.6500	-0.516
	0.6666	-0.497
	0.6833	-0.478
	0.7000	-0.466
	0.7166	-0.447
	0.7333	-0.427
0.7	-0.7500	-0.415
	0.7666	-0.401
	0.7833	-0.383
	0.8000	-0.370
	0.8166	-0.357
	0.8333	-0.344
0.8	-0.8500	-0.331
	0.8666	-0.319
	0.8833	-0.312
	0.9000	-0.299
	0.9166	-0.287
	0.9333	-0.281
0.9	-0.9500	-0.268
	0.9666	-0.261
	0.9833	-0.248
	1.0000	-0.236
1.15	-1.2000	-0.146
	1.4000	-0.102
1.55	-1.6000	-0.076
	1.8000	-0.057
1.95	-2.0000	-0.051
	2.2000	-0.038
	2.4000	-0.038
	2.6000	-0.031
	2.8000	-0.031
2.95	-3.0000	-0.025
	3.2000	-0.025
	3.4000	-0.025
	3.6000	-0.019
	3.8000	-0.019
3.95	-4.0000	-0.019
	4.2000	-0.019

PAL-10-MW14 (D)
Test 1 / Step 8
Slug in (Falling)
Falling Head Slug Test

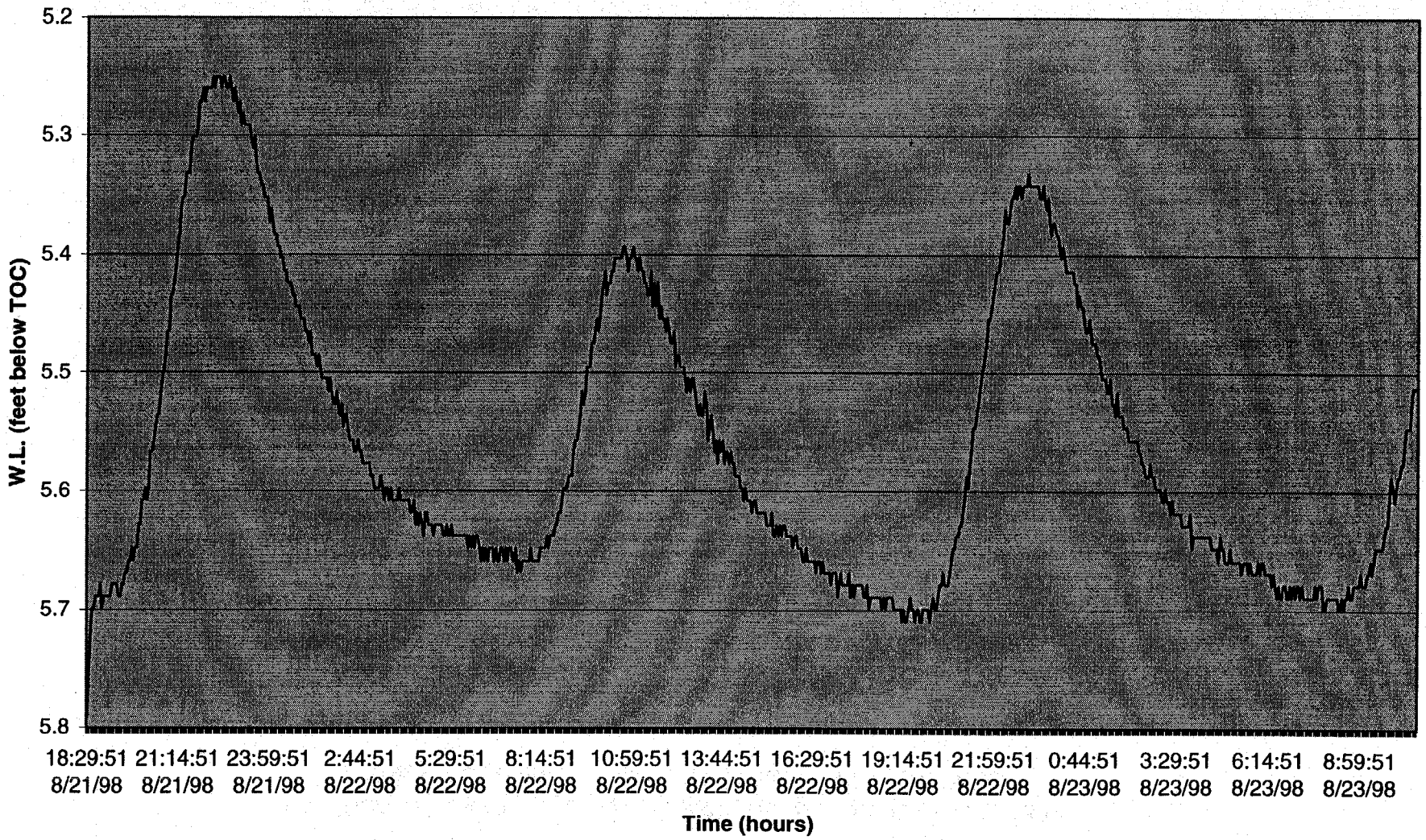
4.4000	-0.019
4.6000	-0.012
4.8000	-0.019
4.8 — 5.0000	-0.019
5.2000	-0.012
5.4000	-0.012
5.6000	-0.012
5.8000	-0.012
6.0000	-0.012
6.2000	-0.012
6.4000	-0.012
6.6000	-0.012
6.8000	-0.012
7.0000	-0.012
7.2000	-0.012
7.4000	-0.012
7.6000	-0.012
7.8000	-0.012
8.0000	-0.012
8.2000	-0.012
8.4000	-0.012
8.6000	-0.012
8.8000	-0.012
9.0000	-0.006
9.2000	-0.012
9.4000	-0.012
9.6000	-0.006
9.8000	-0.006
10.0000	-0.006
12.0000	-0.006

END

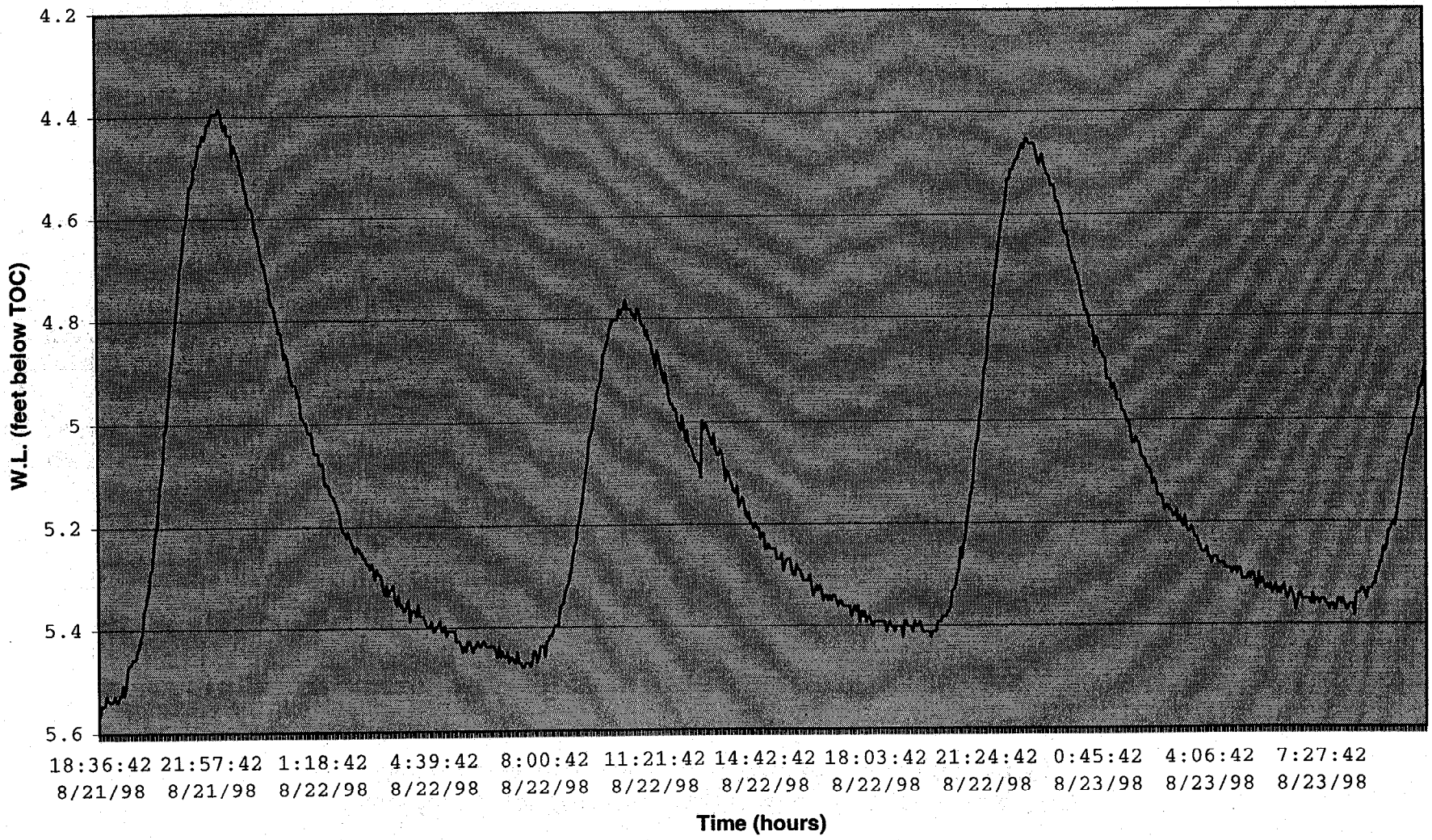
B-2

TIDAL STUDY RESULTS

Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-01(S)



Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-02(D)



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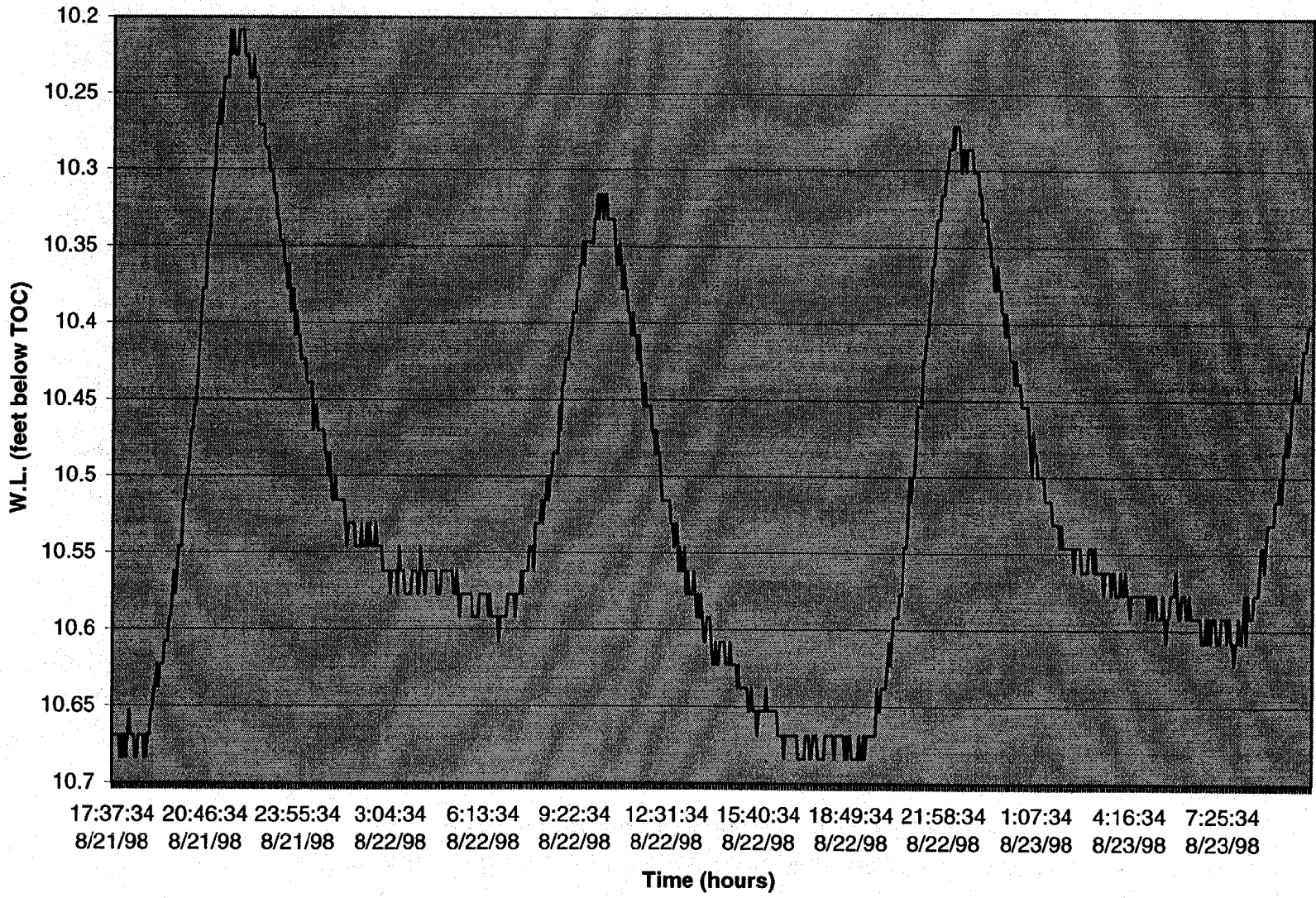
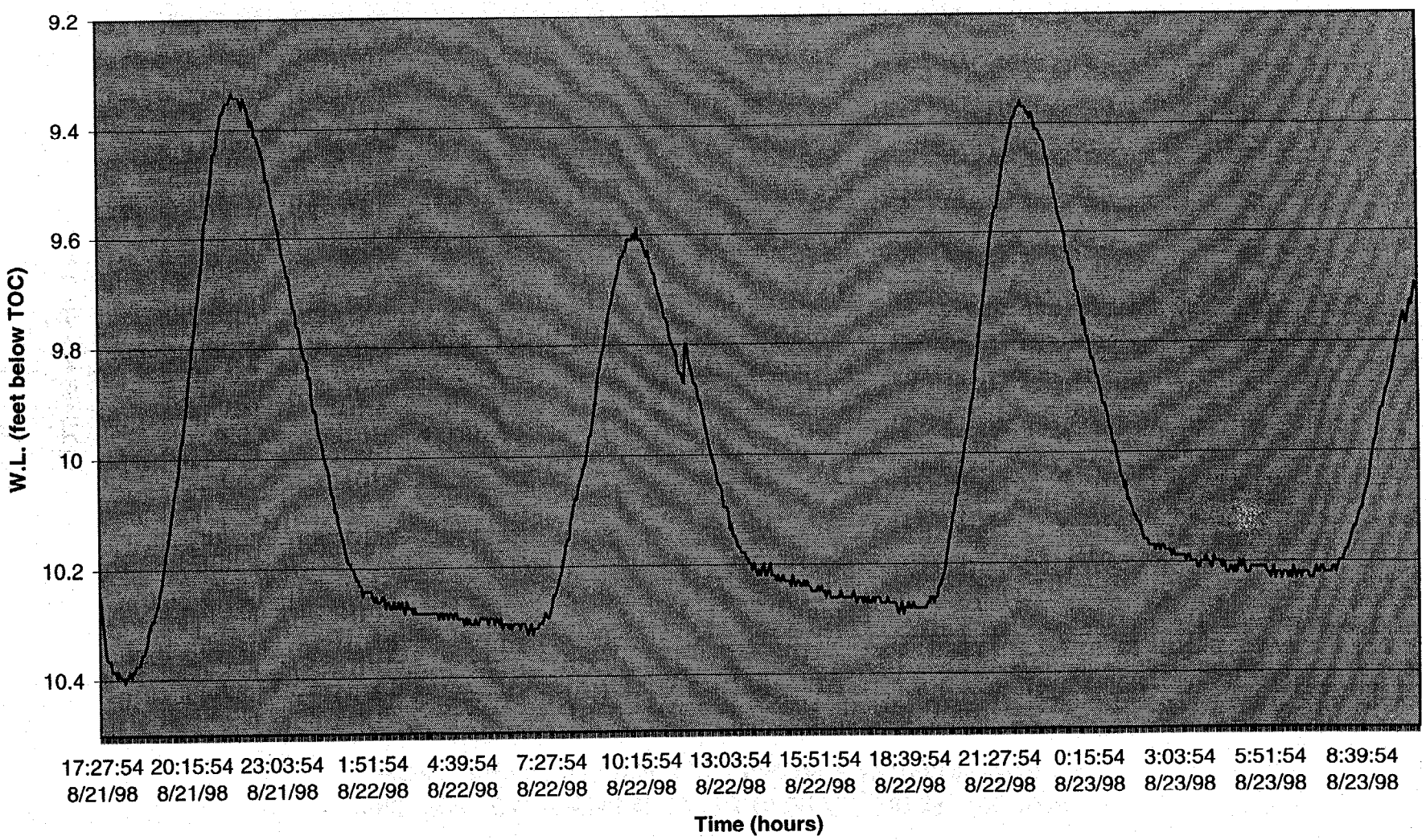
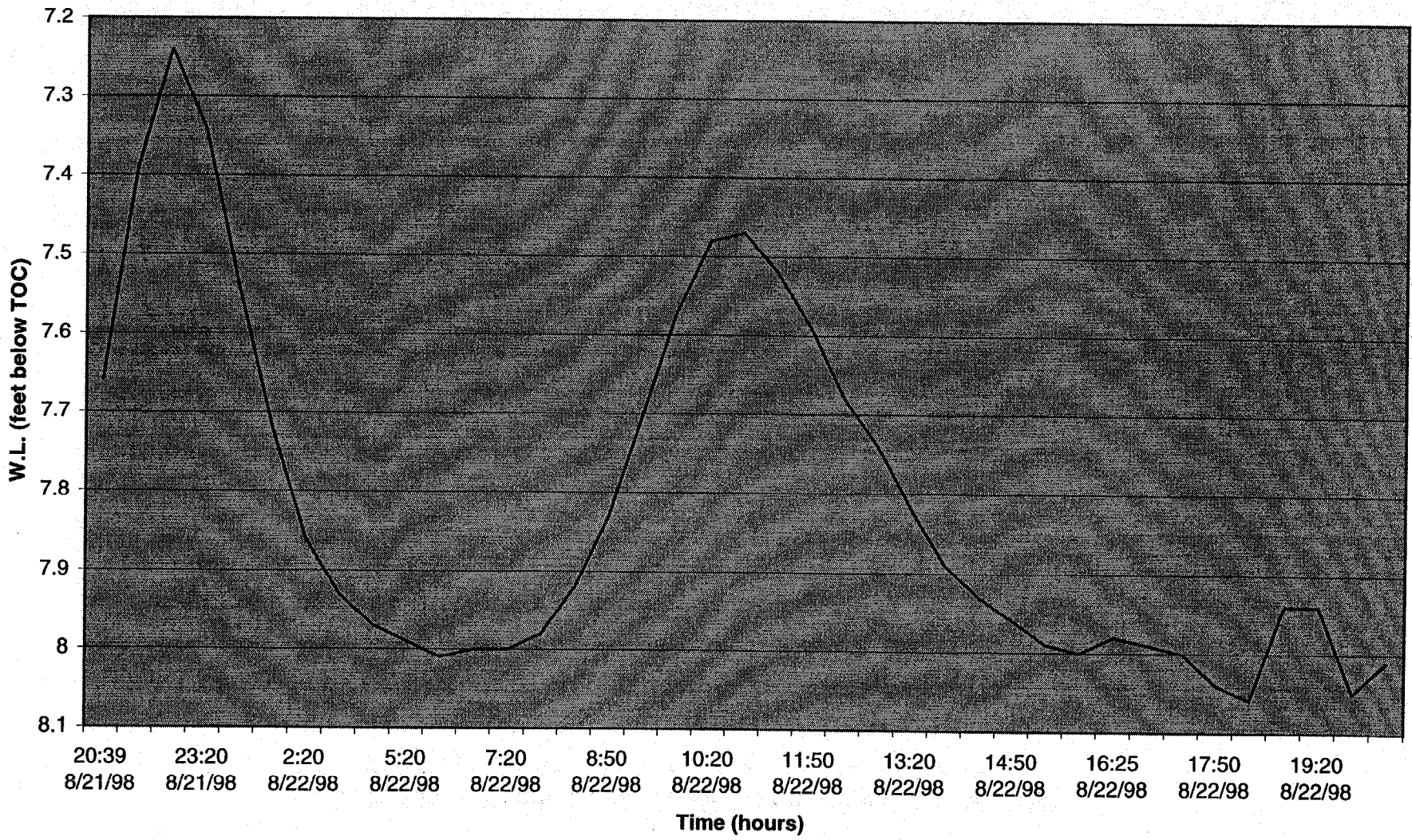
Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-03(S)



Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-04(D)

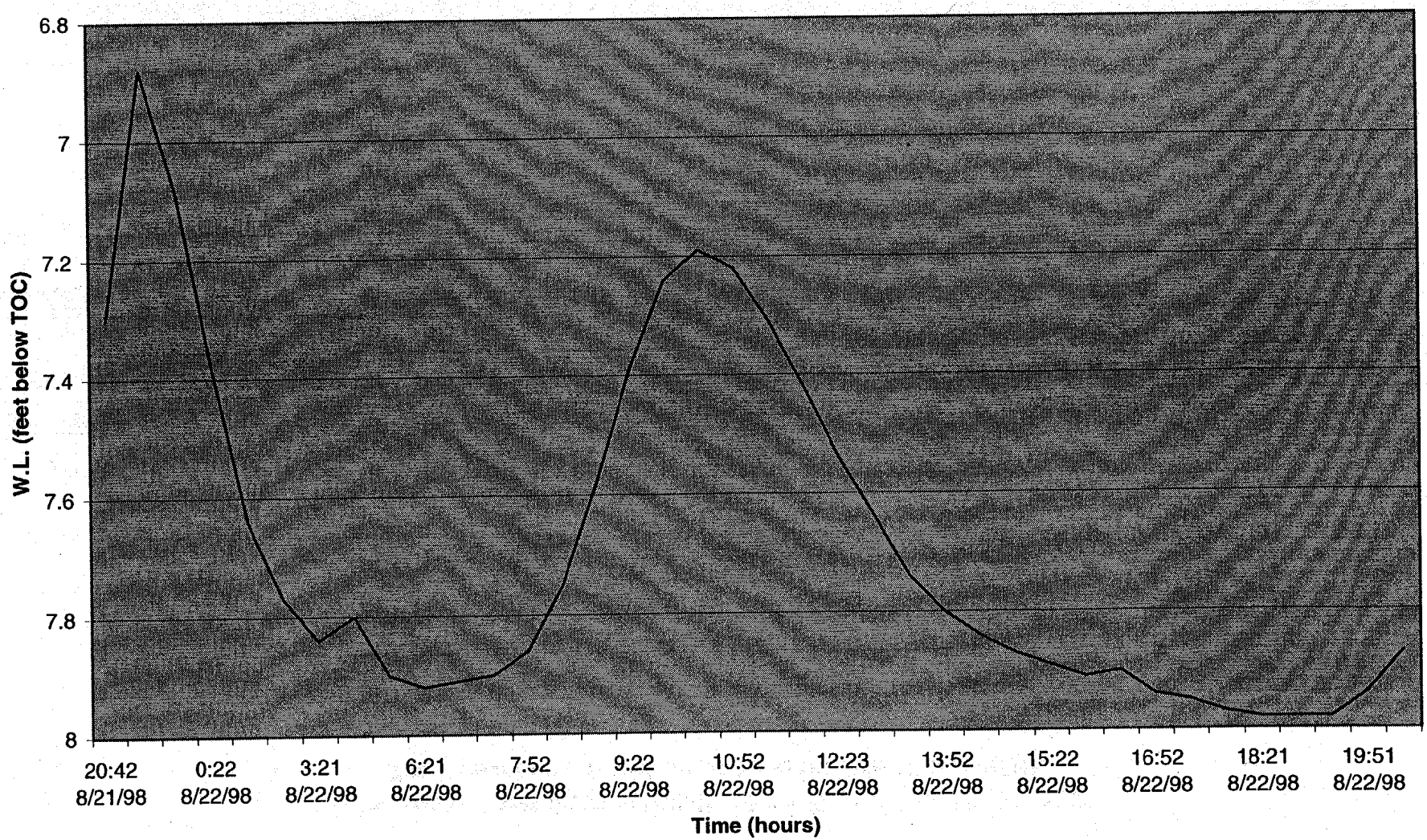


Tidal Study Conducted at SWMU 10 on September 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-05(S)



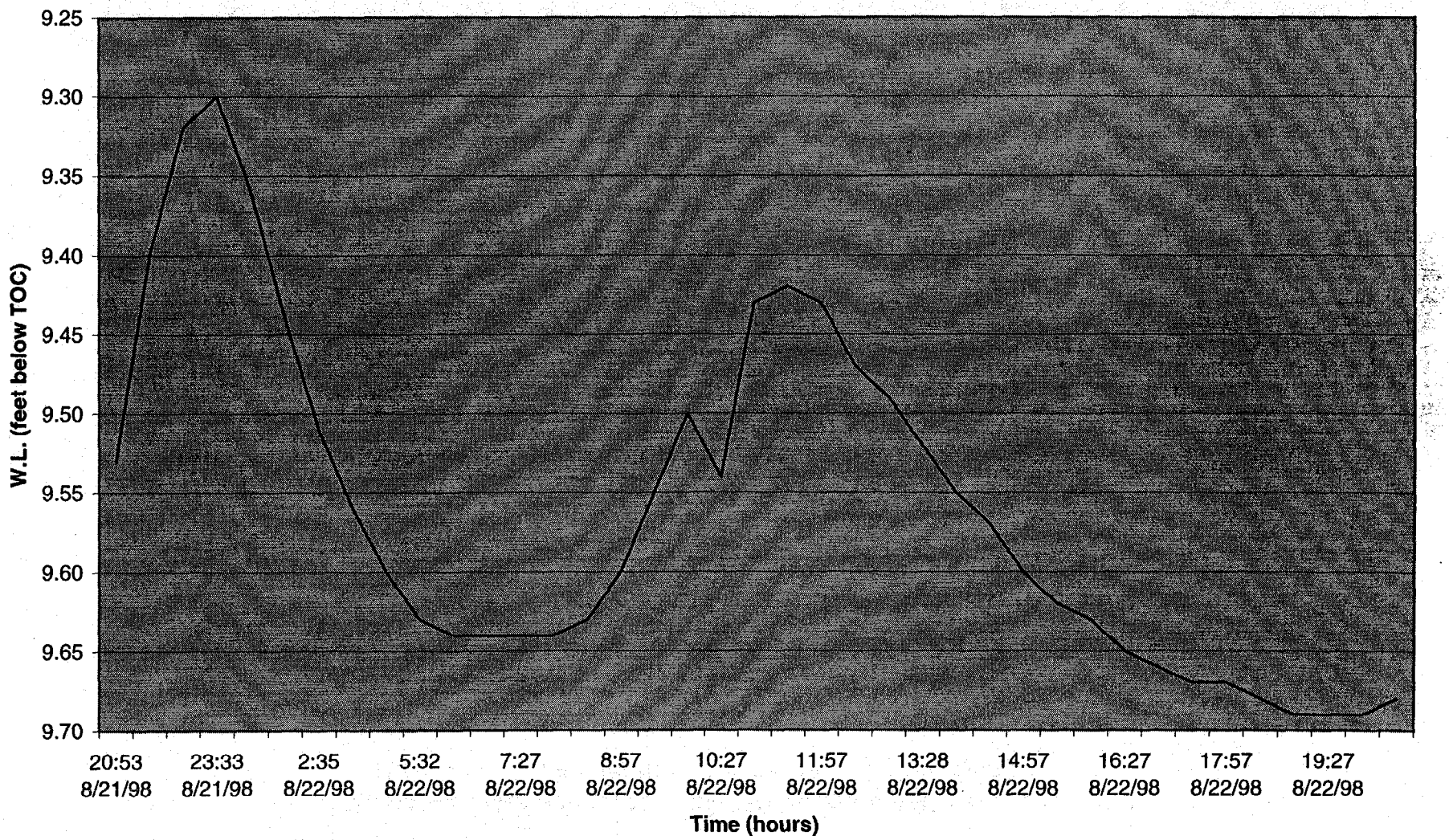
SWMU-173

Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-06(D)



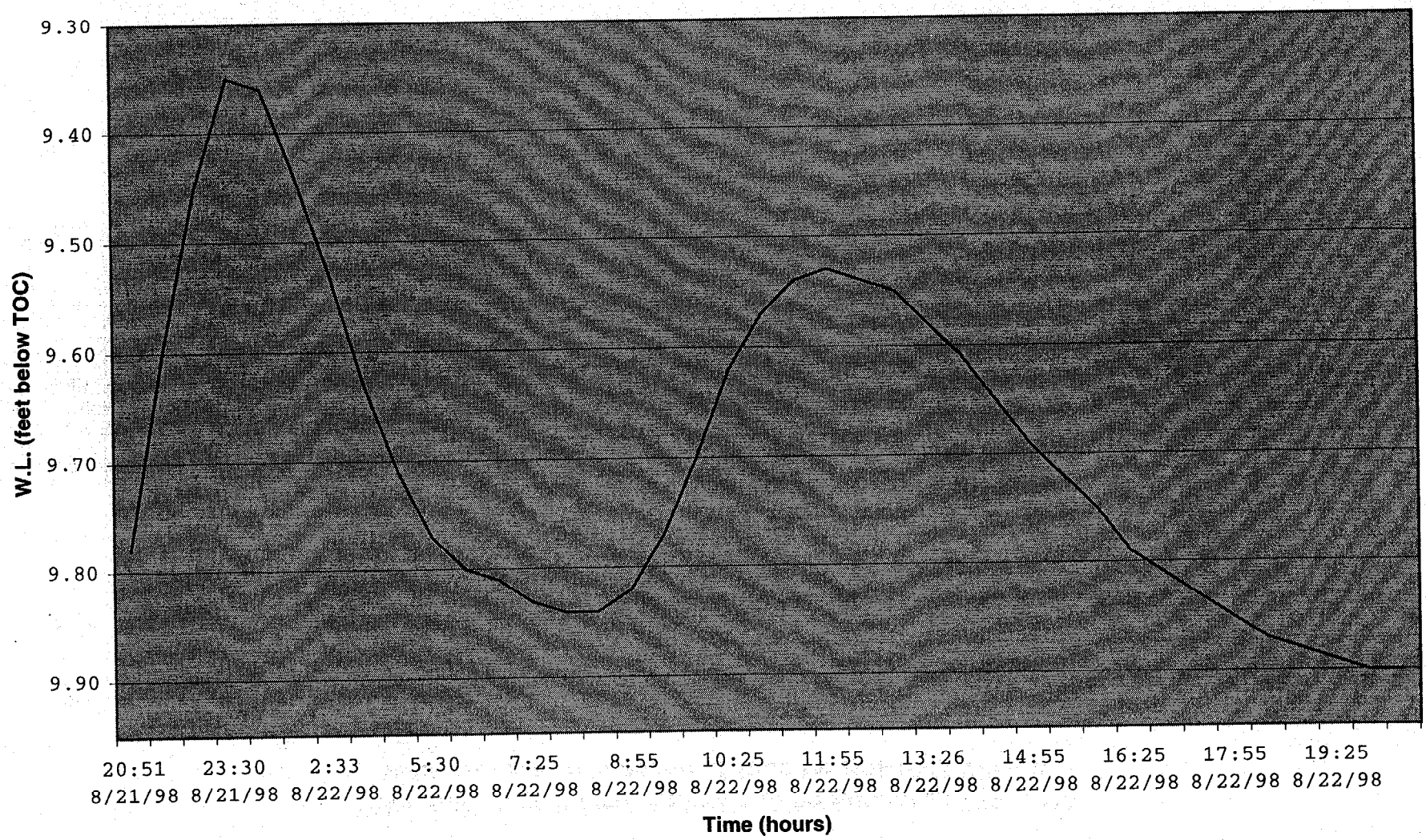
H71-8

Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-07(S)

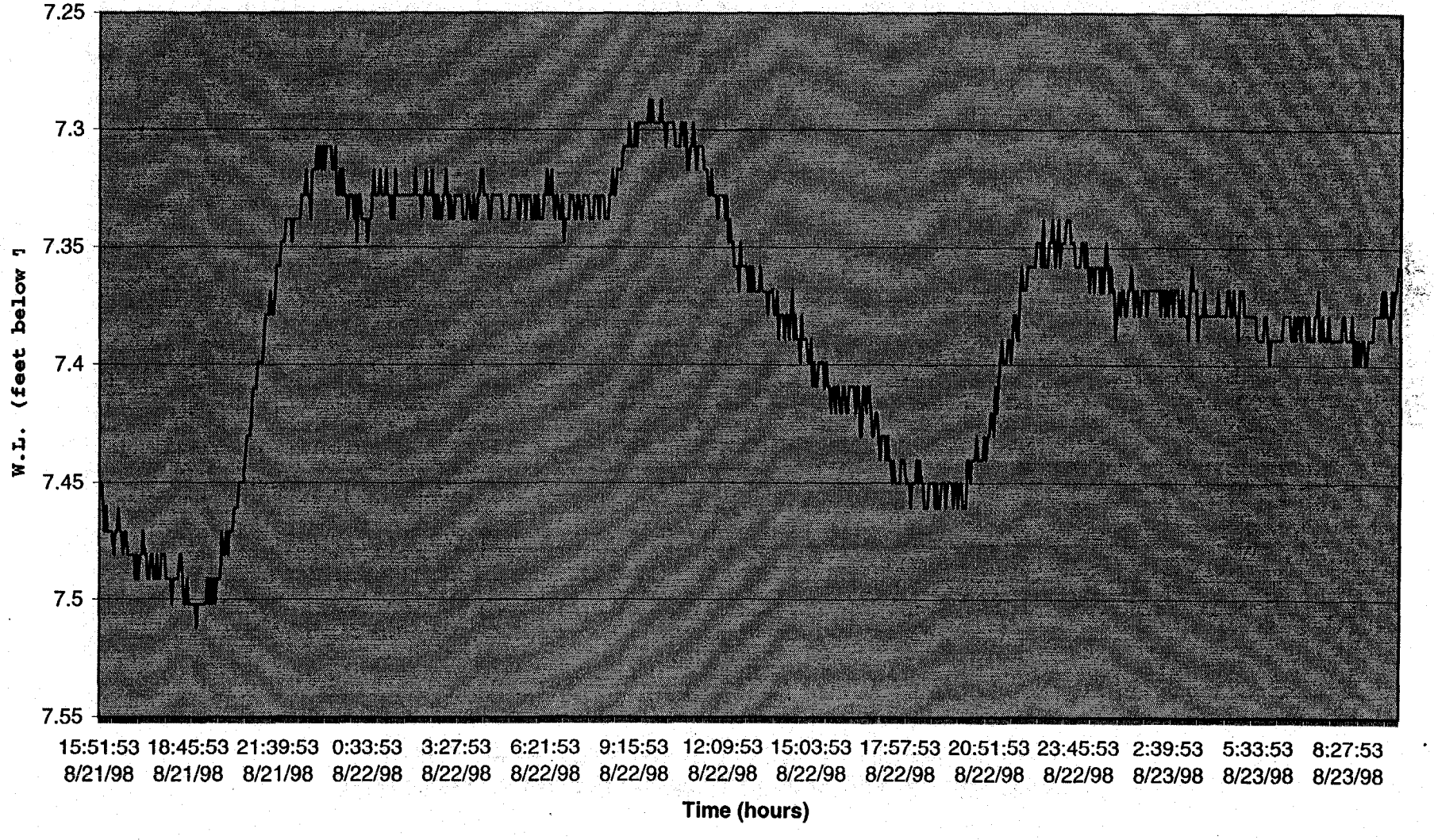


B-175

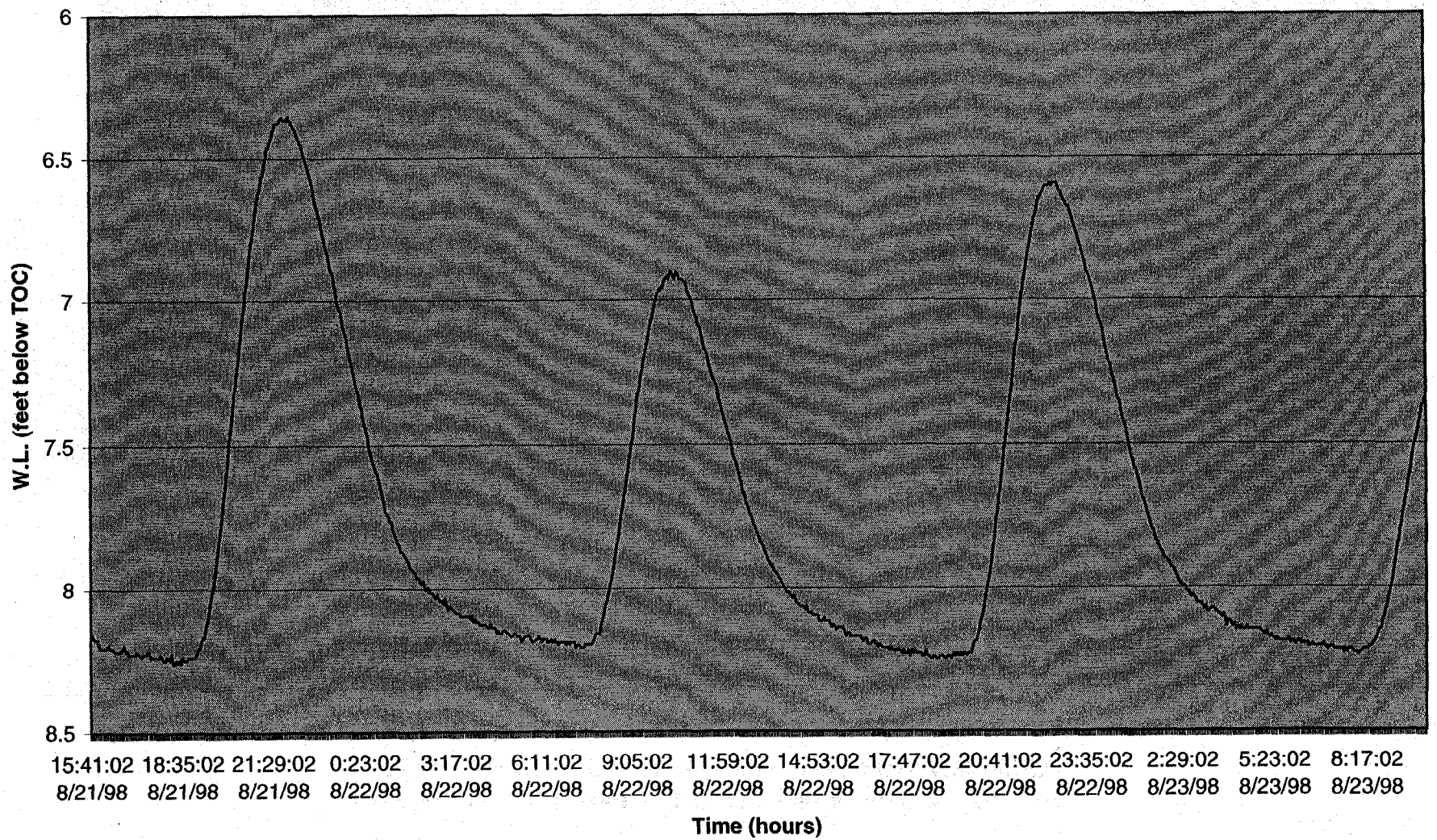
Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-08(D)



Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-09(S)

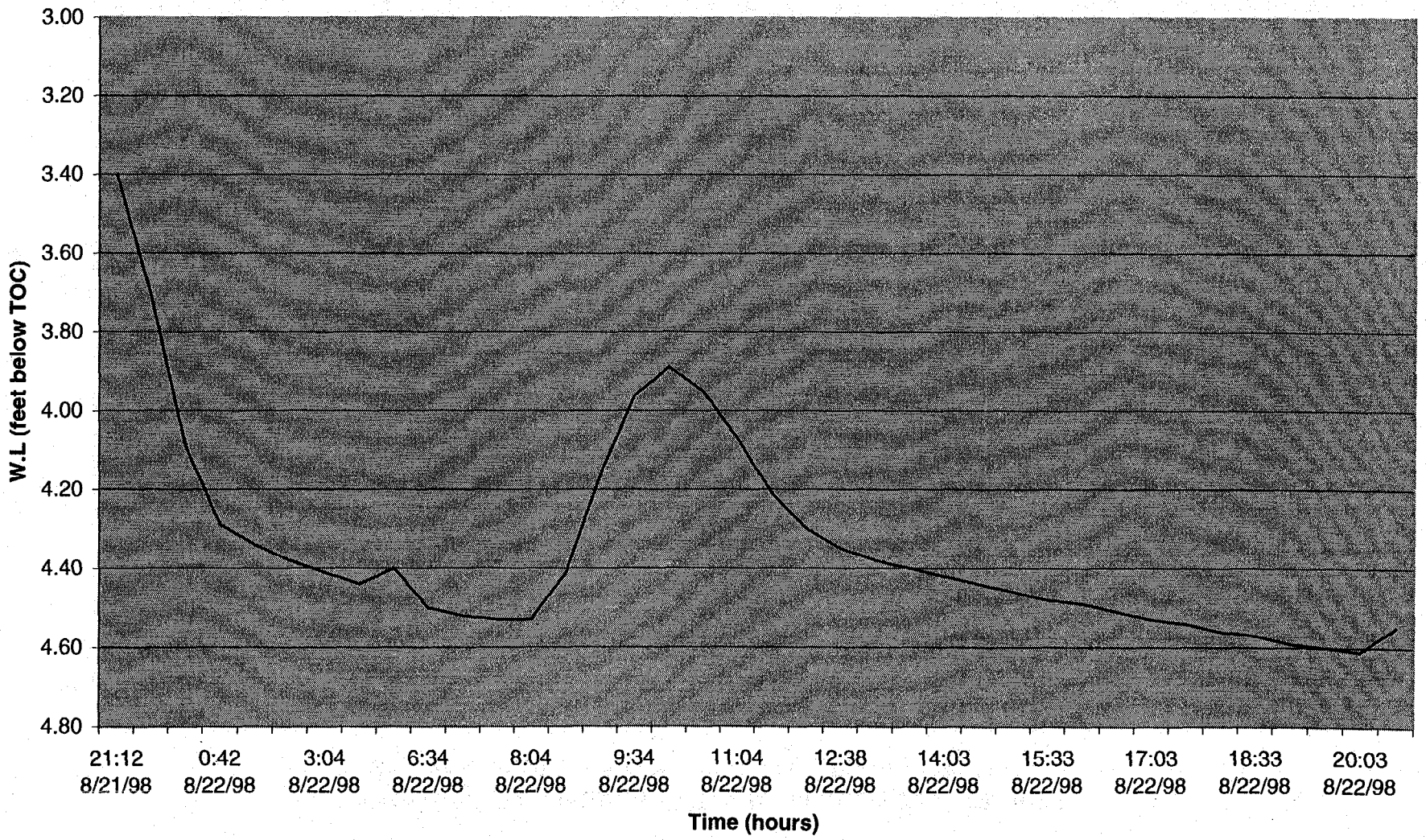


Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-10(D)



B-178

Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-11(S)



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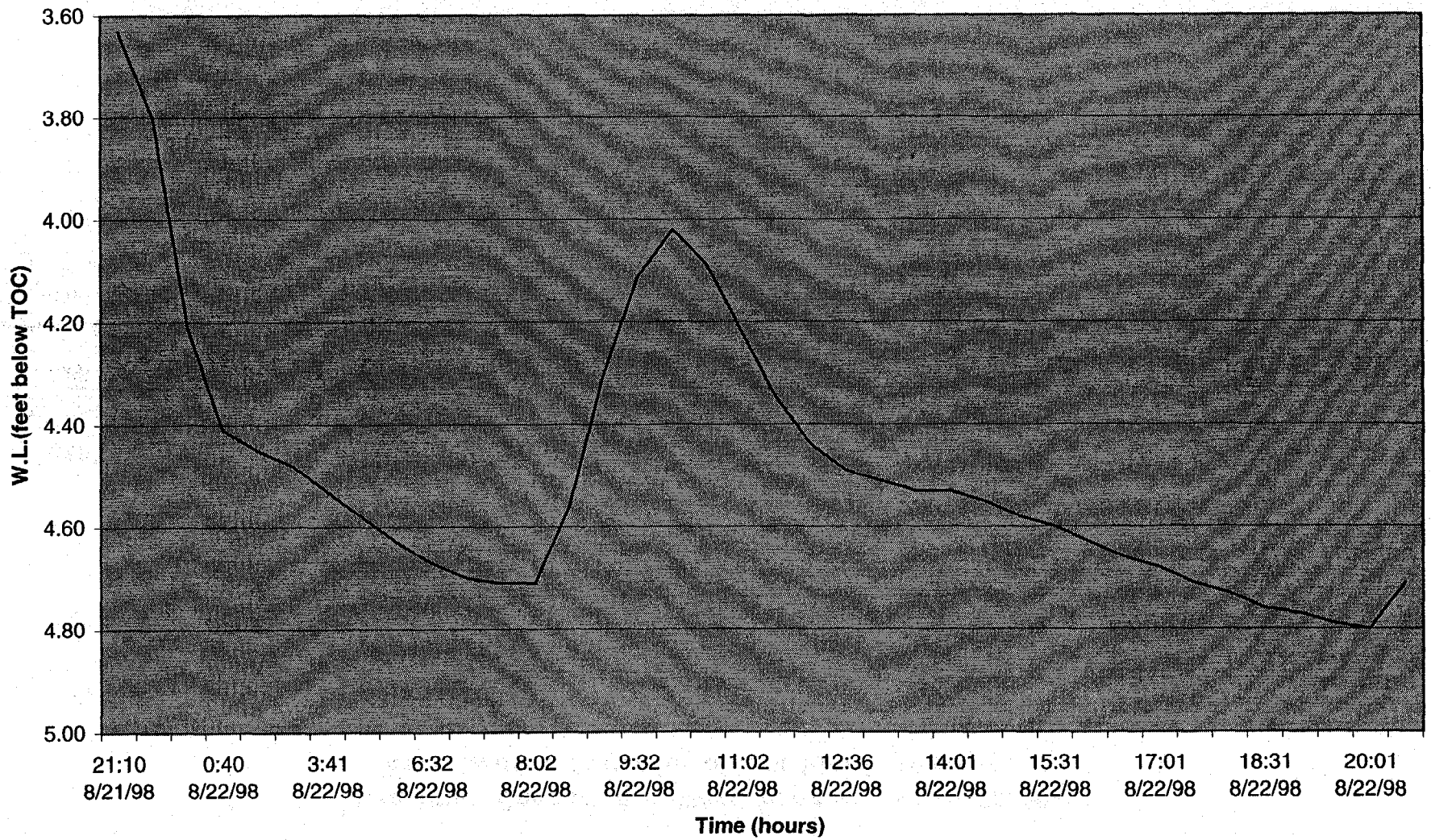
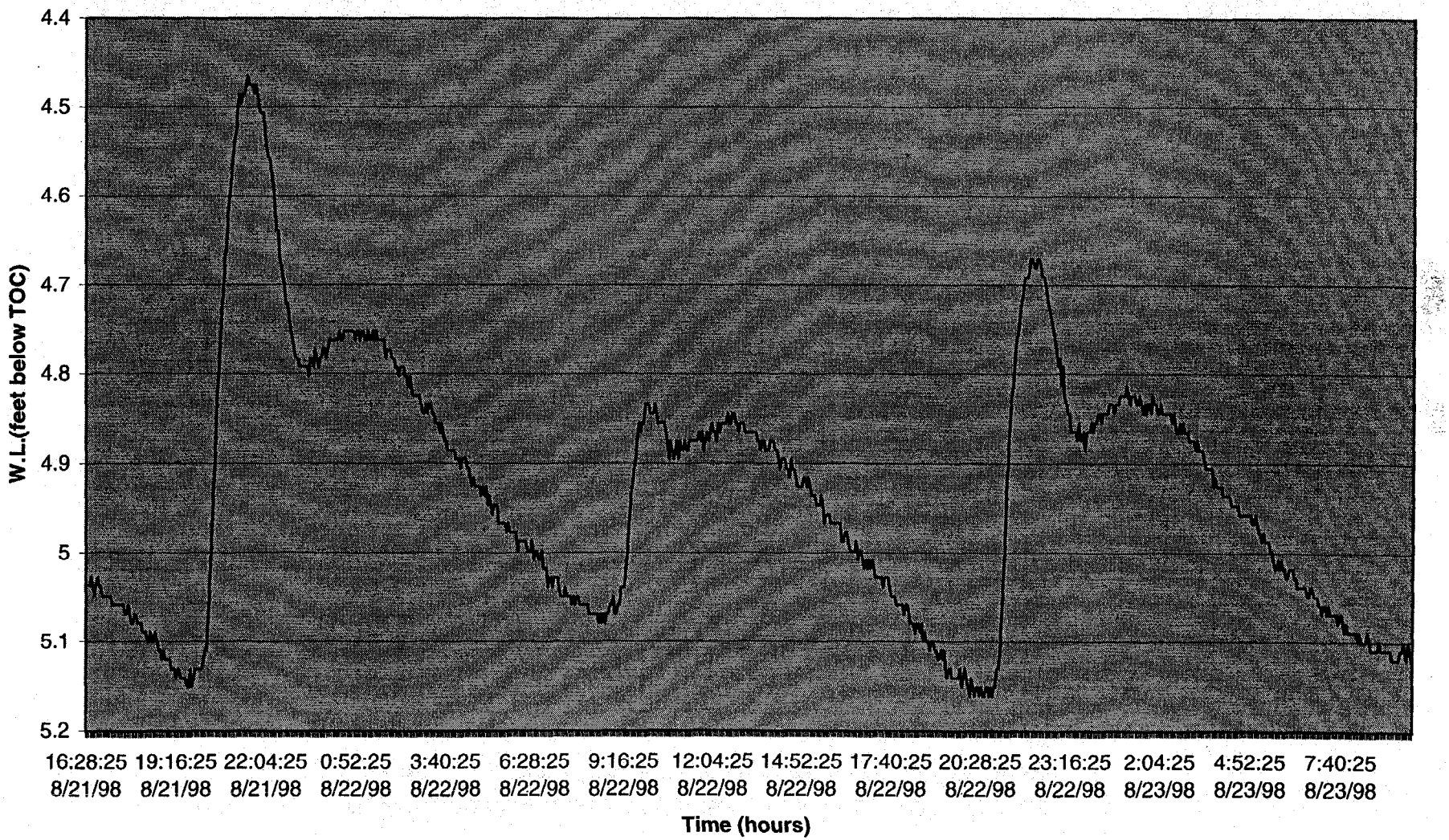
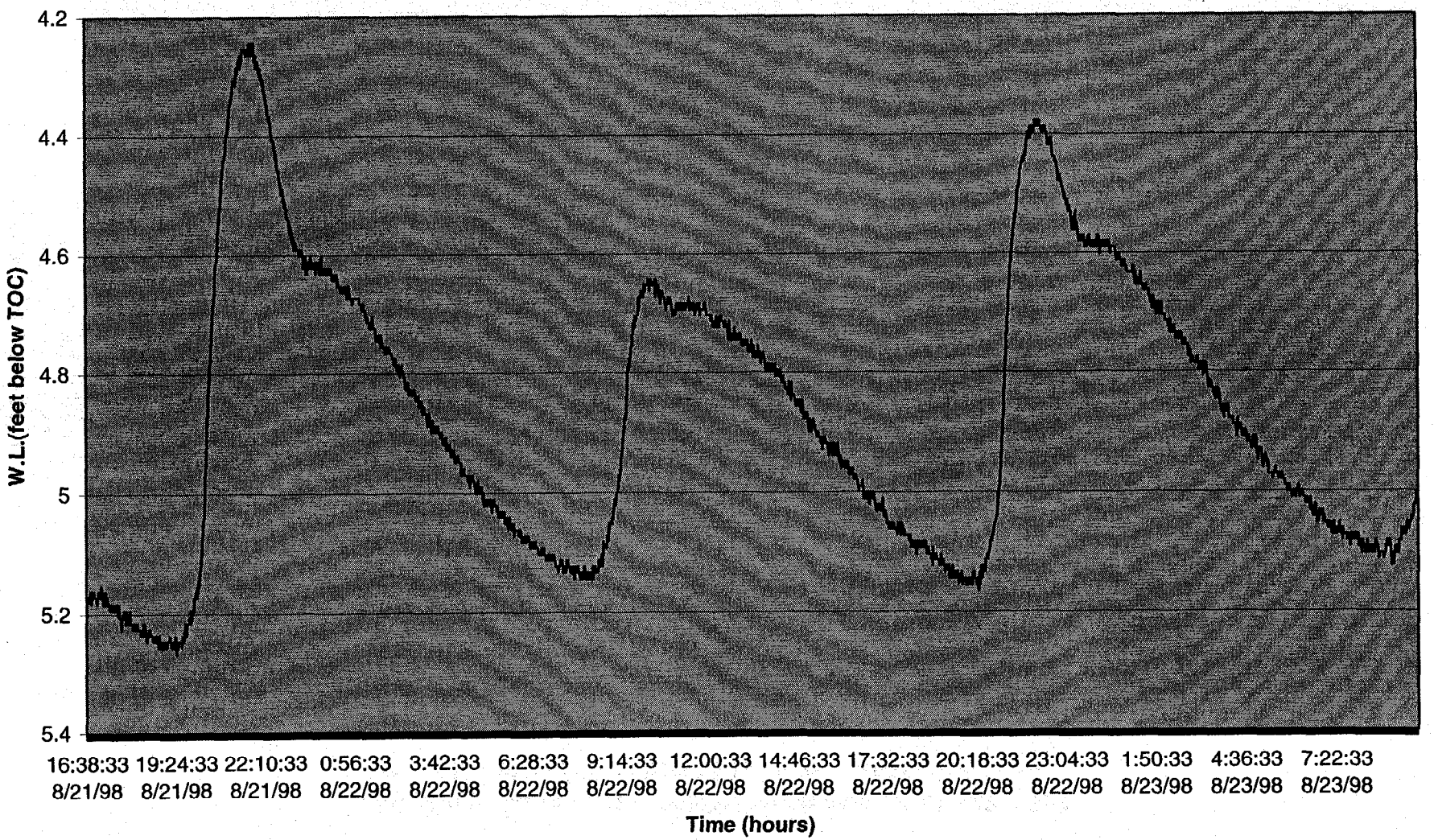
Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-12(D)



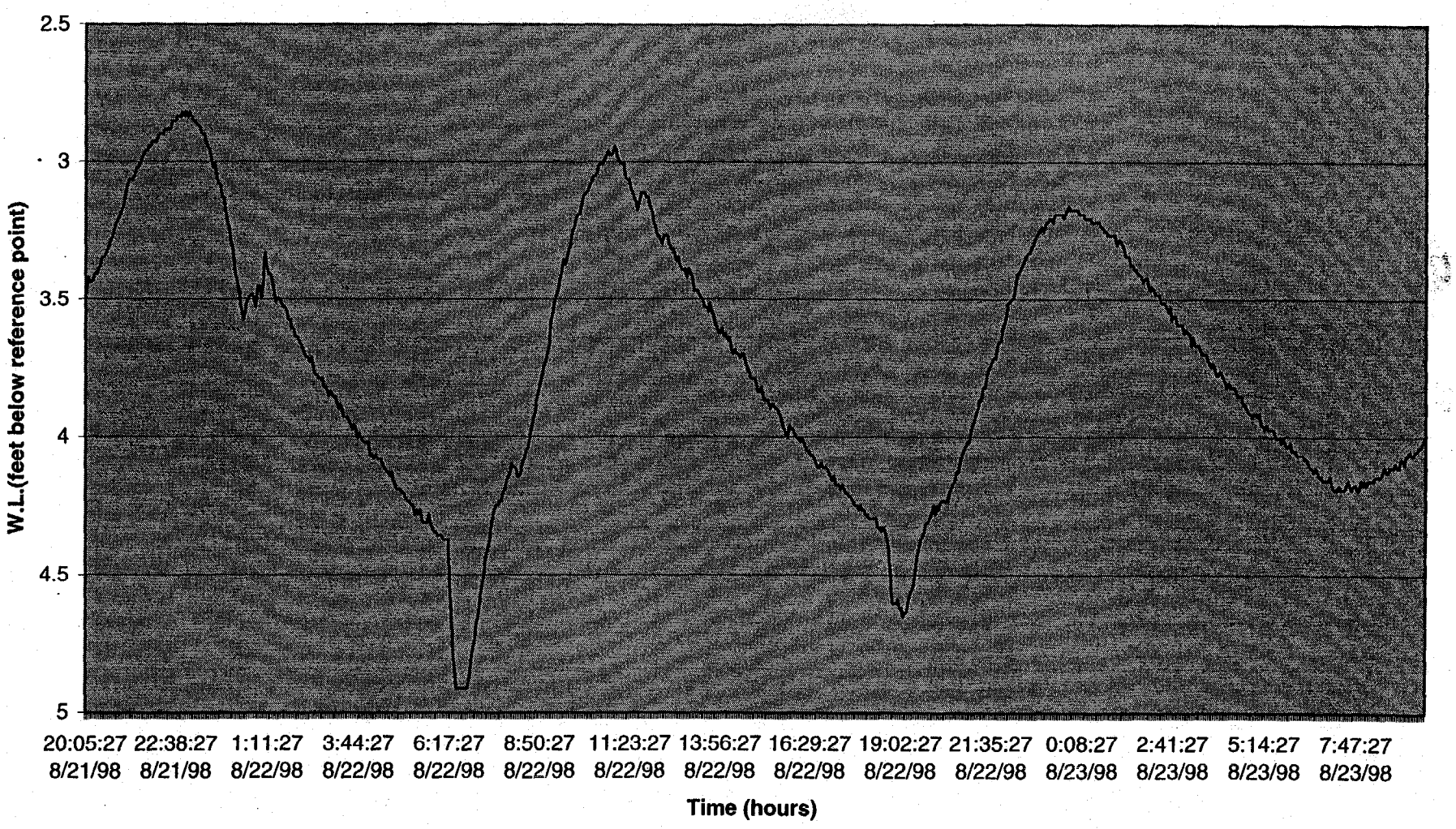
Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-13(S)



Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for PAI-10-MW-14(D)



Tidal Study Conducted at SWMU 10 on August 21 - 22, 1998
Water Level as a Function of Time for Control Point Located in Tidal Stream South of Jericho Island



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APPENDIX C

ANALYTICAL RESULTS

C.1 Surface Soil Results
C.2 Unfiltered Groundwater Results
C.3 Filtered Groundwater Results
C.4 Unfiltered Surface Water Results
C.5 Filtered Surface Water Results
C.6 Sediment Results

C.1

SURFACE SOIL RESULTS

SUMMARY OF POSITIVE DETECTIONS
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-01-01 PAI-10-SS-01 7/28/98	PAI-10-SS-02-01 PAI-10-SS-02 7/28/98	PAI-10-SS-03-01 PAI-10-SS-03 7/28/98	PAI-10-SS-04-01 PAI-10-SS-04 7/28/98	PAI-10-SS-05-01 PAI-10-SS-05 7/28/98	PAI-10-SS-06-01 PAI-10-SS-06 7/28/98
VOLATILES (ug/kg)						
2-HEXANONE	680 U	9.1 U	5.6 U	6.9 U	5.4 U	5.8 U
4-METHYL-2-PENTANONE	680 U	6.5 J	5.6 U	5.2 J	3.8 J	4.8 J
ACETONE	680 UR	77 U	19 U	82 U	64 U	75 U
CARBON DISULFIDE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U
CARBON TETRACHLORIDE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U
CHLOROFORM	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U
CHLOROMETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U
TETRACHLOROETHENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U
TOLUENE	410 U	5.5 U	3.4 U	1.6 J	2.4 J	3.5 U
SEMIVOLATILES (ug/kg)						
2-METHYLNAPHTHALENE	460 U	390 U	410 U	370 U	380 U	350 U
ACENAPHTHENE	460 U	390 U	410 U	370 U	380 U	350 U
ACENAPHTHYLENE	460 U	390 U	410 U	370 U	380 U	350 U
ANTHRACENE	460 U	390 U	410 U	370 U	380 U	350 U
BENZO(A)ANTHRACENE	460 U	390 U	410 U	370 U	380 U	350 U
BENZO(A)PYRENE	460 U	390 U	410 U	370 U	380 U	49 J
BENZO(B)FLUORANTHENE	460 U	390 U	410 U	370 U	380 U	32 J
BENZO(G,H,I)PERYLENE	460 U	390 U	410 U	370 U	380 U	33 J
BENZO(K)FLUORANTHENE	460 U	390 U	410 U	370 U	380 U	350 U
BIS(2-ETHYLHEXYL)PHTHALATE	79 J	38 J	49 J	73 J	380 U	34 J
CHRYSENE	460 U	390 U	410 U	370 U	380 U	350 U
DIBENZO(A,H)ANTHRACENE	460 U	390 U	410 U	370 U	380 U	47 J
DIMETHYL PHTHALATE	460 U	390 U	410 U	370 U	380 U	350 U
FLUORANTHENE	460 U	390 U	410 U	370 U	380 U	350 U
FLUORENE	460 U	390 U	410 U	370 U	380 U	89 J
INDENO(1,2,3-CD)PYRENE	460 U	390 U	410 U	370 U	380 U	350 U
NAPHTHALENE	460 U	390 U	410 U	370 U	380 U	350 U
PENTACHLOROPHENOL	910 U	780 U	820 U	740 U	770 U	690 U
PHENANTHRENE	460 U	390 U	410 U	370 U	380 U	69 J
PYRENE	460 U	390 U	410 U	24 J	380 U	71 J
PESTICIDES/PCBs (ug/kg)						
4,4'-DDE	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U
METHOXYCHLOR	23 U	20 U	21 U	19 U	20 U	18 U
INORGANICS (mg/kg)						
ALUMINUM	1280	822	2180	3620	2740	2470
ANTIMONY	2.5 U	1.9 U	2 U	2 U	2 U	1.9 U
ARSENIC	0.45	0.52	2.2	0.61	0.24	0.46
BARIUM	2.7 U	3.3 U	4.7 U	9.2	7	9.6
BERYLLIUM	0.09 U	0.02 U	0.1 U	0.13 U	0.07 U	0.09 U
CADMIUM	0.26 U	0.2 U	0.21 U	0.21 U	0.21 U	0.2 U
CALCIUM	325	371	280	33.9	68.6	99.9
CHROMIUM	3.2	2.4	2.2	3.9	2.3	3.8
COBALT	0.68 U	0.62 U	0.82 U	0.35 U	0.49 U	0.34 U

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SUMMARY OF POSITIVE DETECTIONS
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-01-01 PAI-10-SS-01 7/28/98	PAI-10-SS-02-01 PAI-10-SS-02 7/28/98	PAI-10-SS-03-01 PAI-10-SS-03 7/28/98	PAI-10-SS-04-01 PAI-10-SS-04 7/28/98	PAI-10-SS-05-01 PAI-10-SS-05 7/28/98	PAI-10-SS-06-01 PAI-10-SS-06 7/28/98
COPPER	1 U	9.6	0.28 U	0.4 U	0.27 U	3
IRON	898	656	485	2600	1480	2210
LEAD	8.1	5	4.7	9.5	4.4	37.8
MAGNESIUM	653	249	630	160	186	130
MANGANESE	8.3 U	8.1 U	3.9 U	9.7 U	8.6 U	13.1
MERCURY	0.02 U	0.02	0.03	0.03	0.02 U	0.08
NICKEL	0.66	0.61	0.67	0.84	1.1	0.96
POTASSIUM	316	81.9	268	77.7	105	81.4
SELENIUM	0.09 U	0.08 U	0.39 U	0.07 U	0.11	0.07 U
SODIUM	3240	154	3870	16 U	21.6 U	19.7 U
THALLIUM	0.23 U	0.37 U	0.2 U	0.19 U	0.19 U	0.2 U
VANADIUM	4.1	1.7	2.4	5	4.1	4.2
ZINC	3.9 U	40.2	1.9 U	6.4 U	2.6 U	10.7
MISCELLANEOUS PARAMETERS						
PH	6.8	7.7	6.2	4.3	5.2	4.6
TOTAL ORGANIC CARBON %	0.72	0.94	0.41	0.79	0.62	0.84

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SUMMARY OF POSITIVE DETECTIONS
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-07-01 PAI-10-SS-07 7/28/98	PAI-10-SS-08-01 PAI-10-SS-08 7/28/98	PAI-10-SS-09-01 PAI-10-SS-09 7/28/98	PAI-10-SS-10-01 PAI-10-SS-10 7/28/98	PAI-10-SS-11-01 PAI-10-SS-11 8/6/98	PAI-10-SS-12-01 PAI-10-SS-12 8/6/98
VOLATILES (ug/kg)						
2-HEXANONE	590 U	5.7 U	8.5	590 U	6 U	6.8 U
4-METHYL-2-PENTANONE	590 U	8.7	26	590 U	6 U	6.8 U
ACETONE	590 U	140 U	320 U	590 U	350 J	170
CARBON DISULFIDE	350 U	3.4 U	3.4 U	350 U	3.6 U	4.1 U
CARBON TETRACHLORIDE	350 U	3.4 U	3.4 U	350 U	3.6 U	4.1 U
CHLOROFORM	350 U	3.4 U	3.4 U	350 U	7.5	4.1 U
CHLOROMETHANE	350 U	3.4 U	3.4 U	350 U	17	4.1 U
TETRACHLOROETHENE	350 U	3.4 U	3.4 U	350 U	3.6 U	4.1 U
TOLUENE	350 U	1.3 J	2.3 J	350 U	2 J	3.3 J
SEMIVOLATILES (ug/kg)						
2-METHYLNAPHTHALENE	370 U	360 U	360 U	360 U	350 U	340 U
ACENAPHTHENE	370 U	360 U	360 U	360 U	350 U	340 U
ACENAPHTHYLENE	370 U	360 U	360 U	360 U	350 U	340 U
ANTHRACENE	370 U	24 J	360 U	360 U	350 U	340 U
BENZO(A)ANTHRACENE	370 U	140 J	360 U	360 U	350 U	340 U
BENZO(A)PYRENE	370 U	120 J	360 U	360 U	350 U	340 U
BENZO(B)FLUORANTHENE	370 U	120 J	360 U	360 U	350 U	340 U
BENZO(G,H,I)PERYLENE	370 U	50 J	360 U	360 U	350 U	340 U
BENZO(K)FLUORANTHENE	370 U	110 J	360 U	360 U	350 U	340 U
BIS(2-ETHYLHEXYL)PHTHALATE	480	83 J	360 U	51 J	350 U	340 U
CHRYSENE	370 U	160 J	360 U	360 U	350 U	340 U
DIBENZO(A,H)ANTHRACENE	370 U	360 U	360 U	360 U	350 U	340 U
DIMETHYL PHTHALATE	370 U	360 U	360 U	360 U	350 U	340 U
FLUORANTHENE	370 U	280 J	360 U	360 U	350 U	340 U
FLUORENE	370 U	360 U	360 U	360 U	350 U	340 U
INDENO(1,2,3-CD)PYRENE	370 U	69 J	360 U	360 U		
NAPHTHALENE	370 U	360 U	360 U	360 U	350 U	340 U
PENTACHLOROPHENOL	740 U	720 U	720 U	720 U	710 U	690 U
PHENANTHRENE	370 U	140 J	360 U	360 U	350 U	340 U
PYRENE	370 U	230 J	360 U	360 U	350 U	340 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDE	3.7 U	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U
METHOXYCHLOR	19 U	18 U	18 U	18 U	18 U	18 U
INORGANICS (mg/kg)						
ALUMINUM	3900	2810	3070	3410	4400	5000
ANTIMONY	2.1 U	1.9 U	1.8 U	2 U	1.9 U	1.9 U
ARSENIC	0.6	0.44	0.62	0.79	0.88	1
BARIUM	10.6	13.1	5.9 U	11.7	12	13.7
BERYLLIUM	0.12 U	0.12 U	0.12 U	0.11 U	0.12	0.18
CADMIUM	0.22 U	0.2 U	0.19 U	0.21 U	0.2 U	0.2 U
CALCIUM	52.1	275	37.9	38.2	78.5	63.7
CHROMIUM	2.9	2.4	1.8	2.4	3.1	3.8
COBALT	0.36 U	0.33 U	0.38 U	0.37 U	0.58	0.75

SUMMARY OF POSITIVE DETECTIONS
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-07-01 PAI-10-SS-07 7/28/98	PAI-10-SS-08-01 PAI-10-SS-08 7/28/98	PAI-10-SS-09-01 PAI-10-SS-09 7/28/98	PAI-10-SS-10-01 PAI-10-SS-10 7/28/98	PAI-10-SS-11-01 PAI-10-SS-11 8/6/98	PAI-10-SS-12-01 PAI-10-SS-12 8/6/98
COPPER	0.67 U	0.86 U	0.29 U	0.5 U	1.2	0.55
IRON	2160	1930	2310	2230	2530	2600
LEAD	5.8	12.5	6.1	4.7	6.7	6.4
MAGNESIUM	169	155	123	129	216	218
MANGANESE	40.2	51.9	8.5 U	61.7	45.3	61.9
MERCURY	0.02 U	0.04	0.02 U	0.05	0.06	0.04
NICKEL	1	0.73	0.95	1.2	1.6	1.6
POTASSIUM	89.5	74.8	76.3	57.8	129	101
SELENIUM	0.11	0.12	0.09	0.1	0.09 U	0.07 U
SODIUM	14.5 U	18.4 U	17.1 U	11.4 U	27.1	20.1 U
THALLIUM	0.28 U	0.18 U	0.18 U	0.19 U	0.19 U	0.18 U
VANADIUM	4.7	4.1	4.2	5.3	4.9	5.4
ZINC	5.1 U	8.6	3.5 U	4.5 U	6.1	4.1
MISCELLANEOUS PARAMETERS						
PH	4.5	5.7	4.4	4.9		
TOTAL ORGANIC CARBON %	0.96	0.46	0.71	0.55		

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SUMMARY OF POSITIVE DETECTIONS
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-12-01-D PAI-10-SS-12 8/6/98	PAI-10-SS-13-01 PAI-10-SS-13 8/6/98	PAI-10-SS-14-01 PAI-10-SS-14 8/6/98	PAI-10-SS-15-01 PAI-10-SS-15-BG 9/9/98	PAI-10-SS-15-01A PAI-10-SS-15 8/6/98	PAI-10-SS-16-01 PAI-10-SS-16 9/9/98
VOLATILES (ug/kg)						
2-HEXANONE	6.1 U	6.9 U	6.1 U	6 U	6.6 U	6 U
4-METHYL-2-PENTANONE	6.1 U	6.9 U	6.1 U	6 U	6.6 U	4 J
ACETONE	64	46	23	7 U	660 U	26
CARBON DISULFIDE	3.7 U	4.1 U	3.6 U	4 U	3.9 U	4 U
CARBON TETRACHLORIDE	3.7 U	4.1 U	3.6 U	4 U	3.9 U	4 U
CHLOROFORM	3.7 U	1.8 J	3.6 U	4 U	3.9 U	4 U
CHLOROMETHANE	3.7 U	4.1 U	3.6 U	4 U	3.6 J	4 U
TETRACHLOROETHENE	3.7 U	4.1 U	3.6 U	4 U	3.9 U	4 U
TOLUENE	1.6 J	1.5 J	3.4 J	4 U	3.9 J	4 U
SEMIVOLATILES (ug/kg)						
2-METHYLNAPHTHALENE	600	350 U	440 U	370 U	350 U	360 U
ACENAPHTHENE	440	350 U	440 U	370 U	350 U	360 U
ACENAPHTHYLENE	580	350 U	440 U	370 U	350 U	360 U
ANTHRACENE	340 U	350 U	440 U	370 U	350 U	360 U
BENZO(A)ANTHRACENE	340 U	350 U	440 U	370 U	350 U	360 U
BENZO(A)PYRENE	340 U	350 U	440 U	370 U	350 U	360 U
BENZO(B)FLUORANTHENE	340 U	350 U	440 U	370 U	350 U	360 U
BENZO(G,H,I)PERYLENE	340 U	350 U	440 U	370 U	350 U	360 U
BENZO(K)FLUORANTHENE	340 U	350 U	440 U	370 U	350 U	360 U
BIS(2-ETHYLHEXYL)PHTHALATE	340 U	350 U	92 J	370 U	30 J	360 U
CHRYSENE	340 U	350 U	440 U	370 U	350 U	360 U
DIBENZO(A,H)ANTHRACENE	340 U	350 U	440 U	370 U	350 U	360 U
DIMETHYL PHTHALATE	340 U	350 U	440 U	370 U	350 U	360 U
FLUORANTHENE	340 U	350 U	440 U	370 U	350 U	360 U
FLUORENE	220 J	350 U	440 U	370 U	350 U	360 U
INDENO(1,2,3-CD)PYRENE				370 U		360 U
NAPHTHALENE	2700	350 U	440 U	370 U	350 U	360 U
PENTACHLOROPHENOL	240 J	690 U	890 U	730 U	700 U	720 U
PHENANTHRENE	340 U	350 U	440 U	370 U	350 U	360 U
PYRENE	340 U	350 U	440 U	370 U	350 U	360 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDE	3.4 U	3.4 U	43	3.6 U	3.5 U	3.6 U
METHOXYCHLOR	18 U	70	23 U	19 U	18 U	18 U
INORGANICS (mg/kg)						
ALUMINUM	4800	3910	5370	2680	5340	3150
ANTIMONY	1.8 U	1.9 U	8	2.1 U	1.8 U	1.8 U
ARSENIC	0.9	0.71	50.8	0.97	0.85	0.79
BARIUM	13.8	10	76.4	5.4	16.7	7.1
BERYLLIUM	0.16	0.13	0.08	0.11 U	0.17	0.11 U
CADMIUM	0.19 U	0.2 U	3.2	0.22 U	0.19 U	0.18 U
CALCIUM	62	79.4	2780	147	191	213
CHROMIUM	3.3	3.1	18.1	3.8	3.2	3.7
COBALT	0.32 U	0.5	6.6	0.37 U	0.57	0.58 U

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SUMMARY OF POSITIVE DETECTIONS
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-12-01-D PAI-10-SS-12 8/6/98	PAI-10-SS-13-01 PAI-10-SS-13 8/6/98	PAI-10-SS-14-01 PAI-10-SS-14 8/6/98	PAI-10-SS-15-01 PAI-10-SS-15-BG 9/9/98	PAI-10-SS-15-01A PAI-10-SS-15 8/6/98	PAI-10-SS-16-01 PAI-10-SS-16 9/9/98
COPPER	0.89	1	189	0.68 U	0.72	1.1 U
IRON	3440	2020	99700	2020	2810	2070
LEAD	7.1	8.8	1100 J	6.6 J	4.7	6.3 J
MAGNESIUM	214	192	3240	258	237	330
MANGANESE	66.3	10.6	522	9.4	206	14.4
MERCURY	0.05	0.04	0.89	0.04	0.06	0.04 U
NICKEL	1.6	1.2	26.5	1.5 U	1.8	1.7 U
POTASSIUM	102	102	640	137	113	142
SELENIUM	0.07 U	0.12 U	0.44 U	0.07 U	0.07 U	0.06 U
SODIUM	31	37.7	10700	115 U	16.7 U	97.9 U
THALLIUM	0.18 U	0.18 U	0.22 U	0.18	0.19 U	0.17 U
VANADIUM	5.1	3.8	9.3	5.3	5.5	4.9
ZINC	5.4	6.2	1020	5.4	5.2	5.4
MISCELLANEOUS PARAMETERS						
PH						
TOTAL ORGANIC CARBON %						

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SUMMARY OF POSITIVE DETECTIONS
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-17-01 PAI-10-SS-17 9/9/98	PI-012-03(37) PI-012-03 12/14/95
VOLATILES (ug/kg)		
2-HEXANONE	6 U	11 U
4-METHYL-2-PENTANONE	4 J	11 U
ACETONE	20 U	11 U
CARBON DISULFIDE	4 U	6 J
CARBON TETRACHLORIDE	4 U	6 J
CHLOROFORM	4 U	11 U
CHLOROMETHANE	4 U	11 U
TETRACHLOROETHENE	4 U	1 J
TOLUENE	2 J	11 U
SEMIVOLATILES (ug/kg)		
2-METHYLNAPHTHALENE	360 U	440 U
ACENAPHTHENE	360 U	440 U
ACENAPHTHYLENE	360 U	440 U
ANTHRACENE	360 U	440 U
BENZO(A)ANTHRACENE	360 U	41 J
BENZO(A)PYRENE	360 U	53 J
BENZO(B)FLUORANTHENE	360 U	130 J
BENZO(G,H,I)PERYLENE	360 U	55 J
BENZO(K)FLUORANTHENE	360 U	440 U
BIS(2-ETHYLHEXYL)PHTHALATE	360 U	440 U
CHRYSENE	360 U	62 J
DIBENZO(A,H)ANTHRACENE	360 U	34 J
DIMETHYL PHTHALATE	360 U	180 J
FLUORANTHENE	360 U	41 J
FLUORENE	360 U	440 U
INDENO(1,2,3-CD)PYRENE	360 U	64 J
NAPHTHALENE	360 U	440 U
PENTACHLOROPHENOL	720 U	1100 U
PHENANTHRENE	360 U	440 U
PYRENE	360 U	43 J
PESTICIDES/PCBs (ug/kg)		
4,4'-DDE	3.6 U	3.5 U
METHOXYCHLOR	18 U	18 U
INORGANICS (mg/kg)		
ALUMINUM	4750	4160
ANTIMONY	1.9 U	0.48 U
ARSENIC	0.94	0.78
BARIUM	10.5	12.3
BERYLLIUM	0.17 U	0.19 U
CADMIUM	0.2 U	0.06
CALCIUM	322	155
CHROMIUM	3.5	8.2
COBALT	0.33 U	0.47

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SUMMARY OF POSITIVE DETECTIONS
SURFACE SOIL
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-17-01 PAI-10-SS-17 9/9/98	PI-012-03(37) PI-012-03 12/14/95
COPPER	0.73 U	3.3
IRON	2360	2940
LEAD	5.4 J	31.7
MAGNESIUM	326	220
MANGANESE	31.8	21.1
MERCURY	0.05	0.09 U
NICKEL	2.3 U	1.5
POTASSIUM	182	137
SELENIUM	0.1 U	0.42 U
SODIUM	124 U	35.6 U
THALLIUM	0.19 U	0.44 U
VANADIUM	5.3	3.8
ZINC	5.6	43
MISCELLANEOUS PARAMETERS		
PH		
TOTAL ORGANIC CARBON %		

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-01-01 PAI-10-SS-01 7/28/98	PAI-10-SS-02-01 PAI-10-SS-02 7/28/98	PAI-10-SS-03-01 PAI-10-SS-03 7/28/98	PAI-10-SS-04-01 PAI-10-SS-04 7/28/98	PAI-10-SS-05-01 PAI-10-SS-05 7/28/98	PAI-10-SS-06-01 PAI-10-SS-06 7/28/98	PAI-10-SS-07-01 PAI-10-SS-07 7/28/98
VOLATILES (ug/kg)							
1,1,1-TRICHLOROETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
1,1,2,2-TETRACHLOROETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
1,1,2-TRICHLOROETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
1,1-DICHLOROETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
1,1-DICHLOROETHENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
1,2-DICHLOROETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
1,2-DICHLOROETHENE (TOTAL)	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
1,2-DICHLOROPROPANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
2-BUTANONE	680 U	9.1 U	5.6 U	6.9 U	5.4 U	5.8 U	590 U
2-HEXANONE	680 U	9.1 U	5.6 U	6.9 U	5.4 U	5.8 U	590 U
4-METHYL-2-PENTANONE	680 U	6.5 J	5.6 U	5.2 J	3.8 J	4.8 J	590 U
ACETONE	680 UR	77 U	19 U	82 U	64 U	75 U	590 U
BENZENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
BROMODICHLOROMETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
BROMOFORM	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
BROMOMETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
CARBON DISULFIDE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
CARBON TETRACHLORIDE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
CHLOROBENZENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
CHLORODIBROMOMETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
CHLOROETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
CHLOROFORM	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
CHLOROMETHANE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
CIS-1,3-DICHLOROPROPENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
ETHYLBENZENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
METHYLENE CHLORIDE	410 U	5.5 U	3.4 U	4.2 U	4.8 U	4.5 U	350 U
STYRENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
TETRACHLOROETHENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
TOLUENE	410 U	5.5 U	3.4 U	1.6 J	2.4 J	3.5 U	350 U
TRANS-1,3-DICHLOROPROPENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
TRICHLOROETHENE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
VINYL CHLORIDE	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
XYLENES, TOTAL	410 U	5.5 U	3.4 U	4.2 U	3.3 U	3.5 U	350 U
SEMIVOLATILES (ug/kg)							
1,2,4-TRICHLOROBENZENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
1,2-DICHLOROBENZENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
1,3-DICHLOROBENZENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
1,4-DICHLOROBENZENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2,2'-OXYBIS(1-CHLOROPROPANE)	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2,4,5-TRICHLOROPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2,4,6-TRICHLOROPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2,4-DICHLOROPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2,4-DIMETHYLPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U

SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-01-01 PAI-10-SS-01 7/28/98	PAI-10-SS-02-01 PAI-10-SS-02 7/28/98	PAI-10-SS-03-01 PAI-10-SS-03 7/28/98	PAI-10-SS-04-01 PAI-10-SS-04 7/28/98	PAI-10-SS-05-01 PAI-10-SS-05 7/28/98	PAI-10-SS-06-01 PAI-10-SS-06 7/28/98	PAI-10-SS-07-01 PAI-10-SS-07 7/28/98
2,4-DINITROPHENOL	910 U	780 U	820 U	740 U	770 U	690 U	740 U
2,4-DINITROTOLUENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2,6-DINITROTOLUENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2-CHLORONAPHTHALENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2-CHLOROPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2-METHYLNAPHTHALENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2-METHYLPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2-NITROANILINE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
2-NITROPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
3,3'-DICHLOROBENZIDINE	910 U	780 U	820 U	740 U	770 U	690 U	740 U
3-NITROANILINE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
4,6-DINITRO-2-METHYLPHENOL	910 U	780 U	820 U	740 U	770 U	690 U	740 U
4-BROMOPHENYL PHENYL ETHER	460 U	390 U	410 U	370 U	380 U	350 U	370 U
4-CHLORO-3-METHYLPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
4-CHLOROANILINE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
4-CHLOROPHENYL PHENYL ETHER	460 U	390 U	410 U	370 U	380 U	350 U	370 U
4-METHYLPHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
4-NITROANILINE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
4-NITROPHENOL	910 U	780 U	820 U	740 U	770 U	690 U	740 U
ACENAPHTHENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
ACENAPHTHYLENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
ANILINE							
ANTHRACENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
BENZO(A)ANTHRACENE	460 U	390 U	410 U	370 U	380 U	49 J	370 U
BENZO(A)PYRENE	460 U	390 U	410 U	370 U	380 U	32 J	370 U
BENZO(B)FLUORANTHENE	460 U	390 U	410 U	370 U	380 U	33 J	370 U
BENZO(G,H,I)PERYLENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
BENZO(K)FLUORANTHENE	460 U	390 U	410 U	370 U	380 U	34 J	370 U
BIS(2-CHLOROETHOXY)METHANE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
BIS(2-CHLOROETHYL)ETHER	460 U	390 U	410 U	370 U	380 U	350 U	370 U
BIS(2-ETHYLHEXYL)PHTHALATE	79 J	38 J	49 J	73 J	380 U	350 U	480
BUTYL BENZYL PHTHALATE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
CARBAZOLE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
CHRYSENE	460 U	390 U	410 U	370 U	380 U	47 J	370 U
DI-N-BUTYL PHTHALATE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
DI-N-OCTYL PHTHALATE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
DIBENZO(A,H)ANTHRACENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
DIBENZOFURAN	460 U	390 U	410 U	370 U	380 U	350 U	370 U
DIETHYL PHTHALATE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
DIMETHYL PHTHALATE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
FLUORANTHENE	460 U	390 U	410 U	370 U	380 U	89 J	370 U
FLUORENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
HEXACHLOROBENZENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
HEXACHLOROBUTADIENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-01-01 PAI-10-SS-01 7/28/98	PAI-10-SS-02-01 PAI-10-SS-02 7/28/98	PAI-10-SS-03-01 PAI-10-SS-03 7/28/98	PAI-10-SS-04-01 PAI-10-SS-04 7/28/98	PAI-10-SS-05-01 PAI-10-SS-05 7/28/98	PAI-10-SS-06-01 PAI-10-SS-06 7/28/98	PAI-10-SS-07-01 PAI-10-SS-07 7/28/98
HEXACHLOROCYCLOPENTADIENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
HEXACHLOROETHANE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
INDENO(1,2,3-CD)PYRENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
ISOPHORONE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
N-NITROSO-DI-N-PROPYLAMINE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
N-NITROSODIPHENYLAMINE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
NAPHTHALENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
NITROBENZENE	460 U	390 U	410 U	370 U	380 U	350 U	370 U
PENTACHLOROPHENOL	910 U	780 U	820 U	740 U	770 U	690 U	740 U
PHENANTHRENE	460 U	390 U	410 U	370 U	380 U	69 J	370 U
PHENOL	460 U	390 U	410 U	370 U	380 U	350 U	370 U
PYRENE	460 U	390 U	410 U	24 J	380 U	71 J	370 U
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
4,4'-DDE	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
4,4'-DDT	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
ALDRIN	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
ALPHA-BHC	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
ALPHA-CHLORDANE	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
AROCLOR-1016	45 U	38 U	41 U	37 U	38 U	34 U	37 U
AROCLOR-1221	90 U	77 U	81 U	73 U	76 U	69 U	73 U
AROCLOR-1232	45 U	38 U	41 U	37 U	38 U	34 U	37 U
AROCLOR-1242	45 U	38 U	41 U	37 U	38 U	34 U	37 U
AROCLOR-1248	45 U	38 U	41 U	37 U	38 U	34 U	37 U
AROCLOR-1254	45 U	38 U	41 U	37 U	38 U	34 U	37 U
AROCLOR-1260	45 U	38 U	41 U	37 U	38 U	34 U	37 U
BETA-BHC	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
DELTA-BHC	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
DIELDRIN	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
ENDOSULFAN I	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
ENDOSULFAN II	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
ENDOSULFAN SULFATE	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
ENDRIN	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
ENDRIN ALDEHYDE	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
ENDRIN KETONE	4.5 U	3.8 U	4.1 U	3.7 U	3.8 U	3.4 U	3.7 U
GAMMA-BHC (LINDANE)	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
GAMMA-CHLORDANE	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
HEPTACHLOR	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
HEPTACHLOR EPOXIDE	2.3 U	2 U	2.1 U	1.9 U	2 U	1.8 U	1.9 U
METHOXYCHLOR	23 U	20 U	21 U	19 U	20 U	18 U	19 U
TOXAPHENE	230 U	200 U	210 U	190 U	200 U	180 U	190 U
INORGANICS (mg/kg)							
ALUMINUM	1280	822	2180	3620	2740	2470	3900
ANTIMONY	2.5 U	1.9 U	2 U	2 U	2 U	1.9 U	2.1 U

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-01-01 PAI-10-SS-01 7/28/98	PAI-10-SS-02-01 PAI-10-SS-02 7/28/98	PAI-10-SS-03-01 PAI-10-SS-03 7/28/98	PAI-10-SS-04-01 PAI-10-SS-04 7/28/98	PAI-10-SS-05-01 PAI-10-SS-05 7/28/98	PAI-10-SS-06-01 PAI-10-SS-06 7/28/98	PAI-10-SS-07-01 PAI-10-SS-07 7/28/98
ARSENIC	0.45	0.52	2.2	0.61	0.24	0.46	0.6
BARIUM	2.7 U	3.3 U	4.7 U	9.2	7	9.6	10.6
BERYLLIUM	0.09 U	0.02 U	0.1 U	0.13 U	0.07 U	0.09 U	0.12 U
CADMIUM	0.26 U	0.2 U	0.21 U	0.21 U	0.21 U	0.2 U	0.22 U
CALCIUM	325	371	280	33.9	68.6	99.9	52.1
CHROMIUM	3.2	2.4	2.2	3.9	2.3	3.8	2.9
COBALT	0.68 U	0.62 U	0.82 U	0.35 U	0.49 U	0.34 U	0.36 U
COPPER	1 U	9.6	0.28 U	0.4 U	0.27 U	3	0.67 U
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
IRON	898	656	485	2600	1480	2210	2160
LEAD	8.1	5	4.7	9.5	4.4	37.8	5.8
MAGNESIUM	653	249	630	160	186	130	169
MANGANESE	8.3 U	8.1 U	3.9 U	9.7 U	8.6 U	13.1	40.2
MERCURY	0.02 U	0.02	0.03	0.03	0.02 U	0.08	0.02 U
NICKEL	0.66	0.61	0.67	0.84	1.1	0.96	1
POTASSIUM	316	81.9	268	77.7	105	81.4	89.5
SELENIUM	0.09 U	0.08 U	0.39 U	0.07 U	0.11	0.07 U	0.11
SILVER	0.56 U	0.43 U	0.46 U	0.46 U	0.45 U	0.43 U	0.47 U
SODIUM	3240	154	3870	16 U	21.6 U	19.7 U	14.5 U
THALLIUM	0.23 U	0.37 U	0.2 U	0.19 U	0.19 U	0.2 U	0.28 U
VANADIUM	4.1	1.7	2.4	5	4.1	4.2	4.7
ZINC	3.9 U	40.2	1.9 U	6.4 U	2.6 U	10.7	5.1 U
MISCELLANEOUS PARAMETERS							
CYANIDE mg/kg					2 U		
HEXAVALENT CHROMIUM mg/kg							
PH	6.8	7.7	6.2	4.3	5.2	4.6	4.5
TOTAL ORGANIC CARBON %	0.72	0.94	0.41	0.79	0.62	0.84	0.96

SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-08-01 PAI-10-SS-08 7/28/98	PAI-10-SS-09-01 PAI-10-SS-09 7/28/98	PAI-10-SS-10-01 PAI-10-SS-10 7/28/98	PAI-10-SS-11-01 PAI-10-SS-11 8/6/98	PAI-10-SS-12-01 PAI-10-SS-12 8/6/98	PAI-10-SS-12-01-D PAI-10-SS-12 8/6/98
VOLATILES (ug/kg)						
1,1,1-TRICHLOROETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
1,1,2,2-TETRACHLOROETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
1,1,2-TRICHLOROETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
1,1-DICHLOROETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
1,1-DICHLOROETHENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
1,2-DICHLOROETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
1,2-DICHLOROETHENE (TOTAL)	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
1,2-DICHLOROPROPANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
2-BUTANONE	5.7 U	5.7 U	590 U	6 U	6.8 U	6.1 U
2-HEXANONE	5.7 U	8.5	590 U	6 U	6.8 U	6.1 U
4-METHYL-2-PENTANONE	8.7	26	590 U	6 U	6.8 U	6.1 U
ACETONE	140 U	320 U	590 U	350 J	170	64
BENZENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
BROMODICHLOROMETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
BROMOFORM	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
BROMOMETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
CARBON DISULFIDE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
CARBON TETRACHLORIDE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
CHLOROBENZENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
CHLORODIBROMOMETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
CHLOROETHANE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
CHLOROFORM	3.4 U	3.4 U	350 U	7.5	4.1 U	3.7 U
CHLOROMETHANE	3.4 U	3.4 U	350 U	17	4.1 U	3.7 U
CIS-1,3-DICHLOROPROPENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
ETHYLBENZENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
METHYLENE CHLORIDE	3.1 U	3.3 U	420 U	11 U	11 U	6.6 U
STYRENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
TETRACHLOROETHENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
TOLUENE	1.3 J	2.3 J	350 U	2 J	3.3 J	1.6 J
TRANS-1,3-DICHLOROPROPENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
TRICHLOROETHENE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
VINYL CHLORIDE	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
XYLENES, TOTAL	3.4 U	3.4 U	350 U	3.6 U	4.1 U	3.7 U
SEMIVOLATILES (ug/kg)						
1,2,4-TRICHLOROBENZENE	360 U	360 U	360 U	350 U	340 U	340 U
1,2-DICHLOROBENZENE	360 U	360 U	360 U	350 U	340 U	340 U
1,3-DICHLOROBENZENE	360 U	360 U	360 U	350 U	340 U	340 U
1,4-DICHLOROBENZENE	360 U	360 U	360 U	350 U	340 U	340 U
2,2'-OXYBIS(1-CHLOROPROPANE)	360 U	360 U	360 U	350 U	340 U	340 U
2,4,5-TRICHLOROPHENOL	360 U	360 U	360 U	350 U	340 U	340 U
2,4,6-TRICHLOROPHENOL	360 U	360 U	360 U	350 U	340 U	340 U
2,4-DICHLOROPHENOL	360 U	360 U	360 U	350 U	340 U	340 U
2,4-DIMETHYLPHENOL	360 U	360 U	360 U	350 U	340 U	340 U

SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-08-01 PAI-10-SS-08 7/28/98	PAI-10-SS-09-01 PAI-10-SS-09 7/28/98	PAI-10-SS-10-01 PAI-10-SS-10 7/28/98	PAI-10-SS-11-01 PAI-10-SS-11 8/6/98	PAI-10-SS-12-01 PAI-10-SS-12 8/6/98	PAI-10-SS-12-01-D PAI-10-SS-12 8/6/98
2,4-DINITROPHENOL	720 U	720 U	720 U	710 U	690 U	690 U
2,4-DINITROTOLUENE	360 U	360 U	360 U	350 U	340 U	340 U
2,6-DINITROTOLUENE	360 U	360 U	360 U	350 U	340 U	340 U
2-CHLORONAPHTHALENE	360 U	360 U	360 U	350 U	340 U	340 U
2-CHLOROPHENOL	360 U	360 U	360 U	350 U	340 U	340 U
2-METHYLNAPHTHALENE	360 U	360 U	360 U	350 U	340 U	600
2-METHYLPHENOL	360 U	360 U	360 U	350 U	340 U	340 U
2-NITROANILINE	360 U	360 U	360 U	350 U	340 U	340 U
2-NITROPHENOL	360 U	360 U	360 U	350 U	340 U	340 U
3,3'-DICHLOROBENZIDINE	720 U	720 U	720 U	350 U	340 U	340 U
3-NITROANILINE	360 U	360 U	360 U	350 U	340 U	340 U
4,6-DINITRO-2-METHYLPHENOL	720 U	720 U	720 U	710 U	690 U	690 U
4-BROMOPHENYL PHENYL ETHER	360 U	360 U	360 U	350 U	340 U	340 U
4-CHLORO-3-METHYLPHENOL	360 U	360 U	360 U	350 U	340 U	340 U
4-CHLOROANILINE	360 U	360 U	360 U	350 U	340 U	340 U
4-CHLOROPHENYL PHENYL ETHER	360 U	360 U	360 U	350 U	340 U	340 U
4-METHYLPHENOL	360 U	360 U	360 U	350 U	340 U	340 U
4-NITROANILINE	360 U	360 U	360 U	350 U	340 U	340 U
4-NITROPHENOL	720 U	720 U	720 U	710 U	690 U	690 U
ACENAPHTHENE	360 U	360 U	360 U	350 U	340 U	440
ACENAPHTHYLENE	360 U	360 U	360 U	350 U	340 U	580
ANILINE				350 U	340 U	340 U
ANTHRACENE	24 J	360 U	360 U	350 U	340 U	340 U
BENZO(A)ANTHRACENE	140 J	360 U	360 U	350 U	340 U	340 U
BENZO(A)PYRENE	120 J	360 U	360 U	350 U	340 U	340 U
BENZO(B)FLUORANTHENE	120 J	360 U	360 U	350 U	340 U	340 U
BENZO(G,H,I)PERYLENE	50 J	360 U	360 U	350 U	340 U	340 U
BENZO(K)FLUORANTHENE	110 J	360 U	360 U	350 U	340 U	340 U
BIS(2-CHLOROETHOXY)METHANE	360 U	360 U	360 U	350 U	340 U	340 U
BIS(2-CHLOROETHYL)ETHER	360 U	360 U	360 U	350 U	340 U	340 U
BIS(2-ETHYLHEXYL)PHTHALATE	83 J	360 U	51 J	350 U	340 U	340 U
BUTYL BENZYL PHTHALATE	360 U	360 U	360 U	350 U	340 U	340 U
CARBAZOLE	360 U	360 U	360 U	350 U	340 U	340 U
CHRYSENE	160 J	360 U	360 U	350 U	340 U	340 U
DI-N-BUTYL PHTHALATE	360 U	360 U	360 U	350 U	340 U	340 U
DI-N-OCTYL PHTHALATE	360 U	360 U	360 U	350 U	340 U	340 U
DIBENZO(A,H)ANTHRACENE	360 U	360 U	360 U	350 U	340 U	340 U
DIBENZOFURAN	360 U	360 U	360 U	350 U	340 U	340 U
DIETHYL PHTHALATE	360 U	360 U	360 U	350 U	340 U	340 U
DIMETHYL PHTHALATE	360 U	360 U	360 U	350 U	340 U	340 U
FLUORANTHENE	280 J	360 U	360 U	350 U	340 U	340 U
FLUORENE	360 U	360 U	360 U	350 U	340 U	220 J
HEXACHLOROBENZENE	360 U	360 U	360 U	350 U	340 U	340 U
HEXACHLOROBUTADIENE	360 U	360 U	360 U	350 U	340 U	340 U

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-08-01 PAI-10-SS-08 7/28/98	PAI-10-SS-09-01 PAI-10-SS-09 7/28/98	PAI-10-SS-10-01 PAI-10-SS-10 7/28/98	PAI-10-SS-11-01 PAI-10-SS-11 8/6/98	PAI-10-SS-12-01 PAI-10-SS-12 8/6/98	PAI-10-SS-12-01-D PAI-10-SS-12 8/6/98
HEXACHLOROCYCLOPENTADIENE	360 U	360 U	360 U	350 U	340 U	340 U
HEXACHLOROETHANE	360 U	360 U	360 U	350 U	340 U	340 U
INDENO(1,2,3-CD)PYRENE	69 J	360 U	360 U			
ISOPHORONE	360 U	360 U	360 U	350 U	340 U	340 U
N-NITROSO-DI-N-PROPYLAMINE	360 U	360 U	360 U	350 U	340 U	340 U
N-NITROSODIPHENYLAMINE	360 U	360 U	360 U	350 U	340 U	340 U
NAPHTHALENE	360 U	360 U	360 U	350 U	340 U	2700
NITROBENZENE	360 U	360 U	360 U	350 U	340 U	340 U
PENTACHLOROPHENOL	720 U	720 U	720 U	710 U	690 U	240 J
PHENANTHRENE	140 J	360 U	360 U	350 U	340 U	340 U
PHENOL	360 U	360 U	360 U	350 U	340 U	340 U
PYRENE	230 J	360 U	360 U	350 U	340 U	340 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDD	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
4,4'-DDE	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
4,4'-DDT	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
ALDRIN	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
ALPHA-BHC	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
ALPHA-CHLORDANE	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
AROCLOR-1016	36 U	36 U	36 U	35 U	34 U	34 U
AROCLOR-1221	72 U	72 U	72 U	70 U	68 U	68 U
AROCLOR-1232	36 U	36 U	36 U	35 U	34 U	34 U
AROCLOR-1242	36 U	36 U	36 U	35 U	34 U	34 U
AROCLOR-1248	36 U	36 U	36 U	35 U	34 U	34 U
AROCLOR-1254	36 U	36 U	36 U	35 U	34 U	34 U
AROCLOR-1260	36 U	36 U	36 U	35 U	34 U	34 U
BETA-BHC	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
DELTA-BHC	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
DIELDRIN	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
ENDOSULFAN I	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
ENDOSULFAN II	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
ENDOSULFAN SULFATE	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
ENDRIN	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
ENDRIN ALDEHYDE	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
ENDRIN KETONE	3.6 U	3.6 U	3.6 U	3.5 U	3.4 U	3.4 U
GAMMA-BHC (LINDANE)	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
GAMMA-CHLORDANE	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
HEPTACHLOR	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
HEPTACHLOR EPOXIDE	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
METHOXYCHLOR	18 U	18 U	18 U	18 U	18 U	18 U
TOXAPHENE	180 U	180 U	180 U	180 U	180 U	180 U
INORGANICS (mg/kg)						
ALUMINUM	2810	3070	3410	4400	5000	4800
ANTIMONY	1.9 U	1.8 U	2 U	1.9 U	1.9 U	1.8 U

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-08-01 PAI-10-SS-08 7/28/98	PAI-10-SS-09-01 PAI-10-SS-09 7/28/98	PAI-10-SS-10-01 PAI-10-SS-10 7/28/98	PAI-10-SS-11-01 PAI-10-SS-11 8/6/98	PAI-10-SS-12-01 PAI-10-SS-12 8/6/98	PAI-10-SS-12-01-D PAI-10-SS-12 8/6/98
ARSENIC	0.44	0.62	0.79	0.88	1	0.9
BARIUM	13.1	5.9 U	11.7	12	13.7	13.8
BERYLLIUM	0.12 U	0.12 U	0.11 U	0.12	0.18	0.16
CADMIUM	0.2 U	0.19 U	0.21 U	0.2 U	0.2 U	0.19 U
CALCIUM	275	37.9	38.2	78.5	63.7	62
CHROMIUM	2.4	1.8	2.4	3.1	3.8	3.3
COBALT	0.33 U	0.38 U	0.37 U	0.58	0.75	0.32 U
COPPER	0.86 U	0.29 U	0.5 U	1.2	0.55	0.89
CYANIDE	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
IRON	1930	2310	2230	2530	2600	3440
LEAD	12.5	6.1	4.7	6.7	6.4	7.1
MAGNESIUM	155	123	129	216	218	214
MANGANESE	51.9	8.5 U	61.7	45.3	61.9	66.3
MERCURY	0.04	0.02 U	0.05	0.06	0.04	0.05
NICKEL	0.73	0.95	1.2	1.6	1.6	1.6
POTASSIUM	74.8	76.3	57.8	129	101	102
SELENIUM	0.12	0.09	0.1	0.09 U	0.07 U	0.07 U
SILVER	0.43 U	0.41 U	0.45 U	0.42 U	0.43 U	0.41 U
SODIUM	18.4 U	17.1 U	11.4 U	27.1	20.1 U	31
THALLIUM	0.18 U	0.18 U	0.19 U	0.19 U	0.18 U	0.18 U
VANADIUM	4.1	4.2	5.3	4.9	5.4	5.1
ZINC	8.6	3.5 U	4.5 U	6.1	4.1	5.4
MISCELLANEOUS PARAMETERS						
CYANIDE mg/kg						
HEXAVALENT CHROMIUM mg/kg						
PH	5.7	4.4	4.9			
TOTAL ORGANIC CARBON %	0.46	0.71	0.55			

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-13-01 PAI-10-SS-13 8/6/98	PAI-10-SS-14-01 PAI-10-SS-14 8/6/98	PAI-10-SS-15-01 PAI-10-SS-15-BG 9/9/98	PAI-10-SS-15-01A PAI-10-SS-15 8/6/98	PAI-10-SS-16-01 PAI-10-SS-16 9/9/98	PAI-10-SS-17-01 PAI-10-SS-17 9/9/98	PI-012-03(37) PI-012-03 12/14/95
VOLATILES (ug/kg)							
1,1,1-TRICHLOROETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
1,1,2,2-TETRACHLOROETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
1,1,2-TRICHLOROETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
1,1-DICHLOROETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
1,1-DICHLOROETHENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
1,2-DICHLOROETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
1,2-DICHLOROETHENE (TOTAL)	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
1,2-DICHLOROPROPANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
2-BUTANONE	6.9 U	6.1 U	6 U	6.6 U	6 U	6 U	11 U
2-HEXANONE	6.9 U	6.1 U	6 U	6.6 U	6 U	6 U	11 U
4-METHYL-2-PENTANONE	6.9 U	6.1 U	6 U	6.6 U	4 J	4 J	11 U
ACETONE	46	23	7 U	660 U	26	20 U	11 U
BENZENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
BROMODICHLOROMETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
BROMOFORM	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
BROMOMETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
CARBON DISULFIDE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	6 J
CARBON TETRACHLORIDE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	6 J
CHLOROBENZENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
CHLORODIBROMOMETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
CHLOROETHANE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
CHLOROFORM	1.8 J	3.6 U	4 U	3.9 U	4 U	4 U	11 U
CHLOROMETHANE	4.1 U	3.6 U	4 U	3.6 J	4 U	4 U	11 U
CIS-1,3-DICHLOROPROPENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
ETHYLBENZENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
METHYLENE CHLORIDE	9.4 U	9.2 U	5 U	5.9 U	6 U	6 U	11 U
STYRENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
TETRACHLOROETHENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	1 J
TOLUENE	1.5 J	3.4 J	4 U	3.9 J	4 U	2 J	11 U
TRANS-1,3-DICHLOROPROPENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
TRICHLOROETHENE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
VINYL CHLORIDE	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
XYLENES, TOTAL	4.1 U	3.6 U	4 U	3.9 U	4 U	4 U	11 U
SEMIVOLATILES (ug/kg)							
1,2,4-TRICHLOROBENZENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
1,2-DICHLOROBENZENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
1,3-DICHLOROBENZENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
1,4-DICHLOROBENZENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2,2'-OXYBIS(1-CHLOROPROPANE)	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2,4,5-TRICHLOROPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	1100 U
2,4,6-TRICHLOROPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2,4-DICHLOROPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2,4-DIMETHYLPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-13-01 PAI-10-SS-13 8/6/98	PAI-10-SS-14-01 PAI-10-SS-14 8/6/98	PAI-10-SS-15-01 PAI-10-SS-15-BG 9/9/98	PAI-10-SS-15-01A PAI-10-SS-15 8/6/98	PAI-10-SS-16-01 PAI-10-SS-16 9/9/98	PAI-10-SS-17-01 PAI-10-SS-17 9/9/98	PI-012-03(37) PI-012-03 12/14/95
2,4-DINITROPHENOL	690 U	890 U	730 U	700 U	720 U	720 U	1100 U
2,4-DINITROTOLUENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2,6-DINITROTOLUENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2-CHLORONAPHTHALENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2-CHLOROPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2-METHYLNAPHTHALENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2-METHYLPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U
2-NITROANILINE	350 U	440 U	370 U	350 U	360 U	360 U	1100 U
2-NITROPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U
3,3'-DICHLOROBENZIDINE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
3-NITROANILINE	350 U	440 U	370 U	350 U	360 U	360 U	1100 U
4,6-DINITRO-2-METHYLPHENOL	690 U	890 U	730 U	700 U	720 U	720 U	1100 U
4-BROMOPHENYL PHENYL ETHER	350 U	440 U	370 U	350 U	360 U	360 U	440 U
4-CHLORO-3-METHYLPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U
4-CHLOROANILINE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
4-CHLOROPHENYL PHENYL ETHER	350 U	440 U	370 U	350 U	360 U	360 U	440 U
4-METHYLPHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U
4-NITROANILINE	350 U	440 U	370 U	350 U	360 U	360 U	1100 U
4-NITROPHENOL	690 U	890 U	730 U	700 U	720 U	720 U	1100 U
ACENAPHTHENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
ACENAPHTHYLENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
ANILINE	350 U	440 U		350 U			
ANTHRACENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
BENZO(A)ANTHRACENE	350 U	440 U	370 U	350 U	360 U	360 U	41 J
BENZO(A)PYRENE	350 U	440 U	370 U	350 U	360 U	360 U	53 J
BENZO(B)FLUORANTHENE	350 U	440 U	370 U	350 U	360 U	360 U	130 J
BENZO(G,H,I)PERYLENE	350 U	440 U	370 U	350 U	360 U	360 U	55 J
BENZO(K)FLUORANTHENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
BIS(2-CHLOROETHOXY)METHANE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
BIS(2-CHLOROETHYL)ETHER	350 U	440 U	370 U	350 U	360 U	360 U	440 U
BIS(2-ETHYLHEXYL)PHTHALATE	350 U	92 J	370 U	30 J	360 U	360 U	440 U
BUTYL BENZYL PHTHALATE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
CARBAZOLE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
CHRYSENE	350 U	440 U	370 U	350 U	360 U	360 U	62 J
DI-N-BUTYL PHTHALATE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
DI-N-OCTYL PHTHALATE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
DIBENZO(A,H)ANTHRACENE	350 U	440 U	370 U	350 U	360 U	360 U	34 J
DIBENZOFURAN	350 U	440 U	370 U	350 U	360 U	360 U	440 U
DIETHYL PHTHALATE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
DIMETHYL PHTHALATE	350 U	440 U	370 U	350 U	360 U	360 U	180 J
FLUORANTHENE	350 U	440 U	370 U	350 U	360 U	360 U	41 J
FLUORENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
HEXACHLOROBENZENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
HEXACHLOROBUTADIENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-13-01 PAI-10-SS-13 8/6/98	PAI-10-SS-14-01 PAI-10-SS-14 8/6/98	PAI-10-SS-15-01 PAI-10-SS-15-BG 9/9/98	PAI-10-SS-15-01A PAI-10-SS-15 8/6/98	PAI-10-SS-16-01 PAI-10-SS-16 9/9/98	PAI-10-SS-17-01 PAI-10-SS-17 9/9/98	PI-012-03(37) PI-012-03 12/14/95
HEXACHLOROCYCLOPENTADIENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
HEXACHLOROETHANE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
INDENO(1,2,3-CD)PYRENE			370 U		360 U	360 U	64 J
ISOPHORONE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
N-NITROSO-DI-N-PROPYLAMINE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
N-NITROSODIPHENYLAMINE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
NAPHTHALENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
NITROBENZENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
PENTACHLOROPHENOL	690 U	890 U	730 U	700 U	720 U	720 U	1100 U
PHENANTHRENE	350 U	440 U	370 U	350 U	360 U	360 U	440 U
PHENOL	350 U	440 U	370 U	350 U	360 U	360 U	440 U
PYRENE	350 U	440 U	370 U	350 U	360 U	360 U	43 J
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	3.4 U	4.4 U	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
4,4'-DDE	3.4 U	43	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
4,4'-DDT	3.4 U	4.4 U	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
ALDRIN	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U
ALPHA-BHC	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U
ALPHA-CHLORDANE	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	4.6 U
AROCLOR-1016	34 U	44 U	36 U	35 U	36 U	36 U	35 U
AROCLOR-1221	69 U	88 U	73 U	69 U	72 U	72 U	72 U
AROCLOR-1232	34 U	44 U	36 U	35 U	36 U	36 U	35 U
AROCLOR-1242	34 U	44 U	36 U	35 U	36 U	36 U	35 U
AROCLOR-1248	34 U	44 U	36 U	35 U	36 U	36 U	35 U
AROCLOR-1254	34 U	44 U	36 U	35 U	36 U	36 U	35 U
AROCLOR-1260	34 U	44 U	36 U	35 U	36 U	36 U	35 U
BETA-BHC	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U
DELTA-BHC	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U
DIELDRIN	3.4 U	4.4 U	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
ENDOSULFAN I	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U
ENDOSULFAN II	3.4 U	4.4 U	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
ENDOSULFAN SULFATE	3.4 U	4.4 U	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
ENDRIN	3.4 U	4.4 U	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
ENDRIN ALDEHYDE	3.4 U	4.4 U	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
ENDRIN KETONE	3.4 U	4.4 U	3.6 U	3.5 U	3.6 U	3.6 U	3.5 U
GAMMA-BHC (LINDANE)	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U
GAMMA-CHLORDANE	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U
HEPTACHLOR	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	0.99 R
HEPTACHLOR EPOXIDE	1.8 U	2.3 U	1.9 U	1.8 U	1.8 U	1.8 U	1.8 U
METHOXYCHLOR	70	23 U	19 U	18 U	18 U	18 U	18 U
TOXAPHENE	180 U	230 U	190 U	180 U	180 U	180 U	180 U
INORGANICS (mg/kg)							
ALUMINUM	3910	5370	2680	5340	3150	4750	4160
ANTIMONY	1.9 U	8	2.1 U	1.8 U	1.8 U	1.9 U	0.48 U

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SUMMARY OF ANALYTICAL RESULTS
SURFACE SOIL
SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SS-13-01 PAI-10-SS-13 8/6/98	PAI-10-SS-14-01 PAI-10-SS-14 8/6/98	PAI-10-SS-15-01 PAI-10-SS-15-BG 9/9/98	PAI-10-SS-15-01A PAI-10-SS-15 8/6/98	PAI-10-SS-16-01 PAI-10-SS-16 9/9/98	PAI-10-SS-17-01 PAI-10-SS-17 9/9/98	PI-012-03(37) PI-012-03 12/14/95
ARSENIC	0.71	50.8	0.97	0.85	0.79	0.94	0.78
BARIUM	10	76.4	5.4	16.7	7.1	10.5	12.3
BERYLLIUM	0.13	0.08	0.11 U	0.17	0.11 U	0.17 U	0.19 U
CADMIUM	0.2 U	3.2	0.22 U	0.19 U	0.18 U	0.2 U	0.06
CALCIUM	79.4	2780	147	191	213	322	155
CHROMIUM	3.1	18.1	3.8	3.2	3.7	3.5	8.2
COBALT	0.5	6.6	0.37 U	0.57	0.58 U	0.33 U	0.47
COPPER	1	189	0.68 U	0.72	1.1 U	0.73 U	3.3
CYANIDE	0.5 U	0.5 U	0.6 U		0.6 U	0.5 U	0.05 U
IRON	2020	99700	2020	2810	2070	2360	2940
LEAD	8.8	1100 J	6.6 J	4.7	6.3 J	5.4 J	31.7
MAGNESIUM	192	3240	258	237	330	326	220
MANGANESE	10.6	522	9.4	206	14.4	31.8	21.1
MERCURY	0.04	0.89	0.04	0.06	0.04 U	0.05	0.09 U
NICKEL	1.2	26.5	1.5 U	1.8	1.7 U	2.3 U	1.5
POTASSIUM	102	640	137	113	142	182	137
SELENIUM	0.12 U	0.44 U	0.07 U	0.07 U	0.06 U	0.1 U	0.42 U
SILVER	0.43 U	0.52 U	0.6 U	0.41 U	0.49 U	0.43 U	0.13 U
SODIUM	37.7	10700	115 U	16.7 U	97.9 U	124 U	35.6 U
THALLIUM	0.18 U	0.22 U	0.18	0.19 U	0.17 U	0.19 U	0.44 U
VANADIUM	3.8	9.3	5.3	5.5	4.9	5.3	3.8
ZINC	6.2	1020	5.4	5.2	5.4	5.6	43
MISCELLANEOUS PARAMETERS							
CYANIDE mg/kg				0.5 U			
HEXAVALENT CHROMIUM mg/kg	2 U	2 U					
PH							
TOTAL ORGANIC CARBON %							

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UNFILTERED GROUNDWATER RESULTS

SUMMARY OF POSITIVE DETECTIONS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01 PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01 PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01 PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01 PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01 PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01 PAI-10-MW-06(D) 8/31/98
VOLATILES (ug/L)						
ACETONE	50 UR	5 UR	50 U	620 J	5 U	5 UR
CARBON DISULFIDE	10 U	0.5 J	10 U	0.4 J	1 U	1 U
CHLOROFORM	10 U	0.4 J	10 U	4.5	1 U	1 U
CHLOROMETHANE	10 U	1 U	10 U	1 U	1 U	1 U
TOLUENE	10 U	1 U	10 U	0.2 J	1 U	1 U
TRICHLOROETHENE	10 U	1 U	10 U	0.4 J	1 U	1 U
SEMIVOLATILES (ug/L)						
4-NITROQUINOLINE-1-OXIDE						
BENZOIC ACID	1 J	25 U	25 U	26 U	25 U	25 U
DI-N-BUTYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 U
INORGANICS (ug/L)						
ALUMINUM	4870	22 U	5140	109 U	22 U	748
ARSENIC	2.3	35.4	15.7	5.6	7.9	1.3
BARIUM	36.4	64.6	194	77.6	194	62.6
CADMIUM	2.1	5.4	2 U	3.3	4	200 U
CALCIUM	148000	238000	258000	356000	66100	216000
CHROMIUM	11 U	6.4 U	18.7 U	25.2 U	32 U	6.4 U
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	11.7
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.7	8.1
IRON	4150	102000	51400	18400	122000	93700
MAGNESIUM	450000	597000	542000	477000	173000	380000
MANGANESE	44.7	209	223	941	330	1530
NICKEL	4.4 U	5.3	4.4 U	4.4 U	4.4 U	7.2
POTASSIUM	155000	175000	229000	122000	29000	28900
SELENIUM	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	1.7 U
SODIUM	3640000	4720000	4010000	3270000	1260000	2300000
THALLIUM	9 U	9 U	9 U	9 U	9 U	10
VANADIUM	14	9	13.7	6.8	5.9	6
ZINC	9.3 U	17.9 U	17.6 U	12.4 U	19.5 U	82.8
MISCELLANEOUS PARAMETERS						
CHLORIDE	7000000	10000000	8700000	7800000	2500000	4800000
FLUORIDE	20000 U	20000 U	20000 U	20000 U	20000 U	100000 U
HARDNESS as CaCO3	2300000	3400000	3000000	2800000	1100000	2400000
NITRATE/NITRITE, AS NITROGEN	30 U	50 U	50 U	10 U	300 J	50 U
SULFATE	930000	1300000	1200000	980000	340000	730000
TOTAL DISSOLVED SOLIDS	14000000	18000000	15000000	13000000	4500000	7600000
TOTAL ORGANIC CARBON	18000	5600	24000	5300	4200	1400
TOTAL SUSPENDED SOLIDS	33000	97000	150000	54000	23000	43000

SUMMARY OF POSITIVE DETECTIONS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01 PAI-10-MW-07(S) 3/31/98	PAI-10-GW-07-01-D PAI-10-MW-07(S) 3/30/98	PAI-10-GW-08-01 PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01 PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01 PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01 PAI-10-MW-11(S) 8/24/98
VOLATILES (ug/L)						
ACETONE	5 U	5 U	650 J	7 U	270 J	9.3 J
CARBON DISULFIDE	1 U	1 U	2.5	1 U	24	0.7 J
CHLOROFORM	0.5 J	0.4 J	1.5	1 U	1 U	1 U
CHLOROMETHANE	1 U	0.2 J	1 U	1 U	0.3 J	1 U
TOLUENE	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
SEMIVOLATILES (ug/L)						
4-NITROQUINOLINE-1-OXIDE				10 UR		10 UR
BENZOIC ACID	25 U	25 U	25 U	25 U	25 U	25 U
DI-N-BUTYL PHTHALATE	5 U	5 U	5 U	5 U	1 J	5 U
INORGANICS (ug/L)						
ALUMINUM	61.9 U	71.3 U	168 U	1080	22 U	
ARSENIC	0.9 U	1.7	19	3.7	0.9 U	12.6
BARIUM	118	126	72.7	57.5	182	119
CADMIUM	2 U	2.8	2 U	2 U	3.1	2 U
CALCIUM	22700	20900	81300	256000	501000	
CHROMIUM	6.4 U	6.4 U	8.1	12	23.2	16.1
COBALT	3.3 U	3.3 U	11.7	3.3 U	3.9	3.3 U
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
IRON	3940	6050	6710	5070	49300	
MAGNESIUM	18600	18600	25800	734000	361000	
MANGANESE	147	139	1360	142	1030	
NICKEL	4.4 U	4.4 U	10.5	4.4 U	4.4 U	4.4 U
POTASSIUM	4370	4370	5700	245000	72600	
SELENIUM	0.7 U	0.7 U	0.7 U	7.1 J	3.5 UJ	3.5 U
SODIUM	173000	181000	146000	5530000	2970000	
THALLIUM	9 UJ	9 UJ	9 UJ	9 U	9 U	9 U
VANADIUM	2.6 U	2.6 U	2.6 U	14.2	5.9	10
ZINC	8.4 U	9.4 U	20.6	7.5	13.5 U	9.5
MISCELLANEOUS PARAMETERS						
CHLORIDE	340000	330000	470000	11000000	5900000	14000000
FLUORIDE	1000 U	1000 U	1000 U	100000 U	20000 U	100000 U
HARDNESS as CaCO3	130000	130000	360000	3800000	2800000	5100000
NITRATE/NITRITE, AS NITROGEN	20 U	20 U	20 U	10 U	60 U	10
SULFATE	56000	56000	17000	1500000	640000	2000000
TOTAL DISSOLVED SOLIDS	610000	590000	830000	19000000	11000000	26000000
TOTAL ORGANIC CARBON	2100	2000	1000 U		1600	5700
TOTAL SUSPENDED SOLIDS	2000	3000	8000	110000	41000	74000

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SUMMARY OF POSITIVE DETECTIONS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01 PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01 PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01 PAI-10-MW-14(D) 8/10/98
VOLATILES (ug/L)			
ACETONE	5 U	6.9 U	5 UR
CARBON DISULFIDE	0.2 J	0.5 J	1 U
CHLOROFORM	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U
TOLUENE	1 U	1 U	1 U
TRICHLOROETHENE	1 U	1 U	1 U
SEMIVOLATILES (ug/L)			
4-NITROQUINOLINE-1-OXIDE			
BENZOIC ACID		25 U	
DI-N-BUTYL PHTHALATE	5 U	5 U	5 U
INORGANICS (ug/L)			
ALUMINUM	22 U	532	806
ARSENIC	10.7	3.4	29.2
BARIUM	216	83.7	215
CADMIUM	8.1	2 U	2 U
CALCIUM	423000	387000	364000
CHROMIUM	10.6	17	6.4 U
COBALT	3.3 U	3.3 U	3.3 U
COPPER	2.6 U	2.6 U	2.6 U
IRON	111000	5780	35400
MAGNESIUM	804000	1070000	1100000
MANGANESE	432	1390	136
NICKEL	4.4 U	4.4 U	4.4 U
POTASSIUM	138000	371000	338000
SELENIUM	7 U	7 U	17.5 U
SODIUM	5280000	8670000	8660000
THALLIUM	18 U	9 U	9 U
VANADIUM	3.7	7.3	11.2
ZINC	13.7	7.9 U	14 U
MISCELLANEOUS PARAMETERS			
CHLORIDE	9000000	16000000	17000000
FLUORIDE	19000	100000 U	20000 U
HARDNESS as CaCO3	4800000	5800000	6200000
NITRATE/NITRITE, AS NITROGEN	120	40 U	50 U
SULFATE	1100000	2100000	2200000
TOTAL DISSOLVED SOLIDS	17000000	30000000	31000000
TOTAL ORGANIC CARBON	5300	3900	9700
TOTAL SUSPENDED SOLIDS	58000	81000	140000

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01 PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01 PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01 PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01 PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01 PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01 PAI-10-MW-06(D) 8/31/98
VOLATILES (ug/L)						
1,1,1,2-TETRACHLOROETHANE						
1,1,1-TRICHLOROETHANE	10 U	1 U	10 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	10 U	1 U	10 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	10 U	1 U	10 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	10 U	1 U	10 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	10 U	1 U	10 U	1 U	1 U	1 U
1,2,3-TRICHLOROPROPANE						
1,2-DIBROMO-3-CHLOROPROPANE						
1,2-DIBROMOETHANE						
1,2-DICHLOROETHANE	10 U	1 U	10 U	1 U	1 U	1 U
1,2-DICHLOROETHENE (TOTAL)	10 U	1 U	10 U	1 U	1 U	1 U
1,2-DICHLOROPROPANE	10 U	1 U	10 U	1 U	1 U	1 U
1,4-DIOXANE						
2-BUTANONE	50 UR	5 UR	50 UR	5 UR	5 UR	5 UR
2-HEXANONE	50 UR	5 UR	50 UR	5 UR	5 UR	5 UR
3-CHLOROPROPENE						
4-METHYL-2-PENTANONE	50 UR	5 UR	50 UR	5 UR	5 UR	5 UR
ACETONE	50 UR	5 UR	50 U	620 J	5 U	5 UR
ACETONITRILE						
ACROLEIN						
ACRYLONITRILE						
BENZENE	10 U	1 U	10 U	1 U	1 U	1 U
BROMODICHLOROMETHANE	10 U	1 U	10 U	1 U	1 U	1 U
BROMOFORM	10 U	1 U	10 U	1 U	1 U	1 U
BROMOMETHANE	10 U	1 U	10 U	1 U	1 U	1 U
CARBON DISULFIDE	10 U	0.5 J	10 U	0.4 J	1 U	1 U
CARBON TETRACHLORIDE	10 U	1 U	10 U	1 U	1 U	1 U
CHLOROBENZENE	10 U	1 U	10 U	1 U	1 U	1 U
CHLORODIBROMOMETHANE	10 U	1 U	10 U	1 U	1 U	1 U
CHLOROETHANE	10 U	1 U	10 U	1 U	1 U	1 U
CHLOROFORM	10 U	0.4 J	10 U	4.5	1 U	1 U
CHLOROMETHANE	10 U	1 U	10 U	1 U	1 U	1 U
CHLOROPRENE						
CIS-1,2-DICHLOROETHENE						
CIS-1,3-DICHLOROPROPENE	10 U	1 U	10 U	1 U	1 U	1 U
DIBROMOMETHANE						
DICHLORODIFLUOROMETHANE						
ETHYL METHACRYLATE						
ETHYLBENZENE	10 U	1 U	10 U	1 U	1 U	1 U
ISOBUTANOL						
METHACRYLONITRILE						
METHYL IODIDE						

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01 PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01 PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01 PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01 PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01 PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01 PAI-10-MW-06(D) 8/31/98
METHYL METHACRYLATE						
METHYLENE CHLORIDE	20 U	2 U	10 U	1 U	2 U	2 U
PROPIONITRILE						
STYRENE	10 U	1 U	10 U	1 U	1 U	1 U
TETRACHLOROETHENE	10 U	1 U	10 U	1 U	1 U	1 U
TOLUENE	10 U	1 U	10 U	0.2 J	1 U	1 U
TRANS-1,2-DICHLOROETHENE						
TRANS-1,3-DICHLOROPROPENE	10 U	1 U	10 U	1 U	1 U	1 U
TRANS-1,4-DICHLORO-2-BUTENE						
TRICHLOROETHENE	10 U	1 U	10 U	0.4 J	1 U	1 U
TRICHLOROFLUOROMETHANE						
VINYL ACETATE						
VINYL CHLORIDE	3 U	0.3 U	3 U	0.3 U	0.3 U	0.3 U
XYLENES, TOTAL	10 U	1 U	10 U	1 U	1 U	1 U
SEMIVOLATILES (ug/L)						
1,2,4,5-TETRACHLOROBENZENE						
1,2,4-TRICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DIPHENYLHYDRAZINE	5 U	5 U	5 U	5 U	5 U	5 U
1,3,5-TRINITROBENZENE						
1,3-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,3-DINITROBENZENE						
1,4-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,4-NAPHTHOQUINONE						
1,4-PHENYLENEDIAMINE						
1-NAPHTHYLAMINE						
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U	5 U	5 U	5 U	5 U
2,3,4,6-TETRACHLOROPHENOL						
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						
2,6-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U	5 U
2-ACETYLAMINOFLUORENE						
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						
2-NITROANILINE	5 U	5 U	5 U	5 U	5 U	5 U

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01 PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01 PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01 PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01 PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01 PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01 PAI-10-MW-06(D) 8/31/98
2-NITROPHENOL	5 U	5 U	5 U	5 U	5 U	5 U
2-PICOLINE						
3,3'-DICHLOROBENZIDINE	5 U	5 U	5 U	5 U	5 U	5 U
3,3'-DIMETHYLBENZIDINE						
3-METHYLCHOLANTHRENE						
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						
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						
5-NITRO-O-TOLUIDINE						
7,12-DIMETHYLBENZ(A)ANTHRACE						
A,A-DIMETHYLPHENETHYLAMINE						
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						
ANILINE	5 U	5 U	5 U	5 U	5 U	5 U
ANTHRACENE	5 U	5 U	5 U	5 U	5 U	5 U
ARAMITE						
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
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	1 J	25 U	25 U	26 U	25 U	25 U
BENZYL ALCOHOL	5 U	5 U	5 U	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	5 U	5 U	5 U	5 U	5 U	5 U
BUTYL BENZYL 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						
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						
DIBENZO(A,H)ANTHRACENE	5 U	5 U	5 U	5 U	5 U	5 U

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01 PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01 PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01 PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01 PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01 PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01 PAI-10-MW-06(D) 8/31/98
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	5 U
DIMETHOATE						
DIMETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 U
DIPHENYLAMINE						
DISULFOTON						
ETHYL METHANE SULFONATE						
ETHYL PARATHION						
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
HEXACHLOROPROPENE						
INDENO(1,2,3-CD)PYRENE	5 U	5 U	5 U	5 U	5 U	5 U
ISODRIN						
ISOPHORONE	5 U	5 U	5 U	5 U	5 U	5 U
ISOSAFROLE						
METHAPYRILENE						
METHYL METHANE SULFONATE						
METHYL PARATHION						
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U	5 U	5 U	5 U	5 U
N-NITROSODI-N-BUTYLAMINE						
N-NITROSODIETHYLAMINE						
N-NITROSODIPHENYLAMINE	5 U	5 U	5 U	5 U	5 U	5 U
N-NITROSOMETHYLETHYLAMINE						
N-NITROSOMORPHOLINE						
N-NITROSOPIPERIDINE						
N-NITROSOPYRROLIDINE						
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-TRIETHYL PHOSPHOROTHIO						
O-TOLUIDINE						
P-(DIMETHYLAMINO)AZOBENZENE						
PENTACHLOROBENZENE						
PENTACHLOROETHANE						
PENTACHLORONITROBENZENE						
PENTACHLOROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U
PHENACETIN						
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
PHORATE						

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01 PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01 PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01 PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01 PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01 PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01 PAI-10-MW-06(D) 8/31/98
PRONAMIDE						
PYRENE	5 U	5 U	5 U	5 U	5 U	5 U
SAFROLE						
SULFOTEPP						
THIONAZIN						
PESTICIDES/PCBs (ug/L)						
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ALDRIN	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-CHLORDANE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
AROCLOR-1016	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1221	2 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1232	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1242	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1248	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1254	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1260	1 U	1 U	1 U	1 U	1 U	1 U
BETA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CHLORDANE						
DELTA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN II	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN ALDEHYDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-CHLORDANE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
METHOXYCHLOR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOXAPHENE	5 U	5 U	5 U	5 U	5 U	5 U
HERBICIDES (ug/L)						
2,4,5-T						
2,4,5-TP (SILVEX)						
2,4-D						
DINOSEB						
HEXACHLOROPHENE						
INORGANICS (ug/L)						
ALUMINUM	4870	22 U	5140	109 U	22 U	748

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01 PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01 PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01 PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01 PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01 PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01 PAI-10-MW-06(D) 8/31/98
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	2.3	35.4	15.7	5.6	7.9	1.3
BARIUM	36.4	64.6	194	77.6	194	62.6
BERYLLIUM	0.2 U	0.3 U	0.4 U	0.5 U	0.5 U	0.4 U
CADMIUM	2.1	5.4	2 U	3.3	4	200 U
CALCIUM	148000	238000	258000	356000	66100	216000
CHROMIUM	11 U	6.4 U	18.7 U	25.2 U	32 U	6.4 U
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	11.7
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.7	8.1
CYANIDE	20 U	20 U	20 U	20 U	20 U	20 UJ
IRON	4150	102000	51400	18400	122000	93700
LEAD	1.1 U	1.1 UJ	1.1 UJ	1.1 UJ	1.1 UJ	1.1 U
MAGNESIUM	450000	597000	542000	477000	173000	380000
MANGANESE	44.7	209	223	941	330	1530
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	4.4 U	5.3	4.4 U	4.4 U	4.4 U	7.2
POTASSIUM	155000	175000	229000	122000	29000	28900
SELENIUM	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	1.7 U
SILVER	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
SODIUM	3640000	4720000	4010000	3270000	1260000	2300000
THALLIUM	9 U	9 U	9 U	9 U	9 U	10
TIN						
VANADIUM	14	9	13.7	6.8	5.9	6
ZINC	9.3 U	17.9 U	17.6 U	12.4 U	19.5 U	82.8
MISCELLANEOUS PARAMETERS						
CHLORIDE	7000000	10000000	8700000	7800000	2500000	4800000
FLUORIDE	20000 U	20000 U	20000 U	20000 U	20000 U	100000 U
HARDNESS as CaCO3	2300000	3400000	3000000	2800000	1100000	2400000
HEXAVALENT CHROMIUM	5 U	5 U				
NITRATE/NITRITE, AS NITROGEN	30 U	50 U	50 U	10 U	300 J	50 U
SULFATE	930000	1300000	1200000	980000	340000	730000
TOTAL DISSOLVED SOLIDS	14000000	18000000	15000000	13000000	4500000	7600000
TOTAL ORGANIC CARBON	18000	5600	24000	5300	4200	1400
TOTAL SUSPENDED SOLIDS	33000	97000	150000	54000	23000	43000

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01 PAI-10-MW-07(S) 3/31/98	PAI-10-GW-07-01-D PAI-10-MW-07(S) 3/30/98	PAI-10-GW-08-01 PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01 PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01 PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01 PAI-10-MW-11(S) 8/24/98
VOLATILES (ug/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-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	
1,2-DICHLOROPROPANE	1 U	1 U	1 U	1 U	1 U	1 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
3-CHLOROPROPENE				1 U		1 U
4-METHYL-2-PENTANONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
ACETONE	5 U	5 U	650 J	7 U	270 J	9.3 J
ACETONITRILE				40 U		40 U
ACROLEIN				5 UR		5 UR
ACRYLONITRILE				1 UR		1 UR
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
CARBON DISULFIDE	1 U	1 U	2.5	1 U	24	0.7 J
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
CHLORODIBROMOMETHANE	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	0.5 J	0.4 J	1.5	1 U	1 U	1 U
CHLOROMETHANE	1 U	0.2 J	1 U	1 U	0.3 J	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
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
ISOBUTANOL				40 U		40 U
METHACRYLONITRILE				1 UR		1 UR
METHYL IODIDE				1 U		1 U

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01 PAI-10-MW-07(S) 3/31/98	PAI-10-GW-07-01-D PAI-10-MW-07(S) 3/30/98	PAI-10-GW-08-01 PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01 PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01 PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01 PAI-10-MW-11(S) 8/24/98
METHYL METHACRYLATE				1 UR		1 UR
METHYLENE CHLORIDE	2 U	2 U	2 U	1 U	2 U	1 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
TRICHLOROFLUOROMETHANE				1 U		1 U
VINYL ACETATE				1 U		1 UR
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	1 U
XYLENES, TOTAL	1 U	1 U	1 U	1 U	1 U	1 U
SEMIVOLATILES (ug/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-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DIPHENYLHYDRAZINE	5 U	5 U	5 U	5 U	5 U	5 U
1,3,5-TRINITROBENZENE				10 U		10 U
1,3-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,3-DINITROBENZENE				10 U		10 U
1,4-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,4-NAPHTHOQUINONE				10 U		10 U
1,4-PHENYLENEDIAMINE				10 U		10 U
1-NAPHTHYLAMINE				10 U		10 U
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U	5 U	5 UJ	5 U	5 UJ
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
2-NITROANILINE	5 U	5 U	5 U	5 U	5 U	5 U

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01 PAI-10-MW-07(S) 3/31/98	PAI-10-GW-07-01-D PAI-10-MW-07(S) 3/30/98	PAI-10-GW-08-01 PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01 PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01 PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01 PAI-10-MW-11(S) 8/24/98
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	10 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 U		10 U
7,12-DIMETHYLBENZ(A)ANTHRACE				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	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
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	25 U	25 U	25 U
BENZYL ALCOHOL	5 U	5 U	5 U	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	5 U	5 U	5 U	5 U	5 U	5 U
BUTYL BENZYL 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	1 J	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

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01 PAI-10-MW-07(S) 3/31/98	PAI-10-GW-07-01-D PAI-10-MW-07(S) 3/30/98	PAI-10-GW-08-01 PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01 PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01 PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01 PAI-10-MW-11(S) 8/24/98
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	5 U
DIMETHOATE				10 U		10 U
DIMETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 U
DIPHENYLAMINE				10 U		10 U
DISULFOTON				10 U		10 U
ETHYL METHANE SULFONATE				10 U		10 U
ETHYL PARATHION				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
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 METHANE SULFONATE				10 U		10 U
METHYL PARATHION				10 U		10 U
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U	5 U	5 U	5 U	5 U
N-NITROSODI-N-BUTYLAMINE				10 U		10 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-TRIETHYL PHOSPHOROTHIO				10 U		10 U
O-TOLUIDINE				10 U		10 U
P-(DIMETHYLAMINO)AZOBENZENE				10 U		10 U
PENTACHLOROBENZENE				10 U		10 U
PENTACHLOROETHANE				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
PHORATE				10 U		10 U

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01 PAI-10-MW-07(S) 3/31/98	PAI-10-GW-07-01-D PAI-10-MW-07(S) 3/30/98	PAI-10-GW-08-01 PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01 PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01 PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01 PAI-10-MW-11(S) 8/24/98
PRONAMIDE				10 U		10 U
PYRENE	5 U	5 U	5 U	5 U	5 U	5 U
SAFROLE				10 U		10 U
SULFOTEPP				10 U		10 U
THIONAZIN				10 U		10 U
PESTICIDES/PCBs (ug/L)						
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ALDRIN	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-CHLORDANE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
AROCLOR-1016	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1221	2 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1232	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1242	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1248	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1254	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1260	1 U	1 U	1 U	1 U	1 U	1 U
BETA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
CHLORDANE				0.5 U		0.5 U
DELTA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN II	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN ALDEHYDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-CHLORDANE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
HEPTACHLOR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
METHOXYCHLOR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOXAPHENE	5 U	5 U	5 U	5 U	5 U	5 U
HERBICIDES (ug/L)						
2,4,5-T				0.04 U		0.04 U
2,4,5-TP (SILVEX)				0.04 U		0.04 U
2,4-D				0.05 U		0.05 U
DINOSEB				0.08 U		0.08 U
HEXACHLOROPHENE				0.5 U		0.5 U
INORGANICS (ug/L)						
ALUMINUM	61.9 U	71.3 U	168 U	1080	22 U	

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01 PAI-10-MW-07(S) 3/31/98	PAI-10-GW-07-01-D PAI-10-MW-07(S) 3/30/98	PAI-10-GW-08-01 PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01 PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01 PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01 PAI-10-MW-11(S) 8/24/98
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	0.9 U	1.7	19	3.7	0.9 U	12.6
BARIUM	118	126	72.7	57.5	182	119
BERYLLIUM	0.5 U	0.3 U	0.2 U	0.2 U	0.2 U	0.2 U
CADMIUM	2 U	2.8	2 U	2 U	3.1	2 U
CALCIUM	22700	20900	81300	256000	501000	
CHROMIUM	6.4 U	6.4 U	8.1	12	23.2	16.1
COBALT	3.3 U	3.3 U	11.7	3.3 U	3.9	3.3 U
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
CYANIDE	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 U
IRON	3940	6050	6710	5070	49300	
LEAD	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	11 U
MAGNESIUM	18600	18600	25800	734000	361000	
MANGANESE	147	139	1360	142	1030	
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	4.4 U	4.4 U	10.5	4.4 U	4.4 U	4.4 U
POTASSIUM	4370	4370	5700	245000	72600	
SELENIUM	0.7 U	0.7 U	0.7 U	7.1 J	3.5 UJ	3.5 U
SILVER	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
SODIUM	173000	181000	146000	5530000	2970000	
THALLIUM	9 UJ	9 UJ	9 UJ	9 U	9 U	9 U
TIN				1000 U		1000 U
VANADIUM	2.6 U	2.6 U	2.6 U	14.2	5.9	10
ZINC	8.4 U	9.4 U	20.6	7.5	13.5 U	9.5
MISCELLANEOUS PARAMETERS						
CHLORIDE	340000	330000	470000	11000000	5900000	14000000
FLUORIDE	1000 U	1000 U	1000 U	100000 U	20000 U	100000 U
HARDNESS as CaCO3	130000	130000	360000	3800000	2800000	5100000
HEXAVALENT CHROMIUM						5 UJ
NITRATE/NITRITE, AS NITROGEN	20 U	20 U	20 U	10 U	60 U	10
SULFATE	56000	56000	17000	1500000	640000	2000000
TOTAL DISSOLVED SOLIDS	610000	590000	830000	19000000	11000000	26000000
TOTAL ORGANIC CARBON	2100	2000	1000 U		1600	5700
TOTAL SUSPENDED SOLIDS	2000	3000	8000	110000	41000	74000

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01 PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01 PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01 PAI-10-MW-14(D) 8/10/98
VOLATILES (ug/L)			
1,1,1,2-TETRACHLOROETHANE			
1,1,1-TRICHLOROETHANE	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	1 U	1 U	1 U
1,1-DICHLOROETHANE	1 U	1 U	1 U
1,1-DICHLOROETHENE	1 U	1 U	1 U
1,2,3-TRICHLOROPROPANE			
1,2-DIBROMO-3-CHLOROPROPANE			
1,2-DIBROMOETHANE			
1,2-DICHLOROETHANE	1 U	1 U	1 U
1,2-DICHLOROETHENE (TOTAL)	1 U	1 U	1 U
1,2-DICHLOROPROPANE	1 U	1 U	1 U
1,4-DIOXANE			
2-BUTANONE	5 UR	5 UR	5 UR
2-HEXANONE	5 UR	5 UR	5 UR
3-CHLOROPROPENE			
4-METHYL-2-PENTANONE	5 UR	5 UR	5 UR
ACETONE	5 U	6.9 U	5 UR
ACETONITRILE			
ACROLEIN			
ACRYLONITRILE			
BENZENE	1 U	1 U	1 U
BROMODICHLOROMETHANE	1 U	1 U	1 U
BROMOFORM	1 U	1 U	1 U
BROMOMETHANE	1 U	1 U	1 U
CARBON DISULFIDE	0.2 J	0.5 J	1 U
CARBON TETRACHLORIDE	1 U	1 U	1 U
CHLOROBENZENE	1 U	1 U	1 U
CHLORODIBROMOMETHANE	1 U	1 U	1 U
CHLOROETHANE	1 U	1 U	1 U
CHLOROFORM	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U
CHLOROPRENE			
CIS-1,2-DICHLOROETHENE			
CIS-1,3-DICHLOROPROPENE	1 U	1 U	1 U
DIBROMOMETHANE			
DICHLORODIFLUOROMETHANE			
ETHYL METHACRYLATE			
ETHYLBENZENE	1 U	1 U	1 U
ISOBUTANOL			
METHACRYLONITRILE			
METHYL IODIDE			

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01 PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01 PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01 PAI-10-MW-14(D) 8/10/98
METHYL METHACRYLATE			
METHYLENE CHLORIDE	2 U	2 U	2 U
PROPIONITRILE			
STYRENE	1 U	1 U	1 U
TETRACHLOROETHENE	1 U	1 U	1 U
TOLUENE	1 U	1 U	1 U
TRANS-1,2-DICHLOROETHENE			
TRANS-1,3-DICHLOROPROPENE	1 U	1 U	1 U
TRANS-1,4-DICHLORO-2-BUTENE			
TRICHLOROETHENE	1 U	1 U	1 U
TRICHLOROFLUOROMETHANE			
VINYL ACETATE			
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U
XYLENES, TOTAL	1 U	1 U	1 U
SEMIVOLATILES (ug/L)			
1,2,4,5-TETRACHLOROBENZENE			
1,2,4-TRICHLOROBENZENE	5 U	5 U	5 U
1,2-DICHLOROBENZENE	5 U	5 U	5 U
1,2-DIPHENYLHYDRAZINE		5 U	
1,3,5-TRINITROBENZENE			
1,3-DICHLOROBENZENE	5 U	5 U	5 U
1,3-DINITROBENZENE			
1,4-DICHLOROBENZENE	5 U	5 U	5 U
1,4-NAPHTHOQUINONE			
1,4-PHENYLENEDIAMINE			
1-NAPHTHYLAMINE			
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U	5 U
2,3,4,6-TETRACHLOROPHENOL			
2,4,5-TRICHLOROPHENOL	5 U	5 U	5 U
2,4,6-TRICHLOROPHENOL	5 U	5 U	5 U
2,4-DICHLOROPHENOL	5 U	5 U	5 U
2,4-DIMETHYLPHENOL	5 U	5 U	5 U
2,4-DINITROPHENOL	10 U	10 U	10 U
2,4-DINITROTOLUENE	5 U	5 U	5 U
2,6-DICHLOROPHENOL			
2,6-DINITROTOLUENE	5 U	5 U	5 U
2-ACETYLAMINOFLUORENE			
2-CHLORONAPHTHALENE	5 U	5 U	5 U
2-CHLOROPHENOL	5 U	5 U	5 U
2-METHYLNAPHTHALENE	5 U	5 U	5 U
2-METHYLPHENOL	5 U	5 U	5 U
2-NAPHTHYLAMINE			
2-NITROANILINE	5 U	5 U	5 U

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01 PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01 PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01 PAI-10-MW-14(D) 8/10/98
2-NITROPHENOL	5 U	5 U	5 U
2-PICOLINE			
3,3'-DICHLOROBENZIDINE	5 U	5 U	5 U
3,3'-DIMETHYLBENZIDINE			
3-METHYLCHOLANTHRENE			
3-NITROANILINE	5 U	5 U	5 U
4,6-DINITRO-2-METHYLPHENOL	10 U	10 U	10 U
4-AMINOBIPHENYL			
4-BROMOPHENYL PHENYL ETHER	5 U	5 U	5 U
4-CHLORO-3-METHYLPHENOL	5 U	5 U	5 U
4-CHLOROANILINE	5 U	5 U	5 U
4-CHLOROPHENYL PHENYL ETHER	5 U	5 U	5 U
4-METHYLPHENOL	5 U	5 U	5 U
4-NITROANILINE	5 U	5 U	5 U
4-NITROPHENOL	10 U	10 U	10 U
4-NITROQUINOLINE-1-OXIDE			
5-NITRO-O-TOLUIDINE			
7,12-DIMETHYLBENZ(A)ANTHRACE			
A,A-DIMETHYLPHENETHYLAMINE			
ACENAPHTHENE	5 U	5 U	5 U
ACENAPHTHYLENE	5 U	5 U	5 U
ACETOPHENONE			
ANILINE		5 U	
ANTHRACENE	5 U	5 U	5 U
ARAMITE			
BENZO(A)ANTHRACENE	5 U	5 U	5 U
BENZO(A)PYRENE	5 U	5 U	5 U
BENZO(B)FLUORANTHENE	5 U	5 U	5 U
BENZO(G,H,I)PERYLENE	5 U	5 U	5 U
BENZO(K)FLUORANTHENE	5 U	5 U	5 U
BENZOIC ACID		25 U	
BENZYL ALCOHOL		5 U	
BIS(2-CHLOROETHOXY)METHANE	5 U	5 U	5 U
BIS(2-CHLOROETHYL)ETHER	5 U	5 U	5 U
BIS(2-ETHYLHEXYL)PHTHALATE	5 U	5 U	5 U
BUTYL BENZYL PHTHALATE	5 U	5 U	5 U
CARBAZOLE	5 U	5 U	5 U
CHLOROBENZILATE			
CHRYSENE	5 U	5 U	5 U
DI-N-BUTYL PHTHALATE	5 U	5 U	5 U
DI-N-OCTYL PHTHALATE	5 U	5 U	5 U
DIALLATE			
DIBENZO(A,H)ANTHRACENE	5 U	5 U	5 U

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01 PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01 PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01 PAI-10-MW-14(D) 8/10/98
DIBENZOFURAN	5 U	5 U	5 U
DIETHYL PHTHALATE	5 U	5 U	5 U
DIMETHOATE			
DIMETHYL PHTHALATE	5 U	5 U	5 U
DIPHENYLAMINE			
DISULFOTON			
ETHYL METHANE SULFONATE			
ETHYL PARATHION			
FLUORANTHENE	5 U	5 U	5 U
FLUORENE	5 U	5 U	5 U
HEXACHLOROBENZENE	5 U	5 U	5 U
HEXACHLOROBUTADIENE	5 U	5 U	5 U
HEXACHLOROCYCLOPENTADIENE	5 U	5 U	5 U
HEXACHLOROETHANE	5 U	5 U	5 U
HEXACHLOROPROPENE			
INDENO(1,2,3-CD)PYRENE	5 U	5 U	5 U
ISODRIN			
ISOPHORONE	5 U	5 U	5 U
ISOSAFROLE			
METHAPYRILENE			
METHYL METHANE SULFONATE			
METHYL PARATHION			
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U	5 U
N-NITROSODI-N-BUTYLAMINE			
N-NITROSODIETHYLAMINE			
N-NITROSODIPHENYLAMINE	5 U	5 U	5 U
N-NITROSOMETHYLETHYLAMINE			
N-NITROSOMORPHOLINE			
N-NITROSOPIPERIDINE			
N-NITROSOPYRROLIDINE			
NAPHTHALENE	5 U	5 U	5 U
NITROBENZENE	5 U	5 U	5 U
O,O,O-TRIETHYL PHOSPHOROTHIO			
O-TOLUIDINE			
P-(DIMETHYLAMINO)AZOBENZENE			
PENTACHLOROBENZENE			
PENTACHLOROETHANE			
PENTACHLORONITROBENZENE			
PENTACHLOROPHENOL	10 U	10 U	10 U
PHENACETIN			
PHENANTHRENE	5 U	5 U	5 U
PHENOL	5 U	5 U	5 U
PHORATE			

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01 PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01 PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01 PAI-10-MW-14(D) 8/10/98
PRONAMIDE			
PYRENE	5 U	5 U	5 U
SAFROLE			
SULFOTEPP			
THIONAZIN			
PESTICIDES/PCBs (ug/L)			
4,4'-DDD	0.1 U	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U	0.1 U
ALDRIN	0.05 U	0.05 U	0.052 U
ALPHA-BHC	0.05 U	0.05 U	0.052 U
ALPHA-CHLORDANE	0.05 U	0.05 U	0.052 U
AROCLOR-1016	1 U	1 U	1 U
AROCLOR-1221	2 U	2 U	2.1 U
AROCLOR-1232	1 U	1 U	1 U
AROCLOR-1242	1 U	1 U	1 U
AROCLOR-1248	1 U	1 U	1 U
AROCLOR-1254	1 U	1 U	1 U
AROCLOR-1260	1 U	1 U	1 U
BETA-BHC	0.05 U	0.05 U	0.052 U
CHLORDANE			
DELTA-BHC	0.05 U	0.05 U	0.052 U
DIELDRIN	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	0.05 U	0.05 U	0.052 U
ENDOSULFAN II	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	0.1 U	0.1 U	0.1 U
ENDRIN	0.1 U	0.1 U	0.1 U
ENDRIN ALDEHYDE	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	0.1 U	0.1 U	0.1 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.052 U
GAMMA-CHLORDANE	0.05 U	0.05 U	0.052 U
HEPTACHLOR	0.05 U	0.05 U	0.052 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.052 U
METHOXYCHLOR	0.5 U	0.5 U	0.52 U
TOXAPHENE	5 U	5 U	5.2 U
HERBICIDES (ug/L)			
2,4,5-T			
2,4,5-TP (SILVEX)			
2,4-D			
DINOSEB			
HEXACHLOROPHENE			
INORGANICS (ug/L)			
ALUMINUM	22 U	532	806

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01 PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01 PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01 PAI-10-MW-14(D) 8/10/98
ANTIMONY	19 U	19 U	19 U
ARSENIC	10.7	3.4	29.2
BARIUM	216	83.7	215
BERYLLIUM	0.6 U	0.2 U	0.2 U
CADMIUM	8.1	2 U	2 U
CALCIUM	423000	387000	364000
CHROMIUM	10.6	17	6.4 U
COBALT	3.3 U	3.3 U	3.3 U
COPPER	2.6 U	2.6 U	2.6 U
CYANIDE	20 U	20 UJ	20 U
IRON	111000	5780	35400
LEAD	11 U	5.5 U	14 U
MAGNESIUM	804000	1070000	1100000
MANGANESE	432	1390	136
MERCURY	0.2 U	0.2 U	0.2 U
NICKEL	4.4 U	4.4 U	4.4 U
POTASSIUM	138000	371000	338000
SELENIUM	7 U	7 U	17.5 U
SILVER	43 U	4.3 U	7.9 U
SODIUM	5280000	8670000	8660000
THALLIUM	18 U	9 U	9 U
TIN			
VANADIUM	3.7	7.3	11.2
ZINC	13.7	7.9 U	14 U
MISCELLANEOUS PARAMETERS			
CHLORIDE	9000000	16000000	17000000
FLUORIDE	19000	100000 U	20000 U
HARDNESS as CaCO3	4800000	5800000	6200000
HEXAVALENT CHROMIUM			
NITRATE/NITRITE, AS NITROGEN	120	40 U	50 U
SULFATE	1100000	2100000	2200000
TOTAL DISSOLVED SOLIDS	17000000	30000000	31000000
TOTAL ORGANIC CARBON	5300	3900	9700
TOTAL SUSPENDED SOLIDS	58000	81000	140000

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FILTERED GROUNDWATER RESULTS

SUMMARY OF POSITIVE DETECTIONS
FILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01-F PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01-F PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01-F PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01-F PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01-F PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01-F PAI-10-MW-06(D) 8/31/98
INORGANICS (ug/L)						
ALUMINUM	299	22 U	22 U	22 U	22 U	391
ARSENIC	2.5	35.9	13.1	6.1	7.3	3.2
BARIUM	234	68.8	188	79.6	195	61.4
CADMIUM	2 U	6.6	2 U	2 U	3	6.5
CALCIUM	154000	228000	255000	373000	67800	216000
CHROMIUM	13.5 U	6.4 U	6.4 U	16.3 U	64 U	6.4 U
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	13.7
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.8
IRON	2700	101000	48000	19600	124000	93600
MAGNESIUM	465000	587000	550000	511000	174000	381000
MANGANESE	44.4	213	225	1000	339	1530
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	9.5
POTASSIUM	161000	170000	232000	128000	29200	28700
SELENIUM	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
SODIUM	3650000	4620000	3850000	3510000	1260000	2240000
VANADIUM	9.3	9.7	8.9	5.8	5.1	6.4
ZINC	31.8	18.1 U	11.9 U	10.8 U	20.2 U	81.6

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SUMMARY OF POSITIVE DETECTIONS
FILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01-F PAI-10-MW-07(S) 8/31/98	PAI-10-GW-07-01-F-D PAI-10-MW-07(S) 8/31/98	PAI-10-GW-08-01-F PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01-F PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01-F PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01-F PAI-10-MW-11(S) 8/24/98
INORGANICS (ug/L)						
ALUMINUM	54.5 U	70.8 U	22 U	113 U	22 U	
ARSENIC	0.9 U	1.1	18.1	3.2	0.9	9.3
BARIUM	120	122	71.9	55.3	196	110
CADMIUM	2 U	2 U	2 U	2 U	2 U	2 U
CALCIUM	23600	21700	78700	256000	520000	
CHROMIUM	6.7	6.4 U	7.1	13.2	17.3	11.9
COBALT	3.3 U	3.3 U	15.5	3.3 U	3.3 U	3.3 U
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
IRON	3580	5160	6570	4860	55100	
MAGNESIUM	19400	18300	25300	768000	397000	
MANGANESE	157	142	1330	147	1070	
NICKEL	5.9	4.4 U	9.8	4.4 U	4.4 U	4.4 U
POTASSIUM	4410	4310	5530	242000	81200	
SELENIUM	0.7 U	0.7 U	0.85 U	3.5 UJ	3.5 UJ	3.5 U
SODIUM	177000	179000	146000	5840000	3340000	
VANADIUM	2.6 U	2.6 U	2.6 U	10.4	3.1	7.1
ZINC	8.8 U	8.9 U	22.2	5.9	10.4 U	10.4

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SUMMARY OF POSITIVE DETECTIONS
FILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01-F PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01-F PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01-F PAI-10-MW-14(D) 8/10/98
INORGANICS (ug/L)			
ALUMINUM	22 U	22 U	22 U
ARSENIC	13.7	1.8	32.3
BARIUM	230	83	366
CADMIUM	9.2	2 U	2 U
CALCIUM	434000	385000	365000
CHROMIUM	6.4 U	10.4	6.4 U
COBALT	3.3 U	3.3 U	3.3 U
COPPER	2.6 U	2.6 U	2.6 U
IRON	118000	5510	35000
MAGNESIUM	814000	1060000	1100000
MANGANESE	443	1370	134
NICKEL	4.4 U	4.4 U	4.4 U
POTASSIUM	141000	371000	340000
SELENIUM	25.8	14 U	17.5 U
SODIUM	5420000	8580000	8640000
VANADIUM	2.7	8.5	11.7
ZINC	12.6	5.3 U	81.2

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SUMMARY OF ANALYTICAL RESULTS
FILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-01-01-F PAI-10-MW-01(S) 8/20/98	PAI-10-GW-02-01-F PAI-10-MW-02(D) 8/20/98	PAI-10-GW-03-01-F PAI-10-MW-03(S) 8/24/98	PAI-10-GW-04-01-F PAI-10-MW-04(D) 8/24/98	PAI-10-GW-05-01-F PAI-10-MW-05(S) 8/24/98	PAI-10-GW-06-01-F PAI-10-MW-06(D) 8/31/98
INORGANICS (ug/L)						
ALUMINUM	299	22 U	22 U	22 U	22 U	391
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	2.5	35.9	13.1	6.1	7.3	3.2
BARIUM	234	68.8	188	79.6	195	61.4
BERYLLIUM	0.2 U	0.2 U	0.3 U	0.2 U	0.5 U	0.2 U
CADMIUM	2 U	6.6	2 U	2 U	3	6.5
CALCIUM	154000	228000	255000	373000	67800	216000
CHROMIUM	13.5 U	6.4 U	6.4 U	16.3 U	64 U	6.4 U
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	13.7
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.8
IRON	2700	101000	48000	19600	124000	93600
LEAD	1.1 U	1.1 UJ	1.1 UJ	2.2 UJ	1.1 UJ	1.1 U
MAGNESIUM	465000	587000	550000	511000	174000	381000
MANGANESE	44.4	213	225	1000	339	1530
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	9.5
POTASSIUM	161000	170000	232000	128000	29200	28700
SELENIUM	3.5 U	3.5 U	3.5 U	3.5 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	3650000	4620000	3850000	3510000	1260000	2240000
THALLIUM	9 U	9 U	9 U	9 U	9 U	9 U
TIN						
VANADIUM	9.3	9.7	8.9	5.8	5.1	6.4
ZINC	31.8	18.1 U	11.9 U	10.8 U	20.2 U	81.6

SUMMARY OF ANALYTICAL RESULTS
FILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-07-01-F PAI-10-MW-07(S) 8/31/98	PAI-10-GW-07-01-F-D PAI-10-MW-07(S) 8/31/98	PAI-10-GW-08-01-F PAI-10-MW-08(D) 8/31/98	PAI-10-GW-09-01-F PAI-10-MW-09(S) 9/1/98	PAI-10-GW-10-01-F PAI-10-MW-10(D) 9/2/98	PAI-10-GW-11-01-F PAI-10-MW-11(S) 8/24/98
INORGANICS (ug/L)						
ALUMINUM	54.5 U	70.8 U	22 U	113 U	22 U	
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	0.9 U	1.1	18.1	3.2	0.9	9.3
BARIUM	120	122	71.9	55.3	196	110
BERYLLIUM	0.4 U	0.3 U	0.2 U	0.2 U	0.2 U	0.3 U
CADMIUM	2 U	2 U	2 U	2 U	2 U	2 U
CALCIUM	23600	21700	78700	256000	520000	
CHROMIUM	6.7	6.4 U	7.1	13.2	17.3	11.9
COBALT	3.3 U	3.3 U	15.5	3.3 U	3.3 U	3.3 U
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
IRON	3580	5160	6570	4860	55100	
LEAD	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	11 U
MAGNESIUM	19400	18300	25300	768000	397000	
MANGANESE	157	142	1330	147	1070	
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	5.9	4.4 U	9.8	4.4 U	4.4 U	4.4 U
POTASSIUM	4410	4310	5530	242000	81200	
SELENIUM	0.7 U	0.7 U	0.85 U	3.5 UJ	3.5 UJ	3.5 U
SILVER	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
SODIUM	177000	179000	146000	5840000	3340000	
THALLIUM	9 UJ	9 UJ	9 U	9 U	9 U	9 U
TIN				1000 U		1000 U
VANADIUM	2.6 U	2.6 U	2.6 U	10.4	3.1	7.1
ZINC	8.8 U	8.9 U	22.2	5.9	10.4 U	10.4

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SUMMARY OF ANALYTICAL RESULTS
FILTERED GROUNDWATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-GW-12-01-F PAI-10-MW-12(D) 9/11/98	PAI-10-GW-13-01-F PAI-10-MW-13(S) 9/2/98	PAI-10-GW-14-01-F PAI-10-MW-14(D) 8/10/98
INORGANICS (ug/L)			
ALUMINUM	22 U	22 U	22 U
ANTIMONY	19 U	19 U	19 U
ARSENIC	13.7	1.8	32.3
BARIUM	230	83	366
BERYLLIUM	0.6 U	0.2 U	0.2 U
CADMIUM	9.2	2 U	2 U
CALCIUM	434000	385000	365000
CHROMIUM	6.4 U	10.4	6.4 U
COBALT	3.3 U	3.3 U	3.3 U
COPPER	2.6 U	2.6 U	2.6 U
IRON	118000	5510	35000
LEAD	11 U	11 U	11 U
MAGNESIUM	814000	1060000	1100000
MANGANESE	443	1370	134
MERCURY	0.2 U	0.2 U	0.2 U
NICKEL	4.4 U	4.4 U	4.4 U
POTASSIUM	141000	371000	340000
SELENIUM	25.8	14 U	17.5 U
SILVER	43 U	4.3 U	4.3 U
SODIUM	5420000	8580000	8640000
THALLIUM	18 U	9 U	9 U
TIN			
VANADIUM	2.7	8.5	11.7
ZINC	12.6	5.3 U	81.2

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UNFILTERED SURFACE WATER RESULTS

SUMMARY OF POSITIVE DETECTIONS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-01-00 PAI-10-SW-01 7/28/98	PAI-10-SW-02-00 PAI-10-SW-02 7/28/98	PAI-10-SW-03-00 PAI-10-SW-03 7/29/98	PAI-10-SW-04-00 PAI-10-SW-04 7/27/98	PAI-10-SW-05-00 PAI-10-SW-05 7/27/98	PAI-10-SW-06-00 PAI-10-SW-06 7/28/98
VOLATILES (ug/L)						
2-BUTANONE	5 UR	5 UR	2.6 J	5 UR	5 UR	2.1 J
ACETONE	5 UR	5 UR	11 U	9.2 U	6.8 UR	8.2 UR
CARBON DISULFIDE	0.2 J	1	0.3 J	0.4 J	0.3 J	1 U
CHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
SEMIVOLATILES (ug/L)						
BIS(2-ETHYLHEXYL)PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 U
BUTYL BENZYL PHTHALATE	5 U	5 U	1 J	2 J	1 J	5 U
PHENOL	5 U	5 U	5 U	7	5 U	5 U
INORGANICS (ug/L)						
ALUMINUM	1440	2030	1570	12900	6940	631
ARSENIC	9	7.8	8.7	8.4	8.1	4.6
BARIUM	23.5	20.1	25.9	34.8	32.5	21.4
CALCIUM	280000	238000	374000	337000	349000	315000
CHROMIUM	9.5	16.2	18.6	32.1	24	17.2
COPPER	3.1 U	3.5 U	3.6 U	4.5 U	3.1 U	2.9 U
IRON	935	1480	775	7890	4050	365
MAGNESIUM	810000	726000	1120000	1010000	1020000	942000
MANGANESE	213	201	205	191	214	128
POTASSIUM	304000	264000	406000	364000	375000	341000
SELENIUM	3.8 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
SODIUM	7200000	6570000	10200000	9240000	9180000	8520000
VANADIUM	16.1	16.7	25.1	33.9	27	15.6
ZINC	6.7 U	8.9 U	6.3 U	23.3 U	20 U	9 U
MISCELLANEOUS PARAMETERS (ug/L)						
HARDNESS as CaCO3				5800000	5800000	
TOTAL ORGANIC CARBON	9800	9900	11000	5900	6000	6000

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SUMMARY OF POSITIVE DETECTIONS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-07-00 PAI-10-SW-07 7/29/98	PAI-10-SW-08-00 PAI-10-SW-08 8/11/98	PAI-10-SW-08-00-D PAI-10-SW-08 8/11/98	PAI-10-SW-09-00 PAI-10-SW-09 8/11/98	PAI-10-SW-10-00 PAI-10-SW-10 8/11/98	PAI-10-SW-11-00 PAI-10-SW-11 8/8/98
VOLATILES (ug/L)						
2-BUTANONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
ACETONE	5.3 UR	5 UR	5 UR	5 UR	5 UR	5 UR
CARBON DISULFIDE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
SEMIVOLATILES (ug/L)						
BIS(2-ETHYLHEXYL)PHTHALATE	5 U	18	5 U	5 U	1 J	5 U
BUTYL BENZYL PHTHALATE	1 J	5 U	5 U	5 U	5 U	1 J
PHENOL	5 U	5 U	5 U	5 U	5 U	5 U
INORGANICS (ug/L)						
ALUMINUM	499	888	750	2910	1840	708
ARSENIC	5.1	3.4	4.5 U	3.7	2.7	3.6
BARIUM	22.4	24.4	24.6	26.1	26.7	24.6
CALCIUM	338000	369000	350000	362000	366000	361000
CHROMIUM	13.2	9.2	16.5	20.2	14.3	18.4
COPPER	2.9 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
IRON	292	543	478	1790	1320	791
MAGNESIUM	956000	1080000	1070000	1070000	1050000	1070000
MANGANESE	143	173	158	123	37.1	112
POTASSIUM	357000	387000	383000	385000	389000	380000
SELENIUM	3.5 U	20.6	17.5 U	17.5 U	17.5 U	18 J
SODIUM	8660000	8710000	8780000	8340000	8600000	8380000
VANADIUM	16.9	15.6	14.1	15.8	13.4	16.1 U
ZINC	4.8 U	6.7 U	9.2 U	17.2 U	11.6 U	12.3 U
MISCELLANEOUS PARAMETERS (ug/L)						
HARDNESS as CaCO3		6000000	6200000	6300000	6000000	5800000
TOTAL ORGANIC CARBON	4500	3400	2700	3600	3500	5000

SUMMARY OF POSITIVE DETECTIONS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-12-00 PAI-10-SW-12 8/11/98	PAI-10-SW-13-00 PAI-10-SW-13 8/11/98	PAI-10-SW-16-01 PAI-10-SW-16 9/10/98	PAI-10-SW-17-01 PAI-10-SW-17 9/10/98	PAI-10-SW-18-01 PAI-10-SW-18 9/10/98
VOLATILES (ug/L)					
2-BUTANONE	5 UR	5 UR	5 UR	5 UR	5 UR
ACETONE	5 UR	13 J	5 U	5 U	5 UR
CARBON DISULFIDE	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U	1 U	0.3 J
SEMIVOLATILES (ug/L)					
BIS(2-ETHYLHEXYL)PHTHALATE	5 U	5 U	5 U	5 U	5 U
BUTYL BENZYL PHTHALATE	5 U	5 U	5 U	5 U	5 U
PHENOL	5 U	5 U	5 U	5 U	5 U
INORGANICS (ug/L)					
ALUMINUM	1690	1020	966	1490	6560
ARSENIC	2.4	2.8	4.5 U	4.5 U	7.9
BARIUM	25.1	25.1	23.7	24.6	29
CALCIUM	355000	366000	392000	393000	392000
CHROMIUM	13.6	16.1	20.2	23.5	22.8
COPPER	2.6 U	2.6 U	4.7	4.7	6.7
IRON	1050	625	584	885	4530
MAGNESIUM	1050000	1070000	1230000	1230000	1230000
MANGANESE	30.3	49	17.6	27.3	86.8
POTASSIUM	375000	383000	409000	414000	405000
SELENIUM	17.5 U	17.5 U	7 U	7 U	7 U
SODIUM	8050000	8730000	10100000	10100000	10100000
VANADIUM	14.4	15.9	13.9	13.6	25.9
ZINC	14 U	8.1 U	11.9	4.3 U	10.3
MISCELLANEOUS PARAMETERS (ug/L)					
HARDNESS as CaCO3	5900000	6100000	6300000	6300000	6300000
TOTAL ORGANIC CARBON	3100	2600	3600	2400	2600

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-01-00 PAI-10-SW-01 7/28/98	PAI-10-SW-02-00 PAI-10-SW-02 7/28/98	PAI-10-SW-03-00 PAI-10-SW-03 7/29/98	PAI-10-SW-04-00 PAI-10-SW-04 7/27/98	PAI-10-SW-05-00 PAI-10-SW-05 7/27/98	PAI-10-SW-06-00 PAI-10-SW-06 7/28/98
VOLATILES (ug/L)						
1,1,1-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-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
2-BUTANONE	5 UR	5 UR	2.6 J	5 UR	5 UR	2.1 J
2-HEXANONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
4-METHYL-2-PENTANONE	5 UR	5 UR	5 UR	5 UR	5 UR	5 UR
ACETONE	5 UR	5 UR	11 U	9.2 U	6.8 UR	8.2 UR
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
CARBON DISULFIDE	0.2 J	1	0.3 J	0.4 J	0.3 J	1 U
CARBON TETRACHLORIDE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
CHLORODIBROMOMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
METHYLENE CHLORIDE	2 U	2 U	2 U	2 U	2 U	2 U
STYRENE	1 U	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	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 (ug/L)						
1,2,4-TRICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DIPHENYLHYDRAZINE	5 U	5 U	5 U	5 U	5 U	5 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
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U	5 U	5 U	5 U	5 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

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-01-00 PAI-10-SW-01 7/28/98	PAI-10-SW-02-00 PAI-10-SW-02 7/28/98	PAI-10-SW-03-00 PAI-10-SW-03 7/29/98	PAI-10-SW-04-00 PAI-10-SW-04 7/27/98	PAI-10-SW-05-00 PAI-10-SW-05 7/27/98	PAI-10-SW-06-00 PAI-10-SW-06 7/28/98
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-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U	5 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-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
3,3'-DICHLOROBENZIDINE	10 U	10 U	10 U	10 U	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-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
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
ANILINE	5 U	5 U	5 U	5 U	5 U	5 U
ANTHRACENE	5 U	5 U	5 U	5 U	5 U	5 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
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
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	5 U	5 U	5 U	5 U	5 U	5 U
BUTYL BENZYL PHTHALATE	5 U	5 U	1 J	2 J	1 J	5 U
CARBAZOLE	5 U	5 U	5 U	5 U	5 U	5 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
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	5 U
DIMETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 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

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-01-00 PAI-10-SW-01 7/28/98	PAI-10-SW-02-00 PAI-10-SW-02 7/28/98	PAI-10-SW-03-00 PAI-10-SW-03 7/29/98	PAI-10-SW-04-00 PAI-10-SW-04 7/27/98	PAI-10-SW-05-00 PAI-10-SW-05 7/27/98	PAI-10-SW-06-00 PAI-10-SW-06 7/28/98
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
INDENO(1,2,3-CD)PYRENE	5 U	5 U	5 U	5 U	5 U	5 U
ISOPHORONE	5 U	5 U	5 U	5 U	5 U	5 U
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U	5 U	5 U	5 U	5 U
N-NITROSODIPHENYLAMINE	5 U	5 U	5 U	5 U	5 U	5 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
PENTACHLOROPHENOL	10 U	10 U	10 U	10 U	10 U	10 U
PHENANTHRENE	5 U	5 U	5 U	5 U	5 U	5 U
PHENOL	5 U	5 U	5 U	7	5 U	5 U
PYRENE	5 U	5 U	5 U	5 U	5 U	5 U
PESTICIDES/PCBs (ug/L)						
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ALDRIN	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
ALPHA-BHC	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
ALPHA-CHLORDANE	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
AROCLOR-1016	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1221	2.1 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1232	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1242	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1248	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1254	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1260	1 U	1 U	1 U	1 U	1 U	1 U
BETA-BHC	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
DELTA-BHC	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
DIELDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
ENDOSULFAN II	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN ALDEHYDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
GAMMA-BHC (LINDANE)	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
GAMMA-CHLORDANE	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
HEPTACHLOR	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
HEPTACHLOR EPOXIDE	0.052 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
METHOXYCHLOR	0.52 U	0.5 U	0.5 U	0.5 U	0.5 U	0.51 U
TOXAPHENE	5.2 U	5 U	5 U	5 U	5 U	5.1 U
INORGANICS (ug/L)						
ALUMINUM	1440	2030	1570	12900	6940	631

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-01-00 PAI-10-SW-01 7/28/98	PAI-10-SW-02-00 PAI-10-SW-02 7/28/98	PAI-10-SW-03-00 PAI-10-SW-03 7/29/98	PAI-10-SW-04-00 PAI-10-SW-04 7/27/98	PAI-10-SW-05-00 PAI-10-SW-05 7/27/98	PAI-10-SW-06-00 PAI-10-SW-06 7/28/98
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	9	7.8	8.7	8.4	8.1	4.6
BARIUM	23.5	20.1	25.9	34.8	32.5	21.4
BERYLLIUM	0.2 U	0.3 U	0.2 U	0.4 U	0.4 U	0.2 U
CADMIUM	2 U	2 U	2 U	2 U	2 U	2 U
CALCIUM	280000	238000	374000	337000	349000	315000
CHROMIUM	9.5	16.2	18.6	32.1	24	17.2
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER	3.1 U	3.5 U	3.6 U	4.5 U	3.1 U	2.9 U
CYANIDE	20 U	20 U	20 U	20 U	20 U	20 U
IRON	935	1480	775	7890	4050	365
LEAD	5.5 U	5.5 U	11 U	11 U	11 U	11 U
MAGNESIUM	810000	726000	1120000	1010000	1020000	942000
MANGANESE	213	201	205	191	214	128
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
POTASSIUM	304000	264000	406000	364000	375000	341000
SELENIUM	3.8 U	3.5 U	3.5 U	3.5 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	7200000	6570000	10200000	9240000	9180000	8520000
THALLIUM	9 U	9 U	9 U	9 U	9 U	9 U
VANADIUM	16.1	16.7	25.1	33.9	27	15.6
ZINC	6.7 U	8.9 U	6.3 U	23.3 U	20 U	9 U
MISCELLANEOUS PARAMETERS (ug/L)						
HARDNESS as CaCO3				5800000	5800000	
HEXAVALENT CHROMIUM						
TOTAL ORGANIC CARBON	9800	9900	11000	5900	6000	6000

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-07-00 PAI-10-SW-07 7/29/98	PAI-10-SW-08-00 PAI-10-SW-08 8/11/98	PAI-10-SW-08-00-D PAI-10-SW-08 8/11/98	PAI-10-SW-09-00 PAI-10-SW-09 8/11/98	PAI-10-SW-10-00 PAI-10-SW-10 8/11/98	PAI-10-SW-11-00 PAI-10-SW-11 8/8/98
VOLATILES (ug/L)						
1,1,1-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
1,2-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
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 UR	5 UR	5 UR	5 UR	5 UR
ACETONE	5.3 UR	5 UR	5 UR	5 UR	5 UR	5 UR
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
CARBON DISULFIDE	1 U	1 U	1 U	1 U	1 U	1 U
CARBON TETRACHLORIDE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
CHLORODIBROMOMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	1 U	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U	1 U	1 U	1 U
CIS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	1 U	1 U	1 U	1 U	1 U	1 U
METHYLENE CHLORIDE	2 U	2 U	2 U	2 U	2 U	2 U
STYRENE	1 U	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
TOLUENE	1 U	1 U	1 U	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	1 U	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	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 (ug/L)						
1,2,4-TRICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U	5 U
1,2-DIPHENYLHYDRAZINE	5 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
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U	5 U	5 U	5 U	5 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

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-07-00 PAI-10-SW-07 7/29/98	PAI-10-SW-08-00 PAI-10-SW-08 8/11/98	PAI-10-SW-08-00-D PAI-10-SW-08 8/11/98	PAI-10-SW-09-00 PAI-10-SW-09 8/11/98	PAI-10-SW-10-00 PAI-10-SW-10 8/11/98	PAI-10-SW-11-00 PAI-10-SW-11 8/8/98
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-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U	5 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-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
3,3'-DICHLOROBENZIDINE	10 U	5 U	5 U	5 U	5 U	5 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-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
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
ANILINE	5 U					
ANTHRACENE	5 U	5 U	5 U	5 U	5 U	5 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
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
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	5 U	18	5 U	5 U	1 J	5 U
BUTYL BENZYL PHTHALATE	1 J	5 U	5 U	5 U	5 U	1 J
CARBAZOLE	5 U	5 U	5 U	5 U	5 U	5 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
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	5 U
DIMETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U	5 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

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-07-00 PAI-10-SW-07 7/29/98	PAI-10-SW-08-00 PAI-10-SW-08 8/11/98	PAI-10-SW-08-00-D PAI-10-SW-08 8/11/98	PAI-10-SW-09-00 PAI-10-SW-09 8/11/98	PAI-10-SW-10-00 PAI-10-SW-10 8/11/98	PAI-10-SW-11-00 PAI-10-SW-11 8/8/98
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
INDENO(1,2,3-CD)PYRENE	5 U	5 U	5 U	5 U	5 U	5 U
ISOPHORONE	5 U	5 U	5 U	5 U	5 U	5 U
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U	5 U	5 U	5 U	5 U
N-NITROSODIPHENYLAMINE	5 U	5 U	5 U	5 U	5 U	5 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
PENTACHLOROPHENOL	10 U	10 U	10 U	10 U	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
PYRENE	5 U	5 U	5 U	5 U	5 U	5 U
PESTICIDES/PCBs (ug/L)						
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ALDRIN	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-CHLORDANE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
AROCLOR-1016	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1221	2 U	2 U	2 U	2 U	2 U	2 U
AROCLOR-1232	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1242	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1248	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1254	1 U	1 U	1 U	1 U	1 U	1 U
AROCLOR-1260	1 U	1 U	1 U	1 U	1 U	1 U
BETA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DELTA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN II	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN ALDEHYDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-CHLORDANE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
METHOXYCHLOR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOXAPHENE	5 U	5 U	5 U	5 U	5 U	5 U
INORGANICS (ug/L)						
ALUMINUM	499	888	750	2910	1840	708

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-07-00 PAI-10-SW-07 7/29/98	PAI-10-SW-08-00 PAI-10-SW-08 8/11/98	PAI-10-SW-08-00-D PAI-10-SW-08 8/11/98	PAI-10-SW-09-00 PAI-10-SW-09 8/11/98	PAI-10-SW-10-00 PAI-10-SW-10 8/11/98	PAI-10-SW-11-00 PAI-10-SW-11 8/8/98
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	5.1	3.4	4.5 U	3.7	2.7	3.6
BARIUM	22.4	24.4	24.6	26.1	26.7	24.6
BERYLLIUM	0.2 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	338000	369000	350000	362000	366000	361000
CHROMIUM	13.2	9.2	16.5	20.2	14.3	18.4
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER	2.9 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
CYANIDE	20 U	20 U	20 U	20 U	20 U	20 U
IRON	292	543	478	1790	1320	791
LEAD	11 U	11 U	12 U	13 U	11 U	11 U
MAGNESIUM	956000	1080000	1070000	1070000	1050000	1070000
MANGANESE	143	173	158	123	37.1	112
MERCURY	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.1 U
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
POTASSIUM	357000	387000	383000	385000	389000	380000
SELENIUM	3.5 U	20.6	17.5 U	17.5 U	17.5 U	18 J
SILVER	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
SODIUM	8660000	8710000	8780000	8340000	8600000	8380000
THALLIUM	9 U	18 U	18 U	9 U	9 U	9 U
VANADIUM	16.9	15.6	14.1	15.8	13.4	16.1 U
ZINC	4.8 U	6.7 U	9.2 U	17.2 U	11.6 U	12.3 U
MISCELLANEOUS PARAMETERS (ug/L)						
HARDNESS as CaCO3		6000000	6200000	6300000	6000000	5800000
HEXAVALENT CHROMIUM		5 UJ	5 UJ	5 UJ	5 UJ	
TOTAL ORGANIC CARBON	4500	3400	2700	3600	3500	5000

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-12-00 PAI-10-SW-12 8/11/98	PAI-10-SW-13-00 PAI-10-SW-13 8/11/98	PAI-10-SW-16-01 PAI-10-SW-16 9/10/98	PAI-10-SW-17-01 PAI-10-SW-17 9/10/98	PAI-10-SW-18-01 PAI-10-SW-18 9/10/98
VOLATILES (ug/L)					
1,1,1-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U
1,1,2,2-TETRACHLOROETHANE	1 U	1 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U
1,1-DICHLOROETHENE	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHANE	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROETHENE (TOTAL)	1 U	1 U	1 U	1 U	1 U
1,2-DICHLOROPROPANE	1 U	1 U	1 U	1 U	1 U
2-BUTANONE	5 UR	5 UR	5 UR	5 UR	5 UR
2-HEXANONE	5 UR	5 UR	5 UR	5 UR	5 UR
4-METHYL-2-PENTANONE	5 UR	5 UR	5 UR	5 UR	5 UR
ACETONE	5 UR	13 J	5 U	5 U	5 UR
BENZENE	1 U	1 U	1 U	1 U	1 U
BROMODICHLOROMETHANE	1 U	1 U	1 U	1 U	1 U
BROMOFORM	1 U	1 U	1 U	1 U	1 U
BROMOMETHANE	1 U	1 U	1 U	1 U	1 U
CARBON DISULFIDE	1 U	1 U	1 U	1 U	1 U
CARBON TETRACHLORIDE	1 U	1 U	1 U	1 U	1 U
CHLOROBENZENE	1 U	1 U	1 U	1 U	1 U
CHLORODIBROMOMETHANE	1 U	1 U	1 U	1 U	1 U
CHLOROETHANE	1 U	1 U	1 U	1 U	1 U
CHLOROFORM	1 U	1 U	1 U	1 U	1 U
CHLOROMETHANE	1 U	1 U	1 U	1 U	0.3 J
CIS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	1 U	1 U	1 U	1 U	1 U
METHYLENE CHLORIDE	2 U	2 U	2 U	2 U	2 U
STYRENE	1 U	1 U	1 U	1 U	1 U
TETRACHLOROETHENE	1 U	1 U	1 U	1 U	1 U
TOLUENE	1 U	1 U	1 U	1 U	1 U
TRANS-1,3-DICHLOROPROPENE	1 U	1 U	1 U	1 U	1 U
TRICHLOROETHENE	1 U	1 U	1 U	1 U	1 U
VINYL CHLORIDE	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
XYLENES, TOTAL	1 U	1 U	1 U	1 U	1 U
SEMIVOLATILES (ug/L)					
1,2,4-TRICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U
1,2-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U
1,2-DIPHENYLHYDRAZINE					
1,3-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U
1,4-DICHLOROBENZENE	5 U	5 U	5 U	5 U	5 U
2,2'-OXYBIS(1-CHLOROPROPANE)	5 U	5 U	5 U	5 U	5 U
2,4,5-TRICHLOROPHENOL	5 U	5 U	5 U	5 U	5 U
2,4,6-TRICHLOROPHENOL	5 U	5 U	5 U	5 U	5 U
2,4-DICHLOROPHENOL	5 U	5 U	5 U	5 U	5 U

SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-12-00 PAI-10-SW-12 8/11/98	PAI-10-SW-13-00 PAI-10-SW-13 8/11/98	PAI-10-SW-16-01 PAI-10-SW-16 9/10/98	PAI-10-SW-17-01 PAI-10-SW-17 9/10/98	PAI-10-SW-18-01 PAI-10-SW-18 9/10/98
2,4-DIMETHYLPHENOL	5 U	5 U	5 U	5 U	5 U
2,4-DINITROPHENOL	10 U	10 U	10 U	10 U	10 U
2,4-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U
2,6-DINITROTOLUENE	5 U	5 U	5 U	5 U	5 U
2-CHLORONAPHTHALENE	5 U	5 U	5 U	5 U	5 U
2-CHLOROPHENOL	5 U	5 U	5 U	5 U	5 U
2-METHYLNAPHTHALENE	5 U	5 U	5 U	5 U	5 U
2-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U
2-NITROANILINE	5 U	5 U	5 U	5 U	5 U
2-NITROPHENOL	5 U	5 U	5 U	5 U	5 U
3,3'-DICHLOROBENZIDINE	5 U	5 U	5 U	5 U	5 U
3-NITROANILINE	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
4-BROMOPHENYL PHENYL ETHER	5 U	5 U	5 U	5 U	5 U
4-CHLORO-3-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U
4-CHLOROANILINE	5 U	5 U	5 U	5 U	5 U
4-CHLOROPHENYL PHENYL ETHER	5 U	5 U	5 U	5 U	5 U
4-METHYLPHENOL	5 U	5 U	5 U	5 U	5 U
4-NITROANILINE	5 U	5 U	5 U	5 U	5 U
4-NITROPHENOL	10 U	10 U	10 U	10 U	10 U
ACENAPHTHENE	5 U	5 U	5 U	5 U	5 U
ACENAPHTHYLENE	5 U	5 U	5 U	5 U	5 U
ANILINE					
ANTHRACENE	5 U	5 U	5 U	5 U	5 U
BENZO(A)ANTHRACENE	5 U	5 U	5 U	5 U	5 U
BENZO(A)PYRENE	5 U	5 U	5 U	5 U	5 U
BENZO(B)FLUORANTHENE	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
BENZO(K)FLUORANTHENE	5 U	5 U	5 U	5 U	5 U
BIS(2-CHLOROETHOXY)METHANE	5 U	5 U	5 U	5 U	5 U
BIS(2-CHLOROETHYL)ETHER	5 U	5 U	5 U	5 U	5 U
BIS(2-ETHYLHEXYL)PHTHALATE	5 U	5 U	5 U	5 U	5 U
BUTYL BENZYL PHTHALATE	5 U	5 U	5 U	5 U	5 U
CARBAZOLE	5 U	5 U	5 U	5 U	5 U
CHRYSENE	5 U	5 U	5 U	5 U	5 U
DI-N-BUTYL PHTHALATE	5 U	5 U	5 U	5 U	5 U
DI-N-OCTYL PHTHALATE	5 U	5 U	5 U	5 U	5 U
DIBENZO(A,H)ANTHRACENE	5 U	5 U	5 U	5 U	5 U
DIBENZOFURAN	5 U	5 U	5 U	5 U	5 U
DIETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U
DIMETHYL PHTHALATE	5 U	5 U	5 U	5 U	5 U
FLUORANTHENE	5 U	5 U	5 U	5 U	5 U
FLUORENE	5 U	5 U	5 U	5 U	5 U
HEXACHLOROBENZENE	5 U	5 U	5 U	5 U	5 U

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-12-00 PAI-10-SW-12 8/11/98	PAI-10-SW-13-00 PAI-10-SW-13 8/11/98	PAI-10-SW-16-01 PAI-10-SW-16 9/10/98	PAI-10-SW-17-01 PAI-10-SW-17 9/10/98	PAI-10-SW-18-01 PAI-10-SW-18 9/10/98
HEXACHLOROBUTADIENE	5 U	5 U	5 U	5 U	5 U
HEXACHLOROCYCLOPENTADIENE	5 U	5 U	5 U	5 U	5 U
HEXACHLOROETHANE	5 U	5 U	5 U	5 U	5 U
INDENO(1,2,3-CD)PYRENE	5 U	5 U	5 U	5 U	5 U
ISOPHORONE	5 U	5 U	5 U	5 U	5 U
N-NITROSO-DI-N-PROPYLAMINE	5 U	5 U	5 U	5 U	5 U
N-NITROSODIPHENYLAMINE	5 U	5 U	5 U	5 U	5 U
NAPHTHALENE	5 U	5 U	5 U	5 U	5 U
NITROBENZENE	5 U	5 U	5 U	5 U	5 U
PENTACHLOROPHENOL	10 U	10 U	10 U	10 U	10 U
PHENANTHRENE	5 U	5 U	5 U	5 U	5 U
PHENOL	5 U	5 U	5 U	5 U	5 U
PYRENE	5 U	5 U	5 U	5 U	5 U
PESTICIDES/PCBs (ug/L)					
4,4'-DDD	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4,4'-DDT	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ALDRIN	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ALPHA-CHLORDANE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
AROCLOR-1016	1 U	1 U	1 U	1 U	1 U
AROCLOR-1221	2 U	2 U	2 U	2 U	2 U
AROCLOR-1232	1 U	1 U	1 U	1 U	1 U
AROCLOR-1242	1 U	1 U	1 U	1 U	1 U
AROCLOR-1248	1 U	1 U	1 U	1 U	1 U
AROCLOR-1254	1 U	1 U	1 U	1 U	1 U
AROCLOR-1260	1 U	1 U	1 U	1 U	1 U
BETA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DELTA-BHC	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
DIELDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN I	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
ENDOSULFAN II	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDOSULFAN SULFATE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN ALDEHYDE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
ENDRIN KETONE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
GAMMA-BHC (LINDANE)	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
GAMMA-CHLORDANE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HEPTACHLOR EPOXIDE	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
METHOXYCHLOR	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
TOXAPHENE	5 U	5 U	5 U	5 U	5 U
INORGANICS (ug/L)					
ALUMINUM	1690	1020	966	1490	6560

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SUMMARY OF ANALYTICAL RESULTS
UNFILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SW-12-00 PAI-10-SW-12 8/11/98	PAI-10-SW-13-00 PAI-10-SW-13 8/11/98	PAI-10-SW-16-01 PAI-10-SW-16 9/10/98	PAI-10-SW-17-01 PAI-10-SW-17 9/10/98	PAI-10-SW-18-01 PAI-10-SW-18 9/10/98
ANTIMONY	19 U	19 U	19 U	19 U	19 U
ARSENIC	2.4	2.8	4.5 U	4.5 U	7.9
BARIUM	25.1	25.1	23.7	24.6	29
BERYLLIUM	0.2 U	0.2 U	0.4 U	0.6 U	0.8 U
CADMIUM	2 U	2 U	2 U	2 U	2 U
CALCIUM	355000	366000	392000	393000	392000
CHROMIUM	13.6	16.1	20.2	23.5	22.8
COBALT	3.3 U	3.3 U	3.7 U	3.3 U	3.3 U
COPPER	2.6 U	2.6 U	4.7	4.7	6.7
CYANIDE	20 U	20 U	20 U	20 U	20 U
IRON	1050	625	584	885	4530
LEAD	11 U	16 U	11 U	11 U	11 U
MAGNESIUM	1050000	1070000	1230000	1230000	1230000
MANGANESE	30.3	49	17.6	27.3	86.8
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
POTASSIUM	375000	383000	409000	414000	405000
SELENIUM	17.5 U	17.5 U	7 U	7 U	7 U
SILVER	4.3 U	4.3 U	86 U	86 U	86 U
SODIUM	8050000	8730000	10100000	10100000	10100000
THALLIUM	18 U	18 U	18 U	18 U	18 U
VANADIUM	14.4	15.9	13.9	13.6	25.9
ZINC	14 U	8.1 U	11.9	4.3 U	10.3
MISCELLANEOUS PARAMETERS (ug/L)					
HARDNESS as CaCO3	5900000	6100000	6300000	6300000	6300000
HEXAVALENT CHROMIUM		5 UJ			
TOTAL ORGANIC CARBON	3100	2600	3600	2400	2600

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FILTERED SURFACE WATER RESULTS

SUMMARY OF POSITIVE DETECTIONS
FILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION SAMPLE DATE:	PAI-10-SW-01-00-F PAI-10-SW-01 7/28/98	PAI-10-SW-02-00-F PAI-10-SW-02 7/28/98	PAI-10-SW-03-00-F PAI-10-SW-03 7/29/98	PAI-10-SW-04-00-F PAI-10-SW-04 7/27/98	PAI-10-SW-05-00-F PAI-10-SW-05 7/27/98	PAI-10-SW-06-00-F PAI-10-SW-06 7/28/98
DISSOLVED INORGANICS (ug/L)						
ARSENIC	6.4	7.3	7.9	6.8	7.4	4.5
BARIUM	19.4	17.3	23.6	21.7	21.2	20.5
CALCIUM	278000	248000	383000	349000	337000	325000
CHROMIUM	11.5	14.6	22.5	19.5	13.2	22.8
MAGNESIUM	823000	743000	1110000	1020000	1020000	945000
MANGANESE	211	211	196	167	183	123
POTASSIUM	297000	269000	405000	377000	365000	347000
SODIUM	7270000	6750000	10200000	9420000	9180000	8480000
THALLIUM	9 U	9 U	9 U	9 U	9 U	9 U
VANADIUM	18.8	12.9	23	21.6	17	15.3
ZINC	5.6 U	11.6 U	4.1 U	7.1 U	6.5 U	7.3 U

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SUMMARY OF POSITIVE DETECTIONS
FILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION SAMPLE DATE:	PAI-10-SW-07-00-F PAI-10-SW-07 7/29/98	PAI-10-SW-08-00-F PAI-10-SW-08 8/11/98	PAI-10-SW-08-00-F-D PAI-10-SW-08 8/11/98	PAI-10-SW-09-00-F PAI-10-SW-09 8/11/98	PAI-10-SW-10-00-F PAI-10-SW-10 8/11/98	PAI-10-SW-11-00-F PAI-10-SW-11 8/8/98
DISSOLVED INORGANICS (ug/L)						
ARSENIC	5.5	3.5	7	3.6	2.2	3.3
BARIUM	21	241	253	248	230	238
CALCIUM	330000	351000	364000	365000	355000	362000
CHROMIUM	16.4	19.8	10.5	13.3	13	8.6
MAGNESIUM	963000	1060000	1060000	1090000	1060000	1050000
MANGANESE	136	152	146	126	29.9	119
POTASSIUM	355000	377000	402000	379000	378000	377000
SODIUM	8640000	8770000	8030000	8840000	8680000	8370000
THALLIUM	9 U	18 U	19	9 U	9 U	30.1
VANADIUM	14	14.7	12.8	12.7	11.6	13.8 U
ZINC	4.1 U	73.3	73.3	84.7	73.7	77.2

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SUMMARY OF POSITIVE DETECTIONS
FILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION SAMPLE DATE:	PAI-10-SW-12-00-F PAI-10-SW-12 8/11/98	PAI-10-SW-13-00-F PAI-10-SW-13 8/11/98	PAI-10-SW-16-01-F PAI-10-SW-16 9/10/98	PAI-10-SW-17-01-F PAI-10-SW-17 9/10/98	PAI-10-SW-18-01-F PAI-10-SW-18 9/10/98
DISSOLVED INORGANICS (ug/L)					
ARSENIC	2.7	2.2	4.5 U	4.5 U	5.3
BARIUM	253	232	20.3	24.3	23.9
CALCIUM	352000	370000	382000	398000	398000
CHROMIUM	8	14.5	20.7	17.1	21.7
MAGNESIUM	1060000	1060000	1210000	1210000	1220000
MANGANESE	23.2	45.3	13.1	18.5	20.1
POTASSIUM	369000	389000	396000	418000	415000
SODIUM	8660000	8650000	9850000	9990000	10100000
THALLIUM	18 U	18 U	18 U	18 U	18 U
VANADIUM	10.1	12.2	13.8	15.5	13.9
ZINC	61.4	67.5	4.1 U	4.1 U	4.1 U

SUMMARY OF ANALYTICAL RESULTS
FILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION SAMPLE DATE:	PAI-10-SW-01-00-F PAI-10-SW-01 7/28/98	PAI-10-SW-02-00-F PAI-10-SW-02 7/28/98	PAI-10-SW-03-00-F PAI-10-SW-03 7/29/98	PAI-10-SW-04-00-F PAI-10-SW-04 7/27/98	PAI-10-SW-05-00-F PAI-10-SW-05 7/27/98	PAI-10-SW-06-00-F PAI-10-SW-06 7/28/98
DISSOLVED INORGANICS (ug/L)						
ALUMINUM	22 U	22 U	22 U	22 U	22 U	22 U
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	6.4	7.3	7.9	6.8	7.4	4.5
BARIUM	19.4	17.3	23.6	21.7	21.2	20.5
BERYLLIUM	0.2 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	278000	248000	383000	349000	337000	325000
CHROMIUM	11.5	14.6	22.5	19.5	13.2	22.8
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER	3.3 U	4.4 U	5 U	4.7 U	2.6 U	2.6 U
IRON	47.5 U	34.2 U	8 U	8 U	8 U	8 U
LEAD	5.5 U	5.5 U	11 U	11 U	11 U	11 U
MAGNESIUM	823000	743000	1110000	1020000	1020000	945000
MANGANESE	211	211	196	167	183	123
MERCURY	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
POTASSIUM	297000	269000	405000	377000	365000	347000
SELENIUM	3.5 U	3.5 U	7 U	3.5 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	7270000	6750000	10200000	9420000	9180000	8480000
THALLIUM	9 U	9 U	9 U	9 U	9 U	9 U
VANADIUM	18.8	12.9	23	21.6	17	15.3
ZINC	5.6 U	11.6 U	4.1 U	7.1 U	6.5 U	7.3 U

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SUMMARY OF ANALYTICAL RESULTS
FILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION SAMPLE DATE:	PAI-10-SW-07-00-F PAI-10-SW-07 7/29/98	PAI-10-SW-08-00-F PAI-10-SW-08 8/11/98	PAI-10-SW-08-00-F-D PAI-10-SW-08 8/11/98	PAI-10-SW-09-00-F PAI-10-SW-09 8/11/98	PAI-10-SW-10-00-F PAI-10-SW-10 8/11/98	PAI-10-SW-11-00-F PAI-10-SW-11 8/8/98
DISSOLVED INORGANICS (ug/L)						
ALUMINUM	22 U	22 U	22 U	22 U	57.7 U	22 U
ANTIMONY	19 U	19 U	19 U	19 U	19 U	19 U
ARSENIC	5.5	3.5	7	3.6	2.2	3.3
BARIUM	21	241	253	248	230	238
BERYLLIUM	0.2 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	330000	351000	364000	365000	355000	362000
CHROMIUM	16.4	19.8	10.5	13.3	13	8.6
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
IRON	9.2 U	22 U	8 U	8 U	79.6 U	71.4 U
LEAD	11 U	12 U	15 U	14 U	11 U	11 U
MAGNESIUM	963000	1060000	1060000	1090000	1060000	1050000
MANGANESE	136	152	146	126	29.9	119
MERCURY	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.1 U
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
POTASSIUM	355000	377000	402000	379000	378000	377000
SELENIUM	3.5 U	17.5 U	17.5 U	17.5 U	17.5 U	7 U
SILVER	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
SODIUM	8640000	8770000	8030000	8840000	8680000	8370000
THALLIUM	9 U	18 U	19	9 U	9 U	30.1
VANADIUM	14	14.7	12.8	12.7	11.6	13.8 U
ZINC	4.1 U	73.3	73.3	84.7	73.7	77.2

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SUMMARY OF ANALYTICAL RESULTS
FILTERED SURFACE WATER
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION SAMPLE DATE:	PAI-10-SW-12-00-F PAI-10-SW-12 8/11/98	PAI-10-SW-13-00-F PAI-10-SW-13 8/11/98	PAI-10-SW-16-01-F PAI-10-SW-16 9/10/98	PAI-10-SW-17-01-F PAI-10-SW-17 9/10/98	PAI-10-SW-18-01-F PAI-10-SW-18 9/10/98
DISSOLVED INORGANICS (ug/L)					
ALUMINUM	22 U	22 U	22 U	22 U	22 U
ANTIMONY	19 U	19 U	19 U	19 U	19 U
ARSENIC	2.7	2.2	4.5 U	4.5 U	5.3
BARIUM	253	232	20.3	24.3	23.9
BERYLLIUM	0.2 U	0.2 U	0.5 U	0.6 U	0.6 U
CADMIUM	2 U	2 U	2 U	2 U	2 U
CALCIUM	352000	370000	382000	398000	398000
CHROMIUM	8	14.5	20.7	17.1	21.7
COBALT	3.3 U	3.3 U	3.3 U	3.3 U	3.7 U
COPPER	2.6 U	2.6 U	2.6 U	2.6 U	5.1
IRON	11.6 U	8 U	8 U	8 U	22
LEAD	16 U	15 U	11 U	11 U	11 U
MAGNESIUM	1060000	1060000	1210000	1210000	1220000
MANGANESE	23.2	45.3	13.1	18.5	20.1
MERCURY	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
NICKEL	4.4 U	4.4 U	4.4 U	4.4 U	4.4 U
POTASSIUM	369000	389000	396000	418000	415000
SELENIUM	17.5 U	17.5 U	7 U	7 U	7 U
SILVER	4.3 U	4.3 U	86 U	86 U	86 U
SODIUM	8660000	8650000	9850000	9990000	10100000
THALLIUM	18 U	18 U	18 U	18 U	18 U
VANADIUM	10.1	12.2	13.8	15.5	13.9
ZINC	61.4	67.5	4.1 U	4.1 U	4.1 U

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SEDIMENT RESULTS

SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-01-01 PAI-10-SD-01 7/27/98	PAI-10-SD-001-01A PAI-10-SD-01 7/27/98	PAI-10-SD-02-01 PAI-10-SD-02 7/29/98	PAI-10-SD-02-01-D PAI-10-SD-02 - -	PAI-10-SD-002-01A PAI-10-SD-02 7/29/98
VOLATILES (ug/kg)					
2-BUTANONE	5 J		7.7 U	8.1 U	
2-HEXANONE	7.2 U		7.7 U	8.1 U	
4-METHYL-2-PENTANONE	4.4 J		7.7 U	5.4 J	
ACETONE	81 U		30 U	110 U	
CARBON DISULFIDE	2.3 J		2.4 J	2.1 J	
TOLUENE	4.3 U		4.6 U	4.9 U	
XYLENES, TOTAL	4.3 U		4.6 U	4.9 U	
SEMIVOLATILES (ug/kg)					
ACENAPHTHENE	520 U	120 U	510 U	500 U	200 U
BENZO(A)ANTHRACENE	520 U	12 U	510 U	500 U	20 U
BENZO(A)PYRENE	520 U	12 U	510 U	500 U	20 UJ
BENZO(B)FLUORANTHENE	520 U	24 U	510 U	500 U	38 U
BENZO(K)FLUORANTHENE	520 U	12 U	510 U	500 U	20 U
BIS(2-ETHYLHEXYL)PHTHALATE	120 J		510 U	490 J	
CHRYSENE	520 U	12 U	510 U	500 U	20 U
DI-N-OCTYL PHTHALATE	520 U		510 U	500 U	
FLUORANTHENE	520 U	24 U	510 U	500 U	38 U
INDENO(1,2,3-CD)PYRENE	520 U	12 U	510 U	500 U	20 U
PENTACHLOROPHENOL	1000 U		1000 U	1000 U	
PHENANTHRENE	520 U	12 U	510 U	500 U	20 U
PYRENE	520 U	12 U	510 U	500 U	20 U
PESTICIDES/PCBs (ug/kg)					
4,4'-DDT	5.2 U		5 U	4.9 U	
ALPHA-CHLORDANE	2.7 U		2.6 U	2.5 U	
GAMMA-CHLORDANE	2.7 U		2.6 U	2.5 U	
METHOXYCHLOR	27 U		26 U	25 U	
DIOXINS AND FURANS (ng/kg)					
1,2,3,4,6,7,8-HPCDD					
1,2,3,6,7,8-HXCDD					
1,2,3,7,8,9-HXCDD					
OCDD					
OCDF					
TOTAL HPCDD					
TOTAL TCDD					
INORGANICS (mg/kg)					
ALUMINUM	1870		5850		
ANTIMONY	2.7 U		2.8 U		
ARSENIC	0.64		2.4		
BARIUM	3.7 U		7.7 U		
BERYLLIUM	0.11 U		0.31		
CADMIUM	0.28 U		0.3 U		
CALCIUM	696		600		
CHROMIUM	3.2		9.9		

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-01-01** **PAI-10-SD-01** **7/27/98**	**PAI-10-SD-001-01A** **PAI-10-SD-01** **7/27/98**	**PAI-10-SD-02-01** **PAI-10-SD-02** **7/29/98**	**PAI-10-SD-02-01-D** **PAI-10-SD-02** **- -**	**PAI-10-SD-002-01A** **PAI-10-SD-02** **7/29/98**
COBALT	0.92 U		1.4 U		
COPPER	1.3 U		1.5 U		
IRON	1420		4600		
LEAD	3.1		6.7		
MAGNESIUM	1900		2110		
MANGANESE	9.2 U		18.4		
MERCURY	0.02 U		0.03 U		
NICKEL	1.4		1.6		
POTASSIUM	692		1280		
SELENIUM	0.47 U		0.49 U		
SODIUM	10000		7820		
THALLIUM	0.32 U		0.25 U		
VANADIUM	4.9		15.4		
ZINC	4.7 U		8.1 U		
SIMULTANEOUSLY EXTRACTED METALS (umo/g)					
CADMIUM	0.0003 U		0.0003 U		
COPPER	0.002 U		0.002 U		
LEAD	0.009		0.011		
MERCURY	0.07 U		0.08 U		
NICKEL	0.001 U		0.002 U		
ZINC	0.12 U		0.17 U		
ACID VOLATILES SULFIDE (umo/g)					
ACID VOLATILE SULFIDE	2.6 U		1.2 U		
MISCEALLANEOUS PARAMETERS					
HEXAVALENT CHROMIUM mg/kg					
PH	7.3		7.9	7.9	
TOTAL ORGANIC CARBON %	0.95		0.97	1.2	

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-002-01A-D PAI-10-SD-02 7/29/98	PAI-10-SD-03-01 PAI-10-SD-03 7/29/98	PAI-10-SD-003-01A PAI-10-SD-03 7/29/98	PAI-10-SD-04-01 PAI-10-SD-04 7/27/98	PAI-10-SD-004-01A PAI-10-SD-04 7/27/98
VOLATILES (ug/kg)					
2-BUTANONE		670 U		10 U	
2-HEXANONE		670 U		10 U	
4-METHYL-2-PENTANONE		670 U		4 J	
ACETONE		670 U		560 U	
CARBON DISULFIDE		400 U		3.2 J	
TOLUENE		400 U		6.4 U	
XYLENES, TOTAL		400 U		2.3 J	
SEMIVOLATILES (ug/kg)					
ACENAPHTHENE	200 U	460 U	96 U	600 U	100 U
BENZO(A)ANTHRACENE	20 U	460 U	9.6 U	600 U	10 U
BENZO(A)PYRENE	26 J	460 U	9.6 U	600 U	10 U
BENZO(B)FLUORANTHENE	39 U	460 U	19 U	600 U	20 U
BENZO(K)FLUORANTHENE	20 U	460 U	9.6 U	600 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE		76 J		600 U	
CHRYSENE	20 U	460 U	9.6 U	600 U	10 U
DI-N-OCTYL PHTHALATE		460 U		600 U	
FLUORANTHENE	39 U	460 U	19 U	600 U	20 U
INDENO(1,2,3-CD)PYRENE	20 U	460 U	9.6 U	600 U	10 U
PENTACHLOROPHENOL		930 U		1200 U	
PHENANTHRENE	20 U	460 U	9.6 U	600 U	10 U
PYRENE	20 U	460 U	9.6 U	600 U	10 U
PESTICIDES/PCBs (ug/kg)					
4,4'-DDT		4.6 U		5.9 U	
ALPHA-CHLORDANE		2.4 U		3 U	
GAMMA-CHLORDANE		2.4 U		3 U	
METHOXYCHLOR		24 U		30 U	
DIOXINS AND FURANS (ng/kg)					
1,2,3,4,6,7,8-HPCDD					
1,2,3,6,7,8-HXCDD					
1,2,3,7,8,9-HXCDD					
OCDD					
OCDF					
TOTAL HPCDD					
TOTAL TCDD					
INORGANICS (mg/kg)					
ALUMINUM		3880		3410	
ANTIMONY		2.3 U		3 U	
ARSENIC		0.35		2.4	
BARIUM		5.4 U		5.7 U	
BERYLLIUM		0.26		0.21 U	
CADMIUM		0.25 U		0.32 U	
CALCIUM		448		468	
CHROMIUM		7.1		6.3	

SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-002-01A-D** **PAI-10-SD-02** **7/29/98**	**PAI-10-SD-03-01** **PAI-10-SD-03** **7/29/98**	**PAI-10-SD-003-01A** **PAI-10-SD-03** **7/29/98**	**PAI-10-SD-04-01** **PAI-10-SD-04** **7/27/98**	**PAI-10-SD-004-01A** **PAI-10-SD-04** **7/27/98**
COBALT		0.98 U		1.5 U	
COPPER		1.4 U		1.7 U	
IRON		4630		4650	
LEAD		3.6		4.3	
MAGNESIUM		1570		1490	
MANGANESE		17.5		24.1	
MERCURY		0.02 U		0.06	
NICKEL		2.1		1.8	
POTASSIUM		796		777	
SELENIUM		0.1		0.6 U	
SODIUM		6150		6840	
THALLIUM		0.21 U		0.31 U	
VANADIUM		10.9		10.8	
ZINC		8.1 U		8.1 U	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)					
CADMIUM		0.0002 U		0.0003 U	
COPPER		0.002 U		0.003 U	
LEAD		0.005		0.006	
MERCURY		0.07 U		0.09 U	
NICKEL		0.002		0.001 U	
ZINC		0.17 U		0.21 U	
ACID VOLATILES SULFIDE (umo/g)					
ACID VOLATILE SULFIDE		1.2 U		1.8 U	
MISCEALLANEOUS PARAMETERS					
HEXAVALENT CHROMIUM mg/kg					
PH		7.7		7.5	
TOTAL ORGANIC CARBON %		0.67		0.86	

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-05-01 PAI-10-SD-05 7/27/98	PAI-10-SD-005-01A PAI-10-SD-05 7/27/98	PAI-10-SD-06-01 PAI-10-SD-06 7/27/98	PAI-10-SD-006-01A PAI-10-SD-06 7/27/98	PAI-10-SD-07-01 PAI-10-SD-07 7/27/98	PAI-10-SD-007-01A PAI-10-SD-07 7/27/98
VOLATILES (ug/kg)						
2-BUTANONE	7.3 U		7.1 U		20	
2-HEXANONE	7.3 U		7.1 U		8.3 U	
4-METHYL-2-PENTANONE	7.3 U		53.7 J		9.2	
ACETONE	420 U		590 U		810 U	
CARBON DISULFIDE	3.3 J		1.9 J		7.5	
TOLUENE	5		4.7		3 J	
XYLENES, TOTAL	2.2 J		1.8 J		5 U	
SEMIVOLATILES (ug/kg)						
ACENAPHTHENE	500 U	97 U	460 U	93 U	530 U	100 U
BENZO(A)ANTHRACENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
BENZO(A)PYRENE	500 U	9.7 U	460 U	9.3 U	530 U	11
BENZO(B)FLUORANTHENE	500 U	19 U	460 U	18 U	530 U	20 U
BENZO(K)FLUORANTHENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	45 J		47 J		440 J	
CHRYSENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
DI-N-OCTYL PHTHALATE	500 U		63 J		530 U	
FLUORANTHENE	500 U	19 U	460 U	18 U	530 U	20 U
INDENO(1,2,3-CD)PYRENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
PENTACHLOROPHENOL	1000 U		910 U		1100 U	
PHENANTHRENE	36 J	9.7 U	460 U	9.3 U	530 U	10 U
PYRENE	32 J	9.7 U	460 U	9.3 U	530 U	10 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDT	4.9 U		4.5 U		5.2 U	
ALPHA-CHLORDANE	2.5 U		2.3 U		2.7 U	
GAMMA-CHLORDANE	2.5 U		2.3 U		2.7 U	
METHOXYCHLOR	25 U		23 U		27 U	
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD						
1,2,3,6,7,8-HXCDD						
1,2,3,7,8,9-HXCDD						
OCDD						
OCDF						
TOTAL HPCDD						
TOTAL TCDD						
INORGANICS (mg/kg)						
ALUMINUM	3960		3540		3770	
ANTIMONY	2.7 U		2.4 U		2.7 U	
ARSENIC	2.1		1.7		4.9	
BARIUM	5.7 U		6.7 U		5.3 U	
BERYLLIUM	0.24		0.21		0.23 U	
CADMIUM	0.28 U		0.25 U		0.28 U	
CALCIUM	474		338		521	
CHROMIUM	7.1		6		7.2	

SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-05-01** **PAI-10-SD-05** **7/27/98**	**PAI-10-SD-005-01A** **PAI-10-SD-05** **7/27/98**	**PAI-10-SD-06-01** **PAI-10-SD-06** **7/27/98**	**PAI-10-SD-006-01A** **PAI-10-SD-06** **7/27/98**	**PAI-10-SD-07-01** **PAI-10-SD-07** **7/27/98**	**PAI-10-SD-007-01A** **PAI-10-SD-07** **7/27/98**
COBALT	1.1 U		1.2 U		1.4 U	
COPPER	2 U		1.7 U		2.3 U	
IRON	4780		3860		5130	
LEAD	5.4		4.3		4.5	
MAGNESIUM	1480		1130		1610	
MANGANESE	26.2		22.1		25.7	
MERCURY	0.02 U		0.02 U		0.07	
NICKEL	1.9		1.3		1.8	
POTASSIUM	859		684		882	
SELENIUM	0.48 U		0.44 U		0.53 U	
SODIUM	5400		3920		6400	
THALLIUM	0.25 U		0.24 U		0.32 U	
VANADIUM	11.8		9.6		11.9	
ZINC	9.7		8.1 U		9.9 U	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM	0.0002 U		0.0002 U		0.0003 U	
COPPER	0.002 U		0.002 U		0.002 U	
LEAD	0.006		0.008		0.007	
MERCURY	0.07 U		0.07 U		0.08 U	
NICKEL	0.001 U		0.003		0.001 U	
ZINC	0.15 U		0.11 U		0.2 U	
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	1.2 U		2 U		2.3 U	
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg						
PH	7.2		7.6		7.1	
TOTAL ORGANIC CARBON %	1.1		0.72		0.96	

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-08-01 PAI-10-SD-08 8/10/98	PAI-10-SD-008-01A PAI-10-SD-08 8/10/98	PAI-10-SD-09-01 PAI-10-SD-09 8/10/98	PAI-10-SD-009-01A PAI-10-SD-09 8/10/98	PAI-10-SD-10-01 PAI-10-SD-10 8/10/98	PAI-10-SD-010-01A PAI-10-SD-10 8/10/98
VOLATILES (ug/kg)						
2-BUTANONE	74 U		26 U		7.9 U	
2-HEXANONE	74 U		26 U		7.9 U	
4-METHYL-2-PENTANONE	74 U		26 U		7.9 U	
ACETONE	390		68		44	
CARBON DISULFIDE	31 J		12 J		2.2 J	
TOLUENE	23 J		16 U		4.3 J	
XYLENES, TOTAL	44 U		16 U		4.7 U	
SEMIVOLATILES (ug/kg)						
ACENAPHTHENE	2600 U	270 U	1100 U	220 U	480 U	110 U
BENZO(A)ANTHRACENE	2600 U	27 U	1100 U	22 U	480 U	11 U
BENZO(A)PYRENE	2600 U	38	1100 U	29 J	480 U	11 U
BENZO(B)FLUORANTHENE	2600 U	120	1100 U	42 U	480 U	21 U
BENZO(K)FLUORANTHENE	2600 U	27 U	1100 U	22 U	480 U	11 U
BIS(2-ETHYLHEXYL)PHTHALATE	2600 U		1100 U		480 U	
CHRYSENE	2600 U	27 U	1100 U	22 U	480 U	11 U
DI-N-OCTYL PHTHALATE	2600 U		1100 U		480 U	
FLUORANTHENE	2600 U	52 U	1100 U	42 U	480 U	21 U
INDENO(1,2,3-CD)PYRENE		27 U		22 U		11 U
PENTACHLOROPHENOL	5100 U		2200 U		970 U	
PHENANTHRENE	2600 U	27 U	1100 U	22 U	480 U	11 U
PYRENE	2600 U	27 U	1100 U	22 U	480 U	11 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDT	25 U		11 U		4.8 U	
ALPHA-CHLORDANE	13 U		5.7 U		2.5 U	
GAMMA-CHLORDANE	13 U		5.7 U		2.5 U	
METHOXYCHLOR	130 U		57 U		25 U	
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD						
1,2,3,6,7,8-HXCDD						
1,2,3,7,8,9-HXCDD						
OCDD						
OCDF						
TOTAL HPCDD						
TOTAL TCDD						
INORGANICS (mg/kg)						
ALUMINUM	52700		26500		4480	
ANTIMONY	13.2 U		6.8		2.6 U	
ARSENIC	18.5		8.3		2.8	
BARIUM	62.9		28.8		6.7	
BERYLLIUM	2		1.1		0.23	
CADMIUM	1.4 U		0.56 U		0.27 U	
CALCIUM	4900		2220		494	
CHROMIUM	75		35.5		8.1	

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-08-01** **PAI-10-SD-08** **8/10/98**	**PAI-10-SD-008-01A** **PAI-10-SD-08** **8/10/98**	**PAI-10-SD-09-01** **PAI-10-SD-09** **8/10/98**	**PAI-10-SD-009-01A** **PAI-10-SD-09** **8/10/98**	**PAI-10-SD-10-01** **PAI-10-SD-10** **8/10/98**	**PAI-10-SD-010-01A** **PAI-10-SD-10** **8/10/98**
COBALT	8.5		5		1.1	
COPPER	18.2		10.1		2.1	
IRON	43100		23300		6230	
LEAD	38.7		16.8		5.6	
MAGNESIUM	15100		6940		1620	
MANGANESE	210		116		23.1	
MERCURY	0.28 U		0.14		0.05 U	
NICKEL	19.6		10.5		1.8	
POTASSIUM	9090		3930		883	
SELENIUM	2.5 U		1.1 U		0.46 U	
SODIUM	60800		24700		6890	
THALLIUM	1.3 U		0.58 U		0.24 U	
VANADIUM	112		47.9		11.9	
ZINC	78.3		40.4		8.5	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM						
COPPER						
LEAD						
MERCURY						
NICKEL						
ZINC						
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	46		10		2 U	
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg			6 U		2 U	
PH	7.5		7.4		7.4	
TOTAL ORGANIC CARBON %	4.7		4		0.8	

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-11-01 PAI-10-SD-11 8/10/98	PAI-10-SD-011-01A PAI-10-SD-11 8/10/98	PAI-10-SD-12-01 PAI-10-SD-12 8/10/98	PAI-10-SD-012-01A PAI-10-SD-12 8/10/98	PAI-10-SD-13-01 PAI-10-SD-13 8/10/98	PAI-10-SD-013-01A PAI-10-SD-13 8/10/98
VOLATILES (ug/kg)						
2-BUTANONE	8.4 U		8.6 U		10 U	
2-HEXANONE	8.4 U		8.6 U		10 U	
4-METHYL-2-PENTANONE	8.4 U		8.6 U		10 U	
ACETONE	49		58		25	
CARBON DISULFIDE	5.1 U		3 J		4.2 J	
TOLUENE	2.5 J		5.2 J		6.1 U	
XYLENES, TOTAL	5.1 U		5.2 U		6.1 U	
SEMIVOLATILES (ug/kg)						
ACENAPHTHENE	510 U	110 U	530 U	110 U	610 U	110 U
BENZO(A)ANTHRACENE	510 U	11 U	530 U	11 U	610 U	18 J
BENZO(A)PYRENE	510 U	11 U	530 U	11 U	610 U	30
BENZO(B)FLUORANTHENE	510 U	21 U	530 U	22 U	610 U	25 J
BENZO(K)FLUORANTHENE	510 U	29 R	530 U	11 U	610 U	18
BIS(2-ETHYLHEXYL)PHTHALATE	510 U		530 U		610 U	
CHRYSENE	510 U	11 U	530 U	11 U	51 J	44 J
DI-N-OCTYL PHTHALATE	510 U		530 U		610 U	
FLUORANTHENE	510 U	21 U	530 U	22 U	140 J	92
INDENO(1,2,3-CD)PYRENE		11 U		11 U		11 U
PENTACHLOROPHENOL	1000 U		1100 U		1200 U	
PHENANTHRENE	510 U	11 U	530 U	11 U	610 U	11 U
PYRENE	510 U	11 U	530 U	11 U	96 J	89
PESTICIDES/PCBs (ug/kg)						
4,4'-DDT	5 U		5.2 U		6 U	
ALPHA-CHLORDANE	2.6 U		2.7 U		3.1 U	
GAMMA-CHLORDANE	2.6 U		2.7 U		3.1 U	
METHOXYCHLOR	26 U		27 U		31 U	
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD						
1,2,3,6,7,8-HXCDD						
1,2,3,7,8,9-HXCDD						
OCDD						
OCDF						
TOTAL HPCDD						
TOTAL TCDD						
INORGANICS (mg/kg)						
ALUMINUM	4200		4750		5740	
ANTIMONY	2.4 U		3.5		3.3 U	
ARSENIC	1.4		2.5		1.9	
BARIUM	5.7		6.1		7.8	
BERYLLIUM	0.21		0.24		0.26	
CADMIUM	0.26 U		0.3 U		0.35 U	
CALCIUM	1350		1100		5550	
CHROMIUM	6.4		8.3		9.4	

SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-11-01 PAI-10-SD-11 8/10/98	PAI-10-SD-011-01A PAI-10-SD-11 8/10/98	PAI-10-SD-12-01 PAI-10-SD-12 8/10/98	PAI-10-SD-012-01A PAI-10-SD-12 8/10/98	PAI-10-SD-13-01 PAI-10-SD-13 8/10/98	PAI-10-SD-013-01A PAI-10-SD-13 8/10/98
COBALT	1		1.1		1.2	
COPPER	3.6		2.1		2.4	
IRON	3060		4800		4890	
LEAD	8.6		5.2		5.6	
MAGNESIUM	1710		1730		2070	
MANGANESE	13.3		22.1		22.8	
MERCURY	0.06		0.06 U		0.06 U	
NICKEL	1.3		2.3		2.4	
POTASSIUM	845		924		1130	
SELENIUM	0.1 U		0.52 U		0.12 U	
SODIUM	8480		7310		9200	
THALLIUM	0.27 U		0.27 U		0.3 U	
VANADIUM	10.8		11.4		13	
ZINC	10.3		9.1		9.6	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM						
COPPER						
LEAD						
MERCURY						
NICKEL						
ZINC						
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	3 U		2 U		4.2 U	
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg					4 U	
PH	6.7		7.3		7.6	
TOTAL ORGANIC CARBON %	1.1		1		1.1	

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-14-01 PAI-10-SD-14 8/10/98	PAI-10-SD-14-02 PAI-10-SD-14 8/13/98	PAI-10-SD-014-01A PAI-10-SD-14 8/10/98	PAI-10-SD-014-02A PAI-10-SD-14 8/10/98	PAI-10-SD-15-01 PAI-10-SD-15 8/10/98	PAI-10-SD-015-01A PAI-10-SD-15 8/10/98
VOLATILES (ug/kg)						
2-BUTANONE	23 U	11 U			11 U	
2-HEXANONE	23 U	11 U			4.4 J	
4-METHYL-2-PENTANONE	23 U	11 U			5.5 J	
ACETONE	83	35 U			70	
CARBON DISULFIDE	14 U	4.4 J			6.4	
TOLUENE	14 U	6.4 U			2.9 J	
XYLENES, TOTAL	14 U	6.4 U			6.3 U	
SEMIVOLATILES (ug/kg)						
ACENAPHTHENE	880 U	580 U	160 U	160 U	570 U	130 U
BENZO(A)ANTHRACENE	880 U	580 U	16 U	16 U	570 U	13 U
BENZO(A)PYRENE	880 U	580 U	31	21	570 U	13 U
BENZO(B)FLUORANTHENE	880 U	580 U	31 U	31 U	570 U	25 U
BENZO(K)FLUORANTHENE	880 U	580 U	16 U	16 U	570 U	13 U
BIS(2-ETHYLHEXYL)PHTHALATE	220 J	430 J			570 U	
CHRYSENE	880 U	580 U	16 U	16 U	570 U	13 U
DI-N-OCTYL PHTHALATE	880 U	580 U			570 U	
FLUORANTHENE	880 U	580 U	31 U	31 U	570 U	25 U
INDENO(1,2,3-CD)PYRENE		580 U	26	16 U		13 U
PENTACHLOROPHENOL	1800 U	180 J			1100 U	
PHENANTHRENE	880 U	580 U	16 U	16 U	570 U	13 U
PYRENE	880 U	580 U	16 U	16 U	570 U	13 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDT	8.7 U	66			5.7 U	
ALPHA-CHLORDANE	4.5 U	12			2.9 U	
GAMMA-CHLORDANE	4.5 U	14			2.9 U	
METHOXYCHLOR	45 U	680			29 U	
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD						
1,2,3,6,7,8-HXCDD						
1,2,3,7,8,9-HXCDD						
OCDD						
OCDF						
TOTAL HPCDD						
TOTAL TCDD						
INORGANICS (mg/kg)						
ALUMINUM	17700	8210			6480	
ANTIMONY	4.7 U	3.3 U			2.8 U	
ARSENIC	11.9	6.6			3.2	
BARIUM	32.2	15.6			8.7	
BERYLLIUM	0.72	0.39			0.27	
CADMIUM	0.84	0.002			0.39	
CALCIUM	2680	957			619	
CHROMIUM	32.7	23.3			10.1	

SUMMARY OF POSITIVE DETECTIONS

SEDIMENT

SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA

MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-14-01** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-14-02** **PAI-10-SD-14** **8/13/98**	**PAI-10-SD-014-01A** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-014-02A** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-15-01** **PAI-10-SD-15** **8/10/98**	**PAI-10-SD-015-01A** **PAI-10-SD-15** **8/10/98**
COBALT	3.7	10.3			0.92	
COPPER	113	0.03			5.2	
IRON	25200	28800			6400	
LEAD	203	49.7			12.8	
MAGNESIUM	5100	2350			2030	
MANGANESE	84	81.6			25.9	
MERCURY	0.35	0.1			0.11	
NICKEL	12.7	1060			3	
POTASSIUM	2770	1210			1180	
SELENIUM	1.9 U	0.6 U			0.57 U	
SODIUM	18600	9440			8190	
THALLIUM	0.48 U	0.36			0.29 U	
VANADIUM	44.9	22.8			14.1	
ZINC	197	98.7			17.9	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM						
COPPER						
LEAD						
MERCURY						
NICKEL						
ZINC						
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	8	2 U			4 U	
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg						
PH	7.2	7.8			7.3	
TOTAL ORGANIC CARBON %	3.8	1.3			1.6	

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-16-01 PAI-10-SD-16 9/9/98	PAI-10-SD-016-01A PAI-10-SD-16 8/10/98	PAI-10-SD-16A-02 PAI-10-SD-16 10/6/99	PAI-10-SD-17-01 PAI-10-SD-17 9/9/98	PAI-10-SD-017-01A PAI-10-SD-17 - -	PAI-10-SD-18-01 PAI-10-SD-18 9/9/98
VOLATILES (ug/kg)						
2-BUTANONE	16 U			38		21 U
2-HEXANONE	16 U			31 U		21 U
4-METHYL-2-PENTANONE	15 J			35		18 J
ACETONE	52 U			110 U		56 U
CARBON DISULFIDE	10 U			7 J		13 U
TOLUENE	4 J			8 J		13 U
XYLENES, TOTAL	10 U			18 U		13 U
SEMIVOLATILES (ug/kg)						
ACENAPHTHENE	810 U	170 U		1200 U	110 U	1000 U
BENZO(A)ANTHRACENE	810 U	17 U		1200 U	11 U	1000 U
BENZO(A)PYRENE	810 U	22 J		1200 U	12	1000 U
BENZO(B)FLUORANTHENE	810 U	33 U		1200 U	21 U	1000 U
BENZO(K)FLUORANTHENE	810 U	17 U		1200 U	11 U	1000 U
BIS(2-ETHYLHEXYL)PHTHALATE	810 U			150 J		62 J
CHRYSENE	810 U	17 U		1200 U	11 U	1000 U
DI-N-OCTYL PHTHALATE	810 U			1200 U		1000 U
FLUORANTHENE	810 U	33 U		1200 U	21 U	1000 U
INDENO(1,2,3-CD)PYRENE	810 U	17 U		1200 U	11 U	1000 U
PENTACHLOROPHENOL	1600 U			2400 U		2100 U
PHENANTHRENE	810 U	17 U		1200 U	11 U	1000 U
PYRENE	810 U	17 U		1200 U	11 U	1000 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDT	8 U			12 U		10 U
ALPHA-CHLORDANE	4.1 U			6.1 U		5.3 U
GAMMA-CHLORDANE	4.1 U			6.1 U		5.3 U
METHOXYCHLOR	41 U			61 U		53 U
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD			41 J			
1,2,3,6,7,8-HXCDD			1.7 J			
1,2,3,7,8,9-HXCDD			4.4 J			
OCDD			350			
OCDF			2.7 J			
TOTAL HPCDD			130 J			
TOTAL TCDD			4 J			
INORGANICS (mg/kg)						
ALUMINUM	22100			24500		21100
ANTIMONY	9 U			6.3 U		4.4 U
ARSENIC	11.6			12.2		10.9
BARIUM	23.7			26.1		24.7
BERYLLIUM	0.97			1		0.93
CADMIUM	0.41 U			0.67 U		0.47 U
CALCIUM	1750			2220		6110
CHROMIUM	32.7			33.6		30.8

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-16-01** **PAI-10-SD-16** **9/9/98**	**PAI-10-SD-016-01A** **PAI-10-SD-16** **8/10/98**	**PAI-10-SD-16A-02** **PAI-10-SD-16** **10/6/99**	**PAI-10-SD-17-01** **PAI-10-SD-17** **9/9/98**	**PAI-10-SD-017-01A** **PAI-10-SD-17** **- -**	**PAI-10-SD-18-01** **PAI-10-SD-18** **9/9/98**
COBALT	4.1 U			6.2 U		4.4 U
COPPER	9.5			10.1		9.8
IRON	19800			20700		19900
LEAD	18.4 J			22.6 J		16.3 J
MAGNESIUM	5320			6200		6270
MANGANESE	128			177		218
MERCURY	0.07 U			0.1		0.1
NICKEL	10.9 U			11.8 U		10.4 U
POTASSIUM	2680			3210		2830
SELENIUM	0.76 U			1.2 U		0.19 U
SODIUM	13200			20500		17600
THALLIUM	0.41			0.61 U		0.49 U
VANADIUM	47			46.6		44.9
ZINC	45.8			42.2		40.2
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM	0.0005 U			0.0008 U		0.0007
COPPER	0.11			0.007 U		0.04
LEAD	0.056			0.024		0.047
MERCURY	0.15 U			0.21 U		0.19 U
NICKEL	0.019			0.008		0.015
ZINC	0.82			1.02		1.4
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	7.9			16		13
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg						
PH	6.8			7.4		7.6
TOTAL ORGANIC CARBON %	2.8			3		2.7

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-018-01A PAI-10-SD-18 - -	PAI-10-SD-19-01 PAI-10-SD-19 12/15/99	PAI-10-SD-20-01 PAI-10-SD-20 12/15/99
VOLATILES (ug/kg)			
2-BUTANONE			
2-HEXANONE			
4-METHYL-2-PENTANONE			
ACETONE			
CARBON DISULFIDE			
TOLUENE			
XYLENES, TOTAL			
SEMIVOLATILES (ug/kg)			
ACENAPHTHENE	200 U	140 U	120 J
BENZO(A)ANTHRACENE	20 U	6.9 U	10 U
BENZO(A)PYRENE	38	6.9 U	10 U
BENZO(B)FLUORANTHENE	39 U	2.8 U	4.1 U
BENZO(K)FLUORANTHENE	20 U	2.8 U	4.1 U
BIS(2-ETHYLHEXYL)PHTHALATE		570 U	830 U
CHRYSENE	20 U	6.9 U	10 U
DI-N-OCTYL PHTHALATE		570 U	830 U
FLUORANTHENE	39 U	6.9 U	10
INDENO(1,2,3-CD)PYRENE	20 U	6.9 U	10 U
PENTACHLOROPHENOL		2800 U	4200 U
PHENANTHRENE	20 U	5.5 U	8.2 U
PYRENE	20 U	14 U	20 U
PESTICIDES/PCBs (ug/kg)			
4,4'-DDT		28 UJ	41 UJ
ALPHA-CHLORDANE		14 U	21 U
GAMMA-CHLORDANE		14 U	21 U
METHOXYCHLOR		140 UJ	210 UJ
DIOXINS AND FURANS (ng/kg)			
1,2,3,4,6,7,8-HPCDD			
1,2,3,6,7,8-HXCDD			
1,2,3,7,8,9-HXCDD			
OCDD			
OCDF			
TOTAL HPCDD			
TOTAL TCDD			
INORGANICS (mg/kg)			
ALUMINUM		6350	13800
ANTIMONY		2.5 UJ	5.1 UJ
ARSENIC		4.8	7.3
BARIUM		7.3 J	15.8 J
BERYLLIUM		0.37 U	0.79 U
CADMIUM		0.27 U	0.55 U
CALCIUM		781	1360
CHROMIUM		12	25

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SUMMARY OF POSITIVE DETECTIONS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-018-01A** **PAI-10-SD-18** - -	**PAI-10-SD-19-01** **PAI-10-SD-19** **12/15/99**	**PAI-10-SD-20-01** **PAI-10-SD-20** **12/15/99**
COBALT		1.5 U	3.4 U
COPPER		2.7 U	10.8
IRON		9960	17000
LEAD		6.9	21.4
MAGNESIUM		2290 J	4050 J
MANGANESE		63 J	94 J
MERCURY		0.08 U	0.11 U
NICKEL		3.4	6.9
POTASSIUM		1300	2480
SELENIUM		4.6	10.7
SODIUM		8540	13100
THALLIUM		6.3 U	13.1 U
VANADIUM		18.8	33.1
ZINC		12	36.4
SIMULTANEOUSLY EXTRACTED METALS (umo/g)			
CADMIUM			
COPPER			
LEAD			
MERCURY			
NICKEL			
ZINC			
ACID VOLATILES SULFIDE (umo/g)			
ACID VOLATILE SULFIDE			
MISCEALLANEOUS PARAMETERS			
HEXAVALENT CHROMIUM mg/kg			
PH			
TOTAL ORGANIC CARBON %			

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-01-01 PAI-10-SD-01 7/27/98	PAI-10-SD-001-01A PAI-10-SD-01 7/27/98	PAI-10-SD-02-01 PAI-10-SD-02 7/29/98	PAI-10-SD-02-01-D PAI-10-SD-02 - -	PAI-10-SD-002-01A PAI-10-SD-02 7/29/98
VOLATILES (ug/kg)					
1,1,1-TRICHLOROETHANE	4.3 U		4.6 U	4.9 U	
1,1,2,2-TETRACHLOROETHANE	4.3 U		4.6 U	4.9 U	
1,1,2-TRICHLOROETHANE	4.3 U		4.6 U	4.9 U	
1,1-DICHLOROETHANE	4.3 U		4.6 U	4.9 U	
1,1-DICHLOROETHENE	4.3 U		4.6 U	4.9 U	
1,2-DICHLOROETHANE	4.3 U		4.6 U	4.9 U	
1,2-DICHLOROETHENE (TOTAL)	4.3 U		4.6 U	4.9 U	
1,2-DICHLOROPROPANE	4.3 U		4.6 U	4.9 U	
2-BUTANONE	5 J		7.7 U	8.1 U	
2-HEXANONE	7.2 U		7.7 U	8.1 U	
4-METHYL-2-PENTANONE	4.4 J		7.7 U	5.4 J	
ACETONE	81 U		30 U	110 U	
BENZENE	4.3 U		4.6 U	4.9 U	
BROMODICHLOROMETHANE	4.3 U		4.6 U	4.9 U	
BROMOFORM	4.3 U		4.6 U	4.9 U	
BROMOMETHANE	4.3 U		4.6 U	4.9 U	
CARBON DISULFIDE	2.3 J		2.4 J	2.1 J	
CARBON TETRACHLORIDE	4.3 U		4.6 U	4.9 U	
CHLOROBENZENE	4.3 U		4.6 U	4.9 U	
CHLORODIBROMOMETHANE	4.3 U		4.6 U	4.9 U	
CHLOROETHANE	4.3 U		4.6 U	4.9 U	
CHLOROFORM	4.3 U		4.6 U	4.9 U	
CHLOROMETHANE	4.3 U		4.6 U	4.9 U	
CIS-1,3-DICHLOROPROPENE	4.3 U		4.6 U	4.9 U	
ETHYLBENZENE	4.3 U		4.6 U	4.9 U	
METHYLENE CHLORIDE	5.4 U		7.1 U	7.9 U	
STYRENE	4.3 U		4.6 U	4.9 U	
TETRACHLOROETHENE	4.3 U		4.6 U	4.9 U	
TOLUENE	4.3 U		4.6 U	4.9 U	
TRANS-1,3-DICHLOROPROPENE	4.3 U		4.6 U	4.9 U	
TRICHLOROETHENE	4.3 U		4.6 U	4.9 U	
VINYL CHLORIDE	4.3 U		4.6 U	4.9 U	
XYLENES, TOTAL	4.3 U		4.6 U	4.9 U	
SEMIVOLATILES (ug/kg)					
1,2,4-TRICHLOROBENZENE	520 U		510 U	500 U	
1,2-DICHLOROBENZENE	520 U		510 U	500 U	
1,3-DICHLOROBENZENE	520 U		510 U	500 U	
1,4-DICHLOROBENZENE	520 U		510 U	500 U	
1,4-DIOXANE					
2,2'-OXYBIS(1-CHLOROPROPANE)	520 U		510 U	500 U	
2,4,5-TRICHLOROPHENOL	520 U		510 U	500 U	
2,4,6-TRICHLOROPHENOL	520 U		510 U	500 U	
2,4-DICHLOROPHENOL	520 U		510 U	500 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-01-01 PAI-10-SD-01 7/27/98	PAI-10-SD-001-01A PAI-10-SD-01 7/27/98	PAI-10-SD-02-01 PAI-10-SD-02 7/29/98	PAI-10-SD-02-01-D PAI-10-SD-02 - -	PAI-10-SD-002-01A PAI-10-SD-02 7/29/98
2,4-DIMETHYLPHENOL	520 U		510 U	500 U	
2,4-DINITROPHENOL	1000 U		1000 U	1000 U	
2,4-DINITROTOLUENE	520 U		510 U	500 U	
2,6-DINITROTOLUENE	520 U		510 U	500 U	
2-CHLORONAPHTHALENE	520 U		510 U	500 U	
2-CHLOROPHENOL	520 U		510 U	500 U	
2-METHYLNAPHTHALENE	520 U		510 U	500 U	
2-METHYLPHENOL	520 U		510 U	500 U	
2-NITROANILINE	520 U		510 U	500 U	
2-NITROPHENOL	520 U		510 U	500 U	
3,3'-DICHLOROBENZIDINE	1000 U		1000 U	1000 U	
3-NITROANILINE	520 U		510 U	500 U	
4,6-DINITRO-2-METHYLPHENOL	1000 U		1000 U	1000 U	
4-BROMOPHENYL PHENYL ETHER	520 U		510 U	500 U	
4-CHLORO-3-METHYLPHENOL	520 U		510 U	500 U	
4-CHLOROANILINE	520 U		510 U	500 U	
4-CHLOROPHENYL PHENYL ETHER	520 U		510 U	500 U	
4-METHYLPHENOL	520 U		510 U	500 U	
4-NITROANILINE	520 U		510 U	500 U	
4-NITROPHENOL	1000 U		1000 U	1000 U	
ACENAPHTHENE	520 U	120 U	510 U	500 U	200 U
ACENAPHTHYLENE	520 U	240 U	510 U	500 U	380 U
ANILINE					
ANTHRACENE	520 U	12 U	510 U	500 U	20 U
BENZIDINE					
BENZO(A)ANTHRACENE	520 U	12 U	510 U	500 U	20 U
BENZO(A)PYRENE	520 U	12 U	510 U	500 U	20 UJ
BENZO(B)FLUORANTHENE	520 U	24 U	510 U	500 U	38 U
BENZO(G,H,I)PERYLENE	520 U	24 U	510 U	500 U	38 U
BENZO(K)FLUORANTHENE	520 U	12 U	510 U	500 U	20 U
BENZOIC ACID					
BIS(2-CHLOROETHOXY)METHANE	520 U		510 U	500 U	
BIS(2-CHLOROETHYL)ETHER	520 U		510 U	500 U	
BIS(2-ETHYLHEXYL)PHTHALATE	120 J		510 U	490 J	
BUTYL BENZYL PHTHALATE	520 U		510 U	500 U	
CARBAZOLE	520 U		510 U	500 U	
CHRYSENE	520 U	12 U	510 U	500 U	20 U
DI-N-BUTYL PHTHALATE	520 U		510 U	500 U	
DI-N-OCTYL PHTHALATE	520 U		510 U	500 U	
DIBENZO(A,H)ANTHRACENE	520 U	24 U	510 U	500 U	38 U
DIBENZOFURAN	520 U		510 U	500 U	
DIETHYL PHTHALATE	520 U		510 U	500 U	
DIMETHYL PHTHALATE	520 U		510 U	500 U	
FLUORANTHENE	520 U	24 U	510 U	500 U	38 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-01-01** **PAI-10-SD-01** **7/27/98**	**PAI-10-SD-001-01A** **PAI-10-SD-01** **7/27/98**	**PAI-10-SD-02-01** **PAI-10-SD-02** **7/29/98**	**PAI-10-SD-02-01-D** **PAI-10-SD-02** **- -**	**PAI-10-SD-002-01A** **PAI-10-SD-02** **7/29/98**
FLUORENE	520 U	24 U	510 U	500 U	38 U
HEXACHLOROBENZENE	520 U		510 U	500 U	
HEXACHLOROBUTADIENE	520 U		510 U	500 U	
HEXACHLOROCYCLOPENTADIENE	520 U		510 U	500 U	
HEXACHLOROETHANE	520 U		510 U	500 U	
INDENO(1,2,3-CD)PYRENE	520 U	12 U	510 U	500 U	20 U
ISOPHORONE	520 U		510 U	500 U	
N-NITROSO-DI-N-PROPYLAMINE	520 U		510 U	500 U	
N-NITROSODIPHENYLAMINE	520 U		510 U	500 U	
NAPHTHALENE	520 U	120 U	510 U	500 U	200 U
NITROBENZENE	520 U		510 U	500 U	
PENTACHLOROPHENOL	1000 U		1000 U	1000 U	
PHENANTHRENE	520 U	12 U	510 U	500 U	20 U
PHENOL	520 U		510 U	500 U	
PYRENE	520 U	12 U	510 U	500 U	20 U
PESTICIDES/PCBs (ug/kg)					
4,4'-DDD	5.2 U		5 U	4.9 U	
4,4'-DDE	5.2 U		5 U	4.9 U	
4,4'-DDT	5.2 U		5 U	4.9 U	
ALDRIN	2.7 U		2.6 U	2.5 U	
ALPHA-BHC	2.7 U		2.6 U	2.5 U	
ALPHA-CHLORDANE	2.7 U		2.6 U	2.5 U	
AROCLOR-1016	52 U		50 U	49 U	
AROCLOR-1221	100 U		100 U	99 U	
AROCLOR-1232	52 U		50 U	49 U	
AROCLOR-1242	52 U		50 U	49 U	
AROCLOR-1248	52 U		50 U	49 U	
AROCLOR-1254	52 U		50 U	49 U	
AROCLOR-1260	52 U		50 U	49 U	
BETA-BHC	2.7 U		2.6 U	2.5 U	
DELTA-BHC	2.7 U		2.6 U	2.5 U	
DIELDRIN	5.2 U		5 U	4.9 U	
ENDOSULFAN I	2.7 U		2.6 U	2.5 U	
ENDOSULFAN II	5.2 U		5 U	4.9 U	
ENDOSULFAN SULFATE	5.2 U		5 U	4.9 U	
ENDRIN	5.2 U		5 U	4.9 U	
ENDRIN ALDEHYDE	5.2 U		5 U	4.9 U	
ENDRIN KETONE	5.2 U		5 U	4.9 U	
GAMMA-BHC (LINDANE)	2.7 U		2.6 U	2.5 U	
GAMMA-CHLORDANE	2.7 U		2.6 U	2.5 U	
HEPTACHLOR	2.7 U		2.6 U	2.5 U	
HEPTACHLOR EPOXIDE	2.7 U		2.6 U	2.5 U	
METHOXYCHLOR	27 U		26 U	25 U	
TOXAPHENE	270 U		260 U	250 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-01-01 PAI-10-SD-01 7/27/98	PAI-10-SD-001-01A PAI-10-SD-01 7/27/98	PAI-10-SD-02-01 PAI-10-SD-02 7/29/98	PAI-10-SD-02-01-D PAI-10-SD-02 - -	PAI-10-SD-002-01A PAI-10-SD-02 7/29/98
DIOXINS AND FURANS (ng/kg)					
1,2,3,4,6,7,8-HPCDD					
1,2,3,4,6,7,8-HPCDF					
1,2,3,4,7,8,9-HPCDF					
1,2,3,4,7,8-HXCDD					
1,2,3,4,7,8-HXCDF					
1,2,3,6,7,8-HXCDD					
1,2,3,6,7,8-HXCDF					
1,2,3,7,8,9-HXCDD					
1,2,3,7,8,9-HXCDF					
1,2,3,7,8-PECDD					
1,2,3,7,8-PECDF					
2,3,4,6,7,8-HXCDF					
2,3,4,7,8-PECDF					
2,3,7,8-TCDD					
2,3,7,8-TCDF					
OCDD					
OCDF					
TOTAL HPCDD					
TOTAL HPCDF					
TOTAL HXCDD					
TOTAL HXCDF					
TOTAL PECDD					
TOTAL PECDF					
TOTAL TCDD					
TOTAL TCDF					
INORGANICS (mg/kg)					
ALUMINUM	1870		5850		
ANTIMONY	2.7 U		2.8 U		
ARSENIC	0.64		2.4		
BARIUM	3.7 U		7.7 U		
BERYLLIUM	0.11 U		0.31		
CADMIUM	0.28 U		0.3 U		
CALCIUM	696		600		
CHROMIUM	3.2		9.9		
COBALT	0.92 U		1.4 U		
COPPER	1.3 U		1.5 U		
CYANIDE	0.5 U		0.5 U		
IRON	1420		4600		
LEAD	3.1		6.7		
MAGNESIUM	1900		2110		
MANGANESE	9.2 U		18.4		
MERCURY	0.02 U		0.03 U		
NICKEL	1.4		1.6		

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-01-01** **PAI-10-SD-01** **7/27/98**	**PAI-10-SD-001-01A** **PAI-10-SD-01** **7/27/98**	**PAI-10-SD-02-01** **PAI-10-SD-02** **7/29/98**	**PAI-10-SD-02-01-D** **PAI-10-SD-02** **- -**	**PAI-10-SD-002-01A** **PAI-10-SD-02** **7/29/98**
POTASSIUM	692		1280		
SELENIUM	0.47 U		0.49 U		
SILVER	0.61 U		0.64 U		
SODIUM	10000		7820		
THALLIUM	0.32 U		0.25 U		
VANADIUM	4.9		15.4		
ZINC	4.7 U		8.1 U		
SIMULTANEOUSLY EXTRACTED METALS (umo/g)					
CADMIUM	0.0003 U		0.0003 U		
COPPER	0.002 U		0.002 U		
LEAD	0.009		0.011		
MERCURY	0.07 U		0.08 U		
NICKEL	0.001 U		0.002 U		
ZINC	0.12 U		0.17 U		
ACID VOLATILES SULFIDE (umo/g)					
ACID VOLATILE SULFIDE	2.6 U		1.2 U		
MISCEALLANEOUS PARAMETERS					
HEXAVALENT CHROMIUM mg/kg					
PH	7.3		7.9	7.9	
TOTAL ORGANIC CARBON %	0.95		0.97	1.2	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-002-01A-D PAI-10-SD-02 7/29/98	PAI-10-SD-03-01 PAI-10-SD-03 7/29/98	PAI-10-SD-003-01A PAI-10-SD-03 7/29/98	PAI-10-SD-04-01 PAI-10-SD-04 7/27/98	PAI-10-SD-004-01A PAI-10-SD-04 7/27/98
VOLATILES (ug/kg)					
1,1,1-TRICHLOROETHANE		400 U		6.2 U	
1,1,2,2-TETRACHLOROETHANE		400 U		6.2 U	
1,1,2-TRICHLOROETHANE		400 U		6.2 U	
1,1-DICHLOROETHANE		400 U		6.2 U	
1,1-DICHLOROETHENE		400 U		6.2 U	
1,2-DICHLOROETHANE		400 U		6.2 U	
1,2-DICHLOROETHENE (TOTAL)		400 U		6.2 U	
1,2-DICHLOROPROPANE		400 U		6.2 U	
2-BUTANONE		670 U		10 U	
2-HEXANONE		670 U		10 U	
4-METHYL-2-PENTANONE		670 U		4 J	
ACETONE		670 U		560 U	
BENZENE		400 U		6.2 U	
BROMODICHLOROMETHANE		400 U		6.2 U	
BROMOFORM		400 U		6.2 U	
BROMOMETHANE		400 U		6.2 U	
CARBON DISULFIDE		400 U		3.2 J	
CARBON TETRACHLORIDE		400 U		6.2 U	
CHLOROBENZENE		400 U		6.2 U	
CHLORODIBROMOMETHANE		400 U		6.2 U	
CHLOROETHANE		400 U		6.2 U	
CHLOROFORM		400 U		6.2 U	
CHLOROMETHANE		400 U		6.2 U	
CIS-1,3-DICHLOROPROPENE		400 U		6.2 U	
ETHYLBENZENE		400 U		6.2 U	
METHYLENE CHLORIDE		400 U		8.8 U	
STYRENE		400 U		6.2 U	
TETRACHLOROETHENE		400 U		6.2 U	
TOLUENE		400 U		6.4 U	
TRANS-1,3-DICHLOROPROPENE		400 U		6.2 U	
TRICHLOROETHENE		400 U		6.2 U	
VINYL CHLORIDE		400 U		6.2 U	
XYLENES, TOTAL		400 U		2.3 J	
SEMIVOLATILES (ug/kg)					
1,2,4-TRICHLOROBENZENE		460 U		600 U	
1,2-DICHLOROBENZENE		460 U		600 U	
1,3-DICHLOROBENZENE		460 U		600 U	
1,4-DICHLOROBENZENE		460 U		600 U	
1,4-DIOXANE					
2,2'-OXYBIS(1-CHLOROPROPANE)		460 U		600 U	
2,4,5-TRICHLOROPHENOL		460 U		600 U	
2,4,6-TRICHLOROPHENOL		460 U		600 U	
2,4-DICHLOROPHENOL		460 U		600 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-002-01A-D PAI-10-SD-02 7/29/98	PAI-10-SD-03-01 PAI-10-SD-03 7/29/98	PAI-10-SD-003-01A PAI-10-SD-03 7/29/98	PAI-10-SD-04-01 PAI-10-SD-04 7/27/98	PAI-10-SD-004-01A PAI-10-SD-04 7/27/98
2,4-DIMETHYLPHENOL		460 U		600 U	
2,4-DINITROPHENOL		930 U		1200 U	
2,4-DINITROTOLUENE		460 U		600 U	
2,6-DINITROTOLUENE		460 U		600 U	
2-CHLORONAPHTHALENE		460 U		600 U	
2-CHLOROPHENOL		460 U		600 U	
2-METHYLNAPHTHALENE		460 U		600 U	
2-METHYLPHENOL		460 U		600 U	
2-NITROANILINE		460 U		600 U	
2-NITROPHENOL		460 U		600 U	
3,3'-DICHLOROBENZIDINE		930 U		1200 U	
3-NITROANILINE		460 U		600 U	
4,6-DINITRO-2-METHYLPHENOL		930 U		1200 U	
4-BROMOPHENYL PHENYL ETHER		460 U		600 U	
4-CHLORO-3-METHYLPHENOL		460 U		600 U	
4-CHLOROANILINE		460 U		600 U	
4-CHLOROPHENYL PHENYL ETHER		460 U		600 U	
4-METHYLPHENOL		460 U		600 U	
4-NITROANILINE		460 U		600 U	
4-NITROPHENOL		930 U		1200 U	
ACENAPHTHENE	200 U	460 U	96 U	600 U	100 U
ACENAPHTHYLENE	390 U	460 U	190 U	600 U	200 U
ANILINE					
ANTHRACENE	20 U	460 U	9.6 U	600 U	10 U
BENZIDINE					
BENZO(A)ANTHRACENE	20 U	460 U	9.6 U	600 U	10 U
BENZO(A)PYRENE	26 J	460 U	9.6 U	600 U	10 U
BENZO(B)FLUORANTHENE	39 U	460 U	19 U	600 U	20 U
BENZO(G,H,I)PERYLENE	39 U	460 U	19 U	600 U	20 U
BENZO(K)FLUORANTHENE	20 U	460 U	9.6 U	600 U	10 U
BENZOIC ACID					
BIS(2-CHLOROETHOXY)METHANE		460 U		600 U	
BIS(2-CHLOROETHYL)ETHER		460 U		600 U	
BIS(2-ETHYLHEXYL)PHTHALATE		76 J		600 U	
BUTYL BENZYL PHTHALATE		460 U		600 U	
CARBAZOLE		460 U		600 U	
CHRYSENE	20 U	460 U	9.6 U	600 U	10 U
DI-N-BUTYL PHTHALATE		460 U		600 U	
DI-N-OCTYL PHTHALATE		460 U		600 U	
DIBENZO(A,H)ANTHRACENE	39 U	460 U	19 U	600 U	20 U
DIBENZOFURAN		460 U		600 U	
DIETHYL PHTHALATE		460 U		600 U	
DIMETHYL PHTHALATE		460 U		600 U	
FLUORANTHENE	39 U	460 U	19 U	600 U	20 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-002-01A-D** **PAI-10-SD-02** **7/29/98**	**PAI-10-SD-03-01** **PAI-10-SD-03** **7/29/98**	**PAI-10-SD-003-01A** **PAI-10-SD-03** **7/29/98**	**PAI-10-SD-04-01** **PAI-10-SD-04** **7/27/98**	**PAI-10-SD-004-01A** **PAI-10-SD-04** **7/27/98**
FLUORENE	39 U	460 U	19 U	600 U	20 U
HEXACHLOROBENZENE		460 U		600 U	
HEXACHLOROBUTADIENE		460 U		600 U	
HEXACHLOROCYCLOPENTADIENE		460 U		600 U	
HEXACHLOROETHANE		460 U		600 U	
INDENO(1,2,3-CD)PYRENE	20 U	460 U	9.6 U	600 U	10 U
ISOPHORONE		460 U		600 U	
N-NITROSO-DI-N-PROPYLAMINE		460 U		600 U	
N-NITROSODIPHENYLAMINE		460 U		600 U	
NAPHTHALENE	200 U	460 U	96 U	600 U	100 U
NITROBENZENE		460 U		600 U	
PENTACHLOROPHENOL		930 U		1200 U	
PHENANTHRENE	20 U	460 U	9.6 U	600 U	10 U
PHENOL		460 U		600 U	
PYRENE	20 U	460 U	9.6 U	600 U	10 U
PESTICIDES/PCBs (ug/kg)					
4,4'-DDD		4.6 U		5.9 U	
4,4'-DDE		4.6 U		5.9 U	
4,4'-DDT		4.6 U		5.9 U	
ALDRIN		2.4 U		3 U	
ALPHA-BHC		2.4 U		3 U	
ALPHA-CHLORDANE		2.4 U		3 U	
AROCLOR-1016		46 U		59 U	
AROCLOR-1221		92 U		120 U	
AROCLOR-1232		46 U		59 U	
AROCLOR-1242		46 U		59 U	
AROCLOR-1248		46 U		59 U	
AROCLOR-1254		46 U		59 U	
AROCLOR-1260		46 U		59 U	
BETA-BHC		2.4 U		3 U	
DELTA-BHC		2.4 U		3 U	
DIELDRIN		4.6 U		5.9 U	
ENDOSULFAN I		2.4 U		3 U	
ENDOSULFAN II		4.6 U		5.9 U	
ENDOSULFAN SULFATE		4.6 U		5.9 U	
ENDRIN		4.6 U		5.9 U	
ENDRIN ALDEHYDE		4.6 U		5.9 U	
ENDRIN KETONE		4.6 U		5.9 U	
GAMMA-BHC (LINDANE)		2.4 U		3 U	
GAMMA-CHLORDANE		2.4 U		3 U	
HEPTACHLOR		2.4 U		3 U	
HEPTACHLOR EPOXIDE		2.4 U		3 U	
METHOXYCHLOR		24 U		30 U	
TOXAPHENE		240 U		300 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-002-01A-D PAI-10-SD-02 7/29/98	PAI-10-SD-03-01 PAI-10-SD-03 7/29/98	PAI-10-SD-003-01A PAI-10-SD-03 7/29/98	PAI-10-SD-04-01 PAI-10-SD-04 7/27/98	PAI-10-SD-004-01A PAI-10-SD-04 7/27/98
DIOXINS AND FURANS (ng/kg)					
1,2,3,4,6,7,8-HPCDD					
1,2,3,4,6,7,8-HPCDF					
1,2,3,4,7,8,9-HPCDF					
1,2,3,4,7,8-HXCDD					
1,2,3,4,7,8-HXCDF					
1,2,3,6,7,8-HXCDD					
1,2,3,6,7,8-HXCDF					
1,2,3,7,8,9-HXCDD					
1,2,3,7,8,9-HXCDF					
1,2,3,7,8-PECDD					
1,2,3,7,8-PECDF					
2,3,4,6,7,8-HXCDF					
2,3,4,7,8-PECDF					
2,3,7,8-TCDD					
2,3,7,8-TCDF					
OCDD					
OCDF					
TOTAL HPCDD					
TOTAL HPCDF					
TOTAL HXCDD					
TOTAL HXCDF					
TOTAL PECDD					
TOTAL PECDF					
TOTAL TCDD					
TOTAL TCDF					
INORGANICS (mg/kg)					
ALUMINUM		3880		3410	
ANTIMONY		2.3 U		3 U	
ARSENIC		0.35		2.4	
BARIUM		5.4 U		5.7 U	
BERYLLIUM		0.26		0.21 U	
CADMIUM		0.25 U		0.32 U	
CALCIUM		448		468	
CHROMIUM		7.1		6.3	
COBALT		0.98 U		1.5 U	
COPPER		1.4 U		1.7 U	
CYANIDE		0.5 U		0.5 U	
IRON		4630		4650	
LEAD		3.6		4.3	
MAGNESIUM		1570		1490	
MANGANESE		17.5		24.1	
MERCURY		0.02 U		0.06	
NICKEL		2.1		1.8	

SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-002-01A-D** **PAI-10-SD-02** **7/29/98**	**PAI-10-SD-03-01** **PAI-10-SD-03** **7/29/98**	**PAI-10-SD-003-01A** **PAI-10-SD-03** **7/29/98**	**PAI-10-SD-04-01** **PAI-10-SD-04** **7/27/98**	**PAI-10-SD-004-01A** **PAI-10-SD-04** **7/27/98**
POTASSIUM		796		777	
SELENIUM		0.1		0.6 U	
SILVER		0.53 U		0.68 U	
SODIUM		6150		6840	
THALLIUM		0.21 U		0.31 U	
VANADIUM		10.9		10.8	
ZINC		8.1 U		8.1 U	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)					
CADMIUM		0.0002 U		0.0003 U	
COPPER		0.002 U		0.003 U	
LEAD		0.005		0.006	
MERCURY		0.07 U		0.09 U	
NICKEL		0.002		0.001 U	
ZINC		0.17 U		0.21 U	
ACID VOLATILES SULFIDE (umo/g)					
ACID VOLATILE SULFIDE		1.2 U		1.8 U	
MISCEALLANEOUS PARAMETERS					
HEXAVALENT CHROMIUM mg/kg					
PH		7.7		7.5	
TOTAL ORGANIC CARBON %		0.67		0.86	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-05-01 PAI-10-SD-05 7/27/98	PAI-10-SD-005-01A PAI-10-SD-05 7/27/98	PAI-10-SD-06-01 PAI-10-SD-06 7/27/98	PAI-10-SD-006-01A PAI-10-SD-06 7/27/98	PAI-10-SD-07-01 PAI-10-SD-07 7/27/98	PAI-10-SD-007-01A PAI-10-SD-07 7/27/98
VOLATILES (ug/kg)						
1,1,1-TRICHLOROETHANE	4.4 U		4.3 U		5 U	
1,1,2,2-TETRACHLOROETHANE	4.4 U		4.3 U		5 U	
1,1,2-TRICHLOROETHANE	4.4 U		4.3 U		5 U	
1,1-DICHLOROETHANE	4.4 U		4.3 U		5 U	
1,1-DICHLOROETHENE	4.4 U		4.3 U		5 U	
1,2-DICHLOROETHANE	4.4 U		4.3 U		5 U	
1,2-DICHLOROETHENE (TOTAL)	4.4 U		4.3 U		5 U	
1,2-DICHLOROPROPANE	4.4 U		4.3 U		5 U	
2-BUTANONE	7.3 U		7.1 U		20	
2-HEXANONE	7.3 U		7.1 U		8.3 U	
4-METHYL-2-PENTANONE	7.3 U		53.7 J		9.2	
ACETONE	420 U		590 U		810 U	
BENZENE	4.4 U		4.3 U		5 U	
BROMODICHLOROMETHANE	4.4 U		4.3 U		5 U	
BROMOFORM	4.4 U		4.3 U		5 U	
BROMOMETHANE	4.4 U		4.3 U		5 U	
CARBON DISULFIDE	3.3 J		1.9 J		7.5	
CARBON TETRACHLORIDE	4.4 U		4.3 U		5 U	
CHLOROBENZENE	4.4 U		4.3 U		5 U	
CHLORODIBROMOMETHANE	4.4 U		4.3 U		5 U	
CHLOROETHANE	4.4 U		4.3 U		5 U	
CHLOROFORM	4.4 U		4.3 U		5 U	
CHLOROMETHANE	4.4 U		4.3 U		5 U	
CIS-1,3-DICHLOROPROPENE	4.4 U		4.3 U		5 U	
ETHYLBENZENE	4.4 U		4.3 U		5 U	
METHYLENE CHLORIDE	8.2 U		6.4 U		5 U	
STYRENE	4.4 U		4.3 U		5 U	
TETRACHLOROETHENE	4.4 U		4.3 U		7 U	
TOLUENE	5		4.7		3 J	
TRANS-1,3-DICHLOROPROPENE	4.4 U		4.3 U		5 U	
TRICHLOROETHENE	4.4 U		4.3 U		5 U	
VINYL CHLORIDE	4.4 U		4.3 U		5 U	
XYLENES, TOTAL	2.2 J		1.8 J		5 U	
SEMIVOLATILES (ug/kg)						
1,2,4-TRICHLOROBENZENE	500 U		460 U		530 U	
1,2-DICHLOROBENZENE	500 U		460 U		530 U	
1,3-DICHLOROBENZENE	500 U		460 U		530 U	
1,4-DICHLOROBENZENE	500 U		460 U		530 U	
1,4-DIOXANE						
2,2'-OXYBIS(1-CHLOROPROPANE)	500 U		460 U		530 U	
2,4,5-TRICHLOROPHENOL	500 U		460 U		530 U	
2,4,6-TRICHLOROPHENOL	500 U		460 U		530 U	
2,4-DICHLOROPHENOL	500 U		460 U		530 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-05-01 PAI-10-SD-05 7/27/98	PAI-10-SD-005-01A PAI-10-SD-05 7/27/98	PAI-10-SD-06-01 PAI-10-SD-06 7/27/98	PAI-10-SD-006-01A PAI-10-SD-06 7/27/98	PAI-10-SD-07-01 PAI-10-SD-07 7/27/98	PAI-10-SD-007-01A PAI-10-SD-07 7/27/98
2,4-DIMETHYLPHENOL	500 U		460 U		530 U	
2,4-DINITROPHENOL	1000 U		910 U		1100 U	
2,4-DINITROTOLUENE	500 U		460 U		530 U	
2,6-DINITROTOLUENE	500 U		460 U		530 U	
2-CHLORONAPHTHALENE	500 U		460 U		530 U	
2-CHLOROPHENOL	500 U		460 U		530 U	
2-METHYLNAPHTHALENE	500 U		460 U		530 U	
2-METHYLPHENOL	500 U		460 U		530 U	
2-NITROANILINE	500 U		460 U		530 U	
2-NITROPHENOL	500 U		460 U		530 U	
3,3'-DICHLOROBENZIDINE	1000 U		910 U		1100 U	
3-NITROANILINE	500 U		460 U		530 U	
4,6-DINITRO-2-METHYLPHENOL	1000 U		910 U		1100 U	
4-BROMOPHENYL PHENYL ETHER	500 U		460 U		530 U	
4-CHLORO-3-METHYLPHENOL	500 U		460 U		530 U	
4-CHLOROANILINE	500 U		460 U		530 U	
4-CHLOROPHENYL PHENYL ETHER	500 U		460 U		530 U	
4-METHYLPHENOL	500 U		460 U		530 U	
4-NITROANILINE	500 U		460 U		530 U	
4-NITROPHENOL	1000 U		910 U		1100 U	
ACENAPHTHENE	500 U	97 U	460 U	93 U	530 U	100 U
ACENAPHTHYLENE	500 U	190 U	460 U	180 U	530 U	200 U
ANILINE						
ANTHRACENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
BENZIDINE						
BENZO(A)ANTHRACENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
BENZO(A)PYRENE	500 U	9.7 U	460 U	9.3 U	530 U	11
BENZO(B)FLUORANTHENE	500 U	19 U	460 U	18 U	530 U	20 U
BENZO(G,H,I)PERYLENE	500 U	19 U	460 U	18 U	530 U	20 U
BENZO(K)FLUORANTHENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
BENZOIC ACID						
BIS(2-CHLOROETHOXY)METHANE	500 U		460 U		530 U	
BIS(2-CHLOROETHYL)ETHER	500 U		460 U		530 U	
BIS(2-ETHYLHEXYL)PHTHALATE	45 J		47 J		440 J	
BUTYL BENZYL PHTHALATE	500 U		460 U		530 U	
CARBAZOLE	500 U		460 U		530 U	
CHRYSENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
DI-N-BUTYL PHTHALATE	500 U		460 U		530 U	
DI-N-OCTYL PHTHALATE	500 U		63 J		530 U	
DIBENZO(A,H)ANTHRACENE	500 U	19 U	460 U	18 U	530 U	20 U
DIBENZOFURAN	500 U		460 U		530 U	
DIETHYL PHTHALATE	500 U		460 U		530 U	
DIMETHYL PHTHALATE	500 U		460 U		530 U	
FLUORANTHENE	500 U	19 U	460 U	18 U	530 U	20 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-05-01 PAI-10-SD-05 7/27/98	PAI-10-SD-005-01A PAI-10-SD-05 7/27/98	PAI-10-SD-06-01 PAI-10-SD-06 7/27/98	PAI-10-SD-006-01A PAI-10-SD-06 7/27/98	PAI-10-SD-07-01 PAI-10-SD-07 7/27/98	PAI-10-SD-007-01A PAI-10-SD-07 7/27/98
FLUORENE	500 U	19 U	460 U	18 U	530 U	20 U
HEXACHLOROBENZENE	500 U		460 U		530 U	
HEXACHLOROBUTADIENE	500 U		460 U		530 U	
HEXACHLOROCYCLOPENTADIENE	500 U		460 U		530 U	
HEXACHLOROETHANE	500 U		460 U		530 U	
INDENO(1,2,3-CD)PYRENE	500 U	9.7 U	460 U	9.3 U	530 U	10 U
ISOPHORONE	500 U		460 U		530 U	
N-NITROSO-DI-N-PROPYLAMINE	500 U		460 U		530 U	
N-NITROSODIPHENYLAMINE	500 U		460 U		530 U	
NAPHTHALENE	500 U	97 U	460 U	93 U	530 U	100 U
NITROBENZENE	500 U		460 U		530 U	
PENTACHLOROPHENOL	1000 U		910 U		1100 U	
PHENANTHRENE	36 J	9.7 U	460 U	9.3 U	530 U	10 U
PHENOL	500 U		460 U		530 U	
PYRENE	32 J	9.7 U	460 U	9.3 U	530 U	10 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDD	4.9 U		4.5 U		5.2 U	
4,4'-DDE	4.9 U		4.5 U		5.2 U	
4,4'-DDT	4.9 U		4.5 U		5.2 U	
ALDRIN	2.5 U		2.3 U		2.7 U	
ALPHA-BHC	2.5 U		2.3 U		2.7 U	
ALPHA-CHLORDANE	2.5 U		2.3 U		2.7 U	
AROCLOR-1016	49 U		45 U		52 U	
AROCLOR-1221	99 U		90 U		100 U	
AROCLOR-1232	49 U		45 U		52 U	
AROCLOR-1242	49 U		45 U		52 U	
AROCLOR-1248	49 U		45 U		52 U	
AROCLOR-1254	49 U		45 U		52 U	
AROCLOR-1260	49 U		45 U		52 U	
BETA-BHC	2.5 U		2.3 U		2.7 U	
DELTA-BHC	2.5 U		2.3 U		2.7 U	
DIELDRIN	4.9 U		4.5 U		5.2 U	
ENDOSULFAN I	2.5 U		2.3 U		2.7 U	
ENDOSULFAN II	4.9 U		4.5 U		5.2 U	
ENDOSULFAN SULFATE	4.9 U		4.5 U		5.2 U	
ENDRIN	4.9 U		4.5 U		5.2 U	
ENDRIN ALDEHYDE	4.9 U		4.5 U		5.2 U	
ENDRIN KETONE	4.9 U		4.5 U		5.2 U	
GAMMA-BHC (LINDANE)	2.5 U		2.3 U		2.7 U	
GAMMA-CHLORDANE	2.5 U		2.3 U		2.7 U	
HEPTACHLOR	2.5 U		2.3 U		2.7 U	
HEPTACHLOR EPOXIDE	2.5 U		2.3 U		2.7 U	
METHOXYCHLOR	25 U		23 U		27 U	
TOXAPHENE	250 U		230 U		270 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-05-01 PAI-10-SD-05 7/27/98	PAI-10-SD-005-01A PAI-10-SD-05 7/27/98	PAI-10-SD-06-01 PAI-10-SD-06 7/27/98	PAI-10-SD-006-01A PAI-10-SD-06 7/27/98	PAI-10-SD-07-01 PAI-10-SD-07 7/27/98	PAI-10-SD-007-01A PAI-10-SD-07 7/27/98
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD						
1,2,3,4,6,7,8-HPCDF						
1,2,3,4,7,8,9-HPCDF						
1,2,3,4,7,8-HXCDD						
1,2,3,4,7,8-HXCDF						
1,2,3,6,7,8-HXCDD						
1,2,3,6,7,8-HXCDF						
1,2,3,7,8,9-HXCDD						
1,2,3,7,8,9-HXCDF						
1,2,3,7,8-PECDD						
1,2,3,7,8-PECDF						
2,3,4,6,7,8-HXCDF						
2,3,4,7,8-PECDF						
2,3,7,8-TCDD						
2,3,7,8-TCDF						
OCDD						
OCDF						
TOTAL HPCDD						
TOTAL HPCDF						
TOTAL HXCDD						
TOTAL HXCDF						
TOTAL PECDD						
TOTAL PECDF						
TOTAL TCDD						
TOTAL TCDF						
INORGANICS (mg/kg)						
ALUMINUM	3960		3540		3770	
ANTIMONY	2.7 U		2.4 U		2.7 U	
ARSENIC	2.1		1.7		4.9	
BARIUM	5.7 U		6.7 U		5.3 U	
BERYLLIUM	0.24		0.21		0.23 U	
CADMIUM	0.28 U		0.25 U		0.28 U	
CALCIUM	474		338		521	
CHROMIUM	7.1		6		7.2	
COBALT	1.1 U		1.2 U		1.4 U	
COPPER	2 U		1.7 U		2.3 U	
CYANIDE	0.5 U		0.5 U		0.5 U	
IRON	4780		3860		5130	
LEAD	5.4		4.3		4.5	
MAGNESIUM	1480		1130		1610	
MANGANESE	26.2		22.1		25.7	
MERCURY	0.02 U		0.02 U		0.07	
NICKEL	1.9		1.3		1.8	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-05-01** **PAI-10-SD-05** **7/27/98**	**PAI-10-SD-005-01A** **PAI-10-SD-05** **7/27/98**	**PAI-10-SD-06-01** **PAI-10-SD-06** **7/27/98**	**PAI-10-SD-006-01A** **PAI-10-SD-06** **7/27/98**	**PAI-10-SD-07-01** **PAI-10-SD-07** **7/27/98**	**PAI-10-SD-007-01A** **PAI-10-SD-07** **7/27/98**
POTASSIUM	859		684		882	
SELENIUM	0.48 U		0.44 U		0.53 U	
SILVER	0.61 U		0.53 U		0.61 U	
SODIUM	5400		3920		6400	
THALLIUM	0.25 U		0.24 U		0.32 U	
VANADIUM	11.8		9.6		11.9	
ZINC	9.7		8.1 U		9.9 U	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM	0.0002 U		0.0002 U		0.0003 U	
COPPER	0.002 U		0.002 U		0.002 U	
LEAD	0.006		0.008		0.007	
MERCURY	0.07 U		0.07 U		0.08 U	
NICKEL	0.001 U		0.003		0.001 U	
ZINC	0.15 U		0.11 U		0.2 U	
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	1.2 U		2 U		2.3 U	
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg						
PH	7.2		7.6		7.1	
TOTAL ORGANIC CARBON %	1.1		0.72		0.96	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-08-01 PAI-10-SD-08 8/10/98	PAI-10-SD-008-01A PAI-10-SD-08 8/10/98	PAI-10-SD-09-01 PAI-10-SD-09 8/10/98	PAI-10-SD-009-01A PAI-10-SD-09 8/10/98	PAI-10-SD-10-01 PAI-10-SD-10 8/10/98	PAI-10-SD-010-01A PAI-10-SD-10 8/10/98
VOLATILES (ug/kg)						
1,1,1-TRICHLOROETHANE	44 U		16 U		4.7 U	
1,1,2,2-TETRACHLOROETHANE	44 U		16 U		4.7 U	
1,1,2-TRICHLOROETHANE	44 U		16 U		4.7 U	
1,1-DICHLOROETHANE	44 U		16 U		4.7 U	
1,1-DICHLOROETHENE	44 U		16 U		4.7 U	
1,2-DICHLOROETHANE	44 U		16 U		4.7 U	
1,2-DICHLOROETHENE (TOTAL)	44 U		16 U		4.7 U	
1,2-DICHLOROPROPANE	44 U		16 U		4.7 U	
2-BUTANONE	74 U		26 U		7.9 U	
2-HEXANONE	74 U		26 U		7.9 U	
4-METHYL-2-PENTANONE	74 U		26 U		7.9 U	
ACETONE	390		68		44	
BENZENE	44 U		16 U		4.7 U	
BROMODICHLOROMETHANE	44 U		16 U		4.7 U	
BROMOFORM	44 U		16 U		4.7 U	
BROMOMETHANE	44 U		16 U		4.7 U	
CARBON DISULFIDE	31 J		12 J		2.2 J	
CARBON TETRACHLORIDE	44 U		16 U		4.7 U	
CHLOROBENZENE	44 U		16 U		4.7 U	
CHLORODIBROMOMETHANE	44 U		16 U		4.7 U	
CHLOROETHANE	44 U		16 U		4.7 U	
CHLOROFORM	44 U		16 U		4.7 U	
CHLOROMETHANE	44 U		16 U		4.7 U	
CIS-1,3-DICHLOROPROPENE	44 U		16 U		4.7 U	
ETHYLBENZENE	44 U		16 U		4.7 U	
METHYLENE CHLORIDE	61 U		42 U		6.9 U	
STYRENE	44 U		16 U		4.7 U	
TETRACHLOROETHENE	44 U		16 U		4.7 U	
TOLUENE	23 J		16 U		4.3 J	
TRANS-1,3-DICHLOROPROPENE	44 U		16 U		4.7 U	
TRICHLOROETHENE	44 U		16 U		4.7 U	
VINYL CHLORIDE	44 U		16 U		4.7 U	
XYLENES, TOTAL	44 U		16 U		4.7 U	
SEMIVOLATILES (ug/kg)						
1,2,4-TRICHLOROBENZENE	2600 U		1100 U		480 U	
1,2-DICHLOROBENZENE	2600 U		1100 U		480 U	
1,3-DICHLOROBENZENE	2600 U		1100 U		480 U	
1,4-DICHLOROBENZENE	2600 U		1100 U		480 U	
1,4-DIOXANE						
2,2'-OXYBIS(1-CHLOROPROPANE)	2600 U		1100 U		480 U	
2,4,5-TRICHLOROPHENOL	2600 U		1100 U		480 U	
2,4,6-TRICHLOROPHENOL	2600 U		1100 U		480 U	
2,4-DICHLOROPHENOL	2600 U		1100 U		480 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-08-01 PAI-10-SD-08 8/10/98	PAI-10-SD-008-01A PAI-10-SD-08 8/10/98	PAI-10-SD-09-01 PAI-10-SD-09 8/10/98	PAI-10-SD-009-01A PAI-10-SD-09 8/10/98	PAI-10-SD-10-01 PAI-10-SD-10 8/10/98	PAI-10-SD-010-01A PAI-10-SD-10 8/10/98
2,4-DIMETHYLPHENOL	2600 U		1100 U		480 U	
2,4-DINITROPHENOL	5100 U		2200 U		970 U	
2,4-DINITROTOLUENE	2600 U		1100 U		480 U	
2,6-DINITROTOLUENE	2600 U		1100 U		480 U	
2-CHLORONAPHTHALENE	2600 U		1100 U		480 U	
2-CHLOROPHENOL	2600 U		1100 U		480 U	
2-METHYLNAPHTHALENE	2600 U		1100 U		480 U	
2-METHYLPHENOL	2600 U		1100 U		480 U	
2-NITROANILINE	2600 U		1100 U		480 U	
2-NITROPHENOL	2600 U		1100 U		480 U	
3,3'-DICHLOROBENZIDINE	2600 U		1100 U		480 U	
3-NITROANILINE	2600 U		1100 U		480 U	
4,6-DINITRO-2-METHYLPHENOL	5100 U		2200 U		970 U	
4-BROMOPHENYL PHENYL ETHER	2600 U		1100 U		480 U	
4-CHLORO-3-METHYLPHENOL	2600 U		1100 U		480 U	
4-CHLOROANILINE	2600 U		1100 U		480 U	
4-CHLOROPHENYL PHENYL ETHER	2600 U		1100 U		480 U	
4-METHYLPHENOL	2600 U		1100 U		480 U	
4-NITROANILINE	2600 U		1100 U		480 U	
4-NITROPHENOL	5100 U		2200 U		970 U	
ACENAPHTHENE	2600 U	270 U	1100 U	220 U	480 U	110 U
ACENAPHTHYLENE	2600 U	520 U	1100 U	420 U	480 U	210 U
ANILINE	2600 U		1100 U		480 U	
ANTHRACENE	2600 U	27 U	1100 U	22 U	480 U	11 U
BENZIDINE						
BENZO(A)ANTHRACENE	2600 U	27 U	1100 U	22 U	480 U	11 U
BENZO(A)PYRENE	2600 U	38	1100 U	29 J	480 U	11 U
BENZO(B)FLUORANTHENE	2600 U	120	1100 U	42 U	480 U	21 U
BENZO(G,H,I)PERYLENE	2600 U	52 U	1100 U	42 U	480 U	21 U
BENZO(K)FLUORANTHENE	2600 U	27 U	1100 U	22 U	480 U	11 U
BENZOIC ACID						
BIS(2-CHLOROETHOXY)METHANE	2600 U		1100 U		480 U	
BIS(2-CHLOROETHYL)ETHER	2600 U		1100 U		480 U	
BIS(2-ETHYLHEXYL)PHTHALATE	2600 U		1100 U		480 U	
BUTYL BENZYL PHTHALATE	2600 U		1100 U		480 U	
CARBAZOLE	2600 U		1100 U		480 U	
CHRYSENE	2600 U	27 U	1100 U	22 U	480 U	11 U
DI-N-BUTYL PHTHALATE	2600 U		1100 U		480 U	
DI-N-OCTYL PHTHALATE	2600 U		1100 U		480 U	
DIBENZO(A,H)ANTHRACENE	2600 U	52 U	1100 U	42 U	480 U	21 U
DIBENZOFURAN	2600 U		1100 U		480 U	
DIETHYL PHTHALATE	2600 U		1100 U		480 U	
DIMETHYL PHTHALATE	2600 U		1100 U		480 U	
FLUORANTHENE	2600 U	52 U	1100 U	42 U	480 U	21 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-08-01** **PAI-10-SD-08** **8/10/98**	**PAI-10-SD-008-01A** **PAI-10-SD-08** **8/10/98**	**PAI-10-SD-09-01** **PAI-10-SD-09** **8/10/98**	**PAI-10-SD-009-01A** **PAI-10-SD-09** **8/10/98**	**PAI-10-SD-10-01** **PAI-10-SD-10** **8/10/98**	**PAI-10-SD-010-01A** **PAI-10-SD-10** **8/10/98**
FLUORENE	2600 U	52 U	1100 U	42 U	480 U	21 U
HEXACHLOROBENZENE	2600 U		1100 U		480 U	
HEXACHLOROBUTADIENE	2600 U		1100 U		480 U	
HEXACHLOROCYCLOPENTADIENE	2600 U		1100 U		480 U	
HEXACHLOROETHANE	2600 U		1100 U		480 U	
INDENO(1,2,3-CD)PYRENE		27 U		22 U		11 U
ISOPHORONE	2600 U		1100 U		480 U	
N-NITROSO-DI-N-PROPYLAMINE	2600 U		1100 U		480 U	
N-NITROSODIPHENYLAMINE	2600 U		1100 U		480 U	
NAPHTHALENE	2600 U	270 U	1100 U	220 U	480 U	110 U
NITROBENZENE	2600 U		1100 U		480 U	
PENTACHLOROPHENOL	5100 U		2200 U		970 U	
PHENANTHRENE	2600 U	27 U	1100 U	22 U	480 U	11 U
PHENOL	2600 U		1100 U		480 U	
PYRENE	2600 U	27 U	1100 U	22 U	480 U	11 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDD	25 U		11 U		4.8 U	
4,4'-DDE	25 U		11 U		4.8 U	
4,4'-DDT	25 U		11 U		4.8 U	
ALDRIN	13 U		5.7 U		2.5 U	
ALPHA-BHC	13 U		5.7 U		2.5 U	
ALPHA-CHLORDANE	13 U		5.7 U		2.5 U	
AROCLOR-1016	250 U		110 U		48 U	
AROCLOR-1221	510 U		220 U		96 U	
AROCLOR-1232	250 U		110 U		48 U	
AROCLOR-1242	250 U		110 U		48 U	
AROCLOR-1248	250 U		110 U		48 U	
AROCLOR-1254	250 U		110 U		48 U	
AROCLOR-1260	250 U		110 U		48 U	
BETA-BHC	13 U		5.7 U		2.5 U	
DELTA-BHC	13 U		5.7 U		2.5 U	
DIELDRIN	25 U		11 U		4.8 U	
ENDOSULFAN I	13 U		5.7 U		2.5 U	
ENDOSULFAN II	25 U		11 U		4.8 U	
ENDOSULFAN SULFATE	25 U		11 U		4.8 U	
ENDRIN	25 U		11 U		4.8 U	
ENDRIN ALDEHYDE	25 U		11 U		4.8 U	
ENDRIN KETONE	25 U		11 U		4.8 U	
GAMMA-BHC (LINDANE)	13 U		5.7 U		2.5 U	
GAMMA-CHLORDANE	13 U		5.7 U		2.5 U	
HEPTACHLOR	13 U		5.7 U		2.5 U	
HEPTACHLOR EPOXIDE	13 U		5.7 U		2.5 U	
METHOXYCHLOR	130 U		57 U		25 U	
TOXAPHENE	1300 U		570 U		250 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-08-01 PAI-10-SD-08 8/10/98	PAI-10-SD-008-01A PAI-10-SD-08 8/10/98	PAI-10-SD-09-01 PAI-10-SD-09 8/10/98	PAI-10-SD-009-01A PAI-10-SD-09 8/10/98	PAI-10-SD-10-01 PAI-10-SD-10 8/10/98	PAI-10-SD-010-01A PAI-10-SD-10 8/10/98
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD						
1,2,3,4,6,7,8-HPCDF						
1,2,3,4,7,8,9-HPCDF						
1,2,3,4,7,8-HXCDD						
1,2,3,4,7,8-HXCDF						
1,2,3,6,7,8-HXCDD						
1,2,3,6,7,8-HXCDF						
1,2,3,7,8,9-HXCDD						
1,2,3,7,8,9-HXCDF						
1,2,3,7,8-PECDD						
1,2,3,7,8-PECDF						
2,3,4,6,7,8-HXCDF						
2,3,4,7,8-PECDF						
2,3,7,8-TCDD						
2,3,7,8-TCDF						
OCDD						
OCDF						
TOTAL HPCDD						
TOTAL HPCDF						
TOTAL HXCDD						
TOTAL HXCDF						
TOTAL PECDD						
TOTAL PECDF						
TOTAL TCDD						
TOTAL TCDF						
INORGANICS (mg/kg)						
ALUMINUM	52700		26500		4480	
ANTIMONY	13.2 U		6.8		2.6 U	
ARSENIC	18.5		8.3		2.8	
BARIUM	62.9		28.8		6.7	
BERYLLIUM	2		1.1		0.23	
CADMIUM	1.4 U		0.56 U		0.27 U	
CALCIUM	4900		2220		494	
CHROMIUM	75		35.5		8.1	
COBALT	8.5		5		1.1	
COPPER	18.2		10.1		2.1	
CYANIDE	0.5 U		0.5 U		0.5 U	
IRON	43100		23300		6230	
LEAD	38.7		16.8		5.6	
MAGNESIUM	15100		6940		1620	
MANGANESE	210		116		23.1	
MERCURY	0.28 U		0.14		0.05 U	
NICKEL	19.6		10.5		1.8	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-08-01** **PAI-10-SD-08** **8/10/98**	**PAI-10-SD-008-01A** **PAI-10-SD-08** **8/10/98**	**PAI-10-SD-09-01** **PAI-10-SD-09** **8/10/98**	**PAI-10-SD-009-01A** **PAI-10-SD-09** **8/10/98**	**PAI-10-SD-10-01** **PAI-10-SD-10** **8/10/98**	**PAI-10-SD-010-01A** **PAI-10-SD-10** **8/10/98**
POTASSIUM	9090		3930		883	
SELENIUM	2.5 U		1.1 U		0.46 U	
SILVER	3 U		1.2 U		0.59 U	
SODIUM	60800		24700		6890	
THALLIUM	1.3 U		0.58 U		0.24 U	
VANADIUM	112		47.9		11.9	
ZINC	78.3		40.4		8.5	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM						
COPPER						
LEAD						
MERCURY						
NICKEL						
ZINC						
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	46		10		2 U	
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg			6 U		2 U	
PH	7.5		7.4		7.4	
TOTAL ORGANIC CARBON %	4.7		4		0.8	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.:	PAI-10-SD-11-01	PAI-10-SD-011-01A	PAI-10-SD-12-01	PAI-10-SD-012-01A	PAI-10-SD-13-01	PAI-10-SD-013-01A
LOCATION:	PAI-10-SD-11	PAI-10-SD-11	PAI-10-SD-12	PAI-10-SD-12	PAI-10-SD-13	PAI-10-SD-13
SAMPLE DATE:	8/10/98	8/10/98	8/10/98	8/10/98	8/10/98	8/10/98
VOLATILES (ug/kg)						
1,1,1-TRICHLOROETHANE	5.1 U		5.2 U		6.1 U	
1,1,2,2-TETRACHLOROETHANE	5.1 U		5.2 U		6.1 U	
1,1,2-TRICHLOROETHANE	5.1 U		5.2 U		6.1 U	
1,1-DICHLOROETHANE	5.1 U		5.2 U		6.1 U	
1,1-DICHLOROETHENE	5.1 U		5.2 U		6.1 U	
1,2-DICHLOROETHANE	5.1 U		5.2 U		6.1 U	
1,2-DICHLOROETHENE (TOTAL)	5.1 U		5.2 U		6.1 U	
1,2-DICHLOROPROPANE	5.1 U		5.2 U		6.1 U	
2-BUTANONE	8.4 U		8.6 U		10 U	
2-HEXANONE	8.4 U		8.6 U		10 U	
4-METHYL-2-PENTANONE	8.4 U		8.6 U		10 U	
ACETONE	49		58		25	
BENZENE	5.1 U		5.2 U		6.1 U	
BROMODICHLOROMETHANE	5.1 U		5.2 U		6.1 U	
BROMOFORM	5.1 U		5.2 U		6.1 U	
BROMOMETHANE	5.1 U		5.2 U		6.1 U	
CARBON DISULFIDE	5.1 U		3 J		4.2 J	
CARBON TETRACHLORIDE	5.1 U		5.2 U		6.1 U	
CHLOROBENZENE	5.1 U		5.2 U		6.1 U	
CHLORODIBROMOMETHANE	5.1 U		5.2 U		6.1 U	
CHLOROETHANE	5.1 U		5.2 U		6.1 U	
CHLOROFORM	5.1 U		5.2 U		6.1 U	
CHLOROMETHANE	5.1 U		5.2 U		6.1 U	
CIS-1,3-DICHLOROPROPENE	5.1 U		5.2 U		6.1 U	
ETHYLBENZENE	5.1 U		5.2 U		6.1 U	
METHYLENE CHLORIDE	7 U		7.5 U		21 U	
STYRENE	5.1 U		5.2 U		6.1 U	
TETRACHLOROETHENE	5.1 U		5.2 U		6.1 U	
TOLUENE	2.5 J		5.2 J		6.1 U	
TRANS-1,3-DICHLOROPROPENE	5.1 U		5.2 U		6.1 U	
TRICHLOROETHENE	5.1 U		5.2 U		6.1 U	
VINYL CHLORIDE	5.1 U		5.2 U		6.1 U	
XYLENES, TOTAL	5.1 U		5.2 U		6.1 U	
SEMIVOLATILES (ug/kg)						
1,2,4-TRICHLOROBENZENE	510 U		530 U		610 U	
1,2-DICHLOROBENZENE	510 U		530 U		610 U	
1,3-DICHLOROBENZENE	510 U		530 U		610 U	
1,4-DICHLOROBENZENE	510 U		530 U		610 U	
1,4-DIOXANE						
2,2'-OXYBIS(1-CHLOROPROPANE)	510 U		530 U		610 U	
2,4,5-TRICHLOROPHENOL	510 U		530 U		610 U	
2,4,6-TRICHLOROPHENOL	510 U		530 U		610 U	
2,4-DICHLOROPHENOL	510 U		530 U		610 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-11-01 PAI-10-SD-11 8/10/98	PAI-10-SD-011-01A PAI-10-SD-11 8/10/98	PAI-10-SD-12-01 PAI-10-SD-12 8/10/98	PAI-10-SD-012-01A PAI-10-SD-12 8/10/98	PAI-10-SD-13-01 PAI-10-SD-13 8/10/98	PAI-10-SD-013-01A PAI-10-SD-13 8/10/98
2,4-DIMETHYLPHENOL	510 U		530 U		610 U	
2,4-DINITROPHENOL	1000 U		1100 U		1200 U	
2,4-DINITROTOLUENE	510 U		530 U		610 U	
2,6-DINITROTOLUENE	510 U		530 U		610 U	
2-CHLORONAPHTHALENE	510 U		530 U		610 U	
2-CHLOROPHENOL	510 U		530 U		610 U	
2-METHYLNAPHTHALENE	510 U		530 U		610 U	
2-METHYLPHENOL	510 U		530 U		610 U	
2-NITROANILINE	510 U		530 U		610 U	
2-NITROPHENOL	510 U		530 U		610 U	
3,3'-DICHLOROBENZIDINE	510 U		530 U		610 U	
3-NITROANILINE	510 U		530 U		610 U	
4,6-DINITRO-2-METHYLPHENOL	1000 U		1100 U		1200 U	
4-BROMOPHENYL PHENYL ETHER	510 U		530 U		610 U	
4-CHLORO-3-METHYLPHENOL	510 U		530 U		610 U	
4-CHLOROANILINE	510 U		530 U		610 U	
4-CHLOROPHENYL PHENYL ETHER	510 U		530 U		610 U	
4-METHYLPHENOL	510 U		530 U		610 U	
4-NITROANILINE	510 U		530 U		610 U	
4-NITROPHENOL	1000 U		1100 U		1200 U	
ACENAPHTHENE	510 U	110 U	530 U	110 U	610 U	110 U
ACENAPHTHYLENE	510 U	210 U	530 U	220 U	610 U	220 U
ANILINE	510 U		530 U		610 U	
ANTHRACENE	510 U	11 U	530 U	11 U	610 U	11 U
BENZIDINE						
BENZO(A)ANTHRACENE	510 U	11 U	530 U	11 U	610 U	18 J
BENZO(A)PYRENE	510 U	11 U	530 U	11 U	610 U	30
BENZO(B)FLUORANTHENE	510 U	21 U	530 U	22 U	610 U	25 J
BENZO(G,H,I)PERYLENE	510 U	21 U	530 U	22 U	610 U	22 U
BENZO(K)FLUORANTHENE	510 U	29 R	530 U	11 U	610 U	18
BENZOIC ACID						
BIS(2-CHLOROETHOXY)METHANE	510 U		530 U		610 U	
BIS(2-CHLOROETHYL)ETHER	510 U		530 U		610 U	
BIS(2-ETHYLHEXYL)PHTHALATE	510 U		530 U		610 U	
BUTYL BENZYL PHTHALATE	510 U		530 U		610 U	
CARBAZOLE	510 U		530 U		610 U	
CHRYSENE	510 U	11 U	530 U	11 U	51 J	44 J
DI-N-BUTYL PHTHALATE	510 U		530 U		610 U	
DI-N-OCTYL PHTHALATE	510 U		530 U		610 U	
DIBENZO(A,H)ANTHRACENE	510 U	21 U	530 U	22 U	610 U	22 U
DIBENZOFURAN	510 U		530 U		610 U	
DIETHYL PHTHALATE	510 U		530 U		610 U	
DIMETHYL PHTHALATE	510 U		530 U		610 U	
FLUORANTHENE	510 U	21 U	530 U	22 U	140 J	92

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-11-01** **PAI-10-SD-11** **8/10/98**	**PAI-10-SD-011-01A** **PAI-10-SD-11** **8/10/98**	**PAI-10-SD-12-01** **PAI-10-SD-12** **8/10/98**	**PAI-10-SD-012-01A** **PAI-10-SD-12** **8/10/98**	**PAI-10-SD-13-01** **PAI-10-SD-13** **8/10/98**	**PAI-10-SD-013-01A** **PAI-10-SD-13** **8/10/98**
FLUORENE	510 U	21 U	530 U	22 U	610 U	22 U
HEXACHLOROBENZENE	510 U		530 U		610 U	
HEXACHLOROBUTADIENE	510 U		530 U		610 U	
HEXACHLOROCYCLOPENTADIENE	510 U		530 U		610 U	
HEXACHLOROETHANE	510 U		530 U		610 U	
INDENO(1,2,3-CD)PYRENE		11 U		11 U		11 U
ISOPHORONE	510 U		530 U		610 U	
N-NITROSO-DI-N-PROPYLAMINE	510 U		530 U		610 U	
N-NITROSODIPHENYLAMINE	510 U		530 U		610 U	
NAPHTHALENE	510 U	110 U	530 U	110 U	610 U	110 U
NITROBENZENE	510 U		530 U		610 U	
PENTACHLOROPHENOL	1000 U		1100 U		1200 U	
PHENANTHRENE	510 U	11 U	530 U	11 U	610 U	11 U
PHENOL	510 U		530 U		610 U	
PYRENE	510 U	11 U	530 U	11 U	96 J	89
PESTICIDES/PCBs (ug/kg)						
4,4'-DDD	5 U		5.2 U		6 U	
4,4'-DDE	5 U		5.2 U		6 U	
4,4'-DDT	5 U		5.2 U		6 U	
ALDRIN	2.6 U		2.7 U		3.1 U	
ALPHA-BHC	2.6 U		2.7 U		3.1 U	
ALPHA-CHLORDANE	2.6 U		2.7 U		3.1 U	
AROCLOR-1016	50 U		52 U		60 U	
AROCLOR-1221	100 U		100 U		120 U	
AROCLOR-1232	50 U		52 U		60 U	
AROCLOR-1242	50 U		52 U		60 U	
AROCLOR-1248	50 U		52 U		60 U	
AROCLOR-1254	50 U		52 U		60 U	
AROCLOR-1260	50 U		52 U		60 U	
BETA-BHC	2.6 U		2.7 U		3.1 U	
DELTA-BHC	2.6 U		2.7 U		3.1 U	
DIELDRIN	5 U		5.2 U		6 U	
ENDOSULFAN I	2.6 U		2.7 U		3.1 U	
ENDOSULFAN II	5 U		5.2 U		6 U	
ENDOSULFAN SULFATE	5 U		5.2 U		6 U	
ENDRIN	5 U		5.2 U		6 U	
ENDRIN ALDEHYDE	5 U		5.2 U		6 U	
ENDRIN KETONE	5 U		5.2 U		6 U	
GAMMA-BHC (LINDANE)	2.6 U		2.7 U		3.1 U	
GAMMA-CHLORDANE	2.6 U		2.7 U		3.1 U	
HEPTACHLOR	2.6 U		2.7 U		3.1 U	
HEPTACHLOR EPOXIDE	2.6 U		2.7 U		3.1 U	
METHOXYCHLOR	26 U		27 U		31 U	
TOXAPHENE	260 U		270 U		310 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-11-01 PAI-10-SD-11 8/10/98	PAI-10-SD-011-01A PAI-10-SD-11 8/10/98	PAI-10-SD-12-01 PAI-10-SD-12 8/10/98	PAI-10-SD-012-01A PAI-10-SD-12 8/10/98	PAI-10-SD-13-01 PAI-10-SD-13 8/10/98	PAI-10-SD-013-01A PAI-10-SD-13 8/10/98
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD						
1,2,3,4,6,7,8-HPCDF						
1,2,3,4,7,8,9-HPCDF						
1,2,3,4,7,8-HXCDD						
1,2,3,4,7,8-HXCDF						
1,2,3,6,7,8-HXCDD						
1,2,3,6,7,8-HXCDF						
1,2,3,7,8,9-HXCDD						
1,2,3,7,8,9-HXCDF						
1,2,3,7,8-PECDD						
1,2,3,7,8-PECDF						
2,3,4,6,7,8-HXCDF						
2,3,4,7,8-PECDF						
2,3,7,8-TCDD						
2,3,7,8-TCDF						
OCDD						
OCDF						
TOTAL HPCDD						
TOTAL HPCDF						
TOTAL HXCDD						
TOTAL HXCDF						
TOTAL PECDD						
TOTAL PECDF						
TOTAL TCDD						
TOTAL TCDF						
INORGANICS (mg/kg)						
ALUMINUM	4200		4750		5740	
ANTIMONY	2.4 U		3.5		3.3 U	
ARSENIC	1.4		2.5		1.9	
BARIUM	5.7		6.1		7.8	
BERYLLIUM	0.21		0.24		0.26	
CADMIUM	0.26 U		0.3 U		0.35 U	
CALCIUM	1350		1100		5550	
CHROMIUM	6.4		8.3		9.4	
COBALT	1		1.1		1.2	
COPPER	3.6		2.1		2.4	
CYANIDE	0.5 U		0.5 U		0.5 U	
IRON	3060		4800		4890	
LEAD	8.6		5.2		5.6	
MAGNESIUM	1710		1730		2070	
MANGANESE	13.3		22.1		22.8	
MERCURY	0.06		0.06 U		0.06 U	
NICKEL	1.3		2.3		2.4	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-11-01** **PAI-10-SD-11** **8/10/98**	**PAI-10-SD-011-01A** **PAI-10-SD-11** **8/10/98**	**PAI-10-SD-12-01** **PAI-10-SD-12** **8/10/98**	**PAI-10-SD-012-01A** **PAI-10-SD-12** **8/10/98**	**PAI-10-SD-13-01** **PAI-10-SD-13** **8/10/98**	**PAI-10-SD-013-01A** **PAI-10-SD-13** **8/10/98**
POTASSIUM	845		924		1130	
SELENIUM	0.1 U		0.52 U		0.12 U	
SILVER	0.55 U		0.65 U		0.75 U	
SODIUM	8480		7310		9200	
THALLIUM	0.27 U		0.27 U		0.3 U	
VANADIUM	10.8		11.4		13	
ZINC	10.3		9.1		9.6	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM						
COPPER						
LEAD						
MERCURY						
NICKEL						
ZINC						
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	3 U		2 U		4.2 U	
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg					4 U	
PH	6.7		7.3		7.6	
TOTAL ORGANIC CARBON %	1.1		1		1.1	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-14-01 PAI-10-SD-14 8/10/98	PAI-10-SD-14-02 PAI-10-SD-14 8/13/98	PAI-10-SD-014-01A PAI-10-SD-14 8/10/98	PAI-10-SD-014-02A PAI-10-SD-14 8/10/98	PAI-10-SD-15-01 PAI-10-SD-15 8/10/98	PAI-10-SD-015-01A PAI-10-SD-15 8/10/98
VOLATILES (ug/kg)						
1,1,1-TRICHLOROETHANE	14 U	6.4 U			6.3 U	
1,1,2,2-TETRACHLOROETHANE	14 U	6.4 U			6.3 U	
1,1,2-TRICHLOROETHANE	14 U	6.4 U			6.3 U	
1,1-DICHLOROETHANE	14 U	6.4 U			6.3 U	
1,1-DICHLOROETHENE	14 U	6.4 U			6.3 U	
1,2-DICHLOROETHANE	14 U	6.4 U			6.3 U	
1,2-DICHLOROETHENE (TOTAL)	14 U	6.4 U			6.3 U	
1,2-DICHLOROPROPANE	14 U	6.4 U			6.3 U	
2-BUTANONE	23 U	11 U			11 U	
2-HEXANONE	23 U	11 U			4.4 J	
4-METHYL-2-PENTANONE	23 U	11 U			5.5 J	
ACETONE	83	35 U			70	
BENZENE	14 U	6.4 U			6.3 U	
BROMODICHLOROMETHANE	14 U	6.4 U			6.3 U	
BROMOFORM	14 U	6.4 U			6.3 U	
BROMOMETHANE	14 U	6.4 U			6.3 U	
CARBON DISULFIDE	14 U	4.4 J			6.4	
CARBON TETRACHLORIDE	14 U	6.4 U			6.3 U	
CHLOROBENZENE	14 U	6.4 U			6.3 U	
CHLORODIBROMOMETHANE	14 U	6.4 U			6.3 U	
CHLOROETHANE	14 U	6.4 U			6.3 U	
CHLOROFORM	14 U	6.4 U			6.3 U	
CHLOROMETHANE	14 U	6.4 U			6.3 U	
CIS-1,3-DICHLOROPROPENE	14 U	6.4 U			6.3 U	
ETHYLBENZENE	14 U	6.4 U			6.3 U	
METHYLENE CHLORIDE	18 U	17 U			11 U	
STYRENE	14 U	6.4 U			6.3 U	
TETRACHLOROETHENE	14 U	6.4 U			6.3 U	
TOLUENE	14 U	6.4 U			2.9 J	
TRANS-1,3-DICHLOROPROPENE	14 U	6.4 U			6.3 U	
TRICHLOROETHENE	14 U	6.4 U			6.3 U	
VINYL CHLORIDE	14 U	6.4 U			6.3 U	
XYLENES, TOTAL	14 U	6.4 U			6.3 U	
SEMIVOLATILES (ug/kg)						
1,2,4-TRICHLOROBENZENE	880 U	580 U			570 U	
1,2-DICHLOROBENZENE	880 U	580 U			570 U	
1,3-DICHLOROBENZENE	880 U	580 U			570 U	
1,4-DICHLOROBENZENE	880 U	580 U			570 U	
1,4-DIOXANE						
2,2'-OXYBIS(1-CHLOROPROPANE)	880 U	580 U			570 U	
2,4,5-TRICHLOROPHENOL	880 U	580 U			570 U	
2,4,6-TRICHLOROPHENOL	880 U	580 U			570 U	
2,4-DICHLOROPHENOL	880 U	580 U			570 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-14-01 PAI-10-SD-14 8/10/98	PAI-10-SD-14-02 PAI-10-SD-14 8/13/98	PAI-10-SD-014-01A PAI-10-SD-14 8/10/98	PAI-10-SD-014-02A PAI-10-SD-14 8/10/98	PAI-10-SD-15-01 PAI-10-SD-15 8/10/98	PAI-10-SD-015-01A PAI-10-SD-15 8/10/98
2,4-DIMETHYLPHENOL	880 U	580 U			570 U	
2,4-DINITROPHENOL	1800 U	1200 U			1100 U	
2,4-DINITROTOLUENE	880 U	580 U			570 U	
2,6-DINITROTOLUENE	880 U	580 U			570 U	
2-CHLORONAPHTHALENE	880 U	580 U			570 U	
2-CHLOROPHENOL	880 U	580 U			570 U	
2-METHYLNAPHTHALENE	880 U	580 U			570 U	
2-METHYLPHENOL	880 U	580 U			570 U	
2-NITROANILINE	880 U	580 U			570 U	
2-NITROPHENOL	880 U	580 U			570 U	
3,3'-DICHLOROBENZIDINE	880 U	580 U			570 U	
3-NITROANILINE	880 U	580 U			570 U	
4,6-DINITRO-2-METHYLPHENOL	1800 U	1200 U			1100 U	
4-BROMOPHENYL PHENYL ETHER	880 U	580 U			570 U	
4-CHLORO-3-METHYLPHENOL	880 U	580 U			570 U	
4-CHLOROANILINE	880 U	580 U			570 U	
4-CHLOROPHENYL PHENYL ETHER	880 U	580 U			570 U	
4-METHYLPHENOL	880 U	580 U			570 U	
4-NITROANILINE	880 U	580 U			570 U	
4-NITROPHENOL	1800 U	1200 U			1100 U	
ACENAPHTHENE	880 U	580 U	160 U	160 U	570 U	130 U
ACENAPHTHYLENE	880 U	580 U	310 U	310 U	570 U	250 U
ANILINE	880 U				570 U	
ANTHRACENE	880 U	580 U	16 U	16 U	570 U	13 U
BENZIDINE						
BENZO(A)ANTHRACENE	880 U	580 U	16 U	16 U	570 U	13 U
BENZO(A)PYRENE	880 U	580 U	31	21	570 U	13 U
BENZO(B)FLUORANTHENE	880 U	580 U	31 U	31 U	570 U	25 U
BENZO(G,H,I)PERYLENE	880 U	580 U	49 R	31 U	570 U	25 U
BENZO(K)FLUORANTHENE	880 U	580 U	16 U	16 U	570 U	13 U
BENZOIC ACID						
BIS(2-CHLOROETHOXY)METHANE	880 U	580 U			570 U	
BIS(2-CHLOROETHYL)ETHER	880 U	580 U			570 U	
BIS(2-ETHYLHEXYL)PHTHALATE	220 J	430 J			570 U	
BUTYL BENZYL PHTHALATE	880 U	580 U			570 U	
CARBAZOLE	880 U	580 U			570 U	
CHRYSENE	880 U	580 U	16 U	16 U	570 U	13 U
DI-N-BUTYL PHTHALATE	880 U	580 U			570 U	
DI-N-OCTYL PHTHALATE	880 U	580 U			570 U	
DIBENZO(A,H)ANTHRACENE	880 U	580 U	31 U	31 U	570 U	25 U
DIBENZOFURAN	880 U	580 U			570 U	
DIETHYL PHTHALATE	880 U	580 U			570 U	
DIMETHYL PHTHALATE	880 U	580 U			570 U	
FLUORANTHENE	880 U	580 U	31 U	31 U	570 U	25 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-14-01** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-14-02** **PAI-10-SD-14** **8/13/98**	**PAI-10-SD-014-01A** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-014-02A** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-15-01** **PAI-10-SD-15** **8/10/98**	**PAI-10-SD-015-01A** **PAI-10-SD-15** **8/10/98**
FLUORENE	880 U	580 U	31 U	31 U	570 U	25 U
HEXACHLOROBENZENE	880 U	580 U			570 U	
HEXACHLOROBUTADIENE	880 U	580 U			570 U	
HEXACHLOROCYCLOPENTADIENE	880 U	580 U			570 U	
HEXACHLOROETHANE	880 U	580 U			570 U	
INDENO(1,2,3-CD)PYRENE		580 U	26	16 U		13 U
ISOPHORONE	880 U	580 U			570 U	
N-NITROSO-DI-N-PROPYLAMINE	880 U	580 U			570 U	
N-NITROSODIPHENYLAMINE	880 U	580 U			570 U	
NAPHTHALENE	880 U	580 U	160 U	160 U	570 U	130 U
NITROBENZENE	880 U	580 U			570 U	
PENTACHLOROPHENOL	1800 U	180 J			1100 U	
PHENANTHRENE	880 U	580 U	16 U	16 U	570 U	13 U
PHENOL	880 U	580 U			570 U	
PYRENE	880 U	580 U	16 U	16 U	570 U	13 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDD	8.7 U	7.3 R			5.7 U	
4,4'-DDE	8.7 U	5.8 U			5.7 U	
4,4'-DDT	8.7 U	66			5.7 U	
ALDRIN	4.5 U	3 U			2.9 U	
ALPHA-BHC	4.5 U	3 U			2.9 U	
ALPHA-CHLORDANE	4.5 U	12			2.9 U	
AROCLOR-1016	87 U	58 U			57 U	
AROCLOR-1221	170 U	120 U			110 U	
AROCLOR-1232	87 U	58 U			57 U	
AROCLOR-1242	87 U	58 U			57 U	
AROCLOR-1248	87 U	58 U			57 U	
AROCLOR-1254	87 U	58 U			57 U	
AROCLOR-1260	87 U	58 U			57 U	
BETA-BHC	4.5 U	3 U			2.9 U	
DELTA-BHC	4.5 U	3 U			2.9 U	
DIELDRIN	8.7 U	5.8 U			5.7 U	
ENDOSULFAN I	4.5 U	3 U			2.9 U	
ENDOSULFAN II	8.7 U	5.8 U			5.7 U	
ENDOSULFAN SULFATE	8.7 U	5.8 U			5.7 U	
ENDRIN	8.7 U	5.8 U			5.7 U	
ENDRIN ALDEHYDE	8.7 U	5.8 U			5.7 U	
ENDRIN KETONE	8.7 U	5.8 U			5.7 U	
GAMMA-BHC (LINDANE)	4.5 U	3 U			2.9 U	
GAMMA-CHLORDANE	4.5 U	14			2.9 U	
HEPTACHLOR	4.5 U	3 U			2.9 U	
HEPTACHLOR EPOXIDE	4.5 U	3 U			2.9 U	
METHOXYCHLOR	45 U	680			29 U	
TOXAPHENE	450 U	300 U			290 U	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-14-01 PAI-10-SD-14 8/10/98	PAI-10-SD-14-02 PAI-10-SD-14 8/13/98	PAI-10-SD-014-01A PAI-10-SD-14 8/10/98	PAI-10-SD-014-02A PAI-10-SD-14 8/10/98	PAI-10-SD-15-01 PAI-10-SD-15 8/10/98	PAI-10-SD-015-01A PAI-10-SD-15 8/10/98
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD						
1,2,3,4,6,7,8-HPCDF						
1,2,3,4,7,8,9-HPCDF						
1,2,3,4,7,8-HXCDD						
1,2,3,4,7,8-HXCDF						
1,2,3,6,7,8-HXCDD						
1,2,3,6,7,8-HXCDF						
1,2,3,7,8,9-HXCDD						
1,2,3,7,8,9-HXCDF						
1,2,3,7,8-PECDD						
1,2,3,7,8-PECDF						
2,3,4,6,7,8-HXCDF						
2,3,4,7,8-PECDF						
2,3,7,8-TCDD						
2,3,7,8-TCDF						
OCDD						
OCDF						
TOTAL HPCDD						
TOTAL HPCDF						
TOTAL HXCDD						
TOTAL HXCDF						
TOTAL PECDD						
TOTAL PECDF						
TOTAL TCDD						
TOTAL TCDF						
INORGANICS (mg/kg)						
ALUMINUM	17700	8210			6480	
ANTIMONY	4.7 U	3.3 U			2.8 U	
ARSENIC	11.9	6.6			3.2	
BARIUM	32.2	15.6			8.7	
BERYLLIUM	0.72	0.39			0.27	
CADMIUM	0.84	0.002			0.39	
CALCIUM	2680	957			619	
CHROMIUM	32.7	23.3			10.1	
COBALT	3.7	10.3			0.92	
COPPER	113	0.03			5.2	
CYANIDE	0.5 U	0.5 UR			0.5 U	
IRON	25200	28800			6400	
LEAD	203	49.7			12.8	
MAGNESIUM	5100	2350			2030	
MANGANESE	84	81.6			25.9	
MERCURY	0.35	0.1			0.11	
NICKEL	12.7	1060			3	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-14-01** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-14-02** **PAI-10-SD-14** **8/13/98**	**PAI-10-SD-014-01A** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-014-02A** **PAI-10-SD-14** **8/10/98**	**PAI-10-SD-15-01** **PAI-10-SD-15** **8/10/98**	**PAI-10-SD-015-01A** **PAI-10-SD-15** **8/10/98**
POTASSIUM	2770	1210			1180	
SELENIUM	1.9 U	0.6 U			0.57 U	
SILVER	1.1 U	0.76 U			0.64 U	
SODIUM	18600	9440			8190	
THALLIUM	0.48 U	0.36			0.29 U	
VANADIUM	44.9	22.8			14.1	
ZINC	197	98.7			17.9	
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM						
COPPER						
LEAD						
MERCURY						
NICKEL						
ZINC						
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	8	2 U			4 U	
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg						
PH	7.2	7.8			7.3	
TOTAL ORGANIC CARBON %	3.8	1.3			1.6	

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-16-01 PAI-10-SD-16 9/9/98	PAI-10-SD-016-01A PAI-10-SD-16 8/10/98	PAI-10-SD-16A-02 PAI-10-SD-16 10/6/99	PAI-10-SD-17-01 PAI-10-SD-17 9/9/98	PAI-10-SD-017-01A PAI-10-SD-17 - -	PAI-10-SD-18-01 PAI-10-SD-18 9/9/98
VOLATILES (ug/kg)						
1,1,1-TRICHLOROETHANE	10 U			18 U		13 U
1,1,2,2-TETRACHLOROETHANE	10 U			18 U		13 U
1,1,2-TRICHLOROETHANE	10 U			18 U		13 U
1,1-DICHLOROETHANE	10 U			18 U		13 U
1,1-DICHLOROETHENE	10 U			18 U		13 U
1,2-DICHLOROETHANE	10 U			18 U		13 U
1,2-DICHLOROETHENE (TOTAL)	10 U			18 U		13 U
1,2-DICHLOROPROPANE	10 U			18 U		13 U
2-BUTANONE	16 U			38		21 U
2-HEXANONE	16 U			31 U		21 U
4-METHYL-2-PENTANONE	15 J			35		18 J
ACETONE	52 U			110 U		56 U
BENZENE	10 U			18 U		13 U
BROMODICHLOROMETHANE	10 U			18 U		13 U
BROMOFORM	10 U			18 U		13 U
BROMOMETHANE	10 U			18 U		13 U
CARBON DISULFIDE	10 U			7 J		13 U
CARBON TETRACHLORIDE	10 U			18 U		13 U
CHLOROBENZENE	10 U			18 U		13 U
CHLORODIBROMOMETHANE	10 U			18 U		13 U
CHLOROETHANE	10 U			18 U		13 U
CHLOROFORM	10 U			18 U		13 U
CHLOROMETHANE	10 U			18 U		13 U
CIS-1,3-DICHLOROPROPENE	10 U			18 U		13 U
ETHYLBENZENE	10 U			18 U		13 U
METHYLENE CHLORIDE	20 U			29 U		19 U
STYRENE	10 U			18 U		13 U
TETRACHLOROETHENE	10 U			18 U		13 U
TOLUENE	4 J			8 J		13 U
TRANS-1,3-DICHLOROPROPENE	10 U			18 U		13 U
TRICHLOROETHENE	10 U			18 U		13 U
VINYL CHLORIDE	10 U			18 U		13 U
XYLENES, TOTAL	10 U			18 U		13 U
SEMIVOLATILES (ug/kg)						
1,2,4-TRICHLOROBENZENE	810 U			1200 U		1000 U
1,2-DICHLOROBENZENE	810 U			1200 U		1000 U
1,3-DICHLOROBENZENE	810 U			1200 U		1000 U
1,4-DICHLOROBENZENE	810 U			1200 U		1000 U
1,4-DIOXANE						
2,2'-OXYBIS(1-CHLOROPROPANE)	810 U			1200 U		1000 U
2,4,5-TRICHLOROPHENOL	810 U			1200 U		1000 U
2,4,6-TRICHLOROPHENOL	810 U			1200 U		1000 U
2,4-DICHLOROPHENOL	810 U			1200 U		1000 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-16-01 PAI-10-SD-16 9/9/98	PAI-10-SD-016-01A PAI-10-SD-16 8/10/98	PAI-10-SD-16A-02 PAI-10-SD-16 10/6/99	PAI-10-SD-17-01 PAI-10-SD-17 9/9/98	PAI-10-SD-017-01A PAI-10-SD-17 - -	PAI-10-SD-18-01 PAI-10-SD-18 9/9/98
2,4-DIMETHYLPHENOL	810 U			1200 U		1000 U
2,4-DINITROPHENOL	1600 U			2400 U		2100 U
2,4-DINITROTOLUENE	810 U			1200 U		1000 U
2,6-DINITROTOLUENE	810 U			1200 U		1000 U
2-CHLORONAPHTHALENE	810 U			1200 U		1000 U
2-CHLOROPHENOL	810 U			1200 U		1000 U
2-METHYLNAPHTHALENE	810 U			1200 U		1000 U
2-METHYLPHENOL	810 U			1200 U		1000 U
2-NITROANILINE	810 U			1200 U		1000 U
2-NITROPHENOL	810 U			1200 U		1000 U
3,3'-DICHLOROBENZIDINE	810 U			1200 U		1000 U
3-NITROANILINE	810 U			1200 U		1000 U
4,6-DINITRO-2-METHYLPHENOL	1600 U			2400 U		2100 U
4-BROMOPHENYL PHENYL ETHER	810 U			1200 U		1000 U
4-CHLORO-3-METHYLPHENOL	810 U			1200 U		1000 U
4-CHLOROANILINE	810 U			1200 U		1000 U
4-CHLOROPHENYL PHENYL ETHER	810 U			1200 U		1000 U
4-METHYLPHENOL	810 U			1200 U		1000 U
4-NITROANILINE	810 U			1200 U		1000 U
4-NITROPHENOL	1600 U			2400 U		2100 U
ACENAPHTHENE	810 U	170 U		1200 U	110 U	1000 U
ACENAPHTHYLENE	810 U	330 U		1200 U	210 U	1000 U
ANILINE						
ANTHRACENE	810 U	17 U		1200 U	11 U	1000 U
BENZIDINE						
BENZO(A)ANTHRACENE	810 U	17 U		1200 U	11 U	1000 U
BENZO(A)PYRENE	810 U	22 J		1200 U	12	1000 U
BENZO(B)FLUORANTHENE	810 U	33 U		1200 U	21 U	1000 U
BENZO(G,H,I)PERYLENE	810 U	33 U		1200 U	21 U	1000 U
BENZO(K)FLUORANTHENE	810 U	17 U		1200 U	11 U	1000 U
BENZOIC ACID						
BIS(2-CHLOROETHOXY)METHANE	810 U			1200 U		1000 U
BIS(2-CHLOROETHYL)ETHER	810 U			1200 U		1000 U
BIS(2-ETHYLHEXYL)PHTHALATE	810 U			150 J		62 J
BUTYL BENZYL PHTHALATE	810 U			1200 U		1000 U
CARBAZOLE	810 U			1200 U		1000 U
CHRYSENE	810 U	17 U		1200 U	11 U	1000 U
DI-N-BUTYL PHTHALATE	810 U			1200 U		1000 U
DI-N-OCTYL PHTHALATE	810 U			1200 U		1000 U
DIBENZO(A,H)ANTHRACENE	810 U	33 U		1200 U	21 U	1000 U
DIBENZOFURAN	810 U			1200 U		1000 U
DIETHYL PHTHALATE	810 U			1200 U		1000 U
DIMETHYL PHTHALATE	810 U			1200 U		1000 U
FLUORANTHENE	810 U	33 U		1200 U	21 U	1000 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-16-01 PAI-10-SD-16 9/9/98	PAI-10-SD-016-01A PAI-10-SD-16 8/10/98	PAI-10-SD-16A-02 PAI-10-SD-16 10/6/99	PAI-10-SD-17-01 PAI-10-SD-17 9/9/98	PAI-10-SD-017-01A PAI-10-SD-17 - -	PAI-10-SD-18-01 PAI-10-SD-18 9/9/98
FLUORENE	810 U	33 U		1200 U	21 U	1000 U
HEXACHLOROBENZENE	810 U			1200 U		1000 U
HEXACHLOROBUTADIENE	810 U			1200 U		1000 U
HEXACHLOROCYCLOPENTADIENE	810 U			1200 U		1000 U
HEXACHLOROETHANE	810 U			1200 U		1000 U
INDENO(1,2,3-CD)PYRENE	810 U	17 U		1200 U	11 U	1000 U
ISOPHORONE	810 U			1200 U		1000 U
N-NITROSO-DI-N-PROPYLAMINE	810 U			1200 U		1000 U
N-NITROSODIPHENYLAMINE	810 U			1200 U		1000 U
NAPHTHALENE	810 U	170 U		1200 U	110 U	1000 U
NITROBENZENE	810 U			1200 U		1000 U
PENTACHLOROPHENOL	1600 U			2400 U		2100 U
PHENANTHRENE	810 U	17 U		1200 U	11 U	1000 U
PHENOL	810 U			1200 U		1000 U
PYRENE	810 U	17 U		1200 U	11 U	1000 U
PESTICIDES/PCBs (ug/kg)						
4,4'-DDD	8 U			12 U		10 U
4,4'-DDE	8 U			12 U		10 U
4,4'-DDT	8 U			12 U		10 U
ALDRIN	4.1 U			6.1 U		5.3 U
ALPHA-BHC	4.1 U			6.1 U		5.3 U
ALPHA-CHLORDANE	4.1 U			6.1 U		5.3 U
AROCLOR-1016	80 U			120 U		100 U
AROCLOR-1221	160 U			240 U		210 U
AROCLOR-1232	80 U			120 U		100 U
AROCLOR-1242	80 U			120 U		100 U
AROCLOR-1248	80 U			120 U		100 U
AROCLOR-1254	80 U			120 U		100 U
AROCLOR-1260	80 U			120 U		100 U
BETA-BHC	4.1 U			6.1 U		5.3 U
DELTA-BHC	4.1 U			6.1 U		5.3 U
DIELDRIN	8 U			12 U		10 U
ENDOSULFAN I	4.1 U			6.1 U		5.3 U
ENDOSULFAN II	8 U			12 U		10 U
ENDOSULFAN SULFATE	8 U			12 U		10 U
ENDRIN	8 U			12 U		10 U
ENDRIN ALDEHYDE	8 U			12 U		10 U
ENDRIN KETONE	8 U			12 U		10 U
GAMMA-BHC (LINDANE)	4.1 U			6.1 U		5.3 U
GAMMA-CHLORDANE	4.1 U			6.1 U		5.3 U
HEPTACHLOR	4.1 U			6.1 U		5.3 U
HEPTACHLOR EPOXIDE	4.1 U			6.1 U		5.3 U
METHOXYCHLOR	41 U			61 U		53 U
TOXAPHENE	410 U			610 U		530 U

SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-16-01 PAI-10-SD-16 9/9/98	PAI-10-SD-016-01A PAI-10-SD-16 8/10/98	PAI-10-SD-16A-02 PAI-10-SD-16 10/6/99	PAI-10-SD-17-01 PAI-10-SD-17 9/9/98	PAI-10-SD-017-01A PAI-10-SD-17 - -	PAI-10-SD-18-01 PAI-10-SD-18 9/9/98
DIOXINS AND FURANS (ng/kg)						
1,2,3,4,6,7,8-HPCDD			41 J			
1,2,3,4,6,7,8-HPCDF			1.3 U			
1,2,3,4,7,8,9-HPCDF			1.2 U			
1,2,3,4,7,8-HXCDD			1.3 U			
1,2,3,4,7,8-HXCDF			1.1 U			
1,2,3,6,7,8-HXCDD			1.7 J			
1,2,3,6,7,8-HXCDF			1.1 U			
1,2,3,7,8,9-HXCDD			4.4 J			
1,2,3,7,8,9-HXCDF			0.93 U			
1,2,3,7,8-PECDD			2.9 U			
1,2,3,7,8-PECDF			1.2 U			
2,3,4,6,7,8-HXCDF			0.86 U			
2,3,4,7,8-PECDF			1.2 U			
2,3,7,8-TCDD			2.6 U			
2,3,7,8-TCDF			2.2 U			
OCDD			350			
OCDF			2.7 J			
TOTAL HPCDD			130 J			
TOTAL HPCDF			2.4 U			
TOTAL HXCDD			96 U			
TOTAL HXCDF			2.4 U			
TOTAL PECDD			13 U			
TOTAL PECDF			1.9 U			
TOTAL TCDD			4 J			
TOTAL TCDF			4.8 U			
INORGANICS (mg/kg)						
ALUMINUM	22100			24500		21100
ANTIMONY	9 U			6.3 U		4.4 U
ARSENIC	11.6			12.2		10.9
BARIUM	23.7			26.1		24.7
BERYLLIUM	0.97			1		0.93
CADMIUM	0.41 U			0.67 U		0.47 U
CALCIUM	1750			2220		6110
CHROMIUM	32.7			33.6		30.8
COBALT	4.1 U			6.2 U		4.4 U
COPPER	9.5			10.1		9.8
CYANIDE	1 U			2 U		8 U
IRON	19800			20700		19900
LEAD	18.4 J			22.6 J		16.3 J
MAGNESIUM	5320			6200		6270
MANGANESE	128			177		218
MERCURY	0.07 U			0.1		0.1
NICKEL	10.9 U			11.8 U		10.4 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-16-01** **PAI-10-SD-16** **9/9/98**	**PAI-10-SD-016-01A** **PAI-10-SD-16** **8/10/98**	**PAI-10-SD-16A-02** **PAI-10-SD-16** **10/6/99**	**PAI-10-SD-17-01** **PAI-10-SD-17** **9/9/98**	**PAI-10-SD-017-01A** **PAI-10-SD-17** **- -**	**PAI-10-SD-18-01** **PAI-10-SD-18** **9/9/98**
POTASSIUM	2680			3210		2830
SELENIUM	0.76 U			1.2 U		0.19 U
SILVER	0.87 U			1.9 U		1.5 U
SODIUM	13200			20500		17600
THALLIUM	0.41			0.61 U		0.49 U
VANADIUM	47			46.6		44.9
ZINC	45.8			42.2		40.2
SIMULTANEOUSLY EXTRACTED METALS (umo/g)						
CADMIUM	0.0005 U			0.0008 U		0.0007
COPPER	0.11			0.007 U		0.04
LEAD	0.056			0.024		0.047
MERCURY	0.15 U			0.21 U		0.19 U
NICKEL	0.019			0.008		0.015
ZINC	0.82			1.02		1.4
ACID VOLATILES SULFIDE (umo/g)						
ACID VOLATILE SULFIDE	7.9			16		13
MISCEALLANEOUS PARAMETERS						
HEXAVALENT CHROMIUM mg/kg						
PH	6.8			7.4		7.6
TOTAL ORGANIC CARBON %	2.8			3		2.7

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-018-01A PAI-10-SD-18 - -	PAI-10-SD-19-01 PAI-10-SD-19 12/15/99	PAI-10-SD-20-01 PAI-10-SD-20 12/15/99
VOLATILES (ug/kg)			
1,1,1-TRICHLOROETHANE			
1,1,2,2-TETRACHLOROETHANE			
1,1,2-TRICHLOROETHANE			
1,1-DICHLOROETHANE			
1,1-DICHLOROETHENE			
1,2-DICHLOROETHANE			
1,2-DICHLOROETHENE (TOTAL)			
1,2-DICHLOROPROPANE			
2-BUTANONE			
2-HEXANONE			
4-METHYL-2-PENTANONE			
ACETONE			
BENZENE			
BROMODICHLOROMETHANE			
BROMOFORM			
BROMOMETHANE			
CARBON DISULFIDE			
CARBON TETRACHLORIDE			
CHLOROBENZENE			
CHLORODIBROMOMETHANE			
CHLOROETHANE			
CHLOROFORM			
CHLOROMETHANE			
CIS-1,3-DICHLOROPROPENE			
ETHYLBENZENE			
METHYLENE CHLORIDE			
STYRENE			
TETRACHLOROETHENE			
TOLUENE			
TRANS-1,3-DICHLOROPROPENE			
TRICHLOROETHENE			
VINYL CHLORIDE			
XYLENES, TOTAL			
SEMIVOLATILES (ug/kg)			
1,2,4-TRICHLOROBENZENE		570 U	830 U
1,2-DICHLOROBENZENE		570 U	830 U
1,3-DICHLOROBENZENE		570 U	830 U
1,4-DICHLOROBENZENE		570 U	830 U
1,4-DIOXANE		4500 UJ	6600 UJ
2,2'-OXYBIS(1-CHLOROPROPANE)		570 U	830 U
2,4,5-TRICHLOROPHENOL		2800 U	4200 U
2,4,6-TRICHLOROPHENOL		570 U	830 U
2,4-DICHLOROPHENOL		570 U	830 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-018-01A PAI-10-SD-18 - -	PAI-10-SD-19-01 PAI-10-SD-19 12/15/99	PAI-10-SD-20-01 PAI-10-SD-20 12/15/99
2,4-DIMETHYLPHENOL		570 U	830 U
2,4-DINITROPHENOL		2800 U	4200 U
2,4-DINITROTOLUENE		570 U	830 U
2,6-DINITROTOLUENE		570 U	830 U
2-CHLORONAPHTHALENE		570 U	830 U
2-CHLOROPHENOL		570 UJ	830 UJ
2-METHYLNAPHTHALENE		570 U	830 U
2-METHYLPHENOL		570 U	830 U
2-NITROANILINE		2800 U	4200 U
2-NITROPHENOL		570 U	830 U
3,3'-DICHLOROBENZIDINE		1100 U	1700 U
3-NITROANILINE		2800 UJ	4200 UJ
4,6-DINITRO-2-METHYLPHENOL		2800 U	4200 U
4-BROMOPHENYL PHENYL ETHER		570 U	830 U
4-CHLORO-3-METHYLPHENOL		570 U	830 U
4-CHLOROANILINE		570 U	830 U
4-CHLOROPHENYL PHENYL ETHER		570 U	830 U
4-METHYLPHENOL		570 U	830 U
4-NITROANILINE		2800 U	4200 U
4-NITROPHENOL		2800 U	4200 U
ACENAPHTHENE	200 U	140 U	120 J
ACENAPHTHYLENE	390 U	69 U	100 U
ANILINE			
ANTHRACENE	20 U	2.8 U	4.1 U
BENZIDINE		5700 UR	8300 UR
BENZO(A)ANTHRACENE	20 U	6.9 U	10 U
BENZO(A)PYRENE	38	6.9 U	10 U
BENZO(B)FLUORANTHENE	39 U	2.8 U	4.1 U
BENZO(G,H,I)PERYLENE	41 R	11 U	16 U
BENZO(K)FLUORANTHENE	20 U	2.8 U	4.1 U
BENZOIC ACID		2800 U	4200 U
BIS(2-CHLOROETHOXY)METHANE		570 U	830 U
BIS(2-CHLOROETHYL)ETHER		570 U	830 U
BIS(2-ETHYLHEXYL)PHTHALATE		570 U	830 U
BUTYL BENZYL PHTHALATE		570 U	830 U
CARBAZOLE		570 U	830 U
CHRYSENE	20 U	6.9 U	10 U
DI-N-BUTYL PHTHALATE		570 U	830 U
DI-N-OCTYL PHTHALATE		570 U	830 U
DIBENZO(A,H)ANTHRACENE	39 U	11 U	16 U
DIBENZOFURAN		570 U	830 U
DIETHYL PHTHALATE		570 U	830 U
DIMETHYL PHTHALATE		570 U	830 U
FLUORANTHENE	39 U	6.9 U	10

SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.:	PAI-10-SD-018-01A	PAI-10-SD-19-01	PAI-10-SD-20-01
LOCATION:	PAI-10-SD-18	PAI-10-SD-19	PAI-10-SD-20
SAMPLE DATE:	- -	12/15/99	12/15/99
FLUORENE	39 U	14 U	20 U
HEXACHLOROBENZENE		570 U	830 U
HEXACHLOROBUTADIENE		570 U	830 U
HEXACHLOROCYCLOPENTADIENE		570 U	830 U
HEXACHLOROETHANE		570 U	830 U
INDENO(1,2,3-CD)PYRENE	20 U	6.9 U	10 U
ISOPHORONE		570 U	830 U
N-NITROSO-DI-N-PROPYLAMINE		570 U	830 U
N-NITROSODIPHENYLAMINE		570 U	830 U
NAPHTHALENE	200 U	69 U	100 U
NITROBENZENE		570 U	830 U
PENTACHLOROPHENOL		2800 U	4200 U
PHENANTHRENE	20 U	5.5 U	8.2 U
PHENOL		570 U	830 U
PYRENE	20 U	14 U	20 U
PESTICIDES/PCBs (ug/kg)			
4,4'-DDD		28 U	41 U
4,4'-DDE		28 U	41 U
4,4'-DDT		28 UJ	41 UJ
ALDRIN		14 U	21 U
ALPHA-BHC		14 U	21 U
ALPHA-CHLORDANE		14 U	21 U
AROCLOR-1016		14 U	21 U
AROCLOR-1221		14 U	21 U
AROCLOR-1232		14 U	21 U
AROCLOR-1242		14 U	21 U
AROCLOR-1248		14 U	21 U
AROCLOR-1254		14 U	21 U
AROCLOR-1260		14 U	21 U
BETA-BHC		14 U	21 U
DELTA-BHC		14 U	21 U
DIELDRIN		28 U	41 U
ENDOSULFAN I		14 U	21 U
ENDOSULFAN II		28 U	41 U
ENDOSULFAN SULFATE		28 U	41 U
ENDRIN		28 U	41 U
ENDRIN ALDEHYDE		28 U	41 U
ENDRIN KETONE		28 U	41 U
GAMMA-BHC (LINDANE)		14 U	21 U
GAMMA-CHLORDANE		14 U	21 U
HEPTACHLOR		14 U	21 U
HEPTACHLOR EPOXIDE		14 U	21 U
METHOXYCHLOR		140 UJ	210 UJ
TOXAPHENE		280 U	410 U

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PAI-10-SD-018-01A PAI-10-SD-18 - -	PAI-10-SD-19-01 PAI-10-SD-19 12/15/99	PAI-10-SD-20-01 PAI-10-SD-20 12/15/99
DIOXINS AND FURANS (ng/kg)			
1,2,3,4,6,7,8-HPCDD			
1,2,3,4,6,7,8-HPCDF			
1,2,3,4,7,8,9-HPCDF			
1,2,3,4,7,8-HXCDD			
1,2,3,4,7,8-HXCDF			
1,2,3,6,7,8-HXCDD			
1,2,3,6,7,8-HXCDF			
1,2,3,7,8,9-HXCDD			
1,2,3,7,8,9-HXCDF			
1,2,3,7,8-PECDD			
1,2,3,7,8-PECDF			
2,3,4,6,7,8-HXCDF			
2,3,4,7,8-PECDF			
2,3,7,8-TCDD			
2,3,7,8-TCDF			
OCDD			
OCDF			
TOTAL HPCDD			
TOTAL HPCDF			
TOTAL HXCDD			
TOTAL HXCDF			
TOTAL PECDD			
TOTAL PECDF			
TOTAL TCDD			
TOTAL TCDF			
INORGANICS (mg/kg)			
ALUMINUM		6350	13800
ANTIMONY		2.5 UJ	5.1 UJ
ARSENIC		4.8	7.3
BARIUM		7.3 J	15.8 J
BERYLLIUM		0.37 U	0.79 U
CADMIUM		0.27 U	0.55 U
CALCIUM		781	1360
CHROMIUM		12	25
COBALT		1.5 U	3.4 U
COPPER		2.7 U	10.8
CYANIDE		0.64 U	1.1 U
IRON		9960	17000
LEAD		6.9	21.4
MAGNESIUM		2290 J	4050 J
MANGANESE		63 J	94 J
MERCURY		0.08 U	0.11 U
NICKEL		3.4	6.9

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PAI-10-SD-018-01A** **PAI-10-SD-18** **- -**	**PAI-10-SD-19-01** **PAI-10-SD-19** **12/15/99**	**PAI-10-SD-20-01** **PAI-10-SD-20** **12/15/99**
POTASSIUM		1300	2480
SELENIUM		4.6	10.7
SILVER		0.33 U	0.68 U
SODIUM		8540	13100
THALLIUM		6.3 U	13.1 U
VANADIUM		18.8	33.1
ZINC		12	36.4
SIMULTANEOUSLY EXTRACTED METALS (umo/g)			
CADMIUM			
COPPER			
LEAD			
MERCURY			
NICKEL			
ZINC			
ACID VOLATILES SULFIDE (umo/g)			
ACID VOLATILE SULFIDE			
MISCEALLANEOUS PARAMETERS			
HEXAVALENT CHROMIUM mg/kg			
PH			
TOTAL ORGANIC CARBON %			

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SUMMARY OF ANALYTICAL RESULTS
SEDIMENT WASTE
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PI-012-01(35) PI-012-01 12/14/95	PI-012-02(36) PI-012-02 12/14/95
VOLATILES (ug/kg)		
1,1,1-TRICHLOROETHANE	17 U	16 U
1,1,2,2-TETRACHLOROETHANE	17 U	16 U
1,1,2-TRICHLOROETHANE	17 U	16 U
1,1-DICHLOROETHANE	17 U	16 U
1,1-DICHLOROETHENE	17 U	16 U
1,2-DICHLOROETHANE	17 U	16 U
1,2-DICHLOROETHENE (TOTAL)	17 U	16 U
1,2-DICHLOROPROPANE	17 U	16 U
2-BUTANONE	17 U	16 U
2-HEXANONE	17 U	16 U
4-METHYL-2-PENTANONE	17 U	16 U
ACETONE	17 U	16 U
BENZENE	17 U	16 U
BROMODICHLOROMETHANE	17 U	16 U
BROMOFORM	17 U	16 U
BROMOMETHANE	17 U	16 U
CARBON DISULFIDE	17 U	16 U
CARBON TETRACHLORIDE	17 U	16 U
CHLOROBENZENE	17 U	16 U
CHLORODIBROMOMETHANE	17 U	16 U
CHLOROETHANE	17 U	16 U
CHLOROFORM	17 U	16 U
CHLOROMETHANE	17 U	16 U
CIS-1,3-DICHLOROPROPENE	17 U	16 U
ETHYLBENZENE	17 U	16 U
METHYLENE CHLORIDE	17 U	16 U
STYRENE	17 U	16 U
TETRACHLOROETHENE	17 U	16 U
TOLUENE	17 U	16 U
TRANS-1,3-DICHLOROPROPENE	17 U	16 U
TRICHLOROETHENE	17 U	16 U
VINYL CHLORIDE	17 U	16 U
XYLENES, TOTAL	17 U	16 U
SEMIVOLATILES (ug/kg)		
1,2,4-TRICHLOROBENZENE	2000 U	620 U
1,2-DICHLOROBENZENE	2000 U	620 U
1,3-DICHLOROBENZENE	2000 U	620 U
1,4-DICHLOROBENZENE	2000 U	620 U
2,2'-OXYBIS(1-CHLOROPROPANE	2000 U	620 U
2,4,5-TRICHLOROPHENOL	5100 U	1600 U
2,4,6-TRICHLOROPHENOL	2000 U	620 U
2,4-DICHLOROPHENOL	2000 U	620 U
2,4-DIMETHYLPHENOL	2000 U	620 U
2,4-DINITROPHENOL	5100 U	1600 U
2,4-DINITROTOLUENE	2000 U	620 U
2,6-DINITROTOLUENE	2000 U	620 U
2-CHLORONAPHTHALENE	2000 U	620 U
2-CHLOROPHENOL	2000 U	620 U
2-METHYLNAPHTHALENE	2000 U	620 U
2-METHYLPHENOL	2000 U	620 U
2-NITROANILINE	5100 U	1600 U
2-NITROPHENOL	2000 U	620 U
3,3'-DICHLOROBENZIDINE	2000 U	620 U
3-NITROANILINE	5100 U	1600 U
4,6-DINITRO-2-METHYLPHENOL	5100 U	1600 U
4-BROMOPHENYL PHENYL ETHER	2000 U	620 U
4-CHLORO-3-METHYLPHENOL	2000 U	620 U
4-CHLOROANILINE	2000 U	620 U
4-CHLOROPHENYL PHENYL ETHER	2000 U	620 U
4-METHYLPHENOL	2000 U	620 U

SUMMARY OF ANALYTICAL RESULTS
SEDIMENT WASTE
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: LOCATION: SAMPLE DATE:	PI-012-01(35) PI-012-01 12/14/95	PI-012-02(36) PI-012-02 12/14/95
4-NITROANILINE	5100 U	1600 U
4-NITROPHENOL	5100 U	1600 U
ACENAPHTHENE	2000 U	620 U
ACENAPHTHYLENE	2000 U	620 U
ANTHRACENE	2000 U	620 U
BENZO(A)ANTHRACENE	2000 U	620 U
BENZO(A)PYRENE	2000 U	620 U
BENZO(B)FLUORANTHENE	2000 U	620 U
BENZO(G,H,I)PERYLENE	2000 U	620 U
BENZO(K)FLUORANTHENE	2000 U	620 U
BIS(2-CHLOROETHOXY)METHANE	2000 U	620 U
BIS(2-CHLOROETHYL)ETHER	2000 U	620 U
BIS(2-ETHYLHEXYL)PHTHALATE	10000	780 U
BUTYL BENZYL PHTHALATE	2000 U	620 U
CARBAZOLE	2000 U	620 U
CHRYSENE	2000 U	620 U
DI-N-BUTYL PHTHALATE	2800 U	620 U
DI-N-OCTYL PHTHALATE	900 J	620 U
DIBENZO(A,H)ANTHRACENE	2000 U	620 U
DIBENZOFURAN	2000 U	620 U
DIETHYL PHTHALATE	2000 U	29 J
DIMETHYL PHTHALATE	2000 U	620 U
FLUORANTHENE	2000 U	620 U
FLUORENE	2000 U	620 U
HEXACHLOROBENZENE	2000 U	620 U
HEXACHLOROBUTADIENE	2000 U	620 U
HEXACHLOROCYCLOPENTADIENE	2000 U	620 U
HEXACHLOROETHANE	2000 U	620 U
INDENO(1,2,3-CD)PYRENE	2000 U	620 U
ISOPHORONE	2000 U	620 U
N-NITROSO-DI-N-PROPYLAMINE	2000 U	620 U
N-NITROSODIPHENYLAMINE	2000 U	620 U
NAPHTHALENE	2000 U	620 U
NITROBENZENE	2000 U	620 U
PENTACHLOROPHENOL	5100 U	1600 U
PHENANTHRENE	2000 U	620 U
PHENOL	2000 U	620 U
PYRENE	2000 U	620 U
PESTICIDES/PCBs (ug/kg)		
4,4'-DDD	150 U	19 U
4,4'-DDE	520	96
4,4'-DDT	580 R	38
ALDRIN	47 U	3.2 U
ALPHA-BHC	47 U	3.1 J
ALPHA-CHLORDANE	47 U	6.2 U
AROCLOR-1016	920 U	62 U
AROCLOR-1221	1900 U	130 U
AROCLOR-1232	920 U	62 U
AROCLOR-1242	920 U	62 U
AROCLOR-1248	920 U	62 U
AROCLOR-1254	24000	62 U
AROCLOR-1260	920 U	62 U
BETA-BHC	47 U	4.6 U
DELTA-BHC	47 U	3.2 U
DIELDRIN	93 R	6.2 J
ENDOSULFAN I	47 U	3.2 U
ENDOSULFAN II	450 U	6.2 U
ENDOSULFAN SULFATE	92 U	6.2 U
ENDRIN	1200 J	6.2 U
ENDRIN ALDEHYDE	180 U	6.2 U
ENDRIN KETONE	92 U	6.2 U

SUMMARY OF ANALYTICAL RESULTS
SEDIMENT WASTE
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

SAMPLE I.D.: **LOCATION:** **SAMPLE DATE:**	**PI-012-01(35)** **PI-012-01** **12/14/95**	**PI-012-02(36)** **PI-012-02** **12/14/95**
GAMMA-BHC (LINDANE)	47 U	3.2 U
GAMMA-CHLORDANE	74 U	6 U
HEPTACHLOR	47 U	3.2 U
HEPTACHLOR EPOXIDE	150 U	3.2 U
METHOXYCHLOR	470 U	32 U
TOXAPHENE	4700 U	320 U
INORGANICS (mg/kg)		
ALUMINUM	9580	11700
ANTIMONY	3.3	9.4
ARSENIC	40.6	49.7
BARIUM	73.2	66.8
BERYLLIUM	0.33 U	0.47 U
CADMIUM	1.8	4.7
CALCIUM	4600	6670
CHROMIUM	37.8	119
COBALT	8.2	22.7
COPPER	168	489
CYANIDE	0.86 U	0.8 U
IRON	122000	307000
LEAD	589	2930
MAGNESIUM	3990	6220
MANGANESE	297	1480
MERCURY	0.15 U	0.08 U
NICKEL	41.4	86.9
POTASSIUM	1470	2210
SELENIUM	1.2	0.86
SILVER	1.2	1.1
SODIUM	11200	8870
THALLIUM	0.74 U	0.74 U
VANADIUM	27.6	44.9
ZINC	751	1520

CTO020-MCRD PARRIS ISLAND
SOIL DATA
KAS
SDG: WR1395

SAMPLE NUMBER:	PAI-01-SD-24-01			PAI-01-SD-25-01			PAI-01-SD-26-01			PAI-10-SS-08-02		
SAMPLE DATE:	04/26/01			04/26/01			04/26/01			04/26/01		
LABORATORY ID:	WR1395-6			WR1395-5			WR1395-3			WR1395-2		
QC_TYPE:	NORMAL			NORMAL			NORMAL			NORMAL		
% SOLIDS:	65.0 %			46.0 %			36.0 %			98.0 %		
UNITS:	UG/KG			UG/KG			UG/KG			UG/KG		
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	30	U		44	U		280	UJ	R	12	J	P
2-METHYLNAPHTHALENE	30	U		44	U		280	UJ	R	9	J	P
ACENAPHTHENE	30	U		44	U		280	UJ	R	30		
ACENAPHTHYLENE	30	U		44	U		280	UJ	R	32		
ANTHRACENE	30	U		44	U		280	UJ	R	350	J	P
BENZO(A)ANTHRACENE	30	U		44	U		280	UJ	R	3100		
BENZO(A)PYRENE	30	U		44	U		280	UJ	R	1700		
BENZO(B)FLUORANTHENE	30	U		44	U		140	J	PR	2900		
BENZO(G,H,I)PERYLENE	30	U		44	U		280	UJ	R	1200		
BENZO(K)FLUORANTHENE	30	U		44	U		280	UJ	R	1400		
CHRYSENE	30	U		44	U		87	J	PR	1800		
DIBENZO(A,H)ANTHRACENE	30	U		44	U		280	UJ	R	840	J	P
FLUORANTHENE	30	U		44	U		66	J	PR	4000		
FLUORENE	30	U		44	U		280	UJ	R	17	J	P
INDENO(1,2,3-CD)PYRENE	30	U		44	U		280	UJ	R	1300		
NAPHTHALENE	30	U		44	U		280	UJ	R	10	J	P
PHENANTHRENE	30	U		44	U		280	UJ	R	1600		
PYRENE	30	U		44	U		50	J	PR	3400		

CTO02 CRD PARRIS ISLAND
SOIL DATA
KAS
SDG: WR1395

SAMPLE NUMBER:	PAI-10-SS-12-02			
SAMPLE DATE:	04/26/01	/ /	/ /	/ /
LABORATORY ID:	WR1395-1			
QC_TYPE:	NORMAL			
% SOLIDS:	97.0 %	100.0 %	100.0 %	100.0 %
UNITS:	UG/KG			
FIELD DUPLICATE OF:				

	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE	RESULT	QUAL	CODE
POLYNUCLEAR AROMATIC HYDROCARBONS												
1-METHYLNAPHTHALENE	20	U										
2-METHYLNAPHTHALENE	20	U										
ACENAPHTHENE	20	U										
ACENAPHTHYLENE	20	U										
ANTHRACENE	20	U										
BENZO(A)ANTHRACENE	33											
BENZO(A)PYRENE	33											
BENZO(B)FLUORANTHENE	53											
BENZO(G,H,I)PERYLENE	16	J	P									
BENZO(K)FLUORANTHENE	15	J	P									
CHRYSENE	27											
DIBENZO(A,H)ANTHRACENE	20	U										
FLUORANTHENE	39											
FLUORENE	20	U										
INDENO(1,2,3-CD)PYRENE	22											
NAPHTHALENE	20	U										
PENTACHLOROPHENOL	820	U										
PHENANTHRENE	16	J	P									
PYRENE	40											

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CTO020-MCRD PARRIS ISLAND
SOIL DATA
KAS
SDG: WR1395

SAMPLE NUMBER:	PAI-10-SS-12-02			/ /			/ /			/ /		
SAMPLE DATE:	04/26/01											
LABORATORY ID:	WR1395-1											
QC_TYPE:	NORMAL											
% SOLIDS:	97.0 %			100.0 %			100.0 %			100.0 %		
UNITS:	UG/KG											
FIELD DUPLICATE OF:												
	RESULT	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**	**RESULT**	**QUAL**	**CODE**
SEMIVOLATILES												
PENTACHLOROPHENOL	820	U										

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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
N01 = Internal Standard Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
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
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is less than sample activity

APPENDIX D

PARCC PARAMATERS/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 SWMU 10. 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 1998) DQOs for all field and laboratory analyses, which includes requirements for precision, accuracy, and completeness, are summarized in the remainder of this section.

1.1 Precision

Precision characterizes the amount of variability and bias inherent in a data set. This parameter also describes the reproducibility of measurements of the same parameters for samples under similar conditions. Precision is expressed as a Relative Percent Difference (RPD), which is defined as the relation of the range relative to the mean RPDs, which are typically expressed as percentages, are used to evaluate both field and laboratory duplicate precision and are calculated, as follows:

$$RPD = \frac{V1 - V2}{(V1 + V2)/2} \times 100$$

where RPD = relative percent difference
V1, V2 = two results obtained by analyzing duplicate samples

The precision objectives for CLP parameters are specified in the associated analytical protocols. For non-CLP data, the precision objective of ±50 percent for solid matrices and ±30 percent for aqueous matrices were employed for this project.

Field duplicates monitor the consistency with which environmental samples were obtained and analyzed. Laboratory duplicates measure the reproducibility of laboratory generated results. RPDs were calculated for each set of field and laboratory duplicates generated for the investigation. Failures in meeting the precision objectives resulted in the qualification (as per data validation protocols) of the associated analytical data. The qualification of the 1998 analytical data for SWMU 10, 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 SWMU 10 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 SWMU 10 is 98.9% (i.e., 126 chemical analytical results out of a total of 12,130 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 SWMU 10 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 SWMU 10 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 SWMU 10 is provided in the remainder of this section. All validated analytical results are presented in Appendix C.

3.3.1 Organic Analyses

Bis(2-ethylhexyl)phthalate, methylene chloride, acetone, and tetrachloroethene were identified as laboratory blank contaminants. Acetone and methylene chloride were identified as field blank contaminants. Detection limits for these compounds in the affected environmental samples were elevated during the data validation process because positive results for these chemicals are considered to be attributable to blank contamination.

In general, analytical results for organic compounds were qualified as estimated, J or UJ, for observed noncompliances with calibrations, percent difference between columns (pesticides only), and instrument range exceedance. 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). The compounds 2-butanone, 2-hexanone,

4-methyl-2-pentanone, and acetone were the most frequently affected. Primarily, aqueous matrices were affected by the noncompliances. Refer to Table 1 for a listing of the affected samples and compounds.

The positive result for 4,4'-DDD in sediment sample PAI-10-SD-14-02 was rejected due to a percent difference between the analytical columns greater than 100%.

Acetone exceeded the instrument's linear calibration range in surface soil sample PAI-10-SS-11-01. The positive result was qualified as estimated, (J). This was the only exceedance of this nature for SWMU 10.

None of the organic analytical results for aqueous or solid samples collected at SWMU 10 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, surrogate recovery, 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 waters: copper, selenium, zinc, iron, and beryllium. 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 and matrix spikes. Other than blank contamination, no qualifiers were assigned to waste water and waste solids analyses. Groundwater, surface water, sediment, and surface soils were qualified due to calibration noncompliances and blank contamination. Surface waters were also qualified due to matrix spike noncompliance.

None of the inorganic analytical results collected at SWMU 10 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.

3.3.3 Miscellaneous Analyses

Nitrate/Nitrite was identified in method blanks associated with groundwater analyses. Acid volatile sulfide and zinc (AVS/SEM) was identified in method blanks associated with sediment analyses.

The nondetected result for cyanide in sediment sample PAI-10-SD-14-02 was rejected, UR, due to matrix spike noncompliance.

Groundwater results for nitrate/nitrite and cyanide were qualified as estimated, J and UJ, due to calibration noncompliances. Surface water results for hexavalent chromium were also qualified as estimated, UJ, due to calibration noncompliances.

No other qualifiers were applied to miscellaneous parameters analyzed for SWMU 10.

All validated results for SWMU 10 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-10-SD-14-02	SD	cyanide, 4,4'-DDD
PAI-10-SS-01-01	SS	acetone
PAI-10-GW-01-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-GW-02-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-GW-03-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-04-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-05-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-06-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-GW-07-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-07-01-D	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-08-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-09-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, 4-nitroquinoline-1-oxide, acrolein, acrylonitrile, methacrylonitrile, methyl methacrylate
PAI-10-GW-10-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-11-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, 4-nitroquinoline-1-oxide, acrolein, acrylonitrile, methacrylonitrile, methyl methacrylate, vinyl acetate
PAI-10-GW-12-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-13-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-GW-14-01	GW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-IDW-W	IDW	2-hexanone, 4-methyl-2-pentanone
PAI-10-SW-01-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-02-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-03-00	SW	2-hexanone, 4-methyl-2-pentanone
PAI-10-SW-04-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-SW-05-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-06-00	SW	2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-07-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-08-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-08-00-D	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-09-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-10-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-11-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-12-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone
PAI-10-SW-13-00	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-SW-16-01	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-SW-17-01	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone
PAI-10-SW-18-01	SW	2-butanone, 2-hexanone, 4-methyl-2-pentanone, acetone

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DATA VALIDATION LETTERS

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-008-00D
PAI-10-SW-010-00
PAI-10-SW-013-00
SOURCE WATER SMU 01,02,03
PAI-10-SW-008-00
PAI-10-SW-009-00
PAI-10-SW-012-00
SOURCE WATER SMU 10

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)."

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**

C-49-08-8-018

TO:	**D. BRAYACK**	**DATE:**	**DECEMBER 8, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**
SUBJECT:	**INORGANIC DATA VALIDATION - PH AND TOC CTO 020/053- MCRD PARRIS ISLAND SDG - U07632**		
SAMPLES:	7/Aqueous/		

PAI-01-SB-002-04 PAI-01-SB-003-04 PAI-01-SB-005-04
PAI-10-SB-001-22 PAI-10-SB-002-10 PAI-10-SB-006-06
PAI-10-SB-007-24

Overview

The sample set for CTO 020/053, MCRD Parris Island, SDG U07632, consists of seven (7) soil environmental samples.

The samples were analyzed for pH and Total Organic Carbon (TOC). The samples were collected by Tetra Tech NUS on July 22 - 24, 1998 and analyzed Recra Labnet – Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA /QC) criteria. TOC analyses were conducted using the Walkley-Black method. pH analyses were conducted using SW 846 method 9045C.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris, Island
SDG U07632

Table 1 - RECOMMENDATION SUMMARY

pH
TOC

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-08-039

TO: D. BRAYACK **DATE:** NOVEMBER 5, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION – SEM METALS AND AVS
CTO 020/ 053 - MCRD PARRIS
SDG – TTP16

SAMPLES: 4 / Sediments /

PAI-01-SD-002-02
PAI-10-SD-016-01
PAI-10-SD-017-01
PAI-10-SD-018-01

Overview

The sample set for CTO 020 / 053, MCRD Parris, SDG TTP16, consists of four (4) sediment environmental samples.

All samples were analyzed for Simultaneously Extracted Metals (SEM) and Acid Volatile Sulfide. The samples were collected by Tetra Tech NUS on September 9 and 14, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering
The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG TTP16

Table 1 - RECOMMENDATION SUMMARY

SEM
~~SAVS~~
AVS

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

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 – 01F
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

PITT-10-8-058

TO: DAVE BRAYACK

DATE: OCTOBER 12, 1998

FROM: JUSTIN ORBICH

COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB
CTO 053, PARRIS ISLAND
SDG TTP05

SAMPLES: 8/Sediment

PAI-10-SD-001-01
PAI-10-SD-002-01D
PAI-10-SD-004-01
PAI-10-SD-006-01
PAI-10-SD-002-01
PAI-10-SD-003-01
PAI-10-SD-005-01
PAI-10-SD-007-01

10/Soil

PAI-10-SS-001-01
PAI-10-SS-003-01
PAI-10-SS-005-01
PAI-10-SS-007-01
PAI-10-SS-009-01
PAI-10-SS-002-01
PAI-10-SS-004-01
PAI-10-SS-006-01
PAI-10-SS-008-01
PAI-10-SS-010-01

OVERVIEW

The sample set for CTO 053, SDG TTP05, Parris Island consists of eight (8) sediment and ten (10) soil environmental samples. The samples were analyzed for volatile organics, semivolatile organics, and pesticide PCB's. One field duplicate was sampled in the SDG, PAI-10-SD-002-01D.

The samples were collected on July 27th, 28th, and 29th, 1998 and analyzed by Laucks Testing Labs. All volatile, semivolatile, and pesticide 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: OCTOBER 12, 1998 – PAGE 2

VOLATILE FRACTION

The initial calibration analysis of methylene chloride contained a percent relative standard deviation greater than 30.0% quality control limit. Qualify positive results that have acceptable identification with (J), and nondetected analytes using professional judgement if the RRF value is greater than 0.05

The continuous calibration of acetone, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, and 1,1,2,2-tetrachloroethane contained a percent difference (%D) greater or less than +/-25.0% quality control limit. Qualify positive results that have acceptable identifications with (J) and no qualification for non-detected compounds with RRF greater than 0.05. For compounds with RRF values less than 0.05, qualify positive results with acceptable identification with (L), and qualify non-detected compounds as unusable, (UR).

The following contaminants were detected in the quality control blanks at the following maximum concentration:

Analyte	Concentration	Action Level
Methylene chloride[1]	2ug/kg	20ug/kg
Acetone[1]	55ug/kg	550ug/kg
4-Methyl-2-pentanone[1]	2ug/kg	10ug/kg
Methylene chloride[2]	140ug/kg	1400ug/kg

[1] - Low level blank
[2] - Medium level 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 percent moisture were taken into consideration during the application of all action levels. Positive results reported for these compounds 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

Several semivolatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

PESTICIDE FRACTION

No validation issues were present.

MEMO TO: DAVE BRAYACK
DATE: OCTOBER 12, 1998 – PAGE 3

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several volatile initial and continuous calibration noncompliances were present. Blank contamination was noted for several volatile compounds.

Other Issues Affecting Data Quality: None

MEMO TO: DAVE BRAYACK
DATE: OCTOBER 12, 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: OCTOBER 12, 1998 – PAGE 5

MCRD PARRIS ISLAND
SDG TTP05

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	Volatile	Semivolatile	Pesticide
PAI-10-SD-001-01	$A^{1,2}$ J^1	J^1	
PAI-10-SD-002-01	$A^{1,2}$ J^1		
PAI-10-SD-002-01D	$A^{1,2}$ J^1	J^1	
PAI-10-SD-003-01		J^1	
PAI-10-SD-004-01	$A^{1,2}$ J^1		
PAI-10-SD-005-01	$A^{1,2}$ J^1	J^1	
PAI-10-SD-006-01	A^2 J^1	J^1	
PAI-10-SD-007-01	$A^{1,2}$ J^1	J^1	
PAI-10-SS-001-01	R^1	J^1	
PAI-10-SS-002-01	$A^{1,2}$ J^1	J^1	
PAI-10-SS-003-01	$A^{1,2}$	J^1	
PAI-10-SS-004-01	$A^{1,2}$ J^1	J^1	
PAI-10-SS-005-01	$A^{1,2}$ J^1		
PAI-10-SS-006-01	$A^{1,2}$ J^1	J^1	
PAI-10-SS-007-01			
PAI-10-SS-008-01	$A^{1,2}$ J^1	J^1	
PAI-10-SS-009-01	$A^{1,2}$ J^1		
PAI-10-SS-010-01	A^2	J^1	

If the field is blank, the qualifier is A, accept all data.

R^1 - Reject, (UR), nondetected results for acetone for continuing calibration RRF less than 0.05.

A^1 - Accept data, but qualify positive result for acetone as nondetected, (U), as a result of blank contamination.

A^2 - Accept data, but qualify positive result for methylene chloride 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).

MEMO TO: DAVE BRAYACK
DATE: OCTOBER 12, 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-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:

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

C-49-08-8-167

TO: D. BRAYACK DATE: OCTOBER 13, 1998

FROM: GRETCHEN PHIPPS COPIES: DV FILE/REV 1

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS, DISSOLVED TAL METALS
CTO 053 - MCRD PARRIS
SDG - TTP06

SAMPLES: 14/ Aqueous /

PAI-10-SW-001-00	PAI-10-SW-001-00-F	PAI-10-SW-002-00
PAI-10-SW-002-00-F	PAI-10-SW-003-00	PAI-10-SW-003-00-F
PAI-10-SW-004-00	PAI-10-SW-004-00-F	PAI-10-SW-005-00
PAI-10-SW-005-00-F	PAI-10-SW-006-00	PAI-10-SW-006-00-F
PAI-10-SW-007-00	PAI-10-SW-007-00-F	

Overview

The sample set for CTO 053, MCRD Parris, SDG TTP06, consists of fourteen (14) aqueous environmental samples.

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 July 26, 28 and 29, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A.

All analyses with the exception of arsenic, mercury, lead, selenium and thallium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Aqueous)
aluminum[1]	45µg/L	225µg/L
barium	3.3µg/L	16.5µg/L
beryllium	0.2µg/L	1µg/L
cadmium[1]	2.4µg/L	12µg/L
calcium	59.0µg/L	295µg/L
copper[1]	3.0µg/L	15µg/L
iron[1]	14.2µg/L	71µg/L
magnesium	64.0µg/L	320µg/L
manganese[1]	4.1µg/L	20.5µg/L
mercury[1]	0.1µg/L	0.5µg/L
potassium[1]	194.4µg/L	972µg/L
selenium	1.1µg/L	5.5µg/L
silver	5.6µg/L	28µg/L
sodium	313.3µg/L	1566µg/L
thallium	3.2µg/L	16µg/L
zinc[1]	9.2µg/L	46µg/L

[1] Maximum concentration present in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Dilution factors were taken into account were determining blank contamination. Positive results < the action level for beryllium, copper, iron, selenium 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.

Notes

The CRDL %R for arsenic, calcium, chromium, lead, silver and vanadium were outside the 90-110% quality control limit. However, no validation actions were required.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. The Continuing Calibration Verification (CCV) Percent Recovery (%R) for lead was <90% quality control limit. The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for several analytes were outside the 90-110% quality control limits.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

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 TTP06

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Magnesium	
Antimony		Manganese	A[1]
Arsenic		Mercury	
Barium		Nickel	
Beryllium	A[1]	Potassium	
Cadmium		Selenium	A[1]
Calcium		Silver	
Chromium		Sodium	
Cobalt		Thallium	
Copper	A[1]	Vanadium	
Cyanide		Zinc	A[1]
Iron	A[1]		
Lead			

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

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-IDW-W
PAI-10-SW-016-01-F
PAI-10-SW-017-01-F
PAI-10-SW-018-01-F
PAI-10-GW-012-01-F
PAI-10-SW-016-01
PAI-10-SW-017-01
PAI-10-SW-018-01
PAI-123-IDW-W

Overview

The sample set for CTO 053, MCRD Parris Island, SDG TTP17, consists of ten (10) aqueous environmental samples.

All samples, with exception to those designated –F, were analyzed for Target Analyte List (TAL) metals. Samples designated –F were analyzed for dissolved TAL metals. Sample PAI-10-GW-012-01 was analyzed for Chloride, Cyanide, Fluoride, Hardness, Nitrate/Nitrite, Sulfate, Total Dissolved Solids (TDS), Total Organic Carbon (TOC) and Total Suspended Solids (TSS). Samples PAI-10-IDW-W and PAI-123-IDW-W were analyzed for Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total oil and grease, TDS, TSS and pH. Samples PAI-10-SW-016-01, PAI-10-SW-017-01 and PAI-10-SW-018-01 were analyzed for Cyanide, Hardness and TOC. The samples were collected by Tetra Tech NUS on September 11, 12 and 13, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A. Chloride, Fluoride and Sulfate analyses were conducted using EPA method 300.0. Cyanide analyses were conducted using SW 846 method 9012. Hardness analyses were conducted using EPA method 130.2. Nitrate/Nitrite analyses were conducted using EPA method 353.2. TDS analyses were conducted using EPA method 160.1. TOC analyses were conducted using SW 846 method 9060(modified). TSS analyses were conducted using EPA method 160.2. BOD analyses were conducted using EPA method 405.1. COD analyses were conducted using EPA method 410.4. Total oil and grease analyses were conducted using EPA method 413.1. pH analyses were conducted using EPA method 150.1.

All metals analyses with the exception of arsenic, mercury, lead, selenium and thallium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
• Holding Times
* • Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Holding Time

The holding time for pH analyses on sample PAI-123-IDW-W was marginally exceeded. The positive result reported for pH in the affected sample was qualified as estimated, "J".

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Aqueous)
Barium	3.8µg/L	19.0µg/L
Beryllium	0.2µg/L	1.0µg/L
Calcium	45.4µg/L	227µg/L
Cobalt	4.4µg/L	22.0µg/L
Lead	1.4µg/L	7.0µg/L
Magnesium	42.9µg/L	214.5µg/L
Manganese[1]	1.400µg/L	7.0µg/L
Sodium	271.1µg/L	1356µg/L
Thallium	2.0µg/L	10.0µg/L
Nitrate/Nitrite	0.018µg/L	0.09µg/L

(1) Maximum concentration found in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into account when determining blank contamination. Positive results < the action level for beryllium and cobalt were qualified, "U", as a result of blank contamination. No action was taken for the remaining analytes since either the results were greater than the action level or were nondetects.

Executive Summary

Laboratory Performance: The holding time for pH analyses on sample PAI-123-IDW-W was marginally exceeded. Several analytes were present in the laboratory method / preparation blanks.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech NUS
Gretchen A. Phipps

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris
SDG TTP17

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Magnesium	
Antimony		Selenium	
Arsenic		Silver	
Barium		Sodium	
Beryllium	A[1]	Thallium	
Cadmium		Vanadium	
Calcium		Zinc	
Chromium		Chloride	
Cobalt	A[1]	Fluoride	
Copper		Hardness	
Cyanide		Nitrate/Nitrite	
Iron		Sulfate	
Lead		TDS	
Magnesium		TOC	
Manganese		TSS	
Mercury		BOD	
Nickel		COD	
Total oil and grease		pH	J[1]

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

J[1] - Accept data, but qualify positive results as estimated, "J", as a result of holding time exceedance.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

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-02-IDW-S
PAI-10-IDW-S
PAI-10-SD-017-01
PAI-10-SS-015-01
PAI-10-SS-017-01
PAI-10-SD-002-02
PAI-03-IDW-S
PAI-10-SD-016-01
PAI-10-SD-018-01
PAI-10-SS-016-01

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-11-8-048

TO: DAVID BRAYACK **DATE:** NOVEMBER 23, 1998

FROM: DANA PIETO **CC:** DV FILE

SUBJECT: ORGANIC DATA VALIDATION – TCL VOAs, SVOAs, & PEST/PCBs
CTO 053, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG TTP17

SAMPLES: Waters\VOC:

PAI-10-GW-012-01	PAI-10-IDW-W	PAI-10-SW-016-01
PAI-10-SW-017-01	PAI-10-SW-018-01	PAI-123-IDW-W
TB980911	TB980912	

Waters\SVOC\PEST\PCB:

PAI-10-GW-012-01	PAI-10-IDW-W	PAI-10-SW-016-01
PAI-10-SW-017-01	PAI-10-SW-018-01	PAI-123-IDW-W

The sample set for the CTO 053, MCRD Parris Island, South Carolina, SDG TTP17, consists of six aqueous environmental samples and two trip blanks (designated TB). All samples were analyzed for target compound list (TCL) volatile, semivolatile, and pesticide/PCB organic compounds.

The samples were collected by Tetra Tech NUS on September 10th and 11th, 1998, and analyzed by Laucks Testing Laboratories. The volatile, semivolatile, and pesticide/PCB compounds were analyzed under Naval Facilities Engineering Service Center (NFESC) Quality Control/Quality Assurance criteria using the U.S. EPA SW-846 Methods 8260B, 8270C, and 8081A, respectively.

The data were evaluated according to the following parameters:

* • Holding times
• Initial and continuing calibrations
• Laboratory and field blank analyses

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below and the attached Table 1 summarizes the validation qualifications.

Volatiles

All positive results reported at concentrations less than the Contract Required Quantitation Limit (CRQL) were qualified as estimated, (J).

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 23, 1998 - PAGE 2

The following compounds were detected in the field quality control blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level
Acetone	4.2 µg/L	42 µg/L
Methylene chloride	0.3 µg/L	3.0 µg/L

Samples Affected: All.

Sample aliquot and dilution factors were taken into consideration during the application of the action level. Positive results for acetone and methylene chloride reported at concentrations below the detection limit were replaced with revised detection limits and qualified as nondetects, (U). It should be noted that field quality control blanks are not qualified for field quality control blank contamination.

The initial calibration Relative Response Factors (RRFs) for acetone, 2-butanone, and 2-hexanone were below the 0.05 quality control limit. This calibration noncompliance indicates a lack of consistency in instrumental responses which could lead to compromised quantitation of positive and nondetected results for the affected compounds. Positive results were qualified as estimated, (J), and nondetected results were considered to be unusable and were rejected, (UR).

The continuing calibration RRFs for acetone, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone were below the 0.05 quality control limit. This calibration noncompliance indicates a lack of consistency in instrumental responses which could lead to compromised quantitation of positive and nondetected results for the affected compounds. Positive results were qualified as estimated, (J), and nondetected results were considered to be unusable and were rejected, (UR).

Acetone and toluene exceeded the instrument's linear calibration range in sample PAI-10-IDW-W. The sample was diluted 10x. The results for only these compounds were transposed over to the original sample results and used in validation of this SDG.

Acetone exceeded the instrument's linear calibration range in sample PAI-123-IDW-W. The sample was diluted 5x. The result for only this compound was transposed over to the original sample result and used in validation of this SDG.

It should be noted that the trip blanks were labeled incorrectly on the database sheets and the appropriate corrections were made.

Semivolatiles

All positive results reported at concentrations less than the CRQL were qualified as estimated, (J).

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 5, 1998 - PAGE 3

The following semivolatile compound was detected in the laboratory method blank at the maximum concentration indicated below:

Compound	Maximum Concentration	Aqueous Action Level
Bis(2-ethylhexyl)phthalate	1.0 µg/L	10 µg/L

Samples Affected: All

Sample aliquot and dilution factors were taken into consideration during the application of the action level. Positive results for bis(2-ethylhexyl)phthalate reported at concentrations below the detection limit were replaced with the revised detection limits and qualified as nondetects, (U).

It should be noted that aniline, benzyl alcohol, benzoic acid, and 1,2-diphenylhydrazine were removed from the data sheets because they were not on the target compound list referenced in the laboratory specifications.

Pesticides

No problems were noted.

Executive Summary

***Laboratory Performance*:** The volatile initial and continuing calibration RRFs less than the 0.05 quality control limit were reported for acetone, 2-butanone, 4-methyl-2-pentanone, and 2-hexanone. Bis(2-ethylhexyl)phthalate was detected in the semivolatile laboratory method blanks

Other Factors Affecting Data Quality: Acetone and methylene chloride were detected in the volatile field quality control blanks.

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 5, 1998 - PAGE 4

The data for these analyses were reviewed with reference to method-specific quality control criteria, the "National Functional Guidelines for Organic Data Evaluation" and the NFESC Interim Guidance Document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (February 1996).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Dana L. Pieto

Tetra Tech NUS
Data Validator

Joseph A. Samchuck

Tetra Tech NUS
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

PARRIS ISLAND
SDG NO. TTP17

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA			SVOA		PEST/PCB
PAI-10-GW-012-01	A^1	J^3	$R^{2,3}$	A^3		
PAI-10-IDW-W	A^1	$J^{2,3}$	R^3	A^3	J^3	
PAI-10-SW-016-01	A^1		$R^{2,3}$	A^3		
PAI-10-SW-017-01	A^1		$R^{2,3}$	A^3		
PAI-10-SW-018-01		J^3	$R^{1,2,3}$	A^3		
PAI-123-IDW-W	$A^{1,2}$	$J^{2,3}$	R^3	A^3	J^3	
TB980911		$J^{1,3}$	$R^{2,3}$			
TB980912		$J^{1,3}$	$R^{2,3}$			

If field is left blank, the qualifier is A - accept all data.

A^1 - Accept data, but change positive results for acetone to revised detection limits and qualify as nondetected, (U), as a result of field quality control blank contamination.

A^2 - Accept data, but change positive results for methylene chloride to revised detection limits and qualify as nondetected, (U), as a result of field quality control blank contamination.

A^3 - Accept data, but change positive results for bis(2-ethylhexyl)phthalate to revised detection limits and qualify as nondetected, (U), as a result of laboratory method blank contamination.

J^1 - Accept data, but qualify positive results for acetone as estimated (J), as a result of initial and/or continuing calibration RRFs below 0.05.

J^2 - Accept data, but qualify positive results for 2-butanone as estimated (J), as a result of initial and/or continuing calibration RRFs below 0.05.

J^3 - Accept data, but qualify positive results less than the CRQL as estimated (J).

R^1 - Reject nondetected results (UR) for acetone as a result of initial and/or continuing calibration RRFs less than 0.05.

R^2 - Reject nondetected results (UR) for 2-butanone as a result of initial and/or continuing calibration RRFs less than 0.05.

R^3 - Reject nondetected results (UR) for 4-methyl-2-pentanone and 2-hexanone as a result of initial and/or continuing calibration RRFs less than 0.05.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory and should not be considered present.
J	-	Positive result is estimated as result of a value below the CRQL or a technical noncompliance.
UR	-	Rejected as a result of a technical noncompliance.

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's $r < 0.995$
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)

Tetra Tech NUS

INTERNAL CORRESPONDENCE

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-10-8-242

TO:	**D. BRAYACK**	**DATE:**	**OCTOBER 30, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – APPENDIX IX, DISSOLVED APPENDIX IX AND MISCELLANOUS PARAMETERS**
CTO 053 - MCRD PARRIS ISLAND
SDG – TTP14

SAMPLES: 4/ Aqueous /

PAI-10-GW-009-01	PAI-10-GW-009-01-F
PAI-10-GW-011-01	PAI-10-GW-011-01-F

Overview

The sample set for CTO 053, MCRD Parris Island, SDG TTP14, consists of four (4) aqueous environmental samples.

Sample PAI-10-GW-011-01 was analyzed for Appendix IX metals, Chloride, Cyanide, Fluoride, Hardness, Hexavalent Chromium, Nitrate/Nitrite, Sulfate, Total Dissolved Solids (TDS), Total Organic Carbon (TOC) and Total Suspended Solids (TSS). Sample PAI-10-GW-009-01 was analyzed for Appendix IX metals and Cyanide. Samples PAI-10-GW-009-01-F and PAI-10-GW-011-01-F were analyzed for dissolved Appendix IX metals. The samples were collected by Tetra Tech NUS on August 24 and September 1, 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 SW 846 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
- 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 Inital 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 / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Aqueous)
Barium	2.7µg/L	13.5µg/L
Beryllium	0.4µg/L	2.0µg/L
Nitrate/Nitrite	0.02µg/L	0.10µg/L
Thallium	1.9µg/L	9.5µg/L
TDS[1]	3.0 mg/L	15.0 mg/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 were determining blank contamination. Positive results < the action level for beryllium 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 Recoveries (%R's) for mercury and zinc were outside the 80-120% quality control limit. However, no validation actions were required per Regional guidance.

The CCV %R for thallium in the CCV 33 was >110% quality control limit. However, no validation action was required as all samples results reported for thallium were nondetected.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. The ICV %R for Hexavalent Chromium analyses 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 TTP14

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Magnesium	
Antimony		Selenium	
Arsenic		Silver	
Barium		Sodium	
Beryllium	A[1]	Thallium	
Cadmium		Vanadium	
Calcium		Zinc	
Chromium		Chloride	
Cobalt		Fluoride	
Copper		Hardness	
Cyanide		Hexavalent Chromium	J[1]
Iron		Nitrate/Nitrite	
Lead		Sulfate	
Magnesium		TDS	
Manganese		TOC	
Mercury		TSS	
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 nondetected results as estimated, "UJ", as a result of calibration noncompliance.

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-008-00D
PAI-10-SW-010-00
PAI-10-SW-013-00
SOURCE WATER SWMU 01,02,03
TB-083198
PAI-10-SW-008-00
PAI-10-SW-009-00
PAI-10-SW-012-00
SOURCE WATER SWMU 10
TB-081298

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

PITT-09-8-036

TO: D. BRAYACK **DATE:** OCTOBER 13, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS
CTO 053 - MCRD PARRIS
SDG - TTP05

SAMPLES: 7/Soil /

PAI-10-SD-001-01 PAI-10-SD-002-01 PAI-10-SD-003-01
PAI-10-SD-004-01 PAI-10-SD-005-01 PAI-10-SD-006-01
PAI-10-SD-007-01

10/Soil/

PAI-10-SS-001-01 PAI-10-SS-002-01 PAI-10-SS-003-01
PAI-10-SS-004-01 PAI-10-SS-005-01 PAI-10-SS-006-01
PAI-10-SS-007-01 PAI-10-SS-008-01 PAI-10-SS-009-01
PAI-10-SS-010-01

Overview

The sample set for CTO 053, MCRD Parris, SDG TTP05, consists of seven (7) sediment environmental samples and ten (10) soil environmental samples.

The samples were analyzed for Target Analyte List (TAL) metals. The samples were collected by Tetra Tech NUS on July 27 - 29, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A.

All analyses with the exception of arsenic, mercury, lead, selenium and thallium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (Soil)
aluminum	40.6µg/L	20.3 mg/kg
barium[1]	1.180 mg/kg	5.9 mg/kg
beryllium	0.3µg/L	.15 mg/kg
calcium	57.9µg/L	28.95 mg/kg
cobalt	3.4µg/L	1.7 mg/kg
copper[1]	0.340 mg/kg	1.7 mg/kg
iron[1]	1.230 mg/kg	6.15 mg/kg
lead	1.2µg/L	0.6 mg/kg
magnesium	43.2µg/L	21.6 mg/kg
manganese[1]	1.90 mg/kg	9.5 mg/kg
sodium[1]	8.160 mg/kg	40.8 mg/kg
thallium[1]	0.240 mg/kg	1.2 mg/kg
vanadium[1]	0.290 mg/kg	1.45 mg/kg
zinc[1]	1.270 mg/kg	6.35 mg/kg

[1] Maximum concentration present in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Dilution factors, percent solids and samples aliquots were taken into account were determining blank contamination. Positive results < the action level for barium, beryllium, cobalt, copper, manganese, sodium, thallium and zinc have been qualified , "U", as a result of blank contamination. No action was taken for the remaining analtyes since either the results were greater than the action level or were nondetects.

Notes

The CRDL %R for arsenic, chromium, lead, mercury and nickel were outside the 90-110% quality control limit. However, no validation actions were required.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for several analytes were outside the 90-110% quality control limits.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

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 TTP05

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Magnesium	
Antimony		Manganese	A[1]
Arsenic		Mercury	
Barium	A[1]	Nickel	
Beryllium	A[1]	Potassium	
Cadmium		Selenium	
Calcium		Silver	
Chromium		Sodium	A[1]
Cobalt	A[1]	Thallium	A[1]
Copper	A[1]	Vanadium	
Cyanide		Zinc	A[1]
Iron			
Lead			

If the field is left blank, the qualifier is A - Accept data.

A[1] - Accept data, but qualify results less than the blank action level as nondetected, "U".

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-11-8-034

TO: DAVID BRAYACK **DATE:** DECEMBER 14, 1998

FROM: DANA PIETO **CC:** DV FILE

SUBJECT: ORGANIC DATA VALIDATION – TCL VOAs, SVOAs, & PEST/PCBs
CTO 053, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG TTP15

SAMPLES: Waters\VOC:

PAI-10-GW-006-01	PAI-10-GW-007-01	PAI-10-GW-007-01D
PAI-10-GW-008-01	PAI-10-GW-009-01	PAI-10-GW-010-01
PAI-10-GW-013-01	TB980901	TB980902B
TB980903		

Waters\SVOC\PEST\PCB:

PAI-10-GW-006-01	PAI-10-GW-007-01	PAI-10-GW-007-01D
PAI-10-GW-008-01	PAI-10-GW-009-01	PAI-10-GW-010-01
PAI-10-GW-013-01		

The sample set for the CTO 053, MCRD Parris Island, South Carolina, SDG TTP15, consists of seven aqueous environmental samples and three trip blanks (designated TB). All samples were analyzed for target compound list (TCL) volatile, semivolatile, and pesticide/PCB organic compounds. One field duplicate pair (PAI-10-GW-007-01/PAI-10-GW-007-01D) was included in this SDG.

The samples were collected by Tetra Tech NUS on August 31st, and September 1st, and 2nd, 1998, and analyzed by Laucks Testing Laboratories. The volatile, semivolatile, and pesticide/PCB compounds were analyzed under Naval Facilities Engineering Service Center (NFESC). All volatile, semivolatile, and pesticide analyses were conducted using the U.S. EPA SW-846 Method 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).

The following compounds were detected in the field quality control blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level
Acetone	3.7 µg/L	370 µg/L
Methylene chloride	1.1 µg/L	11 µg/L
2-Butanone	0.6 µg/L	6.0 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 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). No positive results were reported for methylene chloride and 2-butanone. It should be noted that field quality control blanks are not qualified for field quality control blank contamination.

The initial calibration Relative Response Factor (RRF) 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 RRF 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).

The continuing calibration percent difference (%D) exceeded 50% for 2-hexanone. No action was warranted because the results were qualified due to a more severe noncompliance.

Acetone exceeded the instrument's linear calibration range in samples PAI-10-GW-008-01 and PAI-10-GW-010-01. These samples were diluted 10x. The results for only this compound were transposed over to the original sample results 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).

The aqueous semivolatile holding time until extraction exceeded the 7-day limit by 9 days in the re-extracted sample PAI-10-GW-009-01RE. The holding time until extraction exceeded the 7-day limit by 8 days in re-extracted samples PAI-10-GW-010-01RE and PAI-10-GW-013-01RE. No action is warranted because the original sample results were used in validation of this SDG.

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	24 µg/L	240 µg/L

Samples Affected: All

Sample aliquot and dilution factors were taken into consideration during the application of the action level. Positive results for the compound reported at concentrations below the detection limit were replaced with 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. The volatile continuing calibration %D exceeded 50% for 2-hexanone. The semivolatile aqueous holding time until extraction exceeded the 7-day limit in several re-extracted samples. Methylene chloride was detected in the volatile laboratory method blanks. Bis(2-ethylhexyl)phthalate was detected in the semivolatile laboratory method blanks

Other Factors Affecting Data Quality: Acetone, methylene chloride, and 2-butanone were detected in the volatile field quality control blanks..

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

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. TTP15

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA			SVOA		PEST/PCB
PAI-10-GW-006-01			$R^{1,2}$	A^2		
PAI-10-GW-007-01	A^1	J^3	R^2	A^2		
PAI-10-GW-7-01D	A^1	J^3	R^2	A^2		
PAI-10-GW-008-01		$J^{1,3}$	R^2	A^2		
PAI-10-GW-009-01	A^1		R^2	A^2		
PAI-10-GW-010-01		$J^{1,3}$	$R^{3,4}$	A^2	J^3	
PAI-10-GW-013-01	A^1	J^3	$R^{3,4}$	A^2		
TB980901		$J^{1,3}$	R^2			
TB980902B		$J^{1,2,3}$	R^4			
TB980903		J^3	$R^{1,3,4}$			

If field is left blank, the qualifier is A - accept all data.

A^1 - Accept data, but qualify positive results for acetone as nondetected (U), or change positive results for acetone to revised detection limits and qualify as nondetected, (U), as a result of laboratory method and/or field quality control blank contamination.

A^2 - 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 continuing calibration RRFs below 0.05.

J^2 - Accept data, but qualify positive results for 2-butanone as estimated (J), as a result of 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 continuing calibration RRFs less than 0.05.

R^2 - Reject nondetected results (UR) for 2-butanone, 4-methyl-2-pentanone, and 2-hexanone as a result of continuing calibration RRFs less than 0.05.

R^3 - Reject nondetected results (UR) for 2-butanone as a result of continuing calibration RRFs less than 0.05.

R^4 - Reject nondetected results (UR) for 4-methyl-2-pentanone and 2-hexanone as a result of continuing calibration RRFs less than 0.05.

Data Qualifier Key:

U	-	Value is a nondetect as reported by the laboratory and should not be considered present.
J	-	Positive result is estimated as result of a value below the CRQL or a technical noncompliance.
UR	-	Rejected as a result of a technical noncompliance.

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's $r < 0.995$
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues)
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-11-8-033

TO:	**DAVE BRAYACK**	**DATE:**	**DECEMBER 14, 1998**
FROM:	**JUSTIN ORBICH**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB CTO 053, MCRD PARRIS ISLAND SDG TTP13**		
SAMPLES:	7/Aqueous		

PAI-10-GW-001-01
PAI-10-GW-002-01
PAI-10-GW-003-01
PAI-10-GW-004-01
PAI-10-GW-005-01
TB-082198
TB-082798

OVERVIEW

The sample set for CTO 053, SDG TTP13, MCRD Parris Island consists of seven (7) 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. There were no field duplicate pairs in this SDG.

The samples were collected on August 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 was 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).

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 14, 1998 – PAGE 2

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).

The following contaminants were detected in the quality control blanks at the following maximum concentration:

Analyte	Concentration	Aqueous Action Level
Methylene chloride[1]	8.4µg/L	84.0µg/L
Acetone[1]	1.6µg/L	16.0µg/L
Chloromethane[1]	0.3µg/L	1.5µg/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, dilution factors, and percent moisture were taken into consideration during the application of all action levels. The positive results for methylene chloride, acetone, and chloromethane were qualified according to 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.

Sample aliquots, dilution factors, and percent moisture were taken into consideration during the application of all action levels. The positive results for bis(2-ethylhexyl)phthalate were qualified according to the blank action table.

Several volatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 14, 1998 – PAGE 3

PESTICIDE FRACTION

All quality control parameters were met for this fraction.

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 14, 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). Bis(2-ethylhexyl)phthalate was detected as blank contamination in the method blank.

Other Issues Affecting Data Quality: Methylene chloride, acetone, and chloromethane were detected as blank contamination in the field quality control blanks.

MEMO TO: **DAVE BRAYACK**
DATE: **DECEMBER 14, 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 14, 1998 – PAGE 6

MCRD PARRIS ISLAND
SDG TTP13

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PEST/PCB
PAI-10-GW-001-01	R^1	A^3 J^1	
PAI-10-GW-002-01	J^1 R^1	A^3	
PAI-10-GW-003-01	$A^{1,2}$ R^1	A^3	
PAI-10-GW-004-01	A^2 J^1 R^1		
PAI-10-GW-005-01	A^1 R^1	A^3	
TB-082198	$J^{1,2}$ R^1		
TB-082798	J^2 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.

A^1 - Accept data, but qualify positive results as nondetected, (U), as a result of blank contamination for acetone.

A^2 - Accept data, but qualify positive results as nondetected, (U), as a result of blank contamination for methylene chloride.

A^3 - Accept data, but qualify positive results as nondetected, (U), as a result of blank contamination for bis(2-ethylhexyl)phthalate.

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 14, 1998 – PAGE 7

Data Qualifier Definitions:

U - Compound is considered nondetected as reported by the laboratory or was occupied as a blank contamination.

UR - Compound was rejected due to various technical noncompliances.

UJ - Nondetected results is qualified as estimated due to various technical noncompliances.

J - Compound is considered to be present, but reported at an estimated value.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-11-8-105

TO:	**D. BRAYACK**	**DATE:**	**NOVEMBER 11, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – SEM/AVS METALS**
CTO 053 - MCRD PARRIS ISLAND
SDG - TTP09

SAMPLES: 8/ Sediments /

PAI-10-SD-008-01	PAI-10-SD-009-01
PAI-10-SD-010-01	PAI-10-SD-011-01
PAI-10-SD-012-01	PAI-10-SD-013-01
PAI-10-SD-014-01	PAI-10-SD-015-01

Overview

The sample set for CTO 053, MCRD Parris Island, SDG TTP09, consists of eight (8) sediment environmental samples.

All samples were analyzed for Simultaneously Extracted Metals (SEM) and Acid Volatile Sulfide. The samples were collected by Tetra Tech NUS on August 10, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory preparation blank at the following maximum concentrations:

Samples affected: All

Analyte	Maximum Concentration	Action Level (sediment)
Cadmium	0.002µmoles/g	0.001µmoles/g
Copper	0.003µmoles/g	0.015µmoles/g
Lead	0.003µmoles/g	0.015µmoles/g
Zinc	0.052µmoles/g	0.26µmoles/g
Sulfide	1.00µmoles/g	5.0µmoles/g

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 cadmium, lead, sulfide 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

It should be noted that the SEM/AVS ratios have changes as a result of samples qualified for blank contamination.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory preparation blank.

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 TTP09

Table 1 - RECOMMENDATION SUMMARY

SEM/AVS	
AVS	A[1]
Cadmium	A[1]
Copper	
Mercury	
Nickel	
Lead	A[1]
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".

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-8-065

TO: DAVID BRAYACK

DATE: NOVEMBER 6, 1998

FROM: DANA PIETO

CC: DV FILE

SUBJECT: ORGANIC DATA VALIDATION – TCL VOAs, SVOAs, PEST/PCBs, & HERBs
CTO 053, MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG TTP14

SAMPLES: Waters\VOC:

PAI-10-GW-009-01 PAI-10-GW-011-01 TB980902

Waters\SVOC\PEST\PCB:

PAI-10-GW-009-01 PAI-10-GW-011-01

The sample set for the CTO 053, MCRD Parris Island, South Carolina, SDG TTP14, consists of two aqueous environmental samples and one trip blank (designated TB). All samples were analyzed for Appendix IX volatile, semivolatile, pesticide/PCB, and herbicide organic compounds.

The samples were collected by Tetra Tech NUS on August 24th, and September 1st, 1998, and analyzed by Laucks Testing Laboratories. The volatile, semivolatile, pesticide/PCB, and herbicide compounds were analyzed under Naval Facilities Engineering Service Center (NFESC). All volatile, semivolatile, and pesticide analyses were conducted using the U.S. EPA SW-846 Method 8260B, 8270C, 8081A, and 8151A, respectively.

The data were evaluated according to the following parameters:

- Holding times
- Initial and continuing calibrations
- Laboratory and field blank analyses

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data usability are discussed below and the attached Table 1 summarizes the validation qualifications.

Volatiles

All positive results reported at concentrations less than the Contract Required Quantitation Limit (CRQL) were qualified as estimated, (J).

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 6, 1998

The following compounds were detected in the field quality control blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Aqueous Action Level
Methylene chloride	0.3 µg/L	3.0 µg/L
2-Butanone	1.2 µg/L	12 µg/L
Acrolein	0.5 µg/L	2.5 µg/L

Samples Affected: All.

Sample aliquot and dilution factors were taken into consideration during the application of the action level. No positive results were reported for these compounds, therefore, no action is warranted. 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, 2-hexanone, acrolein, acrylonitrile, methacrylonitrile, and methyl methacrylate 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, 2-hexanone, acrolein, acrylonitrile, methacrylonitrile, methyl methacrylate, and vinyl acetate 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).

Semivolatiles

The aqueous holding time until extraction exceeded the 7-day limit by 9 days in re-extracted sample PAI-10-GW-009-01RE. The holding time until extraction exceeded the 7-day limit by 10 days in re-extracted sample PAI-10-GW-011-01RE. No action is warranted because the original samples were used in validation of this SDG.

The following semivolatile compounds were detected in the laboratory method blank at the maximum concentration indicated below:

Compound	Maximum Concentration	Aqueous Action Level
Bis(2-ethylhexyl)phthalate	20 µg/L	200 µg/L
Di-n-butylphthalate	1.0 µg/L	10 µg/L

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 6, 1998

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). No positive results were reported for di-n-butylphthalate

It should be noted that kepone is missing from the Form Is and the database sheets.

It should be noted that 3,3'-dichlorobenzidine was reported twice on the Form Is.

The initial and continuing calibration RRFs for 4-nitroquinoline-1-oxide 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. Nondetected results were considered to be unusable and were rejected, (UR).

The continuing calibration percent differences (%Ds) exceeded 50% for 4-nitroquinoline-1-oxide and 2,2'-oxybis(1-chloropropane). Nondetected results for 2,2'-oxybis(1-chloropropane) were qualified as estimated, (UJ). Results for 4-nitroquinoline-1-oxide were already qualified due to a more severe noncompliance.

Pesticides

No problems were noted.

Herbicides

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, 2-hexanone, acrolein, acrylonitrile, methacrylonitrile, methyl methacrylate, and vinyl acetate. The semivolatile aqueous holding time until extraction exceeded the 7-day limit in the re-extracted samples. The semivolatile initial and continuing calibration RRFs less than the 0.05 quality control limit were reported for 4-nitroquinoline-1-oxide. The continuing calibration %D exceeded 50% for 4-nitroquinoline-1-oxide and 2,2'-oxybis(1-chloropropane). Bis(2-ethylhexyl)phthalate and di-n-butylphthalate were detected in the semivolatile laboratory method blanks.

Other Factors Affecting Data Quality: Methylene chloride, 2-butanone, and acrolein were detected in the volatile field quality control blanks.

MEMO TO: DAVID BRAYACK
DATE: NOVEMBER 6, 1998

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

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. TTP14

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PEST/PCB	HERB
PAI-10-GW-009-01	$R^{3,4,5,6}$	A^1 J^4 R^7		
PAI-10-GW-011-01	$J^{1,5}$ $R^{1,2}$	J^4 R^7		
TB980902	$J^{2,3,5}$ $R^{4,6}$			

If field is left blank, the qualifier is A - accept all data.

A^1 - 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 a continuing calibration RRF below 0.05.

J^2 - Accept data, but qualify positive results for 2-butanone as estimated (J), as a result of a continuing calibration RRF below 0.05.

J^3 - Accept data, but qualify positive results for acrolein as estimated (J), as a result of a continuing calibration RRF below 0.05.

J^4 - Accept data, but qualify nondetected results for 2,2'-oxybis(1-chloropropane) as estimated (UJ), as a result of a continuing calibration %D greater than 50%.

J^5 - 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 a continuing calibration RRF less than 0.05.

R^2 - Reject nondetected results (UR) for acrolein, acrylonitrile, methacrylonitrile, methylmethacrylate, and vinyl acetate as a result of continuing calibration RRFs less than 0.05.

R^3 - Reject nondetected results (UR) for 2-butanone as a result of a continuing calibration RRF less than 0.05.

R^4 - Reject nondetected results (UR) for acetone, 4-methyl-2-pentanone, and 2-hexaone as a result of continuing calibration RRFs less than 0.05.

R^5 - Reject nondetected results (UR) for acrolein as a result of a continuing calibration RRF less than 0.05.

R^6 - Reject nondetected results (UR) for acrolein, acrylonitrile, and methacrylonitrile as a result of

continuing calibration RRFs less than 0.05.

R^7 - Reject nondetected results (UR) for 4-nitroquinoline-1-oxide as a result of initial and 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.
UJ	-	Nondetected result is considered to be estimated as a result of a technical noncompliance.
UR	-	Rejected as a result of a technical noncompliance.

Qualifier Codes:

a	=	Lab Blank Contamination
b	=	Field Blank Contamination
c	=	Calibration (i.e., % RSDs, %Ds, ICVs, CCVs, RPDs, RRFs, etc.) Noncompliance
d	=	MS/MSD Noncompliance
e	=	LCS/LCSD Noncompliance
f	=	Lab Duplicate Imprecision
g	=	Field Duplicate Imprecision
h	=	Holding Time Exceedance
i	=	ICP Serial Dilution Noncompliance
j	=	GFAA PDS - GFAA MSA's $r < 0.995$
k	=	ICP Interference - include ICSAB % R's
l	=	Instrument Calibration Range Exceedance
m	=	Sample Preservation
n	=	Internal Standard Noncompliance
o	=	Poor Instrument Performance (i.e., base-time drifting)
p	=	Uncertainty near detection limit (< 2 x IDL for inorganics and < CRQL for organics)
q	=	Other problems (can encompass a number of issues).
r	=	Surrogates Recovery Noncompliance
s	=	Pesticide/PCB Resolution
t	=	% Breakdown Noncompliance for DDT and Endrin
u	=	Pest/PCD % between columns for positive results.
v	=	Non-linear calibrations, tuning $r < 0.995$ (correlation coefficient)

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-10-8-238

TO: **D. BRAYACK** **DATE:** **OCTOBER 30, 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 – TTP13

SAMPLES: 10/ Aqueous /

PAI-10-GW-001-01	PAI-10-GW-001-01-F
PAI-10-GW-002-01	PAI-10-GW-002-01-F
PAI-10-GW-003-01	PAI-10-GW-003-01-F
PAI-10-GW-004-01	PAI-10-GW-004-01-F
PAI-10-GW-005-01	PAI-10-GW-005-01-F

Overview

The sample set for CTO 053, MCRD Parris Island, SDG TTP13, consists of ten (10) aqueous environmental samples.

The samples, with exception to those designated –F, were analyzed for Target Analyte List (TAL) metals, Chloride, Cyanide, Fluoride, Hardness, Nitrate/Nitrite, Sulfate, Total Dissolved Solids (TDS), Total Organic Carbon (TOC) and Total Suspended Solids (TSS). Samples PAI-10-GW-001-01 and PAI-10-GW-002-01 were also analyzed for Hexavalent Chromium. The samples designated –F were analyzed for dissolved Target Analyte List (TAL) metals. The samples were collected by Tetra Tech NUS on August 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 SW 846 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
• 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 Continuing Calibration Verification (CCV) Percent Recoveries (%R's) for lead in CCV's 9, 10 and 11 were <90% quality control limit. All samples except PAI-10-GW-001-01 and PAI-01-GW-001-01-F were affected. The nondetected results reported for lead in the affected samples were qualified as estimated, "UJ".

The Initial Calibration Verification (ICV) Percent Recovery (%R) for Nitrate/Nitrite analyses was >110% quality control limit. The positive results reported for Nitrate/Nitrite analyses were 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	28.5µg/L	142.5µg/L
Antimony	19.4µg/L	97.0µg/L
Barium	2.1µg/L	10.5µg/L
Beryllium	0.2µg/L	1.0µg/L
Calcium	30.3µg/L	151.5µg/L
Chromium	7.2µg/L	36.0µg/L
Iron	9.5µg/L	47.5µg/L
Magnesium	45.3µg/L	226.5µg/L
Potassium	179.9µg/L	899.5µg/L
Silver[1]	35.100µg/L	175.5µg/L
Sodium	108.4µg/L	542µg/L
Thallium	1.9µg/L	9.5µg/L
Zinc[1]	6.000µg/L	30.0µg/L
Nitrate/Nitrite	0.02µg/L	0.10µg/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, chromium, zinc 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 Recoveries (%R's) for chromium, manganese and mercury were 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. The ICV %R for Nitrate/Nitrite analyses was >110% quality control limit. Several CCV %R's for lead were <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)."

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 TTP13

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A[1]		Magnesium		
Antimony			Selenium		
Arsenic			Silver		
Barium			Sodium		
Beryllium	A[1]		Thallium		
Cadmium			Vanadium		
Calcium			Zinc	A[1]	
Chromium	A[1]		Chloride		
Cobalt			Fluoride		
Copper			Hardness		
Cyanide			Hexavalent Chromium		
Iron			Nitrate/Nitrite	A[1]	J[1]
Lead		J[1]	Sulfate		
Magnesium			TDS		
Manganese			TOC		
Mercury			TSS		
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 or nondetected results as estimated, "J" or "UJ", respectively, as a result of calibration noncompliance.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-09-8-098

TO: **D. BRAYACK** **DATE:** **SEPTEMBER 15, 1998**

FROM: **GRETCHEN PHIPPS** **COPIES:** **DV FILE**

SUBJECT: **MISCELLANEOUS DATA VALIDATION - PH AND TOC**
CTO 020 - MCRD PARRIS ISLAND
SDG - U06089

SAMPLES: 9/ Soil /

PAI-02-SD-A-01	PAI-01-SD-002-01	PAI-01-SD-003-01
PAI-01-SD-003-01D	PAI-01-SD-004-01	PAI-10-SD-009-01
PAI-01-SD-010-01	PAI-01-SD-011-01	PAI-10-SD-012-01

Overview

The sample set for CTO 020, MCRD Parris Island, SDG U06089, consists of nine (9) soil environmental sample. One (1) field duplicate pair (PAI-01-SD-003-01 / PAI-01-SD-003-01D) were included within this SDG.

The samples were analyzed for pH and Total Organic Carbon (TOC) . The samples were collected by Tetra Tech NUS on June 10, 1998 and analyzed by RECRA Labnet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The pH analyses were conducting using SW 846 method 9045C. The TOC analyses were conducted using the Walkley-Black method.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Notes

Sample PAI-01-SD-A-01 was incorrectly labeled PAI-01-001-01 on all laboratory data.

A comparison of the field duplicate pair (PAI-01-SD-003-01 / PAI-01-SD-003-01D) is included in Appendix C. However, no validation action is required per regional guidance.

Executive Summary

Laboratory Performance: None.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Tetra Tech, NUS
Gretchen A. Phipps

Tetra Tech, NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Data
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

MCRD Parris, Island
SDG U06089

Table 1 - RECOMMENDATION SUMMARY

pH
TOC

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS INTERNAL CORRESPONDENCE

TO: D. BRAYACK **DATE:** OCTOBER 30, 1998

FROM: TERRI L. SOLOMON **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION – TAL METALS, ACID VOLATILE SULFIDE / SIMULTANEOUSLY EXTRACTED METALS, TOTAL ORGANIC CARBON, CYANIDE, HEXAVALENT CHROMIUM, pH
CTO 020/053 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – TTP11

SAMPLES: 2/Sediment/

PAI-10-SD-014-02 PAI-UNKNOWN

Overview

The sample set for MCRD Parris Island, SDG TTP11, consists of two (2) soil environmental samples. No field duplicate pairs were included within this SDG.

All samples were analyzed for TAL metals, Acid Volatile Sulfide (AVS), Simultaneously Extracted Metals (SEM), total organic carbon, cyanide, hexavalent chromium and pH. The samples were collected by Tetra Tech NUS on August 13, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The samples were analyzed using SW-846 methodologies. A 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.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the laboratory / preparation blanks at the following maximum concentrations:

Samples affected: TAL metals

Analyte	Maximum Concentration	Action Level (sediment)
aluminum[1]	6.730 mg/kg	33.65 mg/kg
beryllium	0.2 ug/L	0.10 mg/kg
calcium[1]	39.190 mg/kg	195.95 mg/kg
copper[1]	0.280 mg/kg	1.4 mg/kg
iron[1]	0.900 mg/kg	4.5 mg/kg
magnesium	34.1 ug/L	17.05 mg/kg
manganese	1.8 ug/L	0.9 mg/kg
silver	4.3 ug/L	2.15 mg/kg
sodium[1]	13.940 mg/kg	69.7 mg/kg
zinc[1]	2.040 mg/kg	10.2 mg/kg

Samples affected: SEM/AVS

Analyte	Maximum Concentration	Action Level (sediment)
cadmium	0.0002 umoles/g	0.001 umoles/g
copper	0.003 umoles/g	0.015 umoles/g
lead	0.003 umoles/g	0.015 umoles/g
zinc	0.052 umoles/g	0.26 umoles/g
sulfide (AVS)	1.0 umoles/g	5.0 umoles/g

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 sodium and sulfate 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 cyanide was < 30% quality control limit. The nondetected results reported for cyanide were qualified as rejected, "UR".

Notes

It should be noted that the SEM / AVS ratios have changed as a result of samples qualified for blank contamination.

Total organic carbon was present in the laboratory blank as a result of 21.0 mg/L (0.0 % TOC). However, no validation actions were required as no sample results were impacted by this noncompliance.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory / preparation blanks.

Other Factors Affecting Data Quality: The MS %R for cyanide 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 TTP11

TABLE 1 - RECOMMENDATION SUMMARY

aluminum		nickel	
antimony		potassium	
arsenic		selenium	
barium		silver	
beryllium		sodium	A[1]
cadmium		thallium	
calcium		vanadium	
chromium		zinc	
cobalt		AVS	A[1]
copper		pH	
iron		cyanide	R[1]
lead		hexavalent chromium	
magnesium		TOC	
manganese			
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

PITT-09-8-074

TO: D. BRAYACK **DATE:** OCTOBER 13, 1998

FROM: TERRI L. SOLOMON **COPIES:** DV FILE

SUBJECT: INORGANIC DATA VALIDATION – ACID VOLATILE SULFIDE / SIMULTANEOUSLY EXTRACTED METALS
CTO 053 - MCRD PARRIS ISLAND, SOUTH CAROLINA
SDG – TTP05

SAMPLES: 7/Sediment/

PAI-10-SD-001-01	PAI-10-SD-002-01	PAI-10-SD-003-01	PAI-10-SD-004-01
PAI-10-SD-005-01	PAI-10-SD-006-01	PAI-10-SD-007-01	

Overview

The sample set for MCRD Parris Island, SDG TTP05, consists of seven (7) soil environmental samples. No field duplicate pairs were included within this SDG.

All samples were analyzed for Acid Volatile Sulfide (AVS) and Simultaneously Extracted Metals (SEM). The samples were collected by Tetra Tech NUS on July 27 and 29, 1998 and analyzed by Recra LabNet - Chicago under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. A CLP-like deliverable was provided.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Recoveries
• Laboratory Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Laboratory Blank Analyses

The following contaminants were detected in the preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level (sediment)
Sulfide (AVS)	0.4 umoles/g	2.0 umoles/g
copper	0.002 umoles/g	0.010 umoles/g
zinc	0.05 umoles/g	0.25 umoles/g

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 sulfide 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.

Notes

It should be noted that the SEM / AVS ratios have changed as a result of samples qualified for blank contamination

Executive Summary

Laboratory Performance: Several analytes were present in the 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
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 TTP05

TABLE 1 - RECOMMENDATION SUMMARY

sulfide	A[1]
cadmium	
copper	
mercury	
nickel	
lead	
zinc	A[1]

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.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-09-8-038

TO: D. BRAYACK **DATE:** OCTOBER 13, 1998

FROM: GRETCHEN PHIPPS **COPIES:** DV FILE

SUBJECT: MISCELLANEOUS DATA VALIDATION - PH, CYANIDE, TOC AND HEXAVANLENT CHROMIUM
CTO 053 - MCRD PARRIS
SDG - TTP05

SAMPLES: 8/Sediment/

PAI-10-SD-001-01	PAI-10-SD-002-01	PAI-10-SD-002-01D
PAI-10-SD-003-01	PAI-10-SD-004-01	PAI-10-SD-005-01
PAI-10-SD-006-01	PAI-10-SD-007-01	

10/Soil/

PAI-10-SS-001-01	PAI-10-SS-002-01	PAI-10-SS-003-01
PAI-10-SS-004-01	PAI-10-SS-005-01	PAI-10-SS-006-01
PAI-10-SS-007-01	PAI-10-SS-008-01	PAI-10-SS-009-01
PAI-10-SS-010-01		

Overview

The sample set for CTO 053, MCRD Parris, SDG TTP05, consists of eight (8) sediment environmental samples and ten (10) soil environmental samples. One (1) field duplicate pair (PAI-10-SD-002-01 / PAI-10-SD-002-01D) was included within this SDG.

All samples were analyzed for pH, cyanide and Total Organic Carbon (TOC). Sample PAI-10-SS-005-01 was analyses for Hexavalent Chromium. The samples were collected by Tetra Tech NUS on July 27 - 29, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Cyanide analyses were conducted according to SW-846 method 9012. Total Organic Carbon (TOC) analyses were conducted using SW-846 method 9060. 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:

Notes

Cyanide analyses were conducted , but were not listed on the Chain of Custody reports for samples PAI-10-SS-001-01, PAI-10-SS-002-01, PAI-10-SS-003-01, PAI-10-SS-004-01, PAI-10-SS-005-01, PAI-10-SS-006-01, PAI-10-SS-007-01, PAI-10-SS-008-01 and PAI-10-SS-010-01.

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
SDG TTP05

Table 1 - RECOMMENDATION SUMMARY

Cyanide
Hexavalent Chromium
TOC
pH

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

C-49-08-8-167

TO:	**D. BRAYACK**	**DATE:**	**OCTOBER 13, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS, DISSOLVED TAL METALS**
CTO 053 - MCRD PARRIS
SDG - TTP06

SAMPLES: 14/ Aqueous /

PAI-10-SW-001-00	PAI-10-SW-001-00-F	PAI-10-SW-002-00
PAI-10-SW-002-00-F	PAI-10-SW-003-00	PAI-10-SW-003-00-F
PAI-10-SW-004-00	PAI-10-SW-004-00-F	PAI-10-SW-005-00
PAI-10-SW-005-00-F	PAI-10-SW-006-00	PAI-10-SW-006-00-F
PAI-10-SW-007-00	PAI-10-SW-007-00-F	

Overview

The sample set for CTO 053, MCRD Parris, SDG TTP06, consists of fourteen (14) aqueous environmental samples.

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 July 26, 28 and 29, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A.

All analyses with the exception of arsenic, mercury, lead, selenium and thallium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Calibration Verifications
• Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Calibration Verifications

The Continuing Calibration Verification (CCV) Percent Recovery (%R) for lead was <90% quality control limit. The nondetect results reported for the affected samples were qualified as biased low, "UL".

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[1]	45µg/L	225µg/L
barium	3.3µg/L	16.5µg/L
beryllium	0.2µg/L	1µg/L
cadmium[1]	2.4µg/L	12µg/L
calcium	59.0µg/L	295µg/L
copper[1]	3.0µg/L	15µg/L
iron[1]	14.2µg/L	71µg/L
magnesium	64.0µg/L	320µg/L
manganese[1]	4.1µg/L	20.5µg/L
mercury[1]	0.1µg/L	0.5µg/L
potassium[1]	194.4µg/L	972µg/L
selenium	1.1µg/L	5.5µg/L
silver	5.6µg/L	28µg/L
sodium	313.3µg/L	1566µg/L
thallium	3.2µg/L	16µg/L
zinc[1]	9.2µg/L	46µg/L

(1) Maximum concentration present in preparation blank.

An action level of 5X the maximum concentration has been used to evaluate the sample data for blank contamination. Dilution factors were taken into account were determining blank contamination. Positive results < the action level for beryllium, copper, iron, selenium and zinc have been qualified , "U", as a result of blank contamination. No action was taken for the remaining analtyes since either the results were greater than the action level or were nondetects.

Notes

The CRDL %R for arsenic, calcium, chromium, lead, silver and vanadium were outside the 90-110% quality control limit. However, no validation actions were required.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. The Continuing Calibration Verification (CCV) Percent Recovery (%R) for lead was <90% quality control limit. The Contract Required Detection Limit (CRDL) Percent Recovery (%R) for several analytes were outside the 90-110% quality control limits.

Other Factors Affecting Data Quality: None.

The Data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide" (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

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 TTP06

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Magnesium	
Antimony		Manganese	A[1]
Arsenic		Mercury	
Barium		Nickel	
Beryllium	A[1]	Potassium	
Cadmium		Selenium	A[1]
Calcium		Silver	
Chromium		Sodium	
Cobalt		Thallium	
Copper	A[1]	Vanadium	
Cyanide		Zinc	A[1]
Iron	A[1]		
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 nondetected results as bias low, "UL", as a result of calibration noncompliance.

Tetra Tech NUS INTERNAL CORRESPONDENCE

PITT-10-8-059

TO: DAVE BRAYACK DATE: OCTOBER 12, 1998

FROM: JUSTIN ORBICH COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB
CTO 053, PARRIS ISLAND
SDG TTP06

SAMPLES: 10/Aqueous

PAI-10-SW-001-00	PAI-10-SW-002-00
PAI-10-SW-003-00	PAI-10-SW-004-00
PAI-10-SW-005-00	PAI-10-SW-006-00
PAI-10-SW-007-00	TB-072798
TB-072898	TB-072998

OVERVIEW

The sample set for CTO 053, SDG TTP06, Parris Island consists of ten (10) aqueous environmental samples. The samples were analyzed for volatile organics, semivolatiles, and pesticides PCB's. No field duplicate pairs were included in the SDG.

The samples were collected on July 26th, 28th, and 29th, 1998 and analyzed by Laucks Testing Labs. All volatiles, semivolatiles, and pesticide/PCBs 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 an average relative response factor (RRF) less than 0.05 below the quality control limit. Qualify positive results as estimated (J) and qualify nondetected analytes as rejected (UR).

The continuing calibration for acetone, 2-butanone, 2-hexanone, and 4-methyl-2-pentanone contained an average relative response factor (RRF) less than 0.05 below the quality control limit. Qualify positive results as estimated (J) and qualify nondetected target compounds as rejected (UR).

The following contaminants were detected in the quality control blanks at the following maximum concentration:

Analyte	Concentration	Action Level
Methylene chloride	1.5 ug/L	15.0 ug/L
Acetone	5.0 ug/L	50.0 ug/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.

The aliquot and dilution factors were taken into consideration during the application of all action levels. Positive results reported for these compounds 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 detection limits (CRQL). These results were qualified as estimated (J).

SEMIVOLATILE FRACTION

The following contaminants were detected in the field quality control blanks at the following maximum concentration:

Analyte	Concentration	Action Level
Bis(2-ethylhexyl)phthalate	1.0 ug/L	10.0 ug/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.

The aliquot and dilution factors were taken into consideration during the application of all action levels. Positive results reported for these compounds 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 semivolatile samples contained positive results for compounds below the contract required detection limits (CRQL). These results were qualified as estimated (J).

PESTICIDE FRACTION

No validation issues were present.

MEMO TO: DAVE BRAYACK
DATE: OCTOBER 12, 1998 – PAGE 3

EXECUTIVE SUMMARY

Laboratory Performance Issues: The volatile initial calibration contained RRFs less than 0.05 quality control limit for acetone, 2-butanone, and 2-hexanone. The continuing calibration contained RRFs less than 0.05 below the quality control limit for acetone, 2-butanone, 2-hexanone, and 4-methyl-2-pentanone.

Other Factor Affecting Data Quality: Methylene chloride, acetone, and bis(2-ethylhexyl)phthalate were detected in the quality control blanks.

MEMO TO: DAVE BRAYACK
DATE: OCTOBER 12, 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: OCTOBER 12, 1998 – PAGE 5

MCRD PARRIS ISLAND
SDG TTP06

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	Volatile	Semivolatile	Pesticide
PAI-10-SW-001-00	J^2 R^1	A^1	
PAI-10-SW-002-00	R^1	A^1	
PAI-10-SW-003-00	J^2 R^1	A^1 J^2	
PAI-10-SW-004-00	J^2 R^1	A^1 J^2	
PAI-10-SW-005-00	R^1	A^1 J^2	
PAI-10-SW-006-00	R^1	A^1	
PAI-10-SW-007-00	R^1	A^1 J^2	
TB-072798	$J^{1,2}$ R^1		
TB-072898	J^2 R^1		
TB-072998	J^2 R^1		

If the field is blank, the qualifier is A, accept all data.

R^1 - Reject data and qualify nondetected results as rejected (UR) as a result of the relative response factor in the initial calibration of 2-butanone, 2-hexanone, 4-methyl-2-pentanone, or acetone was below the 0.05 quality control limit.

J^1 - Accept data, but qualify positive results as estimated (J) due to an initial calibration with a percent relative standard deviation greater than 30% for acetone.

J^2 - Accept data, but qualify compounds with positive results for CRQL as an estimated "(J).

A^1 - Accept data, but qualify non-detected results as an estimated (U), as a result of bis(2-ethylhexyl)phthalate in the quality control trip blank.

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

C-49-08-8-163

TO:	**D. BRAYACK**	**DATE:**	**OCTOBER 13, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **MISCELLANEOUS DATA VALIDATION - CYANIDE, TOC AND HARDNESS**
CTO 053 - MCRD PARRIS
SDG - TTP06

SAMPLES: 7/ Aqueous /

PAI-10-SW-001-00	PAI-10-SW-002-00	PAI-10-SW-006-00
PAI-10-SW-004-00	PAI-10-SW-005-00	PAI-10-SW-003-00
PAI-10-SW-007-00		

Overview

The sample set for CTO 053, MCRD Parris, SDG TTP06, consists of seven (7) aqueous environmental sample.

All samples were analyzed for Cyanide and TOC. Samples PAI-10-SW-004-00 and PAI-10-SW-005-00 were analyzed for Hardness as $CaCO_3$. The samples were collected by Tetra Tech NUS on July 26, 28 and 29, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The Cyanide analyses were conducted according to SW-846 9012 method. Total Organic Carbon (TOC) analyses were conducted using SW 9060 Method. Hardness analyses were conducted using EPA 130.2.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Calibration Verifications
* • Laboratory Blank Analyses

* - All quality control criteria were met for this parameter.

The attached Table 1 summarizes the validation recommendations which were based on the following information:

Notes

Cyanide analyses were not listed on the chain of custody report for samples PAI-10-SW-001-00, PAI-10-SW-002-00 and PAI-10-SW-006-00. However, the samples were analyzed for Cyanide.

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
SDG TTP06

Table 1 - RECOMMENDATION SUMMARY

Cyanide
TOC
Hardness

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS

INTERNAL CORRESPONDENCE

PITT-11-8-026

TO: DAVE BRAYACK **DATE:** NOVEMBER 23, 1998

FROM: JUSTIN ORBICH **COPIES:** DV FILE

SUBJECT: ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB
CTO 020/053, MCRD PARRIS ISLAND
SDG TTP11

SAMPLES: 1/Aqueous

TB-081498

2/Solid

~~PAI-10-SD-014-02~~ ~~PAI-UNKNOWN~~

OVERVIEW

The sample set for CTO 020/053, SDG TTP11, MCRD Parris Island consists of one (1) trip blank (designated TB) and two (2) solid environmental samples. The samples were analyzed for Target Compound List (TCL) volatiles, semivolatiles, and pesticide/PCBs. There were no field duplicate pairs in this SDG.

The samples were collected on August 13th, 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 and continuing calibration analysis of acetone, 2-butanone, and 2-hexanone contained Relative Response Factors (RRFs) below the 0.05 quality control limit. Qualify positive results as estimated, (J), and nondetected analytes as rejected, (UR).

The following contaminants were detected in the quality control blanks at the following maximum concentration:

MEMO TO: DAVE BRAYACK
DATE: NOVEMBER 23, 1998 – PAGE 2

Analyte	Maximum Concentration	Aqueous Action Level	Soil Action Level
Methylene Chloride	5.1µg/kg	NA	51.0µg/kg
Acetone	3.5µg/kg	NA	35.0µg/kg

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 were taken into consideration during the application of all action levels. Positive results reported for methylene chloride and acetone 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).

SEMIVOLATILE 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

In sample PAI-10-SD-014-02, the confirmation summary between columns yielded a %D greater than 100% for 4,4'-DDD. The result for 4,4'-DDD was rejected, (R), in the affected sample.

In the pesticide fraction, sample PAI-10-SD-014-02 was diluted 3X due to the exceedance of methoxychlor above the instruments linear calibration range. Results from the dilution were transposed over the undiluted sample results and used for validation purposes.

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). Methylene chloride and acetone were detected as blank contamination for the volatile fraction. In the pesticide fraction, the instruments linear calibration was exceeded.

Other Issues Affecting Data Quality: None

MEMO TO: DAVE BRAYACK
DATE: NOVEMBER 23, 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: NOVEMBER 23, 1998 – PAGE 5

MCRD PARRIS ISLAND
SDG TTP11

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PEST/PCB
TB-081498	J^1 R^1		
PAI-10-SD-014-02	A^1 J^1	J^1	R^2
PAI-UNKNOWN	A^1 J^1		

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, (R), result for 4,4'-DDD as a results of the confirmation summary between columns yielded a %D greater than 100%.

A^1 - Accept data, but qualify positive result for methylene chloride and acetone 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).

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-11-08-004

TO: D. BRAYACK **DATE:** NOVEMBER 2, 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 – TTP15

SAMPLES: 14/ Aqueous /

PAI-10-GW-006-01	PAI-10-GW-006-01-F
PAI-10-GW-007-01	PAI-10-GW-007-01-F
PAI-10-GW-007-01D	PAI-10-GW-007-01D-F
PAI-10-GW-008-01	PAI-10-GW-008-01-F
PAI-10-GW-009-01	PAI-10-GW-009-01-F
PAI-10-GW-010-01	PAI-10-GW-010-01-F
PAI-10-GW-013-01	PAI-10-GW-013-01-F

Overview

The sample set for CTO 053, MCRD Parris Island, SDG TTP15, consists of fourteen (14) aqueous environmental samples. Two (2) field duplicate samples (PAI-10-GW-007-01 / PAI-10-GW-007-01 and PAI-10-GW-007-01-F / PAI-10-GW-007-01D-F) were included within this SDG.

All samples, with exception to those designated –F, were analyzed for Target Analyte List (TAL) metals, Chloride, Cyanide, Fluoride, Hardness, Nitrate/Nitrite, Sulfate, Total Dissolved Solids (TDS), Total Organic Carbon (TOC) and Total Suspended Solids (TSS). Samples designated –F were analyzed for dissolved TAL metals. The samples were collected by Tetra Tech NUS on August 31 and September 1 and 2, 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.

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:

Data Completeness

The laboratory noted that a sample for TOC analyses was not included for sample PAI-10-GW-009-01. Therefore, TOC analyses was not conducted.

Calibration Verifications

The Initial Calibration Verification (ICV) Percent Recovery (%R) for Cyanide analyses was <90% quality control limit. The nondetected results reported for Cyanide analyses were qualified as estimated, "UJ".

A Continuing Calibration Verification (CCV) Percent Recovery (%R) for thallium affecting samples PAI-10-GW-007-01, PAI-10-GW-007-01-F, PAI-10-GW-007-01D, PAI-10-GW-007-01D-F and PAI-10-GW-008-01 was <90% quality control limit. The nondetected results reported for thallium in the affected sample were qualified as estimated, "UJ".

A CCV %R for selenium affecting samples PAI-10-GW-009-01, PAI-10-GW-009-01-F, PAI-10-GW-010-01 and PAI-10-GW-010-01-F was <90% quality control limit. The positive and nondetected results reported for selenium in the affected samples were qualified as estimated, "J" and "UJ", respectively.

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	60.7µg/L	303.5µg/L
Barium	2.7µg/L	13.5µg/L
Beryllium	0.4µg/L	2.0µg/L
Iron	26.9µg/L	134.5µg/L
Magnesium	50.4µg/L	252µg/L
Manganese[1]	1.4µg/L	7.0µg/L
Potassium[1]	125.8µg/L	629µg/L
Selenium	0.9µg/L	4.5µg/L
Sodium	258.0µg/L	1290µg/L
Zinc	4.1µg/L	20.5µg/L
Nitrate/Nitrite[1]	0.019 mg/L	0.095 mg/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 were determining blank contamination. Positive results < the action level for aluminum, beryllium, selenium, zinc 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 Recoveries (%R's) for mercury, lead, and zinc were outside the 80-120% quality control limit. However, no validation actions were required per Regional guidance.

CCV's %R's for thallium affecting samples PAI-10-GW-007-01, PAI-10-GW-007-01D, PAI-10-GW-008-01, PAI-10-GW-008-01-F, PAI-10-GW-009-01-F, PAI-10-GW-010-01-F and PAI-10-GW-013-01 were >110% quality control limit. However, no validation action was required as the results reported for thallium in the affected samples were nondetected.

A CCV %R for selenium affecting samples PAI-10-GW-006-01, PAI-10-GW-007-01 and PAI-10-GW-007-01D was >110% quality control limit. However, no validation action was required as the results reported for selenium in the affected samples were nondetected or qualified for blank contamination.

A CCV %R for lead affecting samples PAI-10-GW-009-01, PAI-10-GW-010-01 and PAI-10-GW-010-01-F was >110% quality control limit. However, no validation action was required as the results reported for lead in the affected samples were nondetected.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method / preparation blanks. The ICV %R for Cyanide analyses was <90% quality control limit. A CCV for thallium affecting several samples was <90% quality control limit. A CCV for selenium affecting several samples 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)."

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 TTP15

Table 1 - RECOMMENDATION SUMMARY

Aluminum	A[1]		Magnesium		
Antimony			Selenium	A[1]	J[1]
Arsenic			Silver		
Barium			Sodium		
Beryllium	A[1]		Thallium		J[1]
Cadmium			Vanadium		
Calcium			Zinc	A[1]	
Chromium			Chloride		
Cobalt			Fluoride		
Copper			Hardness		
Cyanide		J[1]	Nitrate/Nitrite	A[1]	
Iron			Sulfate		
Lead			TDS		
Magnesium			TOC		
Manganese			TSS		
Mercury					
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-11-8-032

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)."

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-11-8-101

TO:	**D. BRAYACK**	**DATE:**	**NOVEMBER 10, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**
SUBJECT:	**INORGANIC DATA VALIDATION - TAL METALS** **CTO 053 - MCRD PARRIS ISLAND** **SDG - TTP09**		

SAMPLES: 8/ Sediments /

PAI-10-SD-008-01
PAI-10-SD-009-01
PAI-10-SD-010-01
PAI-10-SD-011-01
PAI-10-SD-012-01
PAI-10-SD-013-01
PAI-10-SD-014-01
PAI-10-SD-015-01

6/ Soils /

PAI-10-SS-011-01
PAI-10-SS-012-01
PAI-10-SS-012-01-D
PAI-10-SS-013-01
PAI-10-SS-014-01
PAI-10-SS-015-01

Overview

The sample set for CTO 053, MCRD Parris Island, SDG TTP09, consists of eight (8) sediment environmental samples and six (6) soil environmental samples. One (1) field duplicate pair (PAI-10-SS-012-01 / PAI-10-SS-012-01-D) was included within this SDG.

All samples were analyzed for Cyanide. Samples PAI-10-SD-09-01, PAI-10-SD-010-01, PAI-10-SD-013-01, PAI-10-SS-013-01 and PAI-10-SS-014-01 were analyzed for Hexavalent Chromium. The sediment samples were analyzed for Total Organic Carbon (TOC) and pH. The samples were collected by Tetra Tech NUS on August 6 and 10, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. Cyanide analyses were conducted using SW 846 method 9012. Hexavalent Chromium analyses were conducted using SW 846 method 3060A/7196A. TOC analyses were conducted using SW 846 method 9060(modified). pH analyses were conducted using SW 846 method 9045.

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

There was insignificant blank contamination for TOC analyses.

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 TTP09

Table 1 - RECOMMENDATION SUMMARY

Cyanide
Hexavalent Chromium
pH
TOC

If the field is left blank, the qualifier is A - Accept data.

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-11-8-098

TO:	**D. BRAYACK**	**DATE:**	**NOVEMBER 10, 1998**
FROM:	**GRETCHEN PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION - TAL METALS**
CTO 053 - MCRD PARRIS ISLAND
SDG - TTP09

SAMPLES: 8/ Sediments /

PAI-10-SD-008-01
PAI-10-SD-009-01
PAI-10-SD-010-01
PAI-10-SD-011-01
PAI-10-SD-012-01
PAI-10-SD-013-01
PAI-10-SD-014-01
PAI-10-SD-015-01

6/ Soils /

PAI-10-SS-011-01
PAI-10-SS-012-01
PAI-10-SS-012-01-D
PAI-10-SS-013-01
PAI-10-SS-014-01
PAI-10-SS-015-01

Overview

The sample set for CTO 053, MCRD Parris Island, SDG TTP09, consists of eight (8) sediment environmental samples and six (6) soil environmental samples. One (1) field duplicate pair (PAI-10-SS-012-01 / PAI-10-SS-012-01-D) was included within this SDG.

The samples were analyzed for Target Analyte List (TAL) metals. The samples were collected by Tetra Tech NUS on August 6 and 10, 1998 and analyzed by Laucks Testing Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. The metals analyses, with the exception of mercury, were conducted according to SW-846 Method 6010B. Mercury analyses were conducted according to SW-846 Method 7470A.

All analyses with the exception of arsenic, mercury, lead, selenium and thallium were conducted using the Inductively Coupled Plasma (ICP) methodologies. Arsenic, lead, selenium and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA). Mercury analyses were conducted using cold vapor AA.

The data was evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
  • Calibration Verifications
  • Laboratory Blank Analyses

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 TTP09

Table 1 - RECOMMENDATION SUMMARY

Aluminum		Magnesium	
Antimony		Manganese	A[1]
Arsenic		Mercury	
Barium		Nickel	
Beryllium		Potassium	
Cadmium		Selenium	A[1]
Calcium		Silver	
Chromium		Sodium	A[1]
Cobalt		Thallium	
Copper		Vanadium	
Iron		Zinc	
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-11-8-094

TO:	**DAVE BRAYACK**	**DATE:**	**DECEMBER 14, 1998**
FROM:	**JUSTIN ORBICH**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB** **CTO 053, MCRD PARRIS ISLAND** **SDG TTP09**		
SAMPLES:	2/Aqueous		
	TB980807	TB980811	
	14/Soil		
	PAI-10-SD-008-01	PAI-10-SD-009-01	
	PAI-10-SD-010-01	PAI-10-SD-011-01	
	PAI-10-SD-012-01	PAI-10-SD-013-01	
	PAI-10-SD-014-01	PAI-10-SD-015-01	
	PAI-10-SS-011-01	PAI-10-SS-012-01	
	PAI-10-SS-012-01D	PAI-10-SS-013-01	
	PAI-10-SS-014-01	PAI-10-SS-015-01	

OVERVIEW

The sample set for CTO 053, SDG TTP09, MCRD Parris Island consists of two (2) aqueous environmental samples, which includes two (2) trip blanks (designated TB) and fourteen (14) soil environmental samples. The samples were analyzed for Target Compound List (TCL) volatile, semivolatile, and pesticide/PCB organic compounds. There was one field duplicate pair (PAI-10-SS-012-01D/PAI-10-SS-012-01) in this SDG.

The samples were collected on August 6th and 10th, 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 was 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 14, 1998 – PAGE 2

VOLATILE FRACTION

The aqueous initial calibration analysis of acetone, 2-butanone, and 2-hexanone contained Relative Response Factors (RRFs) below the 0.05 quality control limit. Qualify positive results as estimated, (J), and nondetected results as rejected, (UR), in the affected samples.

The aqueous 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. Qualify positive results as estimated, (J), and nondetected results as rejected, (UR), in the affected samples.

The following contaminants were detected in the quality control blanks at the following maximum concentration:

Analyte	Concentration	Soil Action Level
Methylene chloride	5.1µg/kg	51.0µg/kg
2-Butanone[1]	1.7µg/L	17.0µg/kg

[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, dilution factors, and percent moisture were taken into consideration during the application of all action levels. The positive results for methylene chloride were qualified according to the blank action table. It should be noted that field quality control blanks were not qualified for field control blank contamination.

Samples PAI-10-SS-011-01 and PAI-10-SS-015-01 were reanalyzed at a dilution due to the presence of acetone above the instrument's linear calibration range. Results from the reanalysis were transposed over the original analysis results and used for validation purposes.

Several volatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

SEMIVOLATILE FRACTION

The laboratory's Form Is contained three extra compounds not associated with the Target Compound List (TCL). The compounds are benzyl alcohol, benzoic acid, and 1,2-diphenylhydrazine. The reviewer removed these compounds from the Form Is.

Several volatile samples contained positive results for compounds below the contract required quantitation limits (CRQL). These results were qualified as estimated (J).

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 14, 1998 – PAGE 3

PESTICIDE FRACTION

All quality control parameters were met for this fraction.

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 14, 1998 – PAGE 4

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several volatile initial and continuing calibration RRF noncompliances were noted. Positive results were qualified as estimated, (J), while nondetected results were rejected, (UR). Methylene chloride was detected as blank contamination in the method blank. Two samples were reanalyzed at a dilution due to the exceedance of the instrument's linear calibration range for acetone.

Other Issues Affecting Data Quality: 2-Butanone was detected as blank contamination in the field quality control blank.

MEMO TO: DAVE BRAYACK
DATE: DECEMBER 14, 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 14, 1998 – PAGE 6

MCRD PARRIS ISLAND
SDG TTP09

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA	SVOA	PEST/PCB
TB980807	J^1 R^1		
TB980811	J^2 R^1		
PAI-10-SD-008-01	J^1		
PAI-10-SD-009-01	A^1 J^1		
PAI-10-SD-010-01	A^1 J^1		
PAI-10-SD-011-01	A^1 $J^{1,3}$		
PAI-10-SD-012-01	A^1 J^1		
PAI-10-SD-013-01	A^1 J^1	J^1	
PAI-10-SD-014-01	A^1	J^1	
PAI-10-SD-015-01	A^1 $J^{1,3}$		
PAI-10-SS-011-01	A^1 J^1		
PAI-10-SS-012-01	A^1 J^1		
PAI-10-SS-012-01D	A^1 J^1	J^1	
PAI-10-SS-013-01	A^1 J^1		
PAI-10-SS-014-01	A^1 J^1	J^1	
PAI-10-SS-015-01	A^1 J^1	J^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.

A^1 - Accept data, but qualify positive results as nondetected, (U), as a result of blank contamination for methylene chloride.

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.

J^3 - Accept data, but qualify positive results as estimated, (J), for calibration exceedence for acetone.

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

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.

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-02-9-202

TO:	**DAVE BRAYACK**	**DATE:**	**MARCH 2, 1999**
FROM:	**JUSTIN ORBICH**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION – PAH CTO 053, MCRD PARRIS ISLAND SDG TTP19**		
SAMPLES:	20/Soil		

PAI-10-SD-001-01A	PAI-10-SD-002-01A
PAI-10-SD-002-01AD	PAI-10-SD-003-01A
PAI-10-SD-004-01A	PAI-10-SD-005-01A
PAI-10-SD-006-01A	PAI-10-SD-007-01A
PAI-10-SD-008-01A	PAI-10-SD-009-01A
PAI-10-SD-010-01A	PAI-10-SD-011-01A
PAI-10-SD-012-01A	PAI-10-SD-013-01A
PAI-10-SD-014-01A	PAI-10-SD-014-02A
PAI-10-SD-015-01A	PAI-10-SD-016-01A
PAI-10-SD-017-01A	PAI-10-SD-018-01A

OVERVIEW

The sample set for CTO 053, SDG TTP19, Marine Corps Recruit Depot (MCRD) Parris Island consists of twenty (20) solid environmental samples. The samples were analyzed for Polynuclear Aromatic Hydrocarbon (PAH) organic compounds. One (1) field duplicate pair (PAI-10-SD002-01A/ PAI-10-SD-002-01AD) was included within this SDG.

The samples were collected on December 14th and 15th, 1998 and analyzed by Laucks Testing Laboratories. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and SW 846 Method 8310.The data in this SDG was validated with regard to the following parameters:

*	• Data completeness
*	• Holding times
	• Initial/continuing calibrations
*	• Laboratory method and field quality control blank results
*	• Surrogate spike recoveries
	• Matrix Spike/Matrix Spike Duplicate Results
*	• Laboratory Control Sample Results
*	• Compound Identification
*	• Compound Quantitation
*	• Detection Limits
	• Field Duplicate Precision

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.

PAH FRACTION

In sample PAI-10-SD-011-01A, the Percent Difference between columns exceeded the 100% for benzo(k)fluoranthene. The positive result was qualified as rejected (R), in the aforementioned sample.

In sample PAI-10-SD-014-01A, the Percent Difference between columns exceeded the 100% for benzo(g,h,i)perylene. The positive result was qualified as rejected (R), in the aforementioned sample.

In sample PAI-10-SD-018-01A, the Percent Difference between columns exceeded the 100% for benzo(g,h,i)perylene. The positive result was qualified as rejected (R), in the aforementioned sample.

In sample PAI-10-SD-009-01A, the Percent Difference between columns exceeded the 25% quality control limit for benzo(a)pyrene. The positive result was qualified as estimated (J), in the aforementioned sample.

In sample PAI-10-SD-013-01A, the Percent Difference between columns exceeded the 25% quality control limit for benzo(a)anthracene, benzo(b)fluoranthene, and chrysene. The positive results were qualified as estimated (J), in the aforementioned sample.

In sample PAI-10-SD-016-01A, the Percent Difference between columns exceeded the 25% quality control limit for benzo(a)pyrene. The positive result was qualified as estimated (J), in the aforementioned sample.

Several continuing calibration Percent Differences (%Ds) exceeded the 25% quality control limit on the fluorescence detector. No action was warranted since the %Ds were within the quality control limits on the UV detector. In addition, all the results were reported from the UV detector, with the exception of sample PIA-10-SD-011-01A.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Percent Recoveries (%Rs) exceeded the quality control limit for fluorene. No action is warranted since the LCS %R was compliant for fluorene.

In sample PAI-10-SD-002-01A, nondetected result was reported for benzo(a)pyrene. In the associated duplicate, PAI-10-SD-002-01AD, positive result was reported for the aforementioned compound. The positive and nondetected results was qualified as estimated, (J) and (UJ), respectively.

MEMO TO: MR. D. BRAYACK
DATE: MARCH 2, 1999 – PAGE 3
EXECUTIVE SUMMARY

Laboratory Performance Issues: Several continuing calibrations were outside the quality control limit on the fluorescence detector. Field duplicate precision for compound benzo(a)pyrene was noted.

Other Issues Affecting Data Quality: MS/MSD noncompliance was noted for fluorene. Several sample yielded %Ds between columns exceeding the quality control limit.

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

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**FEBRUARY 21, 2000**
FROM:	**GRETCHEN A. PHIPPS**	**COPIES:**	**DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – TAL METALS, TIN, CYANIDE AND MISCELLANEOUS PARAMETERS**
CTO 084 – MCRD PARRIS ISLAND
SDG – 9912254

SAMPLES: 5/Soils/

PAI-07-SB-01-04	PAI-07-SB-DU01-04
PAI-35-SS-04-01	PAI-35-SS-05-01
PAI-35-SS-06-01	

2/Sediments/

PAI-10-SD-19-01	PAI-10-SD-20-01

6/Aqueous/

DECON WATER	PAI-09-GW-02-01
PAI-13C-GW-02-01	PAI-35-GW-01-01
PAI7-GW2-02	PAI7-GW3-02

Overview

The sample set for CTO 084, MCRD Parris Island, SDG 9912254, consists of five (5) soil environmental samples, two (2) sediment environmental samples, five (5) aqueous environmental samples and one (1) DECON. WATER sample. One (1) field duplicate pair (PAI-07-SB-01-04 / PAI-07-SB-DU01-04) was included within this SDG.

All soil / sediment samples were analyzed for target analyte list (TAL) metals. The sediment samples and samples PAI-35-SS-04-01, PAI-35-SS-05-01 and PAI-35-SS-06-01 were also analyzed for cyanide. The soil samples were also analyzed for tin. The aqueous environmental samples were analyzed for TAL metals and cyanide. Samples PAI-13C-GW-02-01 and PAI-35-GW-01-01 were also analyzed for tin. The DECON WATER sample was analyzed for cyanide, chemical oxygen demand (COD), oil and grease, sulfide and total dissolved solids (TDS). Sample PAI-35-GW-01-01 was also analyzed for TDS. The samples were collected by TetraTech NUS on December 13-17, 1998 and analyzed by Severn Trent Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria. All metals analyses, with the exception of mercury, were conducted using SW 846 method 6010B. Mercury analyses were conducted using SW 846 method 7071A. Cyanide analyses were conducted using SW 846 method 9010B. COD analyses were conducted using EPA method 410.1. Oil and grease analyses were conducted using EPA method 413.1. Sulfide analyses were conducted using EPA method 376. TDS analyses were conducted using WPA method 160.1.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
• Calibration Recoveries
• Laboratory Blank Analyses
* • Laboratory / Field Duplicate Results
* • Laboratory Control Sample Results
* • ICP Interference Check Sample Results
• Matrix Spike / Matrix Spike Duplicate Recoveries
• ICP Serial Dilution Results
* • Sample Quanitation
* • Detection Limits

* - All quality control criteria were met for this parameter.

Laboratory Blank Analyses

The following contaminants were detected in the laboratory method / preparation blanks at the following maximum concentrations:

Samples affected: Soil/Sediment

Analyte	Maximum Concentration	Action Level
Aluminum	51.8µg/L	25.9 mg/kg
Barium	4.8µg/L	2.4 mg/kg
Beryllium	1.5µg/L	0.75 mg/kg
Cadmium	3.4µg/L	1.7 mg/kg
Calcium	39.0µg/L	19.5 mg/kg
Chromium	5.2µg/L	2.6 mg/kg
Cobalt	5.5µg/L	2.75 mg/kg
Copper	3.0µg/L	1.5 mg/kg
Iron	29.1µg/L	14.55 mg/kg
Manganese	3.8µg/L	1.9 mg/kg
Thallium	102.3µg/L	51.15 mg/kg
Vanadium	3.7µg/L	1.85 mg/kg

An action level of 5X the maximum concentration were used to evaluate the sample data for blank contamination. Sample aliquot, percent solids and dilution factors were taken into consideration when evaluation for blank contamination. Positive results < the action levels for beryllium, cadmium, cobalt, copper and thallium were qualified as, "U", as a result of blank contamination. No action was taken for the remaining analytes as all results were either greater than the action levels or were nondetected.

Samples affected: Aqueous

Analyte	Maximum Concentration	Action Level
Aluminum	242.8µg/L	1214 µg/L
Barium	2.4µg/L	12.0 µg/L
Beryllium	1.9µg/L	9.5 µg/L
Cadmium	2.4µg/L	12.0 µg/L
Calcium	117.9µg/L	589.5 µg/L
Chromium	4.7µg/L	23.5 µg/L

Cobalt	2.3µg/L	11.5 µg/L
Copper[1]	2.800µg/L	14.0 µg/L
Iron[1]	268.400µg/L	1342 µg/L
Lead	3.6µg/L	18.0 µg/L
Magnesium	116.0µg/L	580 µg/L
Manganese	24.0µg/L	120 µg/L
Nickel	2.7µg/L	13.5 µg/L
Potassium	176.6µg/L	883 µg/L
Silver	2.6µg/L	13.0 µg/L
Sodium[1]	512.700µg/L	2563.5 µg/L
Thallium	6.3µg/L	31.5 µg/L
Vanadium	23.6µg/L	118 µg/L
Zinc[1]	25.800µg/L	129 µg/L
Tin	4.4µg/L	22.0 µg/L

[1] Maximum concentration present in an aqueous preparation blank.

An action level of 5X the maximum concentration were used to evaluate the sample data for blank contamination. Sample aliquot and dilution factors were taken into consideration when evaluation for blank contamination. Positive results < the action levels for aluminum, barium, beryllium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, sodium, vanadium and zinc were qualified as, "U", as a result of blank contamination. No action was taken for the remaining analytes as all results were either greater than the action levels or were nondetected.

Matrix Spike / Matrix Spike Duplicate Recoveries

The Matrix Spike / Matrix Spike Duplicate (MS/MSD) Percent Recoveries (%Rs) for antimony affecting the soil / sediment samples were <75% quality control limit. The nondetected results reported for antimony in the affected samples were qualified as estimated, "UJ".

The MS/MDS %Rs for sulfide were >125% quality control limit. The positive result reported for sulfide was qualified as estimated, "J".

ICP Serial Dilution Results

The ICP Serial Dilution Percent Differences (%Ds) for barium, magnesium and manganese affecting the soil/sediment samples were >10% quality control limit. The positive results reported for barium, magnesium and manganese in the affected samples were qualified as estimated, "J".

The ICP Serial Dilution %D for manganese affecting the aqueous samples was >10% quality control limit. The positive results reported for manganese in the affected samples were qualified as estimated, "J"

Notes

A comparison of field duplicate pair (PAI-07-SB-01-04 / PAI-07-SB-DU01-04) is included in Appendix C.

A Continuing Calibration Verification (CCV) Percent Recovery (%R) for sodium was >110% quality control limit. However, no samples from this SDG were bracketed. Therefore, no validaiton action was required.

The Contract Required Detection Limit (CRDL) Percent Recoveries (%Rs) for chromium, mercury, lead, iron and aluminum were outside the 80-120% quality control limit. However, no validation action is required.

Executive Summary

Laboratory Performance: Several analytes were present in the laboratory method/preparation blanks.

Other Factors Affecting Data Quality: The MS/MSD %R for antimony was <75% quality control limit affecting the soil/sediment samples. The MS/MSD %R for sulfide was >125% quality control limit. The ICP Serial Dilution %Ds for barium, magnesium and manganese affecting the soil/sediment samples were >10% quality control limit. The %D for manganese affecting the aqueous samples was >10% quality control limit.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", February 1994 and the NFESC document entitled "Navy Installation Restoration Laboratory Quality Assurance Guide " (NFESC 2/96).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NFESC Guidelines and the Quality Assurance Project Plan (QAPP)."

Gretchen A. Phipps

Tetra Tech NUS
Gretchen A. Phipps
Chemist

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

PITT-02-0-071

TO: **DAVE BRAYACK** **DATE:** **FEBRUARY 28, 2000**

FROM: **JUSTIN ORBICH** **COPIES:** **DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION – VOA/SVOA/PEST/PCB**
CTO 084, MCRD PARRIS ISLAND
SDG 9912254

SAMPLES: 2/Soil and 2/Sediment

PAI-07-SB-01-04	PAI-07-SB-DU01-04
PAI-10-SD-19-01	PAI-10-SD-20-01

6/Aqueous

PAI-09-GW-02-01	PAI-13C-GW-02-01
PAI-7-GW2-02	PAI-7-GW3-02
TB-121399	TB-121799

OVERVIEW

The sample set for CTO 084, SDG 9912254, Marine Corps Recruit Depot (MCRD) Parris Island consists of six (6) aqueous environmental samples, which includes two (2) trip blanks (designated TB) and two (2) soil and sediment environmental samples. The aqueous samples were analyzed for Target Compound List (TCL) volatile organic compounds. The soil and sediment samples were analyzed for TCL volatile, semivolatile, pesticide/PCB organic compounds. The sediment samples were analyzed for PAH organic compounds. One (1) field duplicate pair (PAI-07-SB-01-04/PAI-07-SB-DU01-04) was included within this SDG.

The samples were collected on December 13th, 14th, 15th and, 17th, 1999 and analyzed by Laucks Testing Laboratories. All analyses were performed in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria and SW 846 Method 8260B, 8270C, 8310 8081A, and 8082. The data in this SDG was validated with regard to the following parameters:

*	Data completeness
*	Holding times
	Initial/continuing calibrations
	Laboratory method and field quality control blank results
*	Surrogate spike recoveries
	Matrix Spike/Matrix Spike Duplicate Results
	Laboratory Control Sample Results
	Internal Standard area Results
*	Field Duplicate Precision
*	Compound Identification
*	Compound Quantitation
*	Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified analytical results are presented in Appendix A.

VOLATILE FRACTION

The initial calibration Relative Response Factors (RRFs) were below the 0.05 quality control limits for acetone, 2-butanone, and 2-hexanone on 9/22/99. The nondetected results were qualified as rejected (UR), in samples TB-121799 and PAI-13C-GW-02-01.

The continuing calibration RRFs were below the 0.05 quality control limits for acetone, 2-butanone, 2-hexanone, and 4-methyl-2-pentanone on 12/29/99 at 0854. The nondetected results were qualified as rejected (UR), in samples TB-121799 and PAI-13C-GW-02-01.

The continuing calibration Percent Difference (%D) exceeded the 25% quality control limits for carbon disulfide on 12/29/99 at 0854. The nondetected results were qualified as estimated (UJ), in samples TB-121799 and PAI-13C-GW-02-01.

The initial calibration Relative Response Factor (RRF) was below the 0.05 quality control limits for acetone on 12/1/99. No action was warranted since acetone was qualified for prior blank contamination.

The continuing calibration Percent Difference (%D) exceeded the 25% quality control limits for 4-methyl-2-pentanone on 12/16/99 at 1028. The nondetected results were qualified as estimated (UJ), in samples PAI-07-SB-01-04 and PAI-07-SB-DU01-04.

The initial and continuing calibration Relative Response Factors (RRFs) were below the 0.05 quality control limits for acetone and 2-butanone. The nondetected results were qualified as rejected (UR), in samples PAI7-GW3-02, PAI7-GW2-02, PAI-09-GW-02-01, and TB-121399.

The continuing calibration RRFs were below the 0.05 quality control limits for acetone, 2-butanone, and 2-hexanone on 12/18/99 at 1905. The nondetected results were qualified as rejected (UR), in sample PAI-7-GW2-02.

The following compounds were detected in the laboratory and field quality control method blanks at the maximum concentrations indicated below:

Compound	Concentration	Soil Action
Acetone	6.0 µg/kg	60.0 µg/kg

Blank Actions

- Value < Reporting Limit (RL); report RL followed by a U.
- Value > RL and < Action level; report value followed by a U.
- Value > RL and > action level; report value unqualified.

Dilution factors, percent moisture, and sample aliquots were taken into consideration during the application of all action levels. Positive results for acetone were qualified as (U) as a result of blank contamination. It should be noted that field quality control blanks are not qualified based on lab method blank contamination.

Several Matrix Spike/Matrix Spike Duplicate (MS/MSD) and Blank Spike/Blank Spike Duplicate (BS/BSD) Percent Recoveries (%Rs) and Relative Percent Differences (RPDs) were outside the quality control limits. No action was warranted on MS/MSD and/or BS/BSD data alone.

The internal standard area fell below the lower control limit for 1,4-dichlorobenzene-d4 in samples PAI-07-SB-01-04 and PAI-07-SB-DU01-04. The samples were reanalyzed with similar results. Therefore, the original analysis were used for validation purposes. No action was warranted since only nondetected results were reported.

It should be noted that the laboratory analyzed for and reported the full TCL volatile compound list plus the additional appendix IX volatile compounds. However, the Chain of Custody (COC) requested only the TCL volatile compounds. The reviewer amended the electronic data to report only the TCL volatile compounds.

SEMIVOLATILE FRACTION

The continuing calibration %Ds were below the 25% quality control limits for 3-nitroaniline on 12/17/99 at 1059. The nondetected results were qualified as estimated (UJ), in samples PAI-07-SB-01-04 and PAI-07-SB-DU01-04.

The continuing calibration %Ds were below the 25% quality control limits for 2-chlorophenol, 3-nitroaniline, and 1,4-dioxane on 12/30/99 at 1030. The nondetected results were qualified as estimated (UJ), in samples PAI-10-SD-19-01 and PAI-10-SD-20-01.

The Tentatively Identified Compounds (TICs), unknown alkane, unknown ketone, unknown, and hexadecanoic acid, were detected in the semivolatile method blank. The presence of these TICs are considered false positives.

The internal standard area exceeded the upper control limits for acenaphthene-d10, phenanthrene-d10, chrysene-d12, and perylene-d12 in the Matrix Spike sample, PAI-07-SB-01-04 and blank spike. No action was warranted since the samples were quality control samples.

The MS/MSD and BS/BSD %Rs were below ten percent for benzidine. The nondetected results were qualified as rejected (UR), in samples PAI-07-SB-01-04, PAI-07-SB-DU01-04, PAI-10-SD-19-01, and PAI-10-SD-20-01.

PAH FRACTION

The PAHs reported from the 8270C analysis of sediment samples were removed from the validated SVOCs since these compounds were reported from the 8310 analysis. The 8310 analysis provided lower reporting limits.

PESTICIDE/PCB FRACTION

The continuing calibration %Ds exceeded the 15% quality control limits for 4,4'-DDT and Methoxychlor on 12/28/99 on both columns. The nondetected results were qualified as estimated (UJ), in samples PAI-10-SD-19-01 and PAI-10-SD-20-01.

The continuing calibration %D exceeded the 15% quality control limit for AROCLOR-1016 on 12/28/99 at 0054 on column ZB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %Ds exceeded the 15% quality control limits for AROCLOR-1016 and AROCLOR-1260 on 12/28/99 at 0542 on column ZB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %D exceeded the 15% quality control limit for 4,4'-DDT on 12/21/99 at 1810 on column DB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %D exceeded the 15% quality control limit for Heptachlor, Endosulfan I, 4,4'-DDT, and Methoxychlor on 12/27/99 at 1720 on column DB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %D exceeded the 15% quality control limit for Heptachlor epoxide, Endosulfan sulfate, and alpha-Chlordane on 12/27/99 at 1755 on column DB-5. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column ZB-35.

The continuing calibration %D exceeded the 15% quality control limit for Endrin aldehyde on 12/21/99 at 0408 on column DB-35. No action was warranted since only nondetected results were reported and the %D was within the quality control limit on column DB-5.

The MS/MSD %R exceeded the quality control limit for 4,4'-DDE. No action was warranted on MS/MSD data alone.

NOTE

It should be noted that the sample identification numbers on the COCs were incorrect for samples PAI-07-GW3-02 and PAI-07-GW2-02.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several initial and continuing calibration RRFs were below the quality control limits in the volatile and semivolatile fractions. Several continuing calibration %Ds exceeded the quality control limits in all the fractions. Acetone was detected as a blank contaminant.

Other Issues Affecting Data Quality: Several MS/MSD and BS/BSD %Rs and RPDs were outside the quality control limits in all the fractions. In the semivolatile fraction, Several TICs were detected in the method blank. The internal standard area exceeded the upper control limits in the volatile and semivolatile fractions.

MEMO TO: **DAVE BRAYACK**
DATE: **FEBRUARY 28, 2000 – 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: FEBRUARY 28, 2000 – PAGE 6

TENTATIVELY IDENTIFIED COMPOUNDS (TICS)

Fraction	TIC
Volatiles	Substituted benzene Substituted indene
Semivolatile	Unknown ketone Hexadecanoic acid Unknown alkane Unknown Sulfur, mol. Sulfur

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**D. BRAYACK**	**DATE:**	**AUGUST 9, 2001**
FROM:	**SETH C. STAFFEN**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION- VOA CTO 020, MCRD PARRIS ISLAND SDG WR1395**		

SAMPLES:

1/Soil/SVOA
PAI-10-SS-12-02

3/Sediment/PEST

PAI-01-SD-18-01	PAI-01-SD-19-01	PAI-01-SD-20-01

7/Sediment/PAH

PAI-01-SD-18-01	PAI-01-SD-19-01	PAI-01-SD-20-01
PAI-01-SD-23-01	PAI-01-SD-24-01	PAI-01-SD-25-01
PAI-01-SD-26-01		

2/Surface Soil/PAH
PAI-10-SS-08-02 PAI-01-SS-12-02

OVERVIEW

The sample set for CTO 020, MCRD Parris Island; SDG WR1395 consists of seven (7) sediment and two (2) surface soil environmental samples. The samples were analyzed for pentachlorophenol, target compound list polynuclear aromatic hydrocarbons, and pesticides according to the above listing. No field duplicate pairs were included in this SDG.

The samples were collected by TetraTech NUS on April 26, 2001 and analyzed by Katahdin Analytical Services. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using SW-846 Method 8270B, 8081A, and 8270C-SIM analytical and reporting protocols. The data contained in this SDG were validated with regard to the following parameters:

- Data completeness
- Holding times
- GC/MS tuning and system performance
- Initial/continuing calibrations
- Laboratory method
- Surrogate spike recoveries
- Matrix Spike/Matrix Spike Duplicate Results
- Laboratory Control Sample Results
- Internal Standard Performance
- Compound Identification
- Compound Quantitation
- Detection Limits

The symbol (*) indicates that all quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A. Results as reported by the laboratory are presented in Appendix B.

SEMIVOLATILE

All quality control parameters were met for this fraction.

PESTICIDE FRACTION

The continuing calibration on 05/21/01 at 2103 contained %Ds that exceeded the 15% quality control limit on both analytical columns for 4,4'-DDD. The positive and nondetected results for 4,4'-DDD were qualified as estimated, J and UJ, respectively in the associated samples.

The surrogate recoveries of TCMX was less than the lower quality control limit on both columns in samples PAI-01-SD-19-01, PAI-01-SD-18-01, and PAI-01-SD-20-01. The positive and nondetected results were qualified as estimated, J and UJ, respectively, in the aforementioned samples.

The surrogate recoveries of TCMX were less than the lower quality control limit on both columns in the laboratory control sample, LCP1660. No action was taken based on surrogate noncompliance of a laboratory control sample.

The percent difference between columns for 4,4'-DDD for sample PAI-01-SD-18-01 was greater than the 25% quality control limit. The reported result for 4,4'-DDD was qualified as estimated, J, in the aforementioned sample.

PAH FRACTION

Due to the presence of target compound concentrations that exceeded the linear range of the instrument calibration, sample PAI-10-SS-08-02 was re-analyzed at 51X dilution. The reported results for the compounds that exceeded the linear range were reported from the 51X dilution and all other results were reported from the original analysis.

The continuing calibration on 05/30/01 at 1150 contained a percent difference (%D) that was greater than the 25% quality control limit for dibenzo(a,h)anthracene. The nondetected result for the aforementioned compound was qualified as estimated, UJ, in sample PAI-01-SD-23-01.

Surrogate recovery of nitrobenzene-d5 (NBZ) and 2-fluorobiphenyl (FBP) were less than the lower quality control limit but >10% in sample PAI-01-SD-26-01. Positive and nondetected results were qualified as estimated, J.

Surrogate recoveries of NBZ, FBP, and terphenyl-d14 (TPH) were less than 10% in sample PAI-01-SD-23-01. The sample was re-extracted however, the holding time was exceeded by 2X the recommended limit. Despite the gross exceedance, the reviewer elected to use and to quality all results in the re-extraction. Nondetected were qualified as estimated, UJ. PAHs are generally very stable and are not expected to degrade when properly preserved.

Surrogate recovery of FBP was less than the lower quality control limit in sample PAI-01-SD-19-01. No action required.

Due to high concentrations of target compounds in the native sample PAI-10-SS-08-02, the matrix spike and matrix spike duplicate %Rs fell outside of the quality control limits for several compounds. No action was taken based on MS/MSD %R noncompliance.

Relative percent differences (RPDs) exceeded the quality control limits for the matrix spike/matrix spike duplicates for benzo(k)fluoranthene, benzo(a)anthracene, benzo(a)pyrene, pyrene, chrysene, chrysene, fluoranthene, and benzo(b)fluoranthene. No action was warranted on MS/MSD noncompliances alone.

Laboratory control sample and laboratory control sample duplicate %Rs were less than the lower quality control limit for acenaphthene, acenaphthylene, anthracene, benzo(k)fluoranthene, fluoranthene, naphthalene, phenanthrene, and pyrene. No action was taken based on minor LCS noncompliance.

Internal standard recovery of Perylene (PRY) on 05/24/01 fell below the –50% quality control limit in samples PAI-01-SD-18-01. The sample was re-analyzed. Recovery of PRY fell below the –50% quality control limit in the re-analysis. The original analysis was used as the basis for data validation. Nondetected and positive results associated with the standard were qualified as estimated, UJ and J.

Additional Comments

Positive results below the reporting limit were qualified as estimated, J, due to uncertainty near the detection limit.

The MS/MSD and the LCS/LCSD were not spiked with 1-methylnaphthalene in the PAH fraction.

EXECUTIVE SUMMARY

Laboratory Performance Issues: Several surrogate recoveries were not within quality control limits in the PEST and PAH fractions. Internal standard recoveries were not within quality control limits in the PAH fraction.

Other Factors Affecting Data Quality: MS/MSD %Rs were outside the quality control limits for the PAH fraction.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (October 1999) and the NFESC guidelines "Navy IRCDQM" (September 1999). 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)."

Seth C. Staffen

Environmental Scientist/Data Validator
Tetra Tech NUS

Joseph A. Samchuck

Data Validation Quality Assurance Officer
TetraTech NUS

Attachments:

1. Appendix A - Qualified Analytical Results
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 Lead Modeling Results
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

CALCULATION WORKSHEET

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:** T. Jackson	**DATE:** MARCH 17, 2000

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface soil by a construction worker.

EQUATION:

$$IEX = \frac{Cs \times IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil/sediment (mg/kg)
IR	=	incidental soil ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFo $(mg/kg/day)^{-1}$

HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	50.8	mg/kg	Arsenic
IR	=	480	mg/day	
EF	=	125	days/year	
ED	=	1	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	365	days	
CSFo	=	1.5	$(mg/kg/day)^{-1}$	
RfDo	=	3.00E-04	(mg/kg/day)	

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SOIL CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:** T. Jackson	**DATE:** MARCH 17, 2000

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{50.8 \text{ mg/kg} \times 480 \text{ mg/day} \times 125 \text{ days/year} \times 1 \text{ years} \times 0.000001 \text{ kg/mg}}{70 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 1.70E-06 mg/kg/day ✓

ICLR = 1.70E-06 mg/kg/day x 1.5 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 2.56E-06 ✓

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{50.8 \text{ mg/kg} \times 480 \text{ mg/day} \times 125 \text{ days/year} \times 1 \text{ years} \times 0.000001 \text{ kg/mg}}{70 \text{ kg} \times 365 \text{ days}}$$

IEXnc = 1.19E-04 mg/kg/day ✓

HQ = 1.19E-04 mg/kg/day / 0.0003 (mg/kg/day) = Hazard Quotient

HQ = 3.98E-01 ✓

CALCULATION WORKSHEET

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:** T Jason	**DATE:** MARCH 17, 2000

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with surface soil by a construction worker.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil/sediment (mg/kg)
CF	=	conversion factor (1.0E-6 kg/mg)
SA	=	skin surface available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFd $(mg/kg/day)^{-1}$
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDd (mg/kg/day)

ASSUMPTIONS:

Cs	=	50.8	mg/kg	Arsenic
CF	=	1.0E-06	kg/mg	
SA	=	4,100	cm^2/day	
AF	=	0.5	mg/cm^2	
ABS	=	0.03		
EF	=	125	days/year	
ED	=	1	years	
BW	=	70	kg	
ATc	=	25550	days	
ATnc	=	365	days	
CSFd	=	3.66	$(mg/kg/day)^{-1}$	
RfDd	=	1.23E-04	(mg/kg/day)	

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SOIL CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{50.8 \text{ mg/kg} \times 0.000001 \text{ kg/mg} \times 4100 \text{ cm2/day} \times 0.5 \text{ mg/cm2} \times 0.03 \times 125 \text{ days/year} \times 1 \text{ years}}{70 \text{ kg} \times 25550 \text{ days}}$$

DEXc = 2.18E-07 mg/kg/day ✓

ICLR = 2.18E-07 mg/kg/day x 3.66 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 7.99E-07 ✓

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{50.8 \text{ mg/kg} \times 0.000001 \text{ kg/mg} \times 4100 \text{ cm2/day} \times 0.5 \text{ mg/cm2} \times 0.03 \times 125 \text{ days/year} \times 1 \text{ years}}{70 \text{ kg} \times 365 \text{ days}}$$

DEXnc = 1.53E-05 mg/kg/day ✓

HQ = 1.53E-05 mg/kg/day / 0.000123 (mg/kg/day) = Hazard Quotient

HQ = 1.24E-01 ✓

CALCULATION WORKSHEET

CLIENT:	JOB NUMBER:	
MCRD PARRIS ISLAND SOUTH CAROLINA	7803	
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of sediment by an adolescent recreational user.

EQUATION:

$$IEX = \frac{Cs \times IR \times EF \times ED \times FI \times CF}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil/sediment (mg/kg)
IR	=	incidental soil ingestion rate (mg/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
FI	=	fraction ingested from contaminated source (unitless)
CF	=	conversion factor (1.0E-6 kg/mg)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)$^{-1}$

HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Cs	=	9.67	mg/kg	Arsenic
IR	=	100	mg/day	
EF	=	45	days/year	
ED	=	10	years	
FI	=	1		
CF	=	1.0E-06	kg/mg	
BW	=	45	kg	
ATc	=	25550	days	
ATnc	=	3650	days	
CSFo	=	1.5	(mg/kg/day)$^{-1}$	
RfDo	=	3.00E-04	(mg/kg/day)	

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SEDIMENT ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{9.67 \text{ mg/kg} \times 100 \text{ mg/day} \times 45 \text{ days/year} \times 10 \text{ years} \times 0.000001 \text{ kg/mg}}{45 \text{ kg} \times 25550 \text{ days}}$$

IEXc = 3.78E-07 mg/kg/day ✓

ICLR = 3.78E-07 mg/kg/day x 1.5 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 5.68E-07 ✓

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{9.67 \text{ mg/kg} \times 100 \text{ mg/day} \times 45 \text{ days/year} \times 10 \text{ years} \times 0.000001 \text{ kg/mg}}{45 \text{ kg} \times 3650 \text{ days}}$$

IEXnc = 2.65E-06 mg/kg/day ✓

$$HQ = \frac{2.65E\text{-}06 \text{ mg/kg/day}}{0.0003 \text{ (mg/kg/day)}} = \text{Hazard Quotient}$$

HQ = 8.83E-03 ✓

CALCULATION WORKSHEET

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:** T. Jackson	**DATE:** MARCH 17, 2000

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with sediment by an adolescent recreational user.

EQUATION:

$$DEX = \frac{Cs \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Where:

DEX	=	estimated exposure intake (mg/kg/day)
Cs	=	exposure point concentration in soil/sediment (mg/kg)
CF	=	conversion factor (1.0E-6 kg/mg)
SA	=	skin surface available for contact (cm^2/day)
ABS	=	absorption factor (unitless)
AF	=	adherence factor (mg/cm^2)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFd	=	dermal carcinogenic slope factor ($(mg/kg/day)^{-1}$)
RfDd	=	dermal noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFd $(mg/kg/day)^{-1}$
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDd (mg/kg/day)

ASSUMPTIONS:

Cs	=	9.67	mg/kg	Arsenic
CF	=	1.0E-06	kg/mg	
SA	=	3,820	cm^2/day	
AF	=	0.2	mg/cm^2	
ABS	=	0.03		
EF	=	45	days/year	
ED	=	10	years	
BW	=	45	kg	
ATc	=	25550	days	
ATnc	=	3650	days	
CSFd	=	3.66	$(mg/kg/day)^{-1}$	
RfDd	=	1.23E-04	(mg/kg/day)	

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SEDIMENT ADOLESCENT RECREATIONAL USER		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

EXAMPLE CARCINOGENIC CALCULATION

$$DEXc = \frac{9.67\ mg/kg \times 0.000001\ kg/mg \times 3820\ cm2/day \times 0.2\ mg/cm2 \times 0.03 \times 45\ days/year \times 10\ years}{45\ kg \times 25550\ days}$$

DEXc = 8.67E-08 mg/kg/day

ICLR = 8.67E-08 mg/kg/day x 3.66 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 3.17E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$DEXnc = \frac{9.67\ mg/kg \times 0.000001\ kg/mg \times 3820\ cm2/day \times 0.2\ mg/cm2 \times 0.03 \times 45\ days/year \times 10\ years}{45\ kg \times 3650\ days}$$

DEXnc = 6.07E-07 mg/kg/day

$$HQ = \frac{6.07E\text{-}07\ mg/kg/day}{0.000123\ (mg/kg/day)} = \text{Hazard Quotient}$$

HQ = 4.94E-03

CALCULATION WORKSHEET

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:** T. Jacobs	**DATE:** MARCH 17, 2000

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with groundwater by a construction worker.

EQUATION:

$$DAD = \frac{DAevent \times EV \times ED \times EF \times A}{BW \times AT}$$

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed does per event (mg/cm^2/event)
EV	=	event frequency (events/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
A	=	skin surface available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = DAD (mg/kg/day) x CSFd (mg/kg/day)$^{-1}$
HQ (Noncarcinogens) = DAD (mg/kg/day) / RFDd (mg/kg/day)

EQUATION for DAevent:

For Inorganics:

$$DA_{event} = (K_p)(C_{gw})(t_{event})$$

For Organics:

$$\text{If } t_{event} < t^{*}, \text{ then : } DA_{event} = (2K_p)(C_{gw})(CF)\left(\sqrt{\frac{6\,\tau\, t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^{*}, \text{ then : } DA_{event} = (K_p)(C_{gw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

Where:

$$B = K_p \times \sqrt{MW} \;/\; 2.6 \qquad \tau = 0.105 \times 10^{(0.0056 \times MW)}$$

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

If $B \leq 0.6$, then $t^* = 2.4 \times \tau$

If $B > 0.6$, then $t^* = (b - \sqrt{b^2 - c^2}) \times \frac{l_{sc}^2}{D_{sc}}$

where: $b = \frac{2 \times (1 + B)^2}{\pi} - c$ $\quad c = \frac{1 + 3B + 3B^2}{3(1 + B)}$

$D_{sc} = l_{sc} \times 10^{(-2.80 - 0.0056 \times MW)}$

Where:

Kp	=	permeability coefficient from water (cm/hr)
Cgw	=	concentration of chemical in groundwater (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
MW	=	molecular weight
lsc	=	apparent thickness of skin (cm)
Dsc	=	effective diffusivity for chemical transfer through skin (cm^2/hr)
t*	=	time it takes to reach steady-state (hr/event)
τ	=	lag time (hr/event)
B	=	Bunge Model Constant (dimensionless)

EXAMPLE CALCULATION OF DAevent

ASSUMPTIONS:

Cgw	=	0.0045	mg/L	Chloroform
Kp	=	0.0069	cm/hr	
tevent	=	8	hr/event	
CF	=	0.001	L/cm^3	
MW	=	119.4		
lsc	=	0.001	cm	

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:** T. Jacobson	**DATE:** MARCH 17, 2000

B = 0.0069 x SQRT(119.4) / 2.6

B = 2.90E-02

τ = 0.105 x 10^(0.0056 x 119.4)

τ = 4.90E-01 hr/event

B < 0.6, therefore,

t* = 2.4 x 4.90E-01

t* = 1.18

tevent > t*, therefore,

$$DAevent = (0.0069\ cm/hr)(0.0045\ mg/L)(0.001\ L/cm3) \times \frac{8\ hr/event}{1 + 2.90E\text{-}02} + 2 \times 4.90E\text{-}01\ hr/event \times \frac{(1 + 3 \times 2.90E\text{-}02 \times 3 \times 2.90E\text{-}02^{\wedge}2)}{3 \times (1 + 2.90E\text{-}02)^{\wedge}2}$$

DAevent = 2.73E-07 mg/cm^2-event

RISK CALCULATIONS

ASSUMPTIONS:

A	=	2490	cm^2/day
EV	=	1	event/day
ED	=	1	years
EF	=	21	days/year
BW	=	70	kg
ATc	=	25550	days
ATnc	=	365	days
CSFd	=	3.10E-02	(mg/kg/day)$^{-1}$
RfDd	=	2.00E-03	(mg/kg/day)

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH GROUNDWATER CONSTRUCTION WORKER		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:** T. Jackson	**DATE:** MARCH 17, 2000

EXAMPLE CARCINOGENIC CALCULATION

$$DADc = \frac{2.73E\text{-}07 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 1 \text{ years} \times 21 \text{ days/year} \times 2490 \text{ cm2/day}}{70 \text{ kg} \times 25550 \text{ days}}$$

DADc = 7.97E-09 mg/kg/day ✓

DADc = 7.97E-09 mg/kg/day x 0.031 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 2.47E-10 ✓

EXAMPLE NONCARCINOGENIC CALCULATION

$$DADnc = \frac{2.73E\text{-}07 \text{ cm2/day} \times 1 \text{ event/day} \times 1 \text{ years} \times 21 \text{ days/year} \times 2490 \text{ cm2/day}}{70 \text{ kg} \times 365 \text{ days}}$$

DADnc = 5.58E-07 mg/kg/day ✓

$$HQ = \frac{5.58E\text{-}07 \text{ mg/kg/day}}{0.002 \text{ (mg/kg/day)}} = \text{Hazard Quotient}$$

HQ = 2.79E-04 ✓

CALCULATION WORKSHEET

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER CHILD RESIDENT		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from incidental ingestion of surface water by a child resident.

EQUATION:

$$IEX = \frac{Csw \times CF \times CRsw \times ET \times EF \times ED}{BW \times AT}$$

Where:

IEX	=	estimated exposure intake (mg/kg/day)
Csw	=	exposure point concentration in surface water (ug/L)
CF	=	conversion factor (1.0E-3 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/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = Intake (mg/kg/day) x CSFo (mg/kg/day)$^{-1}$
HQ (Noncarcinogens) = Intake (mg/kg/day) / RFDo (mg/kg/day)

ASSUMPTIONS:

Csw	=	10.25	ug/L	Bis(2-ethylhexyl)phthalate
CRsw	=	0.01	L/day	
CF	=	1.0E-03	mg/ug	
ET	=	2.6	hours	
EF	=	45	days/year	
ED	=	6	years	
BW	=	15	kg	
ATc	=	25,550	days	
ATnc	=	2,190	days	
CSFo	=	1.40E-02	(mg/kg/day)$^{-1}$	
RfDo	=	2.00E-02	(mg/kg/day)	

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM INCIDENTAL INGESTION OF SURFACE WATER CHILD RESIDENT		
BASED ON: USEPA, DEC. 1989		
BY: R. JUPIN	**CHECKED BY:** T. Jackson	**DATE:** MARCH 17, 2000

EXAMPLE CARCINOGENIC CALCULATION

$$IEXc = \frac{10.25\ ug/L \times 0.001\ mg/ug \times 0.01\ L/day \times 2.6\ hours \times 45\ days/year \times 6\ years}{15\ kg \times 25550\ days}$$

IEXc = 1.88E-07 mg/kg/day ✓

ICLR = 1.88E-07 mg/kg/day x 0.014 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 2.63E-09 ✓

EXAMPLE NONCARCINOGENIC CALCULATION

$$IEXnc = \frac{10.25\ ug/L \times 0.001\ mg/ug \times 0.01\ L/day \times 2.6\ hours \times 45\ days/year \times 6\ years}{15\ kg \times 2190\ days}$$

IEXnc = 2.19E-06 mg/kg/day ✓

$$HQ = \frac{2.19E\text{-}06\ mg/kg/day}{0.02\ (mg/kg/day)} = \text{Hazard Quotient}$$

HQ = 1.10E-04 ✓

CALCULATION WORKSHEET

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CHILD RESIDENT		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

PURPOSE: To estimate intake, carcinogenic and noncarcinogenic risks from dermal contact with surface water by a child resident.

EQUATION:

$$DAD = \frac{DAevent \times EV \times ED \times EF \times A}{BW \times AT}$$

Where:

DAD	=	dermally absorbed dose (mg/kg/day)
DAevent	=	absorbed does per event (mg/cm^2/event)
EV	=	event frequency (events/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
A	=	skin surface available for contact (cm^2)
BW	=	body weight (kg)
AT	=	averaging time (days)
CSFo	=	oral carcinogenic slope factor ((mg/kg/day)$^{-1}$)
RfDo	=	oral noncarcinogenic reference dose (mg/kg/day)

RISKS:

ICLR (Carcinogens) = DAD (mg/kg/day) x CSFd (mg/kg/day)$^{-1}$
HQ (Noncarcinogens) = DAD (mg/kg/day) / RFDd (mg/kg/day)

EQUATION for DAevent:

For Inorganics:

$$DA_{event} = (K_p)(C_{gw})(t_{event})$$

For Organics:

$$\text{If } t_{event} < t^{*}, \text{ then : } DA_{event} = (2K_p)(C_{gw})(CF)\left(\sqrt{\frac{6\tau t_{event}}{\pi}}\right)$$

$$\text{If } t_{event} > t^{*}, \text{ then : } DA_{event} = (K_p)(C_{gw})(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right)$$

Where:

$$B = K_p \times \sqrt{MW} \;/\; 2.6 \qquad \tau = 0.105 \times 10^{(0.0056 \times MW)}$$

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CHILD RESIDENT		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

If $B \leq 0.6$, then $t^* = 2.4 \times \tau$

If $B > 0.6$, then $t^* = (b - \sqrt{b^2 - c^2}) \times \frac{l_{sc}^2}{D_{sc}}$

where: $b = \frac{2 \times (1 + B)^2}{\pi} - c$ $\quad c = \frac{1 + 3B + 3B^2}{3(1 + B)}$

$D_{sc} = l_{sc} \times 10^{(-2.80 - 0.0056 \times MW)}$

Where:

Kp	=	permeability coefficient from water (cm/hr)
Cgw	=	concentration of chemical in groundwater (mg/L)
tevent	=	duration of event (hr/event)
CF	=	conversion factor (0.001 L/cm^3)
MW	=	molecular weight
lsc	=	apparent thickness of skin (cm)
Dsc	=	effective diffusivity for chemical transfer through skin (cm^2/hr)
t*	=	time it takes to reach steady-state (hr/event)
τ	=	lag time (hr/event)
B	=	Bunge Model Constant (dimensionless)

EXAMPLE CALCULATION OF DAevent

ASSUMPTIONS:

Cgw	=	0.01025	mg/L	Bis(2-ethylhexyl)phthalate
Kp	=	0.025	cm/hr	
tevent	=	2.6	hr/event	
CF	=	0.001	L/cm^3	
MW	=	391		
lsc	=	0.001	cm	

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CHILD RESIDENT		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

B = 0.025 x SQRT(391) / 2.6

B = 1.90E-01

τ = 0.105 x 10^(0.0056 x 391)

τ = 1.62E+01 hr/event

B < 0.6, therefore,

t* = 2.4 x 1.62E+01

t* = 38.99

tevent < t*, therefore,

DAevent = (2 x 0.025 cm/hr) (0.01025 mg/L) (0.001 L/cm3) x

SQRT(6 x 1.62E+01 hr/event x 2.6 hr/event / 3.1416)

DAevent = 4.60E-06 mg/cm^2-event

RISK CALCULATIONS

ASSUMPTIONS:

A	=	2000	cm^2/day
EV	=	1	event/day
ED	=	6	years
EF	=	45	days/year
BW	=	15	kg
ATc	=	25550	days
ATnc	=	2190	days
CSFd	=	7.37E-02	$(mg/kg/day)^{-1}$
RfDd	=	3.80E-03	(mg/kg/day)

CLIENT: MCRD PARRIS ISLAND SOUTH CAROLINA		**JOB NUMBER:** 7803
SUBJECT: CALCULATION OF INTAKE/RISK FROM DERMAL CONTACT WITH SURFACE WATER CHILD RESIDENT		
BASED ON: USEPA, DEC. 1998		
BY: R. JUPIN	**CHECKED BY:**	**DATE:** MARCH 17, 2000

EXAMPLE CARCINOGENIC CALCULATION

$$DADc = \frac{4.60E\text{-}06 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 6 \text{ years} \times 45 \text{ days/year} \times 2000 \text{ cm2/day}}{15 \text{ kg} \times 25550 \text{ days}}$$

DADc = 6.49E-06 mg/kg/day

DADc = 6.49E-06 mg/kg/day x 0.0737 (mg/kg/day)-1 = Incremental Lifetime Cancer Risk

ICLR = 4.78E-07

EXAMPLE NONCARCINOGENIC CALCULATION

$$DADnc = \frac{4.60E\text{-}06 \text{ mg/cm2-event} \times 1 \text{ event/day} \times 6 \text{ years} \times 45 \text{ days/year} \times 2000 \text{ cm2/day}}{15 \text{ kg} \times 2190 \text{ days}}$$

DADnc = 7.57E-05 mg/kg/day

$$HQ = \frac{7.57E\text{-}05 \text{ mg/kg/day}}{0.0038 \text{ (mg/kg/day)}} = \text{Hazard Quotient}$$

HQ = 1.99E-02

APPENDIX E.2

RAGS PART D TABLES

TABLE 1

SELECTION OF EXPOSURE PATHWAYS
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 3

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil	Surface Soil	Surface Soil	Construction Workers	Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Construction workers may have contact with soil during excavation activities.
				Full-time Employees	Adult	Ingestion Dermal	On-Site On-Site	None None	There is no current or anticipated future industrial use of the site.
				Maintenance Workers	Adult	Ingestion Dermal	On-Site On-Site	None None	There is no current or anticipated future industrial use of the site.
				Military Personnel	Adult	Ingestion Dermal	On-Site On-Site	None None	No military personnel at the site.
				Trespassers	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Trespassers may be exposed to soil while at the site.
				Recreational Users	Adolescents	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to soil while at the site.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Recreational users may be exposed to soil while at the site.
				Residents	Child	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
					Adult	Ingestion Dermal	On-Site On-Site	Quant Quant	Site may be residential in the future.
	Surface Soil	Air	Surface Soil	Construction Workers	Adult	Inhalation	On-site	Quant	Construction workers may be exposed to fugitive dust and volatile emissions during construction activities.
				Full-time Employees	Adult	Inhalation	On-site	None	There is no current or anticipated future industrial use of the site.
				Maintenance Workers	Adult	Inhalation	On-site	None	There is no current or anticipated future industrial use of the site.
				Military Personnel	Adult	Inhalation	On-site	None	No full-time military personnel at the site.
				Trespassers	Adolescents	Inhalation	On-site	Quant	Trespassers may be exposed to fugitive dust and volatile emissions from soil.
				Recreational Users	Adolescents	Inhalation	On-Site	Quant	Recreational users may be exposed to fugitive dust and volatile emissions from soil.
					Adult	Inhalation	On-Site	Quant	Recreational users may be exposed to fugitive dust and volatile emissions from soil.
				Residents	Child	Inhalation	On-Site	Quant	Future child residents may be exposed to fugitive dust and volatile emissions from soil.
					Adult	Inhalation	On-Site	Quant	Future adult residents may be exposed to fugitive dust and volatile emissions from soil.

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TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SITE 12/SWMU 10 - JERICHO ISLAND
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 2 OF 3

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
	Groundwater	Groundwater	Shallow Aquifer	Recreational Users	Adolescents	Ingestion	On-Site	None	Recreational users are not exposed to groundwater.
						Dermal	On-Site	None	
					Adult	Ingestion	On-Site	None	Recreational users are not exposed to groundwater.
						Dermal	On-Site	None	
				Residents	Child	Ingestion	On-Site	Quant	Groundwater is may be used as a potable water supply in the future.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Groundwater is may be used as a potable water supply in the future.
						Dermal	On-Site	Quant	
	Groundwater	Air	Shallow Aquifer	Construction Workers	Adult	Inhalation	On-site	None	Exposure to volatiles is insignificant compared to dermal exposures.
				Full-time Employees	Adult	Inhalation	On-site	None	Groundwater is not suitable for use as a potable water supply.
				Maintenance Workers	Adult	Inhalation	On-site	None	Maintenance workers are not exposed to groundwater.
				Military Personnel	Adult	Inhalation	On-Site	None	Site is not used by military personnel.
				Trespassers	Adolescents	Inhalation	On-Site	None	Trespassers are not exposed to groundwater.
				Recreational Users	Adolescents	Inhalation	On-Site	None	Recreational users are not exposed to groundwater.
					Adult	Inhalation	On-Site	None	Recreational users are not exposed to groundwater.
				Residents	Child	Inhalation	On-Site	Quant	Groundwater is may be used as a potable water supply in the future.
					Adult	Inhalation	On-Site	Quant	Groundwater is may be used as a potable water supply in the future.
	Sediment	Sediment	Sediment	Construction Workers.	Adult	Ingestion	On-Site	Quant	Construction workers may contact sediment during construction activities.
						Dermal	On-Site	Quant	
				Full-time Employees	Adult	Ingestion	On-Site	None	There is no current or anticipated future industrial use of the site.
						Dermal	On-Site	None	
				Maintenance Workers	Adult	Ingestion	On-Site	None	There is no current or anticipated future industrial use of the site.
						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	Quant	Trespassers may be exposed to sediment while at the site.
						Dermal	On-Site	Quant	
				Recreational Users	Adolescents	Ingestion	On-Site	Quant	Recreational users may be exposed to sediment while at the site.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Recreational users may be exposed to sediment while at the site.
						Dermal	On-Site	Quant	
				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	

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TABLE 1
SELECTION OF EXPOSURE PATHWAYS
SITE 12/SWMU 10 - JERICHO ISLAND
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
	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	There is no current or anticipated future industrial use of the site.
						Dermal	On-Site	None	
				Maintenance Workers	Adult	Ingestion	On-Site	None	There is no current or anticipated future industrial use of the site.
						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	Quant	Trespassers may be exposed to surface water while at the site.
						Dermal	On-Site	Quant	
				Recreational Users	Adolescents	Ingestion	On-Site	Quant	Recreational users may be exposed to surface water while at the site.
						Dermal	On-Site	Quant	
					Adult	Ingestion	On-Site	Quant	Recreational users may be exposed to surface water while at the site.
						Dermal	On-Site	Quant	
				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	

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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 12/SWMU 10 - Jericho Island

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		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatile Organic Compounds																
78-93-3	2-Hexanone	0.0085		0.0085		mg/kg	PAI-10-SS-09-01	1/16	0.0054 - 0.68	0.0085	NA	310	N	NA	NA	No	BSL
108-10-1	4-Methyl-2-pentanone	0.0038	J	0.026		mg/kg	PAI-10-SS-09-01	6/16	0.0056 - 0.68	0.026	0.007	630	N	NA	NA	No	BSL
67-64-1	Acetone	0.023		0.35	J	mg/kg	PAI-10-SS-11-01	4/15	0.011 - 0.66	0.35	0.266	780	N	NA	NA	No	BSL
75-15-0	Carbon Disulfide	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	780	N	NA	NA	No	BSL
56-23-5	Carbon Tetrachloride	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	0.49	N	NA	NA	No	BSL
67-66-3	Chloroform	0.0018	J	0.0075		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.0075	NA	100	C	NA	NA	No	BSL
74-87-3	Chloromethane	0.0036	J	0.017		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.017	NA	49	C	NA	NA	No	BSL
127-18-4	Tetrachloroethene	0.001	J	0.001	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.001	NA	12	C	NA	NA	No	BSL
108-88-3	Toluene	0.0013	J	0.0039	J	mg/kg	PAI-10-SS-15-01A	9/16	0.0034 - 0.41	0.0034	0.0056	1600	N	NA	NA	No	BSL
	Semivolatile Organic Compounds																
91-57-6	2-Methylnaphthalene	0.385		0.385		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.385	NA	160	N	NA	NA	No	BSL
83-32-9	Acenaphthene	0.305		0.305		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.305	NA	470	N	NA	NA	No	BSL
208-96-8	Acenaphthylene	0.375		0.375		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.375	NA	230 (5)	N	NA	NA	No	BSL
120-12-7	Anthracene	0.024	J	0.024	J	mg/kg	PAI-10-SS-08-01	1/16	0.34 - 0.46	0.024	NA	2300	N	NA	NA	No	BSL
56-55-3	Benzo(a)anthracene	0.041	J	0.14	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.14	NA	0.87	C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	0.032	J	0.12	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.12	NA	0.087	C	NA	NA	Yes	ASL
205-99-2	Benzo(b)fluoranthene	0.033	J	0.13	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	3/16	0.34 - 0.46	0.13	NA	0.87	C	NA	NA	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.05	J	0.055	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	2/16	0.34 - 0.46	0.055	NA	230 (5)	N	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	0.034	J	0.11	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.11	NA	8.7	C	NA	NA	No	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	0.03	J	0.48		mg/kg	PAI-10-SS-07-01	9/16	0.34 - 0.44	0.48	NA	46	C	NA	NA	No	BSL
218-01-9	Chrysene	0.047	J	0.16	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.16	NA	87	C	NA	NA	No	BSL
53-70-3	Dibenzo(a,h)anthracene	0.034	J	0.034	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.034	NA	0.087	C	NA	NA	No	BSL
131-11-3	Dimethyl Phthalate	0.18	J	0.18	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.18	NA	78000	N	NA	NA	No	BSL
206-44-0	Fluoranthene	0.041	J	0.28	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.28	NA	310	N	NA	NA	No	BSL
86-73-7	Fluorene	0.22	J	0.22	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.22	0.646	310	N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.064	J	0.069	J	mg/kg	PAI-10-SS-08-01	2/11	0.35 - 0.46	0.069	NA	0.87	C	NA	NA	No	BSL
91-20-3	Naphthalene	1.435		1.435		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	1.435	NA	160	N	NA	NA	No	BSL
87-86-5	Pentachlorophenol	0.24	J	0.24	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.69 - 1.1	0.24	NA	5.3	C	NA	NA	No	BSL
85-01-8	Phenanthrene	0.069	J	0.14	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.14	NA	230 (5)	N	NA	NA	No	BSL
129-00-0	Pyrene	0.024	J	0.23	J	mg/kg	PAI-10-SS-08-01	4/16	0.34 - 0.46	0.23	NA	230	N	NA	NA	No	BSL
	Pesticides/PCBs																
72-55-9	4,4'-DDE	0.043		0.043		mg/kg	PAI-10-SS-14-01	1/14	0.0034 - 0.0045	0.043	NA	1.9	C	NA	NA	No	BSL
72-43-5	Methoxychlor	0.07		0.07		mg/kg	PAI-10-SS-13-01	1/14	0.018 - 0.023	0.07	NA	39	N	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	822		5370		mg/kg	PAI-10-SS-14-01	16/16	ND	5370	7270	7800	N	NA	NA	No	BSL, BKG
7440-36-0	Antimony	8		8		mg/kg	PAI-10-SS-14-01	1/16	0.48 - 2.5	8	NA	3.1	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	0.24		50.8		mg/kg	PAI-10-SS-14-01	16/16	ND	50.8	1.44	0.43	C	NA	NA	Yes	ASL

TABLE 2.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12/SWMU 10 - Jericho Island

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		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
7440-39-3	Barium	7		76.4		mg/kg	PAI-10-SS-14-01	12/16	2.7 - 5.9	76.4	23.6	550	N	NA	NA	No	BSL
7440-41-7	Beryllium	0.08		0.17		mg/kg	PAI-10-SS-12-01-AVG, PAI-10-SS-15-01A	5/16	0.02 - 0.19	0.17	0.095	16	N	NA	NA	No	BSL
7440-43-9	Cadmium	0.06		3.2		mg/kg	PAI-10-SS-14-01	2/16	0.19 - 0.26	3.2	NA	3.9	N	NA	NA	No	BSL
7440-70-2	Calcium	33.9		2780		mg/kg	PAI-10-SS-14-01	16/16	ND	2780	766	NA		NA	NA	No	NUT
7440-47-3	Chromium	1.8		18.1		mg/kg	PAI-10-SS-14-01	16/16	ND	18.1	6.23	12000 (6)		NA	NA	No	BSL
7440-48-4	Cobalt	0.455		6.6		mg/kg	PAI-10-SS-14-01	6/16	0.33 - 0.82	6.6	0.363	470	N	NA	NA	No	BSL
7440-50-8	Copper	0.72		189		mg/kg	PAI-10-SS-14-01	8/16	0.27 - 1	189	1.52	310	N	NA	NA	No	BSL
7439-89-6	Iron	485		99700		mg/kg	PAI-10-SS-14-01	16/16	ND	99700	3920	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	4.4		1100		mg/kg	PAI-10-SS-14-01	16/16	ND	1100	12.5	400 (7)		NA	NA	Yes	ASL
7439-95-4	Magnesium	123		3240		mg/kg	PAI-10-SS-14-01	16/16	ND	3240	515	NA		NA	NA	No	NUT
7439-96-5	Manganese	10.6		522		mg/kg	PAI-10-SS-14-01	10/16	3.9 - 9.7	522	129	160	N	NA	NA	Yes	ASL
7487-94-7	Mercury	0.02		0.89		mg/kg	PAI-10-SS-14-01	11/16	0.02 - 0.09	0.89	0.11	2.3 (8)	N	NA	NA	No	BSL
7440-02-0	Nickel	0.61		26.5		mg/kg	PAI-10-SS-14-01	16/16	ND	26.5	1.8	160	N	NA	NA	No	BSL
7440-09-7	Potassium	57.8		640		mg/kg	PAI-10-SS-14-01	16/16	ND	640	313	NA		NA	NA	No	NUT
7782-49-2	Selenium	0.09		0.12		mg/kg	PAI-10-SS-08-01	5/16	0.07 - 0.44	0.12	0.285	39	N	NA	NA	No	BSL, BGK
7440-23-5	Sodium	20.525		10700		mg/kg	PAI-10-SS-14-01	7/16	11.4 - 35.6	10700	241	NA		NA	NA	No	NUT
7440-62-2	Vanadium	1.7		9.3		mg/kg	PAI-10-SS-14-01	16/16	ND	9.3	9.5	55	N	NA	NA	No	BSL, BKG
7440-66-6	Zinc	4.75		1020		mg/kg	PAI-10-SS-14-01	9/16	1.9 - 6.4	1020	9.7	2300	N	NA	NA	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

(3) USEPA Region III Risk-Based Concentration Table, Apri; 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) Value for naphthalene.

(6) Value for trivalent chromium, hexavalent chromium was not detected in surface soil.

(7) OSWER screening level.

(8) Value for mercuric chloride.

Shading indicates that the criteria was exceeded.

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 2.2

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: Air emissions from soil

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) SSL Soil to Air	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatile Organic Compounds															
78-93-3	2-Hexanone	0.0085		0.0085		mg/kg	PAI-10-SS-09-01	1/16	0.0054 - 0.68	0.0085	NA	NA	NA	NA	No	NTX
108-10-1	4-Methyl-2-pentanone	0.0038	J	0.026		mg/kg	PAI-10-SS-09-01	6/16	0.0056 - 0.68	0.026	0.007	NA	NA	NA	No	NTX
67-64-1	Acetone	0.023		0.35	J	mg/kg	PAI-10-SS-11-01	4/15	0.011 - 0.66	0.35	0.266	100000 sat	NA	NA	No	BSL
75-15-0	Carbon Disulfide	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	720 sat	NA	NA	No	BSL
56-23-5	Carbon Tetrachloride	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	0.3	NA	NA	No	BSL
67-66-3	Chloroform	0.0018	J	0.0075		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.0075	NA	0.3 C	NA	NA	No	BSL
74-87-3	Chloromethane	0.0036	J	0.017		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.017	NA	NA	NA	NA	No	NTX
127-18-4	Tetrachloroethene	0.001	J	0.001	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.001	NA	11	NA	NA	No	BSL
108-88-3	Toluene	0.0013	J	0.0039	J	mg/kg	PAI-10-SS-15-01A	9/16	0.0034 - 0.41	0.0034	0.006	650 sat	NA	NA	No	BSL
	Semivolatile Organic Compounds															
91-57-6	2-Methylnaphthalene	0.385		0.385		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.385	NA	NA	NA	NA	No	NTX
83-32-9	Acenaphthene	0.305		0.305		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.305	NA	NA	NA	NA	No	NTX
208-96-8	Acenaphthylene	0.375		0.375		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.375	NA	NA	NA	NA	No	NTX
120-12-7	Anthracene	0.024	J	0.024	J	mg/kg	PAI-10-SS-08-01	1/16	0.34 - 0.46	0.024	NA	NA	NA	NA	No	NTX
56-55-3	Benzo(a)anthracene	0.041	J	0.14	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.14	NA	NA	NA	NA	No	NTX
50-32-8	Benzo(a)pyrene	0.032	J	0.12	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.12	NA	NA	NA	NA	No	NTX
205-99-2	Benzo(b)fluoranthene	0.033	J	0.13	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	3/16	0.34 - 0.46	0.13	NA	NA	NA	NA	No	NTX
191-24-2	Benzo(g,h,i)perylene	0.05	J	0.055	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	2/16	0.34 - 0.46	0.055	NA	NA	NA	NA	No	NTX
207-08-9	Benzo(k)fluoranthene	0.034	J	0.11	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.11	NA	NA	NA	NA	No	NTX
117-81-7	Bis(2-ethylhexyl)phthalate	0.03	J	0.48		mg/kg	PAI-10-SS-07-01	9/16	0.34 - 0.44	0.48	NA	31000 sat	NA	NA	No	BSL
218-01-9	Chrysene	0.047	J	0.16	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.16	NA	NA	NA	NA	No	NTX
53-70-3	Dibenzo(a,h)anthracene	0.034	J	0.034	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.034	NA	NA	NA	NA	No	NTX
131-11-3	Dimethyl Phthalate	0.18	J	0.18	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.18	NA	*NA	NA	NA	No	NTX
206-44-0	Fluoranthene	0.041	J	0.28	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.28	NA	NA	NA	NA	No	NTX
86-73-7	Fluorene	0.22	J	0.22	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.22	0.646	NA	NA	NA	No	NTX
193-39-5	Indeno(1,2,3-cd)pyrene	0.064	J	0.069	J	mg/kg	PAI-10-SS-08-01	2/11	0.35 - 0.46	0.069	NA	NA	NA	NA	No	NTX
91-20-3	Naphthalene	1.435		1.435		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	1.435	NA	NA	NA	NA	No	NTX
87-86-5	Pentachlorophenol	0.24	J	0.24	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.69 - 1.1	0.24	NA	NA	NA	NA	No	NTX
85-01-8	Phenanthrene	0.069	J	0.14	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.14	NA	NA	NA	NA	No	NTX
129-00-0	Pyrene	0.024	J	0.23	J	mg/kg	PAI-10-SS-08-01	4/16	0.34 - 0.46	0.23	NA	NA	NA	NA	No	NTX
	Pesticides/PCBs															
72-55-9	4,4'-DDE	0.043		0.043		mg/kg	PAI-10-SS-14-01	1/14	0.0034 - 0.0045	0.043	NA	NA	NA	NA	No	NTX
72-43-5	Methoxychlor	0.07		0.07		mg/kg	PAI-10-SS-13-01	1/14	0.018 - 0.023	0.07	NA	NA	NA	NA	No	NTX
	Inorganics															
7429-90-5	Aluminum	822		5370		mg/kg	PAI-10-SS-14-01	16/16	ND	5370	7270	NA	NA	NA	No	NTX
7440-36-0	Antimony	8		8		mg/kg	PAI-10-SS-14-01	1/16	0.48 - 2.5	8	NA	NA	NA	NA	No	NTX
7440-38-2	Arsenic	0.24		50.8		mg/kg	PAI-10-SS-14-01	16/16	ND	50.8	1.44	750 C	NA	NA	No	BSL

he-3

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: Air emissions from soil

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) SSL Soil to Air		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
7440-39-3	Barium	7		76.4		mg/kg	PAI-10-SS-14-01	12/16	2.7 - 5.9	76.4	23.6	690000	N	NA	NA	No	BSL
7440-41-7	Beryllium	0.08		0.17		mg/kg	PAI-10-SS-12-01-AVG, PAI-10-SS-15-01A	5/16	0.02 - 0.19	0.17	0.095	1300	C	NA	NA	No	BSL
7440-43-9	Cadmium	0.06		3.2		mg/kg	PAI-10-SS-14-01	2/16	0.19 - 0.26	3.2	NA	1800	C	NA	NA	No	BSL
7440-70-2	Calcium	33.9		2780		mg/kg	PAI-10-SS-14-01	16/16	ND	2780	766	NA		NA	NA	No	NUT
7440-47-3	Chromium	1.8		18.1		mg/kg	PAI-10-SS-14-01	16/16	ND	18.1	6.23	270	C	NA	NA	No	BSL
7440-48-4	Cobalt	0.455		6.6		mg/kg	PAI-10-SS-14-01	6/16	0.33 - 0.82	6.6	0.363	NA		NA	NA	No	NTX
7440-50-8	Copper	0.72		189		mg/kg	PAI-10-SS-14-01	8/16	0.27 - 1	189	1.52	NA		NA	NA	No	NTX
7439-89-6	Iron	485		99700		mg/kg	PAI-10-SS-14-01	16/16	ND	99700	3920	NA		NA	NA	No	NTX
7439-92-1	Lead	4.4		1100		mg/kg	PAI-10-SS-14-01	16/16	ND	1100	12.5	NA		NA	NA	No	NTX
7439-95-4	Magnesium	123		3240		mg/kg	PAI-10-SS-14-01	16/16	ND	3240	515	NA		NA	NA	No	NUT
7439-96-5	Manganese	10.6		522		mg/kg	PAI-10-SS-14-01	10/16	3.9 - 9.7	522	129	NA		NA	NA	No	NTX
7487-94-7	Mercury	0.02		0.89		mg/kg	PAI-10-SS-14-01	11/16	0.02 - 0.09	0.89	0.110	10		NA	NA	No	BSL
7440-02-0	Nickel	0.61		26.5		mg/kg	PAI-10-SS-14-01	16/16	ND	26.5	1.80	13000	C	NA	NA	No	BSL
7440-09-7	Potassium	57.8		640		mg/kg	PAI-10-SS-14-01	16/16	ND	640	313	NA		NA	NA	No	NUT
7782-49-2	Selenium	0.09		0.12		mg/kg	PAI-10-SS-08-01	5/16	0.07 - 0.44	0.12	0.285	NA		NA	NA	No	BKG
7440-23-5	Sodium	20.525		10700		mg/kg	PAI-10-SS-14-01	7/16	11.4 - 35.6	10700	241	NA		NA	NA	No	NTX
7440-62-2	Vanadium	1.7		9.3		mg/kg	PAI-10-SS-14-01	16/16	ND	9.3	9.50	NA		NA	NA	No	BKG
7440-66-6	Zinc	4.75		1020		mg/kg	PAI-10-SS-14-01	9/16	1.9 - 6.4	1020	9.70	NA		NA	NA	No	NTX

Notes:

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

(3) USEPA Soil Screening Level Guidance: Technical Background Document. May 1996.

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions: N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

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: Leaching to groundwater

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) SSL Soil to Groundwater	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatile Organic Compounds															
78-93-3	2-Hexanone	0.0085		0.0085		mg/kg	PAI-10-SS-09-01	1/16	0.0054 - 0.68	0.0085	NA	NA	NA	NA	No	NTX
108-10-1	4-Methyl-2-pentanone	0.0038	J	0.026		mg/kg	PAI-10-SS-09-01	6/16	0.0056 - 0.68	0.026	0.007	NA	NA	NA	No	NTX
67-64-1	Acetone	0.023		0.35	J	mg/kg	PAI-10-SS-11-01	4/15	0.011 - 0.68	0.35	0.266	16 N	NA	NA	No	BSL
75-15-0	Carbon Disulfide	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	32 N	NA	NA	No	BSL
56-23-5	Carbon Tetrachloride	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	0.07	NA	NA	No	BSL
67-66-3	Chloroform	0.0018	J	0.0075		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.0075	NA	0.6 C	NA	NA	No	BSL
74-87-3	Chloromethane	0.0036	J	0.017		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.017	NA	NA	NA	NA	No	NTX
127-18-4	Tetrachloroethene	0.001	J	0.001	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.001	NA	0.06	NA	NA	No	BSL
108-88-3	Toluene	0.0013	J	0.0039	J	mg/kg	PAI-10-SS-15-01A	9/16	0.0034 - 0.41	0.0034	0.006	12 N	NA	NA	No	BSL
	Semivolatile Organic Compounds															
91-57-6	2-Methylnaphthalene	0.385		0.385		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.385	NA	NA	NA	NA	No	NTX
83-32-9	Acenaphthene	0.305		0.305		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.305	NA	570 N	NA	NA	No	BSL
208-96-8	Acenaphthylene	0.375		0.375		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.375	NA	NA	NA	NA	No	NTX
120-12-7	Anthracene	0.024	J	0.024	J	mg/kg	PAI-10-SS-08-01	1/16	0.34 - 0.46	0.024	NA	12000 N	NA	NA	No	BSL
56-55-3	Benzo(a)anthracene	0.041	J	0.14	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.14	NA	2 C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	0.032	J	0.12	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.12	NA	8 C	NA	NA	No	BSL
205-99-2	Benzo(b)fluoranthene	0.033	J	0.13	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	3/16	0.34 - 0.46	0.13	NA	5 C	NA	NA	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.05	J	0.055	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	2/16	0.34 - 0.46	0.055	NA	NA	NA	NA	No	NTX
207-08-9	Benzo(k)fluoranthene	0.034	J	0.11	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.11	NA	49 C	NA	NA	No	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	0.03	J	0.48		mg/kg	PAI-10-SS-07-01	9/16	0.34 - 0.44	0.48	NA	3600 C	NA	NA	No	BSL
218-01-9	Chrysene	0.047	J	0.16	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.16	NA	160 C	NA	NA	No	BSL
53-70-3	Dibenzo(a,h)anthracene	0.034	J	0.034	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.034	NA	2 C	NA	NA	No	BSL
131-11-3	Dimethyl Phthalate	0.18	J	0.18	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.18	NA	NA	NA	NA	No	NTX
206-44-0	Fluoranthene	0.041	J	0.28	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.28	NA	4300 N	NA	NA	No	BSL
86-73-7	Fluorene	0.22	J	0.22	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.22	0.646	560 N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.064	J	0.069	J	mg/kg	PAI-10-SS-08-01	2/11	0.35 - 0.46	0.069	NA	14 C	NA	NA	No	BSL
91-20-3	Naphthalene	1.435		1.435		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	1.435	NA	84 N	NA	NA	No	BSL
87-86-5	Pentachlorophenol	0.24	J	0.24	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.69 - 1.1	0.24	NA	0.03 C	NA	NA	No	BSL
85-01-8	Phenanthrene	0.069	J	0.14	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.14	NA	NA	NA	NA	No	NTX
129-00-0	Pyrene	0.024	J	0.23	J	mg/kg	PAI-10-SS-08-01	4/16	0.34 - 0.46	0.23	NA	4200 N	NA	NA	No	BSL
	Pesticides/PCBs															
72-55-9	4,4'-DDE	0.043		0.043		mg/kg	PAI-10-SS-14-01	1/14	0.0034 - 0.0045	0.043	NA	54 C	NA	NA	No	BSL
72-43-5	Methoxychlor	0.07		0.07		mg/kg	PAI-10-SS-13-01	1/14	0.018 - 0.023	0.07	NA	160 N	NA	NA	No	BSL
	Inorganics															
7429-90-5	Aluminum	822		5370		mg/kg	PAI-10-SS-14-01	16/16	ND	5370	7270	NA	NA	NA	No	BKG
7440-36-0	Antimony	8		8		mg/kg	PAI-10-SS-14-01	1/16	0.48 - 2.5	8	NA	5	NA	NA	No	BSL
7440-38-2	Arsenic	0.24		50.8		mg/kg	PAI-10-SS-14-01	16/16	ND	50.8	1.44	29	NA	NA	No	BSL

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: Leaching to groundwater

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) SSL Soil to Groundwater	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
7440-39-3	Barium	7		76.4		mg/kg	PAI-10-SS-14-01	12/16	2.7 - 5.9	76.4	23.6	1600	NA	NA	No	BSL
7440-41-7	Beryllium	0.08		0.17		mg/kg	PAI-10-SS-12-01-AVG, PAI-10-SS-15-01A	5/16	0.02 - 0.19	0.17	0.095	63	NA	NA	No	BSL
7440-43-9	Cadmium	0.06		3.2		mg/kg	PAI-10-SS-14-01	2/16	0.19 - 0.26	3.2	NA	8	NA	NA	No	BSL
7440-70-2	Calcium	33.9		2780		mg/kg	PAI-10-SS-14-01	16/16	ND	2780	766	NA	NA	NA	No	NUT
7440-47-3	Chromium	1.8		18.1		mg/kg	PAI-10-SS-14-01	16/16	ND	18.1	6.23	38	NA	NA	No	BSL
7440-48-4	Cobalt	0.455		6.6		mg/kg	PAI-10-SS-14-01	6/16	0.33 - 0.82	6.6	0.363	NA	NA	NA	No	NTX
7440-50-8	Copper	0.72		189		mg/kg	PAI-10-SS-14-01	8/16	0.27 - 1	189	1.52	NA	NA	NA	No	NTX
7439-89-6	Iron	485		99700		mg/kg	PAI-10-SS-14-01	16/16	ND	99700	3920	NA	NA	NA	No	NTX
7439-92-1	Lead	4.4		1100		mg/kg	PAI-10-SS-14-01	16/16	ND	1100	12.5	NA	NA	NA	No	NTX
7439-95-4	Magnesium	123		3240		mg/kg	PAI-10-SS-14-01	16/16	ND	3240	515	NA	NA	NA	No	NTX
7439-96-5	Manganese	10.6		522		mg/kg	PAI-10-SS-14-01	10/16	3.9 - 9.7	522	129	NA	NA	NA	No	NTX
7487-94-7	Mercury	0.02		0.89		mg/kg	PAI-10-SS-14-01	11/16	0.02 - 0.09	0.89	0.110	2	NA	NA	No	BSL
7440-02-0	Nickel	0.81		26.5		mg/kg	PAI-10-SS-14-01	16/16	ND	26.5	1.80	130	NA	NA	No	BSL
7440-09-7	Potassium	57.8		640		mg/kg	PAI-10-SS-14-01	16/16	ND	640	313	NA	NA	NA	No	NUT
7782-49-2	Selenium	0.09		0.12		mg/kg	PAI-10-SS-08-01	5/16	0.07 - 0.44	0.12	0.285	5	NA	NA	No	BKG
7440-23-5	Sodium	20.525		10700		mg/kg	PAI-10-SS-14-01	7/16	11.4 - 35.6	10700	241	NA	NA	NA	No	NTX
7440-62-2	Vanadium	1.7		9.3		mg/kg	PAI-10-SS-14-01	16/16	ND	9.3	9.50	6000 N	NA	NA	No	BKG
7440-66-6	Zinc	4.75		1020		mg/kg	PAI-10-SS-14-01	9/16	1.9 - 6.4	1020	9.70	12000 N	NA	NA	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

(3) USEPA Soil Screening Level Guidance: Technical Background Document. May 1996. (Based on a DAF [Dilutional Attenuation Factor] of 20)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

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 2.4

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 12/SWMU 10 - Jericho Island

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	(2) Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(4) Rationale for Contaminant Deletion or Selection
	Volatile Organic Compounds																
67-64-1	Acetone	9.3	J	650	J	ug/L	PAI-10-GW-08-01	4/10	5 - 50	650	NA	61	N	NA	NA	Yes	ASL
75-15-0	Carbon disulfide	0.2	J	24		ug/L	PAI-10-GW-10-01	7/14	1 - 10	24	NA	100	N	NA	NA	No	BSL
67-66-3	Chloroform	0.4	J	4.5		ug/L	PAI-10-GW-04-01	4/14	1 - 10	4.5	NA	0.15	C	80	MCL	Yes	ASL
74-87-3	Chloromethane	0.2	J	0.3	J	ug/L	PAI-10-GW-10-01	2/14	1 - 10	0.3	NA	2.1	C	NA	NA	No	BSL
108-88-3	Toluene	0.2	J	0.2	J	ug/L	PAI-10-GW-04-01	1/14	1 - 10	0.2	NA	75	N	1000	MCL	No	BSL
79-01-6	Trichloroethene	0.4	J	0.4	J	ug/L	PAI-10-GW-04-01	1/14	1 - 10	0.4	NA	1.6	C	5	MCL	No	BSL
	Semivolatile Organic Compounds																
65-85-0	Benzoic Acid	1	J	1	J	ug/L	PAI-10-GW-01-01	1/12	25 - 26	1	NA	15000	N	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	1	J	1	J	ug/L	PAI-10-GW-10-01	1/14	5	1	NA	370	N	NA	NA	No	BSL
	Inorganics (Unfiltered)																
7429-90-5	Aluminum	532		5140		ug/L	PAI-10-GW-03-01	6/13	22 - 168	5140	NA	3700	N	50 To 200	SMCL	Yes	ASL
7440-38-2	Arsenic	1.075		35.4		ug/L	PAI-10-GW-02-01	12/14	0.9	35.4	NA	0.045	C	50	MCL	Yes	ASL
7440-39-3	Barium	36.4		216		ug/L	PAI-10-GW-12-01	14/14	NA	216	NA	260	N	2000	MCL	No	BSL
7440-43-9	Cadmium	1.9		8.1		ug/L	PAI-10-GW-12-01	7/14	2 - 200	8.1	NA	1.8	N	5	MCL	Yes	ASL
	Calcium	21800		501000		ug/L	PAI-10-GW-10-01	13/13	NA	501000	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	8.1		23.2		ug/L	PAI-10-GW-10-01	6/14	6.4 - 32	23.2	NA	5500 (5)	N	100 (6)	MCL	No	BSL
7440-48-4	Cobalt	3.9		11.7		ug/L	PAI-10-GW-08-01, PAI-10-GW-06-01	3/14	3.3	11.7	NA	220	N	NA	NA	No	BSL
7440-50-8	Copper	2.7		8.1		ug/L	PAI-10-GW-06-01	2/14	2.6	8.1	NA	150	N	1000	SMCL	No	BSL
7439-89-6	Iron	4150		122000		ug/L	PAI-10-GW-05-01	13/13	NA	122000	NA	1100	N	300	SMCL	Yes	ASL
7439-96-5	Magnesium	18600		1100000		ug/L	PAI-10-GW-14-01	13/13	NA	1100000	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	44.7		1530		ug/L	PAI-10-GW-06-01	13/13	NA	1530	NA	73	N	50	SMCL	Yes	ASL
7440-02-0	Nickel	5.3		10.5		ug/L	PAI-10-GW-08-01	3/14	4.4	10.5	NA	73	N	100	MCL	No	BSL
	Potassium	4370		371000		ug/L	PAI-10-GW-13-01	13/13	NA	371000	NA	NA		NA	NA	No	NUT
7782-49-2	Selenium	7.1	J	7.1	J	ug/L	PAI-10-GW-09-01	1/14	0.7 - 17.5	7.1	NA	18	N	50	MCL	No	BSL
	Sodium	146000		8670000		ug/L	PAI-10-GW-13-01	13/13	NA	8670000	NA	NA		NA	NA	No	NUT
7440-28-0	Thallium	10		10		ug/L	PAI-10-GW-06-01	1/14	9 - 18	10	NA	0.26	N	2	MCL	Yes	ASL
7440-62-2	Vanadium	3.7		14.2		ug/L	PAI-10-GW-09-01	12/14	2.6	14.2	NA	26	N	NA	NA	No	BSL
7440-66-6	Zinc	7.5		82.8		ug/L	PAI-10-GW-06-01	5/14	7.9 - 19.5	82.8	NA	1100	N	5000	SMCL	No	BSL

8C-3

TABLE 2.4

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 12/SWMU 10 - Jericho Island

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)

Notes

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

(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 for trivalent chromium, hexavalent chromium was not detected in groundwater.

(6) Value for total chromium

Shading indicates that the criteria was exceeded.

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

TABLE 2.5

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 12/SWMU 10 - Jericho Island

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organic Compounds																
78-93-3	2-Butanone	2.1	J	2.6	J	ug/L	PAI-10-SW-03-00	2/2	NA	2.6	NA	190 (5)	N	NA	NA	No	BSL
67-64-1	Acetone	13	J	13	J	ug/L	PAI-10-SW-13-00	1/3	9.2 - 11	13	NA	61 (5)	N	NA	NA	No	BSL
75-15-0	Carbon disulfide	0.2	J	1		ug/L	PAI-10-SW-02-00	5/13	1	1	NA	100 (5)	N	NA	NA	No	BSL
	Semivolatile Organic Compounds																
117-81-7	Bis(2-ethylhexyl)phthalate	1	J	10.25		ug/L	PAI-10-SW-08-00-AVG	2/13	5	10.25	44.8	1.8		NA	NA	Yes	ASL
85-68-7	Butylbenzyl Phthalate	1	J	2	J	ug/L	PAI-10-SW-04-00	5/13	5	2	NA	3000		NA	NA	No	BSL
108-95-2	Phenol	7		7		ug/L	PAI-10-SW-04-00	1/13	5	7	NA	21000		NA	NA	No	BSL
	Inorganics (Unfiltered)																
7429-90-5	Aluminum	499		12900		ug/L	PAI-10-SW-04-00	13/13	NA	12900	3113	3700 (5)	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	2.4		9		ug/L	PAI-10-SW-01-00	13/13	NA	9	5.13	0.018		NA	NA	Yes	ASL
7440-39-3	Barium	20.1		34.8		ug/L	PAI-10-SW-04-00	13/13	NA	34.8	38.4	260 (5)	N	NA	NA	No	BSL, BKG
7440-70-2	Calcium	238000		374000		ug/L	PAI-10-SW-03-00	13/13	NA	374000	637000	NA		NA	NA	No	NUT, BKG
7440-47-3	Chromium	9.5		32.1		ug/L	PAI-10-SW-04-00	13/13	NA	32.1	22.5	5500 (5,6)	N	NA	NA	No	BSL
7439-89-6	Iron	292		7890		ug/L	PAI-10-SW-04-00	13/13	NA	7890	2091	300		NA	NA	Yes	ASL
7439-96-5	Magnesium	726000		1120000		ug/L	PAI-10-SW-03-00	13/13	NA	1120000	1918667	NA		NA	NA	No	NUT, BKG
7439-96-5	Manganese	30.3		214		ug/L	PAI-10-SW-05-00	13/13	NA	214	53.1	50		NA	NA	Yes	ASL
7440-09-7	Potassium	264000		406000		ug/L	PAI-10-SW-03-00	13/13	NA	406000	831333	NA		NA	NA	No	NUT, BKG
7782-49-2	Selenium	14.675		18		ug/L	PAI-10-SW-11-00	2/13	3.5 - 17.5	18	NA	170		NA	NA	No	BSL
7440-23-5	Sodium	6570000		10200000		ug/L	PAI-10-SW-03-00	13/13	NA	10200000	16226667	NA		NA	NA	No	NUT, BKG
7440-62-2	Vanadium	13.4		33.9		ug/L	PAI-10-SW-04-00	12/13	16.1	33.9	18.2	26 (5)	N	NA	NA	Yes	ASL

Notes:

(1) Minimum/maximum detected concentration.

(2) Background values presented 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) Value for trivalent chromium, hexavalent chromium was not detected in surface water.

Shading indicates that the criteria was exceeded.

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
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: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12/SWMU 10 - Jericho Island

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	(2) Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(4) Rationale for Contaminant Deletion or Selection
	Volatile Organic Compounds																
78-93-3	2-Butanone	5	J	20		ug/kg	PAI-10-SD-07-01	2/16	7.1 - 670	20	NA	4700000	N	NA	NA	No	BSL
591-78-6	2-Hexanone	4.4	J	4.4	J	ug/kg	PAI-10-SD-15-01	1/16	7.1 - 670	4.4	NA	310000	N	NA	NA	No	BSL
108-10-1	4-Methyl-2-pentanone	4	J	53.7	J	ug/kg	PAI-10-SD-06-01	6/16	7.3 - 670	53.7	NA	630000	N	NA	NA	No	BSL
67-64-1	Acetone	25		390		ug/kg	PAI-10-SD-08-01	8/16	35 - 810	390	NA	780000	N	NA	NA	No	BSL
75-15-0	Carbon Disulfide	1.9	J	31	J	ug/kg	PAI-10-SD-08-01	13/16	5.1 - 400	31	NA	780000	N	NA	NA	No	BSL
108-88-3	Toluene	2.5	J	23	J	ug/kg	PAI-10-SD-08-01	8/16	4.3 - 400	23	NA	1600000	N	NA	NA	No	BSL
1330-20-7	Xylenes, Total	1.8	J	2.3	J	ug/kg	PAI-10-SD-04-01	3/16	4.3 - 400	2.3	NA	16000000	N	NA	NA	No	BSL
	Semivolatile Organic Compounds																
83-32-9	Acenaphthene	120	J	120	J	ug/kg	PAI-10-SD-20-01	1/18	93 - 270	120	NA	470000	N	NA	NA	No	BSL
56-55-3	Benzo(a)anthracene	18		18		ug/kg	PAI-10-SD-013-01A	1/18	6.9 - 27	18	NA	870	C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	11		38		ug/kg	PAI-10-SD-008-01A	7/18	6.9 - 13	38	NA	87	C	NA	NA	No	BSL
205-99-2	Benzo(b)fluoranthene	25		120		ug/kg	PAI-10-SD-008-01A	2/18	2.8 - 42	120	NA	870	C	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	18		18		ug/kg	PAI-10-SD-013-01A	1/17	2.8 - 27	18	NA	8700	C	NA	NA	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	45	J	440	J	ug/kg	PAI-10-SD-07-01	8/18	480 - 2600	440	NA	46000	C	NA	NA	No	BSL
218-01-9	Chrysene	44	J	44	J	ug/kg	PAI-10-SD-013-01A	1/18	6.9 - 27	44	NA	87000	C	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	63	J	63	J	ug/kg	PAI-10-SD-06-01	1/18	460 - 2600	63	NA	160000	N	NA	NA	No	BSL
206-44-0	Fluoranthene	10		92		ug/kg	PAI-10-SD-013-01A	2/18	6.9 - 52	92	NA	310000	N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	26		26		ug/kg	PAI-10-SD-014-01A	1/18	6.9 - 27	26	NA	870	C	NA	NA	No	BSL
87-86-5	Pentachlorophenol	180	J	180	J	ug/kg	PAI-10-SD-14-02	1/18	910 - 5100	180	NA	5300	C	NA	NA	No	BSL
129-00-0	Pyrene	89		89		ug/kg	PAI-10-SD-013-01A	1/18	9.3 - 27	89	NA	230000	N	NA	NA	No	BSL
	Pesticides/PCBs																
50-29-3	4,4'-DDT	66		66		ug/kg	PAI-10-SD-14-02	1/18	4.5 - 41	66	NA	1900	C	NA	NA	No	BSL
5103-71-9	Alpha-Chlordane	12		12		ug/kg	PAI-10-SD-14-02	1/18	2.3 - 21	12	NA	1800 (5)	C	NA	NA	No	BSL
12789-03-6	Gamma-Chlordane	14		14		ug/kg	PAI-10-SD-14-02	1/18	2.3 - 21	14	NA	1800 (5)	C	NA	NA	No	BSL
72-43-5	Methoxychlor	680		680		ug/kg	PAI-10-SD-14-02	1/18	23 - 210	680	NA	39000	N	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	1870		52700		mg/kg	PAI-10-SD-08-01	18/18	NA	52700	24284	7800	N	NA	NA	Yes	ASL
7440-36-0	Antimony	3.5		6.8		mg/kg	PAI-10-SD-09-01	2/18	2.3 - 13.2	6.8	NA	3.1	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	0.35		18.5		mg/kg	PAI-10-SD-08-01	18/18	NA	18.5	12.2	0.43	C	NA	NA	Yes	ASL
7440-39-3	Barium	5.7		62.9		mg/kg	PAI-10-SD-08-01	11/18	3.7 - 6.7	62.9	28.0	550	N	NA	NA	No	BSL
7440-41-7	Beryllium	0.21		2		mg/kg	PAI-10-SD-08-01	13/18	0.11 - 0.79	2	0.977	16	N	NA	NA	No	BSL
7440-43-9	Cadmium	0.002		0.84		mg/kg	PAI-10-SD-14-01	3/18	0.25 - 1.4	0.84	0.278	3.9	N	NA	NA	No	BSL
7440-70-2	Calcium	338		5550		mg/kg	PAI-10-SD-13-01	18/18	NA	5550	4002	NA		NA	NA	No	NUT
7440-47-3	Chromium	3.2		75		mg/kg	PAI-10-SD-08-01	18/18	NA	75	35.2	12000 (6)	N	NA	NA	No	BSL
7440-48-4	Cobalt	0.92		10.3		mg/kg	PAI-10-SD-14-02	9/18	0.92 - 3.4	10.3	2.63	470	N	NA	NA	No	BSL
7440-50-8	Copper	0.03		113		mg/kg	PAI-10-SD-14-01	10/18	1.3 - 2.7	113	10.1	310	N	NA	NA	No	BSL
7439-89-6	Iron	1420		43100		mg/kg	PAI-10-SD-08-01	18/18	NA	43100	21450	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	3.1		203		mg/kg	PAI-10-SD-14-01	18/18	NA	203	20.6	400 (7)		NA	NA	No	BSL

TABLE 2.6

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: *Current/Future*
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12/SWMU 10 - Jericho Island

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	(2) Background Value	(3) Screening Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(4) Rationale for Contaminant Deletion or Selection
7439-95-4	Magnesium	1130		15100		mg/kg	PAI-10-SD-08-01	18/18	NA	15100	6437	NA		NA	NA	No	NUT
7439-96-5	Manganese	13.3		210		mg/kg	PAI-10-SD-08-01	17/18	9.2	210	186	160	N	NA	NA	Yes	ASL
7439-97-6	Mercury	0.06		0.35		mg/kg	PAI-10-SD-14-01	7/18	0.02 - 0.28	0.35	0.090	2.3 (8)	N	NA	NA	No	BSL
7440-02-0	Nickel	1.3		1060		mg/kg	PAI-10-SD-14-02	18/18	NA	1060	5.95	160	N	NA	NA	Yes	ASL
7440-09-7	Potassium	684		9090		mg/kg	PAI-10-SD-08-01	18/18	NA	9090	3190	NA		NA	NA	No	NUT
7782-49-2	Selenium	0.1		10.7		mg/kg	PAI-10-SD-20-01	3/18	0.1 - 2.5	10.7	NA	39	N	NA	NA	No	BSL, BKG
7440-23-5	Sodium	3920		60800		mg/kg	PAI-10-SD-08-01	18/18	NA	60800	19110	NA		NA	NA	No	NUT
7440-28-0	Thallium	0.36		0.36		mg/kg	PAI-10-SD-14-02	1/18	0.21 - 13.1	0.36	0.405	0.55	N	NA	NA	No	BSL, BKG
7440-62-2	Vanadium	4.9		112		mg/kg	PAI-10-SD-08-01	18/18	NA	112	49.6	55	N	NA	NA	Yes	ASL
7440-66-6	Zinc	8.5		197		mg/kg	PAI-10-SD-14-01	12/18	4.7 - 9.9	197	45.0	2300	N	NA	NA	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

(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)
Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Deletion Reason: Below Screening Level (BSL)

(5) Value for chlordane

(6) Value for trivalent chromium, hexavalent chromium was not detected in sediment.

(7) OSWER screening level.

(8) Value for mercuric chloride.

Shading indicates that the criteria was exceeded.

Definitions: N/A = Not Applicable
SQL = Sample Quantitation Limit
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J = Estimated Value
C = Carcinogenic
N = Non-Carcinogenic

TABLE 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment Wastes
Exposure Medium: Sediment Wastes
Exposure Point: Site 12/SWMU 10 - Jericho Island

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Semivolatile Organic Compounds																
117-81-7	Bis(2-ethylhexyl)phthalate	10		10		mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.78	10	0.420	46	C	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	0.9	J	0.9	J	mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.62	0.9	ND	160	N	NA	NA	No	BSL
84-66-2	Diethyl Phthalate	0.029	J	0.029	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/2	2	0.029	ND	6300	N	NA	NA	No	BSL
	Pesticides/PCBs																
72-55-9	4,4'-DDE	0.096		0.52		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	0.52	ND	1.9	C	NA	NA	No	BSL
50-29-3	4,4'-DDT	0.038		0.038		mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/1	NA	0.038	ND	1.9	C	NA	NA	No	BSL
11097-69-1	Aroclor-1254	24		24		mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.062	24	ND	0.32	C	NA	NA	Yes	ASL
60-57-1	Dieldrin	0.0062	J	0.0062	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/1	NA	0.0062	ND	0.04	C	NA	NA	No	BSL
72-20-8	Endrin	1.2	J	1.2	J	mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.0062	1.2	ND	2.3	N	NA	NA	No	BSL
319-84-6	alpha-BHC	0.0031	J	0.0031	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/2	0.047	0.0031	ND	0.1	C	NA	NA	No	BSL
	Inorganics																
7429-90-5	Aluminum	9580		11700		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	11700	24284	7800	N	NA	NA	No	BKG
7440-36-0	Antimony	3.3		9.4		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	9.4	ND	3.1	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	40.6		49.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	49.7	12.2	0.43	C	NA	NA	Yes	ASL
7440-39-3	Barium	66.8		73.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	73.2	28.0	550	N	NA	NA	No	BSL
7440-43-9	Cadmium	1.8		4.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	4.7	0.278	3.9	N	NA	NA	Yes	ASL
7440-70-2	Calcium	4600		6670		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	6670	4002	NA		NA	NA	No	NUT
7440-47-3	Chromium	37.8		119		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	119	35.2	12000 (7)	N	NA	NA	No	BSL
7440-48-4	Cobalt	8.2		22.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	22.7	2.63	470	N	NA	NA	No	BSL
7440-50-8	Copper	168		489		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	489	10.1	310	N	NA	NA	Yes	ASL
7439-89-6	Iron	122000		307000		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	307000	21450	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	589		2930		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	2930	20.6	400 (8)		NA	NA	Yes	ASL
7439-93-2	Magnesium	3990		6220		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	6220	6437	NA		NA	NA	No	BKG, NUT
7439-96-5	Manganese	297		1480		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	1480	186	160	N	NA	NA	Yes	ASL
7440-02-0	Nickel	41.4		86.9		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	86.9	5.95	160	N	NA	NA	No	BSL
7440-09-7	Potassium	1470		2210		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	2210	3190	NA		NA	NA	No	BKG, NUT
7782-49-2	Selenium	0.86		1.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	1.2	ND	39	N	NA	NA	No	BSL
7440-02-4	Silver	1.1		1.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	1.2	ND	39	N	NA	NA	No	BSL
7440-28-0	Sodium	8870		11200		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	11200	19110	NA		NA	NA	No	BKG, NUT
7440-62-2	Vanadium	27.6		44.9		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	44.9	49.6	55	N	NA	NA	No	BSL, BKG
7440-66-6	Zinc	751		1520		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	1520	45.0	2300	N	NA	NA	No	BSL

TABLE 2.7

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment Wastes
Exposure Medium: Sediment Wastes
Exposure Point: Site 12/SWMU 10 - Jericho Island

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	(2) Background Value	(3) Screening 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) N/A - Refer to supporting information for background discussion.

(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) Value for naphthalene.

(6) Value for chlordane.

(7) Value for hexavalent chromium.

(8) OSWER screening level.

(9) Value for mercuric chloride.

Shading indicates that the criteria was exceeded.

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: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Jericho Island

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzo(a)pyrene equivalents	mg/kg	0.102	0.198	0.214		mg/kg	0.214	Max	W - Test (1)	N/A	N/A	N/A
Antimony	mg/kg	1.38	2.16	8		mg/kg	8	Max	W - Test (1)	N/A	N/A	N/A
Arsenic	mg/kg	3.89	9.36	50.8		mg/kg	50.8	Max	W - Test (1)	N/A	N/A	N/A
Iron	mg/kg	8124	18831	99700		mg/kg	99700	Max	W - Test (1)	N/A	N/A	N/A
Lead	mg/kg	78.6	198	1100		mg/kg	78.6	AVG	(2)	N/A	N/A	N/A
Manganese	mg/kg	66.2	124	522		mg/kg	328	95% UCL-L	W - Test (3)	N/A	N/A	N/A

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Shapiro-Wilk W Test was inconclusive.

(2) - IEUBK guidance manual recommends using the average concentration for the exposure point concentration.

(3) - Shapiro-Wilk W Test indicates that data is lognormally distributed.

TABLE 3.2

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Jericho Island

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Acetone	ug/L	159	312	650	J	ug/L	650	Max	W - Test (1)	N/A	N/A	N/A
Chloroform	ug/L	1.49	2.36	4.5		ug/L	4.5	Max	W - Test (1)	N/A	N/A	N/A
Aluminum	ug/L	1030	1921	5140		ug/L	5140	Max	W - Test (2)	N/A	N/A	N/A
Arsenic	ug/L	10.6	15.8	35.4		ug/L	35.4	Max	W - Test (2)	N/A	N/A	N/A
Cadmium	ug/L	9.56	21.9	8.1		ug/L	8.1	Max	W - Test (1)	N/A	N/A	N/A
Iron	ug/L	46916	69286	122000		ug/L	122000	Max	W - Test (1)	N/A	N/A	N/A
Manganese	ug/L	609	883	1530		ug/L	1530	Max	W - Test (2)	N/A	N/A	N/A
Thallium	ug/L	5.21	6.08	10		ug/L	10	Max	W - Test (1)	N/A	N/A	N/A

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Shapiro-Wilk W Test was inconclusive.

(2) - Shapiro-Wilk W Test indicates that data is lognormally distributed, UCL is greater than maximum detected concentration.

(3) - Shapiro-Wilk W Test indicates that data is lognormally distributed.

TABLE 3.3

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Jericho Island

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aluminum	mg/kg	9844	14905	52700		mg/kg	14845	95% UCL-L	W - Test (1)	N/A	N/A	N/A
Antimony	mg/kg	2.20	2.91	6.8		mg/kg	2.82	95% UCL-L	W - Test (1)	N/A	N/A	N/A
Arsenic	mg/kg	4.65	6.53	18.5		mg/kg	9.34	95% UCL-L	W - Test (1)	N/A	N/A	N/A
Iron	mg/kg	11212	15937	43100		mg/kg	19376	95% UCL-L	W - Test (1)	N/A	N/A	N/A
Manganese	mg/kg	49.7	70.8	210		mg/kg	89.4	95% UCL-L	W - Test (1)	N/A	N/A	N/A
Nickel	mg/kg	63.1	165	1060		mg/kg	62.6	95% UCL-L	W - Test (1)	N/A	N/A	N/A
Vanadium	mg/kg	23.1	33.5	112		mg/kg	33.2	95% UCL-L	W - Test (1)	N/A	N/A	N/A

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Shapiro-Wilk W Test indicates that data is lognormally distributed.

TABLE 3.4

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Jericho Island

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Bis(2-ethylhexyl)phthalate	ug/L	2.95	3.76	10.25		ug/L	10.25	Max	W - Test (1)	N/A	N/A	N/A
Aluminum	ug/L	2569	4173	12900		ug/L	4700	95% UCL-L	W - Test (2)	N/A	N/A	N/A
Arsenic	ug/L	5.18	6.42	9		ug/L	7.1	95% UCL-L	W - Test (2)	N/A	N/A	N/A
Iron	ug/L	1604	2570	7890		ug/L	2926	95% UCL-L	W - Test (2)	N/A	N/A	N/A
Manganese	ug/L	131	165	214		ug/L	165	95% UCL-N	W - Test (3)	N/A	N/A	N/A
Vanadium	ug/L	17.7	20.8	33.9		ug/L	21.4	95% UCL-L	W - Test (2)	N/A	N/A	N/A

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Shapiro-Wilk W Test was inconclusive.

(2) - Shapiro-Wilk W Test indicates that data is lognormally distributed.

(3) - Shapiro-Wilk W Test indicates that data is normally distributed.

TABLE 3.5

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Jericho Island

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aroclor-1254	mg/kg	12.0155	(1)	24		mg/kg	24	Max	(1)	N/A	N/A	N/A
Antimony	mg/kg	6.35	(1)	9.4		mg/kg	9.4	Max	(1)	N/A	N/A	N/A
Arsenic	mg/kg	45.15	(1)	49.7		mg/kg	49.7	Max	(1)	N/A	N/A	N/A
Cadmium	mg/kg	3.25	(1)	4.7		mg/kg	4.7	Max	(1)	N/A	N/A	N/A
Copper	mg/kg	328.5	(1)	489		mg/kg	489	Max	(1)	N/A	N/A	N/A
Iron	mg/kg	214500	(1)	307000		mg/kg	307000	Max	(1)	N/A	N/A	N/A
Lead	mg/kg	1759.5	(1)	2930		mg/kg	1759.5	AVG	(2)	N/A	N/A	N/A
Manganese	mg/kg	888.5	(1)	1480		mg/kg	1480	Max	(1)	N/A	N/A	N/A

Notes:

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration; for duplicate sample results, the average value was used in the calculation.

W - Test: Developed by Shapiro and Wilk, refer to Supplemental Guidance to RAGS: Calculating the Concentration Term, OSWER Directive 9285.7-081, May 1992.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Mean of Log-transformed Data (Mean-T); Mean of Normal Data (Mean-N).

(1) - Insufficient number of samples to calculate statistics.

(2) - IEUBK guidance manual recommends using the average concentration for the exposure point concentration.

TABLE 4.1

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	N/A	N/A	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	480	EPA, 1993	N/A	N/A	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	N/A	N/A	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	N/A	N/A	
	EF	Exposure Frequency	days/year	125	(1)	N/A	N/A	
	ED	Exposure Duration	years	1	(1)	N/A	N/A	
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	N/A	N/A	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	N/A	N/A	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	N/A	N/A	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	4100	(2)	N/A	N/A	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.5	EPA, 1997	N/A	N/A	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	N/A	N/A	
	EF	Exposure Frequency	days/year	125	(1)	N/A	N/A	
	ED	Exposure Duration	years	1	(1)	N/A	N/A	
	BW	Body Weight	kg	70	EPA, 1993	N/A	N/A	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	N/A	N/A	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	N/A	N/A	

Notes:

(1) - Assumed that constructions activties occur 125 days a year over a one year period.

(2) - Assume hands, forearms, and head are exposed.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.

EPA, 1993: *Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.*

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook. *EPA/600/8-95/002FA.*

TABLE 4.2

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 1998	NA	NA	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	2490	(1)	NA	NA	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	(2)	NA	NA	
	ET	Exposure Time	hours/event	8	(2)	NA	NA	
	EF	Exposure Frequency	days/year	21	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	1	(2)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	

Notes:

(1) - Assumes forearms and hands are exposed (EPA, 1992).

(2) - Professional judgement.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1992: Dermal Exposure Assessment: Principles and Applications.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.3

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	IR-S	Ingestion Rate	mg/day	480	EPA, 1993	NA	NA	
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	21	(1)	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) = $\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	SA	Skin Surface Available for Contact	cm2	4100	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.5	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	21	(1)	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(1) - Assume hands, forearms, and head are exposed (EPA, 1992).

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1992: Dermal Exposure Assessment: Principles and Applications.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.4

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CR	Contact Rate	L/hour	0.01	EPA, 1995	NA	NA	
	CF	Conversion factor	ug/mg	0.001	- -	NA	NA	
	ET	Exposure Time	hours/event	8	(1)	NA	NA	
	EF	Exposure Frequency	events/year	21	EPA, 1995	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 1998	NA	NA	Dermally Absorbed Dose (mg/kg/day) $= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	2490	(1)	NA	NA	
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	8	EPA, 1989	NA	NA	
	EF	Exposure Frequency	days/year	21	EPA, 1995	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

EPA Region 4, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.5

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	480	EPA, 1993	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	21	(1)	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	4100	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.5	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	21	(1)	NA	NA	
	ED	Exposure Duration	years	1	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	365	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement.

(1) - Assume hands, forearms, and head are exposed (EPA, 1992).

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1992: Dermal Exposure Assessment: Principles and Applications.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.6

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an adolescent ages 7 to 16 visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.7

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an adolescent ages 7 to 16 visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.8

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CR	Contact Rate	L/hour	0.01	EPA IV, 1995	NA	NA	
	CF	Conversion factor	ug/mg	0.001	--	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 1998	NA	NA	Dermally Absorbed Dose (mg/kg/day) = $\frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an adolescent ages 7 to 16 visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.9

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) = $\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an adolescent ages 7 to 16 visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.10

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an adolescent ages 7 to 16 visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.11

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an adolescent ages 7 to 16 visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: *Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A.* OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

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TABLE 4.12

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CR	Contact Rate	L/hour	0.01	EPA IV, 1995	NA	NA	
	CF	Conversion factor	ug/mg	0.001	--	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 1998	NA	NA	Dermally Absorbed Dose (mg/kg/day) $= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an adolescent ages 7 to 16 visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.13

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	--	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	3820	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	See Text	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	10	(1)	NA	NA	
	BW	Body Weight	kg	45	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	3650	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an adolescent ages 7 to 16 visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.14

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an individual visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.15

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an individual visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

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TABLE 4.16

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 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CR	Contact Rate	L/hour	0.01	EPA IV, 1995	NA	NA	
	CF	Conversion factor	ug/mg	0.001	- -	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 1998	NA	NA	Dermally Absorbed Dose (mg/kg/day) $= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA, 1988	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an individual visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

TABLE 4.17
VALUES USED FOR DAILY INTAKE CALCULATIONS
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) = $\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	(1)	NA	NA	
	BW	Body Weight	kg	70	EPA, 1997	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:
(1) - Professional judgement - assumes an individual visits the site approximately 1 day a week.
(2) - Assume 25 percent of total body surface area available for contact.
Sources:
EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.
EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.18

VALUES USED FOR DAILY INTAKE CALCULATIONS
INDIAN HEAD, MARYLAND

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	200	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	2000	(1)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.19

VALUES USED FOR DAILY INTAKE CALCULATIONS

INDIAN HEAD, MARYLAND

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	mg/L	See Text	See Text	NA	NA	Intake (mg/kg/day) = $\frac{CW \times IR \times EF \times ED}{BW \times AT}$
	IR	Ingestion Rate	L/day	1	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2555	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day)
	SA	Skin Surface Available for Contact	cm2	6600	EPA, 1992	NA	NA	$= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	EV	Event Frequency	events/day	1	EPA, 1992	NA	NA	
	ET	Exposure Time	hours/event	0.25	EPA, 1992	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2,555	EPA, 1989	NA	NA	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1992: Dermal Exposure Assessment: Principles and Applications. EPA/600/8-91/011B.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

TABLE 4.20

VALUES USED FOR DAILY INTAKE CALCULATIONS

INDIAN HEAD, MARYLAND

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	200	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	2000	(1)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(2)	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Assume 25 percent of total body surface area available for contact.

(2) - Professional judgement - assumes an individual visits the site approximately 1 day a week.

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 IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.21

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CR	Contact Rate	L/hour	0.01	EPA IV, 1995	NA	NA	
	CF	Conversion factor	ug/mg	0.001	--	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 1998	NA	NA	Dermally Absorbed Dose (mg/kg/day) = $\frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	2000	(2)	NA	NA	
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Professional judgement - assumes an individual visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1988: Superfund Exposure Assessment Manual.

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.22

VALUES USED FOR DAILY INTAKE CALCULATIONS

INDIAN HEAD, MARYLAND

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	200	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	2000	(1)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.2	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(2)	NA	NA	
	ED	Exposure Duration	years	6	EPA, 1993	NA	NA	
	BW	Body Weight	kg	15	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2190	EPA, 1989	NA	NA	

Notes:

(1) - Assume 25 percent of total body surface area available for contact.

(2) - *Professional judgement - assumes an individual visits the site approximately 1 day a week.*

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 IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.23

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(1)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.07	EPA, 1997	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	

Notes:

(1) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure.

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.24

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	mg/L	See Text	See Text	NA	NA	Intake (mg/kg/day) = $\frac{CW \times IR \times EF \times ED}{BW \times AT}$
	IR	Ingestion Rate	L/day	2	EPA, 1993	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	72	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2555	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	See Text	See Text	NA	NA	Dermally Absorbed Dose (mg/kg/day) $= \frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	18000	EPA, 1992	NA	NA	
	EV	Event Frequency	events/day	1	EPA, 1992	NA	NA	
	ET	Exposure Time	hours/event	0.25	EPA, 1992	NA	NA	
	EF	Exposure Frequency	days/year	350	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25,550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	2,555	EPA, 1989	NA	NA	

Sources:

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1992: Dermal Exposure Assessment: Principles and Applications. EPA/600/8-91/011B.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

TABLE 4.25

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(1)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.07	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(2)	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	

Notes:

(1) - Assume 25 percent of total body surface area available for contact.

(2) - Professional judgement - assumes an individual visits the site approximately 1 day a week.

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 IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 4.26

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CW	Chemical Concentration in Water	ug/L	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) = $\frac{CW \times CR \times CF \times ET \times EF \times ED}{BW \times AT}$
	CR	Contact Rate	L/hour	0.01	EPA IV, 1995	NA	NA	
	CF	Conversion factor	ug/mg	0.001	- -	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	events/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	
Dermal	DAevent	Absorbed dose per event	mg/cm2-event	Calculated	EPA, 1998	NA	NA	Dermally Absorbed Dose (mg/kg/day) = $\frac{DAevent \times EV \times EF \times ED \times SA}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(2)	NA	NA	
	EV	Event Frequency	events/day	1	(1)	NA	NA	
	ET	Exposure Time	hours/event	2.6	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(1)	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	See text for calculation of DAevent.
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	

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Notes:

(1) - Professional judgement - assumes an individual visits the site approximately 1 day a week.

(2) - Assume 25 percent of total body surface area available for contact.

Sources:

EPA, 1988: Superfund Exposure Assessment Manual.

EPA, 1989: Risk Assessment Guidance for Superfund. Vol 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

EPA, 1993: Superfund Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure..

EPA Region IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1998: Risk Assessment Guidance for Superfund, Supplemental Guidance, Dermal Risk Assessment, Interim Guidance.

TABLE 4.27

VALUES USED FOR DAILY INTAKE CALCULATIONS

MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Intake (mg/kg/day) =
	IR-S	Ingestion Rate	mg/day	100	EPA IV, 1995	NA	NA	$\frac{Cs \times IRS \times CF3 \times FI \times EF \times ED}{BW \times AT}$
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	
	FI	Fraction Ingested	unitless	1	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	EPA, 1993	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	
Dermal	CS	Chemical concentration in soil	mg/kg	Max or 95% UCL	EPA IV, 1995	NA	NA	Dermally Absorbed Dose (mg/kg/day) =
	CF3	Conversion Factor 3	kg/mg	1.0E-06	- -	NA	NA	$\frac{Cs \times CF3 \times SA \times SSAF \times DABS \times EF \times ED}{BW \times AT}$
	SA	Skin Surface Available for Contact	cm2	5700	(1)	NA	NA	
	SSAF	Soil to Skin Adherence Factor	mg/cm2/event	0.07	EPA, 1998	NA	NA	
	DABS	Absorption Factor	unitless	Chemical Specific	EPA IV, 1995	NA	NA	
	EF	Exposure Frequency	days/year	45	(2)	NA	NA	
	ED	Exposure Duration	years	24	EPA, 1993	NA	NA	
	BW	Body Weight	kg	70	EPA, 1993	NA	NA	
	AT-C	Averaging Time (Cancer)	days	25550	EPA, 1989	NA	NA	
	AT-N	Averaging Time (Non-Cancer)	days	8760	EPA, 1989	NA	NA	

Notes:

(1) - Assume 25 percent of total body surface area available for contact.

(2) - Professional judgement - assumes an individual visits the site approximately 1 day a week.

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 IV, 1995: Supplement Guidance to RAGS: Region 4 Bulletins. Exposure Assessment Human Health Risk Assessment Bulletin No. 3.

EPA, 1997: Exposure Factors Handbook, EPA/600/P-95/002Fa.

TABLE 5.1
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 12/SWMU 10 - JERICHO ISLAND
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										
Acetone	Chronic	1.0E-01	mg/kg/day	83%	8.3E-02	mg/kg/day	Kidney, Liver	1000/1	IRIS	9/25/00
Chloroform	Chronic	1.0E-02	mg/kg/day	20%	2.0E-03	mg/kg/day	Liver	1000/1	IRIS	9/25/00
SVOCs										
Benzo(a)pyrene	Chronic	NA	mg/kg/day	31%	NA	mg/kg/day	Cancer	NA	NA	NA
Bis(2-ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg/day	19%	3.8E-03	mg/kg/day	Liver	1000/1	IRIS	9/25/00
Pesticides/PCBs										
Aroclor-1254	Chronic	2.0E-05	mg/kg/day	90%	1.8E-05	mg/kg/day	Cancer, Immune	300/1	IRIS	9/25/00
Inorganics										
Aluminum	Chronic	1E+00	mg/kg/day	10%	1.0E-01	mg/kg/day	Body Weight	NA	EPAIII	4/13/00
Antimony	Chronic	4E-04	mg/kg/day	2%	8.0E-06	mg/kg/day	Blood	1000/1	IRIS	9/25/00
Arsenic	Chronic	3.0E-04	mg/kg/day	41%	1.2E-04	mg/kg/day	Skin, CVS	3/1	IRIS	9/25/00
Barium	Chronic	7E-02	mg/kg/day	7%	4.9E-03	mg/kg/day	CVS	3/1	IRIS:IRIS	9/25/00
Cadmium	Chronic	5.0E-04	mg/kg/day	1%	5.0E-06	mg/kg/day	Kidney	10/1	IRIS	9/25/00
Chromium	Chronic	1.5E+00	mg/kg/day	0.5%	7.5E-03	mg/kg/day	None Reported	100/10	IRIS	9/25/00
Copper	Chronic	4.0E-02	mg/kg/day	30%	1.2E-02	mg/kg/day	GS	NA	HEAST	7/97
Iron	Chronic	3.0E-01	mg/kg/day	15%	4.5E-02	mg/kg/day	Blood, GS	NA	EPAIII	4/13/00
Lead	Chronic	NA	mg/kg/day	15%	NA	mg/kg/day	CNS	NA	IRIS	9/25/00
Manganese	Chronic	2.0E-02	mg/kg/day	4%	8.0E-04	mg/kg/day	CNS	1/1	IRIS	9/25/00
Nickel	Chronic	2.0E-02	mg/kg/day	27%	5.4E-03	mg/kg/day	Body Weight	300/1	IRIS	9/25/00
Selenium	Chronic	5.0E-03	mg/kg/day	44%	2.2E-03	mg/kg/day	Skin	3/1	IRIS	9/25/00
Thallium	Chronic	7.0E-05	mg/kg/day	15%	1.1E-05	mg/kg/day	None Reported	NA	EPAIII	4/13/00
Vanadium	Chronic	7.0E-03	mg/kg/day	1%	7.0E-05	mg/kg/day	None Reported	NA	HEAST	7/97

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, the date of HEAST.
FOR EPAIII, date of RBC Table.

N/A = Not Applicable

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

EPAIII = USEPA Region III Risk-Based Concentration Table, April 13, 2000

CNS = Central Nervous System

CVS = Cardiovascular System

Immune = Immunological

GS = Gastrointestinal

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 12/SWMU 10 - JERICHO ISLAND
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							
Acetone	NA	83%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Chloroform	6.1E-03	20%	3.1E-02	$(mg/kg/day)^{-1}$	B2	IRIS	9/25/00
SVOCs							
Benzo(a)pyrene	7.3E+00	31%	2.4E+01	$(mg/kg/day)^{-1}$	B2	IRIS	9/25/00
Bis(2-ethylhexyl)phthalate	1.4E-02	19%	7.4E-02	$(mg/kg/day)^{-1}$	B2	IRIS	9/25/00
Pesticides/PCBs							
Aroclor-1254	2.0E+00	90%	2.2E+00	$(mg/kg/day)^{-1}$	NA	IRIS	9/25/00
Inorganics							
Aluminum	NA	10%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Antimony	NA	2%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Arsenic	1.5E+00	41%	3.7E+00	$(mg/kg/day)^{-1}$	A	IRIS	9/25/00
Barium	NA	7%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Cadmium	NA	1%	NA	$(mg/kg/day)^{-1}$	B1	IRIS	9/25/00
Chromium	NA	0.5%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Copper	NA	30%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Iron	NA	15%	NA	$(mg/kg/day)^{-1}$	N/A	N/A	N/A
Lead	NA	15%	NA	$(mg/kg/day)^{-1}$	B2	IRIS	9/25/00
Manganese	NA	4%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Nickel	NA	27%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Selenium	NA	44%	NA	$(mg/kg/day)^{-1}$	D	IRIS	9/25/00
Thallium	NA	15%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA
Vanadium	NA	1%	NA	$(mg/kg/day)^{-1}$	NA	NA	NA

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Notes:

IRIS = Integrated Risk Information System

HEAST= Health Effects Assessment Summary Tables

(1) - USEPA Region IV, February 26, 1996.

(2) - CSFdermal = CSForal/Oral to Dermal Adjustment Factor.

(3) - For IRIS values, the date IRIS was searched.
For HEAST values, the date of 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 F termined

Not Like

TABLE 7.1
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	5.0E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.9E-05	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	4.7E-02
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	1.2E-04	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	4.0E-01
	Iron	99700	mg/kg	99700	mg/kg	M	2.3E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	7.8E-01
	Manganese	328	mg/kg	328	mg/kg	M	7.7E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.9E-02
	(Total)												1.3E+00
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	2.8E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	8.0E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	1.0E-02
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	1.5E-05	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.2E-01
	Iron	99700	mg/kg	99700	mg/kg	M	1.0E-03	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	2.2E-02
	Manganese	328	mg/kg	328	mg/kg	M	3.3E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	4.1E-03
	(Total)												1.6E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.4E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.2
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
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	Acetone	650	ug/L	650	ug/L	M	1.0E-03	mg/kg/day	8.3E-02	mg/kg/day	N/A	N/A	1.3E-02
	Chloroform	4.50	ug/L	4.50	ug/L	M	5.6E-07	mg/kg/day	2.0E-03	mg/kg/day	N/A	N/A	2.8E-04
	Aluminum	5140	ug/L	5140	ug/L	M	8.4E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	8.4E-04
	Arsenic	35.4	ug/L	35.4	ug/L	M	5.8E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.7E-03
	Cadmium	8.10	ug/L	8.10	ug/L	M	1.3E-07	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	2.7E-02
	Iron	122000	ug/L	122000	ug/L	M	2.0E-03	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	4.4E-02
	Manganese	1530	ug/L	1530	ug/L	M	2.5E-05	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.1E-02
	Thallium	10.0	ug/L	10.0	ug/L	M	1.6E-07	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	1.6E-02
	(Total)												1.4E-01
												Total Hazard Index Across All Exposure Routes/Pathways	1.4E-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: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
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	Aluminum	14845	mg/kg	14845	mg/kg	M	5.9E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	5.9E-03
	Antimony	2.82	mg/kg	2.82	mg/kg	M	1.1E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	2.8E-03
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	3.7E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.2E-02
	Iron	19376	mg/kg	19376	mg/kg	M	7.6E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	2.5E-02
	Manganese	89.4	mg/kg	89.4	mg/kg	M	3.5E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.8E-03
	Nickel	62.6	mg/kg	62.6	mg/kg	M	2.5E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.2E-03
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	1.3E-05	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	1.9E-03
	(Total)												5.1E-02
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	2.5E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	2.5E-04
	Antimony	2.82	mg/kg	2.82	mg/kg	M	4.8E-09	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	5.9E-04
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	4.7E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	3.8E-03
	Iron	19376	mg/kg	19376	mg/kg	M	3.3E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	7.3E-04
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.5E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	1.9E-04
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.1E-07	mg/kg/day	5.4E-03	mg/kg/day	N/A	N/A	2.0E-05
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	5.6E-08	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	8.0E-04
	(Total)												6.4E-03
												Total Hazard Index Across All Exposure Routes/Pathways	5.8E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.4
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
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	10.3	ug/L	10.3	ug/L	M	6.7E-07	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.4E-05
	Aluminum	4700	ug/L	4700	ug/L	M	3.1E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	3.1E-04
	Arsenic	7.10	ug/L	7.10	ug/L	M	4.7E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.6E-03
	Iron	2926	ug/L	2926	ug/L	M	1.9E-04	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	6.4E-04
	Manganese	165	ug/L	165	ug/L	M	1.1E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	5.4E-04
	Vanadium	21.4	ug/L	21.4	ug/L	M	1.4E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	2.0E-04
	(Total)												3.3E-03
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	1.7E-05	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	4.3E-03
	Aluminum	4700	ug/L	4700	ug/L	M	7.7E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	7.7E-04
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.2E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	9.5E-04
	Iron	2926	ug/L	2926	ug/L	M	4.8E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.1E-03
	Manganese	165	ug/L	165	ug/L	M	2.7E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.4E-03
	Vanadium	21.4	ug/L	21.4	ug/L	M	3.5E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	5.0E-03
	(Total)												1.6E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.9E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
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	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	9.5E-06	mg/kg/day	2.0E-05	mg/kg/day	N/A	N/A	4.7E-01
	Antimony	9.40	mg/kg	9.40	mg/kg	M	3.7E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	9.3E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	2.0E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	6.5E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.9E-06	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	3.7E-03
	Copper	489	mg/kg	489	mg/kg	M	1.9E-04	mg/kg/day	4.0E-02	mg/kg/day	N/A	N/A	4.8E-03
	Iron	307000	mg/kg	307000	mg/kg	M	1.2E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	4.0E-01
	Manganese	1480	mg/kg	1480	mg/kg	M	5.8E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.9E-02
	(Total)												9.9E-01
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	4.0E-07	mg/kg/day	1.8E-05	mg/kg/day	N/A	N/A	2.2E-02
	Antimony	9.40	mg/kg	9.40	mg/kg	M	1.6E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.0E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	2.5E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.0E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	7.9E-09	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	1.6E-03
	Copper	489	mg/kg	489	mg/kg	M	8.2E-07	mg/kg/day	1.2E-02	mg/kg/day	N/A	N/A	6.9E-05
	Iron	307000	mg/kg	307000	mg/kg	M	5.2E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.1E-02
	Manganese	1480	mg/kg	1480	mg/kg	M	2.5E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.1E-03
	(Total)												6.1E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.1E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	5.9E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	2.2E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	5.5E-03
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	1.4E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	4.6E-02
	Iron	99700	mg/kg	99700	mg/kg	M	2.7E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	9.1E-02
	Manganese	328	mg/kg	328	mg/kg	M	9.0E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	4.5E-03
	(Total)												1.5E-01
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	5.8E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.7E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.1E-03
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	3.2E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.6E-02
	Iron	99700	mg/kg	99700	mg/kg	M	2.1E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	4.6E-03
	Manganese	328	mg/kg	328	mg/kg	M	6.9E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	8.6E-04
	(Total)												3.4E-02
												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.

TABLE 7.7
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
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	Aluminum	14845	mg/kg	14845	mg/kg	M	4.1E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	4.1E-03
	Antimony	2.82	mg/kg	2.82	mg/kg	M	7.7E-07	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	1.9E-03
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	2.6E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	8.5E-03
	Iron	19376	mg/kg	19376	mg/kg	M	5.3E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.8E-02
	Manganese	89.4	mg/kg	89.4	mg/kg	M	2.4E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.2E-03
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.7E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	8.6E-04
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	9.1E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	1.3E-03
	(Total)												3.6E-02
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	3.1E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	3.1E-04
	Antimony	2.82	mg/kg	2.82	mg/kg	M	5.9E-09	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	7.4E-04
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	5.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.8E-03
	Iron	19376	mg/kg	19376	mg/kg	M	4.1E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	9.0E-04
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.9E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	2.3E-04
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.3E-07	mg/kg/day	5.4E-03	mg/kg/day	N/A	N/A	2.4E-05
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	6.9E-08	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	9.9E-04
	(Total)												8.0E-03
												Total Hazard Index Across All Exposure Routes/Pathways	4.4E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.8
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 12 - Jericho Island
Receptor Population: Trespassers
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	10.3	ug/L	10.3	ug/L	M	7.3E-07	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.7E-05
	Aluminum	4700	ug/L	4700	ug/L	M	3.3E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	3.3E-04
	Arsenic	7.10	ug/L	7.10	ug/L	M	5.1E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.7E-03
	Iron	2926	ug/L	2926	ug/L	M	2.1E-04	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	6.9E-04
	Manganese	165	ug/L	165	ug/L	M	1.2E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	5.9E-04
	Vanadium	21.4	ug/L	21.4	ug/L	M	1.5E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	2.2E-04
	(Total)												3.6E-03
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	4.8E-05	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.3E-02
	Aluminum	4700	ug/L	4700	ug/L	M	1.3E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.3E-03
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.6E-03
	Iron	2926	ug/L	2926	ug/L	M	8.0E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.8E-03
	Manganese	165	ug/L	165	ug/L	M	4.5E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	5.6E-03
	Vanadium	21.4	ug/L	21.4	ug/L	M	5.8E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	8.3E-03
	(Total)												3.1E-02
												Total Hazard Index Across All Exposure Routes/Pathways	3.5E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.9
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
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	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	6.6E-06	mg/kg/day	2.0E-05	mg/kg/day	N/A	N/A	3.3E-01
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.6E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	6.4E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	1.4E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	4.5E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	2.6E-03
	Copper	489	mg/kg	489	mg/kg	M	1.3E-04	mg/kg/day	4.0E-02	mg/kg/day	N/A	N/A	3.3E-03
	Iron	307000	mg/kg	307000	mg/kg	M	8.4E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	2.8E-01
	Manganese	1480	mg/kg	1480	mg/kg	M	4.1E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.0E-02
	(Total)												6.9E-01
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	5.0E-07	mg/kg/day	1.8E-05	mg/kg/day	N/A	N/A	2.8E-02
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.0E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.5E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	3.1E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.5E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	9.8E-09	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	2.0E-03
	Copper	489	mg/kg	489	mg/kg	M	1.0E-06	mg/kg/day	1.2E-02	mg/kg/day	N/A	N/A	8.5E-05
	Iron	307000	mg/kg	307000	mg/kg	M	6.4E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.4E-02
	Manganese	1480	mg/kg	1480	mg/kg	M	3.1E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.9E-03
	(Total)												7.6E-02
												Total Hazard Index Across All Exposure Routes/Pathways	7.6E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.10
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	5.9E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	2.2E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	5.5E-03
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	1.4E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	4.6E-02
	Iron	99700	mg/kg	99700	mg/kg	M	2.7E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	9.1E-02
	Manganese	328	mg/kg	328	mg/kg	M	9.0E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	4.5E-03
	(Total)												1.5E-01
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	5.8E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.7E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.1E-03
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	3.2E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.6E-02
	Iron	99700	mg/kg	99700	mg/kg	M	2.1E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	4.6E-03
	Manganese	328	mg/kg	328	mg/kg	M	6.9E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	8.6E-04
	(Total)												3.4E-02
												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.

8L-3

TABLE 7.11
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	14845	mg/kg	14845	mg/kg	M	4.1E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	4.1E-03
	Antimony	2.82	mg/kg	2.82	mg/kg	M	7.7E-07	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	1.9E-03
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	2.6E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	8.5E-03
	Iron	19376	mg/kg	19376	mg/kg	M	5.3E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.8E-02
	Manganese	89.4	mg/kg	89.4	mg/kg	M	2.4E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.2E-03
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.7E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	8.6E-04
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	9.1E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	1.3E-03
	(Total)												3.6E-02
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	3.1E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	3.1E-04
	Antimony	2.82	mg/kg	2.82	mg/kg	M	5.9E-09	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	7.4E-04
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	5.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.8E-03
	Iron	19376	mg/kg	19376	mg/kg	M	4.1E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	9.0E-04
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.9E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	2.3E-04
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.3E-07	mg/kg/day	5.4E-03	mg/kg/day	N/A	N/A	2.4E-05
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	6.9E-08	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	9.9E-04
	(Total)												8.0E-03
												Total Hazard Index Across All Exposure Routes/Pathways	4.4E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.12
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	7.3E-07	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.7E-05
	Aluminum	4700	ug/L	4700	ug/L	M	3.3E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	3.3E-04
	Arsenic	7.10	ug/L	7.10	ug/L	M	5.1E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.7E-03
	Iron	2926	ug/L	2926	ug/L	M	2.1E-04	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	6.9E-04
	Manganese	165	ug/L	165	ug/L	M	1.2E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	5.9E-04
	Vanadium	21.4	ug/L	21.4	ug/L	M	1.5E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	2.2E-04
	(Total)												3.6E-03
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	4.8E-05	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.3E-02
	Aluminum	4700	ug/L	4700	ug/L	M	1.3E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.3E-03
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.6E-03
	Iron	2926	ug/L	2926	ug/L	M	8.0E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.8E-03
	Manganese	165	ug/L	165	ug/L	M	4.5E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	5.6E-03
	Vanadium	21.4	ug/L	21.4	ug/L	M	5.8E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	8.3E-03
	(Total)												3.1E-02
												Total Hazard Index Across All Exposure Routes/Pathways	3.5E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.13
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	6.6E-06	mg/kg/day	2.0E-05	mg/kg/day	N/A	N/A	3.3E-01
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.6E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	6.4E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	1.4E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	4.5E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.3E-06	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	2.6E-03
	Copper	489	mg/kg	489	mg/kg	M	1.3E-04	mg/kg/day	4.0E-02	mg/kg/day	N/A	N/A	3.3E-03
	Iron	307000	mg/kg	307000	mg/kg	M	8.4E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	2.8E-01
	Manganese	1480	mg/kg	1480	mg/kg	M	4.1E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.0E-02
	(Total)												6.9E-01
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	5.0E-07	mg/kg/day	1.8E-05	mg/kg/day	N/A	N/A	2.8E-02
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.0E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.5E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	3.1E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.5E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	9.8E-09	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	2.0E-03
	Copper	489	mg/kg	489	mg/kg	M	1.0E-06	mg/kg/day	1.2E-02	mg/kg/day	N/A	N/A	8.5E-05
	Iron	307000	mg/kg	307000	mg/kg	M	6.4E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.4E-02
	Manganese	1480	mg/kg	1480	mg/kg	M	3.1E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.9E-03
	(Total)												7.6E-02
												Total Hazard Index Across All Exposure Routes/Pathways	7.6E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.14
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

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	0.214	mg/kg	0.214	mg/kg	M	3.8E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.4E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	3.5E-03
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	8.9E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	3.0E-02
	Iron	99700	mg/kg	99700	mg/kg	M	1.8E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	5.9E-02
	Manganese	328	mg/kg	328	mg/kg	M	5.8E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.9E-03
	(Total)												9.5E-02
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	5.6E-08	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.6E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.0E-03
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	3.1E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.5E-02
	Iron	99700	mg/kg	99700	mg/kg	M	2.0E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	4.4E-03
	Manganese	328	mg/kg	328	mg/kg	M	6.6E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	8.2E-04
	(Total)												3.2E-02
												Total Hazard Index Across All Exposure Routes/Pathways	1.3E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.15
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

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	Aluminum	14845	mg/kg	14845	mg/kg	M	2.6E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	2.6E-03
	Antimony	2.82	mg/kg	2.82	mg/kg	M	5.0E-07	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	1.2E-03
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	1.6E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	5.5E-03
	Iron	19376	mg/kg	19376	mg/kg	M	3.4E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.1E-02
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.6E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	7.9E-04
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.1E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	5.5E-04
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	5.8E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	8.4E-04
	(Total)												2.3E-02
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	3.0E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	3.0E-04
	Antimony	2.82	mg/kg	2.82	mg/kg	M	5.7E-09	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	7.1E-04
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	5.6E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.6E-03
	Iron	19376	mg/kg	19376	mg/kg	M	3.9E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	8.6E-04
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.8E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	2.2E-04
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.3E-07	mg/kg/day	5.4E-03	mg/kg/day	N/A	N/A	2.3E-05
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	6.7E-08	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	9.5E-04
	(Total)												7.6E-03
												Total Hazard Index Across All Exposure Routes/Pathways	3.1E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.16
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 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

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	10.3	ug/L	10.3	ug/L	M	4.7E-07	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.3E-05
	Aluminum	4700	ug/L	4700	ug/L	M	2.2E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	2.2E-04
	Arsenic	7.10	ug/L	7.10	ug/L	M	3.3E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.1E-03
	Iron	2926	ug/L	2926	ug/L	M	1.3E-04	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	4.5E-04
	Manganese	165	ug/L	165	ug/L	M	7.6E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.8E-04
	Vanadium	21.4	ug/L	21.4	ug/L	M	9.8E-07	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	1.4E-04
	(Total)												2.3E-03
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	4.6E-05	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.2E-02
	Aluminum	4700	ug/L	4700	ug/L	M	1.2E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.2E-03
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.5E-03
	Iron	2926	ug/L	2926	ug/L	M	7.6E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.7E-03
	Manganese	165	ug/L	165	ug/L	M	4.3E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	5.4E-03
	Vanadium	21.4	ug/L	21.4	ug/L	M	5.6E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	8.0E-03
	(Total)												3.0E-02
												Total Hazard Index Across All Exposure Routes/Pathways	3.2E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.17
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

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	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	4.2E-06	mg/kg/day	2.0E-05	mg/kg/day	N/A	N/A	2.1E-01
	Antimony	9.40	mg/kg	9.40	mg/kg	M	1.7E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	4.1E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	8.8E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	2.9E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	8.3E-07	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.7E-03
	Copper	489	mg/kg	489	mg/kg	M	8.6E-05	mg/kg/day	4.0E-02	mg/kg/day	N/A	N/A	2.2E-03
	Iron	307000	mg/kg	307000	mg/kg	M	5.4E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.8E-01
	Manganese	1480	mg/kg	1480	mg/kg	M	2.6E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.3E-02
	(Total)												4.4E-01
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	4.8E-07	mg/kg/day	1.8E-05	mg/kg/day	N/A	N/A	2.7E-02
	Antimony	9.40	mg/kg	9.40	mg/kg	M	1.9E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.4E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	3.0E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.4E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	9.4E-09	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	1.9E-03
	Copper	489	mg/kg	489	mg/kg	M	9.8E-07	mg/kg/day	1.2E-02	mg/kg/day	N/A	N/A	8.2E-05
	Iron	307000	mg/kg	307000	mg/kg	M	6.2E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.4E-02
	Manganese	1480	mg/kg	1480	mg/kg	M	3.0E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.7E-03
	(Total)												7.3E-02
												Total Hazard Index Across All Exposure Routes/Pathways	5.1E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.18
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	2.7E-06	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.0E-04	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	2.6E-01
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	6.5E-04	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	2.2E+00
	Iron	99700	mg/kg	99700	mg/kg	M	1.3E+00	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	4.2E+00
	Manganese	328	mg/kg	328	mg/kg	M	4.2E-03	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.1E-01
	(Total)												6.9E+00
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	7.1E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	--
	Antimony	8.00	mg/kg	8.00	mg/kg	M	2.0E-07	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.6E-02
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	3.9E-05	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	3.2E-01
	Iron	99700	mg/kg	99700	mg/kg	M	2.5E-03	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	5.7E-02
	Manganese	328	mg/kg	328	mg/kg	M	8.4E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	1.0E-02
	(Total)												4.1E-01
												Total Hazard Index Across All Exposure Routes/Pathways	7.3E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.19
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acetone	650	ug/L	650	ug/L	M	3.6E-02	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	3.6E-01
	Chloroform	4.50	ug/L	4.50	ug/L	M	2.5E-04	mg/kg/day	1.0E-02	mg/kg/day	N/A	N/A	2.5E-02
	Aluminum	5140	ug/L	5140	ug/L	M	2.8E-01	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	2.8E-01
	Arsenic	35.4	ug/L	35.4	ug/L	M	1.9E-03	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	6.5E+00
	Cadmium	8.10	ug/L	8.10	ug/L	M	4.4E-04	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	8.9E-01
	Iron	122000	ug/L	122000	ug/L	M	6.7E+00	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	2.2E+01
	Manganese	1530	ug/L	1530	ug/L	M	8.4E-02	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	4.2E+00
	Thallium	10.0	ug/L	10.0	ug/L	M	5.5E-04	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	7.8E+00
	(Total)												4.2E+01
Dermal	Acetone	650	ug/L	650	ug/L	M	1.8E-04	mg/kg/day	8.3E-02	mg/kg/day	N/A	N/A	2.2E-03
	Chloroform	4.50	ug/L	4.50	ug/L	M	1.4E-05	mg/kg/day	2.0E-03	mg/kg/day	N/A	N/A	6.9E-03
	Aluminum	5140	ug/L	5140	ug/L	M	4.6E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	4.6E-03
	Arsenic	35.4	ug/L	35.4	ug/L	M	3.2E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.6E-02
	Cadmium	8.10	ug/L	8.10	ug/L	M	7.3E-07	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	1.5E-01
	Iron	122000	ug/L	122000	ug/L	M	1.1E-02	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	2.5E-01
	Manganese	1530	ug/L	1530	ug/L	M	1.4E-04	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	1.7E-01
	Thallium	10.0	ug/L	10.0	ug/L	M	9.0E-07	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	8.6E-02
	(Total)												6.9E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.3E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.20
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	14845	mg/kg	14845	mg/kg	M	2.4E-02	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	2.4E-02
	Antimony	2.82	mg/kg	2.82	mg/kg	M	4.6E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	1.2E-02
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	1.5E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	5.1E-02
	Iron	19376	mg/kg	19376	mg/kg	M	3.2E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.1E-01
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.5E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	7.3E-03
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.0E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	5.1E-03
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	5.5E-05	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	7.8E-03
	(Total)												2.1E-01
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	4.9E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	4.9E-04
	Antimony	2.82	mg/kg	2.82	mg/kg	M	9.3E-09	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	1.2E-03
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	9.2E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	7.5E-03
	Iron	19376	mg/kg	19376	mg/kg	M	6.4E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.4E-03
	Manganese	89.4	mg/kg	89.4	mg/kg	M	2.9E-07	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	3.7E-04
	Nickel	62.6	mg/kg	62.6	mg/kg	M	2.1E-07	mg/kg/day	5.4E-03	mg/kg/day	N/A	N/A	3.8E-05
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	1.1E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.6E-03
	(Total)												1.3E-02
												Total Hazard Index Across All Exposure Routes/Pathways	2.3E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.21
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	2.2E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.1E-04
	Aluminum	4700	ug/L	4700	ug/L	M	1.0E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	1.0E-03
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.5E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	5.1E-03
	Iron	2926	ug/L	2926	ug/L	M	6.3E-04	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	2.1E-03
	Manganese	165	ug/L	165	ug/L	M	3.5E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.8E-03
	Vanadium	21.4	ug/L	21.4	ug/L	M	4.6E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	6.5E-04
	(Total)												1.1E-02
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	7.6E-05	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	2.0E-02
	Aluminum	4700	ug/L	4700	ug/L	M	2.0E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	2.0E-03
	Arsenic	7.10	ug/L	7.10	ug/L	M	3.0E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	2.5E-03
	Iron	2926	ug/L	2926	ug/L	M	1.3E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	2.8E-03
	Manganese	165	ug/L	165	ug/L	M	7.1E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	8.8E-03
	Vanadium	21.4	ug/L	21.4	ug/L	M	9.1E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.3E-02
	(Total)												4.9E-02
												Total Hazard Index Across All Exposure Routes/Pathways	6.0E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.22
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	3.9E-05	mg/kg/day	2.0E-05	mg/kg/day	N/A	N/A	2.0E+00
	Antimony	9.40	mg/kg	9.40	mg/kg	M	1.5E-05	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	3.9E-02
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	8.2E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	2.7E-01
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	7.7E-06	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.5E-02
	Copper	489	mg/kg	489	mg/kg	M	8.0E-04	mg/kg/day	4.0E-02	mg/kg/day	N/A	N/A	2.0E-02
	Iron	307000	mg/kg	307000	mg/kg	M	5.0E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.7E+00
	Manganese	1480	mg/kg	1480	mg/kg	M	2.4E-03	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.2E-01
	(Total)												4.1E+00
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	7.9E-07	mg/kg/day	1.8E-05	mg/kg/day	N/A	N/A	4.4E-02
	Antimony	9.40	mg/kg	9.40	mg/kg	M	3.1E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	3.9E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	4.9E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	4.0E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.5E-08	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	3.1E-03
	Copper	489	mg/kg	489	mg/kg	M	1.6E-06	mg/kg/day	1.2E-02	mg/kg/day	N/A	N/A	1.3E-04
	Iron	307000	mg/kg	307000	mg/kg	M	1.0E-03	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	2.2E-02
	Manganese	1480	mg/kg	1480	mg/kg	M	4.9E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	6.1E-03
	(Total)												1.2E-01
												Total Hazard Index Across All Exposure Routes/Pathways	4.2E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.23
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	2.9E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	- -
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.1E-05	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	2.7E-02
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	7.0E-05	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	2.3E-01
	Iron	99700	mg/kg	99700	mg/kg	M	1.4E-01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	4.6E-01
	Manganese	328	mg/kg	328	mg/kg	M	4.5E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.2E-02
	(Total)												7.4E-01
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	1.5E-07	mg/kg/day	NA	mg/kg/day	N/A	N/A	- -
	Antimony	8.00	mg/kg	8.00	mg/kg	M	4.4E-08	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	5.5E-03
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	8.3E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	6.8E-02
	Iron	99700	mg/kg	99700	mg/kg	M	5.4E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.2E-02
	Manganese	328	mg/kg	328	mg/kg	M	1.8E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	2.2E-03
	(Total)												8.8E-02
												Total Hazard Index Across All Exposure Routes/Pathways	8.2E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.24
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
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	Acetone	650	ug/L	650	ug/L	M	5.9E-02	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	5.9E-01
	Chloroform	4.50	ug/L	4.50	ug/L	M	4.1E-04	mg/kg/day	1.0E-02	mg/kg/day	N/A	N/A	4.1E-02
	Aluminum	5140	ug/L	5140	ug/L	M	4.7E-01	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	4.7E-01
	Arsenic	35.4	ug/L	35.4	ug/L	M	3.2E-03	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.1E+01
	Cadmium	8.10	ug/L	8.10	ug/L	M	7.4E-04	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.5E+00
	Iron	122000	ug/L	122000	ug/L	M	1.1E+01	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	3.7E+01
	Manganese	1530	ug/L	1530	ug/L	M	1.4E-01	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	7.0E+00
	Thallium	10.0	ug/L	10.0	ug/L	M	9.1E-04	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	1.3E+01
	(Total)												7.1E+01
Dermal	Acetone	650	ug/L	650	ug/L	M	4.2E-04	mg/kg/day	8.3E-02	mg/kg/day	N/A	N/A	5.0E-03
	Chloroform	4.50	ug/L	4.50	ug/L	M	3.2E-05	mg/kg/day	2.0E-03	mg/kg/day	N/A	N/A	1.6E-02
	Aluminum	5140	ug/L	5140	ug/L	M	1.1E-03	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.1E-02
	Arsenic	35.4	ug/L	35.4	ug/L	M	7.5E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	6.1E-02
	Cadmium	8.10	ug/L	8.10	ug/L	M	1.7E-06	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	3.4E-01
	Iron	122000	ug/L	122000	ug/L	M	2.6E-02	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	5.7E-01
	Manganese	1530	ug/L	1530	ug/L	M	3.2E-04	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	4.0E-01
	Thallium	10.0	ug/L	10.0	ug/L	M	2.1E-06	mg/kg/day	1.1E-05	mg/kg/day	N/A	N/A	2.0E-01
	(Total)												1.6E+00
												Total Hazard Index Across All Exposure Routes/Pathways	7.2E+01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.25
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
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	Aluminum	14845	mg/kg	14845	mg/kg	M	2.6E-03	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	2.6E-03
	Antimony	2.82	mg/kg	2.82	mg/kg	M	5.0E-07	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	1.2E-03
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	1.6E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	5.5E-03
	Iron	19376	mg/kg	19376	mg/kg	M	3.4E-03	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.1E-02
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.6E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	7.9E-04
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.1E-05	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	5.5E-04
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	5.8E-06	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	8.4E-04
	(Total)												2.3E-02
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	1.0E-05	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.0E-04
	Antimony	2.82	mg/kg	2.82	mg/kg	M	2.0E-09	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	2.5E-04
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	2.0E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.6E-03
	Iron	19376	mg/kg	19376	mg/kg	M	1.4E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	3.0E-04
	Manganese	89.4	mg/kg	89.4	mg/kg	M	6.3E-08	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	7.9E-05
	Nickel	62.6	mg/kg	62.6	mg/kg	M	4.4E-08	mg/kg/day	5.4E-03	mg/kg/day	N/A	N/A	8.1E-06
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	2.3E-08	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	3.3E-04
	(Total)												2.7E-03
												Total Hazard Index Across All Exposure Routes/Pathways	2.6E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.26
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
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	10.3	ug/L	10.3	ug/L	M	4.7E-07	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	2.3E-05
	Aluminum	4700	ug/L	4700	ug/L	M	2.2E-04	mg/kg/day	1.0E+00	mg/kg/day	N/A	N/A	2.2E-04
	Arsenic	7.10	ug/L	7.10	ug/L	M	3.3E-07	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	1.1E-03
	Iron	2926	ug/L	2926	ug/L	M	1.3E-04	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	4.5E-04
	Manganese	165	ug/L	165	ug/L	M	7.6E-06	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	3.8E-04
	Vanadium	21.4	ug/L	21.4	ug/L	M	9.8E-07	mg/kg/day	7.0E-03	mg/kg/day	N/A	N/A	1.4E-04
	(Total)												2.3E-03
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	4.6E-05	mg/kg/day	3.8E-03	mg/kg/day	N/A	N/A	1.2E-02
	Aluminum	4700	ug/L	4700	ug/L	M	1.2E-04	mg/kg/day	1.0E-01	mg/kg/day	N/A	N/A	1.2E-03
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.9E-07	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	1.5E-03
	Iron	2926	ug/L	2926	ug/L	M	7.6E-05	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	1.7E-03
	Manganese	165	ug/L	165	ug/L	M	4.3E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	5.4E-03
	Vanadium	21.4	ug/L	21.4	ug/L	M	5.6E-07	mg/kg/day	7.0E-05	mg/kg/day	N/A	N/A	8.0E-03
	(Total)												3.0E-02
												Total Hazard Index Across All Exposure Routes/Pathways	3.2E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

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TABLE 7.27
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
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	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	4.2E-06	mg/kg/day	2.0E-05	mg/kg/day	N/A	N/A	2.1E-01
	Antimony	9.40	mg/kg	9.40	mg/kg	M	1.7E-06	mg/kg/day	4.0E-04	mg/kg/day	N/A	N/A	4.1E-03
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	8.8E-06	mg/kg/day	3.0E-04	mg/kg/day	N/A	N/A	2.9E-02
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	8.3E-07	mg/kg/day	5.0E-04	mg/kg/day	N/A	N/A	1.7E-03
	Copper	489	mg/kg	489	mg/kg	M	8.6E-05	mg/kg/day	4.0E-02	mg/kg/day	N/A	N/A	2.2E-03
	Iron	307000	mg/kg	307000	mg/kg	M	5.4E-02	mg/kg/day	3.0E-01	mg/kg/day	N/A	N/A	1.8E-01
	Manganese	1480	mg/kg	1480	mg/kg	M	2.6E-04	mg/kg/day	2.0E-02	mg/kg/day	N/A	N/A	1.3E-02
	(Total)												4.4E-01
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	1.7E-07	mg/kg/day	1.8E-05	mg/kg/day	N/A	N/A	9.4E-03
	Antimony	9.40	mg/kg	9.40	mg/kg	M	6.6E-09	mg/kg/day	8.0E-06	mg/kg/day	N/A	N/A	8.3E-04
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	1.0E-06	mg/kg/day	1.2E-04	mg/kg/day	N/A	N/A	8.5E-03
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	3.3E-09	mg/kg/day	5.0E-06	mg/kg/day	N/A	N/A	6.6E-04
	Copper	489	mg/kg	489	mg/kg	M	3.4E-07	mg/kg/day	1.2E-02	mg/kg/day	N/A	N/A	2.9E-05
	Iron	307000	mg/kg	307000	mg/kg	M	2.2E-04	mg/kg/day	4.5E-02	mg/kg/day	N/A	N/A	4.8E-03
	Manganese	1480	mg/kg	1480	mg/kg	M	1.0E-06	mg/kg/day	8.0E-04	mg/kg/day	N/A	N/A	1.3E-03
	(Total)												2.5E-02
												Total Hazard Index Across All Exposure Routes/Pathways	4.7E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 8.1
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	7.2E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	5.2E-08
	Antimony	8.00	mg/kg	8.00	mg/kg	M	2.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	1.7E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.6E-06
	Iron	99700	mg/kg	99700	mg/kg	M	3.3E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	1.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.6E-06
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	4.0E-09	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	9.4E-08
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.1E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	2.2E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	8.0E-07
	Iron	99700	mg/kg	99700	mg/kg	M	1.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	4.7E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										8.9E-07
										Total Risk Across All Exposure Routes/Pathways	3.50E-06

(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: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
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	Acetone	650	ug/L	650	ug/L	M	1.5E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Chloroform	4.50	ug/L	4.50	ug/L	M	8.0E-09	mg/kg/day	3.1E-02	(mg/kg/day) $^{-1}$	2.4E-10
	Aluminum	5140	ug/L	5140	ug/L	M	1.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	35.4	ug/L	35.4	ug/L	M	8.3E-09	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	3.0E-08
	Cadmium	8.10	ug/L	8.10	ug/L	M	1.9E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	122000	ug/L	122000	ug/L	M	2.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1530	ug/L	1530	ug/L	M	3.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	10.0	ug/L	10.0	ug/L	M	2.3E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.1E-08
								Total Risk Across All Exposure Routes/Pathways			3.1E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

Lb-3

TABLE 8.3
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
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	Aluminum	14845	mg/kg	14845	mg/kg	M	8.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	1.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	5.3E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	7.9E-08
	Iron	19376	mg/kg	19376	mg/kg	M	1.1E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	5.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	3.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	1.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										7.9E-08
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	3.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	6.8E-11	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	6.7E-09	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.5E-08
	Iron	19376	mg/kg	19376	mg/kg	M	4.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	2.2E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.5E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	8.0E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.5E-08
										Total Risk Across All Exposure Routes/Pathways	1.0E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
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	10.3	ug/L	10.3	ug/L	M	9.6E-09	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	1.3E-10
	Aluminum	4700	ug/L	4700	ug/L	M	4.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	6.7E-09	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.0E-08
	Iron	2926	ug/L	2926	ug/L	M	2.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	1.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	2.0E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.0E-08
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	2.4E-07	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	1.7E-08
	Aluminum	4700	ug/L	4700	ug/L	M	1.1E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.7E-09	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	6.1E-09
	Iron	2926	ug/L	2926	ug/L	M	6.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	3.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	5.0E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.3E-08
										Total Risk Across All Exposure Routes/Pathways	3.4E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
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	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	1.4E-07	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	2.7E-07
	Antimony	9.40	mg/kg	9.40	mg/kg	M	5.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	2.8E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	4.2E-07
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	2.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	2.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	1.7E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	8.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										6.9E-07
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	5.8E-09	mg/kg/day	2.2E+00	(mg/kg/day) $^{-1}$	1.3E-08
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.3E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	3.6E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.3E-07
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.1E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	1.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	7.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	3.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.4E-07
										Total Risk Across All Exposure Routes/Pathways	8.3E-07

(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: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	8.4E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	6.1E-08
	Antimony	8.00	mg/kg	8.00	mg/kg	M	3.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	2.0E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.0E-06
	Iron	99700	mg/kg	99700	mg/kg	M	3.9E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	1.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.0E-06
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	8.3E-09	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.0E-07
	Antimony	8.00	mg/kg	8.00	mg/kg	M	2.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	4.6E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.7E-06
	Iron	99700	mg/kg	99700	mg/kg	M	3.0E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	9.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.9E-06
										Total Risk Across All Exposure Routes/Pathways	4.91E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.7
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
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	Aluminum	14845	mg/kg	14845	mg/kg	M	5.8E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	1.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	3.7E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	5.5E-07
	Iron	19376	mg/kg	19376	mg/kg	M	7.6E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	3.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	2.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	1.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										5.5E-07
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	4.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	8.4E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	8.4E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	3.1E-07
	Iron	19376	mg/kg	19376	mg/kg	M	5.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	2.7E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	9.9E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.1E-07
										Total Risk Across All Exposure Routes/Pathways	8.5E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.8
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 12 - Jericho Island
Receptor Population: Trespassers
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	10.3	ug/L	10.3	ug/L	M	1.0E-07	mg/kg/day	1.4E-02	(mg/kg/day) -1	1.5E-09
	Aluminum	4700	ug/L	4700	ug/L	M	4.8E-05	mg/kg/day	NA	(mg/kg/day) -1	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	7.2E-08	mg/kg/day	1.5E+00	(mg/kg/day) -1	1.1E-07
	Iron	2926	ug/L	2926	ug/L	M	3.0E-05	mg/kg/day	NA	(mg/kg/day) -1	N/A
	Manganese	165	ug/L	165	ug/L	M	1.7E-06	mg/kg/day	NA	(mg/kg/day) -1	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	2.2E-07	mg/kg/day	NA	(mg/kg/day) -1	N/A
	(Total)										1.1E-07
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	6.9E-06	mg/kg/day	7.4E-02	(mg/kg/day) -1	5.1E-07
	Aluminum	4700	ug/L	4700	ug/L	M	1.8E-05	mg/kg/day	NA	(mg/kg/day) -1	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	2.8E-08	mg/kg/day	3.7E+00	(mg/kg/day) -1	1.0E-07
	Iron	2926	ug/L	2926	ug/L	M	1.1E-05	mg/kg/day	NA	(mg/kg/day) -1	N/A
	Manganese	165	ug/L	165	ug/L	M	6.4E-07	mg/kg/day	NA	(mg/kg/day) -1	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	8.3E-08	mg/kg/day	NA	(mg/kg/day) -1	N/A
	(Total)										6.1E-07
										Total Risk Across All Exposure Routes/Pathways	7.2E-07

(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: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Trespassers
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	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	9.4E-07	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	1.9E-06
	Antimony	9.40	mg/kg	9.40	mg/kg	M	3.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	1.9E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.9E-06
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	1.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	1.2E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	5.8E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										4.8E-06
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	7.2E-08	mg/kg/day	2.2E+00	(mg/kg/day) $^{-1}$	1.6E-07
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.8E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	4.5E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.6E-06
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	1.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	9.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	4.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.8E-06
										Total Risk Across All Exposure Routes/Pathways	6.6E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.10
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	8.4E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	6.1E-08
	Antimony	8.00	mg/kg	8.00	mg/kg	M	3.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	2.0E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.0E-06
	Iron	99700	mg/kg	99700	mg/kg	M	3.9E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	1.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.0E-06
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	8.3E-09	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	2.0E-07
	Antimony	8.00	mg/kg	8.00	mg/kg	M	2.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	4.6E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.7E-06
	Iron	99700	mg/kg	99700	mg/kg	M	3.0E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	9.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.9E-06
										Total Risk Across All Exposure Routes/Pathways	4.91E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.11
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	14845	mg/kg	14845	mg/kg	M	5.8E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	1.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	3.7E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	5.5E-07
	Iron	19376	mg/kg	19376	mg/kg	M	7.6E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	3.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	2.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	1.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										5.5E-07
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	4.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	8.4E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	8.4E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	3.1E-07
	Iron	19376	mg/kg	19376	mg/kg	M	5.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	2.7E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.9E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	9.9E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.1E-07
										Total Risk Across All Exposure Routes/Pathways	8.5E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.12
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	1.0E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	1.5E-09
	Aluminum	4700	ug/L	4700	ug/L	M	4.8E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	7.2E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.1E-07
	Iron	2926	ug/L	2926	ug/L	M	3.0E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	1.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	2.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.1E-07
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	6.9E-06	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	5.1E-07
	Aluminum	4700	ug/L	4700	ug/L	M	1.8E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	2.8E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.0E-07
	Iron	2926	ug/L	2926	ug/L	M	1.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	6.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	8.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										6.1E-07
										Total Risk Across All Exposure Routes/Pathways	7.2E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.13
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adolescents

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	9.4E-07	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	1.9E-06
	Antimony	9.40	mg/kg	9.40	mg/kg	M	3.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	1.9E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.9E-06
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.8E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	1.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	1.2E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	5.8E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										4.8E-06
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	7.2E-08	mg/kg/day	2.2E+00	(mg/kg/day) $^{-1}$	1.6E-07
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.8E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	4.5E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.6E-06
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	1.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	9.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	4.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.8E-06
										Total Risk Across All Exposure Routes/Pathways	6.6E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.14
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

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	0.214	mg/kg	0.214	mg/kg	M	3.2E-09	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	2.4E-08
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	7.7E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.2E-06
	Iron	99700	mg/kg	99700	mg/kg	M	1.5E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	5.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.2E-06
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	4.8E-09	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	1.1E-07
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	2.6E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	9.6E-07
	Iron	99700	mg/kg	99700	mg/kg	M	1.7E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	5.6E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.1E-06
										Total Risk Across All Exposure Routes/Pathways	2.25E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.15
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

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	Aluminum	14845	mg/kg	14845	mg/kg	M	2.2E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	4.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	1.4E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.1E-07
	Iron	19376	mg/kg	19376	mg/kg	M	2.9E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	9.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	5.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.1E-07
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	2.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	4.9E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	4.8E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.8E-07
	Iron	19376	mg/kg	19376	mg/kg	M	3.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.1E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	5.7E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.8E-07
										Total Risk Across All Exposure Routes/Pathways	3.9E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.16
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 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

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	10.3	ug/L	10.3	ug/L	M	4.0E-08	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	5.6E-10
	Aluminum	4700	ug/L	4700	ug/L	M	1.8E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	2.8E-08	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	4.2E-08
	Iron	2926	ug/L	2926	ug/L	M	1.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	6.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	8.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										4.2E-08
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	4.0E-06	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	2.9E-07
	Aluminum	4700	ug/L	4700	ug/L	M	1.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.6E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	5.8E-08
	Iron	2926	ug/L	2926	ug/L	M	6.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	3.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	4.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.5E-07
										Total Risk Across All Exposure Routes/Pathways	3.9E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.17
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Recreational Users
Receptor Age: Adults

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	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	3.6E-07	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	7.2E-07
	Antimony	9.40	mg/kg	9.40	mg/kg	M	1.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	7.5E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.1E-06
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	7.1E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	7.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	4.6E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	2.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.9E-06
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	4.1E-08	mg/kg/day	2.2E+00	(mg/kg/day) $^{-1}$	9.2E-08
	Antimony	9.40	mg/kg	9.40	mg/kg	M	1.6E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	2.6E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	9.4E-07
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	8.1E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	8.4E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	5.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	2.5E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.0E-06
										Total Risk Across All Exposure Routes/Pathways	2.9E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.18
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	2.3E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	1.7E-06
	Antimony	8.00	mg/kg	8.00	mg/kg	M	8.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	5.6E-05	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	8.4E-05
	Iron	99700	mg/kg	99700	mg/kg	M	1.1E-01	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	3.6E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										8.5E-05
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	6.1E-08	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	1.4E-06
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	3.3E-06	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.2E-05
	Iron	99700	mg/kg	99700	mg/kg	M	2.2E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	7.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.4E-05
										Total Risk Across All Exposure Routes/Pathways	9.89E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.19
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
INDIAN HEAD, MARYLAND

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acetone	650	ug/L	650	ug/L	M	3.6E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Chloroform	4.50	ug/L	4.50	ug/L	M	2.5E-05	mg/kg/day	6.1E-03	(mg/kg/day) $^{-1}$	1.5E-07
	Aluminum	5140	ug/L	5140	ug/L	M	2.8E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	35.4	ug/L	35.4	ug/L	M	1.9E-04	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.9E-04
	Cadmium	8.10	ug/L	8.10	ug/L	M	4.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	122000	ug/L	122000	ug/L	M	6.7E-01	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1530	ug/L	1530	ug/L	M	8.4E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	10.0	ug/L	10.0	ug/L	M	5.5E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
											2.9E-04
Dermal	Acetone	650	ug/L	650	ug/L	M	1.8E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Chloroform	4.50	ug/L	4.50	ug/L	M	1.4E-06	mg/kg/day	3.1E-02	(mg/kg/day) $^{-1}$	4.2E-08
	Aluminum	5140	ug/L	5140	ug/L	M	4.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	35.4	ug/L	35.4	ug/L	M	3.2E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.2E-06
	Cadmium	8.10	ug/L	8.10	ug/L	M	7.3E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	122000	ug/L	122000	ug/L	M	1.1E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1530	ug/L	1530	ug/L	M	1.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	10.0	ug/L	10.0	ug/L	M	9.0E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.2E-06
										Total Risk Across All Exposure Routes/Pathways	2.92E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.20
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	14845	mg/kg	14845	mg/kg	M	2.1E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	4.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	1.3E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.0E-06
	Iron	19376	mg/kg	19376	mg/kg	M	2.7E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	1.3E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	8.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	4.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.0E-06
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	4.2E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	7.9E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	7.9E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.9E-07
	Iron	19376	mg/kg	19376	mg/kg	M	5.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	2.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	9.4E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.9E-07
										Total Risk Across All Exposure Routes/Pathways	2.3E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.21
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	1.9E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	2.6E-09
	Aluminum	4700	ug/L	4700	ug/L	M	8.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.3E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	2.0E-07
	Iron	2926	ug/L	2926	ug/L	M	5.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	3.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	3.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.0E-07
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	6.5E-06	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	4.8E-07
	Aluminum	4700	ug/L	4700	ug/L	M	1.7E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	2.6E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	9.5E-08
	Iron	2926	ug/L	2926	ug/L	M	1.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	6.0E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	7.8E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										5.7E-07
										Total Risk Across All Exposure Routes/Pathways	7.7E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.22
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
Receptor Population: Child Residents
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	3.4E-06	mg/kg/day	2.0E+00	(mg/kg/day) $^{-1}$	6.8E-06
	Antimony	9.40	mg/kg	9.40	mg/kg	M	1.3E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	7.0E-06	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.1E-05
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	6.6E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	6.9E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	4.3E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	2.1E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.7E-05
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	6.8E-08	mg/kg/day	2.2E+00	(mg/kg/day) $^{-1}$	1.5E-07
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.6E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	4.2E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.5E-06
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.3E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	1.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	8.7E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	4.2E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.7E-06
										Total Risk Across All Exposure Routes/Pathways	1.9E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.23
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Site 12 - Jericho Island
Receptor Population: Adult Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	1.0E-07	mg/kg/day	7.3E+00	(mg/kg/day) $^{-1}$	7.3E-07
	Antimony	8.00	mg/kg	8.00	mg/kg	M	3.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	2.4E-05	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	3.6E-05
	Iron	99700	mg/kg	99700	mg/kg	M	4.7E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	1.5E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										3.7E-05
Dermal	Benzo(a)pyrene	0.214	mg/kg	0.214	mg/kg	M	5.2E-08	mg/kg/day	2.4E+01	(mg/kg/day) $^{-1}$	1.2E-06
	Antimony	8.00	mg/kg	8.00	mg/kg	M	1.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	50.8	mg/kg	50.8	mg/kg	M	2.9E-06	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	1.0E-05
	Iron	99700	mg/kg	99700	mg/kg	M	1.9E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	328	mg/kg	328	mg/kg	M	6.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.2E-05
										Total Risk Across All Exposure Routes/Pathways	4.8E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

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TABLE 8.24
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Site 12 - Jericho Island
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	Acetone	650	ug/L	650	ug/L	M	5.9E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Chloroform	4.50	ug/L	4.50	ug/L	M	4.1E-05	mg/kg/day	6.1E-03	(mg/kg/day) $^{-1}$	2.5E-07
	Aluminum	5140	ug/L	5140	ug/L	M	4.7E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	35.4	ug/L	35.4	ug/L	M	3.2E-04	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	4.8E-04
	Cadmium	8.10	ug/L	8.10	ug/L	M	7.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	122000	ug/L	122000	ug/L	M	1.1E+00	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1530	ug/L	1530	ug/L	M	1.4E-02	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	10.0	ug/L	10.0	ug/L	M	9.1E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
											4.9E-04
Dermal	Acetone	650	ug/L	650	ug/L	M	4.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Chloroform	4.50	ug/L	4.50	ug/L	M	3.2E-06	mg/kg/day	3.1E-02	(mg/kg/day) $^{-1}$	9.8E-08
	Aluminum	5140	ug/L	5140	ug/L	M	1.1E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	35.4	ug/L	35.4	ug/L	M	7.5E-07	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.7E-06
	Cadmium	8.10	ug/L	8.10	ug/L	M	1.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Iron	122000	ug/L	122000	ug/L	M	2.6E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	1530	ug/L	1530	ug/L	M	3.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Thallium	10.0	ug/L	10.0	ug/L	M	2.1E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.8E-06
										Total Risk Across All Exposure Routes/Pathways	4.9E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.25
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Site 12 - Jericho Island
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	Aluminum	14845	mg/kg	14845	mg/kg	M	9.0E-04	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	1.7E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	5.6E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	8.5E-07
	Iron	19376	mg/kg	19376	mg/kg	M	1.2E-03	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	5.4E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	3.8E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	2.0E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										8.5E-07
Dermal	Aluminum	14845	mg/kg	14845	mg/kg	M	3.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Antimony	2.82	mg/kg	2.82	mg/kg	M	6.8E-10	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	9.34	mg/kg	9.34	mg/kg	M	6.8E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.5E-07
	Iron	19376	mg/kg	19376	mg/kg	M	4.7E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	89.4	mg/kg	89.4	mg/kg	M	2.2E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Nickel	62.6	mg/kg	62.6	mg/kg	M	1.5E-08	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	33.2	mg/kg	33.2	mg/kg	M	8.0E-09	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										2.5E-07
										Total Risk Across All Exposure Routes/Pathways	1.1E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.26
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Site 12 - Jericho Island
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	10.3	ug/L	10.3	ug/L	M	1.6E-07	mg/kg/day	1.4E-02	(mg/kg/day) $^{-1}$	2.3E-09
	Aluminum	4700	ug/L	4700	ug/L	M	7.4E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	1.1E-07	mg/kg/day	1.5E+00	(mg/kg/day) $^{-1}$	1.7E-07
	Iron	2926	ug/L	2926	ug/L	M	4.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	2.6E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	3.4E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.7E-07
Dermal	Bis(2-ethylhexyl)phthalate	10.3	ug/L	10.3	ug/L	M	1.6E-05	mg/kg/day	7.4E-02	(mg/kg/day) $^{-1}$	1.2E-06
	Aluminum	4700	ug/L	4700	ug/L	M	4.2E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Arsenic	7.10	ug/L	7.10	ug/L	M	6.4E-08	mg/kg/day	3.7E+00	(mg/kg/day) $^{-1}$	2.3E-07
	Iron	2926	ug/L	2926	ug/L	M	2.6E-05	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Manganese	165	ug/L	165	ug/L	M	1.5E-06	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	Vanadium	21.4	ug/L	21.4	ug/L	M	1.9E-07	mg/kg/day	NA	(mg/kg/day) $^{-1}$	N/A
	(Total)										1.4E-06
										Total Risk Across All Exposure Routes/Pathways	1.6E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.27
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment Waste
Exposure Medium: Sediment Waste
Exposure Point: Site 12 - Jericho Island
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	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	1.4E-06	mg/kg/day	2.0E+00	$(mg/kg/day)^{-1}$	2.9E-06
	Antimony	9.40	mg/kg	9.40	mg/kg	M	5.7E-07	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	3.0E-06	mg/kg/day	1.5E+00	$(mg/kg/day)^{-1}$	4.5E-06
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	2.8E-07	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	3.0E-05	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	1.9E-02	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	8.9E-05	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	(Total)										7.4E-06
Dermal	Aroclor-1254	24.0	mg/kg	24.0	mg/kg	M	5.8E-08	mg/kg/day	2.2E+00	$(mg/kg/day)^{-1}$	1.3E-07
	Antimony	9.40	mg/kg	9.40	mg/kg	M	2.3E-09	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	Arsenic	49.7	mg/kg	49.7	mg/kg	M	3.6E-07	mg/kg/day	3.7E+00	$(mg/kg/day)^{-1}$	1.3E-06
	Cadmium	4.70	mg/kg	4.70	mg/kg	M	1.1E-09	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	Copper	489	mg/kg	489	mg/kg	M	1.2E-07	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	Iron	307000	mg/kg	307000	mg/kg	M	7.4E-05	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	Manganese	1480	mg/kg	1480	mg/kg	M	3.6E-07	mg/kg/day	NA	$(mg/kg/day)^{-1}$	N/A
	(Total)										1.4E-06
										Total Risk Across All Exposure Routes/Pathways	8.8E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 9.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	5.2E-08	--	9.4E-08	1.5E-07	Benzo(a)pyrene	Cancer	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	4.7E-02	--	1.0E-02	5.7E-02
			Arsenic	2.6E-06	--	8.0E-07	3.4E-06	Arsenic	Skin, CVS	4.0E-01	--	1.24E-01	5.2E-01
			Iron	--	--	--	--	Iron	Blood, GS	7.8E-01	--	2.2E-02	8.0E-01
			Manganese	--	--	--	--	Manganese	CNS	3.9E-02	--	4.1E-03	4.3E-02
			(Total)	2.6E-06	--	8.9E-07	3.5E-06	(Total)		1.3E+00	--	1.6E-01	1.4E+00
Groundwater	Groundwater	Site 12 - Jericho Island	Acetone	--	--	--	--	Acetone	Kidney, Liver	--	--	1.3E-02	1.3E-02
			Chloroform	--	--	2.4E-10	2.4E-10	Chloroform	Liver	--	--	2.8E-04	2.8E-04
			Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	8.4E-04	8.4E-04
			Arsenic	--	--	3.0E-08	3.0E-08	Arsenic	Skin, CVS	--	--	4.7E-03	4.7E-03
			Cadmium	--	--	--	--	Cadmium	Kidney	--	--	2.7E-02	2.7E-02
			Iron	--	--	--	--	Iron	Blood, GS	--	--	4.4E-02	4.4E-02
			Manganese	--	--	--	--	Manganese	CNS	--	--	3.1E-02	3.1E-02
			Thallium	--	--	--	--	Thallium	None Reported	--	--	1.6E-02	1.6E-02
			(Total)	--	--	3.1E-08	3.1E-08	(Total)		--	--	1.4E-01	1.4E-01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	1.3E-10	--	1.7E-08	1.8E-08	Bis(2-ethylhexyl)phthalate	Liver	3.4E-05	--	4.3E-03	4.4E-03
			Aluminum	--	--	--	--	Aluminum	Body Weight	3.1E-04	--	7.7E-04	1.1E-03
			Arsenic	1.0E-08	--	6.1E-09	1.6E-08	Arsenic	Skin, CVS	1.6E-03	--	9.5E-04	2.5E-03
			Iron	--	--	--	--	Iron	Blood, GS	6.4E-04	--	1.1E-03	1.7E-03
			Manganese	--	--	--	--	Manganese	CNS	5.4E-04	--	3.4E-03	3.9E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	2.0E-04	--	5.0E-03	5.2E-03
			(Total)	1.0E-08	--	2.3E-08	3.4E-08	(Total)		3.3E-03	--	1.6E-02	1.9E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	5.9E-03	--	2.5E-04	6.1E-03
			Antimony	--	--	--	--	Antimony	Blood	2.8E-03	--	5.9E-04	3.4E-03
			Arsenic	7.9E-08	--	2.5E-08	1.0E-07	Arsenic	Skin, CVS	1.2E-02	--	3.8E-03	1.6E-02
			Iron	--	--	--	--	Iron	Blood, GS	2.5E-02	--	7.3E-04	2.6E-02
			Manganese	--	--	--	--	Manganese	CNS	1.8E-03	--	1.9E-04	2.0E-03
			Nickel	--	--	--	--	Nickel	Body Weight	1.2E-03	--	2.0E-05	1.3E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	1.9E-03	--	8.0E-04	2.7E-03
			(Total)	7.9E-08	--	2.5E-08	1.0E-07	(Total)		5.1E-02	--	6.4E-03	5.8E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	2.7E-07	--	1.3E-08	2.8E-07	Aroclor-1254	Cancer, Immune	4.7E-01	--	2.2E-02	5.0E-01
			Antimony	--	--	--	--	Antimony	Blood	9.3E-03	--	2.0E-03	1.1E-02
			Arsenic	4.2E-07	--	1.3E-07	5.5E-07	Arsenic	Skin, CVS	6.5E-02	--	2.0E-02	8.6E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	3.7E-03	--	1.6E-03	5.3E-03
			Copper	--	--	--	--	Copper	GS	4.8E-03	--	6.9E-05	4.9E-03
			Iron	--	--	--	--	Iron	Blood, GS	4.0E-01	--	1.1E-02	4.2E-01
			Manganese	--	--	--	--	Manganese	CNS	2.9E-02	--	3.1E-03	3.2E-02
			(Total)	6.9E-07	--	1.4E-07	8.3E-07	(Total)		9.9E-01	--	6.1E-02	1.1E+00

Total Risk Across Soil	3.5E-06
Total Risk Across Groundwater	3.1E-08
Total Risk Across Surface Water	3.4E-08
Total Risk Across Sediment	1.0E-07
Total Risk Across Sediment Waste	8.3E-07
Total Risk Across All Media and All Exposure Routes	4.5E-06

Total Hazard Index Across All Media and All Exposure Routes: 2.7E+00

Total CVS HI	6.3E-01
Total Liver HI	1.7E-02
Total CNS HI	1.1E-01
Total Blood HI	1.4E+00
Total GS HI	1.3E+00
Total Body Weight	8.0E-03
Total None Reported	2.3E-02
Total Immune	5.0E-01
Total Skin HI	6.3E-01
Total Kidney HI	2.7E-02

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: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	6.1E-08	--	2.0E-07	2.6E-07	Benzo(a)pyrene	Cancer	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	5.5E-03	--	2.1E-03	7.6E-03
			Arsenic	3.0E-06	--	1.7E-06	4.6E-06	Arsenic	Skin, CVS	4.6E-02	--	2.6E-02	7.2E-02
			Iron	--	--	--	--	Iron	Blood, GS	9.1E-02	--	4.6E-03	9.6E-02
			Manganese	--	--	--	--	Manganese	CNS	4.5E-03	--	8.6E-04	5.4E-03
			(Total)	3.0E-06	--	1.9E-06	4.9E-06	(Total)		1.5E-01	--	3.4E-02	1.8E-01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	1.5E-09	--	5.1E-07	5.1E-07	Bis(2-ethylhexyl)phthalate	Liver	3.7E-05	--	1.3E-02	1.3E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	3.3E-04	--	1.3E-03	1.6E-03
			Arsenic	1.1E-07	--	1.0E-07	2.1E-07	Arsenic	Skin, CVS	1.7E-03	--	1.6E-03	3.3E-03
			Iron	--	--	--	--	Iron	Blood, GS	6.9E-04	--	1.8E-03	2.5E-03
			Manganese	--	--	--	--	Manganese	CNS	5.9E-04	--	5.6E-03	6.2E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	2.2E-04	--	8.3E-03	8.5E-03
			(Total)	1.1E-07	--	6.1E-07	7.2E-07	(Total)		3.6E-03	--	3.1E-02	3.5E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	4.1E-03	--	3.1E-04	4.4E-03
			Antimony	--	--	--	--	Antimony	Blood	1.9E-03	--	7.4E-04	2.7E-03
			Arsenic	5.5E-07	--	3.1E-07	8.5E-07	Arsenic	Skin, CVS	8.5E-03	--	4.8E-03	1.3E-02
			Iron	--	--	--	--	Iron	Blood, GS	1.8E-02	--	9.0E-04	1.9E-02
			Manganese	--	--	--	--	Manganese	CNS	1.2E-03	--	2.3E-04	1.5E-03
			Nickel	--	--	--	--	Nickel	Body Weight	8.6E-04	--	2.4E-05	8.8E-04
			Vanadium	--	--	--	--	Vanadium	None Reported	1.3E-03	--	9.9E-04	2.3E-03
			(Total)	5.5E-07	--	3.1E-07	8.5E-07	(Total)		3.6E-02	--	8.0E-03	4.4E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	1.9E-06	--	1.6E-07	2.0E-06	Aroclor-1254	Cancer, Immune	3.3E-01	--	2.8E-02	3.6E-01
			Antimony	--	--	--	--	Antimony	Blood	6.4E-03	--	2.5E-03	8.9E-03
			Arsenic	2.9E-06	--	1.6E-06	4.5E-06	Arsenic	Skin, CVS	4.5E-02	--	2.5E-02	7.1E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	2.6E-03	--	2.0E-03	4.5E-03
			Copper	--	--	--	--	Copper	GS	3.3E-03	--	8.5E-05	3.4E-03
			Iron	--	--	--	--	Iron	Blood, GS	2.8E-01	--	1.4E-02	2.9E-01
			Manganese	--	--	--	--	Manganese	CNS	2.0E-02	--	3.9E-03	2.4E-02
			(Total)	4.8E-06	--	1.8E-06	6.6E-06	(Total)		6.9E-01	--	7.6E-02	7.6E-01

Total Risk Across Surface Soil	4.9E-06
Total Risk Across Surface Water	7.2E-07
Total Risk Across Sediment	8.5E-07
Total Risk Across Sediment Waste	6.6E-06
Total Risk Across All Media and All Exposure Routes	1.3E-05

Total Hazard Index Across All Media and All Exposure Routes: 1.0E+00

Total Skin, CVS HI	1.6E-01
Total Liver HI	1.3E-02
Total CNS HI	3.7E-02
Total Blood HI	4.2E-01
Total GS HI	4.1E-01
Total Body Weight HI	6.9E-03
Total None Reported HI	1.1E-02
Total Kidney HI	4.5E-03
Total Immune HI	3.6E-01

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TABLE 9.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Recreational Users
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	6.1E-08	--	2.0E-07	2.6E-07	Benzo(a)pyrene	Cancer	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	5.5E-03	--	2.1E-03	7.6E-03
			Arsenic	3.0E-06	--	1.7E-06	4.6E-06	Arsenic	Skin, CVS	4.6E-02	--	2.6E-02	7.2E-02
			Iron	--	--	--	--	Iron	Blood, GS	9.1E-02	--	4.6E-03	9.6E-02
			Manganese	--	--	--	--	Manganese	CNS	4.5E-03	--	8.6E-04	5.4E-03
			(Total)	3.0E-06	--	1.9E-06	4.9E-06	(Total)		1.5E-01	--	3.4E-02	1.8E-01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	1.5E-09	--	5.1E-07	5.1E-07	Bis(2-ethylhexyl)phthalate	Liver	3.7E-05	--	1.3E-02	1.3E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	3.3E-04	--	1.3E-03	1.6E-03
			Arsenic	1.1E-07	--	1.0E-07	2.1E-07	Arsenic	Skin, CVS	1.7E-03	--	1.6E-03	3.3E-03
			Iron	--	--	--	--	Iron	Blood, GS	6.9E-04	--	1.8E-03	2.5E-03
			Manganese	--	--	--	--	Manganese	CNS	5.9E-04	--	5.6E-03	6.2E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	2.2E-04	--	8.3E-03	8.5E-03
			(Total)	1.1E-07	--	6.1E-07	7.2E-07	(Total)		3.6E-03	--	3.1E-02	3.5E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	4.1E-03	--	3.1E-04	4.4E-03
			Antimony	--	--	--	--	Antimony	Blood	1.9E-03	--	7.4E-04	2.7E-03
			Arsenic	5.5E-07	--	3.1E-07	8.5E-07	Arsenic	Skin, CVS	8.5E-03	--	4.8E-03	1.3E-02
			Iron	--	--	--	--	Iron	Blood, GS	1.8E-02	--	9.0E-04	1.9E-02
			Manganese	--	--	--	--	Manganese	CNS	1.2E-03	--	2.3E-04	1.5E-03
			Nickel	--	--	--	--	Nickel	Body Weight	8.6E-04	--	2.4E-05	8.8E-04
			Vanadium	--	--	--	--	Vanadium	None Reported	1.3E-03	--	9.9E-04	2.3E-03
			(Total)	5.5E-07	--	3.1E-07	8.5E-07	(Total)		3.6E-02	--	8.0E-03	4.4E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	1.9E-06	--	1.6E-07	2.0E-06	Aroclor-1254	Cancer, Immune	3.3E-01	--	2.8E-02	3.6E-01
			Antimony	--	--	--	--	Antimony	Blood	6.4E-03	--	2.5E-03	8.9E-03
			Arsenic	2.9E-06	--	1.6E-06	4.5E-06	Arsenic	Skin, CVS	4.5E-02	--	2.5E-02	7.1E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	2.6E-03	--	2.0E-03	4.5E-03
			Copper	--	--	--	--	Copper	GS	3.3E-03	--	8.5E-05	3.4E-03
			Iron	--	--	--	--	Iron	Blood, GS	2.8E-01	--	1.4E-02	2.9E-01
			Manganese	--	--	--	--	Manganese	CNS	2.0E-02	--	3.9E-03	2.4E-02
			(Total)	4.8E-06	--	1.8E-06	6.6E-06	(Total)		6.9E-01	--	7.6E-02	7.6E-01

Total Risk Across Surface Soil	4.9E-06
Total Risk Across Surface Water	7.2E-07
Total Risk Across Sediment	8.5E-07
Total Risk Across Sediment Waste	6.6E-06
Total Risk Across All Media and All Exposure Routes	1.3E-05

Total Hazard Index Across All Media and All Exposure Routes	1.0E+00

Total Skin, CVS HI	1.6E-01
Total Liver HI	1.3E-02
Total CNS HI	3.7E-02
Total Blood HI	4.2E-01
Total GS HI	4.1E-01
Total Body Weight HI	6.9E-03
Total None Reported HI	1.1E-02
Total Kidney HI	4.5E-03
Total Immune HI	3.6E-01

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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: Recreational Users
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	2.4E-08	--	1.1E-07	1.4E-07	Benzo(a)pyrene	Cancer	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	3.5E-03	--	2.0E-03	5.5E-03
			Arsenic	1.2E-06	--	9.6E-07	2.1E-06	Arsenic	Skin, CVS	3.0E-02	--	2.5E-02	5.5E-02
			Iron	--	--	--	--	Iron	Blood, GS	5.9E-02	--	4.4E-03	6.3E-02
			Manganese	--	--	--	--	Manganese	CNS	2.9E-03	--	8.2E-04	3.7E-03
			(Total)	1.2E-06	--	1.1E-06	2.2E-06	(Total)		9.5E-02	--	3.2E-02	1.3E-01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	5.6E-10	--	2.9E-07	2.9E-07	Bis(2-ethylhexyl)phthalate	Liver	2.3E-05	--	1.2E-02	1.2E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	2.2E-04	--	1.2E-03	1.4E-03
			Arsenic	4.2E-08	--	5.8E-08	1.0E-07	Arsenic	Skin, CVS	1.1E-03	--	1.5E-03	2.6E-03
			Iron	--	--	--	--	Iron	Blood, GS	4.5E-04	--	1.7E-03	2.1E-03
			Manganese	--	--	--	--	Manganese	CNS	3.8E-04	--	5.4E-03	5.8E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	1.4E-04	--	8.0E-03	8.1E-03
			(Total)	4.2E-08	--	3.5E-07	3.9E-07	(Total)		2.3E-03	--	3.0E-02	3.2E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	2.6E-03	--	3.0E-04	2.9E-03
			Antimony	--	--	--	--	Antimony	Blood	1.2E-03	--	7.1E-04	1.9E-03
			Arsenic	2.1E-07	--	1.8E-07	3.9E-07	Arsenic	Skin, CVS	5.5E-03	--	4.6E-03	1.0E-02
			Iron	--	--	--	--	Iron	Blood, GS	1.1E-02	--	8.6E-04	1.2E-02
			Manganese	--	--	--	--	Manganese	CNS	7.9E-04	--	2.2E-04	1.0E-03
			Nickel	--	--	--	--	Nickel	Body Weight	5.5E-04	--	2.3E-05	5.7E-04
			Vanadium	--	--	--	--	Vanadium	None Reported	8.4E-04	--	9.5E-04	1.8E-03
			(Total)	2.1E-07	--	1.8E-07	3.9E-07	(Total)		2.3E-02	--	7.6E-03	3.1E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	7.2E-07	--	9.2E-08	8.2E-07	Aroclor-1254	Cancer, Immune	2.1E-01	--	2.7E-02	2.4E-01
			Antimony	--	--	--	--	Antimony	Blood	4.1E-03	--	2.4E-03	6.5E-03
			Arsenic	1.1E-06	--	9.4E-07	2.1E-06	Arsenic	Skin, CVS	2.9E-02	--	2.4E-02	5.4E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	1.7E-03	--	1.9E-03	3.5E-03
			Copper	--	--	--	--	Copper	GS	2.2E-03	--	8.2E-05	2.2E-03
			Iron	--	--	--	--	Iron	Blood, GS	1.8E-01	--	1.4E-02	1.9E-01
			Manganese	--	--	--	--	Manganese	CNS	1.3E-02	--	3.7E-03	1.7E-02
			(Total)	1.9E-06	--	1.0E-06	2.9E-06	(Total)		4.4E-01	--	7.3E-02	5.1E-01

Total Risk Across Surface Soil	2.2E-06
Total Risk Across Surface Water	3.9E-07
Total Risk Across Sediment	3.9E-07
Total Risk Across Sediment Waste	2.9E-06
Total Risk Across All Media and All Exposure Routes	5.9E-06

Total Hazard Index Across All Media and All Exposure Routes	7.0E-01

Total Skin, CVS HI	1.2E-01
Total Liver HI	1.2E-02
Total CNS HI	2.7E-02
Total Blood HI	2.8E-01
Total GS HI	2.7E-01
Total Body Weight HI	4.9E-03
Total None Reported HI	9.9E-03
Total Kidney HI	3.5E-03
Total Immune HI	2.4E-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: Future
Receptor Population: Child Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	1.7E-06	--	1.4E-06	3.1E-06	Benzo(a)pyrene	Cancer	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	2.6E-01	--	2.6E-02	2.8E-01
			Arsenic	8.4E-05	--	1.2E-05	9.6E-05	Arsenic	Skin, CVS	2.2E+00	--	3.2E-01	2.5E+00
			Iron	--	--	--	--	Iron	Blood, GS	4.2E+00	--	5.7E-02	4.3E+00
			Manganese	--	--	--	--	Manganese	CNS	2.1E-01	--	1.0E-02	2.2E-01
			(Total)	8.5E-05	--	1.4E-05	9.9E-05	(Total)		6.9E+00	--	4.1E-01	7.3E+00
Groundwater	Groundwater	Site 12 - Jericho Island	Acetone	--	--	--	--	Acetone	Kidney, Liver	3.6E-01	3.6E-01	2.2E-03	7.1E-01
			Chloroform	1.5E-07	1.5E-07	4.2E-08	3.4E-07	Chloroform	Liver	2.5E-02	2.5E-02	6.9E-03	5.6E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	2.8E-01	--	4.6E-03	2.9E-01
			Arsenic	2.9E-04	--	1.2E-06	2.9E-04	Arsenic	Skin, CVS	6.5E+00	--	2.6E-02	6.5E+00
			Cadmium	--	--	--	--	Cadmium	Kidney	8.9E-01	--	1.5E-01	1.0E+00
			Iron	--	--	--	--	Iron	Blood, GS	2.2E+01	--	2.5E-01	2.3E+01
			Manganese	--	--	--	--	Manganese	CNS	4.2E+00	--	1.7E-01	4.4E+00
			Thallium	--	--	--	--	Thallium	None Reported	7.8E+00	--	8.6E-02	7.9E+00
			(Total)	2.9E-04	1.5E-07	1.2E-06	2.9E-04	(Total)		4.2E+01	3.8E-01	6.9E-01	4.3E+01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	2.6E-09	--	4.8E-07	4.8E-07	Bis(2-ethylhexyl)phthalate	Liver	1.1E-04	--	2.0E-02	2.0E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	1.0E-03	--	2.0E-03	3.0E-03
			Arsenic	2.0E-07	--	9.5E-08	2.9E-07	Arsenic	Skin, CVS	5.1E-03	--	2.5E-03	7.5E-03
			Iron	--	--	--	--	Iron	Blood, GS	2.1E-03	--	2.8E-03	4.9E-03
			Manganese	--	--	--	--	Manganese	CNS	1.8E-03	--	8.8E-03	1.1E-02
			Vanadium	--	--	--	--	Vanadium	None Reported	6.5E-04	--	1.3E-02	1.4E-02
			(Total)	2.0E-07	--	5.7E-07	7.7E-07	(Total)		1.1E-02	--	4.9E-02	6.0E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	2.4E-02	--	4.9E-04	2.5E-02
			Antimony	--	--	--	--	Antimony	Blood	1.2E-02	--	1.2E-03	1.3E-02
			Arsenic	2.0E-06	--	2.9E-07	2.3E-06	Arsenic	Skin, CVS	5.1E-02	--	7.5E-03	5.9E-02
			Iron	--	--	--	--	Iron	Blood, GS	1.1E-01	--	1.4E-03	1.1E-01
			Manganese	--	--	--	--	Manganese	CNS	7.3E-03	--	3.7E-04	7.7E-03
			Nickel	--	--	--	--	Nickel	Body Weight	5.1E-03	--	3.8E-05	5.2E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	7.8E-03	--	1.6E-03	9.4E-03
			(Total)	2.0E-06	--	2.9E-07	2.3E-06	(Total)		2.1E-01	--	1.3E-02	2.3E-01
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	6.8E-06	--	1.5E-07	6.9E-06	Aroclor-1254	Cancer, Immune	2.0E+00	--	4.4E-02	2.0E+00
			Antimony	--	--	--	--	Antimony	Blood	3.9E-02	--	3.9E-03	4.2E-02
			Arsenic	1.1E-05	--	1.5E-06	1.2E-05	Arsenic	Skin, CVS	2.7E-01	--	4.0E-02	3.1E-01
			Cadmium	--	--	--	--	Cadmium	Kidney	1.5E-02	--	3.1E-03	1.9E-02
			Copper	--	--	--	--	Copper	GS	2.0E-02	--	1.3E-04	2.0E-02
			Iron	--	--	--	--	Iron	Blood, GS	1.7E+00	--	2.2E-02	1.7E+00
			Manganese	--	--	--	--	Manganese	CNS	1.2E-01	--	6.1E-03	1.3E-01
			(Total)	1.7E-05	--	1.7E-06	1.9E-05	(Total)		4.1E+00	--	1.2E-01	4.2E+00

Total Risk Across Surface Soil	9.9E-05
Total Risk Across Groundwater	2.9E-04
Total Risk Across Surface Water	7.7E-07
Total Risk Across Sediment	2.3E-06
Total Risk Across Sediment Waste	1.9E-05
Total Risk Across All Media and All Exposure Routes	4.1E-04

Total Hazard Index Across All Media and All Exposure Routes: 5.5E+01

Total Skin, CVS HI	9.4E+00
Total Liver HI	7.9E-01
Total CNS HI	4.7E+00
Total Blood HI	2.9E+01
Total Body Weight HI	8.2E+00
Total None Reported HI	2.3E-02
Total Kidney HI	1.8E+00
Total GS HI	2.9E+01
Total Immune	2.0E+00

TABLE 9.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Adult Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface/Subsurface Soil	Surface/Subsurface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	7.3E-07	--	1.2E-06	2.0E-06	Benzo(a)pyrene	Cancer	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	2.7E-02	--	5.5E-03	3.3E-02
			Arsenic	3.6E-05	--	1.0E-05	4.6E-05	Arsenic	Skin, CVS	2.3E-01	--	6.8E-02	3.0E-01
			Iron	--	--	--	--	Iron	Blood, GS	4.6E-01	--	1.2E-02	4.7E-01
			Manganese	--	--	--	--	Manganese	CNS	2.2E-02	--	2.2E-03	2.5E-02
			(Total)	3.7E-05	--	1.2E-05	4.8E-05	(Total)		7.4E-01	--	8.8E-02	8.2E-01
Groundwater	Groundwater	Site 12 - Jericho Island	Acetone	--	--	--	--	Acetone	Kidney, Liver	5.9E-01	5.9E-01	5.0E-03	1.2E+00
			Chloroform	2.5E-07	2.5E-07	9.8E-08	6.0E-07	Chloroform	Liver	4.1E-02	4.1E-02	1.6E-02	9.8E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	4.7E-01	--	1.1E-02	4.8E-01
			Arsenic	4.8E-04	--	2.7E-06	4.9E-04	Arsenic	Skin, CVS	1.1E+01	--	6.1E-02	1.1E+01
			Cadmium	--	--	--	--	Cadmium	Kidney	1.5E+00	--	3.4E-01	1.8E+00
			Iron	--	--	--	--	Iron	Blood, GS	3.7E+01	--	5.7E-01	3.8E+01
			Manganese	--	--	--	--	Manganese	CNS	7.0E+00	--	4.0E-01	7.4E+00
			Thallium	--	--	--	--	Thallium	None Reported	1.3E+01	--	2.0E-01	1.3E+01
			(Total)	4.9E-04	2.5E-07	2.8E-06	4.9E-04	(Total)		7.1E+01	6.3E-01	1.6E+00	7.3E+01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	2.3E-09	--	1.2E-06	1.2E-06	Bis(2-ethylhexyl)phthalate	Liver	2.3E-05	--	1.2E-02	1.2E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	2.2E-04	--	1.2E-03	1.4E-03
			Arsenic	1.7E-07	--	2.3E-07	4.0E-07	Arsenic	Skin, CVS	1.1E-03	--	1.5E-03	2.6E-03
			Iron	--	--	--	--	Iron	Blood, GS	4.5E-04	--	1.7E-03	2.1E-03
			Manganese	--	--	--	--	Manganese	CNS	3.8E-04	--	5.4E-03	5.8E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	1.4E-04	--	8.0E-03	8.1E-03
			(Total)	1.7E-07	--	1.4E-06	1.6E-06	(Total)		2.3E-03	--	3.0E-02	3.2E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	2.6E-03	--	1.0E-04	2.7E-03
			Antimony	--	--	--	--	Antimony	Blood	1.2E-03	--	2.5E-04	1.5E-03
			Arsenic	8.5E-07	--	2.5E-07	1.1E-06	Arsenic	Skin, CVS	5.5E-03	--	1.6E-03	7.1E-03
			Iron	--	--	--	--	Iron	Blood, GS	1.1E-02	--	3.0E-04	1.2E-02
			Manganese	--	--	--	--	Manganese	CNS	7.9E-04	--	7.9E-05	8.7E-04
			Nickel	--	--	--	--	Nickel	Body Weight	5.5E-04	--	8.1E-06	5.6E-04
			Vanadium	--	--	--	--	Vanadium	None Reported	8.4E-04	--	3.3E-04	1.2E-03
			(Total)	8.5E-07	--	2.5E-07	1.1E-06	(Total)		2.3E-02	--	2.7E-03	2.6E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	2.9E-06	--	1.3E-07	3.0E-06	Aroclor-1254	Cancer, Immune	2.1E-01	--	9.4E-03	2.2E-01
			Antimony	--	--	--	--	Antimony	Blood	4.1E-03	--	8.3E-04	5.0E-03
			Arsenic	4.5E-06	--	1.3E-06	5.8E-06	Arsenic	Skin, CVS	2.9E-02	--	8.5E-03	3.8E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	1.7E-03	--	6.6E-04	2.3E-03
			Copper	--	--	--	--	Copper	GS	2.2E-03	--	2.9E-05	2.2E-03
			Iron	--	--	--	--	Iron	Blood, GS	1.8E-01	--	4.8E-03	1.9E-01
			Manganese	--	--	--	--	Manganese	CNS	1.3E-02	--	1.3E-03	1.4E-02
			(Total)	7.4E-06	--	1.4E-06	8.8E-06	(Total)		4.4E-01	--	2.5E-02	4.7E-01

Total Risk Across Surface Soil	4.8E-05
Total Risk Across Groundwater	4.9E-04
Total Risk Across Surface Water	1.6E-06
Total Risk Across Sediment	1.1E-06
Total Risk Across Sediment Waste	8.8E-06
Total Risk Across All Media and All Exposure Routes	5.5E-04

Total Hazard Index Across All Media and All Exposure Routes	7.4E+01

Total Skin, CVS HI	1.1E+01
Total Liver HI	1.3E+00
Total CNS HI	7.4E+00
Total Blood HI	3.8E+01
Total Body Weight HI	1.4E+01
Total None Reported HI	9.3E-03
Total Kidney HI	3.0E+00
Total GS HI	3.8E+01
Total Immune	2.2E-01

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TABLE 9.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Lifetime Residents
Receptor Age: Children/Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface/Subsurface Soil	Surface/Subsurface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	2.0E-06	--	2.3E-06	4.2E-06	Benzo(a)pyrene	Cancer	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	--	--	--	--
			Arsenic	1.2E-04	--	2.3E-05	1.4E-04	Arsenic	Skin, CVS	--	--	--	--
			Iron	--	--	--	--	Iron	Blood, GS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			(Total)	1.2E-04	--	2.5E-05	1.5E-04	(Total)		--	--	--	--
Groundwater	Groundwater	Site 12 - Jericho Island	Acetone	--	--	--	--	Acetone	Kidney, Liver	--	--	--	--
			Chloroform	4.0E-07	4.0E-07	1.4E-07	9.4E-07	Chloroform	Liver	--	--	--	--
			Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	--	--
			Arsenic	7.8E-04	--	3.9E-06	7.8E-04	Arsenic	Skin, CVS	--	--	--	--
			Cadmium	--	--	--	--	Cadmium	Kidney	--	--	--	--
			Iron	--	--	--	--	Iron	Blood, GS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			Thallium	--	--	--	--	Thallium	None Reported	--	--	--	--
			(Total)	7.8E-04	4.0E-07	4.0E-06	7.8E-04	(Total)		--	--	--	--
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	4.9E-09	--	1.6E-06	1.7E-06	Bis(2-ethylhexyl)phthalate	Liver	--	--	--	--
			Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	--	--
			Arsenic	3.6E-07	--	3.3E-07	6.9E-07	Arsenic	Skin, CVS	--	--	--	--
			Iron	--	--	--	--	Iron	Blood, GS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			Vanadium	--	--	--	--	Vanadium	None Reported	--	--	--	--
			(Total)	3.7E-07	--	2.0E-06	2.3E-06	(Total)		--	--	--	--
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	--	--	--	--
			Arsenic	2.8E-06	--	5.4E-07	3.4E-06	Arsenic	Skin, CVS	--	--	--	--
			Iron	--	--	--	--	Iron	Blood, GS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			Nickel	--	--	--	--	Nickel	Body Weight	--	--	--	--
			Vanadium	--	--	--	--	Vanadium	None Reported	--	--	--	--
			(Total)	2.8E-06	--	5.4E-07	3.4E-06	(Total)		--	--	--	--
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	9.7E-06	--	2.8E-07	9.9E-06	Aroclor-1254	Cancer, Immune	--	--	--	--
			Antimony	--	--	--	--	Antimony	Blood	--	--	--	--
			Arsenic	1.5E-05	--	2.9E-06	1.8E-05	Arsenic	Skin, CVS	--	--	--	--
			Cadmium	--	--	--	--	Cadmium	Kidney	--	--	--	--
			Copper	--	--	--	--	Copper	GS	--	--	--	--
			Iron	--	--	--	--	Iron	Blood, GS	--	--	--	--
			Manganese	--	--	--	--	Manganese	CNS	--	--	--	--
			(Total)	2.5E-05	--	3.1E-06	2.8E-05	(Total)		--	--	--	--

Total Risk Across Surface Soil	1.5E-04
Total Risk Across Groundwater	7.8E-04
Total Risk Across Surface Water	2.3E-06
Total Risk Across Sediment	3.4E-06
Total Risk Across Sediment Waste	2.8E-05
Total Risk Across All Media and All Exposure Routes	9.6E-04

Total Hazard Index Across All Media and All Exposure Routes	--

TABLE 10.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Arsenic	2.6E-06	--	8.0E-07	3.4E-06	Arsenic	Skin, CVS	4.0E-01	--	1.2E-01	5.22E-01
			(Total)	2.6E-06	--	8.0E-07	3.4E-06	(Total)		4.0E-01	--	1.2E-01	5.2E-01
Groundwater	*Groundwater*	*Site 12 - Jericho Island*	Acetone	--	--	--	--	Acetone	Kidney, Liver	--	--	1.3E-02	1.3E-02
			Chloroform	--	--	2.4E-10	2.4E-10	Chloroform	Liver	--	--	2.8E-04	2.8E-04
			Aluminum	--	--	--	--	Aluminum	Body Weight	--	--	8.4E-04	8.4E-04
			Arsenic	--	--	3.0E-08	3.0E-08	Arsenic	Skin, CVS	--	--	4.7E-03	4.7E-03
			Cadmium	--	--	--	--	Cadmium	Kidney	--	--	2.7E-02	2.7E-02
			Iron	--	--	--	--	Iron	Blood, GS	--	--	4.4E-02	4.4E-02
			Manganese	--	--	--	--	Manganese	CNS	--	--	3.1E-02	3.1E-02
			Thallium	--	--	--	--	Thallium	None Reported	--	--	1.6E-02	1.6E-02
			(Total)	--	--	3.1E-08	3.1E-08	(Total)		--	--	1.4E-01	1.4E-01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	1.3E-10	--	1.7E-08	1.8E-08	Bis(2-ethylhexyl)phthalate	Liver	3.4E-05	--	4.3E-03	4.4E-03
			Aluminum	--	--	--	--	Aluminum	Body Weight	3.1E-04	--	7.7E-04	1.1E-03
			Arsenic	1.0E-08	--	6.1E-09	1.6E-08	Arsenic	Skin, CVS	1.6E-03	--	9.5E-04	2.5E-03
			Iron	--	--	--	--	Iron	Blood, GS	6.4E-04	--	1.1E-03	1.7E-03
			Manganese	--	--	--	--	Manganese	CNS	5.4E-04	--	3.4E-03	3.9E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	2.0E-04	--	5.0E-03	5.2E-03
			(Total)	1.0E-08	--	2.3E-08	3.4E-08	(Total)		3.3E-03	--	1.6E-02	1.9E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	5.9E-03	--	2.5E-04	6.1E-03
			Antimony	--	--	--	--	Antimony	Blood	2.8E-03	--	5.9E-04	3.4E-03
			Arsenic	7.9E-08	--	2.5E-08	1.0E-07	Arsenic	Skin, CVS	1.2E-02	--	3.8E-03	1.6E-02
			Iron	--	--	--	--	Iron	Blood, GS	2.5E-02	--	7.3E-04	2.6E-02
			Manganese	--	--	--	--	Manganese	CNS	1.8E-03	--	1.9E-04	2.0E-03
			Nickel	--	--	--	--	Nickel	Body Weight	1.2E-03	--	2.0E-05	1.3E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	1.9E-03	--	8.0E-04	2.7E-03
			(Total)	7.9E-08	--	2.5E-08	1.0E-07	(Total)		5.1E-02	--	6.4E-03	5.8E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	2.7E-07	--	1.3E-08	2.8E-07	Aroclor-1254	Cancer, Immune	4.7E-01	--	2.2E-02	5.0E-01
			Antimony	--	--	--	--	Antimony	Blood	9.3E-03	--	2.0E-03	1.1E-02
			Arsenic	4.2E-07	--	1.3E-07	5.5E-07	Arsenic	Skin, CVS	6.5E-02	--	2.0E-02	8.6E-02
			Cadmium	--	--	--	--	Cadmium	Kidney	3.7E-03	--	1.6E-03	5.3E-03
			Copper	--	--	--	--	Copper	GS	4.8E-03	--	6.9E-05	4.9E-03
			Iron	--	--	--	--	Iron	Blood, GS	4.0E-01	--	1.1E-02	4.2E-01
			Manganese	--	--	--	--	Manganese	CNS	2.9E-02	--	3.1E-03	3.2E-02
			(Total)	6.9E-07	--	1.4E-07	8.3E-07	(Total)		9.9E-01	--	6.1E-02	1.1E+00

Total Risk Across Soil	3.4E-06
Total Risk Across Groundwater	3.1E-08
Total Risk Across Surface Water	3.4E-08
Total Risk Across Sediment	1.0E-07
Total Risk Across Sediment Waste	8.3E-07
Total Risk Across All Media and All Exposure Routes	4.4E-06

Total Hazard Index Across All Media and All Exposure Routes	1.8E+00

Total CVS HI	6.3E-01
Total Liver HI	1.7E-02
Total CNS HI	6.9E-02
Total Blood HI	4.9E-01
Total GS HI	4.9E-01
Total Body Weight	8.0E-03
Total None Reported	2.3E-02
Total Immune	5.0E-01
Total Skin HI	6.3E-01
Total Kidney HI	2.7E-02

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TABLE 10.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Trespassers
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Arsenic	3.0E-06	--	1.7E-06	4.6E-06	Arsenic	Skin, CVS	4.6E-02	--	2.6E-02	7.2E-02
			(Total)	3.0E-06	--	1.7E-06	4.6E-06	(Total)		4.6E-02	--	2.6E-02	7.2E-02
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	1.5E-09	--	5.1E-07	5.1E-07	Bis(2-ethylhexyl)phthalate	Liver	3.7E-05	--	1.3E-02	1.3E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	3.3E-04	--	1.3E-03	1.6E-03
			Arsenic	1.1E-07	--	1.0E-07	2.1E-07	Arsenic	Skin, CVS	1.7E-03	--	1.6E-03	3.3E-03
			Iron	--	--	--	--	Iron	Blood, GS	6.9E-04	--	1.8E-03	2.5E-03
			Manganese	--	--	--	--	Manganese	CNS	5.9E-04	--	5.6E-03	6.2E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	2.2E-04	--	8.3E-03	8.5E-03
			(Total)	1.1E-07	--	6.1E-07	7.2E-07	(Total)		3.6E-03	--	3.1E-02	3.5E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	4.1E-03	--	3.1E-04	4.4E-03
			Antimony	--	--	--	--	Antimony	Blood	1.9E-03	--	7.4E-04	2.7E-03
			Arsenic	5.5E-07	--	3.1E-07	8.5E-07	Arsenic	Skin, CVS	8.5E-03	--	4.8E-03	1.3E-02
			Iron	--	--	--	--	Iron	Blood, GS	1.8E-02	--	9.0E-04	1.9E-02
			Manganese	--	--	--	--	Manganese	CNS	1.2E-03	--	2.3E-04	1.5E-03
			Nickel	--	--	--	--	Nickel	Body Weight	8.6E-04	--	2.4E-05	8.8E-04
			Vanadium	--	--	--	--	Vanadium	None Reported	1.3E-03	--	9.9E-04	2.3E-03
			(Total)	5.5E-07	--	3.1E-07	8.5E-07	(Total)		3.6E-02	--	8.0E-03	4.4E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	1.9E-06	--	1.6E-07	2.0E-06	Aroclor-1254	Cancer, Immune	3.3E-01	--	2.8E-02	3.6E-01
			Arsenic	2.9E-06	--	1.6E-06	4.5E-06	Arsenic	Skin, CVS	4.5E-02	--	2.5E-02	7.1E-02
			(Total)	4.8E-06	--	1.8E-06	6.6E-06	(Total)		3.7E-01	--	5.3E-02	4.3E-01

Total Risk Across Surface Soil	4.6E-06
Total Risk Across Surface Water	7.2E-07
Total Risk Across Sediment	8.5E-07
Total Risk Across Sediment Waste	6.6E-06
Total Risk Across All Media and All Exposure Routes	1.3E-05

Total Hazard Index Across All Media and All Exposure Routes	5.8E-01

Total Skin, CVS HI	1.6E-01
Total Liver HI	1.3E-02
Total CNS HI	7.7E-03
Total Blood HI	2.4E-02
Total GS HI	2.1E-02
Total Body Weight HI	6.9E-03
Total None Reported HI	1.1E-02
Total Immune HI	3.6E-01

TABLE 10.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Current/Future
Receptor Population: Recreational Users
Receptor Age: Adolescents

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Arsenic	3.0E-06	--	1.7E-06	4.6E-06	Arsenic	Skin, CVS	4.6E-02	--	2.6E-02	7.2E-02
			(Total)	3.0E-06	--	1.7E-06	4.6E-06	(Total)		4.6E-02	--	2.6E-02	7.2E-02
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	1.5E-09	--	5.1E-07	5.1E-07	Bis(2-ethylhexyl)phthalate	Liver	3.7E-05	--	1.3E-02	1.3E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	3.3E-04	--	1.3E-03	1.6E-03
			Arsenic	1.1E-07	--	1.0E-07	2.1E-07	Arsenic	Skin, CVS	1.7E-03	--	1.6E-03	3.3E-03
			Iron	--	--	--	--	Iron	Blood, GS	6.9E-04	--	1.8E-03	2.5E-03
			Manganese	--	--	--	--	Manganese	CNS	5.9E-04	--	5.6E-03	6.2E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	2.2E-04	--	8.3E-03	8.5E-03
			(Total)	1.1E-07	--	6.1E-07	7.2E-07	(Total)		3.6E-03	--	3.1E-02	3.5E-02
Sediment	Sediment	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	4.1E-03	--	3.1E-04	4.4E-03
			Antimony	--	--	--	--	Antimony	Blood	1.9E-03	--	7.4E-04	2.7E-03
			Arsenic	5.5E-07	--	3.1E-07	8.5E-07	Arsenic	Skin, CVS	8.5E-03	--	4.8E-03	1.3E-02
			Iron	--	--	--	--	Iron	Blood, GS	1.8E-02	--	9.0E-04	1.9E-02
			Manganese	--	--	--	--	Manganese	CNS	1.2E-03	--	2.3E-04	1.5E-03
			Nickel	--	--	--	--	Nickel	Body Weight	8.6E-04	--	2.4E-05	8.8E-04
			Vanadium	--	--	--	--	Vanadium	None Reported	1.3E-03	--	9.9E-04	2.3E-03
			(Total)	5.5E-07	--	3.1E-07	8.5E-07	(Total)		3.6E-02	--	8.0E-03	4.4E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	1.9E-06	--	1.6E-07	2.0E-06	Aroclor-1254	Cancer, Immune	3.3E-01	--	2.8E-02	3.6E-01
			Arsenic	2.9E-06	--	1.6E-06	4.5E-06	Arsenic	Skin, CVS	4.5E-02	--	2.5E-02	7.1E-02
			(Total)	4.8E-06	--	1.8E-06	6.6E-06	(Total)		3.7E-01	--	5.3E-02	4.3E-01

Total Risk Across Surface Soil	4.6E-06
Total Risk Across Surface Water	7.2E-07
Total Risk Across Sediment	8.5E-07
Total Risk Across Sediment Waste	6.6E-06
Total Risk Across All Media and All Exposure Routes	1.3E-05

Total Hazard Index Across All Media and All Exposure Routes 5.8E-01

Total Skin, CVS HI	1.6E-01
Total Liver HI	1.3E-02
Total CNS HI	7.7E-03
Total Blood HI	2.4E-02
Total GS HI	2.1E-02
Total Body Weight HI	6.9E-03
Total None Reported HI	1.1E-02
Total Immune HI	3.6E-01

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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: Recreational Users
Receptor Age: Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 10 - Jericho Island	Arsenic	1.2E-06	--	9.6E-07	2.1E-06	Arsenic	Skin, CVS	3.0E-02	--	2.5E-02	5.5E-02
			(Total)	1.2E-06	--	9.6E-07	2.1E-06	(Total)		3.0E-02	--	2.5E-02	5.5E-02
Surface Water	Surface Water	Site 10 - Jericho Island	Bis(2-ethylhexyl)phthalate	5.6E-10	--	2.9E-07	2.9E-07	Bis(2-ethylhexyl)phthalate	Liver	2.3E-05	--	1.2E-02	1.2E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	2.2E-04	--	1.2E-03	1.4E-03
			Arsenic	4.2E-08	--	5.8E-08	1.0E-07	Arsenic	Skin, CVS	1.1E-03	--	1.5E-03	2.6E-03
			Iron	--	--	--	--	Iron	Blood, GS	4.5E-04	--	1.7E-03	2.1E-03
			Manganese	--	--	--	--	Manganese	CNS	3.8E-04	--	5.4E-03	5.8E-03
			Vanadium	--	--	--	--	Vanadium	None Reported	1.4E-04	--	8.0E-03	8.1E-03
			(Total)	4.2E-08	--	3.5E-07	3.9E-07	(Total)		2.3E-03	--	3.0E-02	3.2E-02
Sediment	Sediment	Site 10 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	2.6E-03	--	3.0E-04	2.9E-03
			Antimony	--	--	--	--	Antimony	Blood	1.2E-03	--	7.1E-04	1.9E-03
			Arsenic	2.1E-07	--	1.8E-07	3.9E-07	Arsenic	Skin, CVS	5.5E-03	--	4.6E-03	1.0E-02
			Iron	--	--	--	--	Iron	Blood, GS	1.1E-02	--	8.6E-04	1.2E-02
			Manganese	--	--	--	--	Manganese	CNS	7.9E-04	--	2.2E-04	1.0E-03
			Nickel	--	--	--	--	Nickel	Body Weight	5.5E-04	--	2.3E-05	5.7E-04
			Vanadium	--	--	--	--	Vanadium	None Reported	8.4E-04	--	9.5E-04	1.8E-03
			(Total)	2.1E-07	--	1.8E-07	3.9E-07	(Total)		2.3E-02	--	7.6E-03	3.1E-02
Sediment Waste	Sediment Waste	Site 10 - Jericho Island	Arsenic	1.1E-06	--	9.4E-07	2.1E-06	Arsenic	Skin, CVS	2.9E-02	--	2.4E-02	5.4E-02
			(Total)	1.1E-06	--	9.4E-07	2.1E-06	(Total)		2.9E-02	--	2.4E-02	5.4E-02

Total Risk Across Surface Soil	2.1E-06
Total Risk Across Surface Water	3.9E-07
Total Risk Across Sediment	3.9E-07
Total Risk Across Sediment Waste	2.1E-06
Total Risk Across All Media and All Exposure Routes	5.0E-06

Total Hazard Index Across All Media and All Exposure Routes	1.7E-01

Total Skin, CVS HI	1.2E-01
Total Liver HI	1.2E-02
Total CNS HI	6.8E-03
Total Blood HI	1.4E-02
Total GS HI	1.4E-02
.Total Body Weight HI	4.9E-03
Total None Reported HI	9.9E-03

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TABLE 10.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Child Residents
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	1.7E-06	--	1.4E-06	3.1E-06	Benzo(a)pyrene	Cancer	--	--	--	--
			Arsenic	8.4E-05	--	1.2E-05	9.6E-05	Arsenic	Skin, CVS	2.2E+00	--	3.2E-01	2.5E+00
			Iron	--	--	--	--	Iron	Blood, GS	4.2E+00	--	5.7E-02	4.3E+00
			(Total)	8.5E-05	--	1.4E-05	9.9E-05	(Total)		6.4E+00	--	3.7E-01	6.8E+00
Groundwater	Groundwater	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	2.8E-01	--	4.6E-03	2.9E-01
			Arsenic	2.9E-04	--	1.2E-06	2.9E-04	Arsenic	Skin, CVS	6.5E+00	--	2.6E-02	6.5E+00
			Cadmium	--	--	--	--	Cadmium	Kidney	8.9E-01	--	1.5E-01	1.0E+00
			Iron	--	--	--	--	Iron	Blood, GS	2.2E+01	--	2.5E-01	2.3E+01
			Manganese	--	--	--	--	Manganese	CNS	4.2E+00	--	1.7E-01	4.4E+00
			Thallium	--	--	--	--	Thallium	None Reported	7.8E+00	--	8.6E-02	7.9E+00
			(Total)	2.9E-04	--	1.2E-06	2.9E-04	(Total)		4.2E+01	--	6.8E-01	4.3E+01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	2.6E-09	--	4.8E-07	4.8E-07	Bis(2-ethylhexyl)phthalate	Liver	1.1E-04	--	2.0E-02	2.0E-02
			Aluminum	--	--	--	--	Aluminum	Body Weight	1.0E-03	--	2.0E-03	3.0E-03
			Arsenic	2.0E-07	--	9.5E-08	2.9E-07	Arsenic	Skin, CVS	5.1E-03	--	2.5E-03	7.5E-03
			Iron	--	--	--	--	Iron	Blood, GS	2.1E-03	--	2.8E-03	4.9E-03
			Manganese	--	--	--	--	Manganese	CNS	1.8E-03	--	8.8E-03	1.1E-02
			Vanadium	--	--	--	--	Vanadium	None Reported	6.5E-04	--	1.3E-02	1.4E-02
			(Total)	2.0E-07	--	5.7E-07	7.7E-07	(Total)		1.1E-02	--	4.9E-02	6.0E-02
Sediment	Sediment	Site 12 - Jericho Island	Arsenic	2.0E-06	--	2.9E-07	2.3E-06	Arsenic	Skin, CVS	5.1E-02	--	7.5E-03	5.9E-02
			(Total)	2.0E-06	--	2.9E-07	2.3E-06	(Total)		5.1E-02	--	7.5E-03	5.9E-02
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	6.8E-06	--	1.5E-07	6.9E-06	Aroclor-1254	Cancer, Immune	2.0E+00	--	4.4E-02	2.0E+00
			Arsenic	1.1E-05	--	1.5E-06	1.2E-05	Arsenic	Skin, CVS	2.7E-01	--	4.0E-02	3.1E-01
			Iron	--	--	--	--	Iron	Blood, GS	1.7E+00	--	2.2E-02	1.7E+00
			(Total)	1.7E-05	--	1.7E-06	1.9E-05	(Total)		3.9E+00	--	1.1E-01	4.0E+00

Total Risk Across Surface Soil	9.9E-05
Total Risk Across Groundwater	2.9E-04
Total Risk Across Surface Water	7.7E-07
Total Risk Across Sediment	2.3E-06
Total Risk Across Sediment Waste	1.9E-05
Total Risk Across All Media and All Exposure Routes	4.1E-04

Total Hazard Index Across All Media and All Exposure Routes 5.4E+01

Total Skin, CVS HI	9.4E+00
Total Liver HI	2.0E-02
Total CNS HI	4.4E+00
Total Blood HI	2.9E+01
Total Body Weight HI	8.2E+00
Total None Reported HI	1.4E-02
Total Kidney HI	1.0E+00
Total GS HI	2.9E+01
Total Immune	2.0E+00

TABLE 10.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Adult Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface/Subsurface Soil	Surface/Subsurface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	7.3E-07	--	1.2E-06	2.0E-06	Benzo(a)pyrene	Cancer	--	--	--	--
			Arsenic	3.6E-05	--	1.0E-05	4.6E-05	Arsenic	Skin, CVS	2.3E-01	--	6.8E-02	3.0E-01
			(Total)	3.7E-05	--	1.2E-05	4.8E-05	(Total)		2.3E-01	--	6.8E-02	3.0E-01
Groundwater	Groundwater	Site 12 - Jericho Island	Aluminum	--	--	--	--	Aluminum	Body Weight	4.7E-01	--	1.1E-02	4.8E-01
			Arsenic	4.8E-04	--	2.7E-06	4.9E-04	Arsenic	Skin, CVS	1.1E+01	--	6.1E-02	1.1E+01
			Cadmium	--	--	--	--	Cadmium	Kidney	1.5E+00	--	3.4E-01	1.8E+00
			Iron	--	--	--	--	Iron	Blood, GS	3.7E+01	--	5.7E-01	3.8E+01
			Manganese	--	--	--	--	Manganese	CNS	7.0E+00	--	4.0E-01	7.4E+00
			Thallium	--	--	--	--	Thallium	None Reported	1.3E+01	--	2.0E-01	1.3E+01
			(Total)	4.8E-04	--	2.7E-06	4.9E-04	(Total)		7.0E+01	--	1.6E+00	7.1E+01
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	2.3E-09	--	1.2E-06	1.2E-06	Bis(2-ethylhexyl)phthalate	Liver	2.3E-05	--	1.2E-02	1.2E-02
			(Total)	2.3E-09	--	1.2E-06	1.2E-06	(Total)		2.3E-05	--	1.2E-02	1.2E-02
Sediment	Sediment	Site 12 - Jericho Island	Arsenic	8.5E-07	--	2.5E-07	1.1E-06	Arsenic	Skin, CVS	5.5E-03	--	1.6E-03	7.1E-03
			(Total)	8.5E-07	--	2.5E-07	1.1E-06	(Total)		5.5E-03	--	1.6E-03	7.1E-03
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	2.9E-06	--	1.3E-07	3.0E-06	Aroclor-1254	Cancer, Immune	2.1E-01	--	9.4E-03	2.2E-01
			Arsenic	4.5E-06	--	1.3E-06	5.8E-06	Arsenic	Skin, CVS	2.9E-02	--	8.5E-03	3.8E-02
			(Total)	7.4E-06	--	1.4E-06	8.8E-06	(Total)		2.4E-01	--	1.8E-02	2.6E-01

Total Risk Across Surface Soil	4.8E-05
Total Risk Across Groundwater	4.9E-04
Total Risk Across Surface Water	1.2E-06
Total Risk Across Sediment	1.1E-06
Total Risk Across Sediment Waste	8.8E-06
Total Risk Across All Media and All Exposure Routes	5.5E-04

Total Hazard Index Across All Media and All Exposure Routes	1.4E+01
Total Skin, CVS HI	1.1E+01
Total Liver HI	1.2E-02
Total CNS HI	7.4E+00
Total Blood HI	3.8E+01
Total Body Weight HI	1.4E+01
Total Kidney HI	1.8E+00
Total GS HI	3.8E+01
Total Immune	2.2E-01

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TABLE 10.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
MCRD PARRIS ISLAND, SOUTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Lifetime Residents
Receptor Age: Children/Adults

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface/Subsurface Soil	Surface/Subsurface Soil	Site 12 - Jericho Island	Benzo(a)pyrene	2.0E-06	--	2.3E-06	4.2E-06	Benzo(a)pyrene	Cancer	--	--	--	--
			Arsenic	1.2E-04	--	2.3E-05	1.4E-04	Arsenic	Skin, CVS	--	--	--	--
			(Total)	1.2E-04	--	2.5E-05	1.5E-04	(Total)		--	--	--	--
Groundwater	Groundwater	Site 12 - Jericho Island	Arsenic	7.8E-04	--	3.9E-06	7.8E-04	Arsenic	Skin, CVS	--	--	--	--
			(Total)	7.8E-04	--	3.9E-06	7.8E-04	(Total)		--	--	--	--
Surface Water	Surface Water	Site 12 - Jericho Island	Bis(2-ethylhexyl)phthalate	4.9E-09	--	1.6E-06	1.7E-06	Bis(2-ethylhexyl)phthalate	Liver	--	--	--	--
			(Total)	4.9E-09	--	1.6E-06	1.7E-06	(Total)		--	--	--	--
Sediment	Sediment	Site 12 - Jericho Island	Arsenic	2.8E-06	--	5.4E-07	3.4E-06	Arsenic	Skin, CVS	--	--	--	--
			(Total)	2.8E-06	--	5.4E-07	3.4E-06	(Total)		--	--	--	--
Sediment Waste	Sediment Waste	Site 12 - Jericho Island	Aroclor-1254	9.7E-06	--	2.8E-07	9.9E-06	Aroclor-1254	Cancer, Immune	--	--	--	--
			Arsenic	1.5E-05	--	2.9E-06	1.8E-05	Arsenic	Skin, CVS	--	--	--	--
			(Total)	2.5E-05	--	3.1E-06	2.8E-05	(Total)		--	--	--	--
							Total Risk Across Surface Soil	1.5E-04					
							Total Risk Across Groundwater	7.8E-04					
							Total Risk Across Surface Water	1.7E-06					
							Total Risk Across Sediment	3.4E-06					
							Total Risk Across Sediment Waste	2.8E-05					
							Total Risk Across All Media and All Exposure Routes	9.6E-04	Total Hazard Index Across All Media and All Exposure Routes				--

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APPENDIX E.3

LEAD MODELING RESULTS

IEUBK MODEL - Exposure to Lead (Page 1 of 2)
SITE NAME: Site 12/SWMU 10 - Jericho Island
EXPOSURE SCENARIO: On-site Child Resident
LOCATION: MCRD Parris Island, South Carolina
DATE: April 3, 2000

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 ug Pb/m3 DEFAULT
Indoor AIR Pb Conc: 30.0 percent of outdoor.
Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 4.00 ug Pb/L DEFAULT
WATER Consumption: DEFAULT

SOIL & DUST:
Soil: constant conc.
Dust: Multiple Source Analysis

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
0-1	78.6	65.0
1-2	78.6	65.0
2-3	78.6	65.0
3-4	78.6	65.0
4-5	78.6	65.0
5-6	78.6	65.0
6-7	78.6	65.0

Additional Dust Sources: None DEFAULT
Soil contribution conversion factor: 0.70
Air contribution conversion factor: 100.0

PAINT Intake: 0.00 ug Pb/day DEFAULT

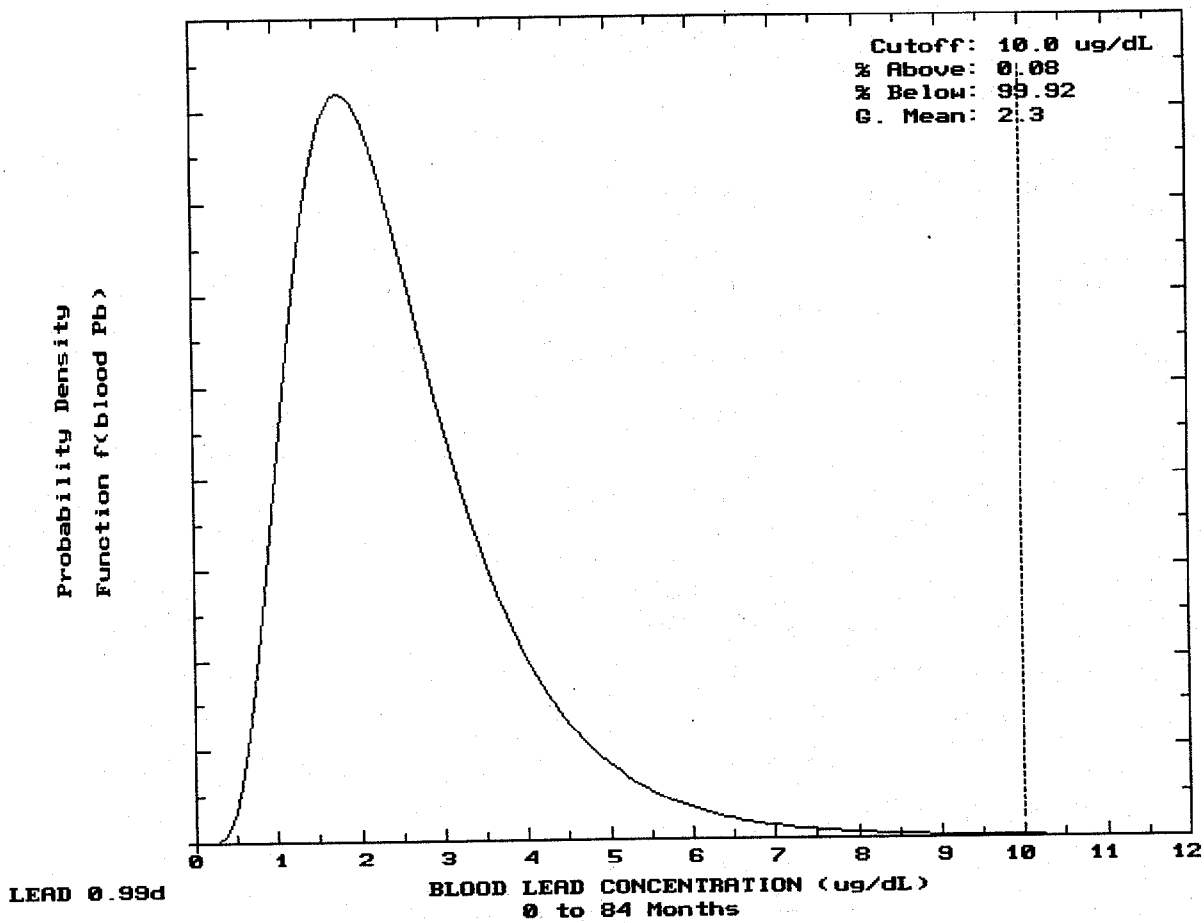
MATERNAL CONTRIBUTION: Infant Model
Maternal Blood Conc: 2.50 ug Pb/dL

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level (ug/dL)	Total Uptake (ug/day)	Soil+Dust Uptake (ug/day)
0.5-1:	2.6	4.74	1.72
1-2:	2.7	6.44	2.72
2-3:	2.6	6.87	2.74
3-4:	2.4	6.83	2.76
4-5:	2.1	6.10	2.06
5-6:	1.9	6.16	1.86
6-7:	1.8	6.41	1.76

YEAR	Diet Uptake (ug/day)	Water Uptake (ug/day)	Paint Uptake (ug/day)	Air Uptake (ug/day)
0.5-1:	2.62	0.38	0.00	0.02
1-2:	2.73	0.95	0.00	0.03
2-3:	3.08	0.99	0.00	0.06
3-4:	2.99	1.02	0.00	0.07
4-5:	2.91	1.06	0.00	0.07
5-6:	3.08	1.13	0.00	0.09
6-7:	3.40	1.15	0.00	0.09

IEUBK MODEL - Exposure to Lead (Page 2 of 2)
SITE NAME: Site 12/SWMU 10 - Jericho Island
EXPOSURE SCENARIO: On-site Child Resident
LOCATION: MCRD Parris Island, South Carolina
DATE: April 3, 2000



Calculations of 95th Percentile Fetal Blood Lead Concentrations for Adult Exposure to Soil

SITE NAME: **SITE 12/SWMU 10 - JERICHO ISLAND**
LOCATION: **MCRD PARRIS ISLAND, SOUTH CAROLINA**
RECEPTOR: **CONSTRUCTION WORKER**
DATE: **APRIL 3, 2000**

OBJECTIVE: Adult exposure to lead in soil is addressed by an evaluation of the relationship between the site soil lead concentration and the blood lead concentration in the developing fetuses of adult women. This spreadsheet calculates a range of 95th percentile fetal blood lead concentrations from central estimates of blood lead concentrations in pregnant adult women using the exposure parameters identified below (U.S. EPA, Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil , December 1996).

RELEVANT EQUATIONS: $PbB_{fetal,\ GM} = R_{fetal/maternal} \times [PbB_{adult,\ 0} + (PbS \times BKSF \times IR_s \times AF_s \times EF_s)/AT]$

and

$PbB_{fetal,\ 0.95} = PbB_{fetal,\ GM} \times GSD_{i,\ adult}^{1.645}$

Exposure Parameter	Description (units)	GSD_i = 1.8 - 2.1; $PbB_{adult,\ 0}$ = 1.7 - 2.2			
		Adult 1	Adult 2	Adult 3	Adult 4
$PbB_{adult,\ 0}$	Typical blood lead concentration in adult women of child-bearing age in absence of site exposures (ug/dL)	1.7	1.7	2.2	2.2
PbS	Site-specific soil lead concentration (mg/kg)	78.6	78.6	78.6	78.6
BKSF	Biokinetic slope factor (ug/dL per ug/day))	0.4	0.4	0.4	0.4
IR_s	Intake rate of soil, includes outdoor soil and indoor soil-derived dust (g/day)	0.100	0.100	0.100	0.100
AF_s	Absolute gastrointestinal absorption fraction (unitless)	0.12	0.12	0.12	0.12
EF_s	Exposure frequency (days/year)	125	125	125	125
AT	Averaging time (days/year)	365	365	365	365
$GSD_{i,\ adult}$	Estimate of individual geometric standard deviation among adults (unitless)	1.8	2.1	1.8	2.1
$R_{fetal/maternal}$	Constant of proportionality between fetal blood lead concentraiton at birth and maternal blood lead concentration (unitless)	0.9	0.9	0.9	0.9
$PbB_{adult,\ central}$	Calculated central estimate of blood lead concentrations in adult women of child-bearing age from site exposures (ug/dL)	1.83	1.83	2.33	2.33
$PbB_{fetal,\ GM}$	Central estimate of blood lead concentration (ug/dL) for fetuses carried by women who have site exposures to soil lead at concentration, PbS.	1.65	1.65	2.10	2.10
	Probability that $PbB_{fetal,GM}$ exceeds 10 ug/dL	0.11%	0.75%	0.39%	1.76%
$PbB_{fetal,\ 0.95}$	Calculated 95th percentile blood lead concentrations among fetuses born to women having site exposures (ug/dL)	4.33	5.58	5.51	7.10
RBRG	Lead soil concentration corresponding to a 95th percentile 10 ug/dL lead blood level in a fetus (mg/kg).	1536	960	1232	656

Note: According to the cited guidance document, this adult exposure model is not applicable for infrequent site exposures, where the EF_s is less than 1 day/week.

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APPENDIX E.4

TOXICOLOGICAL PROFILES FOR CHEMICALS OF CONCERN

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REFERENCE		**R-1**

E.4.1 ACETONE

E.4.1.1 Noncancer Toxicity

Studies of workers exposed to acetone revealed irritation of the ocular and respiratory tract mucosa, and, at high concentrations, central nervous system (CNS) effects (American Conference of Governmental Industrial Hygienists [ACGIH] 1991). Rats exposed by inhalation to high concentrations exhibited narcosis and slight decreases in organ and body weight, compared with controls, but no clinical pathological or histopathological evidence of organ damage. Inhalation reference concentration (RfC) values were not located for acetone. Oral toxicity data are limited to a comprehensive 90-day gavage study in rats, in which 100 mg/kg/day was a no observed effect level (NOEL) and 500 mg/kg/day was the lowest observed adverse effect level (LOAEL) associated with increased liver and kidney weight and tubular nephropathy (EPA 2000b). A verified reference dose RfD for chronic oral exposure of 0.1 mg/kg/day was derived by applying an uncertainty factor of 1000 to the NOEL of 100 mg/kg/day. The EPA (2000b) presented a provisional subchronic oral RfD of 1 mg/kg/day, based on the same NOEL and an uncertainty factor of 100. The target organs for inhalation exposure to acetone are the CNS and the respiratory and ocular mucosa. Target organs for oral exposure are the liver and kidney.

E.4.1.2 Carcinogenicity

No data was located on the carcinogenicity of acetone.

E.4.2 ALUMINUM

E.4.2.1 Noncancer Toxicity

Aluminum is not generally regarded as an industrial poison. Inhalation of finely divided powder has been reported as a cause of pulmonary fibrosis. Aluminum in aerosols has been implicated in Alzheimer's disease. As with other metals, the powder and dust are the most dangerous forms (Sax and Lewis, 1989). Most hazardous exposures to aluminum occur in refining and smelting processes. Aluminum dust is a respiratory and eye irritant. USEPA presented an oral RfD of 1.00 mg/kg/day and an inhalation reference dose of 0.001 mg/kg/day (USEPA, 2000a).

E.4.2.2 Carcinogenicity

Data were not located regarding the carcinogenicity of aluminum to humans. No oral or inhalation cancer slope factor is available for aluminum.

E.4.3 ANTIMONY

E.4.3.1 Pharmacokinetics

Ingested antimony is absorbed slowly and incompletely from the gastrointestinal (GI tract (Iffland 1988). Within a few days of acute exposure, highest tissue concentrations are found in the liver, kidney, and thyroid. Organs of storage include skin, bones, and teeth. Highest concentrations in deceased smelter workers (inhalation exposure) occurred in the lungs and skeleton. Excretion is largely via the urine or feces, although some is incorporated into the hair.

E.4.3.2 Noncancer Toxicity

Acute intoxication from ingestion of large doses of antimony induces GI disturbances, dehydration, and cardiac effects in human (Iffland 1988). Chronic effects from occupational exposure include irritation of the respiratory tract, pneumoconiosis, pustular eruptions of the skin called "antimony spots," allergic contact dermatitis, and cardiac effects, including abnormalities of the electrocardiograph (ECG) and myocardial changes. Cardiac effects were also observed in rats and rabbits exposed by inhalation for six weeks and in animals (dogs, and possibly other species) treated by intravenous injection (Elinder and Friber 1986a).

Chronic oral exposure studies in laboratory animals include two briefly reported lifetime drinking water studies in rates and mice (Kanisawa and Schroeder 1960; Schroeder et al. 1970). The only dose tested, 5 ppm potassium antimony tartrate, resulted in reduced longevity in both species and in reduced mean heart weight in rats. The EPA (2000bb) verified an RfD of 0.0004 mg/kg/day for chronic oral exposure to antimony from the LOAEL of 5 ppm potassium antimony tartrate (0.35 mg/antimony/kg body weight-day) in the lifetime study in rats (Schrodeder et al. 1970). An uncertainty factor of 1000 was applied; factors of 10 each for inter- and intraspecies variation and to estimate an NOAEL from an LOAEL. The heart is considered a likely target organ for chronic oral exposure of humans.

E.4.3.2 Carcinogenicity

Data were not located regarding the carcinogenicity of antimony to humans. Antimony fed to rats did not produce an excess of tumors (Goyer 1991), but a high frequency of lung tumors was observed in rats exposed by inhalation to antimony trioxide for one year (Elinder and Friberg 1986a). Antimony is classified in EPA cancer weight-of-evidence Group D (not classifiable as a carcinogenicity to humans) (EPA 2000bb).

E.4.4 ARSENIC

E.4.4.1 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.4.4.2 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 2000b). Similar effects were observed in persons exposed to high levels of arsenic in water in Utah and the northern part of Mexico (Cebrian et al. 1983; Southwick et al. 1983). Occupational (predominantly inhalation) exposure is also associated with neurological deficits, anemia, and cardiovascular effects (Ishinishi et al. 1986), but concomitant exposure to other chemicals cannot be ruled out. The EPA (2000b) 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.4.4.3 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 2000b). Oral exposure to high levels in well water is associated with increased risk of skin cancer (Tseng 1977; EPA 2000b). 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 (2000b) 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 (2000b) 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 2000b), 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.4.5 BARIUM

E.4.5.1 Noncancer Toxicity

Barium is a naturally occurring alkaline earth metal that comprises approximately 0.04 percent of the earth's crust (Reeves 1986a). Acute oral toxicity was manifested by GI upset, altered cardiac performance, and transient hypertension, convulsions, and muscular paralysis. Repeated oral exposures were associated with hypertension. Occupational exposure to insoluble barium sulfate induced benign pneumoconiosis (ACGIH 1991). The EPA (2000b) presented a verified chronic oral RfD of 0.07 mg/kg/day, based on an NOAEL of 0.21 mg/kg/day in a ten-week study in humans exposed to barium in drinking water and an uncertainty factor of 3. The EPA (2000b) presented the same value as a provisional RfD for subchronic oral exposure. A provisional chronic inhalation RfC of 0.0005 mg/m3 and a provisional subchronic inhalation RfC of 0.005 were based on an NOEL for fetotoxicity in a four-month intermittent-exposure inhalation study in rats (EPA 2000b). Uncertainty factors of 1000 and 100 were used for the chronic and subchronic RfC values, respectively. The chronic and subchronic inhalation RfC values are equivalent to 0.0001 and 0.001 mg/kg/day, assuming a human inhalation rate of 20 m3/day and body weight of 70 kg. Barium is principally a muscle toxin. Its targets are the GI system, skeletal muscle, the cardiovascular system, and the fetus.

E.4.5.2 Carcinogenicity

The EPA (2000b) classifies barium as a cancer weight-of-evidence Group D substance (not classifiable as to carcinogenicity in humans). Cancer risk is not estimated for Group D substances.

E.4.6 BENZO(A)PYRENE (BAP)

E.4.6.1 Pharmacokinetics

Benzo(a)pyrene was readily absorbed across the GI (Rees et al. 1971) and respiratory epithelia (Kotin et al. 1969; Vainich et al. 1976). Benzo(a)pyrene was distributed widely in the tissues of treated rats and mice, but primarily to tissues high in fat, such as adipose tissue and mammary gland (Kotin et al. 1969; Schlede et al. 1970a).

Studies of the metabolism of benzo(a)pyrene provide information relevant to other PAHs because of the structural similarities of all members of the class. Metabolism involves microsomal mixed function oxidase hydroxylation of one or more of the phenyl rings with the formation of phenols and dihydrodiols, probably via formation of arene oxide intermediates (EPA 1979a). The dihydrodiols may be further oxidized to diol epoxides, which, for certain members of the class, are known to be the ultimate carcinogens (LaVoie et al. 1982). Conjugation with glutathione or glucuronic acid, and reduction to tetrahydrotetrols are important detoxification pathways.

Excretion of benzo(a)pyrene residue was reported to be rapid, although quantitative data were not located (EPA 1979b). Excretion occurred mainly via the feces, probably largely due to biliary secretion (Schlede et al. 1970a, 1970b). The EPA (1980a) concluded that accumulation in the body tissues of PAHs from chronic low level exposure would be unlikely.

E.4.6.2 Noncancer Toxicity

The oral RfD and inhalation RfC are not available at this time.

E.4.6.3 Carcinogenicity

The PAHs are ubiquitous, being released to the environment from anthropogenic as well as from natural sources (ATSDR 1987). Benzo (a)pyrene is the most extensively studied member of the class, inducing tumors in multiple tissues of virtually all laboratory species tested by all routes of exposure. Although epidemiology studies suggested that complex mixtures that contain PAHs (coal tar, soots, coke oven emissions, cigarette smoke) are carcinogenic to humans (EPA 1994), the carcinogenicity cannot be attributed to PAHs alone because of the presence of other potentially carcinogenic substances in these mixtures (ATSDR 1987). In addition, recent investigations showed that the PAH fraction of roofing tar, cigarette smoke, and coke oven emissions accounted for only 0.1 to 8 percent of the total mutagenic activity of the unfractionated complex mixture in Salmonella (Lewtas 1988). Aromatic amines, nitrogen heterocyclic

compounds, highly oxygenated quinones, diones, and nitrooxygenated compounds, none of which would be expected to arise from in vivo metabolism of PAHs, probably accounted for the majority of the mutagenicity of coke oven emissions and cigarette smoke. Coal tar, which contains a mixture of many PAHs, has a long history of use in the clinical treatment of a variety of skin disorders in humans (ATSDR 1987).

Because of the lack of human cancer data, assignment of individual PAHs to EPA cancer weight-of-evidence groups was based largely on the results of animal studies with large doses of purified compound (EPA 1994). Frequently, unnatural routes of exposure, including implants of the test chemical in beeswax and trioctanoin in the lungs of female Osborne-Mendel rats, intratracheal instillation, and subcutaneous or intraperitoneal injection, were used. Benzo (a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were classified in Group B2 (probable human carcinogens).

The EPA (2000b) verified a slope factor for oral exposure to benzo(a)pyrene of 7.3 per mg/kg/day, based on several dietary studies in mice and rats. Neither verified nor provisional quantitative risk estimates were available for the other PAHs in Group B2. The EPA (1980) promulgated an ambient water quality criterion for "total carcinogenic PAHs," based on an oral slope factor derived from a study with benzo(a)pyrene, as being sufficiently protective for the class. Largely because of this precedent, the quantitative risk estimates for benzo(a)pyrene were adopted for the other carcinogenic PAHs when quantitative estimates were needed.

Human data specifically linking benzo(a)pyrene (BAP) to a carcinogenic effect are lacking. There are, however, multiple animal studies in many species demonstrating BAP to be carcinogenic following administration by numerous routes. In addition, BAP has produced positive results in numerous genotoxicity assays.

The data for animal carcinogenicity was sufficient. The animal data consist of dietary, gavage, inhalation, intratracheal instillation, dermal and subcutaneous studies in numerous strains of at least four species of rodents and several primates. Repeated BAP administration has been associated with increased incidences of total tumors and of tumors at the site of exposure. The tumor types in mice from oral diet studies include forestomach, squamous cell papillomas and carcinomas (Neal and Rigdon 1967).

Benzo(a)pyrene has been shown to cause genotoxic effects in a broad range of prokaryotic and mammalian cell assay systems (EPA 1991a).

The oral slope factor presented in IRIS is 7.3 per mg/kg/day The cancer slope factor for inhalation is not available.

E.4.7 BIS(2-ETHYLHEXYL)PHTHALATE (DI[2-ETHYLHEXYL]PHTHALATE)

E.4.7.1 Noncancer Toxicity

The acute oral toxicity of bis(2-ethylhexyl)phthalate is very low; oral $LD_{50/30}$ (lethal dose to 50 percent of population within 30 days without medical 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 (2000b) 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 (2000b) 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.4.7.2 Carcinogenicity

The EPA (2000b) 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 (2000b).

E.4.8 CADMIUM

E.4.8.1 Pharmacokinetics

Estimates of cadmium uptake by the respiratory tract range from 10 to 50 percent; uptake is greatest for fumes and small particles and least for large dust particles (Friberg et al. 1986; Goyer 1991). GI absorption of ingested cadmium is ordinarily 5 to 8 percent, but may reach 20 percent in cases of serious dietary ion deficiency. Highest tissue levels are normally found in the kidneys followed by the liver, although levels in the liver may exceed those in the kidneys of persons suffering from cadmium-induced renal dysfunction. The half-life of cadmium in the kidneys and liver may be as long as 10-30 years. Fecal and urinary excretion of cadmium are approximately equivalent to normal humans exposed to small amounts. Urinary excretion increases markedly in humans with cadmium-induced renal disease.

E.4.8.2 Noncancer Toxicity

Acute inhalation exposure to fumes or particles of cadmium induces respiratory symptoms, general weakness, and, in severe cases, respiratory insufficiency, shock, and death (Friberg et al. 1986). Acute oral exposure induces GI disturbances. Chronic inhalation exposure induces pulmonary emphysema, and chronic exposure by either route consistently produces renal tubular disease in humans and laboratory animals. Proteinuria is a reliable early indicator of cadmium-induced kidney disease. The combination of pulmonary emphysema and renal tubular disease, if severe, may result in early mortality. Painful osteomalacia and osteoporosis may arise from altered metabolism of bone minerals secondary to renal damage. The combination of renal and skeletal damage is called itai-itai disease in Japan. Cadmium exposurehas been associated with liver damage, but the liver appears to be less sensitive than the kidney. The kidney is the primary target organ of cadmium toxicity. The EPA (2000bb) derived chronic oral RfD values of 05. ug/kg/day for cadmium ingested in water and 1 ug/kg/day for cadmium ingested in food, based on a toxicokinetic model that predicted NOAELs from renal cortical concentration of cadmium. The different RfD values reflect assumed differences in GI absorption of cadmium from water 95 percent) and food (2.5 percent).

E.4.8.3 Carcinogenicity

Carcinogenicity data in humans consist of several occupational studies that associate cadmium exposure with lung cancer, but concomitant exposure to other carcinogenic chemicals and smoking were not adequately controlled. Other occupational studies reported significantly increased risk of prostatic cancer, but this effect was not observed in the largest occupational study of workers exposed to high levels (Thun et al. 1985). The animal data consist of an inhalation study in rats that showed a significant increase in

lung tumors, and several parental injection studies that produced injection site tumors. No evidence of carcinogenicity, however, was observed in seven oral studies in rats and mice. The EPA (2000bb) classifies cadmium a cancer weight-of-evidence Group B1 substance for inhalation exposure on the basis of limited evidence of carcinogenicity in humans and sufficient evidence in animals. The data were insufficient to classify cadmium as carcinogenic to humans exposed by the oral route. An inhalation unit risk of 0.0018 mg/m^3, equivalent to 6.3 per mg/kg/day, was derived from the occupational exposure study by Thun et al. (1985) assuming an inhalation rate of 20 m^3/day and a body weight of 70 kg for humans.

E.4.9 CHLOROFORM

E.4.9.1 Noncancer Toxicity

Oral or inhalation exposure of animals to chloroform was associated with liver and kidney damage (ACGIH 1991; EPA 2000b). 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 (2000b) 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 2000b). The EPA (2000b) 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.4.9.2 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 2000b). 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.4.10 CHROMIUM

E.4.10.1 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 2000b). The NOEL of 5% Cr_2O_3 was the basis for a verified chronic oral RfD of 1.5 mg/kg/day (EPA 2000b). 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 2000b).

Acute oral exposure of humans to high doses of chromium (VI) induced neurological effects, GI hemorrhage and fluid loss, and kidney and liver effects. Parenteral dosing of animals with chromium (VI) is selectively toxic to the kidney tubules. An NOAEL of 2.4 mg chromium (VI) /kg/day in a one-year drinking water study in rats and an uncertainty factor of 500 was the basis of a verified RfD of 0.003 mg/kg/day for chronic oral exposure (EPA 2000b).

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 (2000b).

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.4.10.2 Carcinogenicity

Data were not located regarding the carcinogenicity of chromium (III). The EPA (2000b) 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.4.11 COPPER

E.4.11.1 Noncancer Toxicity

Copper is a nutritionally essential element that functions as a cofactor in several enzyme systems (Aaseth and Norseth 1986). Acute exposure to large oral doses of copper salts was associated with GI disturbances, hemolysis, and liver and kidney lesions. Chronic oral toxicity in humans has not been reported. Chronic oral exposure of animals was associated with an iron-deficiency type of anemia, hemolysis, and lesions in the liver and kidneys. Occupational exposure may induce metal fume fever, and, in cases of chronic exposure to high levels, hemolysis and anemia (ACGIH 1991). The EPA (USEPA Region III, 2000a) presented an oral RfD of 0.04 mg/kg/day. An inhalation RfC value was not located for copper. The target organs for copper are the erythrocyte, liver, and kidney, and for inhalation exposure, the lung.

E.4.11.2 Carcinogenicity

Copper is classified in cancer weight-of-evidence Group D (not classifiable as to carcinogenicity to humans) (EPA 2000b). Quantitative risk estimates are not derived for Group D chemicals.

E.4.12 IRON

E.4.12.1 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 (2000) 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.4.12.2 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.4.13 LEAD

E.4.13.1 Pharmacokinetics

Studies in humans indicate that an average of 10 percent of ingested lead is absorbed, but estimates as high as 40 percent were obtained in some individuals (Tsuchiya, 1986). Nutritional factors have a profound effect on GI absorption efficiency. Children absorb ingested lead more efficiently than adults; absorption efficiencies up to 53 percent were recorded for children three months to eight years of age. Similar results were obtained for laboratory animals; absorption efficiencies of 5 to 10 percent were obtained for adults and > 50 percent were obtained for young animals. The deposition rate of inhaled lead averages approximately 30 to 50 percent, depending on particle size, with as much as 60 percent deposition of very small particles (0.03 mm) near highways. All lead deposited in the lungs is eventually absorbed.

Approximately 95 percent of the lead in the blood is located in the erythrocytes (EPA, 2000b). Lead in the plasma exchanges with several body compartments, including the internal organs, bone, and several excretory pathways. In humans, lead concentrations in bone increase with age (Tsuchiya, 1986). About 90 percent of the body burden of lead is located in the skeleton. Neonatal blood concentrations are about 85 percent of maternal concentrations (EPA, 2000b). Excretion of absorbed lead is principally through the urine, although GI secretion, biliary excretion, and loss through hair, nails, and sweat are also significant.

E.5.13.2 Noncancer Toxicity

The noncancer toxicity of lead to humans has been well characterized through decades of medical observation and scientific research (EPA, 1990). The principal effects of acute oral exposure are colic with diffuse paroxysmal abdominal pain (probably due to vagal irritation), anemia, and, in severe cases, acute encephalopathy, particularly in children (Tsuchiya, 1986). The primary effects of long-term exposure are neurological and hematological. Limited occupational data indicate that long-term exposure to lead may induce kidney damage. The principal target organs of lead toxicity are the erythrocyte and the nervous system. Some of the effects on the blood, particularly changes in levels of certain blood enzymes, and subtle neurobehavioral changes in children, appear to occur at levels so low as to be considered nonthreshold effects.

The USEPA (1990; July 1995) determined that it is inappropriate to derive an RfD for oral exposure to lead for several reasons. First, the use of an RfD assumes that a threshold for toxicity exists, below which adverse effects are not expected to occur; however, the most sensitive effects of lead exposure,

impaired neurobehavioral development in children and altered blood enzyme levels associated with anemia, may occur at blood lead concentrations so low as to be considered practically nonthreshold in nature. Second, RfD values are specific for the route of exposure for which they are derived. Lead, however, is ubiquitous, so that exposure occurs from virtually all media and by all pathways simultaneously, making it practically impossible to quantify the contribution to blood lead from any one route of exposure. Finally, the dose-response relationships common to many toxicants, and upon which derivation of an RfD is based, do not hold true for lead. This is because the fate of lead within the body depends, in part, on the amount and rate of previous exposures, the age of the recipient, and the rate of exposure. There is, however, a reasonably good correlation between blood lead concentration and effect. Therefore, blood lead concentration is the appropriate parameter on which to base the regulation of lead.

USEPA (2000b) presented no inhalation RfC for lead, but referred to the National Ambient Air Quality Standard (NAAQS) for lead, which could be used in lieu of an inhalation RfC. The NAAQSs are based solely on human health considerations and are designed to protect the most sensitive subgroup of the human population. The NAAQS for lead is 1.5 mg/m^3, averaged quarterly.

E.4.13.3 Carcinogenicity

USEPA (2000b) classifies lead in cancer weight-of-evidence Group B2 (probable human carcinogen), based on inadequate evidence of cancer in humans and sufficient animal evidence. The human data consist of several epidemiologic occupational studies that yielded confusing results. All of the studies lacked quantitative exposure data and failed to control for smoking and concomitant exposure to other possibly carcinogenic metals. Rat and mouse bioassays showed statistically significant increases in renal tumors following dietary and subcutaneous exposure to several soluble lead salts. Various lead compounds were observed to induce chromosomal alterations in vivo and in vitro, sister chromatic exchange in exposed workers, and cell transformation in Syrian hamster embryo cells; to enhance simian adenovirus induction; and to alter molecular processes that regulate gene expression. USEPA (2000b) declined to estimate risk for oral exposure to lead because many factors (e.g., age, general health, nutritional status, existing body burden and duration of exposure) influence the bioavailability of ingested lead, introducing a great deal of uncertainty into any estimate of risk.

The USEPA IEUBK lead model is an iterated set of equations that estimate blood lead concentration in children aged 0 to 7 years (USEPA, February 1994). The biokinetic part of the model describes the movement of lead between the plasma and several body compartments and estimates the resultant blood lead concentration. The rate of the movement of lead between the plasma and each compartment is a function of the transition or residence time (i.e., the mean time for lead to leave the plasma and enter a

given compartment, or the mean residence time for lead in that compartment). Compartments modeled include the erythrocytes, liver, kidneys, all the other soft tissue of the body, cortical bone, and trabecular bone. Excretory pathways and their rates are also modeled. These include the mean time for excretion from the plasma to the urine, from the liver to the bile, and from the other soft tissues to the hair, skin, sweat, etc. The model permits the user to adjust the transition and residence times.

USEPA guidance (USEPA, July 1994) recommends using 400 mg/kg as a screening level for lead in soil for residential scenarios at CERCLA sties and at RCRA Corrective Action sites. Residential areas with soil lead below 400 mg/kg generally require no further action. However, in some special situations, further study is warranted below the screening level (e.g., wetlands, agricultural areas).

E.4.14 MANGANESE

E.4.14.1 Noncancer Toxicity

Manganese is nutritionally required in humans for normal growth and health (EPA, 2000b). 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, 2000b) based on drinking water. The EPA (2000b) 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.4.14.2 Carcinogenicity

The EPA (2000b) 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.4.15 NICKEL

E.4.15.1 Noncancer Toxicity

In a subchronic gavage study with nickel chloride in water, clinical signs of toxicity in rats included lethargy, ataxia, irregular breathing, reduced body temperature, salivation, and discolored extremities (EPA 1998). Inhalation exposure was associated with asthma and pulmonary fibrosis in welders using nickel alloys (ACGIH 1986). Lung effects were observed in laboratory animals exposed by inhalation. The EPA (2000 presented a verified RfD of 0.02 for chronic oral exposure to nickel, based on an NOAEL for decreased organ and body weights in a two-year dietary study with nickel sulfate in rats and an uncertainty factor of 300. The EPA (2000 presented the same value as a provisional subchronic oral RfD. The CNS appears to be the target organ for the oral toxicity of nickel. The lung is clearly the target organ for inhalation exposure.

E.4.15.2 Carcinogenicity

Occupational exposure to nickel was associated with increased risk of nasal, laryngeal and lung cancer (ATSDR 1988a). Inhalation exposure of rats to nickel subsulfide increased the incidence of lung tumors. The EPA (1997) presents a cancer weight-of-evidence Group A classification (human carcinogen) for nickel, and presents an inhalation unit risk of 0.00024 per $\mu g/m^3$ for nickel refinery dust. The unit risk is equivalent to 0.84 per mg/kg/day, assuming humans inhale 20 m^3 of air/day and weigh 70 kg. The quantitative estimate was derived from the human occupational studies.

E.4.16 POLYAROMATIC HYDROCARBONS

PAHs are a large class of ubiquitous natural and anthropogenic chemicals, all with similar chemical structures (ATSDR 1990).

E.4.16.1 Pharmacokinetics

Although quantitative absorption data for the PAHs were not located, benzo(a)pyrene was readily absorbed across the GI (Rees et al. 1971) and respiratory epithelia (Kotin et al. 1969; Vainich et al. 1976). The high lipophilicity of other compounds in this class suggests that other PAHs also would be readily absorbed across GI and respiratory epithelia.

Benzo(a)pyrene was distributed widely in the tissues of treated rats and mice, but primarily to tissues high in fat, such as adipose tissue and mammary gland (Kotin et al. 1969; Schlede et al. 1970a). Patterns of tissue distribution of other PAHs would be expected to be similar because of the high lipophilicity of the members of this class.

Studies of the metabolism of benzo(a)pyrene provide information relevant to other PAHs because of the structural similarities of all members of the class. Metabolism involves microsomal mixed function oxidase hydroxylation of one or more of the phenyl rings with the formation of phenols and dihydrodiols, probably via formation of arene oxide intermediates (EPA 1979a). The dihydrodiols may be further oxidized to diol epoxides, which, for certain members of the class, are known to be the ultimate carcinogens (LaVoie et al. 1982). Conjugation with glutathione or glucuronic acid, and reduction to tetrahydrotetrols are important detoxification pathways. Metabolism of naphthalene resulted in the formation of 1,2-naphthoquinone, which induced cataract formation and retinal damage in rats and rabbits.

Excretion of benzo(a)pyrene or dibenzo(a,h)anthracene residues was reported to be rapid, although quantitative data were not located (EPA 1979b). Excretion occurred mainly via the feces, probably largely due to biliary secretion (Schlede et al. 1970a, 1970b). The EPA (1980a) concluded that accumulation in the body tissues of PAHs from chronic low level exposure would be unlikely.

E.4.16.2 Noncancer Toxicity

Oral noncancer toxicity data are available for acenaphthene, anthracene, fluoranthene, fluorene, and naphthalene. Newborn infants, children, and adults exposed to naphthalene by ingestion, inhalation, or possibly by skin contact developed hemolytic anemia with associated jaundice and occasionally renal disease (EPA 1979c). In a 13-week gavage study in rats, treatment with 50 mg naphthalene/kg, 5

days/week for 13 weeks (35.7 mg/kg/day) induced no effects; higher doses presumably reduced the growth rate (National Toxicology Program (NTP) 1980). Application of an uncertainty factor of 1000 yielded a provisional RfD for chronic oral exposure of 0.04 mg/kg/day (EPA 1997). The very mild effect (decreased growth rate) apparently observed at higher doses suggests that the RfD is very conservatively protective.

E.4.16.3 Carcinogenicity

The PAHs are ubiquitous, being released to the environment from anthropogenic as well as from natural sources (ATSDR 1987). Benzo(a)pyrene is the most extensively studied member of the class, inducing tumors in multiple tissues of virtually all laboratory species tested by all routes of exposure. Although epidemiology studies suggested that complex mixtures that contain PAHs (coal tar, soots, coke oven emissions, cigarette smoke) are carcinogenic to humans (EPA 1994), the carcinogenicity cannot be attributed to PAHs alone because of the presence of other potentially carcinogenic substances in these mixtures (ATSDR 1987). In addition, recent investigations showed that the PAH fraction of roofing tar, cigarette smoke, and coke oven emissions accounted for only 0.1 to 8 percent of the total mutagenic activity of the unfractionated complex mixture in Salmonella (Lewtas 1988). Aromatic amines, nitrogen heterocyclic compounds, highly oxygenated quinones, diones, and nitrooxygenated compounds, none of which would be expected to arise from in vivo metabolism of PAHs, probably accounted for the majority of the mutagenicity of coke oven emissions and cigarette smoke. Furthermore, coal tar, which contains a mixture of many PAHs, has a long history of use in the clinical treatment of a variety of skin disorders in humans (ATSDR 1987).

Because of the lack of human cancer data, assignment of individual PAHs to EPA cancer weight-of-evidence groups was based largely on the results of animal studies with large doses of purified compound (EPA 1994). Frequently, unnatural routes of exposure, including implants of the test chemical in beeswax and trioctanoin in the lungs of female Osborne-Mendel rats, intratracheal instillation, and subcutaneous or intraperitoneal injection, were used. Benzo(a)anthracene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were classified in Group B2 (probable human carcinogens).

The EPA (1993a) verified a slope factor for oral exposure to benzo(a)pyrene of 7.3 per mg/kg/day, based on several dietary studies in mice and rats. Neither verified nor provisional quantitative risk estimates were available for the other PAHs in Group B2. The EPA (1980a) promulgated an ambient water quality criterion for "total carcinogenic PAHs," based on an oral slope factor derived from a study with benzo(a)pyrene, as being sufficiently protective for the class. Largely because of this precedent, the

quantitative risk estimates for benzo(a)pyrene were adopted for the other carcinogenic PAHs when quantitative estimates were needed.

Recent reevaluations of the carcinogenity and mutagenicity of the Group B2 PAHs suggest that there are large differences between individual PAHs in cancer potency (Krewski et al., 1989). Based on the available cancer and mutagenicity data, and assuming that there is a constant relative potency between different carcinogens across different bioassay systems and that the PAHs under consideration have similar dose-response curves, Thorslund and Charnley (1988) derived relative potency values for several PAHs. A more recent Relative Potency Factor (RPF) scheme for the Group B2 PAHs was based only on the induction of lung epidermoid carcinomas in female Osborne-Mendel rats in the lung-implantation experiments (Clement International 1990).

E.4.17 POLYCHLORINATED BIPHENYLS

E.4.17.1 Noncancer Toxicity

Epidemiologic studies of women in the United States associated oral PCB exposure with low birth weight or retarded musculoskeletal or neurobehavioral development of their infants (ATSDR 1991). Oral studies in animals established the liver as the target organ in all species, and the thyroid as an additional target organ in the rat. Effects observed in monkeys included gastritis, anemia, chloracne-like dermatitis, and immunosuppression. Oral treatment of animals induced developmental effects, including retarded neurobehavioral and learning development in monkeys. Neither subchronic nor chronic oral RfD values were located for any of the aroclors.

Occupational exposure to PCBs was associated with upper respiratory tract and ocular irritation, loss of appetite, liver enlargement, increased serum concentrations of liver enzymes, skin irritation, rashes and chloracne, and, in heavily exposed female workers, decreased birth weight of their infants (ATSDR 1991). Concurrent exposure to other chemicals confounded the interpretation of the occupational exposure studies. Laboratory animals exposed by inhalation to Aroclor-1254 vapors exhibited moderate liver degeneration, decreased body weight gain and slight renal tubular degeneration. EPA presented an oral RfD of 0.02 ug/kg/day for Aroclor-1254. No RfD was located for Aroclor-1260. No RfC was located for Aroclor 1254 or Aroclor-1260. Target organs for PCBs include the skin, liver, fetus, and neonate.

E.4.17.2 Carcinogenicity

The EPA (2000) classifies Aroclor-1254 and Aroclor-1260 as EPA cancer weight-of-evidence Group B2 substances (probable human carcinogens), based on inadequate data in humans and sufficient data in animals. The human data consist of several epidemiologic occupational and accidental oral exposure studies with serious limitations, including poorly quantified concentrations of PCBs and durations of exposure, and probable exposures to other potential carcinogens.

The animal data consist of several oral studies in rats and mice with various aroclors, kanechlors, or clophens (commercial PCB mixtures manufactured in the United States, Japan and Germany, respectively) that reported increased incidence of liver tumors in both species (EPA 1994).

The EPA (2000) presents an oral slope factor of 2.0 per mg/kg/day for Aroclor-1254 and Aroclor-1260 based on liver tumors in rats.

E.4.18 THALLIUM

E.4.18.1 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 (2000b) 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 (2000b) presented a chronic oral RfD for thallium of 0.07 mg/kg/day.

E.4.18.2 Carcinogenicity

Thallium was classified as a cancer weight-of-evidence Group D substance (not classifiable as to carcinogenicity to humans) (EPA, 2000b).

E.4.19 VANADIUM

E.4.19.1 Noncancer Toxicity

The oral toxicity of vanadium compounds to humans is very low (Lagerkvist et al. 1986), probably because little vanadium is absorbed from the GI tract. Effects in humans exposed by inhalation include upper and lower respiratory tract irritation. A provisional subchronic and chronic oral RfD of 0.007 mg/kg/day was derived from an NOEL of 5 ppm in rats in a lifetime drinking water study with vanadyl sulfate and an uncertainty factor of 100 (EPA 2000b). A target organ could not be identified for oral exposure. The respiratory tract is the target organ for inhalation exposure.

E.4.19.2 Carcinogenicity

No information was located regarding the carcinogenicity of vanadium.

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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) 1,200 (mg/day) 800 (mg/day)	1 - 10 11 - 24 >24	40	743 (average of all ages) 1,179 743 (average of all ages); 530 (women ages 35-50)	NA NA >2,500	53.3	21.2
Magnesium	6 (mg/kg/day) 4.5 (mg/kg/day)	1 - 15 >15	50	193 (age 1-5) 207 - 329	NA NA	6	3
Potassium	15 - 20 (mg/kg/day) 1,600 - 2,000 (mg/day)	1 - 10 >20	90	1,500 2,500	NA 18,000 (hyperkalemia)	15	13.5
Sodium	300 (mg/day) 500 (mg/day)	2 - 5 Adult	90[4]	NA 1,800 - 5,000	NA 2,400 (Intake not to be exceeded)	20 20	18 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 EG.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

DIRECT CONTACT WITH SURFACE SOIL

SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA

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		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																				
78-93-3	2-Hexanone	0.0085		0.0085		mg/kg	PAI-10-SS-09-01	1/16	0.0054 - 0.68	0.0085	NA	310	N	NA		NA		NA		No	BSL
108-10-1	4-Methyl-2-pentanone	0.0038	J	0.026		mg/kg	PAI-10-SS-09-01	6/16	0.0056 - 0.68	0.026	0.007	630	N	79	N	NA		NA		No	BSL
67-64-1	Acetone	0.023		0.35	J	mg/kg	PAI-10-SS-11-01	4/15	0.011 - 0.66	0.35	0.266	780	N	157	N	100000	sat	16	N	No	BSL
75-15-0	Carbon Disulfide	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	780	N	36	N	720	sat	32	N	No	BSL
56-23-5	Carbon Tetrachloride	0.006	J	0.006	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.006	NA	0.49	N	0.2	C	0.3		0.07		No	BSL
67-66-3	Chloroform	0.0018	J	0.0075		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.0075	NA	100	C	0.2	C	0.3	C	0.6	C	No	BSL
74-87-3	Chloromethane	0.0036	J	0.017		mg/kg	PAI-10-SS-11-01	2/16	0.0033 - 0.41	0.017	NA	49	C	1	C	NA		NA		No	BSL
127-18-4	Tetrachloroethene	0.001	J	0.001	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.0033 - 0.41	0.001	NA	12	C	6	C	11		0.06		No	BSL
108-88-3	Toluene	0.0013	J	0.0039	J	mg/kg	PAI-10-SS-15-01A	9/16	0.0034 - 0.41	0.0034	0.0056	1600	N	52	sat	650	sat	12	N	No	BSL
	Semivolatile Organic Compounds																				
91-57-6	2-Methylnaphthalene	0.385		0.385		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.385	NA	160	N	5.6(7)	N	NA		NA		No	BSL
83-32-9	Acenaphthene	0.305		0.305		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.305	NA	470	N	370	N	NA		570	N	No	BSL
208-96-8	Acenaphthylene	0.375		0.375		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.375	NA	160(7)	N	5.6(7)	N	NA		NA		No	BSL
120-12-7	Anthracene	0.024	J	0.024	J	mg/kg	PAI-10-SS-08-01	1/16	0.34 - 0.46	0.024	NA	2300	N	2200	N	NA		12000	N	No	BSL
56-55-3	Benzo(a)anthracene	0.041	J	0.14	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.14	NA	0.87	C	0.6	C	NA		2	C	No	BSL
50-32-8	Benzo(a)pyrene	0.032	J	0.12	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.12	NA	0.087	C	0.06	C	NA		8	C	Yes	ASL
205-99-2	Benzo(b)fluoranthene	0.033	J	0.13	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	3/16	0.34 - 0.46	0.13	NA	0.87	C	0.6	C	NA		5	C	No	BSL
191-24-2	Benzo(g,h,i)perylene	0.05	J	0.055	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	2/16	0.34 - 0.46	0.055	NA	160(7)	N	5.6(7)	N	NA		NA		No	BSL
207-08-9	Benzo(k)fluoranthene	0.034	J	0.11	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.11	NA	8.7	C	6	C	NA		49	C	No	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	0.03	J	0.48		mg/kg	PAI-10-SS-07-01	9/16	0.34 - 0.44	0.48	NA	46	C	35	C	31000	sat	3600	C	No	BSL
218-01-9	Chrysene	0.047	J	0.16	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.16	NA	87	C	62	C	NA		160	C	No	BSL
53-70-3	Dibenzo(a,h)anthracene	0.034	J	0.034	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.034	NA	0.087	C	0.06	C	NA		2	C	No	BSL
131-11-3	Dimethyl Phthalate	0.18	J	0.18	J	mg/kg	PI-012-03(37), PAI-10-SS-01A	1/16	0.34 - 0.46	0.18	NA	78000	N	10000	max	NA		NA		No	BSL
206-44-0	Fluoranthene	0.041	J	0.28	J	mg/kg	PAI-10-SS-08-01	3/16	0.34 - 0.46	0.28	NA	310	N	230	N	NA		4300	N	No	BSL
86-73-7	Fluorene	0.22	J	0.22	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	0.22	0.646	310	N	264	N	NA		560	N	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	0.064	J	0.069	J	mg/kg	PAI-10-SS-08-01	2/11	0.35 - 0.46	0.069	NA	0.87	C	0.6	C	NA		14	C	No	BSL
91-20-3	Naphthalene	1.435		1.435		mg/kg	PAI-10-SS-12-01-AVG	1/16	0.35 - 0.46	1.435	NA	160	N	5.6	N	NA		84	N	No	BSL
87-86-5	Pentachlorophenol	0.24	J	0.24	J	mg/kg	PAI-10-SS-12-01-AVG	1/16	0.69 - 1.1	0.24	NA	5.3	C	3	C	NA		0.03	C	No	BSL
85-01-8	Phenanthrene	0.069	J	0.14	J	mg/kg	PAI-10-SS-08-01	2/16	0.34 - 0.46	0.14	NA	160(7)	N	5.6(7)	N	NA		NA		No	BSL
129-00-0	Pyrene	0.024	J	0.23	J	mg/kg	PAI-10-SS-08-01	4/16	0.34 - 0.46	0.23	NA	230	N	230	N	NA		4200	N	No	BSL
	Pesticides/PCBs																				
72-55-9	4,4'-DDE	0.043		0.043		mg/kg	PAI-10-SS-14-01	1/14	0.0034 - 0.0045	0.043	NA	2	C	2	C	NA		54	C	No	BSL
72-43-5	Methoxychlor	0.07		0.07		mg/kg	PAI-10-SS-13-01	1/14	0.018 - 0.023	0.07	NA	39	N	31	N	NA		160	N	No	BSL
	Inorganics																				
7429-90-5	Aluminum	822		5370		mg/kg	PAI-10-SS-14-01	16/16	ND	5370	7270	7800	N	7600	N	NA		NA		No	BSL, BKG
7440-36-0	Antimony	8		8		mg/kg	PAI-10-SS-14-01	1/16	0.48 - 2.5	8	NA	3.1	N	3.1	N	NA		5		Yes	ASL
7440-38-2	Arsenic	0.24		50.8		mg/kg	PAI-10-SS-14-01	16/16	ND	50.8	1.44	0.43	C	0.39	C	750	C	29		Yes	ASL
7440-39-3	Barium	7		76.4		mg/kg	PAI-10-SS-14-01	12/16	2.7 - 5.9	76.4	23.6	550	N	540	N	690000	N	1600		No	BSL
7440-41-7	Beryllium	0.08		0.17		mg/kg	PAI-10-SS-12-01-AVG, PAI-10-SS-15-01A	5/16	0.02 - 0.19	0.17	0.095	16	N	15	N	1300	C	63		No	BSL

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TABLE E6.1

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

DIRECT CONTACT WITH SURFACE SOIL

SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA

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		US EPA (4) SSL Soil to Air		US EPA (5) SSL Soil to Groundwater		COPC Flag	Rationale for (6) Contaminant Deletion or Selection
7440-43-9	Cadmium	0.06		3.2		mg/kg	PAI-10-SS-14-01	2/16	0.19 - 0.26	3.2	NA	3.9	N	3.7	N	1800	C	8		No	BSL
7440-70-2	Calcium	33.9		2780		mg/kg	PAI-10-SS-14-01	16/16	ND	2780	766	NA		NA		NA		NA		No	NUT
7440-47-3	Chromium	1.8		18.1		mg/kg	PAI-10-SS-14-01	16/16	ND	18.1	6.23	12000[8]		10000	N	270	C	38		No	BSL
7440-48-4	Cobalt	0.455		6.6		mg/kg	PAI-10-SS-14-01	6/16	0.33 - 0.82	6.6	0.363	470	N	470	N	NA		NA		No	BSL
7440-50-8	Copper	0.72		189		mg/kg	PAI-10-SS-14-01	8/16	0.27 - 1	189	1.52	310	N	290	N	NA		NA		No	BSL
7439-89-6	Iron	485		99700		mg/kg	PAI-10-SS-14-01	16/16	ND	99700	3920	2300	N	2300	N	NA		NA		Yes	ASL
7439-92-1	Lead	4.4		1100		mg/kg	PAI-10-SS-14-01	16/16	ND	1100	12.5	400[9]		400	N	NA		NA		Yes	ASL
7439-95-4	Magnesium	123		3240		mg/kg	PAI-10-SS-14-01	16/16	ND	3240	515	NA		NA		NA		NA		No	NUT
7439-96-5	Manganese	10.6		522		mg/kg	PAI-10-SS-14-01	10/16	3.9 - 9.7	522	129	160	N	176	N	NA		NA		Yes	ASL
7487-94-7	Mercury	0.02		0.89		mg/kg	PAI-10-SS-14-01	11/16	0.02 - 0.09	0.89	0.11	2.3[10]	N	2.3	N	10		2		No	BSL
7440-02-0	Nickel	0.61		26.5		mg/kg	PAI-10-SS-14-01	16/16	ND	26.5	1.8	160	N	160	N	13000	C	130		No	BSL
7440-09-7	Potassium	57.8		640		mg/kg	PAI-10-SS-14-01	16/16	ND	640	313	NA		NA		NA		NA		No	NUT
7782-49-2	Selenium	0.09		0.12		mg/kg	PAI-10-SS-08-01	5/16	0.07 - 0.44	0.12	0.285	39	N	39	N	NA		5		No	BSL; BGK
7440-23-5	Sodium	20.525		10700		mg/kg	PAI-10-SS-14-01	7/16	11.4 - 35.6	10700	241	NA		NA		NA		NA		No	NUT
7440-62-2	Vanadium	1.7		9.3		mg/kg	PAI-10-SS-14-01	16/16	ND	9.3	9.5	55	N	55	N	NA		6000	N	No	BSL, BKG
7440-66-6	Zinc	4.75		1020		mg/kg	PAI-10-SS-14-01	9/16	1.9 - 6.4	1020	9.7	2300	N	2300	N	NA		12000	N	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

(3) USEPA Region III Risk-Based Concentration Table, October 27, 1999. (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) Value for naphthalene.

(8) Value for trivalent chromium, hexavalent chromium was not detected in surface soil.

(9) OSWER screening level.

(10) Value for mercuric chloride.

Shading indicates that the criteria was exceeded.

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

E6.1-3

TABLE E Co. 2

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

DIRECT CONTACT WITH SEDIMENT WASTES

SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA

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	Screening (3) Toxicity Value		US EPA Region IX PRGs		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Semivolatile Organic Compounds																		
117-81-7	Bis(2-ethylhexyl)phthalate	10		10		mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.78	10	0.42	46	C	35	C	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	0.9	J	0.9	J	mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.62	0.9	ND	160	N	120	N	NA	NA	No	BSL
84-66-2	Diethyl Phthalate	0.029	J	0.029	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/2	2	0.029	ND	6300	N	4900	N	NA	NA	No	BSL
	Pesticides/PCBs																		
72-55-9	4,4'-DDE	0.096		0.52		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	0.52	ND	1.9	C	2	C	NA	NA	No	BSL
50-29-3	4,4'-DDT	0.038		0.038		mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/1	NA	0.038	ND	1.9	C	2	C	NA	NA	No	BSL
11097-69-1	Aroclor-1254	24		24		mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.062	24	ND	0.32	C	0.2	C	NA	NA	Yes	ASL
60-57-1	Dieldrin	0.0062	J	0.0062	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/1	NA	0.0062	ND	0.04	C	0.03	C	NA	NA	No	BSL
72-20-8	Endrin	1.2	J	1.2	J	mg/kg	PI-12-01(35)/PAI-10-SDW-01	1/2	0.0062	1.2	ND	2.3	N	1.8	N	NA	NA	No	BSL
319-84-6	alpha-BHC	0.0031	J	0.0031	J	mg/kg	PI-12-02(36)/PAI-10-SDW-02	1/2	0.047	0.0031	ND	0.1	C	0.09	C	NA	NA	No	BSL
	Inorganics																		
7429-90-5	Aluminum	9580		11700		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	11700	24284	7800	N	7600	N	NA	NA	No	BKG
7440-36-0	Antimony	3.3		9.4		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	9.4	ND	3.1	N	3.1	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	40.6		49.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	49.7	12.2	0.43	C	0.39	C	NA	NA	Yes	ASL
7440-39-3	Barium	66.8		73.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	73.2	28.0	550	N	540	N	NA	NA	No	BSL
7440-43-9	Cadmium	1.8		4.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	4.7	0.278	3.9	N	3.7	N	NA	NA	Yes	ASL
7440-70-2	Calcium	4600		6670		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	6670	4002	NA		NA		NA	NA	No	NUT
7440-47-3	Chromium	37.8		119		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	119	35.2	12000(7)	N	10000	max	NA	NA	No	BSL
7440-48-4	Cobalt	8.2		22.7		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	22.7	2.63	470	N	470	N	NA	NA	No	BSL
7440-50-8	Copper	168		489		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	489	10.1	310	N	290	N	NA	NA	Yes	ASL
7439-89-6	Iron	122000		307000		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	307000	21450	2300	N	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	569		2930		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	2930	20.6	400		400	N	NA	NA	Yes	ASL
7439-93-2	Magnesium	3990		6220		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	6220	6437	NA		NA		NA	NA	No	BKG, NUT
7439-96-5	Manganese	297		1480		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	1480	186	160	N	176	N	NA	NA	Yes	ASL
7440-02-0	Nickel	41.4		86.9		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	86.9	5.95	160	N	156	N	NA	NA	No	BSL
7440-09-7	Potassium	1470		2210		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	2210	3190	NA		NA		NA	NA	No	BKG, NUT
7782-49-2	Selenium	0.86		1.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	1.2	ND	39	N	39	N	NA	NA	No	BSL
7440-02-4	Silver	1.1		1.2		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	1.2	ND	39	N	39	N	NA	NA	No	BSL
7440-28-0	Sodium	8870		11200		mg/kg	PI-12-01(35)/PAI-10-SDW-01	2/2	NA	11200	19110	NA		NA		NA	NA	No	BKG, NUT
7440-62-2	Vanadium	27.6		44.9		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	44.9	49.6	55	N	55	N	NA	NA	No	BSL, BKG
7440-66-6	Zinc	751		1520		mg/kg	PI-12-02(36)/PAI-10-SDW-02	2/2	NA	1520	45.0	2300	N	2300	N	NA	NA	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

(3) USEPA Region III Risk-Based Concentration Table, October 27, 1999. (Cancer benchmark value = 1E-06, HI = 0.1)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

(5) Value for naphthalene.

(6) Value for chlordane

(7) Value for hexavalent chromium.

(8) OSWER screening level.

(9) Value for mercuric chloride.

Shading indicates that the criteria was exceeded.

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 E6.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

DIRECT CONTACT WITH SEDIMENT

SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA

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	Screening (3) Toxicity Value		US EPA Region IX PRGs		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
	Volatile Organic Compounds																		
78-93-3	2-Butanone	5	J	20		ug/kg	PAI-10-SD-07-01	2/16	7.1 - 670	20	NA	4700000	N	730000	N	NA	NA	No	BSL
591-78-6	2-Hexanone	4.4	J	4.4	J	ug/kg	PAI-10-SD-15-01	1/16	7.1 - 670	4.4	NA	310000	N	NA		NA	NA	No	BSL
108-10-1	4-Methyl-2-pentanone	4	J	53.7	J	ug/kg	PAI-10-SD-06-01	6/16	7.3 - 670	53.7	NA	630000	N	79000	N	NA	NA	No	BSL
67-64-1	Acetone	25		390		ug/kg	PAI-10-SD-08-01	8/16	35 - 810	390	NA	780000	N	160000	N	NA	NA	No	BSL
75-15-0	Carbon Disulfide	1.9	J	31	J	ug/kg	PAI-10-SD-08-01	13/16	5.1 - 400	31	NA	780000	N	36000	N	NA	NA	No	BSL
108-88-3	Toluene	2.5	J	23	J	ug/kg	PAI-10-SD-08-01	8/16	4.3 - 400	23	NA	1600000	N	52000	sat	NA	NA	No	BSL
1330-20-7	Xylenes, Total	1.8	J	2.3	J	ug/kg	PAI-10-SD-04-01	3/16	4.3 - 400	2.3	NA	16000000	N	21000	sat	NA	NA	No	BSL
	Semivolatile Organic Compounds																		
83-32-9	Acenaphthene	120	J	120	J	ug/kg	PAI-10-SD-20-01	1/18	93 - 270	120	NA	470000[5]	N	360000[5]	N	NA	NA	No	BSL
56-55-3	Benzo(a)anthracene	18		18		ug/kg	PAI-10-SD-013-01A	1/18	6.9 - 27	18	NA	870	C	600	C	NA	NA	No	BSL
50-32-8	Benzo(a)pyrene	11		38		ug/kg	PAI-10-SD-008-01A	7/18	6.9 - 13	38	NA	87	C	60	C	NA	NA	No	BSL
205-99-2	Benzo(b)fluoranthene	25		120		ug/kg	PAI-10-SD-008-01A	2/18	2.8 - 42	120	NA	870	C	600	C	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	18		18		ug/kg	PAI-10-SD-013-01A	1/17	2.8 - 27	18	NA	8700	C	6000	C	NA	NA	No	BSL
117-81-7	Bis(2-Ethylhexyl)phthalate	45	J	440	J	ug/kg	PAI-10-SD-07-01	8/18	480 - 2600	440	NA	46000	C	35000	C	NA	NA	No	BSL
218-01-9	Chrysene	44	J	44	J	ug/kg	PAI-10-SD-013-01A	1/18	6.9 - 27	44	NA	87000	C	62000	C	NA	NA	No	BSL
117-84-0	Di-n-octyl phthalate	63	J	63	J	ug/kg	PAI-10-SD-06-01	1/18	460 - 2600	63	NA	160000	N	120000	N	NA	NA	No	BSL
206-44-0	Fluoranthene	10		92		ug/kg	PAI-10-SD-013-01A	2/18	6.9 - 52	92	NA	310000	N	230000	N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	26		26		ug/kg	PAI-10-SD-014-01A	1/18	6.9 - 27	26	NA	870	C	600	C	NA	NA	No	BSL
87-86-5	Pentachlorophenol	180	J	180	J	ug/kg	PAI-10-SD-14-02	1/18	910 - 5100	180	NA	5300	C	3000	C	NA	NA	No	BSL
129-00-0	Pyrene	89		89		ug/kg	PAI-10-SD-013-01A	1/18	9.3 - 27	89	NA	230000	N	230000	N	NA	NA	No	BSL
	Pesticides/PCBs																		
50-29-3	4,4'-DDT	66		66		ug/kg	PAI-10-SD-14-02	1/18	4.5 - 41	66	NA	1900	C	2000	C	NA	NA	No	BSL
5103-71-9	Alpha-Chlordane	12		12		ug/kg	PAI-10-SD-14-02	1/18	2.3 - 21	12	NA	1800[6]	C	2000[6]	C	NA	NA	No	BSL
12789-03-6	Gamma-Chlordane	14		14		ug/kg	PAI-10-SD-14-02	1/18	2.3 - 21	14	NA	1800[6]	C	2000[6]	C	NA	NA	No	BSL
72-43-5	Methoxychlor	680		680		ug/kg	PAI-10-SD-14-02	1/18	23 - 210	680	NA	39000	N	31000	N	NA	NA	No	BSL
	Inorganics																		
7429-90-5	Aluminum	1870		52700		mg/kg	PAI-10-SD-08-01	18/18	NA	52700	24284	7800	N	7600	N	NA	NA	Yes	ASL
7440-36-0	Antimony	3.5		6.8		mg/kg	PAI-10-SD-09-01	2/18	2.3 - 13.2	6.8	NA	3.1	N	3.1	N	NA	NA	Yes	ASL
7440-38-2	Arsenic	0.35		18.5		mg/kg	PAI-10-SD-08-01	18/18	NA	18.5	12.2	0.43	C	0.39	C	NA	NA	Yes	ASL
7440-39-3	Barium	5.7		62.9		mg/kg	PAI-10-SD-08-01	11/18	3.7 - 6.7	62.9	28.0	550	N	540	N	NA	NA	No	BSL
7440-41-7	Beryllium	0.21		2		mg/kg	PAI-10-SD-08-01	13/18	0.11 - 0.79	2	0.977	16	N	15	N	NA	NA	No	BSL
7440-43-9	Cadmium	0.002		0.84		mg/kg	PAI-10-SD-14-01	3/18	0.25 - 1.4	0.84	0.278	3.9	N	3.7	N	NA	NA	No	BSL
7440-70-2	Calcium	338		5550		mg/kg	PAI-10-SD-13-01	18/18	NA	5550	4002	NA		NA		NA	NA	No	NUT
7440-47-3	Chromium	3.2		75		mg/kg	PAI-10-SD-08-01	18/18	NA	75	35.2	12000[7]	N	10000	max	NA	NA	No	BSL
7440-48-4	Cobalt	0.92		10.3		mg/kg	PAI-10-SD-14-02	9/18	0.92 - 3.4	10.3	2.63	470	N	470	N	NA	NA	No	BSL
7440-50-8	Copper	0.03		113		mg/kg	PAI-10-SD-14-01	10/18	1.3 - 2.7	113	10.1	310	N	290	N	NA	NA	No	BSL
7439-89-6	Iron	1420		43100		mg/kg	PAI-10-SD-08-01	18/18	NA	43100	21450	2300	N	2300	N	NA	NA	Yes	ASL
7439-92-1	Lead	3.1		203		mg/kg	PAI-10-SD-14-01	18/18	NA	203	20.6	400[8]		400	N	NA	NA	No	BSL
7439-95-4	Magnesium	1130		15100		mg/kg	PAI-10-SD-08-01	18/18	NA	15100	6437	NA		NA		NA	NA	No	NUT

TABLE E6.3

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

DIRECT CONTACT WITH SEDIMENT

SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA

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	Screening (3) Toxicity Value		US EPA Region IX PRGs		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
7439-96-5	Manganese	13.3		210		mg/kg	PAI-10-SD-08-01	17/18	9.2	210	186	160	N	176	N	NA	NA	Yes	ASL
7439-97-6	Mercury	0.06		0.35		mg/kg	PAI-10-SD-14-01	7/18	0.02 - 0.28	0.35	0.090	2.3[9]	N	2.3	N	NA	NA	No	BSL
7440-02-0	Nickel	1.3		1060		mg/kg	PAI-10-SD-14-02	18/18	NA	1060	5.95	160	N	160	N	NA	NA	Yes	ASL
7440-09-7	Potassium	684		9090		mg/kg	PAI-10-SD-08-01	18/18	NA	9090	3190	NA		NA		NA	NA	No	NUT
7782-49-2	Selenium	0.1		10.7		mg/kg	PAI-10-SD-20-01	3/18	0.1 - 2.5	10.7	NA	39	N	39	N	NA	NA	No	BSL, BKG
7440-23-5	Sodium	3920		60800		mg/kg	PAI-10-SD-08-01	18/18	NA	60800	19110	NA		NA		NA	NA	No	NUT
7440-28-0	Thallium	0.36		0.36		mg/kg	PAI-10-SD-14-02	1/18	0.21 - 13.1	0.36	0.405	0.55	N	0.5	N	NA	NA	No	BSL, BKG
7440-62-2	Vanadium	4.9		112		mg/kg	PAI-10-SD-08-01	18/18	NA	112	49.6	55	N	55	N	NA	NA	Yes	ASL
7440-66-6	Zinc	8.5		197		mg/kg	PAI-10-SD-14-01	12/18	4.7 - 9.9	197	45.0	2300	N	2300	N	NA	NA	No	BSL

Notes:

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

(3) USEPA Region III Risk-Based Concentration Table, October 27, 1999. (Cancer benchmark value = 1E-06, HI = 0.1)

(4) Rationale Codes Selection Reason: Above Screening Levels (ASL)

Deletion Reason: Background Levels (BKG)

No Toxicity Information (NTX)

Essential Nutrient (NUT)

Below Screening Level (BSL)

(5) Value is for naphthalene.

(6) Value for chlordane

(7) Value for trivalent chromium, hexavalent chromium was not detected in sediment.

(8) OSWER screening level.

(9) Value for mercuric chloride.

Shading indicates that the criteria was exceeded.

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 E6-9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

DIRECT CONTACT WITH GROUNDWATER

SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA

MCRD PARRIS ISLAND, SOUTH CAROLINA

CAS Number	Chemical	Minimum Concentration (1)	Minimum Qualifier	Maximum Concentration (1)	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (2)	Screening Toxicity Value (3)		US EPA Region IX PRGs		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for Contaminant Deletion or Selection (4)
	Volatile Organic Compounds																		
67-64-1	Acetone	9.3	J	650	J	ug/L	PAI-10-GW-08-01	4/10	5 - 50	650	NA	61	N	61	N	NA	NA	Yes	ASL
75-15-0	Carbon disulfide	0.2	J	24		ug/L	PAI-10-GW-10-01	7/14	1 - 10	24	NA	100	N	104	N	NA	NA	No	BSL
67-66-3	Chloroform	0.4	J	4.5		ug/L	PAI-10-GW-04-01	4/14	1 - 10	4.5	NA	0.15	C	0.165	C	80	MCL	Yes	ASL
74-87-3	Chloromethane	0.2	J	0.3	J	ug/L	PAI-10-GW-10-01	2/14	1 - 10	0.3	NA	2.1	C	2	C	NA	NA	No	BSL
108-88-3	Toluene	0.2	J	0.2	J	ug/L	PAI-10-GW-04-01	1/14	1 - 10	0.2	NA	75	N	72	N	1000	MCL	No	BSL
79-01-6	Trichloroethene	0.4	J	0.4	J	ug/L	PAI-10-GW-04-01	1/14	1 - 10	0.4	NA	1.6	C	2	C	5	MCL	No	BSL
	Semivolatile Organic Compounds																		
65-85-0	Benzoic Acid	1	J	1	J	ug/L	PAI-10-GW-01-01	1/12	25 - 26	1	NA	15000	N	14600	N	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	1	J	1	J	ug/L	PAI-10-GW-10-01	1/14	5	1	NA	370	N	365	N	NA	NA	No	BSL
	Inorganics (Unfiltered)																		
7429-90-5	Aluminum	532		5140		ug/L	PAI-10-GW-03-01	6/13	22 - 168	5140	NA	3700	N	3650	N	50 To 200	SMCL	Yes	ASL
7440-38-2	Arsenic	1.075		35.4		ug/L	PAI-10-GW-02-01	13/14	0.9	35.4	NA	0.045	C	0.045	C	50	MCL	Yes	ASL
7440-39-3	Barium	36.4		216		ug/L	PAI-10-GW-12-01	14/14	NA	216	NA	260	N	260	N	2000	MCL	No	BSL
7440-43-9	Cadmium	1.9		8.1		ug/L	PAI-10-GW-12-01	7/14	2 - 200	8.1	NA	1.8	N	1.8	N	5	MCL	Yes	ASL
	Calcium	21800		501000		ug/L	PAI-10-GW-10-01	13/13	NA	501000	NA	NA		NA		NA	NA	No	NUT
7440-47-3	Chromium	8.1		23.2		ug/L	PAI-10-GW-10-01	6/14	6.4 - 32	23.2	NA	5500 (5)	N	5500	N	100 (6)	MCL	No	BSL
7440-48-4	Cobalt	3.9		11.7		ug/L	PAI-10-GW-08-01, PAI-10-GW-06-01	3/14	3.3	11.7	NA	220	N	219	N	NA	NA	No	BSL
7440-50-8	Copper	2.7		8.1		ug/L	PAI-10-GW-06-01	2/14	2.6	8.1	NA	150	N	136	N	1000	SMCL	No	BSL
7439-89-6	Iron	4150		122000		ug/L	PAI-10-GW-05-01	13/13	NA	122000	NA	1100	N	1100	N	300	SMCL	Yes	ASL
7439-96-5	Magnesium	18600		1100000		ug/L	PAI-10-GW-14-01	13/13	NA	1100000	NA	NA		NA		NA	NA	No	NUT
7439-96-5	Manganese	44.7		1530		ug/L	PAI-10-GW-06-01	13/13	NA	1530	NA	73	N	88	N	50	SMCL	Yes	ASL
7440-02-0	Nickel	5.3		10.5		ug/L	PAI-10-GW-08-01	3/14	4.4	10.5	NA	73	N	73	N	100	MCL	No	BSL
	Potassium	4370		371000		ug/L	PAI-10-GW-13-01	13/13	NA	371000	NA	NA		NA		NA	NA	No	NUT
7782-49-2	Selenium	7.1	J	7.1	J	ug/L	PAI-10-GW-09-01	1/14	0.7 - 17.5	7.1	NA	18	N	18	N	50	MCL	No	BSL
	Sodium	146000		8670000		ug/L	PAI-10-GW-13-01	13/13	NA	8670000	NA	NA		NA		NA	NA	No	NUT
7440-28-0	Thallium	10		10		ug/L	PAI-10-GW-06-01	1/14	9 - 18	10	NA	0.26	N	0.3	N	2	MCL	Yes	ASL
7440-62-2	Vanadium	3.7		14.2		ug/L	PAI-10-GW-09-01	12/14	2.6	14.2	NA	26	N	26	N	NA	NA	No	BSL
7440-66-6	Zinc	7.5		82.8		ug/L	PAI-10-GW-06-01	5/14	7.9 - 19.5	82.8	NA	1100	N	1100	N	5000	SMCL	No	BSL
	Inorganics (Filtered)																		
7429-90-5	Aluminum	299		391		ug/L	PAI-10-GW-06-01-F	2/13	22 - 113	391	NA	3700	N	3650	N	50 To 200	SMCL	No	BSL
7440-38-2	Arsenic	0.775		35.9		ug/L	PAI-10-GW-02-01-F	14/14	NA	35.9	NA	0.045	C	0.045	C	50	MCL	Yes	ASL
7440-39-3	Barium	55.3		366		ug/L	PAI-10-GW-14-01-F	14/14	NA	366	NA	260	N	260	N	2000	MCL	Yes	ASL
7440-43-9	Cadmium	3		9.2		ug/L	PAI-10-GW-12-01-F	4/14	2	9.2	NA	1.8	N	1.8	N	5	MCL	Yes	ASL
7440-70-2	Calcium	22650		520000		ug/L	PAI-10-GW-10-01-F	13/13	NA	520000	NA	NA		NA		NA	NA	No	NUT
7440-47-3	Chromium	4.95		17.3		ug/L	PAI-10-GW-10-01-F	6/14	6.4 - 64	17.3	NA	11(5)	N	5500	N	100 (6)	MCL	Yes	ASL
7440-48-4	Cobalt	13.7		15.5		ug/L	PAI-10-GW-08-01-F	2/14	3.3	15.5	NA	220	N	219	N	NA	NA	No	BSL
7440-50-8	Copper	2.8		2.8		ug/L	PAI-10-GW-06-01-F	1/14	2.6	2.8	NA	150	N	136	N	1000	SMCL	No	BSL

TABLE E6.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

DIRECT CONTACT WITH GROUNDWATER

SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA

MCRD PARRIS ISLAND, SOUTH CAROLINA

CAS Number	Chemical	(1) Minimum Concentration	Minimum Qualifier	(1) Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	(2) Background Value	(3) Screening Toxicity Value		US EPA Region IX PRGs		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	(4) Rationale for Contaminant Deletion or Selection
7439-89-6	Iron	2700		124000		ug/L	PAI-10-GW-05-01-F	13/13	NA	124000	NA	1100	N	1100	N	300	SMCL	Yes	ASL
7439-96-5	Magnesium	18850		1100000		ug/L	PAI-10-GW-14-01-F	13/13	NA	1100000	NA	NA		NA		NA	NA	No	NUT
7439-96-5	Manganese	44.4		1530		ug/L	PAI-10-GW-06-01-F	13/13	NA	1530	NA	73	N	88	N	50	SMCL	Yes	ASL
7440-02-0	Nickel	4.04		9.8		ug/L	PAI-10-GW-08-01-F	3/14	4.4	9.8	NA	73	N	73	N	100	MCL	No	BSL
7440-09-7	Potassium	4360		371000		ug/L	PAI-10-GW-13-01-F	13/13	NA	371000	NA	NA		NA		NA	NA	No	NUT
7440-23-5	Sodium	146000		8640000		ug/L	PAI-10-GW-14-01-F	13/13	NA	8640000	NA	NA		NA		NA	NA	No	NUT
7782-49-2	Selenium	25.8		25.8		ug/L	PAI-10-GW-12-01-F	1/14	0.7 - 17.5	25.8	NA	18	N	18	N	50	MCL	Yes	ASL
7440-62-2	Vanadium	2.7		11.7		ug/L	PAI-10-GW-14-01-F	12/14	2.6	11.7	NA	26	N	26	N	NA	NA	No	BSL
7440-66-6	Zinc	5.9		81.6		ug/L	PAI-10-GW-06-01-F	7/14	5.3 - 20.2	81.6	NA	1100	N	1100	N	5000	SMCL	No	BSL

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Notes

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.
Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

(3) USEPA Region III Risk-Based Concentration Table, October 27, 1999. (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 for trivalent chromium, hexavalent chromium was not detected in groundwater.

(6) Value for total chromium

Shading indicates that the criteria was exceeded.

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

APPENDIX F

ECOLOGICAL RISK ASSESSMENT SUPPORTING INFORMATION

F-1 BAFs, BCFs, AND BSAFs

F-2 TOXICITY PROFILES FOR COPCs

F-3 FOOD-CHAIN MODELING CALCULAITONS

F-4 REFERENCES

F-5 COPC REFINEMENT

F-1

BAFs, BCFs, and BSAFs

TABLE F-1
BIOACCUMULATION FACTORS
SITE 12- JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Chemical	Bioaccumulation Factor[a]					
	Terrestrial Invertebrate	Invertebrate Source	Terrestrial Plant	Plant Source	Mammal	Mammal Source
Semivolatile Organic Compounds						
2-Methylnaphthalene	0.1047[b]	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Acenaphthylene	0.1047[b]	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Benzo(a)anthracene	0.025	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Benzo(a)pyrene	0.0684	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Benzo(b)fluoranthene	0.0638	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Benzo(k)fluoranthene	0.0507	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Bis(2-Ethylhexyl)phthalate	NA	NA	0.033[c]	Travis & Arms, 1988	0.15[d]	Travis & Arms, 1988
Chrysene	0.035	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Fluoranthene	0.0158	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Fluorene	0.1047[b]	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Naphthalene	0.1047[b]	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1989	0.3[d]	Travis & Arms, 1989
Pentachlorophenol	NA	NA	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Phenanthrene	0.0243	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Pyrene	0.0184	Beyer, 1990[e]	0.0067[c]	Travis & Arms, 1988	0.3[d]	Travis & Arms, 1988
Pesticides/PCBs (mg/kg)						
4,4'-DDE	1.7[f]	see footnote g	0.01	see footnote h	1.2	Forsyth & Peterle, 1984
Metals and Inorganic Compounds						
Aluminum	0.053	Sample et al., 1998	0.0008	Baes et al., 1984	0.075	Baes et al., 1984
Antimony	NA	NA	0.04	Baes et al., 1984	0.05	Baes et al., 1984
Arsenic	0.224	Sample et al., 1998	0.0375	ORNL, 1998	0.1	Eisler, 1988
Cadmium	7.708	Sample et al., 1998	0.586	ORNL, 1998	2.1	Baes et al., 1984
Chromium	0.16	Diercxsens et al., 1985	0.0015	Baes et al., 1984	0.28	Baes et al., 1984
Copper	0.515	Sample et al., 1998	0.124	ORNL, 1998	0.6	Levine et al., 1989
Iron	0.038	Sample et al., 1998	NA	NA	NA	NA
Lead	0.266	Sample et al., 1998	0.0389	ORNL, 1998	0.015	Baes et al., 1984
Manganese	0.054	Sample et al., 1998	0.05	Baes et al., 1984	0.02	Baes et al., 1984

TABLE F-1
BIOACCUMULATION FACTORS
SITE 12- JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mercury	1.693	Sample et al., 1998	0.652	ORNL, 1998	0.01	USEPA, 1985
Vanadium	0.039	Sample et al., 1998	0.0011	Baes et al., 1984	0.13	Baes et al., 1984
Zinc	3.201	Sample et al., 1998	0.366	ORNL, 1998	2.1	Baes et al., 1984

NA BAF, BCF, or BSAF not available

a Bioaccumulation factors (BAFs) consist of concentrations in tissue/concentrations in soil for invertebrates and plants, and concentrations in tissue/concentrations in food for mammals.

b Average of earthworm BAFs for PAH compounds (Beyer, 1990) converted from dry weight to wet weight assuming earthworm is 80% water.

c log (Plant Uptake Factor) = 1.588-0.578 (log Kow). Converted from dry weight to wet weight plant concentration assuming 80% water content.

d Calculated using the following equation from Travis and Arms (1988) for semivolatile organic analytes with Kows>5: Log BTF (biotransfer factor) = log Kow - 7.6; results multiplied by average ingestion rates for non-lactating and lactating test animals to convert from BTFs and divided by a factor of 0.2 to convert from dry feed to fresh feed.With the exception of pesticides and PCBs, BAFs for anaylsis with long Kows<5 are assumed to be 0.15 because they are unlikely to bioaccumulate in animal tissue (Maughan, 1993).

e Earthworm BAF converted from dry weight to wet weight assuming earthworm is 80% water.

f Dry soil concentrations calculated assuming 10% moisture content in sandy-loam soils (Donahue et al., 1977)

g Geometric mean of 4,4`-DDE (Davis, 1968; Davis and Harrison, 1966; Cramp and Olney, 1967; Collett and Harrison, 1968; Hunt and Sacho, 1969; Gish, 1970.

h Geometric mean of 4,4`-DDT, 4,4`-DDD, and 4,4`-DDE BAFs (fresh wt/dry wt) reported for roots (carrot, potato, sugar beet), grains (corn, oats), an legumes (alfalfa) derived from USEPA (1985b) converted from dry weight to wet weight per values provided by Suter (1993).

TABLE F-2
BIOCONCENTRATION FACTORS AND BIOTA SEDIMENT ACCUMULATION FACTORS
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROILNA
PAGE 1 OF2

COPC	Bioconcentration Factor	BCF Source	BSAF	BSAF Source
Semivolatile Organic Compounds				
2-Methylnphthalene	NA	NA	NA	NA
Acenaphthene	242	USEPA, 1997	0.29	Hansen, 1995
Acenaphthylene	30	USEPA, 1997	0.0111	ERED, 1998
Benzo(a)anthracene	30	USEPA, 1997	0.29	Hansen, 1995
Benzo(a)pyrene	30	USEPA, 1997	0.29	Hansen, 1995
Benzo(b)fluoranthene	30	USEPA, 1997	0.29	Hansen, 1995
Benzo(k)fluoranthene	30	USEPA, 1997	0.29	Hansen, 1995
Benzoic acid	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	130	USEPA, 1997	NA	NA
Chrysene	30	USEPA, 1997	0.29	Hansen, 1995
Di-*n*-octyl phthalate	NA	NA	NA	NA
Fluoranthene	1150	USEPA, 1997	0.29	Hansen, 1995
Fluorene	30	USEPA, 1997	0.29	Hansen, 1995
Indeno(1,2,3-cd)pyrene	30	USEPA, 1997	0.29	Hansen, 1995
Naphthalene	10.5	USEPA, 1997	0.29	Hansen, 1995
Pentachlorophenol	NA	NA	NA	NA
Phenanthrene	30	USEPA, 1997	0.6493	ERED, 1998
Pyrene	30	USEPA, 1997	0.29	Hansen, 1995
Pesticides/PCBs				
4,4'-DDE	53600	USEPA, 1997	7.7	Cook, 1995
4,4'-DDT	53600	USEPA, 1997	1.67	Cook, 1995
Aroclor-1254	31200	USEPA, 1997	1.85	Cook, 1995
alpha-BHC	130	USEPA, 1997	1.8	Hansen, 1995
Alpha-Chlordane	14100[a]	USEPA, 1997	4.77	Cook, 1995
Gamma-Chlordane	14100[a]	USEPA, 1997	2.22	Cook, 1995
Dieldrin	4670	USEPA, 1997	1.8	Hansen, 1995
Endrin	3970	USEPA, 1997	1.8	Hansen, 1995

TABLE F-2
BIOCONCENTRATION FACTORS AND BIOTA SEDIMENT ACCUMULATION FACTORS
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROILNA
PAGE 2 OF2

COPC	Bioconcentration Factor	BCF Source	BSAF	BSAF Source
Methoxyclor	NA	NA	NA	NA
Metals and Inorganic Compounds				
Aluminum	95	AQUIRE, 1994	NA	NA
Antimony	NA	NA	NA	NA
Arsenic	44	USEPA, 1997	NA	NA
Barium	4	Barnthouse et al., 1988	NA	NA
Beryllium	19	USEPA, 1997	NA	NA
Cadmium	64	USEPA, 1997	NA	NA
Chromium	NA	NA	NA	NA
Cobalt	50	Jorgensen et al., 1991	NA	NA
Copper	36	USEPA, 1997	NA	NA
Iron	450	Jorgensen et al., 1991	NA	NA
Lead	49	USEPA, 1997	NA	NA
Manganese	373	Jorgensen et al., 1991	NA	NA
Mercury	3760	USEPA, 1997	1.2 (fish)	Walter et al., 1973
			2.0 (benthic organisms)	Evans and Engle, 1994
Nickel	NA	NA	NA	NA
Selenium	NA	NA	NA	NA
Silver	0.5	USEPA, 1997	NA	NA
Thallium	119	USEPA, 1997	NA	NA
Vanadium	0.01	Barnthouse et al., 1988	NA	NA
Zinc	47	USEPA, 1997	NA	NA

NA = not avalable (carbazole); not applicable (metals)
ERED = Environmental Residue Effects Database
a = Total chlordane
Note: BSAFs not available for metals

h-4

F-2

TOXICITY PROFILES FOR COPCs

2-Butanone

2-Butanone, also known as methylethylketone, is used as a solvent, paint stripper, cleaning fluid, and in cements and adhesives. It has a sweet sharp odor and has 100 percent recognition at 6.0 ppm. The single oral lethal dose in rats was reported by Verschueren (1983) to be 3.3 g/kg.

When releases occur to soil, 2-butanone does not adsorb to the soil but will leach to the groundwater (ATSDR, 1992). In the aquatic environment, the compound will evaporate to the atmosphere and biodegrade (Spectrum, 1999f). Sediment adsorption does not occur and bioconcentration in aquatic organisms is also not expected (ATSDR, 1992).

Toxicity reference values are unavailable for both birds and mammals.

2-Hexanone

2-Hexanone is used as a solvent for lacquers, ink thinners, nitrocellulose, resins, oils, fats and waxes. An important pathway for release of 2-hexanone is volatilization to the atmosphere, from both water and soil. In the atmosphere, reaction with photochemically produced hydroxyl radicals should be the most rapid method of degradation (half-life approximately 2 days). The relatively high water solubility of 2-hexanone suggests that rain washout may be an important fate process. It is expected to be highly mobile in the soil, and it is capable of undergoing rapid biodegradation (National Library of Medicine, 1996).

The toxicological data base for oral ingestion of 2-hexanone is small, and no chronic data seem to be available. LD50 values for single administrations to both rats and mice have been reported at about 2,500 mg/kg of body weight. A low LD value has been reported for the guinea pig at about 900 mg/kg (NIOSH, 1996).

Toxicity reference values for birds and mammals were unavailable.

4-Methyl-2-Pentanone

Methyl isobutyl ketone (MIBK) is another name for the compound that is used as a solvent for paint, varnishes, and nitrocellulose lacquers. It is also used in industry in organic synthesis, extraction procedures, and dewaxing of mineral oils (Spectrum, 1999d).

The compound is released into the environment by effluent and emissions from manufacturing and use facilities, vehicle exhaust, and land disposal and ocean dumping of consumer products and industrial wastes contain the compound. If MIBK is released to the soil, it may be removed by volatilization, photolysis if on the surface, or aerobic biodegradation. However, leaching can occur to the groundwater. The primary mechanism for removal from water is volatilization and direct photolysis. Bioaccumulation in aquatic organisms and adsorption to sediments is unlikely to occur (Spectrum, 1999d).

Toxicity reference values for birds and mammals were unavailable.

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 posses 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). The LOAEL for birds is 1097 mg/kg/day, while 19.3 mg/kg/day is the LOAEL for mammals (Sample et al., 1996).

Antimony

Antimony is used in metal alloys for producing fireproofing chemicals, ceramics, glassware, and pigments. Along with its industrial uses, it is used to medicinally treat people infected with parasites (ATSDR, 1995). Antimony is absorbed slowly from the gastrointestinal tract and many antimony compounds are gastrointestinal irritants (Klaassen, 1996).

It is considered a nonessential metal and is easily taken up by plants if present in a soluble form (Kabata-Pendias and Pendias, 1992). Plants growing in soils contaminated by industrial emissions may be expected to contain elevated tissue concentrations of this metal. However, there are no reports of plant toxicity resulting from uptake of antimony (Kabata-Pendias and Pendias, 1992).

Industrial emissions make this metal a common air pollutant. When acute exposure occurs, the effects include rhinitis, and acute pulmonary edema. After chronic exposure, the effects include rhinitis, pharyngitis, tracheitis, bronchitis, pneumoconiosis with obstructive lung disease, and emphysema (Klaassen, 1996).

When rats were orally fed antimony, it did not produce an excess of tumors. However, when Syrian hamster embryo cells were treated with antimony acetate, the cells under went neoplastic transformation (Klaassen, 1996). Antimony has been shown to produce liver damage in rabbits at 5.5 mg/kg in diet (NRC, 1980).

The NOAEL and LOAEL for mammals are 0.125 mg/kg/day and 1.25 mg/kg/day, respectively (Sample et al., 1996). Toxicity reference values for birds are unavailable.

Arsenic

Arsenic is a naturally occurring element in the earth's crust. Pure arsenic is a gray-colored metal, but this form is not common in the environment. Arsenic is usually found combined with one or more other elements such as oxygen, chlorine, and sulfur. Arsenic combined with these elements is referred to as inorganic arsenic. Arsenic combined with carbon and hydrogen is referred to as organic arsenic (ATSDR, 1989b).

Arsenic enters the environment both as the result of natural forces (volcanoes and weathering of arsenic-containing rocks) and human activity (metal smelting, glass manufacturing, pesticide production and application, and fossil fuel burning) (ATSDR, 1989b).

Arsenic in the environment may undergo a complex cycle of chemical interconversions and transfers between media. Atmospheric emissions, which are usually adsorbed to particulate matter, may undergo oxidation before being returned to the surface by wet or dry deposition. Arsenic in water may undergo either reduction or oxidation, depending on pH, the electrochemical oxidation-reduction potential (Eh), and other ions present. Soluble forms of arsenic tend to be quite mobile in water, while less soluble species adsorb to clay or soil particles (ATSDR, 1989b).

The NOAEL for birds, fish, and mammals is 5.14 mg/kg/day, 0.59 mg/kg/day, and 0.126 mg/kg/day, respectively (Sample et al., 1996; ERT, 1997). The LOAEL is 12.84 mg/kg/day for birds, 7.1 mg/kg/day for fish, and 1.26 mg/kg/day for mammals (Sample et al., 1996; ERT, 1997).

Barium

Barium is the heaviest of the stable alkaline earths (Group IIa of the Periodic Table). The free element is a silver-grey soft metal. It oxidizes readily in moist air, and it reacts with water or with dilute acids under evolution of hydrogen gas (Friberg, 1986).

In its compounds, barium is a colorless divalent positive ion. The chloride and nitrate are soluble in water. The carbonate is much less soluble in water, but is soluble in dilute acids, and the sulfate is one of the least soluble compounds in any medium (Friberg, 1986).

Barium is used in various alloys, in paints, soap, paper, and rubber, and in the manufacture of ceramics and glass. Barium fluorosilicate and carbonate have been used as insecticides. Barium is relatively abundant in nature and is found in plant and animal tissue. Plants accumulate barium from the soil (Klaassen et al., 1986).

The toxicity of barium compounds depends on their solubility. The free ion is readily absorbed from the lung or gastrointestinal tract, but barium sulfate remains essentially unabsorbed. After absorption, barium accumulates in the skeleton. An accumulation also takes place in the pigmented parts of the eye (Friberg, 1986).

Barium occurs chiefly as the mineral barite ($BaSO_4$). In recent years, about 80% of ground and crushed barite solid was used directly as a weighting agent in oil- and gas-well drilling muds. The remainder of barite is used in the manufacture of glass, ceramics, television picture tubes, brick and tile refractories, vinyl stabilizers, railroad flares, fireworks, fine chemicals, lubricating oil additives, permanent magnets, as well as in sugar refining, paper coating, steel hardening, and as pigment in paint (Friberg, 1986).

The NOAEL for birds and mammals is 20.8 mg/kg/day and 5.1 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 41.7 mg/kg/day for birds and 51 mg/kg/day for mammals (Sample et al., 1996).

Benzene hexachloride (BHC)

Benzene hexachloride, also known as hexachlorocyclohexane (HCH) or lindane, is an organochlorine insecticide consisting of eight stereo isomers, of which four (alpha, beta, gamma, and delta) predominate in the technical product due to relatively strainless bonds. BHC isomers degrade to chlorophenols at different rates in order of their solubilities in fat (delta > gamma > alpha > beta) (Deo et al., 1982). The gamma isomer is the only isomer that is highly insecticidal (Deo et al., 1982), and constitutes at least 99 percent of lindane (Manahan, 1992). Signs of toxicity are very similar to those of DDT, and include tremors, ataxia, and convulsions (Murphy, 1986).

Newell et al. (1987) selected 0.1 mg/kg total BHC as a non-carcinogenic based wildlife criterion, and 0.51 mg/kg total BHC as a 1 in 100 cancer risk level for piscivorous wildlife.

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).

Cadmium

To date, no evidence exists to suggest that cadmium is either biologically essential or beneficial (Venugopal and Luckey, 1978; USFWS, 1985). Freshwater biota are particularly sensitive to this heavy metal; concentrations as low as 0.8 to 9.9 µg/L produce lethality among insects, crustaceans, and fish (USFWS, 1985; EPA, 1985b). This heavy metal does not bioconcentrate to an appreciable extent; bioconcentration data listed in EPA (1985a) for freshwater species range from 3 (brook trout) to 4190 (caddisfly; *Hydropsyche betteni*) with a geometric mean value of 404.

Elemental cadmium is insoluble in water, although its chloride and sulfate salts are freely soluble (USFWS, 1985). The availability of cadmium to aquatic biota from their immediate physical and chemical environs depends on numerous factors, including adsorption and desorption rates of cadmium from terrigenous materials, pH, Eh, chemical speciation, and many other modifiers. Adsorption and desorption processes are likely to be major factors in controlling the concentration of cadmium in natural waters and tend to counteract changes in the concentration of cadmium ions in solution (USFWS, 1985). Water hardness also alters the bioavailability of cadmium. Adsorption and desorption rates of cadmium are rapid on mud solids and particles of clay, silica, humic material, and other naturally occurring solids. It should be borne in mind that mobility and availability of cadmium, like most heavy metals, is a function of a large number of interrelated factors (e.g., CEC). Beyer et al. (1985) demonstrated that only a small portion of all metals measured in the soil become incorporated into plant foliage and suggested that most of the metal contamination detected in biota came from aerial deposition.

Compared to aquatic biota, mammals and birds are relatively less sensitive to cadmium exposure. Adult mallards fed a diet containing up to 200 mg Cd/kg survived and exhibited no loss in body weight, although egg production of laying hens was suppressed (White and Finely, 1978). The lowest oral doses producing lethality among mammals were 250 and 150 mg/kg body weight in rats and guinea pigs, respectively (EPA, 1985b).

The NOAELs for birds and mammals are 1.45 mg/kg/day and 1.0 mg/kg/day, respectively (Sample et al, 1996). The LOAELs for birds and mammals are 20 mg/kg/day and 10 mg/kg/day, respectively (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.

Chlordane

Pure chlordane is a mixture composed of primarily cis-chlordane and trans-chlordane. It is a white crystalline solid with a mild, pungent odor. Chlordane is an insecticide that was used from 1948 to 1988 on food crops (specifically corn) and to control household termites. Consequently, it was intentionally applied to soils both in agricultural and urban settings. Due to its persistence indoors, its use as a termicide was stopped (ATSDR, 1990f).

Chlordane is expected to persist for more than 20 years in some soils. Volatilization appears to be the only major removal mechanism from soil. Leaching to groundwater from soil is not a likely removal mechanism. Adsorption to sediments and volatilization are significant removal mechanisms in water. In air, chlordane will degrade by photolysis and hydroxyl radical reaction. Rainout and dry deposition are not expected to be significant removal mechanisms (ATSDR, 1990f).

Chlordane will bioconcentrate in both marine and freshwater species, as well as in bacteria (ATSDR, 1990f).

The NOAEL for birds and mammals is 2.14 mg/kg/day and 4.6 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 10.7 mg/kg/day for birds and 9.2 mg/kg/day for mammals (Sample et al., 1996).

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).

The NOAEL and LOAEL for mammals are 15 mg/kg/day and 41 mg/kg/day, respectively (Sample et al., 1996). Toxicity reference values for birds were unavailable.

Chloromethane

This chemical is a clear, colorless gas that is both naturally and industrially produced (ATSDR, 1990e). Large amounts of chloromethane are produced by the oceans along with some plants, rotting wood, and when grass, wood, and charcoal burn (ATSDR, 1990e). In industry, the compound is used mainly in the production of silicones, agricultural chemicals, and butyl rubber (ATSDR, 1990e).

When environmental releases occur, chloromethane will be mainly released to air where it will diffuse into the troposphere and later react with hydroxyl radicals in the stratosphere (ATSDR, 1990e; Spectrum, 1999c). In water, the chemical will volatilize rapidly (ATSDR, 1990e). Chloromethane released into the soil can be from landfilling industrial waste and municipal sewage treatment and is mostly transported by volatilization if present near the surface (ATSDR, 1990e). However, the volatilization rate is influenced by the following factors: surface roughness, soil type, rainfall, leaching, depth of incorporation, temperature, and ground cover (ATSDR, 1990e). At lower soil depths, chloromethane is expected to either diffuse to the surface or leach further into the soil since evidence of groundwater contamination has been found (ATSDR, 1990e).

Animals that have breathed high levels of chloromethane during a few hours a day for one or more days have developed harmful liver, kidney, and nervous system effects; some animals also died from exposure (ATSDR, 1990e). If animals were exposed to lower levels for longer periods of time, the same effects also developed (ATSDR, 1990e).

Toxicity reference values were unavailable for birds and mammals.

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, 1985a). 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, 1985a).

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, 1985a).

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).

DDT, DDE and DDD

Historically, DDT was released to the environment during its formulation and extensive use as a pesticide in agricultural and vector control applications. Its primary metabolites are DDE and DDD. Although DDT was banned for use in this country in 1972, it is still being used in several areas in the world, particularly tropical countries. DDT and its primary metabolites do not occur naturally in the environment. However, due to its extensive past use of DDT worldwide and the persistence of DDT and is metabolites, these compounds are virtually ubiquitous and are continually being transformed and redistributed in the environment. DDT and its metabolites have been detected in virtually all media (ATSDR, 1990c).

DDT and its metabolites may be transported among media by the processes of solubilization, adsorption, bioaccumulation or volatilization. DDT, DDE and DDD in the atmosphere are subject to photodegradation or redeposition by rain or dry deposition (ATSDR, 1990c).

DDT and its environmental degradation products preferentially bind to soil and sediment , where they may be subject to photodegradation on the surface and biodegradation in the subsurface. Under certain conditions, DDT may persist for long periods of time or may be converted to DDE, which persists for an even longer duration. Consequently, these compounds are not easily displaced from their site of application, whether by runoff or leaching to groundwater. However, volatilization of DDT and DDE from soil accounts for considerable losses of these compounds. The tendency of DDD to volatilize is approximately one-third that of DDT or DDE (ATSDR, 1990c).

When DDT is released to water, it quickly absorbs to particles and is subject to sedimentation, volatilization, photodegradation and uptake into the food chain. Similar to soil, volatilization accounts for loss of these compounds from water. One study found that DDE volatilizes from seawater 10 to 20 times faster than from freshwater (ATSDR, 1990c).

DDT, DDE and DDD are highly lipid soluble. This lipophilic property, combined with an extremely long half-life, results in bioaccumulation. When present in ambient water, DDT and its metabolites are concentrated in freshwater and marine plankton, insects, mollusks, and other invertebrates and fish. As these organisms become part of the food chain, a progressive accumulation of residues may result in high levels of residues in organisms at the top of the food chain (ATSDR, 1990c).

For mammals, the toxicity reference value depended on the metabolite. 4,4'-DDD and 4,4'-DDT have a NOAEL value of 0.8 mg/kg/day and a LOAEL value of 4 mg/kg/day (Sample et al., 1996). 4,4'-DDE NOAEL and LOAEL values are 20 mg/kg/day and 41.5 mg/kg/day, respectively (ATSDR, 1988a). For all three chemicals, the NOAEL is 0.0028 mg/kg/day and the LOAEL is 0.028 mg/kg/day for birds (Sample et al., 1996).

Endrin

Endrin is a solid, white, odorless substance. Endrin has not been produced in the U.S. since 1986 (ATSDR, 1994). No natural sources of endrin are known. Endrin in the environment is the result of its use as an insecticide, avicide, and rodenticide. It has been used on agricultural crops, cotton crops, as control of birds on buildings, and mice in orchards (Howard, 1993).

Endrin released to soils will persist for long periods (up to 14 years or more). Endrin strongly adsorbs to soil and becomes relatively immobile. However, leaching into groundwater does occur

under specific conditions. Runoff from rain will carry endrin into water systems. Endrin may biodegrade in flooded soils or under anaerobic conditions (Howard, 1993).

Endrin in water will not hydrolyze or biodegrade. Endrin is not very soluble in water. It will undergo photoisomerization into ketoendrin. Endrin will extensively sorb to sediment and will significantly bioconcentrate. Extensive bioconcentration of endrin has been reported in fish (Howard, 1993).

Endrin released into the atmosphere, it is expected to be associated with particulate matter, but small amounts may exist in the vapor phase (Howard, 1993).

Since toxicity reference values could not be found for endrin ketone, values for endrin were used as a surrogate. The NOAEL and LOAEL are 0.092 mg/kg/day and 0.92 mg/kg/day, respectively, for mammals. For birds, the NOAEL is 0.01 mg/kg/day, while the LOAEL is 0.1 mg/kg/day (Sample et al., 1996).

Iron

Iron is a silvery white, malleable metal. It is the fourth most abundant (by weight) of the elements that compose the earth's crust and is a major constituent of clay soils (EPA, 1990).

Iron in water may be present in varying quantities dependent upon the geology of the area and other chemical components of the water body (EPA, 1990; EPA, 1985a). 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, 1985a).

Iron released into soil has relatively low mobility potential. However, iron can be transported through the atmosphere (EPA, 1985a).

The NOAEL for birds and mammals is 100 mg/kg/day and 50 mg/kg/day, respectively (ERT, 1996). The LOAEL for birds and mammals is 1000 mg/kg/day and 500 mg/kg/day, respectively (ERT, 1996).

Lead

Lead is ubiquitous and is a characteristic trace constituent in rocks, soils, water, plants, animals, and air. Lead is used in the manufacture of storage batteries, gasoline additives, pigments, alloys, and ammunition (Eisler, 1988).

Lead compounds are extremely persistent in water and soil. Natural lead compounds are not mobile in surface and groundwater because lead leached from ore is adsorbed by ferric hydroxide. Lead also readily combines with hydroxide, carbonate, and sulfate ions to form insoluble compounds. These compounds precipitate and settle in the bottom sediment. Lead is not volatile, therefore, volatilization is not an important transport process from the aquatic environment (EPA, 1985a).

In water, lead is most soluble and bioavailable under conditions of low pH, low organic content; low concentrations of suspended sediments; and low concentrations of the salts of calcium, cadmium, iron, manganese, and zinc. Lead tends to concentrate in the water surface microlayer

(the upper 0.3 mm of water), especially when surface organic matter is present in thin films. However, most lead entering natural waters will precipitate to the sediment bottom as carbonates or hydroxides. Migration and speciation of lead in water is influenced by the water flow rate, increased flow rate results in increased concentrations of particulate and labile lead and a decrease in bound forms. At low stream flow, lead is rapidly removed from the water column by sedimentation (Eisler, 1988).

Lead in sediment is mobilized and released when the pH decreases suddenly or ionic composition changes. Methylation of lead occurs in the sediments and is positively correlated to increasing temperature, reduced pH, and high microbial activities (Davis, 1994).

Sorption is a dominant effect on the distribution of lead in soil. Lead readily adsorbs to inorganic solids, organic material and hydrous iron and manganese oxides. Because of its affinity for other materials, and its solubility characteristics, the mobility of lead in soil is low (EPA, 1985a). Most lead is retained in soil and not transported via leaching or runoff to surface water (ATSDR, 1990a).

Plants do not readily take up lead. Therefore, its availability to terrestrial life forms also is limited (EPA, 1985a). However, excessive amounts of lead can cause growth inhabition, as well as reduced photosynthesis, mitosis, and water absorption (Eisler, 1988). Inorganic and organic lead compound disperse in the atmosphere as particulate matter. Lead is removed from the atmosphere by wet or dry deposition. Photolysis of atmospheric organic lead compounds occurs rapidly (EPA, 1985a). The average residence time of atmospheric lead is seven to thirty days (ATSDR, 1990a).

Lead does not appear to significantly bioaccumulate in most fish (ATSDR, 1990a). Microcosm studies indicate that lead is not biomagnified through the food chain (EPA, 1985a). Lead concentrations tended to decrease markedly with increasing trophic level in both detritus-based and grazing aquatic food chains. However, lead is toxic to all phyla of aquatic biota, though effects are modified significantly by various biological and abiotic conditions (Eisler, 1988).

Lead adversely impacts survival, growth, development, and metabolism of most terrestrial species. The organic forms of lead tend to be more toxic to wildlife than the inorganic lead compounds, but the inorganic forms are easily converted into organic lead forms by microorganisms (Davis, 1994).

The NOAEL for birds and mammals is 1.13 mg/kg/day and 8 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 11.3 mg/kg/day for birds and 80 mg/kg/day for mammals (Sample et al., 1996).

Manganese

Manganese is a brittle silvery metal that usually occurs as a complex with other metals such as iron. Manganese and its compounds are used in the making of steel alloys, dry-cell batteries, electrical coils, and other metallic fabrication applications. Other uses of manganese include as an oxidizing agent and as a food additive (Klaassen et al., 1986; Hawley, 1987).

Manganese can occur in soil, water, or air. Because it is an element, 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, 1985a).

The NOAEL for birds and mammals is 977 mg/kg/day and 88 mg/kg/day, respectively (Sample et al., 1996). The LOAEL for mammals is 284 mg/kg/day (Sample et al., 1996).

Mercury

Mercury is a silvery, heavy liquid with valences of +1 and +2. Mercury exists as insoluble elemental mercury, organic species, and inorganic species. Solubility depends upon the reduction-oxidation potential, and the pH of the environment (EPA, 1985a). Mercury is commonly used for amalgams, catalysts, electrical apparatuses, instruments such as thermometers and barometers, and neutron absorbers in nuclear power plants (Hawley, 1987).

Mercury released to the environment will remain there indefinitely. The form that mercury exists in (organic or inorganic) may change with time. Chemical speciation is probably the most important variable influencing the ecotoxicology of mercury (Eisler, 1987). Inorganic mercury can be methylated by microorganisms indigenous to soils, freshwater, and salt water. This process is mediated by various microbial populations under both aerobic and anaerobic conditions. Methyl mercury is the most hazardous mercury species due to its high stability, its lipid solubility, and its possession of ionic properties that create a high ability to penetrate membranes in living organisms. Methylmercury in surface waters is rapidly accumulated by aquatic organisms. The top-level predator species usually contain the highest concentrations of methyl mercury (Eisler, 1987).

Freshwater plants exhibit a wide range of sensitivity to mercury; however, the most sensitive aquatic plant is less sensitive than the most sensitive freshwater animal. Fish tend to be more resistant to mercury than mollusks and crustaceans.

Mercury released into soils or surface water will exist in the mercuric state (Hg^{++}) and mercurous (H^{+}) states as a number of complex ions with varying water solubilities. Mercuric mercury, present as complexes and chelates with ligands, is probably the most predominant form of mercury present in surface waters (ATSDR, 1989d).

Volatile forms of mercury present in surface water are expected to evaporate into the air; whereas, solid forms of mercury partition to particulates or are transported in the water column, depending on their solubility. The two most important transformation processes in the fate of mercury in surface waters are biotransformation and bioaccumulation. Photolysis of organomercurials also may occur in surface waters (ATSDR, 1989d).

Mercury released into soils may undergo the same chemical and biological transformations as mercury released into surface waters. Mercuric mercury usually forms complexes with chloride and hydroxide ions in soils, the specific compounds form are dependent on pH, salt content, and composition of the soil solution (ATSDR, 1989d).

Mercury released into the atmosphere will most likely undergo photolysis. Metallic mercury vapor may be oxidized to other forms in the removal of the compound from the atmosphere by precipitation. Mercury vapor can be transported long distances before wet and dry deposition processes return the element to the earth. The atmosphere is the smallest environmental reservoir of mercury (ATSDR, 1989d).

The NOAEL for birds, fish, and mammals is 0.0064 mg/kg/day, 0.008 mg/kg/day, and 0.015 mg/kg/day, respectively (Sample et al., 1996; ERT, 1997). The LOAEL is 0.064 mg/kg/day for birds, 0.94 mg/kg/day for fish, and 0.025 mg/kg/day for mammals (Sample et al., 1996; ERT, 1997).

Methoxychlor

Methoxychlor is used as an insecticide for home and garden applications, livestock, poultry, alfalfa, soy beans, forests, shrubs, deciduous fruits and nuts, and vegetables. Methoxychlor may potentially be released from the manufacturing, disposing, and handlingof the chemical.

In the terrestrial environment, methoxychlor will remain primarily in the surface layer of soil. Methoxychlor has not been demonstrated to leach into the soil. Biodegradation occurs under anaerobic conditions. The major degradation products of methoxychlor include dechlorinated methoxychlor, and mono- and dihydroxy-derivatives of methoxyclor and dechlorinated methoxychlor. Methoxychlor may undergo chemical hydrolysis in moist soils (Howard, 1991).

Methoxyclor released into water may be removed or transported by various mechanisms. Methoxychlor can adsorb to suspended soils and sediments or it may be taken up and bioaccumulated in some aquatic organisms. However, fish tend to rapidly metabolize methoxychlor. Photolysis of methoxychlor in water is slow; however, the process is accelerated by the presence of photosesitizers (such as humic acid) in natural waters (Howard, 1991).

Methoxychlor can biodegrade under anaerobic conditions (half-life less than 28 days) or aerobic conditions (half-life less than 100 days) in sediments (Howard, 1991).

Methoxychlor will bioaccumulate in aquatic organisms which do not metabolize methoxychlor at a significant rate. Fish generally metabolize methoxychlor rapidly. The bioconcentration factors (BCF) for methoxychlor in continuous flow systems have been measured to be 8,300 in fathead minnow (*Pimephales promelas*). 12,000 in mussel, 5,000 to 8,570 in snail (*Physa integra*) and 384 to 1,130 in stonefly (*Pteronarcys dorsata*). BCF values also have been calculated at 138 in Sheepsheasd minnow (Cyprinodon variegatus), 1,500 in soft clams (Mya avenaria), 5,200 in fungi, and 8,400 in alga.

In the atmosphere, methoxychlor may exist as either vapor or particulated form. Methoxychlor may undergo reactions with photochemically generated hydroxyl radicals (estimated vapor phase half-life is 3.7 hours) or be physically removed by settling out or washing precipitation.

For mammals, the NOAEL is 4 mg/kg/day, while the LOAEL is 8 mg/kg/day (Sample et al., 1996). Toxicity reference values are unavailable for birds.

Nickel

Nickel is a naturally occurring silvery metal that is found in the earth's crust. Nickel and its compounds are found in all parts of the environment, including plants and animals. Primary nickel is recovered from mined ore and nickel matte, and secondary nickel is recovered from scrap metal (ATSDR, 1988b).

Nickel released into water will exist in both soluble and insoluble forms depending on the chemical and physical properties of the water. Nickel has not been shown to volatize from the water surface. Nickel is significantly bioaccumulated in some, but not all aquatic species (ATSDR, 1988b). Nickel adversely influences cell membranes with increasing water hardness (Davis, 1994).

Nickel is extremely persistent in soil; however, it still has the potential to leach through soil into groundwater. The average residence time of nickel in soil is estimated to be 2,400 to 3,500 years. The sorption of nickel into soils has found to correlate with suspension pH, total iron, and surface area. Organic complexing agents in soil tend to restrict the movement and availability of nickel in soil by forming organo-nickel complexes. Nickel is not expected to volatize from soils (ATSDR, 1988b). Nickel is not essential to plants in some instances it produces toxic effects (Davis, 1994).

Nickel released into the atmosphere will exist primarily in aerosol form. Airborne nickel will remain in the atmosphere for varying periods of time depending upon factors such as concentration, density and particle size, and precipitation. The average residence time of nickel in the atmosphere is seven days, with typical residence time ranging from one to twenty-one days. The predominant nickel species in air tend to be nickel oxide, nickel sulfate, complex oxides of nickel and other metals, and to a lesser extent, metallic nickel, and nickel subsulfide (ATSDR, 1998b).

The NOAELs for birds and mammals are 77.4 mg/kg/day and 40 mg/kg/day, respectively (Sample et al., 1996). The LOAELs for birds and mammals are 107 mg/kg/day and 80 mg/kg/day, respectively (Sample et al., 1996).

Pentachlorophenol

Pentachlorophenol is not found naturally in the environment but is a manufactured chemical used as a wood preservative for power line poles, railroad ties, cross arms, and fence posts. At one time it was a biocide and one of the most heavily used pesticides in the United States (ATSDR, 1994). Purchase and use of pentachlorophenol is now controlled and restricted to certified applicators (ATSDR, 1994).

Environmental releases of the chemical may result from leaching from wood and spills (Spectrum, 1999b). If a release occurred, the chemical would generally bind to soil where it would be biodegraded by microorganisms or leach into the groundwater, which would depend on the acidity of the soil (ATSDR, 1994; Spectrum, 1999b). If released into surface water, will absorb to sediment, photodegrade, and slowly be biodegraded by microorganisms (Spectrum, 1999b). Pentachlorophenol in tissue levels of fish are mainly low due to the ability to break down the compound (ATSDR, 1994).

The NOAEL and LOAEL for mammals are 0.24 mg/kg/day and 2.4 mg/kg/day, respectively (Sample et al., 1996). For birds, the NOAEL and LOAEL are 6.85 mg/kg/day and 68.5 mg/kg/day, respectively (ERT, 1997).

Polychlorinated biphenyls (Aroclor 1254)

The term polychlorinated biphenyls (PCBs) commonly refers to a variety of mixtures of individual biphenyl isomers, each consisting of two joined benzene rings and up to ten chlorine atoms. Mixtures of these isomers are known by their commercial designation of Aroclor. This trade name is followed by a four-digit number; the first two numbers indicate the type of isomer mixture and the last two numbers indicate the approximate weight percent of chlorine in the mixture (ATSDR, 1997).

PCBs are man-made chemicals that were used widely in transformers, electrical equipment, and as lubricants (ATSDR, 1997). PCBs are inert, thermally and chemically stable compounds with dielectric properties. Because of their persistence and toxicity in the environment, their manufacture was discontinued in the United States in 1977. However, PCB equipment manufactured before 1977 is currently still being used in the United States and this use is regulated by the Environmental Protection Agency.

PCBs are very stable chemically and tend to be persistent in the environment. Persistence and bioaccumulation in living organisms also occurs due to the high lipophilicity of these compounds (ATSDR, 1997).

PCBs released into water adsorb to sediments and other organic matter. Typically PCB concentrations are greater in the sediment and suspended material than in the water column. Substantial quantities of PCBs in aquatic sediments can act as an environmental reservoir from which PCBs may be released slowly over a long period of time (ATSDR, 1989f). For PCBs that exist in the dissolved state in water, volatilization becomes the primary fate process. Therefore, the volatilization process is the major removal mechanisms of PCBs from water sources. However, the rate of volatilization is dependent upon PCB adsorption to sediment (ATSDR, 1997). PCBs have the capability to bioaccumulate and biomagnify (ATSDR, 1997).

PCBs are expected to be highly immobile in the soil due to rapid and strong sorption. Accumulation of PCBs in terrestrial vegetation can occur by uptake from soil through the root and by deposition of atmospheric particulates on aerial plant surfaces. However, the transfer of vapor-phase PCBs from air to aerial plant parts may be the main source of vegetation contamination (ATSDR, 1997).

Adverse effects of PCBs on terrestrial wildlife include increased mortality, reproductive effects, and behavioral effects. Behavioral effects include increased activity, decreased avoidance response, and decreased nesting (ATSDR, 1997).

Degradation of PCBs in the environment is dependent upon the degree of chlorination. Generally, the more chlorinated the PCB molecule, the more persistent it will be in the environment. Factors which determine biodegradability include the amount of chlorination, concentration, type of microbial population, available nutrients, and the temperature (ATSDR, 1997).

In the atmosphere, PCBs exist almost entirely in the vapor phase, and therefore they are readily dispersed. The tendency of PCBs to adsorb to airborne particulates will increase as the degree of chlorination increases. The dominant degradation process in the atmosphere is dependent upon the vapor phase reaction of PCBs with hydroxyl radicals. PCBs are physically removed from the atmosphere through wet and dry deposition (ATSDR, 1997).

The NOAEL for birds and mammals is 0.18 mg/kg/day and 0.068 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 10.7 mg/kg/day for birds and 0.68 mg/kg/day for mammals (Sample et al., 1996).

Polycyclic aromatic hydrocarbons: acenaphthylene, acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, carbzole, chrysene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, pyrene

The PAHs are a diverse group of compounds consisting of two or more substituted and unsubstituted polycyclic aromatic rings formed by the incomplete combustion of carbonaceous materials (ATSDR, 1990b).

PAHs are ubiquitous in the modern environment and commonly are constituents of coal tar, soot, vehicular exhausts, cigarette smoke, certain petroleum products, road tar, mineral oils, creosote and many cooked foods. PAHs also are released to the environment through natural sources such as volcano and forest fire emissions. However, most of the emissions result from anthropogenic sources, largely wood burning for homes. Vehicular emissions are another primary source of PAHs. Hazardous waste sites can be a concentrated source on a local scale.

Examples of such sites include former manufactured gas sites (i.e., sources of coal tar) and abandoned wood treatment plants (i.e., sources of creosote) (ATSDR, 1990b).

In the air, PAHs are found sorbed to particulates and as gases. Particle-bound PAHs can be transported long distances and are removed from the atmosphere by precipitation and dry deposition (ATSDR, 1990b).

PAHs are transferred from surface water by volatilization and sorption to settling particles. The compounds are transformed in surface water by photooxidation, chemical oxidation and microbial metabolism (ATSDR, 1990b).

In soil and sediments, microbial metabolism is the major process for degradation of PAHs (ATSDR, 1990b). Although PAHs accumulate in terrestrial and aquatic plants, many organisms are able to metabolize and eliminate these compounds. Vertebrates can readily metabolize PAHs; whereas, lower forms (insects and worms) cannot metabolize PAHs as quickly. Food chain uptake does not appear to be a major exposure source to PAHs for aquatic animals (ATSDR, 1990b).

Depending on the type of PAH, the NOAEL and LOAEL values differed. See Table 7-1 for the specific values.

Selenium

Selenium is essential in amounts from trace to part-per-billion concentrations for humans and certain plants and animals, but toxic at some concentrations present in the environment. Selenium is widely distributed in nature, being especially abundant with sulfide minerals of various metals, such as iron, lead, and copper. The major source of environmental selenium is the weathering of natural rock. Authorities agree that selenium may favorably or adversely affect growth, survival, and reproduction of algae and higher plants, bacteria and yeasts, crustaceans, mollusk, insects, fish, birds, and mammals (ATSDR, 1989e).

There is a general agreement among authorities on four points concerning selenium. First, that selenium chemistry is complex, and that additional research is warranted on chemical and biochemical transformations among valence states, allotropic forms, and isomers of selenium. Second, that selenium metabolism and degradation is significantly modified by interaction with heavy metals, agricultural chemicals, microorganisms, and a variety of physicochemical factors. Third, that anthropogenic activities (including fossil fuel combustion and metal smelting) and naturally seleniferous areas pose the greatest hazards to fish and wildlife. And fourth, that selenium deficiency is not as well documented as selenium poisoning, but may be equally significant (ATSDR, 1989e).

Elemental selenium is insoluble and largely unavailable to the biosphere, although it is still capable of satisfying metabolic nutritional requirements. In areas of acid or neutral soils, the amount of biologically available selenium should steadily decline. The decline may be accelerated by active agricultural or industrial practices. In dry areas with alkaline soils and oxidizing conditions, elemental selenium and selenides in rocks and volcanic soils may oxidize sufficiently to maintain the availability of biologically active selenium. Concentrations of selenium in water are a function of selenium levels in the drainage system and of water pH. Selenium volatilizes from soils at rates that are modified by temperature, moisture, time, season of year, concentrations of water-soluble selenium, and microbiological activity (ATSDR, 1989e).

Selenium was used in the early 1900s as a pesticide to control plant pests, and is still used sparingly to control pests of greenhouse chrysanthemums and carnations. It has been used to control cotton pests, mites and spiders that attack citrus, and mites that damage apples. Although no insect-resistant strains have developed, the use of selenium pesticides has been

discontinued, owing to their stability in soils and resultant contamination of food crops, their high price, and their proven toxicity to mammals and birds. Selenium is used extensively in the manufacture and production of glass, pigments, rubber, metal alloys, textiles, petroleum, medical therapeutic agents, and photographic emulsions (ATSDR, 1989e).

Air and surface waters generally contain nonhazardous concentrations of selenium. Significant increases of selenium in specific areas are attributed exclusively to industrial sources, and to leaching of groundwater from seleniferous soils (ATSDR, 1989e).

The NOAEL for birds and mammals is 0.4 mg/kg/day and 0.2 mg/kg/day, respectively (Sample et al., 1996). The LOAEL is 0.8 mg/kg/day for birds and 0.33 mg/kg/day for mammals (Sample et al., 1996).

Thallium

Thallium is crystalline form blue-white metal. Thallium metal forms a brownish-black oxide upon exposure to air. Thallium is highly reactive, readily soluble in acids and forms monovalent thallous and trivalent thallic salts, the latter being less stable (Friberg, 1986).

Thallium is found in the U.S.A. and Brazil in the minerals lorandite and crookesite. However, it is usually recovered from flue-dust residues in zinc and lead smelters and as a by-product of cadmium production. Thallous sulfate was used on a large scale as a rodenticide, but this has been replaced in some countries. Thallium is also used in photoelectric cells, lamps, in electronics, and in semiconductors and scintillation counters (Friberg, 1986).

Thallium is widely but sparingly distributed over the earth, mainly in rock formations and soils containing potassium feldspars and micas. Thallium is also found in potash, lead and zinc ores; and in fossil fuels. The most important sources of thallium exposure in the general population are air emissions from coal-burning power plants, and copper, lead, and zinc smelters (Friberg, 1986).

Thallium is one of the more toxic metals and can cause neural, hepatic, and renal injury. It may also cause deafness and loss of vision. Thallium is not a normal constituent of animal tissues. It is absorbed through the skin and gastrointestinal tract (Klaassen et al., 1986).

For mammals, the NOAEL and LOAEL are 0.0074 mg/kg/day and 0.074 mg/kg/day, respectively (Sample et al., 1996). The NOAEL and LOAEL for birds are 0:47 mg/kg/day and 4.7 mg/kg/day, respectively (Hudson et al., 1984).

Toluene

Toluene is a colorless liquid at standard temperature and pressure. It is primarily used as a component in gasoline but is also used in the synthesis of benzene, methane foams and other organic chemicals (ATSDR, 1989f).

Toluene can be present in the air, water, and soil. The low vapor pressure indicates that volatilization is the most probable route of transport among medium.

Photooxidation is the primary fate mechanism for atmospheric toluene. In the atmosphere, it is readily degraded by reacting with hydroxyl radicals resulting in benzaldehyde and cresols. Benzaldehyde is the principal organic product of this atmospheric conversion (ATSDR, 1989F). These rings undergo cleavage to form simple hydrocarbons. Toluene is also oxidized by reacting with nitrogen dioxide, oxygen, and ozone (ATSDR, 1989f).

Volatilization is a primary means of transport from surface water (ATSDR, 1989f). This volatilization from water depends on the turbulence of the water. Toluene in static water has a half-life of one to six days. In turbulent water, the half-life is reduced to five to six hours. In the aquatic environment, toluene can also be oxidized by a reaction similar to that of atmospheric toluene. However, the rate of the reaction is much slower. Degradation of toluene that is not volatilized is primarily through microbial action (ATSDR, 1989f).

The partition coefficients in conjunction with water solubility indicate that toluene would tend to leach into groundwater (ATSDR, 1989f).

The primary route of transport from surface soil is volatilization. The rate of evaporation from soil depends on environmental setting characteristics such as temperature, humidity, and soil type. In general, more than 90 percent of toluene present in soil vaporizes within the first 24 hours. Toluene that has not evaporated from soil is rapidly biodegraded by various bacterial species (ATSDR, 1989f).

Toluene has a low to moderate tendency to bioaccumulate in lipophilic tissues (ATSDR, 1989f). Consequently, bioaccumulation is most likely not a significant environmental fate process (EPA, 1985a).

The NOAEL and LOAEL for mammals are 26 mg/kg/day and 260 mg/kg/day, respectively (Sample et al., 1996).

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).

Xylene

Xylene is used in petroleum distillation, coal tar distillation, and used extensively in the organic chemical industry. The chemical is relatively volatile, with a characteristic sweet odor. Xylene is found in the environment in ortho, meta, and para forms.

The compound enters the environment from fugitive emissions and exhaust from gasoline along with industrial sources such as petroleum refining and use as solvents. If a spill occurs on land, volatilization and leaching into the ground will happen. However, degradation may occur as the compound passes through the soil. This degradation depends on the following factors: residence time in the soil, nature of the soil, and if microbial populations are present. In aquatic environments, volatilization is the primary means of removal although some adsorption to sediments may take place (Spectrum, 1999e).

Bacteria are known to aggressively metabolize xylene. The 96 hour LC50 for shrimp (*Crangon francisorum*) was 1.3 ppm (Verschueren, 1983). A 96 hour LC50 of 13.5 mg/l was observed for

rainbow trout (Verschueren, 1983). A bioconcentration factor of 23.6 was observed in the eel (*Anguilla japonica*). Humans has been observed to exhibit symptoms of illness after inhalation of xylene at 1000 ppm (Verschueren, 1983).

Toxicity reference values are unavailable for birds and mammals.

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, 1989c).

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, 1989c).

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, 1989c).

Zinc is actively accumulated in aquatic systems. However, biota appear to represent a minor sink for zinc compared with the sediments (ATSDR, 1989c). 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, 1989c).

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, 1989c).

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 QUOTIENTS
GREEN HERON
BASED ON THE MAXIMUM CONCENTRATION OF 4,4'-DDT IN SAMPLES COLLECTED IN 1998 AND 1999

(See Section 7.4.2.1 of text for definitions of the terms in the following two equations).

The predicted dose (PD) for all representative receptors =
$[(C_{sediment}\ FI * SA * F) + (C_{water} * W * FI) + (C_{food} * F * FA * FI)]/WR$

Concentrations of organic compounds in food items of the green heron prey were derived from sediment data using the following equation: $TBP = BSAF(C_s/f_{oc})f_l$.

BSAF for 4,4'-DDT = 1.67 (from Appendix F, Table F-2)
C_s = 0.066 mg/kg (see Section 7.4.2.1)
f_{oc} = 1.61 percent = 0.0161 (see Section 7.4.2.1)
f_l for mummichogs (assumed food of the heron) = 3.5 percent = 0.035 (see Section 7.4.2.1)

Using the above values, TBP = 1.67 * (0.066/0.0161) * 0.011 = 0.2396 mg/kg. Thus, the predicted tissue concentration of 4,4'-DDT in food items of the heron (C_{food}) = 0.2396 mg/kg. Since the incidental ingestion of sediment by herons is negligible (Table 7-2 of text), then $C_{sediment}$ = 0. Herons could incidentally ingest water when consuming fish (see Section 7.4.2.2 of text), so the predicted dose = $(C_{water} * W * FI) + (C_{food} * F * FA * FI)]/WR$.

4,4'-DDT was not detected in surface water. Thus, C_{water} = 0.
C_{food} = 0.2396 mg/kg (derivation shown above)
F = 0.04 kg/day
FA = 100 percent = 1.0
FI = 100 percent = 1.0
WR = 0.212 kg

Using the above values, PD = (0.2396 mg/kg * 0.04 kg/day * 1.0 * 1.0) / 0.212 kg = 0.0452 mg/kg/day.
The avian NOAEL for 4,4'-DDT is 0.0028 mg/kg/day.
Thus, the HQ (based on the NOAEL) = 0.0452 mg/kg/day ÷ 0.0028 mg/kg/day = 16.1.

FOOD CHAIN MODELING CALCULATION
GREEN HERON - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron

(Conservative Inputs)			
Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)								
Acenaphthene	0.12	0	0.076	1.43E-02	10	100	1.43E-03	1.43E-04
Benzo(a)anthracene	0.018	0	0.011	2.14E-03	10	100	2.14E-04	2.14E-05
Benzo(a)pyrene	0.038	0	0.024	4.52E-03	10	100	4.52E-04	4.52E-05
Benzo(b)fluoranthene	0.12	0	0.076	1.43E-02	10	100	1.43E-03	1.43E-04
Benzo(k)fluoranthene	0.018	0	0.011	2.14E-03	10	100	2.14E-04	2.14E-05
Bis(2-ethylhexyl)phthalate	0.44	0.010	0.957	1.81E-01	1.1	11	1.64E-01	1.64E-02
Chrysene	0.044	0	0.028	5.23E-03	10	100	5.23E-04	5.23E-05
Fluoranthene	0.092	0	0.058	1.09E-02	10	100	1.09E-03	1.09E-04
Indeno(1,2,3-cd)pyrene	0.026	0	0.016	3.09E-03	10	100	3.09E-04	3.09E-05
Pentachlorophenol	0.18	0	0.391	7.38E-02	0	0	NA	NA
Pyrene	0.089	0	0.056	1.06E-02	10	100	1.06E-03	1.06E-04
Pesticides/PCBs (mg/kg)								
4,4'-DDT	0.066	0	0.240	4.52E-02	0.0028	0.028	1.61E+01	1.61E+00
Alpha-chlordane	0.012	0	0.124	2.35E-02	2.14	10.7	1.10E-02	2.19E-03
Gamma-chlordane	0.014	0	0.068	1.27E-02	2.14	10.7	5.96E-03	1.19E-03
Methoxychlor	0.68	0	2.661	5.02E-01	0	0	NA	NA
Inorganics (mg/kg)								
Aluminum	52700	12.9	52700.000	9.94E+03	109.7	1097	9.06E+01	9.06E+00
Antimony	6.8	0	6.800	1.28E+00	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
GREEN HERON - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron
(Conservative Inputs)

Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	18.5	0.009	18.500	3.49E+00	2.46	7.38	1.42E+00	4.73E-01
Barium	62.9	0.253	62.900	1.19E+01	20.8	41.7	5.71E-01	2.85E-01
Beryllium	2	0	2.000	3.77E-01	0	0	NA	NA
Cadmium	0.84	0	0.840	1.58E-01	1.45	20	1.09E-01	7.92E-03
Chromium (total)	75	0.032	75.000	1.42E+01	1	5	1.42E+01	2.83E+00
Cobalt	10.3	0	10.300	1.94E+00	1	10	1.94E+00	1.94E-01
Copper	113	0	113.000	2.13E+01	47	61.7	4.54E-01	3.46E-01
Iron	43100	7.89	43100.000	8.13E+03	100	1000	8.13E+01	8.13E+00
Lead	203	0	203.000	3.83E+01	1.13	11.3	3.39E+01	3.39E+00
Manganese	210	0.214	210.000	3.96E+01	977	9770	4.06E-02	4.06E-03
Mercury	0.35	0	0.350	6.60E-02	0.0064	0.064	1.03E+01	1.03E+00
Nickel	1060	0	1060.000	2.00E+02	77.4	107	2.58E+00	1.87E+00
Selenium	10.7	0.018	10.700	2.02E+00	0.4	0.8	5.05E+00	2.52E+00
Thallium	0.36	0	0.360	6.79E-02	0.47	4.7	1.45E-01	1.45E-02
Vanadium	112	0.034	112.000	2.11E+01	11.4	114	1.85E+00	1.85E-01
Zinc	197	0	197.000	3.72E+01	14.5	131	2.56E+00	2.84E-01

a = Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
GREEN HERON - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998 - 1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron
(Conservative Inputs)

Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)								
Acenaphthene	0.071	0	0.045	8.48E-03	10	100	8.48E-04	8.48E-05
Benzo(a)anthracene	0.007	0	0.005	8.61E-04	10	100	8.61E-05	8.61E-06
Benzo(a)pyrene	0.013	0	0.008	1.55E-03	10	100	1.55E-04	1.55E-05
Benzo(b)fluoranthene	0.018	0	0.011	2.14E-03	10	100	2.14E-04	2.14E-05
Benzo(k)fluoranthene	0.007	0	0.004	8.38E-04	10	100	8.38E-05	8.38E-06
Bis(2-ethylhexyl)phthalate	0.337	0.003	0.733	1.38E-01	1.1	11	1.26E-01	1.26E-02
Chrysene	0.009	0	0.005	1.03E-03	10	100	1.03E-04	1.03E-05
Fluoranthene	0.017	0	0.011	2.03E-03	10	100	2.03E-04	2.03E-05
Indeno(1,2,3-cd)pyrene	0.008	0	0.005	8.97E-04	10	100	8.97E-05	8.97E-06
Pentachlorophenol	0.805	0	1.749	3.30E-01	0	0	NA	NA
Pyrene	0.012	0	0.007	1.39E-03	10	100	1.39E-04	1.39E-05
Pesticides/PCBs (mg/kg)								
4,4'-DDT	0.009	0	0.031	5.85E-03	0.0028	0.028	2.09E+00	2.09E-01
Alpha-chlordane	0.003	0	0.033	6.20E-03	2.14	10.7	2.90E-03	5.80E-04
Gamma-chlordane	0.003	0	0.016	2.99E-03	2.14	10.7	1.40E-03	2.79E-04
Methoxychlor	0.063	0	0.246	4.64E-02	0	0	NA	NA
Inorganics (mg/kg)								
Aluminum	9843.888	2.692	9843.888	1.86E+03	109.7	1097	1.69E+01	1.69E+00
Antimony	2.197	0	2.197	4.15E-01	0	0	NA	NA

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FOOD CHAIN MODELING CALCULATION
GREEN HERON - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998 - 1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron

(Conservative Inputs)			
Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	4.649	0.005	4.649	8.77E-01	2.46	7.38	3.57E-01	1.19E-01
Barium	12.094	0.123	12.094	2.29E+00	20.8	41.7	1.10E-01	5.48E-02
Beryllium	0.405	0	0.405	7.65E-02	0	0	NA	NA
Cadmium	0.233	0	0.233	4.39E-02	1.45	20	3.03E-02	2.20E-03
Chromium (total)	16.256	0.017	16.256	3.07E+00	1	5	3.07E+00	6.14E-01
Cobalt	2.196	0	2.196	4.14E-01	1	10	4.14E-01	4.14E-02
Copper	9.713	0	9.713	1.83E+00	47	61.7	3.90E-02	2.97E-02
Iron	11211.667	1.683	11211.667	2.12E+03	100	1000	2.12E+01	2.12E+00
Lead	22.567	0	22.567	4.26E+00	1.13	11.3	3.77E+00	3.77E-01
Manganese	49.689	0.139	49.689	9.38E+00	977	9770	9.60E-03	9.60E-04
Mercury	0.070	0	0.070	1.33E-02	0.0064	0.064	2.07E+00	2.07E-01
Nickel	63.100	0	63.100	1.19E+01	77.4	107	1.54E-01	1.11E-01
Selenium	1.158	0.006	1.158	2.19E-01	0.4	0.8	5.47E-01	2.73E-01
Thallium	0.715	0	0.715	1.35E-01	0.47	4.7	2.87E-01	2.87E-02
Vanadium	23.111	0.018	23.111	4.36E+00	11.4	114	3.83E-01	3.83E-02
Zinc	30.633	0	30.633	5.78E+00	14.5	131	3.99E-01	4.41E-02

a = Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
GREEN HERON - MEAN CONCENTRATION
FILTERED WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron
(Conservative Inputs)

Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Filtered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose	NOAEL	LOAEL	NOAEL	LOAEL HQ
Inorganics (mg/kg)								
Barium	12.094	0.123	0.490	9.71E-02	20.8	41.7	4.67E-03	2.33E-03
Manganese	49.689	0.132	49.334	9.31E+00	977	9770	9.53E-03	9.53E-04
Thallium	0.715	0.008	0.939	1.78E-01	0.47	4.7	3.78E-01	3.78E-02
Vanadium	23.111	0.015	0.000	5.79E-04	11.4	114	5.08E-05	5.08E-06

FOOD CHAIN MODELING CALCULATION
GREEN HERON - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron
(Conservative Inputs)

Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
Bis(2-Ethylhexyl)phthalate	5.195	11.293	2.13E+00	1.1	11	1.94E+00	1.94E-01
Di-n-octyl phthalate	0.605	1.315	2.48E-01	1.1	11	2.26E-01	2.26E-02
Diethyl Phthalate	0.515	1.118	2.11E-01	0	0	NA	NA
Pesticides/PCBs							
4,4'-DDE	0.308	5.156	9.73E-01	0.0028	0.028	3.47E+02	3.47E+01
4,4'-DDT	0.038	0.138	2.60E-02	0.0028	0.028	9.30E+00	9.30E-01
Aroclor-1254	12.016	48.323	9.12E+00	0.18	1.8	5.07E+01	5.07E+00
Dieldrin	0.006	0.024	4.58E-03	0.077	0.77	5.94E-02	5.94E-03
Endrin	0.602	2.354	4.44E-01	0.01	0.1	4.44E+01	4.44E+00
alpha-BHC	0.013	0.052	9.82E-03	0.56	2.25	1.75E-02	4.36E-03
Inorganics							
Aluminum	10640.000	10640.000	2.01E+03	109.7	1097	1.83E+01	1.83E+00
Antimony	6.350	6.350	1.20E+00	0	0	NA	NA
Arsenic	45.150	45.150	8.52E+00	2.46	7.38	3.46E+00	1.15E+00
Barium	70.000	70.000	1.32E+01	20.8	41.7	6.35E-01	3.17E-01
Cadmium	3.250	3.250	6.13E-01	1.45	20	4.23E-01	3.07E-02
Chromium	78.400	78.400	1.48E+01	1	5	1.48E+01	2.96E+00
Cobalt	15.450	15.450	2.92E+00	1	10	2.92E+00	2.92E-01
Copper	328.500	328.500	6.20E+01	47	61.7	1.32E+00	1.00E+00

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FOOD CHAIN MODELING CALCULATION
GREEN HERON - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron

(Conservative Inputs)			
Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	214500.000	214500.000	4.05E+04	100	1000	4.05E+02	4.05E+01
Lead	1759.500	1759.500	3.32E+02	1.13	11.3	2.94E+02	2.94E+01
Manganese	888.500	888.500	1.68E+02	977	9770	1.72E-01	1.72E-02
Nickel	64.150	64.150	1.21E+01	77.4	107	1.56E-01	1.13E-01
Selenium	1.030	1.030	1.94E-01	0.4	0.8	4.86E-01	2.43E-01
Silver	1.150	1.150	2.17E-01	0	0	NA	NA
Vanadium	36.250	36.250	6.84E+00	11.4	114	6.00E-01	6.00E-02
Zinc	1135.500	1135.500	2.14E+02	14.5	131	1.48E+01	1.64E+00

a = Calculated using Theoretical Bioaccumulation Potential Equation (organic compounds).
NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
GREEN HERON - MAXIMUM CONCENTRATION
FILITERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron
(Conservative Inputs)

Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Filtered Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics (mg/kg)								
Barium	62.900	0.253	1.012	2.00E-01	20.8	41.7	9.64E-03	4.81E-03
Manganese	210.000	0.211	78.703	1.49E+01	977	9770	1.52E-02	1.52E-03
Thallium	0.360	0.030	3.582	6.77E-01	0.47	4.7	1.44E+00	1.44E-01
Vanadium	112.000	0.023	0.000	9.11E-04	11.4	114	7.99E-05	7.99E-06

FOOD CHAIN MODELING CALCULATION
GREEN HERON - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron

(Conservative Inputs)			
Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
Bis(2-Ethylhexyl)phthalate	10.000	21.739	4.10E+00	1.1	11	3.73E+00	3.73E-01
Di-n-octyl phthalate	0.900	1.957	3.69E-01	1.1	11	3.36E-01	3.36E-02
Diethyl Phthalate	0.029	0.063	1.19E-02	0	0	NA	NA
Pesticides/PCBs							
4,4'-DDE	0.520	8.704	1.64E+00	0.0028	0.028	5.87E+02	5.87E+01
4,4'-DDT	0.038	0.138	2.60E-02	0.0028	0.028	9.30E+00	9.30E-01
Aroclor-1254	24.000	96.522	1.82E+01	0.18	1.8	1.01E+02	1.01E+01
Dieldrin	0.006	0.024	4.58E-03	0.077	0.77	5.94E-02	5.94E-03
Endrin	1.200	4.696	8.86E-01	0.01	0.1	8.86E+01	8.86E+00
alpha-BHC	0.003	0.012	2.29E-03	0.56	2.25	4.09E-03	1.02E-03
Inorganics							
Aluminum	11700.000	11700.000	2.21E+03	109.7	1097	2.01E+01	2.01E+00
Antimony	9.400	9.400	1.77E+00	0	0	NA	NA
Arsenic	49.700	49.700	9.38E+00	2.46	7.38	3.81E+00	1.27E+00
Barium	73.200	73.200	1.38E+01	20.8	41.7	6.64E-01	3.31E-01
Cadmium	4.700	4.700	8.87E-01	1.45	20	6.12E-01	4.43E-02
Chromium	119.000	119.000	2.25E+01	1	5	2.25E+01	4.49E+00
Cobalt	22.700	22.700	4.28E+00	1	10	4.28E+00	4.28E-01
Copper	489.000	489.000	9.23E+01	47	61.7	1.96E+00	1.50E+00

FOOD CHAIN MODELING CALCULATION
GREEN HERON - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Green Heron
(Conservative Inputs)

Body Weight	0.212 kg		
Food Ingestion Rate	0.04 kg/day	% fish	1
Water Ingestion Rate	0.008 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	307000.000	307000.000	5.79E+04	100	1000	5.79E+02	5.79E+01
Lead	2930.000	2930.000	5.53E+02	1.13	11.3	4.89E+02	4.89E+01
Manganese	1480.000	1480.000	2.79E+02	977	9770	2.86E-01	2.86E-02
Nickel	86.900	86.900	1.64E+01	77.4	107	2.12E-01	1.53E-01
Selenium	1.200	1.200	2.26E-01	0.4	0.8	5.66E-01	2.83E-01
Silver	1.200	1.200	2.26E-01	0	0	NA	NA
Vanadium	44.900	44.900	8.47E+00	11.4	114	7.43E-01	7.43E-02
Zinc	1520.000	1520.000	2.87E+02	14.5	131	1.98E+01	2.19E+00

a = Calculated using Theoretical Bioaccumulation Potential Equation (organic compounds).
NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
RED FOX - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox
(Conservative Inputs)

Body Weight	3.94 kg		
Food Ingestion Rate	0.552 kg/day	% prey	0.972
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.552 kg/day	% soil	0.028

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Prey Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.385	0.012	3.16E-03	1	10	3.16E-03	3.16E-04
Acenaphthene	0.305	0.092	1.37E-02	1.3	2.6	1.05E-02	5.25E-03
Acenaphthylene	0.375	0.012	3.07E-03	1.3	2.6	2.37E-03	1.18E-03
Benzo(a)anthracene	0.14	0.001	6.92E-04	1	10	6.92E-04	6.92E-05
Benzo(a)pyrene	0.12	0.002	8.06E-04	1	10	8.06E-04	8.06E-05
Benzo(b)fluoranthene	0.13	0.002	8.49E-04	1	10	8.49E-04	8.49E-05
Benzo(k)fluoranthene	0.11	0.002	6.59E-04	1	10	6.59E-04	6.59E-05
Bis(2-ethylhexyl)phthalate	0.48	0.072	1.17E-02	18.3	183	6.39E-04	6.39E-05
Chrysene	0.16	0.002	8.56E-04	1	10	8.56E-04	8.56E-05
Fluoranthene	0.28	0.001	1.28E-03	1	10	1.28E-03	1.28E-04
Fluorene	0.22	0.007	1.81E-03	1.3	2.6	1.39E-03	6.95E-04
Indeno(1,2,3-cd)pyrene	0.069	0.002	5.07E-04	1	10	5.07E-04	5.07E-05
Naphthalene	1.435	0.043	1.15E-02	1.3	2.6	8.84E-03	4.42E-03
Pentachlorophenol	0.24	0.288	4.02E-02	0.24	2.4	1.67E-01	1.67E-02
Phenanthrene	0.14	0.001	6.88E-04	1.3	2.6	5.30E-04	2.65E-04
Pyrene	0.23	0.001	1.08E-03	1	10	1.08E-03	1.08E-04
Pesticides/PCBs							
4,4'-DDE	0.043	0.088	1.21E-02	0.8	4	1.51E-02	3.03E-03
Methoxychlor	0.07	0.000	2.75E-04	4	8	6.87E-05	3.43E-05
Metals and Inorganics							
Aluminum	5370	21.346	2.40E+01	1.93	19.3	1.24E+01	1.24E+00
Antimony	8	0.400	8.59E-02	0.125	1.25	6.87E-01	6.87E-02

FOOD CHAIN MODELING CALCULATION
RED FOX - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox

(Conservative Inputs)			
Body Weight	3.94 kg		
Food Ingestion Rate	0.552 kg/day	% prey	0.972
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.552 kg/day	% soil	0.028

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Prey Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	50.8	1.138	3.54E-01	0.126	1.26	2.81E+00	2.81E-01
Barium	76.4	0.573	3.78E-01	5.1	51	7.41E-02	7.41E-03
Beryllium	0.17	0.009	1.82E-03	0.66	6.6	2.76E-03	2.76E-04
Cadmium	3.2	51.798	7.07E+00	1	10	7.07E+00	7.07E-01
Chromium (total)	18.1	0.811	1.81E-01	1	5	1.81E-01	3.63E-02
Cobalt	6.6	6.600	9.25E-01	1	10	9.25E-01	9.25E-02
Copper	189	58.401	8.69E+00	47	61.7	1.85E-01	1.41E-01
Iron	99700	3788.600	9.07E+02	100	1000	9.07E+00	9.07E-01
Lead	1100	4.389	4.91E+00	1.13	11.3	4.35E+00	4.35E-01
Manganese	522	0.564	2.12E+00	977	9770	2.17E-03	2.17E-04
Mercury	0.89	0.015	5.54E-03	0.0064	0.064	8.66E-01	8.66E-02
Nickel	26.5	8.419	1.25E+00	77.4	107	1.62E-02	1.17E-02
Selenium	0.12	0.089	1.25E-02	0.4	0.8	3.14E-02	1.57E-02
Vanadium	9.3	0.047	4.29E-02	11.4	114	3.76E-03	3.76E-04
Zinc	1020	6856.542	9.38E+02	14.5	131	6.47E+01	7.16E+00

a = In the maximum concentration scenario, the fox was assumed to prey exclusively on shrews. Contaminant concentrations in shrews were estimated by first multiplying the surface soil concentration by the invertebrate BAF (to obtain the estimated concentration in invertebrates). This value was then multiplied by the mammal BAF to obtain the predicted concentration in the shrew.

FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.134 kg		
Food Ingestion Rate	0.103 kg/day	% Earthworm	0.896
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.103 kg/day	% Soil	0.104

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.203	0.021	3.09E-02	10	100	3.09E-03	3.09E-04
Acenaphthene	0.198	0.198	1.53E-01	10	100	1.53E-02	1.53E-03
Acenaphthylene	0.203	0.021	3.08E-02	10	100	3.08E-03	3.08E-04
Benzo(a)anthracene	0.168	0.004	1.64E-02	10	100	1.64E-03	1.64E-04
Benzo(a)pyrene	0.167	0.011	2.12E-02	10	100	2.12E-03	2.12E-04
Benzo(b)fluoranthene	0.172	0.011	2.13E-02	10	100	2.13E-03	2.13E-04
Benzo(k)fluoranthene	0.177	0.009	2.03E-02	10	100	2.03E-03	2.03E-04
Bis(2-ethylhexyl)phthalate	0.141	0.141	1.09E-01	1.1	11	9.87E-02	9.87E-03
Chrysene	0.171	0.006	1.78E-02	10	100	1.78E-03	1.78E-04
Fluoranthene	0.180	0.003	1.63E-02	10	100	1.63E-03	1.63E-04
Fluorene	0.193	0.020	2.94E-02	10	100	2.94E-03	2.94E-04
Indeno(1,2,3-cd)pyrene	0.169	0.014	2.33E-02	10	100	2.33E-03	2.33E-04
Naphthalene	0.269	0.027	4.00E-02	10	100	4.00E-03	4.00E-04
Pentachlorophenol	0.381	0.381	2.93E-01	0	0	NA	NA
Phenanthrene	0.181	0.004	1.75E-02	10	100	1.75E-03	1.75E-04
Pyrene	0.166	0.003	1.53E-02	10	100	1.53E-03	1.53E-04
Pesticides/PCBs							
4,4'-DDE	0.004	0.007	5.51E-03	0.0028	0.028	1.97E+00	1.97E-01
Methoxychlor	0.013	0.008	6.33E-03	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.134 kg		
Food Ingestion Rate	0.103 kg/day	% Earthworm	0.896
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.103 kg/day	% Soil	0.104

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Metals and Inorganics							
Aluminum	3398.875	180.140	3.96E+02	109.7	1097	3.61E+00	3.61E-01
Antimony	1.376	1.376	1.06E+00	0	0	NA	NA
Arsenic	3.869	0.867	9.06E-01	2.46	7.38	3.68E-01	1.23E-01
Barium	13.166	13.166	1.01E+01	20.8	41.7	4.87E-01	2.43E-01
Beryllium	0.078	0.078	6.01E-02	0	0	NA	NA
Cadmium	0.294	2.268	1.59E+00	1.45	20	1.09E+00	7.93E-02
Chromium (total)	4.159	0.666	7.91E-01	1	5	7.91E-01	1.58E-01
Cobalt	0.722	0.722	5.55E-01	1	10	5.55E-01	5.55E-02
Copper	13.167	6.781	5.72E+00	47	61.7	1.22E-01	9.28E-02
Iron	8123.688	308.700	8.62E+02	100	1000	8.62E+00	8.62E-01
Lead	78.578	20.902	2.07E+01	1.13	11.3	1.83E+01	1.83E+00
Manganese	66.222	3.576	7.76E+00	977	9770	7.94E-03	7.94E-04
Mercury	0.089	0.151	1.11E-01	0.0064	0.064	1.74E+01	1.74E+00
Nickel	2.683	2.841	2.17E+00	77.4	107	2.80E-02	2.03E-02
Selenium	0.093	0.091	7.04E-02	0.4	0.8	1.76E-01	8.80E-02
Vanadium	4.522	0.176	4.83E-01	11.4	114	4.24E-02	4.24E-03
Zinc	72.419	231.812	1.65E+02	14.5	131	1.14E+01	1.26E+00

a = Value calculated by multiplying surface soil concentration by the invertebrate BAF.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.134	kg		
Food Ingestion Rate	0.103	kg/day	% Earthworm	0.896
Water Ingestion Rate	0	L/day		
Soil Ingestion Rate	0.103	kg/day	% Soil	0.104

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.385	0.040	5.85E-02	10	100	5.85E-03	5.85E-04
Acenaphthene	0.305	0.305	2.34E-01	10	100	2.34E-02	2.34E-03
Acenaphthylene	0.375	0.039	5.70E-02	10	100	5.70E-03	5.70E-04
Benzo(a)anthracene	0.14	0.004	1.36E-02	10	100	1.36E-03	1.36E-04
Benzo(a)pyrene	0.12	0.008	1.52E-02	10	100	1.52E-03	1.52E-04
Benzo(b)fluoranthene	0.13	0.008	1.61E-02	10	100	1.61E-03	1.61E-04
Benzo(k)fluoranthene	0.11	0.006	1.26E-02	10	100	1.26E-03	1.26E-04
Bis(2-ethylhexyl)phthalate	0.48	0.48	3.69E-01	1.1	11	3.35E-01	3.35E-02
Chrysene	0.16	0.006	1.66E-02	10	100	1.66E-03	1.66E-04
Fluoranthene	0.28	0.004	2.54E-02	10	100	2.54E-03	2.54E-04
Fluorene	0.22	0.0231	3.35E-02	10	100	3.35E-03	3.35E-04
Indeno(1,2,3-cd)pyrene	0.069	0.006	9.50E-03	10	100	9.50E-04	9.50E-05
Naphthalene	1.435	0.144	2.14E-01	10	100	2.14E-02	2.14E-03
Pentachlorophenol	0.24	0.24	1.84E-01	0	0	NA	NA
Phenanthrene	0.14	0.003	1.35E-02	10	100	1.35E-03	1.35E-04
Pyrene	0.23	0.004	2.13E-02	10	100	2.13E-03	2.13E-04
Pesticides/PCBs							
4,4'-DDE	0.043	0.073	5.38E-02	0.0028	0.028	1.92E+01	1.92E+00
Methoxychlor	0.07	0.040	3.31E-02	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
AMERICAN WOODCOCK - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Woodcock
(Conservative Inputs)

Body Weight	0.134 kg		
Food Ingestion Rate	0.103 kg/day	% Earthworm	0.896
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.103 kg/day	% Soil	0.104

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Earthworm Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Metals and Inorganics							
Aluminum	5370	284.610	6.25E+02	109.7	1097	5.70E+00	5.70E-01
Antimony	8	8.000	6.15E+00	0	0	NA	NA
Arsenic	50.8	11.379	1.19E+01	2.46	7.38	4.84E+00	1.61E+00
Barium	76.4	76.400	5.87E+01	20.8	41.7	2.82E+00	1.41E+00
Beryllium	0.17	0.170	1.31E-01	0	0	NA	NA
Cadmium	3.2	24.666	1.72E+01	1.45	20	1.19E+01	8.62E-01
Chromium (total)	18.1	2.896	3.44E+00	1	5	3.44E+00	6.88E-01
Cobalt	6.6	6.600	5.07E+00	1	10	5.07E+00	5.07E-01
Copper	189	97.335	8.21E+01	47	61.7	1.75E+00	1.33E+00
Iron	99700	3788.600	1.06E+04	100	1000	1.06E+02	1.06E+01
Lead	1100	292.600	2.89E+02	1.13	11.3	2.56E+02	2.56E+01
Manganese	522	28.188	6.11E+01	977	9770	6.26E-02	6.26E-03
Mercury	0.89	1.507	1.11E+00	0.0064	0.064	1.73E+02	1.73E+01
Nickel	26.5	28.064	2.14E+01	77.4	107	2.77E-01	2.00E-01
Selenium	0.12	0.118	9.10E-02	0.4	0.8	2.27E-01	1.14E-01
Vanadium	9.3	0.363	9.93E-01	11.4	114	8.71E-02	8.71E-03
Zinc	1020	3265.020	2.33E+03	14.5	131	1.61E+02	1.78E+01

a = Value calculated by multiplying surface soil concentration by the invertebrate BAF.
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 2

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097 kg		
Food Ingestion Rate	0.006 kg/day	% Earthworm	0.87
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.006 kg/day	% Surface Soil	0.13

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.203	0.021	2.78E-02	1	10	2.78E-02	2.78E-03
Acenaphthene	0.198	0.198	1.23E-01	1.3	2.6	9.44E-02	4.72E-02
Acenaphthylene	0.203	0.021	2.77E-02	1.3	2.6	2.13E-02	1.07E-02
Benzo(a)anthracene	0.168	0.004	1.58E-02	1	10	1.58E-02	1.58E-03
Benzo(a)pyrene	0.167	0.011	1.96E-02	1	10	1.96E-02	1.96E-03
Benzo(b)fluoranthene	0.172	0.011	1.97E-02	1	10	1.97E-02	1.97E-03
Benzo(k)fluoranthene	0.177	0.009	1.90E-02	1	10	1.90E-02	1.90E-03
Bis(2-ethylhexyl)phthalate	0.141	0.141	8.74E-02	18.3	183	4.77E-03	4.77E-04
Chrysene	0.171	0.006	1.70E-02	1	10	1.70E-02	1.70E-03
Fluoranthene	0.180	0.003	1.60E-02	1	10	1.60E-02	1.60E-03
Fluorene	0.193	0.020	2.64E-02	1.3	2.6	2.03E-02	1.02E-02
Indeno(1,2,3-cd)pyrene	0.169	0.014	2.12E-02	1	10	2.12E-02	2.12E-03
Naphthalene	0.269	0.027	3.61E-02	1.3	2.6	2.78E-02	1.39E-02
Pentachlorophenol	0.381	0.381	2.35E-01	0.24	2.4	9.81E-01	9.81E-02
Phenanthrene	0.181	0.004	1.69E-02	1.3	2.6	1.30E-02	6.51E-03
Pyrene	0.166	0.003	1.49E-02	1	10	1.49E-02	1.49E-03
Pesticides/PCBs							
4,4'-DDE	0.004	0.007	4.39E-03	0.8	4	5.49E-03	1.10E-03
Methoxychlor	0.013	0.008	5.19E-03	4	8	1.30E-03	6.49E-04

FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097 kg		
Food Ingestion Rate	0.006 kg/day	% Earthworm	0.87
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.006 kg/day	% Surface Soil	0.13

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Metals and Inorganics							
Aluminum	3398.875	180.140	3.70E+02	1.93	19.3	1.92E+02	1.92E+01
Antimony	1.376	1.376	8.51E-01	0.125	1.25	6.81E+00	6.81E-01
Arsenic	3.869	0.867	7.77E-01	0.126	1.26	6.17E+00	6.17E-01
Barium	13.166	13.166	8.14E+00	5.1	51	1.60E+00	1.60E-01
Beryllium	0.078	0.078	4.83E-02	0.66	6.6	7.32E-02	7.32E-03
Cadmium	0.294	2.268	1.24E+00	1	10	1.24E+00	1.24E-01
Chromium (total)	4.159	0.666	6.93E-01	3.28	32.8	2.11E-01	2.11E-02
Cobalt	0.722	0.722	4.46E-01	1	10	4.46E-01	4.46E-02
Copper	13.167	6.781	4.71E+00	11.7	15.14	4.02E-01	3.11E-01
Iron	8123.688	308.700	8.19E+02	50	500	1.64E+01	1.64E+00
Lead	78.578	20.902	1.76E+01	8	80	2.20E+00	2.20E-01
Manganese	66.222	3.576	7.25E+00	88	284	8.24E-02	2.55E-02
Mercury	0.089	0.151	8.86E-02	0.015	0.025	5.91E+00	3.54E+00
Nickel	2.683	2.841	1.74E+00	40	80	4.36E-02	2.18E-02
Selenium	0.093	0.091	5.67E-02	0.2	0.33	2.83E-01	1.72E-01
Vanadium	4.522	0.176	4.59E-01	0.21	2.1	2.18E+00	2.18E-01
Zinc	72.419	231.812	1.31E+02	160	320	8.16E-01	4.08E-01

a = Value calculated by multiplying surface soil concentration by the invertebrate BAF.

FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097000 kg		
Food Ingestion Rate	0.0060000 kg/day	% Earthworm	0.87
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.006 kg/day	% Surface Soil	0.13

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.385	0.040	5.26E-02	1	10	5.26E-02	5.26E-03
Acenaphthene	0.305	0.305	1.887E-01	1.3	2.6	1.45E-01	7.26E-02
Acenaphthylene	0.375	0.039	5.13E-02	1.3	2.6	3.94E-02	1.97E-02
Benzo(a)anthracene	0.140	0.004	1.31E-02	1	10	1.31E-02	1.31E-03
Benzo(a)pyrene	0.120	0.008	1.41E-02	1	10	1.41E-02	1.41E-03
Benzo(b)fluoranthene	0.130	0.008	1.49E-02	1	10	1.49E-02	1.49E-03
Benzo(k)fluoranthene	0.110	0.006	1.18E-02	1	10	1.18E-02	1.18E-03
Bis(2-ethylhexyl)phthalate	0.48	0.48	2.97E-01	18.3	183	1.62E-02	1.62E-03
Chrysene	0.160	0.006	1.59E-02	1	10	1.59E-02	1.59E-03
Fluoranthene	0.280	0.004	2.49E-02	1	10	2.49E-02	2.49E-03
Fluorene	0.22	0.023	3.01E-02	1.3	2.6	2.32E-02	1.16E-02
Indeno(1,2,3-cd)pyrene	0.069	0.006	8.66E-03	1	10	8.66E-03	8.66E-04
Naphthalene	1.435	0.144	1.93E-01	1.3	2.6	1.48E-01	7.41E-02
Pentachlorophenol	0.24	0.24	1.48E-01	0.24	2.4	6.19E-01	6.19E-02
Phenanthrene	0.140	0.003	1.31E-02	1.3	2.6	1.01E-02	5.04E-03
Pyrene	0.230	0.004	2.08E-02	1	10	2.08E-02	2.08E-03
Pesticides/PCBs							
4,4'-DDE	0.043	0.073	4.28E-02	0.8	4	5.35E-02	1.07E-02
Methoxychlor	0.070	0.040	2.71E-02	4	8	6.78E-03	3.39E-03

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FOOD CHAIN MODELING CALCULATION
SHORT-TAILED SHREW - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Short-Tailed Shrew
(Conservative Inputs)

Body Weight	0.0097000 kg		
Food Ingestion Rate	0.0060000 kg/day	% Earthworm	0.87
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.006 kg/day	% Surface Soil	0.13

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Invertebrate[a] Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Metals and Inorganics							
Aluminum	5370.000	284.610	5.85E+02	1.93	19.3	3.03E+02	3.03E+01
Antimony	8.000	8.000	4.95E+00	0.125	1.25	3.96E+01	3.96E+00
Arsenic	50.800	11.379	1.02E+01	0.126	1.26	8.10E+01	8.10E+00
Barium	76.400	76.400	4.73E+01	5.1	51	9.27E+00	9.27E-01
Beryllium	0.170	0.170	1.05E-01	0.66	6.6	1.59E-01	1.59E-02
Cadmium	3.200	24.666	1.35E+01	1	10	1.35E+01	1.35E+00
Chromium (total)	18.100	2.896	3.01E+00	3.28	32.8	9.19E-01	9.19E-02
Cobalt	6.600	6.600	4.08E+00	1	10	4.08E+00	4.08E-01
Copper	189.000	97.335	6.76E+01	11.7	15.14	5.78E+00	4.46E+00
Iron	99700.000	3788.600	1.01E+04	50	500	2.01E+02	2.01E+01
Lead	1100.000	292.600	2.46E+02	8	80	3.07E+01	3.07E+00
Manganese	522.000	28.188	5.71E+01	88	284	6.49E-01	2.01E-01
Mercury	0.890	1.507	8.82E-01	0.015	0.025	5.88E+01	3.53E+01
Nickel	26.500	28.064	1.72E+01	40	80	4.31E-01	2.15E-01
Selenium	0.120	0.118	7.33E-02	0.2	0.33	3.66E-01	2.22E-01
Vanadium	9.300	0.363	9.43E-01	0.21	2.1	4.49E+00	4.49E-01
Zinc	1020.000	3265.020	1.84E+03	160	320	1.15E+01	5.75E+00

a = Value calculated by multiplying surface soil concentration by the invertebrate BAF.

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FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA
PAGE 1 OF 3

American Robin
(Conservative Inputs)

Body Weight	0.077 kg		
Food Ingestion Rate	0.069 kg/day	% Vegetation	0.6
Water Ingestion Rate	0 L/day	% Earthworm	0.35
Soil Ingestion Rate	0.069 kg/day	% Surface Soil	0.05

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/L)	Invertebrate Concentration[b] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds								
2-Methylnaphthalene	0.203	0.001	0.021	1.65E-02	10	100	1.65E-03	1.65E-04
Acenaphthene	0.198	0.001	0.198	7.18E-02	10	100	7.18E-03	7.18E-04
Acenaphthylene	0.203	0.001	0.021	1.65E-02	10	100	1.65E-03	1.65E-04
Benzo(a)anthracene	0.168	0.001	0.004	9.47E-03	10	100	9.47E-04	9.47E-05
Benzo(a)pyrene	0.167	0.001	0.011	1.17E-02	10	100	1.17E-03	1.17E-04
Benzo(b)fluoranthene	0.172	0.001	0.011	1.18E-02	10	100	1.18E-03	1.18E-04
Benzo(k)fluoranthene	0.177	0.001	0.009	1.14E-02	10	100	1.14E-03	1.14E-04
Bis(2-ethylhexyl)phthalate	0.141	0.005	0.141	5.31E-02	1.1	11	4.83E-02	4.83E-03
Chrysene	0.171	0.001	0.006	1.01E-02	10	100	1.01E-03	1.01E-04
Fluoranthene	0.180	0.001	0.003	9.59E-03	10	100	9.59E-04	9.59E-05
Fluorene	0.193	0.001	0.020	1.57E-02	10	100	1.57E-03	1.57E-04
Indeno(1,2,3-cd)pyrene	0.169	0.001	0.014	1.26E-02	10	100	1.26E-03	1.26E-04
Naphthalene	0.269	0.002	0.027	2.15E-02	10	100	2.15E-03	2.15E-04
Pentachlorophenol	0.381	0.001	0.381	1.37E-01	0	0	NA	NA
Phenanthrene	0.181	0.001	0.004	1.01E-02	10	100	1.01E-03	1.01E-04
Pyrene	0.166	0.001	0.003	8.97E-03	10	100	8.97E-04	8.97E-05
Pesticides/PCBs								
4,4'-DDE	0.004	0.000	0.007	2.57E-03	0.0028	0.028	9.19E-01	9.19E-02
Methoxychlor	0.013	0.000	0.008	3.09E-03	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.077 kg		
Food Ingestion Rate	0.069 kg/day	% Vegetation	0.6
Water Ingestion Rate	0 L/day	% Earthworm	0.35
Soil Ingestion Rate	0.069 kg/day	% Surface Soil	0.05

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/L)	Invertebrate Concentration[b] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Metals and Inorganics								
Aluminum	3398.875	2.719	180.140	2.10E+02	109.7	1097	1.92E+00	1.92E-01
Antimony	1.376	0.055	1.376	5.23E-01	0	0	NA	NA
Arsenic	3.869	0.145	0.867	5.23E-01	2.46	7.38	2.13E-01	7.09E-02
Barium	13.166	0.395	13.166	4.93E+00	20.8	41.7	2.37E-01	1.18E-01
Beryllium	0.078	0.078	0.078	7.00E-02	0	0	NA	NA
Cadmium	0.294	0.172	2.268	8.17E-01	1.45	20	5.64E-01	4.09E-02
Chromium (total)	4.159	0.006	0.666	3.98E-01	1	5	3.98E-01	7.97E-02
Cobalt	0.722	0.003	0.722	2.60E-01	1	10	2.60E-01	2.60E-02
Copper	13.167	1.633	6.781	3.59E+00	47	61.7	7.65E-02	5.83E-02
Iron	8123.688	8123.688	308.700	4.83E+03	100	1000	4.83E+01	4.83E+00
Lead	78.578	3.057	20.902	1.17E+01	1.13	11.3	1.04E+01	1.04E+00
Manganese	66.222	3.311	3.576	5.87E+00	977	9770	6.01E-03	6.01E-04
Mercury	0.089	0.058	0.151	8.28E-02	0.0064	0.064	1.29E+01	1.29E+00
Nickel	2.683	0.048	2.841	1.04E+00	77.4	107	1.34E-02	9.69E-03
Selenium	0.093	0.062	0.091	6.64E-02	0.4	0.8	1.66E-01	8.30E-02
Vanadium	4.522	0.005	0.176	2.61E-01	11.4	114	2.29E-02	2.29E-03
Zinc	72.419	26.505	231.812	9.02E+01	14.5	131	6.22E+00	6.89E-01

a = value calculated by multiplying surface soil concentration by plant BAF.
b = value calculated by multiplying surface soil concentration by invertebrate BAF.

robin mean

FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.077 kg		
Food Ingestion Rate	0.069 kg/day	% Vegetation	0.6
Water Ingestion Rate	0 L/day	% Earthworm	0.35
Soil Ingestion Rate	0.069 kg/day	% Surface Soil	0.05

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/L)	Invertebrate Concentration[b] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ

NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.077 kg		
Food Ingestion Rate	0.069 kg/day	% Vegetation	0.6
Water Ingestion Rate	0 L/day	% Earthworm	0.35
Soil Ingestion Rate	0.069 kg/day	% Surface Soil	0.05

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/L)	Invertebrate Concentration[b] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds								
2-Methylnaphthalene	0.385	0.003	0.040	3.13E-02	10	100	3.13E-03	3.13E-04
Acenaphthene	0.305	0.002	0.305	1.10E-01	10	100	1.10E-02	1.10E-03
Acenaphthylene	0.375	0.003	0.039	3.05E-02	10	100	3.05E-03	3.05E-04
Benzo(a)anthracene	0.140	0.001	0.004	7.87E-03	10	100	7.87E-04	7.87E-05
Benzo(a)pyrene	0.120	0.001	0.008	8.38E-03	10	100	8.38E-04	8.38E-05
Benzo(b)fluoranthene	0.130	0.001	0.008	8.90E-03	10	100	8.90E-04	8.90E-05
Benzo(k)fluoranthene	0.110	0.001	0.006	7.07E-03	10	100	7.07E-04	7.07E-05
Bis(2-ethylhexyl)phthalate	0.48	0.016	0.480	1.81E-01	1.1	11	1.64E-01	1.64E-02
Chrysene	0.160	0.001	0.006	9.50E-03	10	100	9.50E-04	9.50E-05
Fluoranthene	0.280	0.002	0.004	1.49E-02	10	100	1.49E-03	1.49E-04
Fluorene	0.22	0.001	0.023	1.79E-02	10	100	1.79E-03	1.79E-04
Indeno(1,2,3-cd)pyrene	0.069	0.000	0.006	5.16E-03	10	100	5.16E-04	5.16E-05
Naphthalene	1.435	0.010	0.144	1.14E-01	10	100	1.14E-02	1.14E-03
Pentachlorophenol	0.24	0.001	0.240	8.64E-02	0	0	NA	NA
Phenanthrene	0.140	0.001	0.003	7.85E-03	10	100	7.85E-04	7.85E-05
Pyrene	0.230	0.002	0.004	1.25E-02	10	100	1.25E-03	1.25E-04
Pesticides/PCBs								
4,4'-DDE	0.043	0.000	0.073	2.51E-02	0.0028	0.028	8.96E+00	8.96E-01
Methoxychlor	0.070	0.001	0.040	1.61E-02	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
AMERICAN ROBIN - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

American Robin
(Conservative Inputs)

Body Weight	0.077 kg		
Food Ingestion Rate	0.069 kg/day	% Vegetation	0.6
Water Ingestion Rate	0 L/day	% Earthworm	0.35
Soil Ingestion Rate	0.069 kg/day	% Surface Soil	0.05

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/L)	Invertebrate Concentration[b] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Metals and Inorganics								
Aluminum	5370.000	4.296	284.610	3.32E+02	109.7	1097	3.03E+00	3.03E-01
Antimony	8.000	0.320	8.000	3.04E+00	0	0	NA	NA
Arsenic	50.800	1.905	11.379	6.87E+00	2.46	7.38	2.79E+00	9.31E-01
Barium	76.400	2.292	76.400	2.86E+01	20.8	41.7	1.38E+00	6.86E-01
Beryllium	0.170	0.170	0.170	1.52E-01	0	0	NA	NA
Cadmium	3.200	1.875	24.666	8.89E+00	1.45	20	6.13E+00	4.44E-01
Chromium (total)	18.100	0.027	2.896	1.73E+00	1	5	1.73E+00	3.47E-01
Cobalt	6.600	0.026	6.600	2.38E+00	1	10	2.38E+00	2.38E-01
Copper	189.000	23.436	97.335	5.16E+01	47	61.7	1.10E+00	8.36E-01
Iron	99700.000	99700.000	3788.600	5.93E+04	100	1000	5.93E+02	5.93E+01
Lead	1100.000	42.790	292.600	1.64E+02	1.13	11.3	1.45E+02	1.45E+01
Manganese	522.000	26.100	28.188	4.63E+01	977	9770	4.74E-02	4.74E-03
Mercury	0.890	0.580	1.507	8.24E-01	0.0064	0.064	1.29E+02	1.29E+01
Nickel	26.500	0.477	28.064	1.02E+01	77.4	107	1.32E-01	9.58E-02
Selenium	0.120	0.081	0.118	8.58E-02	0.4	0.8	2.15E-01	1.07E-01
Vanadium	9.300	0.010	0.363	5.36E-01	11.4	114	4.70E-02	4.70E-03
Zinc	1020.000	373.320	3265.020	1.27E+03	14.5	131	8.76E+01	9.70E+00

a = value calculated by multiplying surface soil concentration by plant BAF.
b = value calculated by multiplying surface soil concentration by invertebrate BAF.
NA = NOAEL/LOAEL not available

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FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum

(Conservative Inputs)			
Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	% fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)							
Acenaphthene	0.071	0.045	9.78E-04	0.3	3	3.26E-03	3.26E-04
Benzo(a)anthracene	0.007	0.005	9.93E-05	0.3	3	3.31E-04	3.31E-05
Benzo(a)pyrene	0.013	0.008	1.79E-04	0.3	3	5.96E-04	5.96E-05
Benzo(b)fluoranthene	0.018	0.011	2.47E-04	0.3	3	8.24E-04	8.24E-05
Benzo(k)fluoranthene	0.007	0.004	9.66E-05	0.3	3	3.22E-04	3.22E-05
Bis(2-ethylhexyl)phthalate	0.337	0.733	1.35E-02	0	0	NA	NA
Chrysene	0.009	0.005	1.19E-04	0.3	3	3.97E-04	3.97E-05
Fluoranthene	0.017	0.011	2.34E-04	0.3	3	7.80E-04	7.80E-05
Indeno(1,2,3-cd)pyrene	0.008	0.005	1.03E-04	0.3	3	3.45E-04	3.45E-05
Pentachlorophenol	0.805	1.749	3.22E-02	0	0	NA	NA
Pyrene	0.012	0.007	1.60E-04	0.3	3	5.33E-04	5.33E-05
Pesticides/PCBs (mg/kg)							
4,4'-DDT	0.009	0.031	5.53E-04	0	0	NA	NA
Alpha-chlordane	0.003	0.033	5.68E-04	0	0	NA	NA
Gamma-chlordane	0.003	0.016	2.79E-04	0	0	NA	NA
Methoxychlor	0.063	0.246	4.37E-03	0	0	NA	NA
Inorganics (mg/kg)							
Aluminum	9843.888	9843.888	1.97E+02	0	0	NA	NA
Antimony	2.197	2.197	4.39E-02	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	% fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	4.649	4.649	9.30E-02	0.59	7.1	1.58E-01	1.31E-02
Barium	12.094	12.094	2.42E-01	0	0	NA	NA
Beryllium	0.405	0.405	8.11E-03	0	0	NA	NA
Cadmium	0.233	0.233	4.66E-03	0	0	NA	NA
Chromium (total)	16.256	16.256	3.25E-01	0.02	0.12	1.63E+01	2.71E+00
Cobalt	2.196	2.196	4.39E-02	0	0	NA	NA
Copper	9.713	9.713	1.94E-01	0	0	NA	NA
Iron	11211.667	11211.667	2.24E+02	0	0	NA	NA
Lead	22.567	22.567	4.51E-01	0	0	NA	NA
Manganese	49.689	49.689	9.94E-01	0	0	NA	NA
Mercury	0.070	0.070	1.41E-03	0.008	0.94	1.76E-01	1.50E-03
Nickel	63.100	63.100	1.26E+00	0	0	NA	NA
Selenium	1.158	1.158	2.32E-02	0	0	NA	NA
Thallium	0.715	0.715	1.43E-02	0	0	NA	NA
Vanadium	23.111	23.111	4.62E-01	0	0	NA	NA
Zinc	30.633	30.633	6.13E-01	0	0	NA	NA

a = Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
FILTERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum

(Conservative Inputs)			
Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	% fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Mean Concentrations

COPC	Filtered Surface Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics (mg/kg)							
Barium	0.123	0.490	4.46E-02	0	0	NA	NA
Manganese	0.132	49.334	9.88E-01	0	0	NA	NA
Thallium	0.008	0.939	1.81E-02	0	0	NA	NA
Vanadium	0.015	0.000	6.93E-02	0	0	NA	NA

NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	%fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
Bis(2-Ethylhexyl)phthalate	5.20	11.29	2.08E-01	0	0	NA	NA
Di-n-octyl phthalate	0.61	1.32	2.42E-02	0	0	NA	NA
Diethyl Phthalate	0.51	1.12	2.06E-02	0	0	NA	NA
Pesticides/PCBs							
4,4'-DDE	0.31	5.16	8.86E-02	0	0	NA	NA
4,4'-DDT	0.04	0.14	2.46E-03	0	0	NA	NA
Aroclor-1254	12.02	48.32	8.58E-01	0	0	NA	NA
Dieldrin	0.01	0.02	4.31E-04	0	0	NA	NA
Endrin	0.60	2.35	4.18E-02	0	0	NA	NA
alpha-BHC	0.01	0.05	9.25E-04	0	0	NA	NA
Inorganics							
Aluminum	10640.00	10640.00	2.13E+02	0	0	NA	NA
Antimony	6.35	6.35	1.27E-01	0	0	NA	NA
Arsenic	45.15	45.15	9.03E-01	0.59	7.1	1.53E+00	1.27E-01
Barium	70.00	70.00	1.40E+00	0	0	NA	NA
Cadmium	3.25	3.25	6.50E-02	0	0	NA	NA
Chromium	78.40	78.40	1.57E+00	0.02	0.12	7.84E+01	1.31E+01
Cobalt	15.45	15.45	3.09E-01	0	0	NA	NA
Copper	328.50	328.50	6.57E+00	0	0	NA	NA

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FOOD CHAIN MODELING CALCULATION
RED DRUM - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum

(Conservative Inputs)			
Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	%fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	214500.00	214500.00	4.29E+03	0	0	NA	NA
Lead	1759.50	1759.50	3.52E+01	0	0	NA	NA
Manganese	888.50	888.50	1.78E+01	0	0	NA	NA
Nickel	64.15	64.15	1.28E+00	0	0	NA	NA
Selenium	1.03	1.03	2.06E-02	0	0	NA	NA
Silver	1.15	1.15	2.30E-02	0	0	NA	NA
Vanadium	36.25	36.25	7.25E-01	0	0	NA	NA
Zinc	1135.50	1135.50	2.27E+01	0	0	NA	NA

a = Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND
MCRD PARIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	% fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)							
Acenaphthene	0.120	0.076	1.65E-03	0.3	3	5.49E-03	5.49E-04
Benzo(a)anthracene	0.018	0.011	2.47E-04	0.3	3	8.23E-04	8.23E-05
Benzo(a)pyrene	0.038	0.024	5.21E-04	0.3	3	1.74E-03	1.74E-04
Benzo(b)fluoranthene	0.120	0.076	1.65E-03	0.3	3	5.49E-03	5.49E-04
Benzo(k)fluoranthene	0.018	0.011	2.47E-04	0.3	3	8.23E-04	8.23E-05
Bis(2-ethylhexyl)phthalate	0.440	0.957	1.76E-02	0	0	NA	NA
Chrysene	0.044	0.028	6.04E-04	0.3	3	2.01E-03	2.01E-04
Fluoranthene	0.092	0.058	1.26E-03	0.3	3	4.21E-03	4.21E-04
Indeno(1,2,3-cd)pyrene	0.026	0.016	3.57E-04	0.3	3	1.19E-03	1.19E-04
Pentachlorophenol	0.180	0.391	7.19E-03	0	0	NA	NA
Pyrene	0.089	0.056	1.22E-03	0.3	3	4.07E-03	4.07E-04
Pesticides/PCBs (mg/kg)							
4,4'-DDT	0.066	0.240	4.27E-03	0	0	NA	NA
Alpha-chlordane	0.012	0.124	2.15E-03	0	0	NA	NA
Gamma-chlordane	0.014	0.068	1.19E-03	0	0	NA	NA
Methoxychlor	0.680	2.661	4.73E-02	0	0	NA	NA
Inorganics (mg/kg)							
Aluminum	52700.000	52700.000	1.05E+03	0	0	NA	NA
Antimony	6.800	6.800	1.36E-01	0	0	NA	NA

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FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND
MCRD PARIS ISLAND, SOUTH CAROLINA

Red Drum

(Conservative Inputs)			
Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	% fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	18.500	18.500	3.70E-01	0.59	7.1	6.27E-01	5.21E-02
Barium	62.900	62.900	1.26E+00	0	0	NA	NA
Beryllium	2.000	2.000	4.00E-02	0	0	NA	NA
Cadmium	0.840	0.840	1.68E-02	0	0	NA	NA
Chromium (total)	75.000	75.000	1.50E+00	0.02	0.12	7.50E+01	1.25E+01
Cobalt	10.300	10.300	2.06E-01	0	0	NA	NA
Copper	113.000	113.000	2.26E+00	0	0	NA	NA
Iron	43100.000	43100.000	8.62E+02	0	0	NA	NA
Lead	203.000	203.000	4.06E+00	0	0	NA	NA
Manganese	210.000	210.000	4.20E+00	0	0	NA	NA
Mercury	0.350	0.350	7.00E-03	0.008	0.94	8.75E-01	7.45E-03
Nickel	1060.000	1060.000	2.12E+01	0	0	NA	NA
Selenium	10.700	10.700	2.14E-01	0	0	NA	NA
Thallium	0.360	0.360	7.20E-03	0	0	NA	NA
Vanadium	112.000	112.000	2.24E+00	0	0	NA	NA
Zinc	197.000	197.000	3.94E+00	0	0	NA	NA

a = Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
FILTERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum

(Conservative Inputs)			
Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	%fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Maximum Concentrations

COPC	Filtered Surface Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics (mg/kg)							
Barium	0.253	1.012	2.06E-01	0	0	NA	NA
Manganese	0.211	78.703	1.97E+00	0	0	NA	NA
Thallium	0.030	3.582	6.20E-02	0	0	NA	NA
Vanadium	0.023	0.000	3.36E-01	0	0	NA	NA

NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum

(Conservative Inputs)			
Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	%fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
Bis(2-Ethylhexyl)phthalate	10	21.739	4.00E-01	0	0	NA	NA
Di-n-octyl phthalate	0.9	1.957	3.60E-02	0	0	NA	NA
Diethyl Phthalate	0.029	0.063	1.16E-03	0	0	NA	NA
Pesticides/PCBs							
4,4'-DDE	0.520	8.704	1.50E-01	0	0	NA	NA
4,4'-DDT	0.038	0.138	2.46E-03	0	0	NA	NA
Aroclor-1254	24.000	96.522	1.71E+00	0	0	NA	NA
Dieldrin	0.006	0.024	4.31E-04	0	0	NA	NA
Endrin	1.200	4.696	8.34E-02	0	0	NA	NA
alpha-BHC	0.003	0.012	2.16E-04	0	0	NA	NA
Inorganics							
Aluminum	11700	11700	2.34E+02	0	0	NA	NA
Antimony	9.4	9.4	1.88E-01	0	0	NA	NA
Arsenic	49.7	49.7	9.94E-01	0.59	7.1	1.68E+00	1.40E-01
Barium	73.2	73.2	1.46E+00	0	0	NA	NA
Cadmium	4.7	4.7	9.40E-02	0	0	NA	NA
Chromium	119	119	2.38E+00	0.02	0.12	1.19E+02	1.98E+01
Cobalt	22.7	22.7	4.54E-01	0	0	NA	NA
Copper	489	489	9.78E+00	0	0	NA	NA

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FOOD CHAIN MODELING CALCULATION
RED DRUM - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Drum
(Conservative Inputs)

Body Weight	1 kg		
Food Ingestion Rate	0.02 kg/day	%fish	0.85
Water Ingestion Rate	0 L/day	% sediment	0.15
Sediment Ingestion Rate	0.02 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog TBP Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	307000	307000	6.14E+03	0	0	NA	NA
Lead	2930	2930	5.86E+01	0	0	NA	NA
Manganese	1480	1480	2.96E+01	0	0	NA	NA
Nickel	86.9	86.9	1.74E+00	0	0	NA	NA
Selenium	1.2	1.2	2.40E-02	0	0	NA	NA
Silver	1.2	1.2	2.40E-02	0	0	NA	NA
Vanadium	44.9	44.9	8.98E-01	0	0	NA	NA
Zinc	1520	1520	3.04E+01	0	0	NA	NA

a = Calculated using Theoretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998 - 1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey

(Conservative Inputs)			
Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)							
Acenaphthene	0.071	0.014	2.97E-03	10	100	2.97E-04	2.97E-05
Benzo(a)anthracene	0.007	0.001	3.01E-04	10	100	3.01E-05	3.01E-06
Benzo(a)pyrene	0.013	0.003	5.43E-04	10	100	5.43E-05	5.43E-06
Benzo(b)fluoranthene	0.018	0.004	7.50E-04	10	100	7.50E-05	7.50E-06
Benzo(k)fluoranthene	0.007	0.001	2.93E-04	10	100	2.93E-05	2.93E-06
Bis(2-ethylhexyl)phthalate	0.337	0.230	4.84E-02	1.1	11	4.40E-02	4.40E-03
Chrysene	0.009	0.002	3.62E-04	10	100	3.62E-05	3.62E-06
Fluoranthene	0.017	0.003	7.11E-04	10	100	7.11E-05	7.11E-06
Indeno(1,2,3-cd)pyrene	0.008	0.001	3.14E-04	10	100	3.14E-05	3.14E-06
Pentachlorophenol	0.805	0.550	1.16E-01	0	0	NA	NA
Pyrene	0.012	0.002	4.86E-04	10	100	4.86E-05	4.86E-06
Pesticides/PCBs (mg/kg)							
4,4'-DDT	0.009	0.010	2.05E-03	0.0028	0.028	7.32E-01	7.32E-02
Alpha-chlordane	0.003	0.010	2.17E-03	2.14	10.7	1.02E-03	2.03E-04
Gamma-chlordane	0.003	0.005	1.05E-03	2.14	10.7	4.89E-04	9.78E-05
Methoxychlor	0.063	0.077	1.62E-02	0	0	NA	NA
Inorganics (mg/kg)							
Aluminum	9843.888	9843.888	2.07E+03	109.7	1097	1.89E+01	1.89E+00
Antimony	2.197	2.197	4.62E-01	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998 - 1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey

(Conservative Inputs)			
Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	4.649	4.649	9.78E-01	2.46	7.38	3.97E-01	1.32E-01
Barium	12.094	12.094	2.54E+00	20.8	41.7	1.22E-01	6.10E-02
Beryllium	0.405	0.405	8.52E-02	0	0	NA	NA
Cadmium	0.233	0.233	4.90E-02	1.45	20	3.38E-02	2.45E-03
Chromium (total)	16.256	16.256	3.42E+00	1	5	3.42E+00	6.84E-01
Cobalt	2.196	2.196	4.62E-01	1	10	4.62E-01	4.62E-02
Copper	9.713	9.713	2.04E+00	47	61.7	4.35E-02	3.31E-02
Iron	11211.667	11211.667	2.36E+03	100	1000	2.36E+01	2.36E+00
Lead	22.567	22.567	4.74E+00	1.13	11.3	4.20E+00	4.20E-01
Manganese	49.689	49.689	1.04E+01	977	9770	1.07E-02	1.07E-03
Mercury	0.070	0.070	1.48E-02	0.0064	0.064	2.31E+00	2.31E-01
Nickel	63.100	63.100	1.33E+01	77.4	107	1.71E-01	1.24E-01
Selenium	1.158	1.158	2.43E-01	0.4	0.8	6.09E-01	3.04E-01
Thallium	0.715	0.715	1.50E-01	0.47	4.7	3.20E-01	3.20E-02
Vanadium	23.111	23.111	4.86E+00	11.4	114	4.26E-01	4.26E-02
Zinc	30.633	30.633	6.44E+00	14.5	131	4.44E-01	4.92E-02

a = Calculated using Theroretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

FOOD CHAIN MODLEING CALCULATION
OSPREY - AVERAGE CONCENTRATION
FILTERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey

(Conservative Inputs)			
Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics (mg/kg)							
Barium	0.123	0.490	1.03E-01	20.8	41.7	4.95E-03	2.47E-03
Manganese	0.132	49.334	1.04E+01	977	9770	1.06E-02	1.06E-03
Thallium	0.008	0.939	1.97E-01	0.47	4.7	4.20E-01	4.20E-02
Vanadium	0.015	0.000	3.07E-05	11.4	114	2.69E-06	2.69E-07

FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey

(Conservative Inputs)			
Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
Bis(2-Ethylhexyl)phthalate	5.195	3.549	7.46E-01	1.1	11	6.78E-01	6.78E-02
Di-n-octyl phthalate	0.605	0.413	8.69E-02	1.1	11	7.90E-02	7.90E-03
Diethyl Phthalate	0.515	0.352	7.39E-02	0	0	NA	NA
Pesticides/PCBs							
4,4'-DDE	0.308	1.620	3.41E-01	0.0028	0.028	1.22E+02	1.22E+01
4,4'-DDT	0.038	0.043	9.12E-03	0.0028	0.028	3.26E+00	3.26E-01
Aroclor-1254	12.016	15.187	3.19E+00	0.18	1.8	1.77E+01	1.77E+00
Dieldrin	0.006	0.008	1.60E-03	0.077	0.77	2.08E-02	2.08E-03
Endrin	0.602	0.740	1.56E-01	0.01	0.1	1.56E+01	1.56E+00
alpha-BHC	0.013	0.016	3.44E-03	0.56	2.25	6.14E-03	1.53E-03
Inorganics							
Aluminum	10640.000	10640.000	2.24E+03	109.7	1097	2.04E+01	2.04E+00
Antimony	6.350	6.350	1.34E+00	0	0	NA	NA
Arsenic	45.150	45.150	9.49E+00	2.46	7.38	3.86E+00	1.29E+00
Barium	70.000	70.000	1.47E+01	20.8	41.7	7.08E-01	3.53E-01
Cadmium	3.250	3.250	6.83E-01	1.45	20	4.71E-01	3.42E-02
Chromium	78.400	78.400	1.65E+01	1	5	1.65E+01	3.30E+00
Cobalt	15.450	15.450	3.25E+00	1	10	3.25E+00	3.25E-01
Copper	328.500	328.500	6.91E+01	47	61.7	1.47E+00	1.12E+00

FOOD CHAIN MODELING CALCULATION
OSPREY - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey

(Conservative Inputs)			
Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	214500.000	214500.000	4.51E+04	100	1000	4.51E+02	4.51E+01
Lead	1759.500	1759.500	3.70E+02	1.13	11.3	3.27E+02	3.27E+01
Manganese	888.500	888.500	1.87E+02	977	9770	1.91E-01	1.91E-02
Nickel	64.150	64.150	1.35E+01	77.4	107	1.74E-01	1.26E-01
Selenium	1.030	1.030	2.17E-01	0.4	0.8	5.41E-01	2.71E-01
Silver	1.150	1.150	2.42E-01	0	0	NA	NA
Vanadium	36.250	36.250	7.62E+00	11.4	114	6.69E-01	6.69E-02
Zinc	1135.500	1135.500	2.39E+02	14.5	131	1.65E+01	1.82E+00

a = Calculated using Theoretical Bioaccumulation Potential Equation (organic compounds).
NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998 - 1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)							
Acenaphthene	0.12	0.024	5.00E-03	10	100	5.00E-04	5.00E-05
Benzo(a)anthracene	0.018	0.004	7.50E-04	10	100	7.50E-05	7.50E-06
Benzo(a)pyrene	0.038	0.008	1.58E-03	10	100	1.58E-04	1.58E-05
Benzo(b)fluoranthene	0.12	0.024	5.00E-03	10	100	5.00E-04	5.00E-05
Benzo(k)fluoranthene	0.018	0.004	7.50E-04	10	100	7.50E-05	7.50E-06
Bis(2-ethylhexyl)phthalate	0.44	0.301	6.32E-02	1.1	11	5.75E-02	5.75E-03
Chrysene	0.044	0.009	1.83E-03	10	100	1.83E-04	1.83E-05
Fluoranthene	0.092	0.018	3.83E-03	10	100	3.83E-04	3.83E-05
Indeno(1,2,3-cd)pyrene	0.026	0.005	1.08E-03	10	100	1.08E-04	1.08E-05
Pentachlorophenol	0.18	0.123	2.59E-02	0	0	NA	NA
Pyrene	0.089	0.018	3.71E-03	10	100	3.71E-04	3.71E-05
Pesticides/PCBs (mg/kg)							
4,4'-DDT	0.066	0.075	1.58E-02	0.0028	0.028	5.66E+00	5.66E-01
Alpha-chlordane	0.012	0.039	8.22E-03	2.14	10.7	3.84E-03	7.69E-04
Gamma-chlordane	0.014	0.021	4.46E-03	2.14	10.7	2.09E-03	4.17E-04
Methoxychlor	0.68	0.836	1.76E-01	0	0	NA	NA
Inorganics (mg/kg)							
Aluminum	52700	52700	1.11E+04	109.7	1097	1.01E+02	1.01E+01
Antimony	6.8	6.8	1.43E+00	0	0	NA	NA

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FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998 - 1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey

(Conservative Inputs)			
Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	18.5	18.5	3.89E+00	2.46	7.38	1.58E+00	5.27E-01
Barium	62.9	62.9	1.32E+01	20.8	41.7	6.36E-01	3.17E-01
Beryllium	2	2	4.21E-01	0	0	NA	NA
Cadmium	0.84	0.84	1.77E-01	1.45	20	1.22E-01	8.83E-03
Chromium (total)	75	75	1.58E+01	1	5	1.58E+01	3.15E+00
Cobalt	10.3	10.3	2.17E+00	1	10	2.17E+00	2.17E-01
Copper	113	113	2.38E+01	47	61.7	5.06E-01	3.85E-01
Iron	43100	43100	9.06E+03	100	1000	9.06E+01	9.06E+00
Lead	203	203	4.27E+01	1.13	11.3	3.78E+01	3.78E+00
Manganese	210	210	4.42E+01	977	9770	4.52E-02	4.52E-03
Mercury	0.35	0.35	7.36E-02	0.0064	0.064	1.15E+01	1.15E+00
Nickel	1060	1060	2.23E+02	77.4	107	2.88E+00	2.08E+00
Selenium	10.7	10.7	2.25E+00	0.4	0.8	5.62E+00	2.81E+00
Thallium	0.36	0.36	7.57E-02	0.47	4.7	1.61E-01	1.61E-02
Vanadium	112	112	2.35E+01	11.4	114	2.07E+00	2.07E-01
Zinc	197	197	4.14E+01	14.5	131	2.86E+00	3.16E-01

a = Calculated using Theroretical Bioaccumulation Potential equation (organic compounds).
NA = NOAEL/LOAEL not available

FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
FILTERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics (mg/kg)							
Barium	0.253	1.012	2.13E-01	20.8	41.7	1.02E-02	5.10E-03
Manganese	0.211	78.703	1.65E+01	977	9770	1.69E-02	1.69E-03
Thallium	0.030	3.582	7.53E-01	0.47	4.7	1.60E+00	1.60E-01
Vanadium	0.023	0.000	4.84E-05	11.4	114	4.24E-06	4.24E-07

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FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey
(Conservative Inputs)

Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
Bis(2-Ethylhexyl)phthalate	10.000	6.832	1.44E+00	1.1	11	1.31E+00	1.31E-01
Di-n-octyl phthalate	0.900	0.615	1.29E-01	1.1	11	1.18E-01	1.18E-02
Diethyl Phthalate	0.029	0.020	4.17E-03	0	0	NA	NA
Pesticides/PCBs							
4,4'-DDE	0.520	2.736	5.75E-01	0.0028	0.028	2.05E+02	2.05E+01
4,4'-DDT	0.038	0.043	9.12E-03	0.0028	0.028	3.26E+00	3.26E-01
Aroclor-1254	24.000	30.335	6.38E+00	0.18	1.8	3.54E+01	3.54E+00
Dieldrin	0.006	0.008	1.60E-03	0.077	0.77	2.08E-02	2.08E-03
Endrin	1.200	1.476	3.10E-01	0.01	0.1	3.10E+01	3.10E+00
alpha-BHC	0.003	0.004	8.02E-04	0.56	2.25	1.43E-03	3.56E-04
Inorganics							
Aluminum	11700	11700	2.46E+03	109.7	1097	2.24E+01	2.24E+00
Antimony	9.4	9.4	1.98E+00	0	0	NA	NA
Arsenic	49.7	49.7	1.05E+01	2.46	7.38	4.25E+00	1.42E+00
Barium	73.2	73.2	1.54E+01	20.8	41.7	7.40E-01	3.69E-01
Cadmium	4.7	4.7	9.88E-01	1.45	20	6.82E-01	4.94E-02
Chromium	119	119	2.50E+01	1	5	2.50E+01	5.00E+00
Cobalt	22.7	22.7	4.77E+00	1	10	4.77E+00	4.77E-01
Copper	489	489	1.03E+02	47	61.7	2.19E+00	1.67E+00

FOOD CHAIN MODELING CALCULATION
OSPREY - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Osprey

(Conservative Inputs)			
Body Weight	1.403 kg		
Food Ingestion Rate	0.295 kg/day	% fish	1
Water Ingestion Rate	0 L/day		
Sediment Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Red Drum Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	307000	307000	6.46E+04	100	1000	6.46E+02	6.46E+01
Lead	2930	2930	6.16E+02	1.13	11.3	5.45E+02	5.45E+01
Manganese	1480	1480	3.11E+02	977	9770	3.19E-01	3.19E-02
Nickel	86.9	86.9	1.83E+01	77.4	107	2.36E-01	1.71E-01
Selenium	1.2	1.2	2.52E-01	0.4	0.8	6.31E-01	3.15E-01
Silver	1.2	1.2	2.52E-01	0	0	NA	NA
Vanadium	44.9	44.9	9.44E+00	11.4	114	8.28E-01	8.28E-02
Zinc	1520	1520	3.20E+02	14.5	131	2.20E+01	2.44E+00

a = Calculated using Theoretical Bioaccumulation Potential Equation (organic compounds).
NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day
Sediment Ingestion Rate	0 kg/day

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)						
Acenaphthene	0.071	4.28E-03	0.3	3	1.43E-02	1.43E-03
Benzo(a)anthracene	0.007	4.34E-04	0.3	3	1.45E-03	1.45E-04
Benzo(a)pyrene	0.013	7.82E-04	0.3	3	2.61E-03	2.61E-04
Benzo(b)fluoranthene	0.018	1.08E-03	0.3	3	3.60E-03	3.60E-04
Benzo(k)fluoranthene	0.007	4.23E-04	0.3	3	1.41E-03	1.41E-04
Bis(2-ethylhexyl)phthalate	0.337	2.02E-02	0	0	NA	NA
Chrysene	0.009	5.21E-04	0.3	3	1.74E-03	1.74E-04
Fluoranthene	0.017	1.02E-03	0.3	3	3.41E-03	3.41E-04
Indeno(1,2,3-cd)pyrene	0.008	4.53E-04	0.3	3	1.51E-03	1.51E-04
Pentachlorophenol	0.805	4.83E-02	0	0	NA	NA
Pyrene	0.012	6.99E-04	0.3	3	2.33E-03	2.33E-04
Pesticides/PCBs (mg/kg)						
4,4'-DDT	0.009	5.13E-04	0	0	NA	NA
Alpha-chlordane	0.003	1.90E-04	0	0	NA	NA
Gamma-chlordane	0.003	1.97E-04	0	0	NA	NA
Methoxychlor	0.063	3.77E-03	0	0	NA	NA
Inorganics (mg/kg)						
Aluminum	9843.888	5.91E+02	0	0	NA	NA
Antimony	2.197	1.32E-01	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog

(Conservative Inputs)	
Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day
Sediment Ingestion Rate	0 kg/day

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	4.649	2.79E-01	0.59	7.1	4.73E-01	3.93E-02
Barium	12.094	7.26E-01	0	0	NA	NA
Beryllium	0.405	2.43E-02	0	0	NA	NA
Cadmium	0.233	1.40E-02	0	0	NA	NA
Chromium (total)	16.256	9.75E-01	0.02	0.12	4.88E+01	8.13E+00
Cobalt	2.196	1.32E-01	0	0	NA	NA
Copper	9.713	5.83E-01	0	0	NA	NA
Iron	11211.667	6.73E+02	0	0	NA	NA
Lead	22.567	1.35E+00	0	0	NA	NA
Manganese	49.689	2.98E+00	0	0	NA	NA
Mercury	0.070	4.22E-03	0.008	0.94	5.27E-01	4.49E-03
Nickel	63.100	3.79E+00	0	0	NA	NA
Selenium	1.158	6.95E-02	0	0	NA	NA
Thallium	0.715	4.29E-02	0	0	NA	NA
Vanadium	23.111	1.39E+00	0	0	NA	NA
Zinc	30.633	1.84E+00	0	0	NA	NA

NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
FILTERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day (No Data)
Sediment Ingestion Rate	0 kg/day (No Data)

Mean Concentrations

COPC	Filtered Surface Water Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics (mg/kg)						
Barium	0.123	7.35E-03	NA	NA	NA	NA
Manganese	0.132	7.94E-03	NA	NA	NA	NA
Thallium	0.008	4.74E-04	NA	NA	NA	NA
Vanadium	0.015	8.76E-04	NA	NA	NA	NA

NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day
Sediment Ingestion Rate	0 kg/day

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds						
Bis(2-Ethylhexyl)phthalate	5.195	3.12E-01	0	0	NA	NA
Di-n-octyl phthalate	0.605	3.63E-02	0	0	NA	NA
Diethyl Phthalate	0.515	3.09E-02	0	0	NA	NA
Pesticides/PCBs						
4,4'-DDE	0.308	1.85E-02	0	0	NA	NA
4,4'-DDT	0.038	2.28E-03	0	0	NA	NA
Aroclor-1254	12.016	7.21E-01	0	0	NA	NA
Dieldrin	0.006	3.72E-04	0	0	NA	NA
Endrin	0.602	3.61E-02	0	0	NA	NA
alpha-BHC	0.013	7.98E-04	0	0	NA	NA
Inorganics						
Aluminum	10640.000	6.38E+02	0	0	NA	NA
Antimony	6.350	3.81E-01	0	0	NA	NA
Arsenic	45.150	2.71E+00	0.59	7.1	4.59E+00	3.82E-01
Barium	70.000	4.20E+00	0	0	NA	NA
Cadmium	3.250	1.95E-01	0	0	NA	NA
Chromium	78.400	4.70E+00	0.02	0.12	2.35E+02	3.92E+01
Cobalt	15.450	9.27E-01	0	0	NA	NA
Copper	328.500	1.97E+01	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog

(Conservative Inputs)		
Body Weight	0.003	kg
Food Ingestion Rate	0.00018	kg/day
Water Ingestion Rate	0	L/day
Sediment Ingestion Rate	0	kg/day

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	214500.000	1.29E+04	0	0	NA	NA
Lead	1759.500	1.06E+02	0	0	NA	NA
Manganese	888.500	5.33E+01	0	0	NA	NA
Nickel	64.150	3.85E+00	0	0	NA	NA
Selenium	1.030	6.18E-02	0	0	NA	NA
Silver	1.150	6.90E-02	0	0	NA	NA
Vanadium	36.250	2.18E+00	0	0	NA	NA
Zinc	1135.500	6.81E+01	0	0	NA	NA

NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998- 1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog

(Conservative Inputs)	
Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day
Sediment Ingestion Rate	0 kg/day

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)						
Acenaphthene	0.120	7.20E-03	0.3	3	2.40E-02	2.40E-03
Benzo(a)anthracene	0.018	1.08E-03	0.3	3	3.60E-03	3.60E-04
Benzo(a)pyrene	0.038	2.28E-03	0.3	3	7.60E-03	7.60E-04
Benzo(b)fluoranthene	0.120	7.20E-03	0.3	3	2.40E-02	2.40E-03
Benzo(k)fluoranthene	0.018	1.08E-03	0.3	3	3.60E-03	3.60E-04
Bis(2-ethylhexyl)phthalate	0.440	2.64E-02	0	0	NA	NA
Chrysene	0.044	2.64E-03	0.3	3	8.80E-03	8.80E-04
Fluoranthene	0.092	5.52E-03	0.3	3	1.84E-02	1.84E-03
Indeno(1,2,3-cd)pyrene	0.026	1.56E-03	0.3	3	5.20E-03	5.20E-04
Pentachlorophenol	0.180	1.08E-02	0	0	NA	NA
Pyrene	0.089	5.34E-03	0.3	3	1.78E-02	1.78E-03
Pesticides/PCBs (mg/kg)						
4,4'-DDT	0.066	3.96E-03	0	0	NA	NA
Alpha-chlordane	0.012	7.20E-04	0	0	NA	NA
Gamma-chlordane	0.014	8.40E-04	0	0	NA	NA
Methoxychlor	0.680	4.08E-02	0	0	NA	NA
Inorganics (mg/kg)						
Aluminum	52700.000	3.16E+03	0	0	NA	NA
Antimony	6.800	4.08E-01	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998- 1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog

(Conservative Inputs)	
Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day
Sediment Ingestion Rate	0 kg/day

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	18.500	1.11E+00	0.59	7.1	1.88E+00	1.56E-01
Barium	62.900	3.77E+00	0	0	NA	NA
Beryllium	2.000	1.20E-01	0	0	NA	NA
Cadmium	0.840	5.04E-02	0	0	NA	NA
Chromium (total)	75.000	4.50E+00	0.02	0.12	2.25E+02	3.75E+01
Cobalt	10.300	6.18E-01	0	0	NA	NA
Copper	113.000	6.78E+00	0	0	NA	NA
Iron	43100.000	2.59E+03	0	0	NA	NA
Lead	203.000	1.22E+01	0	0	NA	NA
Manganese	210.000	1.26E+01	0	0	NA	NA
Mercury	0.350	2.10E-02	0.008	0.94	2.63E+00	2.23E-02
Nickel	1060.000	6.36E+01	0	0	NA	NA
Selenium	10.700	6.42E-01	0	0	NA	NA
Thallium	0.360	2.16E-02	0	0	NA	NA
Vanadium	112.000	6.72E+00	0	0	NA	NA
Zinc	197.000	1.18E+01	0	0	NA	NA

NA = NOAEL/LOAEL not available.

FOOD CHIAN MODELING CALCULATION
MUMMICHOG - MAXIMUM
FILTERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day
Sediment Ingestion Rate	0 kg/day

Maximum Concentrations

COPC	Filtered Surface Water Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	NOAEL HQ
Inorganics (mg/kg)						
Barium	0.253	1.52E-02	NA	NA	NA	NA
Manganese	0.211	1.27E-02	NA	NA	NA	NA
Thallium	0.030	1.81E-03	NA	NA	NA	NA
Vanadium	0.023	1.38E-03	NA	NA	NA	NA

NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day
Sediment Ingestion Rate	0 kg/day

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds						
Bis(2-Ethylhexyl)phthalate	10.000	6.00E-01	0	0	NA	NA
Di-n-octyl phthalate	0.900	5.40E-02	0	0	NA	NA
Diethyl Phthalate	0.029	1.74E-03	0	0	NA	NA
Pesticides/PCBs						
4,4'-DDE	0.520	3.12E-02	0	0	NA	NA
4,4'-DDT	0.038	2.28E-03	0	0	NA	NA
Aroclor-1254	24.000	1.44E+00	0	0	NA	NA
Dieldrin	0.006	3.72E-04	0	0	NA	NA
Endrin	1.200	7.20E-02	0	0	NA	NA
alpha-BHC	0.003	1.86E-04	0	0	NA	NA
Inorganics						
Aluminum	11700.000	7.02E+02	0	0	NA	NA
Antimony	9.400	5.64E-01	0	0	NA	NA
Arsenic	49.700	2.98E+00	0.59	7.1	5.05E+00	4.20E-01
Barium	73.200	4.39E+00	0	0	NA	NA
Cadmium	4.700	2.82E-01	0	0	NA	NA
Chromium	119.000	7.14E+00	0.02	0.12	3.57E+02	5.95E+01
Cobalt	22.700	1.36E+00	0	0	NA	NA
Copper	489.000	2.93E+01	0	0	NA	NA

FOOD CHAIN MODELING CALCULATION
MUMMICHOG - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mummichog
(Conservative Inputs)

Body Weight	0.003 kg
Food Ingestion Rate	0.00018 kg/day
Water Ingestion Rate	0 L/day
Sediment Ingestion Rate	0 kg/day

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	307000.000	1.84E+04	0	0	NA	NA
Lead	2930.000	1.76E+02	0	0	NA	NA
Manganese	1480.000	8.88E+01	0	0	NA	NA
Nickel	86.900	5.21E+00	0	0	NA	NA
Selenium	1.200	7.20E-02	0	0	NA	NA
Silver	1.200	7.20E-02	0	0	NA	NA
Vanadium	44.900	2.69E+00	0	0	NA	NA
Zinc	1520.000	9.12E+01	0	0	NA	NA

NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.031 kg		
Food Ingestion Rate	0.0086 kg/day	% Vegetation	0.98
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.0086 kg/day	% Surface Soil	0.02

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.203	0.001	1.499E-03	1	10	1.50E-03	1.50E-04
Acenaphthene	0.198	0.001	1.462E-03	1.3	2.6	1.12E-03	5.62E-04
Acenaphthylene	0.203	0.001	1.495E-03	1.3	2.6	1.15E-03	5.75E-04
Benzo(a)anthracene	0.168	0.001	1.241E-03	1	10	1.24E-03	1.24E-04
Benzo(a)pyrene	0.167	0.001	1.230E-03	1	10	1.23E-03	1.23E-04
Benzo(b)fluoranthene	0.172	0.001	1.266E-03	1	10	1.27E-03	1.27E-04
Benzo(k)fluoranthene	0.177	0.001	1.303E-03	1	10	1.30E-03	1.30E-04
Bis(2-ethylhexyl)phthalate	0.141	0.005	2.051E-03	18.3	183	1.12E-04	1.12E-05
Chrysene	0.171	0.001	1.259E-03	1	10	1.26E-03	1.26E-04
Fluoranthene	0.180	0.001	1.324E-03	1	10	1.32E-03	1.32E-04
Fluorene	0.193	0.001	1.423E-03	1.3	2.6	1.09E-03	5.47E-04
Indeno(1,2,3-cd)pyrene	0.169	0.001	1.245E-03	1	10	1.24E-03	1.24E-04
Naphthalene	0.269	0.002	1.983E-03	1.3	2.6	1.53E-03	7.63E-04
Pentachlorophenol	0.381	0.001	2.422E-03	0.24	2.4	1.01E-02	1.01E-03
Phenanthrene	0.181	0.001	1.333E-03	1.3	2.6	1.03E-03	5.13E-04
Pyrene	0.166	0.001	1.220E-03	1	10	1.22E-03	1.22E-04
Pesticides/PCBs							
4,4'-DDE	0.004	0.000	3.645E-05	0.8	4	4.56E-05	9.11E-06
Methoxychlor	0.013	0.000	1.218E-04	4	8	3.04E-05	1.52E-05

FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.031 kg		
Food Ingestion Rate	0.0086 kg/day	% Vegetation	0.98
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.0086 kg/day	% Surface Soil	0.02

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Metals and Inorganics							
Aluminum	3398.875	2.719	1.960E+01	1.93	19.3	1.02E+01	1.02E+00
Antimony	1.376	0.055	2.260E-02	0.125	1.25	1.81E-01	1.81E-02
Arsenic	3.869	0.145	6.091E-02	0.126	1.26	4.83E-01	4.83E-02
Barium	13.166	0.395	1.804E-01	5.1	51	3.54E-02	3.54E-03
Beryllium	0.078	0.078	2.167E-02	0.66	6.6	3.28E-02	3.28E-03
Cadmium	0.294	0.172	4.851E-02	1	10	4.85E-02	4.85E-03
Chromium (total)	4.159	0.006	2.477E-02	3.28	32.8	7.55E-03	7.55E-04
Cobalt	0.722	0.003	4.788E-03	1	10	4.79E-03	4.79E-04
Copper	13.167	1.633	5.169E-01	11.7	15.14	4.42E-02	3.41E-02
Iron	8123.688	8123.688	2.254E+03	50	500	4.51E+01	4.51E+00
Lead	78.578	3.057	1.267E+00	8	80	1.58E-01	1.58E-02
Manganese	66.222	3.311	1.268E+00	88	284	1.44E-02	4.46E-03
Mercury	0.089	0.058	1.634E-02	0.015	0.025	1.09E+00	6.54E-01
Nickel	2.683	0.048	2.801E-02	40	80	7.00E-04	3.50E-04
Selenium	0.093	0.062	1.747E-02	0.2	0.33	8.74E-02	5.29E-02
Vanadium	4.522	0.005	2.644E-02	0.21	2.1	1.26E-01	1.26E-02
Zinc	72.419	26.505	7.608E+00	160	320	4.75E-02	2.38E-02

a = Value calculated by multiplying the plant BAF by the surface soil concentration.

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FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.031 kg		
Food Ingestion Rate	0.0086 kg/day	% Vegetation	0.98
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.0086 kg/day	% Surface Soil	0.02

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.385	0.003	2.84E-03	1	10	2.84E-03	2.84E-04
Acenaphthene	0.305	0.002	2.25E-03	1.3	2.6	1.73E-03	8.65E-04
Acenaphthylene	0.375	0.003	2.76E-03	1.3	2.6	2.13E-03	1.06E-03
Benzo(a)anthracene	0.14	0.001	1.03E-03	1	10	1.03E-03	1.03E-04
Benzo(a)pyrene	0.12	0.001	8.84E-04	1	10	8.84E-04	8.84E-05
Benzo(b)fluoranthene	0.13	0.001	9.58E-04	1	10	9.58E-04	9.58E-05
Benzo(k)fluoranthene	0.11	0.001	8.11E-04	1	10	8.11E-04	8.11E-05
Bis(2-ethylhexyl)phthalate	0.48	0.016	6.97E-03	18.3	183	3.81E-04	3.81E-05
Chrysene	0.16	0.001	1.18E-03	1	10	1.18E-03	1.18E-04
Fluoranthene	0.28	0.002	2.06E-03	1	10	2.06E-03	2.06E-04
Fluorene	0.22	0.001	1.62E-03	1.3	2.6	1.25E-03	6.24E-04
Indeno(1,2,3-cd)pyrene	0.069	0.000	5.09E-04	1	10	5.09E-04	5.09E-05
Naphthalene	1.435	0.010	1.06E-02	1.3	2.6	8.14E-03	4.07E-03
Pentachlorophenol	0.24	0.001	1.53E-03	0.24	2.4	6.36E-03	6.36E-04
Phenanthrene	0.14	0.001	1.03E-03	1.3	2.6	7.94E-04	3.97E-04
Pyrene	0.23	0.002	1.70E-03	1	10	1.70E-03	1.70E-04
Pesticides/PCBs							
4,4'-DDE	0.043	0.000	3.55E-04	0.8	4	4.44E-04	8.89E-05
Methoxychlor	0.07	0.001	6.36E-04	4	8	1.59E-04	7.95E-05

mouse max

FOOD CHAIN MODELING CALCULATION
COTTON MOUSE - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Cotton Mouse
(Conservative Inputs)

Body Weight	0.031 kg		
Food Ingestion Rate	0.0086 kg/day	% Vegetation	0.98
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.0086 kg/day	% Surface Soil	0.02

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Vegetation Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Metals and Inorganics							
Aluminum	5370	4.296	3.10E+01	1.93	19.3	1.60E+01	1.60E+00
Antimony	8	0.320	1.31E-01	0.125	1.25	1.05E+00	1.05E-01
Arsenic	50.8	1.905	8.00E-01	0.126	1.26	6.35E+00	6.35E-01
Barium	76.4	2.292	1.05E+00	5.1	51	2.05E-01	2.05E-02
Beryllium	0.17	0.170	4.72E-02	0.66	6.6	7.15E-02	7.15E-03
Cadmium	3.2	1.875	5.28E-01	1	10	5.28E-01	5.28E-02
Chromium (total)	18.1	0.027	1.08E-01	3.28	32.8	3.29E-02	3.29E-03
Cobalt	6.6	0.026	4.38E-02	1	10	4.38E-02	4.38E-03
Copper	189	23.436	7.42E+00	11.7	15.14	6.34E-01	4.90E-01
Iron	99700	99700	2.77E+04	50	500	5.53E+02	5.53E+01
Lead	1100	42.790	1.77E+01	8	80	2.22E+00	2.22E-01
Manganese	522	26.100	9.99E+00	88	284	1.14E-01	3.52E-02
Mercury	0.89	0.580	1.63E-01	0.015	0.025	1.08E+01	6.51E+00
Nickel	26.5	0.477	2.77E-01	40	80	6.92E-03	3.46E-03
Selenium	0.12	0.081	2.26E-02	0.2	0.33	1.13E-01	6.85E-02
Vanadium	9.3	0.010	5.44E-02	0.21	2.1	2.59E-01	2.59E-02
Zinc	1020	373.320	1.07E+02	160	320	6.70E-01	3.35E-01

a = Value calculated by multiplying the plant BAF by the surface soil concentration.

hg-1

8:34 AM

FOOD CHAIN MODELING CALCULATION
MINK - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink

(Conservative Inputs)			
Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)								
Acenaphthene	0.071	0	0.045	1.04E-02	1.3	2.6	8.02E-03	4.01E-03
Benzo(a)anthracene	0.007	0	0.005	1.06E-03	1	10	1.06E-03	1.06E-04
Benzo(a)pyrene	0.013	0	0.008	1.91E-03	1	10	1.91E-03	1.91E-04
Benzo(b)fluoranthene	0.018	0	0.011	2.64E-03	1	10	2.64E-03	2.64E-04
Benzo(k)fluoranthene	0.007	0	0.004	1.03E-03	1	10	1.03E-03	1.03E-04
Bis(2-ethylhexyl)phthalate	0.337	0.003	0.733	1.53E-01	18.3	183	8.37E-03	8.37E-04
Chrysene	0.009	0	0.005	1.27E-03	1	10	1.27E-03	1.27E-04
Fluoranthene	0.017	0	0.011	2.50E-03	1	10	2.50E-03	2.50E-04
Indeno(1,2,3-cd)pyrene	0.008	0	0.005	1.10E-03	1	10	1.10E-03	1.10E-04
Pentachlorophenol	0.805	0	1.749	3.65E-01	0.24	2.4	1.52E+00	1.52E-01
Pyrene	0.012	0	0.007	1.71E-03	1	10	1.71E-03	1.71E-04
Pesticides/PCBs (mg/kg)								
4,4'-DDT	0.009	0	0.031	6.36E-03	0.8	4	7.95E-03	1.59E-03
Alpha-chlordane	0.003	0	0.033	6.62E-03	4.6	9.2	1.44E-03	7.19E-04
Gamma-chlordane	0.003	0	0.016	3.22E-03	4.6	9.2	7.01E-04	3.51E-04
Methoxychlor	0.063	0	0.246	5.03E-02	4	8	1.26E-02	6.29E-03
Inorganics (mg/kg)								
Aluminum	9843.888	2.692	9843.888	2.17E+03	1.93	19.3	1.12E+03	1.12E+02
Antimony	2.197	0	2.197	4.83E-01	0.125	1.25	3.87E+00	3.87E-01

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FOOD CHAIN MODELING CALCULATION
MINK - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink
(Conservative Inputs)

Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	4.649	0.005	4.649	1.02E+00	0.126	1.26	8.12E+00	8.12E-01
Barium	12.094	0.123	12.094	2.67E+00	5.1	51	5.23E-01	5.23E-02
Beryllium	0.405	0	0.405	8.92E-02	0.66	6.6	1.35E-01	1.35E-02
Cadmium	0.233	0	0.233	5.12E-02	1	10	5.12E-02	5.12E-03
Chromium (total)	16.256	0.017	16.256	3.58E+00	3.28	32.8	1.09E+00	1.09E-01
Cobalt	2.196	0	2.196	4.83E-01	1	10	4.83E-01	4.83E-02
Copper	9.713	0	9.713	2.14E+00	11.7	15.14	1.83E-01	1.41E-01
Iron	11211.667	1.683	11211.667	2.47E+03	50	500	4.93E+01	4.93E+00
Lead	22.567	0	22.567	4.96E+00	8	80	6.21E-01	6.21E-02
Manganese	49.689	0.139	49.689	1.09E+01	88	284	1.24E-01	3.85E-02
Mercury	0.070	0	0.070	1.55E-02	0.015	0.025	1.03E+00	6.18E-01
Nickel	63.100	0	63.100	1.39E+01	40	80	3.47E-01	1.74E-01
Selenium	1.158	0.006	1.158	2.55E-01	0.2	0.33	1.27E+00	7.73E-01
Thallium	0.715	0	0.715	1.57E-01	0.007	0.074	2.13E+01	2.13E+00
Vanadium	23.111	0.018	23.111	5.09E+00	0.21	2.1	2.42E+01	2.42E+00
Zinc	30.633	0	30.633	6.74E+00	160	320	4.21E-02	2.11E-02

a = Calculated using Theoretical Bioaccumulation Potential Equation (organic compounds).

8:34 AM

FOOD CHAIN MODELING CALCULATION
MINK - AVERAGE CONCENTRATION
FILTERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink

(Conservative Inputs)			
Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Mean Concentrations

COPC	Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Inorganics							
Barium	0.123	0.490	3.53E-01	5.1	51	6.93E-02	6.93E-03
Manganese	0.132	49.334	1.09E+01	88	284	1.23E-01	3.83E-02
Thallium	0.008	0.939	2.02E-01	0.0074	0.074	2.73E+01	2.73E+00
Vanadium	0.015	0.000	4.79E-01	0.21	2.1	2.28E+00	2.28E-01

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FOOD CHAIN MODELING CALCULATION
MINK - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink
(Conservative Inputs)

Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
Bis(2-Ethylhexyl)phthalate	5.195	11.293	2.36E+00	18.3	183	1.29E-01	1.29E-02
Di-n-octyl phthalate	0.605	1.315	2.75E-01	13	130	2.11E-02	2.11E-03
Diethyl Phthalate	0.515	1.118	2.34E-01	4583	0	5.10E-05	NA
Pesticides/PCBs							
4,4'-DDE	0.308	5.156	1.03E+00	0.8	4	1.29E+00	2.58E-01
4,4'-DDT	0.038	0.138	2.83E-02	0.8	4	3.54E-02	7.07E-03
Aroclor-1254	12.016	48.323	9.88E+00	0.068	0.68	1.45E+02	1.45E+01
Dieldrin	0.006	0.024	4.96E-03	0.02	0.2	2.48E-01	2.48E-02
Endrin	0.602	2.354	4.82E-01	0.092	0.92	5.23E+00	5.23E-01
alpha-BHC	0.013	0.052	1.06E-02	0.014	0.14	7.61E-01	7.61E-02
Inorganics							
Aluminum	10640.000	10640.000	2.34E+03	1.93	19.3	1.21E+03	1.21E+02
Antimony	6.350	6.350	1.40E+00	0.125	1.25	1.12E+01	1.12E+00
Arsenic	45.150	45.150	9.93E+00	0.126	1.26	7.88E+01	7.88E+00
Barium	70.000	70.000	1.54E+01	5.1	51	3.02E+00	3.02E-01
Cadmium	3.250	3.250	7.15E-01	1	10	7.15E-01	7.15E-02
Chromium	78.400	78.400	1.72E+01	3.28	32.8	5.26E+00	5.26E-01
Cobalt	15.450	15.450	3.40E+00	1	10	3.40E+00	3.40E-01
Copper	328.500	328.500	7.23E+01	11.7	15.14	6.18E+00	4.77E+00

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FOOD CHAIN MODELING CALCULATION
MINK - AVERAGE CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink

(Conservative Inputs)			
Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Mean Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	214500.000	214500.000	4.72E+04	50	500	9.44E+02	9.44E+01
Lead	1759.500	1759.500	3.87E+02	8	80	4.84E+01	4.84E+00
Manganese	888.500	888.500	1.95E+02	88	284	2.22E+00	6.88E-01
Nickel	64.150	64.150	1.41E+01	40	80	3.53E-01	1.76E-01
Selenium	1.030	1.030	2.27E-01	0.2	0.33	1.13E+00	6.87E-01
Silver	1.150	1.150	2.53E-01	1.8	18	1.41E-01	1.41E-02
Vanadium	36.250	36.250	7.98E+00	0.21	2.1	3.80E+01	3.80E+00
Zinc	1135.500	1135.500	2.50E+02	160	320	1.56E+00	7.81E-01

a = Calculated using Theoretical Bioaccumulation Potential Equation (organic compounds).
NA = NOAEL/LOAEL not available.

FOOD CHAIN MODELING CALCULATION
MINK - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink

(Conservative Inputs)			
Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatiles (mg/kg)								
Acenaphthene	0.12	0	0.076	1.76E-02	1.3	2.6	1.35E-02	6.75E-03
Benzo(a)anthracene	0.018	0	0.011	2.63E-03	1	10	2.63E-03	2.63E-04
Benzo(a)pyrene	0.038	0	0.024	5.56E-03	1	10	5.56E-03	5.56E-04
Benzo(b)fluoranthene	0.12	0	0.076	1.76E-02	1	10	1.76E-02	1.76E-03
Benzo(k)fluoranthene	0.018	0	0.011	2.63E-03	1	10	2.63E-03	2.63E-04
Bis(2-ethylhexyl)phthalate	0.44	0.010	0.957	2.00E-01	18.3	183	1.09E-02	1.09E-03
Chrysene	0.044	0	0.028	6.44E-03	1	10	6.44E-03	6.44E-04
Fluoranthene	0.092	0	0.058	1.35E-02	1	10	1.35E-02	1.35E-03
Indeno(1,2,3-cd)pyrene	0.026	0	0.016	3.80E-03	1	10	3.80E-03	3.80E-04
Pentachlorophenol	0.18	0	0.391	8.17E-02	0.24	2.4	3.40E-01	3.40E-02
Pyrene	0.089	0	0.056	1.30E-02	1	10	1.30E-02	1.30E-03
Pesticides/PCBs (mg/kg)								
4,4'-DDT	0.066	0	0.240	4.91E-02	0.8	4	6.14E-02	1.23E-02
Alpha-chlordane	0.012	0	0.124	2.51E-02	4.6	9.2	5.45E-03	2.72E-03
Gamma-chlordane	0.014	0	0.068	1.38E-02	4.6	9.2	2.99E-03	1.50E-03
Methoxychlor	0.68	0	2.661	5.44E-01	4	8	1.36E-01	6.81E-02
Inorganics (mg/kg)								
Aluminum	52700	12.9	52700.000	1.16E+04	1.93	19.3	6.01E+03	6.01E+02
Antimony	6.8	0	6.800	1.50E+00	0.125	1.25	1.20E+01	1.20E+00

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FOOD CHAIN MODELING CALCULATION
MINK - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1998-1999
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink

(Conservative Inputs)			
Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Water Concentration (mg/L)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	18.5	0.009	18.500	4.07E+00	0.126	1.26	3.23E+01	3.23E+00
Barium	62.9	0.253	62.900	1.38E+01	5.1	51	2.72E+00	2.72E-01
Beryllium	2	0	2.000	4.40E-01	0.66	6.6	6.67E-01	6.67E-02
Cadmium	0.84	0	0.840	1.85E-01	1	10	1.85E-01	1.85E-02
Chromium (total)	75	0.0321	75.000	1.65E+01	3.28	32.8	5.03E+00	5.03E-01
Cobalt	10.3	0	10.300	2.27E+00	1	10	2.27E+00	2.27E-01
Copper	113	0	113.000	2.49E+01	11.7	15.14	2.12E+00	1.64E+00
Iron	43100	7.89	43100.000	9.48E+03	50	500	1.90E+02	1.90E+01
Lead	203	0	203.000	4.47E+01	8	80	5.58E+00	5.58E-01
Manganese	210	0.214	210.000	4.62E+01	88	284	5.25E-01	1.63E-01
Mercury	0.35	0	0.350	7.70E-02	0.015	0.025	5.13E+00	3.08E+00
Nickel	1060	0	1060.000	2.33E+02	40	80	5.83E+00	2.92E+00
Selenium	10.7	0.018	10.700	2.35E+00	0.2	0.33	1.18E+01	7.14E+00
Thallium	0.36	0	0.360	7.92E-02	0.0074	0.074	1.07E+01	1.07E+00
Vanadium	112	0.0339	112.000	2.46E+01	0.21	2.1	1.17E+02	1.17E+01
Zinc	197	0	197	4.33E+01	160	320	2.71E-01	1.35E-01

a = Calculated using Theoretical Bioaccumulation Potential Equation (organic compounds).

FOOD CHAIN MODELING CALCULATION
MINK - MAXIMUM CONCENTRATION
FILTERED SURFACE WATER
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink
(Conservative Inputs)

Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Maximum Concentrations

COPC	Water Concentration (mg/L)	Fish Concentration (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	LOAEL HQ	NOAEL HQ
Inorganics (mg/kg)							
Barium	0.253	1.012	1.51E+00	5.1	51	2.97E-01	2.97E-02
Manganese	0.211	78.703	2.00E+01	88	284	2.28E-01	7.06E-02
Thallium	0.030	3.582	7.23E-01	0.0074	0.074	9.77E+01	9.77E+00
Vanadium	0.023	0.000	2.32E+00	0.21	2.1	1.10E+01	1.10E+00

FOOD CHAIN MODELING CALCULATION
MINK - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink

(Conservative Inputs)			
Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
Bis(2-Ethylhexyl)phthalate	10.000	21.739	4.54E+00	18.3	183	2.48E-01	2.48E-02
Di-n-octyl phthalate	0.900	1.957	4.09E-01	13	130	3.14E-02	3.14E-03
Diethyl Phthalate	0.029	0.063	1.32E-02	4583	0	2.87E-06	NA
Pesticides/PCBs							
4,4'-DDE	0.520	8.704	1.75E+00	0.8	4	2.18E+00	4.36E-01
4,4'-DDT	0.038	0.138	2.83E-02	0.8	4	3.54E-02	7.07E-03
Aroclor-1254	24.000	96.522	1.97E+01	0.068	0.68	2.90E+02	2.90E+01
Dieldrin	0.006	0.024	4.96E-03	0.02	0.2	2.48E-01	2.48E-02
Endrin	1.200	4.696	9.61E-01	0.092	0.92	1.04E+01	1.04E+00
alpha-BHC	0.003	0.012	2.48E-03	0.014	0.14	1.77E-01	1.77E-02
Inorganics							
Aluminum	11700.000	11700.000	2.57E+03	1.93	19.3	1.33E+03	1.33E+02
Antimony	9.400	9.400	2.07E+00	0.125	1.25	1.65E+01	1.65E+00
Arsenic	49.700	49.700	1.09E+01	0.126	1.26	8.68E+01	8.68E+00
Barium	73.200	73.200	1.61E+01	5.1	51	3.16E+00	3.16E-01
Cadmium	4.700	4.700	1.03E+00	1	10	1.03E+00	1.03E-01
Chromium	119.000	119.000	2.62E+01	3.28	32.8	7.98E+00	7.98E-01
Cobalt	22.700	22.700	4.99E+00	1	10	4.99E+00	4.99E-01
Copper	489.000	489.000	1.08E+02	11.7	15.14	9.19E+00	7.11E+00

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FOOD CHAIN MODELING CALCULATION
MINK - MAXIMUM CONCENTRATION
BASED ON SAMPLES COLLECTED IN 1995
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Mink
(Conservative Inputs)

Body Weight	0.55 kg		
Food Ingestion Rate	0.121 kg/day	% prey	0.906
Water Ingestion Rate	0.0242 L/day		
Sed Ingestion Rate	0.121 kg/day	% sediment	0.094

Maximum Concentrations

COPC	Sediment Concentration (mg/kg)	Mummichog Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Iron	307000.000	307000.000	6.75E+04	50	500	1.35E+03	1.35E+02
Lead	2930.000	2930.000	6.45E+02	8	80	8.06E+01	8.06E+00
Manganese	1480.000	1480.000	3.26E+02	88	284	3.70E+00	1.15E+00
Nickel	86.900	86.900	1.91E+01	40	80	4.78E-01	2.39E-01
Selenium	1.200	1.200	2.64E-01	0.2	0.33	1.32E+00	8.00E-01
Silver	1.200	1.200	2.64E-01	1.8	18	1.47E-01	1.47E-02
Vanadium	44.900	44.900	9.88E+00	0.21	2.1	4.70E+01	4.70E+00
Zinc	1520.000	1520.000	3.34E+02	160	320	2.09E+00	1.05E+00

a = Calculated using Theoretical Bioaccumulation Potential Equation (organic compounds).
NA = NOAEL/LOAEL not available.

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FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	0.957 kg		
Food Ingestion Rate	0.105 kg/day	% prey	1
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Prey Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.203	0.003	3.73E-04	10	100	3.73E-05	3.73E-06
Acenaphthene	0.198	0.030	3.29E-03	10	100	3.29E-04	3.29E-05
Acenaphthylene	0.203	0.003	3.72E-04	10	100	3.72E-05	3.72E-06
Benzo(a)anthracene	0.168	0.001	8.79E-05	10	100	8.79E-06	8.79E-07
Benzo(a)pyrene	0.167	0.002	2.06E-04	10	100	2.06E-05	2.06E-06
Benzo(b)fluoranthene	0.172	0.002	1.99E-04	10	100	1.99E-05	1.99E-06
Benzo(k)fluoranthene	0.177	0.002	1.67E-04	10	100	1.67E-05	1.67E-06
Bis(2-ethylhexyl)phthalate	0.141	0.011	1.20E-03	1.1	11	1.09E-03	1.09E-04
Chrysene	0.171	0.001	1.17E-04	10	100	1.17E-05	1.17E-06
Fluoranthene	0.180	0.001	6.66E-05	10	100	6.66E-06	6.66E-07
Fluorene	0.193	0.003	3.55E-04	10	100	3.55E-05	3.55E-06
Indeno(1,2,3-cd)pyrene	0.169	0.002	2.52E-04	10	100	2.52E-05	2.52E-06
Naphthalene	0.269	0.004	4.72E-04	10	100	4.72E-05	4.72E-06
Pentachlorophenol	0.381	0.229	2.51E-02	0	0	NA	NA
Phenanthrene	0.181	0.001	9.24E-05	10	100	9.24E-06	9.24E-07
Pyrene	0.166	0.001	6.84E-05	10	100	6.84E-06	6.84E-07
Pesticides/PCBs							
4,4'-DDE	0.004	0.005	4.96E-04	0.0028	0.028	1.77E-01	1.77E-02
Methoxychlor	0.013	0.000	4.29E-10	0	0	NA	NA
Metals and Inorganics							
Aluminum	3398.875	6.857	7.52E-01	109.7	1097	6.86E-03	6.86E-04
Antimony	1.376	0.036	3.93E-03	0	0	NA	NA
Arsenic	3.869	0.051	5.55E-03	2.46	7.38	2.26E-03	7.52E-04

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FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	0.957 kg		
Food Ingestion Rate	0.105 kg/day	% prey	1
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0 kg/day		

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Prey Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Barium	13.166	0.051	5.58E-03	20.8	41.7	2.68E-04	1.34E-04
Beryllium	0.078	0.004	4.29E-04	0	0	NA	NA
Cadmium	0.294	2.562	2.81E-01	1.45	20	1.94E-01	1.41E-02
Chromium (total)	4.159	0.094	1.03E-02	1	5	1.03E-02	2.06E-03
Cobalt	0.722	0.362	3.97E-02	1	10	3.97E-02	3.97E-03
Copper	13.167	2.524	2.77E-01	47	61.7	5.89E-03	4.49E-03
Iron	8123.688	4216.194	4.63E+02	100	1000	4.63E+00	4.63E-01
Lead	78.578	0.180	1.97E-02	1.13	11.3	1.74E-02	1.74E-03
Manganese	66.222	0.069	7.56E-03	977	9770	7.73E-06	7.73E-07
Mercury	0.089	0.001	1.15E-04	0.0064	0.064	1.80E-02	1.80E-03
Nickel	2.683	0.433	4.75E-02	77.4	107	6.14E-04	4.44E-04
Selenium	0.093	0.058	6.33E-03	0.4	0.8	1.58E-02	7.91E-03
Vanadium	4.522	0.012	1.29E-03	11.4	114	1.13E-04	1.13E-05
Zinc	72.419	271.234	2.98E+01	14.5	131	2.05E+00	2.27E-01

a = Value calculated using predicted concentrations in shrew and mouse. For the shrew concentration, the concentration in earthworms was first calculated by multiplying the invertebrate BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in the shrew. The mouse concentration was calculated by first multiplying the plant BAF by the surface coil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a mouse. The average of the predicted shrew and mouse concentrations was used to represent the prey concentration.

NA = NOAEL/LOAEL not available.

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hawk mean

FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	0.957 kg		
Food Ingestion Rate	0.105 kg/day	% prey	1
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Prey Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.385	0.012	1.33E-03	10	100	1.33E-04	1.33E-05
Acenaphthene	0.305	0.092	1.00E-02	10	100	1.00E-03	1.00E-04
Acenaphthylene	0.375	0.012	1.29E-03	10	100	1.29E-04	1.29E-05
Benzo(a)anthracene	0.14	0.001	1.15E-04	10	100	1.15E-05	1.15E-06
Benzo(a)pyrene	0.12	0.002	2.70E-04	10	100	2.70E-05	2.70E-06
Benzo(b)fluoranthene	0.13	0.002	2.73E-04	10	100	2.73E-05	2.73E-06
Benzo(k)fluoranthene	0.11	0.002	1.83E-04	10	100	1.83E-05	1.83E-06
Bis(2-ethylhexyl)phthalate	0.48	0.072	7.90E-03	1.1	11	7.18E-03	7.18E-04
Chrysene	0.16	0.002	1.84E-04	10	100	1.84E-05	1.84E-06
Fluoranthene	0.28	0.001	1.46E-04	10	100	1.46E-05	1.46E-06
Fluorene	0.22	0.007	7.60E-04	10	100	7.60E-05	7.60E-06
Indeno(1,2,3-cd)pyrene	0.069	0.002	1.90E-04	10	100	1.90E-05	1.90E-06
Naphthalene	1.435	0.043	4.72E-03	10	100	4.72E-04	4.72E-05
Pentachlorophenol	0.24	0.288	3.16E-02	0	0	NA	NA
Phenanthrene	0.14	0.001	1.12E-04	10	100	1.12E-05	1.12E-06
Pyrene	0.23	0.001	1.39E-04	10	100	1.39E-05	1.39E-06
Pesticides/PCBs							
4,4'-DDE	0.043	0.088	9.62E-03	0.0028	0.028	3.44E+00	3.44E-01
Methoxychlor	0.07	0.000	4.38E-09	0	0	NA	NA
Metals and Inorganics							
Aluminum	5370	21.346	2.34E+00	109.7	1097	2.13E-02	2.13E-03
Antimony	8	0.400	4.39E-02	0	0	NA	NA
Arsenic	50.8	1.138	1.25E-01	2.46	7.38	5.08E-02	1.69E-02

FOOD CHAIN MODELING CALCULATION
RED-TAILED HAWK - MAXIMUM CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red-Tailed Hawk
(Conservative Inputs)

Body Weight	0.957 kg		
Food Ingestion Rate	0.105 kg/day	% prey	1
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0 kg/day		

Maximum Concentrations

COPC	Soil Concentration (mg/kg)	Prey Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Barium	76.4	0.573	6.29E-02	20.8	41.7	3.02E-03	1.51E-03
Beryllium	0.17	0.009	9.33E-04	0	0	NA	NA
Cadmium	3.2	51.798	5.68E+00	1.45	20	3.92E+00	2.84E-01
Chromium (total)	18.1	0.811	8.90E-02	1	5	8.90E-02	1.78E-02
Cobalt	6.6	6.600	7.24E-01	1	10	7.24E-01	7.24E-02
Copper	189	58.401	6.41E+00	47	61.7	1.36E-01	1.04E-01
Iron	99700	3788.600	4.16E+02	100	1000	4.16E+00	4.16E-01
Lead	1100	4.389	4.82E-01	1.13	11.3	4.26E-01	4.26E-02
Manganese	522	0.564	6.19E-02	977	9770	6.33E-05	6.33E-06
Mercury	0.89	0.015	1.65E-03	0.0064	0.064	2.58E-01	2.58E-02
Nickel	26.5	8.419	9.24E-01	77.4	107	1.19E-02	8.63E-03
Selenium	0.12	0.089	9.73E-03	0.4	0.8	2.43E-02	1.22E-02
Vanadium	9.3	0.047	5.17E-03	11.4	114	4.54E-04	4.54E-05
Zinc	1020	6856.542	7.52E+02	14.5	131	5.19E+01	5.74E+00

a = In the maximum concentration scenario, the hawk was assumed to prey exclusively on shrews. Contaminant concentrations in shrews were estimated by first multiplying the surface soil concentration by the invertebrate BAF (to obtain the estimated concentration in invertebrates). This value was then multiplied by the mammal BAF to obtain the predicted concentration in the shrew.

NA = NOAEL/LOAEL not available.

FOOD CHAIN CALCULATION
RED FOX - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox

(Conservative Inputs)			
Body Weight	3.94 kg		
Food Ingestion Rate	0.552 kg/day	% prey	0.972
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.552 kg/day	% soil	0.028

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Prey Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Semivolatile Organic Compounds							
2-Methylnaphthalene	0.203	0.003	1.26E-03	1	10	1.26E-03	1.26E-04
Acenaphthene	0.198	3.00E-02	4.86E-03	1.3	2.6	3.74E-03	1.87E-03
Acenaphthylene	0.203	0.003	1.26E-03	1.3	2.6	9.67E-04	4.83E-04
Benzo(a)anthracene	0.168	0.001	7.70E-04	1	10	7.70E-04	7.70E-05
Benzo(a)pyrene	0.167	0.002	9.11E-04	1	10	9.11E-04	9.11E-05
Benzo(b)fluoranthene	0.172	0.002	9.21E-04	1	10	9.21E-04	9.21E-05
Benzo(k)fluoranthene	0.177	0.002	9.01E-04	1	10	9.01E-04	9.01E-05
Bis(2-ethylhexyl)phthalate	0.141	0.011	2.04E-03	18.3	183	1.12E-04	1.12E-05
Chrysene	0.171	0.001	8.16E-04	1	10	8.16E-04	8.16E-05
Fluoranthene	0.180	0.001	7.88E-04	1	10	7.88E-04	7.88E-05
Fluorene	0.193	0.003	1.20E-03	1.3	2.6	9.22E-04	4.61E-04
Indeno(1,2,3-cd)pyrene	0.169	0.002	9.75E-04	1	10	9.75E-04	9.75E-05
Naphthalene	0.269	0.004	1.64E-03	1.3	2.6	1.26E-03	6.32E-04
Pentachlorophenol	0.381	0.229	3.27E-02	0.24	2.4	1.36E-01	1.36E-02
Phenanthrene	0.181	0.001	8.24E-04	1.3	2.6	6.34E-04	3.17E-04
Pyrene	0.166	0.001	7.34E-04	1	10	7.34E-04	7.34E-05
Pesticides/PCBs							
4,4'-DDE	0.004	0.005	6.33E-04	0.8	4	7.92E-04	1.58E-04
Methoxychlor	0.013	0.000	5.26E-05	4	8	1.31E-05	6.57E-06
Metals and Inorganics							
Aluminum	3398.875	6.857	1.43E+01	1.93	19.3	7.39E+00	7.39E-01
Antimony	1.376	0.036	1.03E-02	0.125	1.25	8.22E-02	8.22E-03

FOOD CHAIN CALCULATION
RED FOX - AVERAGE CONCENTRATION
SITE 12 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Red Fox

(Conservative Inputs)			
Body Weight	3.94 kg		
Food Ingestion Rate	0.552 kg/day	% prey	0.972
Water Ingestion Rate	0 L/day		
Soil Ingestion Rate	0.552 kg/day	% soil	0.028

Mean Concentrations

COPC	Soil Concentration (mg/kg)	Prey Concentration[a] (mg/kg)	Dose (mg/kg/day)	NOAEL (mg/kg/day)	LOAEL (mg/kg/day)	NOAEL HQ	LOAEL HQ
Arsenic	3.869	0.051	2.21E-02	0.126	1.26	1.75E-01	1.75E-02
Barium	13.166	0.051	5.86E-02	5.1	51	1.15E-02	1.15E-03
Beryllium	0.078	0.004	8.38E-04	0.66	6.6	1.27E-03	1.27E-04
Cadmium	0.294	2.562	3.50E-01	1	10	3.50E-01	3.50E-02
Chromium (total)	4.159	0.094	2.91E-02	3.28	32.8	8.88E-03	8.88E-04
Cobalt	0.722	0.362	5.22E-02	1	10	5.22E-02	5.22E-03
Copper	13.167	2.524	3.95E-01	11.7	15.14	3.38E-02	2.61E-02
Iron	8123.688	4216.194	6.06E+02	50	500	1.21E+01	1.21E+00
Lead	78.578	0.180	3.33E-01	8	80	4.16E-02	4.16E-03
Manganese	66.222	0.069	2.69E-01	88	284	3.06E-03	9.48E-04
Mercury	0.089	0.001	4.93E-04	0.015	0.025	3.29E-02	1.97E-02
Nickel	2.683	0.433	6.95E-02	40	80	1.74E-03	8.69E-04
Selenium	0.093	0.058	8.22E-03	0.2	0.33	4.11E-02	2.49E-02
Vanadium	4.522	0.012	1.93E-02	0.21	2.1	9.21E-02	9.21E-03
Zinc	72.419	271.234	3.72E+01	160	320	2.33E-01	1.16E-01

a = Value calculated using predicted concentrations in shrew and mouse. For the shrew concentration, the concentration in earthworms was first calculated by multiplying the invertebrate BAF by the surface soil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in the shrew. The mouse concentration was calculated by first multiplying the plant BAF by the surface coil concentration. This value was then multiplied by the mammal BAF to obtain the predicted concentration in a mouse. The average of the predicted shrew and mouse concentrations was used to represent the prey concentration.

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F-5

COPC REFINEMENT

TABLE F-3
COPC REFINEMENT
SURFACE WATER - SITE12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Surface Water?
		Minimum	Maximum									
Volatile Organic Compounds (ug/L)												
2-Butanone	2/2	2.1	2.6	PAI-10-SW-03-00	2.4	NA	NA	NA	NA	0	<2 to <5	No[abc]
Acetone	1/3	13	13	PAI-10-SW-13-00	7.7	NA	NA	NA	NA	9.2 - 11	<2 to <5	No[ab]
Carbon disulfide	5/13	0.2	1	PAI-10-SW-02-00	0.5	NA	NA	NA	NA	1	<1 to <2	No[abc]
Semivolatile Organic Compounds (ug/L)												
Bis(2-ethylhexyl)phthalate	2/13	1	10.25	PAI-10-SW-08-00-AVG	3.0	NA	NA	NA	NA	5	45	No[abc]
Inorganics (ug/L)												
Aluminum	13/13	499	12900	PAI-10-SW-04-00	2692 UF	NA	NA	NA	NA	0	3100 UF, <22 to <99.4 F	No[abd]
Barium	13/13	17.3	253	PAI-10-SW-12-00-F	25.6 UF, 122.5F	NA	NA	NA	NA	0	38 UF, 256 F	No[abc]
Iron	13/13	292	7890	PAI-10-SW-04-00	1683 UF	NA	NA	NA	NA	0	2090 UF, 48 F	Yes[e]
Manganese	13/13	23.2	214	PAI-10-SW-05-00	139 UF, 132 F	NA	NA	NA	NA	0	53 UF, 18 F	Yes[e]
Thallium	2/13	14	30.1	PAI-10-SW-11-00-F	7.9 F	21.3	1.41	0.37	1	9 - 18	<1.6 to <18 UF & F	Yes[e]
Vanadium	12/13	10.1	33.9	PAI-10-SW-04-00	18.0 UF, 14.6 F	NA	NA	NA	NA	16.1	18 UF, 15 F	Yes[e]

COPC = Contaminant of potential concern.
ESV = Ecological screening value for saltwater
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available
Note: Inorganics were analyzed in filtered and unfiltered samples. Barium, manganese, thallium, and vanadium were the only surface water COPCs detected in filtered surface water samples at Site 1. Thallium was not detected in unfiltered samples.
F = Filtered, UF = Unfiltered
1 For chemicals with at least one detection in background samples, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detected background samples. If the chemical was not detected in any background sample, the range of detection limits in background samples is shown.

a This chemical does not biomagnify in the food chain.
b No screening values were identified for this chemical.
c Maximum detected concentration is less than or similar similar to background concentration.
d Not detected in filtered samples and concentrations in only one unfiltered sample exceeded the unfiltered background concentration.
e Potential risk to aquatic organisms via direct toxicity.

TABLE F-4
COPC REFINEMENT
SEDIMENT SAMPLES COLLECTED IN 1998-1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Sediment?
		Minimum	Maximum									
Volatile Organic Compounds (ug/kg)												
2-Butanone	2/16	5	20	PAI-10-SD-07-01	29.1	NA	NA	NA	NA	7.1 - 670	22	No[abc]
2-Hexanone	1/16	4.4	4.4	PAI-10-SD-15-01	28.0	NA	NA	NA	NA	7.1 - 670	<7 to <31	No[abcd]
4-Methyl-2-pentanone	6/16	4	53.7	PAI-10-SD-06-01	31.5	NA	NA	NA	NA	7.3 - 670	26	No[ab]
Acetone	8/16	25	390	PAI-10-SD-08-01	150.3	NA	NA	NA	NA	35 - 810	<7 to <110	No[ab]
Carbon disulfide	13/16	1.9	31	PAI-10-SD-08-01	18.3	NA	NA	NA	NA	5.1 - 400	9.2	No[ab]
Toluene	8/16	2.5	23	PAI-10-SD-08-01	17.5	NA	NA	NA	NA	4.3 - 400	9.7	No[abe]
Xylenes, Total	3/16	1.8	2.3	PAI-10-SD-04-01	16.7	NA	NA	NA	NA	4.3 - 400	<7 to <18	No[abc]
Semivolatile Organic Compounds (ug/kg)												
Bis(2-ethylhexyl)phthalate	8/18	45	440	PAI-10-SD-07-01	337.1	182[2]	2.4	1.9	4	480 - 2600	421	Yes[f]
Pentachlorophenol	1/18	180	180	PAI-10-SD-14-02	804.7	NA	NA	NA	NA	910 - 5100	<1600 to <2400	Yes[fg]
Total PAHs	7/16	91	333.5	PAI-10-SD-013-01A	137	1684	0.2	0.08	0	0.42 - 38	ND	No[ai]
Pesticides/PCBs (ug/kg)												
4,4'-DDT	1/18	66	66	PAI-10-SD-14-02	8.5	1.19	55.5	7.2	1	4.5 - 41	<2 to <22	Yes[fg]
Alpha-chlordane	1/18	12	12	PAI-10-SD-14-02	3.2	0.5[4]	24.0	6.3	1	2.3 - 21	<0.99 to <11	Yes[fg]
Gamma-chlordane	1/18	14	14	PAI-10-SD-14-02	3.3	0.5[4]	28.0	6.6	1	2.3 - 21	<0.99 to <11	Yes[fg]
Methoxychlor	1/18	680	680	PAI-10-SD-14-02	62.8	NA	NA	NA	NA	23 - 210	<9.9 to <110	Yes[h]
Inorganics (mg/kg)												
Aluminum	18/18	1870	52700	PAI-10-SD-08-01	9843.9	NA	NA	NA	NA	0	24200	Yes[h]
Antimony	2/18	3.5	6.8	PAI-10-SD-09-01	2.2	2	3.4	1.1	2	2.3 - 13.2	<0.17 to <9	Yes[f]
Arsenic	18/18	0.35	18.5	PAI-10-SD-08-01	4.6	7.24	2.6	0.6	6	0	12	Yes[fg]
Barium	11/18	5.7	62.9	PAI-10-SD-08-01	12.1	NA	NA	NA	NA	3.7 - 6.7	28	Yes[f]
Beryllium	13/18	0.21	2	PAI-10-SD-08-01	0.4	NA	NA	NA	NA	0.11 - 0.79	0.98	Yes[h]
Cadmium	3/18	0.002	0.84	PAI-10-SD-14-01	0.23	0.676	1.2	0.3	1	0.25 - 1.4	0.28	Yes[fg]
Chromium	18/18	3.2	75	PAI-10-SD-08-01	16.3	52.3	1.4	0.3	1	0	35.2	Yes[fg]
Cobalt	9/18	0.92	10.3	PAI-10-SD-14-02	2.2	NA	NA	NA	NA	0.92 - 3.4	2.6	Yes[h]
Copper	10/18	0.03	113	PAI-10-SD-14-01	9.7	18.7	6.0	0.5	1	1.3 - 2.7	10	Yes[fg]
Iron	18/18	1420	43100	PAI-10-SD-08-01	11211.7	NA	NA	NA	NA	0.5 - 1.1	21500	Yes[f]
Lead	18/18	3.1	203	PAI-10-SD-14-01	22.6	30.2	6.7	0.7	3	0	21	Yes[fg]
Manganese	17/18	13.3	210	PAI-10-SD-08-01	49.7	NA	NA	NA	NA	9.2	186	No[ace]
Mercury	7/18	0.06	0.35	PAI-10-SD-14-01	0.07	0.13	2.7	0.5	2	0.02 - 0.28	0.09	Yes[fg]
Nickel	18/18	1.3	1060	PAI-10-SD-14-02	63.1	15.9	66.7	4.0	1	0	6	Yes[fg]
Selenium	3/18	0.1	10.7	PAI-10-SD-20-01	1.2	NA	NA	NA	NA	0.1 - 2.5	<0.17 to <1.2	Yes[fg]
Thallium	1/18	0.36	0.36	PAI-10-SD-14-02	0.7	NA	NA	NA	NA	0.21 - 13.1	0.41	No[abc]
Vanadium	18/18	4.9	112	PAI-10-SD-08-01	23.1	NA	NA	NA	NA	0	50	Yes[f]
Zinc	12/18	8.5	197	PAI-10-SD-14-01	30.6	124	1.6	0.2	1	4.7 - 9.9	45	Yes[fg]

COPC = Contaminant of potential concern.
ESV = Ecological screening value
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available
Total organic carbon (TOC) in sediment samples ranged from 0.67 to 4.7 percent. Grain size ranged from 0.0 to 3.0 per cent gravel, 11.8 to 91.6 per cent sand, 2.0 to 40.2 per cent silt, and 4.3 to 47.6 per cent clay. See Appendix C.6 for TOC data and Appendix A-5 for grain size data in individual sediment samples.

TABLE F-4
COPC REFINEMENT
SEDIMENT SAMPLES COLLECTED IN 1998-1999
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Sediment?
		Minimum	Maximum									

1 For chemicals with at least one detection, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detected samples. If the chemical was not detected in any background sample, the range of detection limits is shown, except for total PAHs, where ND = not detected in any background sample.
2 Bis(2-ethylhexyl)phthalate used as a surrogate.
3 Range of method detection limits for individual PAHs, uncorrected for sample-specific dilution factors.
4 Chlordane used as a surrogate.
a This chemical does not biomagnify in the food chain.
b No screening values were identified for this chemical.
c Maximum detected concentration is similar to background concentration and the detection limits in most "non-detect" samples were less than or similar to background concentration.
d Infrequent detection.
e Measured concentrations were less than alternate screening values shown in Table 7-19.
f Potential risk to benthic receptors via direct toxicity.
g Potential risk to aquatic and semi-aquatic receptors via the food chain.
h Maximum detected concentration is greater than background concentration.
i Maximum concentration is less than ESV.

TABLE F-5
COPC REFINEMENT
SEDIMENT SAMPLES COLLECTED IN 1995
SITE 12/SWMU 10 - JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Concentration		Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Background Concentration[1]	Retained as COPC in Sediment?
	Sample # PI-12-01	Sample # PI-12-02							
Semivolatile Organic Compounds (ug/kg)									
Bis(2-ethylhexyl)phthalate	10000	780 U	5195	182	54.9	28.5	1	421	Yes[a]
Di-n-octyl phthalate	900	620 U	605	182 [2]	4.9	3.3	1	<400 to <1200	Yes[a]
Pesticides/PCBs (ug/kg)									
4,4'-DDE	520	96	308	2.07	251.2	148.8	2	<2 to <22	Yes[ab]
4,4'-DDT	See Note	38	38	1.19	31.9	31.9	1	<2 to <22	Yes[ab]
Aroclor-1254	24000	62 U	12016	21.6 [3]	1111.1	556.3	1	<9.9 to <120	Yes[ab]
Dieldrin	See Note	6.2	6.2	0.02	310.0	310.0	1	<2 to <22	Yes[ab]
Endrin	1200	6.2 U	602	0.02	60000.0	30077.5	1	<2 to <22	Yes[ab]
alpha-BHC	47 U	3.1	13.3	NA	NA	NA	NA	<0.99 to <11	Yes[a]
Inorganics (mg/kg)									
Aluminum	9580	11700	10640.0	NA	NA	NA	NA	24200	No[cd]
Antimony	3.3	9.4	6.4	2	4.7	3.2	2	<0.17 to <9	Yes[a]
Arsenic	40.6	49.7	45.2	7.24	6.9	6.2	2	12	Yes[ab]
Barium	73.2	66.8	70.0	NA	NA	NA	NA	28	Yes[a]
Cadmium	1.8	4.7	3.3	0.676	7.0	4.8	2	0.28	Yes[ab]
Chromium	37.8	119	78.4	52.3	2.3	1.5	1	35.2	Yes[ab]
Cobalt	8.2	22.7	15.5	NA	NA	NA	NA	2.6	Yes[a]
Copper	168	489	328.5	18.7	26.1	17.6	2	10	Yes[ab]
Iron	122000	307000	214500	NA	NA	NA	NA	21500	Yes[a]
Lead	589	2930	1759.5	30.2	97.0	58.3	2	21	Yes[ab]
Manganese	297	1480	888.5	NA	NA	NA	NA	186	Yes[a]
Nickel	41.4	86.9	64.2	15.9	5.5	4.0	2	6	Yes[ab]
Selenium	1.2	0.86	1.03	NA	NA	NA	NA	<0.17 to <1.2	Yes[ab]
Silver	1.2	1.1	1.2	0.733	1.6	1.6	2	<0.06 to <1.9	Yes[a]
Vanadium	27.6	44.9	36.3	NA	NA	NA	NA	50	Yes[a]
Zinc	751	1520	1135.5	124	12.3	9.2	2	45	Yes[ab]

COPC = Contaminant of potential concern.
ESV = Ecological screening value
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available
Note: Analytical data for this chemical were rejected in the data validation process.
1 For chemicals with at least one detection, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detecte was not detected in any background sample, the range of detection limits is shown.
2 Bis(2-ethylhexyl)phthalate used as a surrogate.
3 ESV for total PCBs
a Potential risk to benthic receptors via direct toxicity.
b Potential risk to aquatic and semi-aquatic receptors via the food chain.
c Maximum detected concentration is less than background concentration.
d This chemical does not biomagnify in the food chain.

TABLE F-6
COPC REFINEMENT
SURFACE SOIL - SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Surface Soil?
		Minimum	Maximum									
Volatile Organic Compounds (ug/kg)												
2-Hexanone	1/16	8.5	8.5	PAI-10-SS-09-01	61.2	NA	NA	NA	NA	5.4 - 680	<6 to <8	No[abcd]
4-Methyl-2-pentanone	6/16	3.8	26	PAI-10-SS-09-01	63.1	NA	NA	NA	NA	5.6 - 680	7.3	No[cd]
Acetone	4/15	23	350	PAI-10-SS-11-01	123.3	NA	NA	NA	NA	11 - 660	267	No[cd]
Carbon disulfide	1/16	6	6	PAI-10-SS-01A (1995)	36.5	NA	NA	NA	NA	3.3 - 410	<4 to <8	No[abcd]
Chloroform	2/16	1.8	7.5	PAI-10-SS-11-01	36.8	1.0	7.50	36.8	2	3.3 - 410	<4 to <8	Yes[e]
Chloromethane	2/16	3.6	17	PAI-10-SS-11-01	37.5	NA	NA	NA	NA	3.3 - 410	<4 to <8	No[cd]
Semivolatile Organic Compounds (ug/kg)												
Bis(2-ethylhexyl)phthalate	9/16	30	480	PAI-10-SS-07-01	141.3	100[2]	4.80	1.4	1	340 - 440	<340 to <390	Yes[e]
Pentachlorophenol	1/16	240	240	PAI-10-SS-12-01-D	380.6	2	120.0	190.31	1	690 - 1100	<720 to <2000	Yes[ef]
Total PAHs	5/16	685	4753	PAI-10-SS-12-01-D	896	1000	4.8	0.9	2	18 - 200[3]	ND	Yes[e]
Pesticides/PCBs (ug/kg)												
4,4'-DDE	1/16	43	43	PAI-10-SS-14-01	4.4	2.5	17.20	1.76	1	3.4 - 4.5	<3.6 to <18	Yes[ef]
Inorganics (mg/kg)												
Aluminum	16/16	822	5370	PAI-10-SS-14-01	3399	50	107.4	68.0	16	0	7270	No[g]
Antimony	1/16	8	8	PAI-10-SS-14-01	1.4	3.5	2.3	0.4	1	0.48 - 2.5	<0.15 to <2.1	Yes[e]
Arsenic	16/16	0.24	50.8	PAI-10-SS-14-01	3.87	10	5.1	0.4	1	0	1.4	Yes[ef]
Cadmium	2/16	0.06	3.2	PAI-10-SS-14-01	0.29	1.6	2.0	0.2	1	0.19 - 0.26	<0.03 to <0.22	Yes[ef]
Chromium (total)	16/16	1.8	18.1	PAI-10-SS-14-01	4.2	0.4[4]	45.3	10.4	16	0	6.2	Yes[ef]
Copper	8/16	0.72	189	PAI-10-SS-14-01	13.2	40	4.7	0.3	1	0.27 - 1	1.5	Yes[ef]
Iron	16/16	485	99700	PAI-10-SS-14-01	8124	200	498.5	40.6	16	0	3920	Yes[e]
Lead	16/16	4.4	1100	PAI-10-SS-14-01	78.6	50	22	1.6	1	0	12.5	Yes[ef]
Manganese	10/16	10.6	522	PAI-10-SS-14-01	66.2	100	5.2	0.7	2	3.9 - 9.7	129	Yes[e]
Mercury	11/16	0.02	0.89	PAI-10-SS-14-01	0.09	0.1	8.9	0.9	1	0.02 - 0.09	0.11	Yes[ef]
Vanadium	16/16	1.7	9.3	PAI-10-SS-14-01	4.5	2.0	4.7	2.3	15	0	9.5	Yes[e]
Zinc	9/16	4.75	1020	PAI-10-SS-14-01	72.4	50	20.4	1.4	1	1.9 - 6.4	9.7	Yes[ef]

COPC = Contaminant of potential concern.
ESV = Ecological screening value
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available

1 For chemicals with at least one detection in background samples, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detected background samples. If the chemical was not detected in any background sample, the range of detection limits in background samples is shown, except for total PAHs, where ND = not detected in any background sample.
2 ESV for total phthalates.
3 Range of method detection limits for individual PAHs, uncorrected for sample-specific dilution factors.
4 ESV for haxavalent chromium.
a Infrequent detection.
b Maximum concentration is less than or similar to background concentration and the detection limits in most "non-detect" samples were less than or similar to background concentration.
c This chemical does not biomagnify in the food chain.
d No screening values were identified for this chemical.
e Potential risk to terrestrial receptors via direct contact.
f Potential risk to terrestrial receptors via the food chain.
g Maximum concentration is less than background concentration.

TABLE F-7
COPC REFINEMENT
GROUNDWATER - SITE 12/SWMU 10
JERICHO ISLAND DISPOSAL AREA
MCRD PARRIS ISLAND, SOUTH CAROLINA

Analyte	Frequency of Detection	Range of Detection		Location of Maximum Concentration	Average Concentration	EPA Region IV ESV	Maximum Hazard Quotient	Average Hazard Quotient	# Samples Exceeding ESV	Range of Detection Limits	Background Concentration[1]	Retained as COPC in Groundwater?
		Minimum	Maximum									
Volatile Organic Compounds (ug/L)												
Acetone	4/10	9.3	650	PAI-10-GW-08-01	159	NA	NA	NA	NA	5 - 50	See Note	No[ab]
Carbon disulfide	7/14	0.2	24	PAI-10-GW-10-01	2.9	NA	NA	NA	NA	1 - 10	<1	No[ab]
Trichloroethene	1/14	0.4	0.4	PAI-10-GW-04-01	1.1	NA	NA	NA	NA	1 - 10	<1	No[abc]
Semivolatile Organic Compounds (ug/L)												
Benzoic acid	1/12	1	1	PAI-10-GW-01-01	11.6	NA	NA	NA	NA	25 - 26	<25	No[abcd]
Inorganics (ug/L)												
Aluminum	6/13	299	5140	PAI-10-GW-03-01	1030 UF, 67 F	NA	NA	NA	NA	22 - 168	3505	Yes[e]
Barium	14/14	36.4	366	PAI-10-GW-14-01-F	121 UF, 147 F	NA	NA	NA	NA	0	74.7	Yes[e]
Cobalt	3/14	3.9	15.5	PAI-10-GW-08-01-F	3.2 UF, 3.5 F	NA	NA	NA	NA	3.3	<3.3	Yes[e]
Copper	2/14	2.7	8.1	PAI-10-GW-06-01	1.9 UF, 1.4 F	2.9	2.8	0.7 UF	1	2.6	22.9	No[d]
Iron	13/13	2700	124000	PAI-10-GW-05-01-F	46916 UF, 47562 F	NA	NA	NA	NA	0	2147	Yes[e]
Manganese	13/13	44.4	1530	PAI-10-GW-06-01	609 UF, 615 F	NA	NA	NA	NA	0	128	Yes[e]
Nickel	3/14	4.05	10.5	PAI-10-GW-08-01	3.4 UF, 3.4 F	8.3	1.3	0.4	2	4.4	<4.4 to < 9.2	Yes[ef]
Vanadium	12/14	2.7	14.2	PAI-10-GW-09-01	7.9 UF, 6.5 F	NA	NA	NA	NA	2.6	3.8	Yes[e]

COPC = Contaminant of potential concern.
ESV = Ecological screening value for salt surface water (average salinity in groundwater = 20 ppt)
Hazard quotient = chemical concentration ÷ ESV
NA = EPA Region IV ESV not available
Note: Analytical data for this chemical were rejected in the data validation process.

1 Inorganics were analyzed in filtered (F) and unfiltered (UF) samples.
2 Groundwater samples were not collected from background sites. Background data for this table are from two "upgradient" monitoring wells at Site 2 (PAI2-MW1[S] and PAI2-MW2[S]) and from one "upgradient" monitoring well at Site 1 (PAI1-MW4[S]). For chemicals with at least one detection in these three groundwater samples, the background value shown is twice the average concentration calculated using 1/2 the detection limit in non-detected samples. If the chemical was not detected in any of these three samples, the range of detection limits in the three samples is shown. All values in this column are from unfiltered samples.

a This chemical does not biomagnify in the food chain.
b No screening values were identified for this chemical.
c Infrequent detection.
d Maximum detected concentration is less than "background" concentration.
e Potential risk to aquatic organisms via direct toxicity.
f Potential risk to aquatic and semi-aquatic receptors via the food chain.

APPENDIX G

TOTAL PAH AND BENZO(A)PYRENE EQUIVALENT CONCENTRATIONS

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

Objective:

Using PAH data for surface soil and sediment samples collected during the Site 12/SWMU 10 RFI/RI, calculate Total PAH and BAP Equivalent concentrations.

Assumptions:

(1) Total PAH concentrations will be used to compare against ecological RGOs to determine the extent of impacted sediment.

(2) BAP Equivalent concentrations will be used to compare against the human health RGO to determine the extent of impacted sediment.

(3) Total PAH #1 uses 1/2 the method detection limit (MDL) for nondetects. Laboratory-provided, sample-specific MDLs are used. If an MDL is not available, 1/2 the detection limit is used.

(4) Total PAH #2 assumes a value of zero for nondetects.

(5) For Total PAHs #1 and #2 = Low Molecular Weight PAHs + High Molecular Weight PAHs.

(6) Low Molecular Weight PAHs = 2-methylnaphthalene + acenaphthene + acenaphthylene + anthracene + fluorene + naphthalene + phenanthrene.

(7) High Molecular Weight PAHs = benzo(a)anthracene + benzo(a)pyrene + chyrsene + dibenzo(a,h)anthracene + fluoranthene + pyrene.

(8) Reference for Total PAHs: MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. FDEP.

(9) BAP equivalents = benzo(a)anthracene(0.1) + benzo(a)pyrene(1.0) + benzo(b)fluoranthene(0.1) + benzo(k)fluoranthene(0.01) + chyrsene(0.001) + dibenzo(a,h)anthracene(1.0) + indeno(1,2,3-cd)pyrene (0.1)
For nondetects, 1/2 the method detection limit (MDL) is used.

(10) Bolded cells indicate that an RGO has been exceeded. The following RGOs are used
Human health (soil and sediment) - B(a)P equivalent concentration of 434 ug/kg (MCRD Parris Island derived RGO)
Ecological (soil) - Total PAH concentration of 1000 ug/kg (U.S. EPA Region 4 Screening Value)
Ecological (sediment) - Total PAH concentration of 1684 ug/kg (U.S. EPA Region 4 Screening Value)

Calculations:

PAH Chemicals	Sample PAI-10-SS-01-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	460 U	160	80	0	
Acenaphthene	460 U	170	85	0	
Acenaphthylene	460 U	150	75	0	
Anthracene	460 U	160	80	0	
Benzo(a)anthracene	460 U	160	80	0	8
Benzo(a)pyrene	460 U	210	105	0	105
Benzo(b)fluoranthene	460 U	190	0	0	9.5
Benzo(k)fluoranthene	460 U	170	0	0	0.85
Chrysene	460 U	170	85	0	0.085
Dibenzo(a,h)anthracene	460 U	150	75	0	75
Fluoranthene	460 U	200	100	0	
Fluorene	460 U	150	75	0	
Indeno(1,2,3-cd)pyrene	460 U	190	0	0	9.5
Naphthalene	460 U	150	75	0	
Phenanthrene	460 U	22	11	0	
Pyrene	460 U	190	95	0	
	SUM		1021	0	208

PAH Chemicals	Sample PAI-10-SS-02-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	390 U	130	65	0	
Acenaphthene	390 U	140	70	0	
Acenaphthylene	390 U	130	65	0	
Anthracene	390 U	140	70	0	
Benzo(a)anthracene	390 U	140	70	0	7
Benzo(a)pyrene	390 U	180	90	0	90
Benzo(b)fluoranthene	390 U	170	0	0	8.5
Benzo(k)fluoranthene	390 U	140	0	0	0.7
Chrysene	390 U	150	75	0	0.075
Dibenzo(a,h)anthracene	390 U	130	65	0	65
Fluoranthene	390 U	170	85	0	
Fluorene	390 U	130	65	0	
Indeno(1,2,3-cd)pyrene	390 U	160	0	0	8
Naphthalene	390 U	130	65	0	
Phenanthrene	390 U	19	10	0	
Pyrene	390 U	160	80	0	
	SUM		875	0	179

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SS-03-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	410 U	140	70	0	
Acenaphthene	410 U	150	75	0	
Acenaphthylene	410 U	140	70	0	
Anthracene	410 U	150	75	0	
Benzo(a)anthracene	410 U	150	75	0	7.5
Benzo(a)pyrene	410 U	190	95	0	95
Benzo(b)fluoranthene	410 U	180	0	0	9
Benzo(k)fluoranthene	410 U	150	0	0	0.75
Chrysene	410 U	160	80	0	0.08
Dibenzo(a,h)anthracene	410 U	140	70	0	70
Fluoranthene	410 U	180	90	0	
Fluorene	410 U	140	70	0	
Indeno(1,2,3-cd)pyrene	410 U	170	0	0	8.5
Naphthalene	410 U	140	70	0	
Phenanthrene	410 U	20	10	0	
Pyrene	410 U	170	85	0	
	SUM		935	0	191

PAH Chemicals	Sample PAI-10-SS-04-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	370 U	130	65	0	
Acenaphthene	370 U	130	65	0	
Acenaphthylene	370 U	130	65	0	
Anthracene	370 U	130	65	0	
Benzo(a)anthracene	370 U	130	65	0	6.5
Benzo(a)pyrene	370 U	170	85	0	85
Benzo(b)fluoranthene	370 U	160	0	0	8
Benzo(k)fluoranthene	370 U	130	0	0	0.65
Chrysene	370 U	140	70	0	0.07
Dibenzo(a,h)anthracene	370 U	130	65	0	65
Fluoranthene	370 U	170	85	0	
Fluorene	370 U	130	65	0	
Indeno(1,2,3-cd)pyrene	370 U	160	0	0	8
Naphthalene	370 U	120	60	0	
Phenanthrene	370 U	18	9	0	
Pyrene	24 J	160	24	24	
	SUM		788	24	173

PAH Chemicals	Sample PAI-10-SS-05-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	380 U	130	65	0	
Acenaphthene	380 U	140	70	0	
Acenaphthylene	380 U	130	65	0	
Anthracene	380 U	140	70	0	
Benzo(a)anthracene	380 U	140	70	0	7
Benzo(a)pyrene	380 U	180	90	0	90
Benzo(b)fluoranthene	380 U	160	0	0	8
Benzo(k)fluoranthene	380 U	140	0	0	0.7
Chrysene	380 U	150	75	0	0.075
Dibenzo(a,h)anthracene	380 U	130	65	0	65
Fluoranthene	380 U	170	85	0	
Fluorene	380 U	130	65	0	
Indeno(1,2,3-cd)pyrene	380 U	160	0	0	8
Naphthalene	380 U	130	65	0	
Phenanthrene	380 U	19	10	0	
Pyrene	380 U	160	80	0	
	SUM		875	0	179

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SS-06-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	350 U	120	60	0	
Acenaphthene	350 U	130	65	0	
Acenaphthylene	350 U	120	60	0	
Anthracene	350 U	120	60	0	
Benzo(a)anthracene	49 J	120	49	49	4.9
Benzo(a)pyrene	32 J	160	32	32	32
Benzo(b)fluorarithene	33 J	150	0	0	3.3
Benzo(k)fluoranthene	34 J	130	0	0	0.34
Chrysene	47 J	130	47	47	0.047
Dibenzo(a,h)anthracene	350 U	120	60	0	60
Fluoranthene	89 J	160	89	89	
Fluorene	350 U	120	60	0	
Indeno(1,2,3-cd)pyrene	350 U	150	0	0	7.5
Naphthalene	350 U	120	60	0	
Phenanthrene	69 J	17	69	69	
Pyrene	71 J	150	71	71	
	SUM		782	357	108

PAH Chemicals	Sample PAI-10-SS-07-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	370 U	130	65	0	
Acenaphthene	370 U	140	70	0	
Acenaphthylene	370 U	130	65	0	
Anthracene	370 U	130	65	0	
Benzo(a)anthracene	370 U	130	65	0	6.5
Benzo(a)pyrene	370 U	170	85	0	85
Benzo(b)fluoranthene	370 U	160	0	0	8
Benzo(k)fluoranthene	370 U	140	0	0	0.7
Chrysene	370 U	140	70	0	0.07
Dibenzo(a,h)anthracene	370 U	130	65	0	65
Fluoranthene	370 U	170	85	0	
Fluorene	370 U	130	65	0	
Indeno(1,2,3-cd)pyrene	370 U	160	0	0	8
Naphthalene	370 U	120	60	0	
Phenanthrene	370 U	18	9	0	
Pyrene	370 U	160	80	0	
	SUM		849	0	173

PAH Chemicals	Sample PAI-10-SS-08-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	360 U	130	65	0	
Acenaphthene	360 U	130	65	0	
Acenaphthylene	360 U	120	60	0	
Anthracene	24 J	130	24	24	
Benzo(a)anthracene	140 J	130	140	140	14
Benzo(a)pyrene	120 J	170	120	120	120
Benzo(b)fluoranthene	120 J	160	0	0	12
Benzo(k)fluoranthene	110 J	130	0	0	1.1
Chrysene	160 J	140	160	160	0.16
Dibenzo(a,h)anthracene	360 U	120	60	0	60
Fluoranthene	280 J	160	280	280	
Fluorene	360 U	120	60	0	
Indeno(1,2,3-cd)pyrene	69 J	150	0	0	6.9
Naphthalene	360 U	120	60	0	
Phenanthrene	140 J	18	140	140	
Pyrene	230 J	150	230	230	
	SUM		1464	1094	214

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SS-08-02 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	9 J	2.51	9	9	
Acenaphthene	30	5.35	30	30	
Acenaphthylene	32	4.13	32	32	
Anthracene	350	5.05	350	350	
Benzo(a)anthracene	3100	3.8	3100	3100	310
Benzo(a)pyrene	1700	6.41	1700	1700	1700
Benzo(b)fluoranthene	2900	4.38	0	0	290
Benzo(k)fluoranthene	1400	4.44	0	0	14
Chrysene	1800	3.59	1800	1800	1.8
Dibenzo(a,h)anthracene	840 J	5.82	840	840	840
Fluoranthene	4000	4.3	4000	4000	
Fluorene	17 J	3.26	17	17	
Indeno(1,2,3-cd)pyrene	1300	7.43	0	0	130
Naphthalene	10 J	3.75	10	10	
Phenanthrene	1600	4.04	1600	1600	
Pyrene	3400	2.97	3400	3400	
	SUM		16888	16888	3286

PAH Chemicals	Sample PAI-10-SS-09-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	360 U	130	65	0	
Acenaphthene	360 U	130	65	0	
Acenaphthylene	360 U	120	60	0	
Anthracene	360 U	130	65	0	
Benzo(a)anthracene	360 U	130	65	0	6.5
Benzo(a)pyrene	360 U	170	85	0	85
Benzo(b)fluoranthene	360 U	160	0	0	8
Benzo(k)fluoranthene	360 U	130	0	0	0.65
Chrysene	360 U	140	70	0	0.07
Dibenzo(a,h)anthracene	360 U	120	60	0	60
Fluoranthene	360 U	160	80	0	
Fluorene	360 U	120	60	0	
Indeno(1,2,3-cd)pyrene	360 U	150	0	0	7.5
Naphthalene	360 U	120	60	0	
Phenanthrene	360 U	18	9	0	
Pyrene	360 U	150	75	0	
	SUM		819	0	168

PAH Chemicals	Sample PAI-10-SS-10-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	360 U	130	65	0	
Acenaphthene	360 U	130	65	0	
Acenaphthylene	360 U	120	60	0	
Anthracene	360 U	130	65	0	
Benzo(a)anthracene	360 U	130	65	0	6.5
Benzo(a)pyrene	360 U	170	85	0	85
Benzo(b)fluoranthene	360 U	160	0	0	8
Benzo(k)fluoranthene	360 U	130	0	0	0.65
Chrysene	360 U	140	70	0	0.07
Dibenzo(a,h)anthracene	360 U	120	60	0	60
Fluoranthene	360 U	160	80	0	
Fluorene	360 U	120	60	0	
Indeno(1,2,3-cd)pyrene	360 U	150	0	0	7.5
Naphthalene	360 U	120	60	0	
Phenanthrene	360 U	18	9	0	
Pyrene	360 U	150	75	0	
	SUM		819	0	168

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SS-11-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	350 U	120	60	0	
Acenaphthene	350 U	130	65	0	
Acenaphthylene	350 U	120	60	0	
Anthracene	350 U	130	65	0	
Benzo(a)anthracene	350 U	130	65	0	6.5
Benzo(a)pyrene	350 U	170	85	0	85
Benzo(b)fluoranthene	350 U	150	0	0	7.5
Benzo(k)fluoranthene	350 U	130	0	0	0.65
Chrysene	350 U	130	65	0	0.065
Dibenzo(a,h)anthracene	350 U	120	60	0	60
Fluoranthene	350 U	160	80	0	
Fluorene	350 U	120	60	0	
Indeno(1,2,3-cd)pyrene					
Naphthalene	350 U	17	9	0	
Phenanthrene	350 U	150	75	0	
Pyrene	350 U	24	12	0	
	SUM		761	0	160

PAH Chemicals	Sample PAI-10-SS-12-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	340 U	120	60	0	
Acenaphthene	340 U	130	65	0	
Acenaphthylene	340 U	120	60	0	
Anthracene	340 U	120	60	0	
Benzo(a)anthracene	340 U	120	60	0	6
Benzo(a)pyrene	340 U	160	80	0	80
Benzo(b)fluoranthene	340 U	150	0	0	7.5
Benzo(k)fluoranthene	340 U	130	0	0	0.65
Chrysene	340 U	130	65	0	0.065
Dibenzo(a,h)anthracene	340 U	120	60	0	60
Fluoranthene	340 U	160	80	0	
Fluorene	340 U	120	60	0	
Indeno(1,2,3-cd)pyrene					
Naphthalene	340 U	120	60	0	
Phenanthrene	340 U	17	9	0	
Pyrene	340 U	150	75	0	
	SUM		794	0	154

PAH Chemicals	Sample PAI-10-SS-12-01-D Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	600	120	600	600	
Acenaphthene	440	130	440	440	
Acenaphthylene	580	120	580	580	
Anthracene	340 U	120	60	0	
Benzo(a)anthracene	340 U	120	60	0	6
Benzo(a)pyrene	340 U	160	80	0	80
Benzo(b)fluoranthene	340 U	150	0	0	7.5
Benzo(k)fluoranthene	340 U	130	0	0	0.65
Chrysene	340 U	130	65	0	0.065
Dibenzo(a,h)anthracene	340 U	120	60	0	60
Fluoranthene	340 U	160	80	0	
Fluorene	220 J	120	220	220	
Indeno(1,2,3-cd)pyrene					
Naphthalene	2700	120	2700	2700	
Phenanthrene	340 U	17	9	0	
Pyrene	340 U	150	75	0	
	SUM		5029	4540	154

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SS-12-02 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	20 U	2.51	1	0	
Acenaphthene	20 U	5.35	3	0	
Acenaphthylene	20 U	4.13	2	0	
Anthracene	20 U	5.05	3	0	
Benzo(a)anthracene	33	3.8	33	33	3.3
Benzo(a)pyrene	33	6.41	33	33	33
Benzo(b)fluoranthene	53	4.38	0	0	5.3
Benzo(k)fluoranthene	15 J	4.44	0	0	0.15
Chrysene	27	3.59	27	27	0.027
Dibenzo(a,h)anthracene	20 U	5.82	3	0	2.91
Fluoranthene	39	4.3	39	39	
Fluorene	20 U	3.26	2	0	
Indeno(1,2,3-cd)pyrene	22	7.43	0	0	2.2
Naphthalene	20 U	3.75	2	0	
Phenanthrene	16 J	4.04	16	16	
Pyrene	40	2.97	40	40	
	SUM		203	188	47

PAH Chemicals	Sample PAI-10-SS-13-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	350 U	120	60	0	
Acenaphthene	350 U	130	65	0	
Acenaphthylene	350 U	120	60	0	
Anthracene	350 U	120	60	0	
Benzo(a)anthracene	350 U	120	60	0	6
Benzo(a)pyrene	350 U	160	80	0	80
Benzo(b)fluoranthene	350 U	150	0	0	7.5
Benzo(k)fluoranthene	350 U	130	0	0	0.65
Chrysene	350 U	130	65	0	0.065
Dibenzo(a,h)anthracene	350 U	120	60	0	60
Fluoranthene	350 U	160	80	0	
Fluorene	350 U	120	60	0	
Indeno(1,2,3-cd)pyrene					
Naphthalene	350 U	120	60	0	
Phenanthrene	350 U	17	9	0	
Pyrene	350 U	150	75	0	
	SUM		794	0	154

PAH Chemicals	Sample PAI-10-SS-14-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	440 U	160	80	0	
Acenaphthene	440 U	160	80	0	
Acenaphthylene	440 U	150	75	0	
Anthracene	440 U	160	80	0	
Benzo(a)anthracene	440 U	160	80	0	8
Benzo(a)pyrene	440 U	210	105	0	105
Benzo(b)fluoranthene	440 U	190	0	0	9.5
Benzo(k)fluoranthene	440 U	160	0	0	0.8
Chrysene	440 U	170	85	0	0.085
Dibenzo(a,h)anthracene	440 U	150	75	0	75
Fluoranthene	440 U	200	100	0	
Fluorene	440 U	150	75	0	
Indeno(1,2,3-cd)pyrene					
Naphthalene	440 U	150	75	0	
Phenanthrene	440 U	22	11	0	
Pyrene	440 U	190	95	0	
	SUM		1016	0	198

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SS-15-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	370 U	130	65	0	
Acenaphthene	370 U	130	65	0	
Acenaphthylene	370 U	120	60	0	
Anthracene	370 U	130	65	0	
Benzo(a)anthracene	370 U	130	65	0	6.5
Benzo(a)pyrene	370 U	170	85	0	85
Benzo(b)fluoranthene	370 U	160	0	0	8
Benzo(k)fluoranthene	370 U	130	0	0	0.65
Chrysene	370 U	140	70	0	0.07
Dibenzo(a,h)anthracene	370 U	120	60	0	60
Fluoranthene	370 U	160	80	0	
Fluorene	370 U	120	60	0	
Indeno(1,2,3-cd)pyrene	370 U	150	0	0	7.5
Naphthalene	370 U	120	60	0	
Phenanthrene	370 U	18	9	0	
Pyrene	370 U	150	75	0	
	SUM		819	0	168

PAH Chemicals	Sample PAI-10-SS-15-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	350 U	120	60	0	
Acenaphthene	350 U	130	65	0	
Acenaphthylene	350 U	120	60	0	
Anthracene	350 U	130	65	0	
Benzo(a)anthracene	350 U	130	65	0	6.5
Benzo(a)pyrene	350 U	170	85	0	85
Benzo(b)fluoranthene	350 U	150	0	0	7.5
Benzo(k)fluoranthene	350 U	130	0	0	0.65
Chrysene	350 U	130	65	0	0.065
Dibenzo(a,h)anthracene	350 U	120	60	0	60
Fluoranthene	350 U	160	80	0	
Fluorene	350 U	120	60	0	
Indeno(1,2,3-cd)pyrene					
Naphthalene	350 U	120	60	0	
Phenanthrene	350 U	17	9	0	
Pyrene	350 U	150	75	0	
	SUM		809	0	160

PAH Chemicals	Sample PAI-10-SS-16-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	360 U	130	65	0	
Acenaphthene	360 U	130	65	0	
Acenaphthylene	360 U	120	60	0	
Anthracene	360 U	130	65	0	
Benzo(a)anthracene	360 U	130	65	0	6.5
Benzo(a)pyrene	360 U	170	85	0	85
Benzo(b)fluoranthene	360 U	160	0	0	8
Benzo(k)fluoranthene	360 U	130	0	0	0.65
Chrysene	360 U	140	70	0	0.07
Dibenzo(a,h)anthracene	360 U	120	60	0	60
Fluoranthene	360 U	160	80	0	
Fluorene	360 U	120	60	0	
Indeno(1,2,3-cd)pyrene	360 U	150	0	0	7.5
Naphthalene	360 U	120	60	0	
Phenanthrene	360 U	18	9	0	
Pyrene	360 U	150	75	0	
	SUM		819	0	168

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
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Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SS-17-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	360 U	130	65	0	
Acenaphthene	360 U	130	65	0	
Acenaphthylene	360 U	120	60	0	
Anthracene	360 U	130	65	0	
Benzo(a)anthracene	360 U	130	65	0	6.5
Benzo(a)pyrene	360 U	170	85	0	85
Benzo(b)fluoranthene	360 U	160	0	0	8
Benzo(k)fluoranthene	360 U	130	0	0	0.65
Chrysene	360 U	140	70	0	0.07
Dibenzo(a,h)anthracene	360 U	120	60	0	60
Fluoranthene	360 U	160	80	0	
Fluorene	360 U	120	60	0	
Indeno(1,2,3-cd)pyrene	360 U	150	0	0	7.5
Naphthalene	360 U	120	60	0	
Phenanthrene	360 U	18	9	0	
Pyrene	360 U	150	75	0	
	SUM		819	0	168

PAH Chemicals	Sample PI-012-03(37) Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	440 U	NA	220	0	
Acenaphthene	440 U	NA	220	0	
Acenaphthylene	440 U	NA	220	0	
Anthracene	440 U	NA	220	0	
Benzo(a)anthracene	41 J	NA	41	41	4.1
Benzo(a)pyrene	53 J	NA	53	53	53
Benzo(b)fluoranthene	130 J	NA	0	0	13
Benzo(k)fluoranthene	440 U	NA	0	0	2.2
Chrysene	62 J	NA	62	62	0.062
Dibenzo(a,h)anthracene	34 J	NA	34	34	34
Fluoranthene	41 J	NA	41	41	
Fluorene	440 U	NA	220	0	
Indeno(1,2,3-cd)pyrene	64 J	NA	64	64	6.4
Naphthalene	440 U	NA	220	0	
Phenanthrene	440 U	NA	220	0	
Pyrene	43 J	NA	43	43	
	SUM		1878	338	113

PAH Chemicals	Sample PAI-10-SD-01-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	520 U	NA	260	0	
Acenaphthene	120 U	18	9	0	
Acenaphthylene	240 U	9	4.5	0	
Anthracene	12 U	0.56	0.28	0	
Benzo(a)anthracene	12 U	0.99	0.495	0	0.0495
Benzo(a)pyrene	12 U	0.9	0.45	0	0.45
Benzo(b)fluoranthene	24 U	1.6	0	0	0.08
Benzo(k)fluoranthene	12 U	1.5	0	0	0.0075
Chrysene	12 U	1.1	0.55	0	0.00055
Dibenzo(a,h)anthracene	24 U	4.2	2.1	0	2.1
Fluoranthene	24 U	6.3	3.15	0	
Fluorene	24 U	1.6	0.8	0	
Indeno(1,2,3-cd)pyrene	12 U	0.97	0	0	0.0485
Naphthalene	120 U	8.3	4.15	0	
Phenanthrene	12 U	1.9	0.95	0	
Pyrene	12 U	12	6	0	
	SUM		292	0	2.7

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
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BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SD-02-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	510 U	NA	255	0	
Acenaphthene	200 U	28	14	0	
Acenaphthylene	380 U	15	7.5	0	
Anthracene	20 U	0.9	0.45	0	
Benzo(a)anthracene	20 U	1.6	0.8	0	0.08
Benzo(a)pyrene	20 UJ	1.5	20	20	20
Benzo(b)fluoranthene	38 U	2.6	0	0	0.13
Benzo(k)fluoranthene	20 U	2.5	0	0	0.0125
Chrysene	20 U	1.8	0.9	0	0.0009
Dibenzo(a,h)anthracene	38 U	6.8	3.4	0	3.4
Fluoranthene	38 U	10	5	0	
Fluorene	38 U	2.7	1.35	0	
Indeno(1,2,3-cd)pyrene	20 U	1.6	0	0	0.08
Naphthalene	200 U	13	6.5	0	
Phenanthrene	20 U	3.1	1.55	0	
Pyrene	20 U	19	9.5	0	
	SUM		326	20	23.7

PAH Chemicals	Sample PAI-10-SD-02-01A-D Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	500 U	NA	250	0	
Acenaphthene	200 U	29	14.5	0	
Acenaphthylene	390 U	15	7.5	0	
Anthracene	20 U	0.91	0.455	0	
Benzo(a)anthracene	20 U	1.6	0.8	0	0.08
Benzo(a)pyrene	26 J	1.5	26	26	26
Benzo(b)fluoranthene	39 U	2.7	0	0	0.135
Benzo(k)fluoranthene	20 U	2.5	0	0	0.0125
Chrysene	20 U	1.9	0.95	0	0.00095
Dibenzo(a,h)anthracene	39 U	6.9	3.45	0	3.45
Fluoranthene	39 U	10	5	0	
Fluorene	39 U	2.7	1.35	0	
Indeno(1,2,3-cd)pyrene	20 U	1.6	0	0	0.08
Naphthalene	200 U	14	7	0	
Phenanthrene	20 U	3.2	1.6	0	
Pyrene	20 U	20	10	0	
	SUM		329	26	29.8

PAH Chemicals	Sample PAI-10-SD-03-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	460 U	NA	230	0	
Acenaphthene	96 U	14	7	0	
Acenaphthylene	190 U	7	3.5	0	
Anthracene	9.6 U	0.43	0.215	0	
Benzo(a)anthracene	9.6 U	0.77	0.385	0	0.0385
Benzo(a)pyrene	9.6 U	0.7	0.35	0	0.35
Benzo(b)fluoranthene	19 U	1.3	0	0	0.065
Benzo(k)fluoranthene	9.6 U	1.2	0	0	0.006
Chrysene	9.6 U	0.88	0.44	0	0.00044
Dibenzo(a,h)anthracene	19 U	3.3	1.65	0	1.65
Fluoranthene	19 U	4.9	2.45	0	
Fluorene	19 U	1.3	0.65	0	
Indeno(1,2,3-cd)pyrene	9.6 U	0.75	0	0	0.0375
Naphthalene	96 U	6.4	3.2	0	
Phenanthrene	9.6 U	1.5	0.75	0	
Pyrene	9.6 U	9.4	4.7	0	
	SUM		255	0	2.1

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SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
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BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SD-04-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	600 U	NA	300	0	
Acenaphthene	100 U	14	7	0	
Acenaphthylene	200 U	7.4	3.7	0	
Anthracene	10 U	0.45	0.225	0	
Benzo(a)anthracene	10 U	0.81	0.405	0	0.0405
Benzo(a)pyrene	10 U	0.74	0.37	0	0.37
Benzo(b)fluoranthene	20 U	1.3	0	0	0.065
Benzo(k)fluoranthene	10 U	1.3	0	0	0.0065
Chrysene	10 U	0.92	0.46	0	0.00046
Dibenzo(a,h)anthracene	20 U	3.5	1.75	0	1.75
Fluoranthene	20 U	5.2	2.6	0	
Fluorene	20 U	1.3	0.65	0	
Indeno(1,2,3-cd)pyrene	10 U	0.79	0	0	0.0395
Naphthalene	100 U	6.8	3.4	0	
Phenanthrene	10 U	1.6	0.8	0	
Pyrene	10 U	9.9	4.95	0	
	SUM		326	0	2.3

PAH Chemicals	Sample PAI-10-SD-05-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	500 U	NA	250	0	
Acenaphthene	97 U	14	7	0	
Acenaphthylene	190 U	7.1	3.55	0	
Anthracene	9.7 U	0.44	0.22	0	
Benzo(a)anthracene	9.7 U	0.78	0.39	0	0.039
Benzo(a)pyrene	9.7 U	0.71	0.355	0	0.355
Benzo(b)fluoranthene	19 U	1.3	0	0	0.065
Benzo(k)fluoranthene	9.7 U	1.2	0	0	0.006
Chrysene	9.7 U	0.89	0.445	0	0.000445
Dibenzo(a,h)anthracene	19 U	3.3	1.65	0	1.65
Fluoranthene	19 U	5	2.5	0	
Fluorene	19 U	1.3	0.65	0	
Indeno(1,2,3-cd)pyrene	9.7 U	0.77	0	0	0.0385
Naphthalene	97 U	6.5	3.25	0	
Phenanthrene	9.7 U	1.5	0.75	0	
Pyrene	9.7 U	9.5	4.75	0	
	SUM		276	0	2.2

PAH Chemicals	Sample PAI-10-SD-06-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	460 U	NA	230	0	
Acenaphthene	93 U	13	6.5	0	
Acenaphthylene	180.0 U	6.8	3.4	0	
Anthracene	9.3 U	0.42	0.21	0	
Benzo(a)anthracene	9.3 U	0.75	0.375	0	0.0375
Benzo(a)pyrene	9.3 U	0.69	0.345	0	0.345
Benzo(b)fluoranthene	18 U	1.2	0	0	0.06
Benzo(k)fluoranthene	9.3 U	1.2	0	0	0.006
Chrysene	9.3 U	0.86	0.43	0	0.00043
Dibenzo(a,h)anthracene	18.0 U	3.2	1.6	0	1.6
Fluoranthene	18 U	4.8	2.4	0	
Fluorene	18.0 U	1.2	0.6	0	
Indeno(1,2,3-cd)pyrene	9.3 U	0.74	0	0	0.037
Naphthalene	93.0 U	6.3	3.15	0	
Phenanthrene	9.3 U	1.5	0.75	0	
Pyrene	9.3 U	9.1	4.55	0	
	SUM		254	0	2.1

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SD-07-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	530 U	NA	265	0	
Acenaphthene	100 U	15	7.5	0	
Acenaphthylene	200.0 U	7.6	3.8	0	
Anthracene	10.0 U	0.46	0.23	0	
Benzo(a)anthracene	10 U	0.82	0.41	0	0.041
Benzo(a)pyrene	11	0.76	11	11	11
Benzo(b)fluoranthene	20 U	1.4	0	0	0.07
Benzo(k)fluoranthene	10 U	1.3	0	0	0.0065
Chrysene	10 U	0.95	0.475	0	0.000475
Dibenzo(a,h)anthracene	20 U	3.5	1.75	0	1.75
Fluoranthene	20 U	5.3	2.65	0	
Fluorene	20 U	1.4	0.7	0	
Indeno(1,2,3-cd)pyrene	10 U	0.81	0	0	0.0405
Naphthalene	100 U	6.9	3.45	0	
Phenanthrene	10 U	1.6	0.8	0	
Pyrene	10 U	10	5	0	
	SUM		303	11	12.9

PAH Chemicals	Sample PAI-10-SD-08-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	2600 U	NA	1300	0	
Acenaphthene	270 U	38	19	0	
Acenaphthylene	520 U	19	9.5	0	
Anthracene	27 U	1.2	0.6	0	
Benzo(a)anthracene	27 U	2.1	1.05	0	0.105
Benzo(a)pyrene	38	1.9	38	38	38
Benzo(b)fluoranthene	120	3.5	0	0	12
Benzo(k)fluoranthene	27 U	3.3	0	0	0.0165
Chrysene	27 U	2.4	1.2	0	0.0012
Dibenzo(a,h)anthracene	52 U	9.1	4.55	0	4.55
Fluoranthene	52 U	14	7	0	
Fluorene	52 U	3.5	1.75	0	
Indeno(1,2,3-cd)pyrene	27 U	2.1	0	0	0.105
Naphthalene	270 U	18	9	0	
Phenanthrene	27 U	4.2	2.1	0	
Pyrene	27 U	26	13	0	
	SUM		1407	38	54.8

PAH Chemicals	Sample PAI-10-SD-09-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	1100 U	NA	550	0	
Acenaphthene	220 U	31	15.5	0	
Acenaphthylene	420 U	16	8	0	
Anthracene	22 U	0.98	0.49	0	
Benzo(a)anthracene	22 U	1.7	0.85	0	0.085
Benzo(a)pyrene	29 J	1.6	29	29	29
Benzo(b)fluoranthene	42 U	2.9	0	0	0.145
Benzo(k)fluoranthene	22 U	2.7	0	0	0.0135
Chrysene	22 U	2	1	0	0.001
Dibenzo(a,h)anthracene	42 U	7.5	3.75	0	3.75
Fluoranthene	42 U	11	5.5	0	
Fluorene	42 U	2.9	1.45	0	
Indeno(1,2,3-cd)pyrene	22 U	1.7	0	0	0.085
Naphthalene	220 U	15	7.5	0	
Phenanthrene	22 U	3.4	1.7	0	
Pyrene	22 U	21	10.5	0	
	SUM		635	29	33

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
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Date: 08/17/01	Date:		

PAH Chemicals	Sample PAI-10-SD-10-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	480 U	NA	240	0	
Acenaphthene	110 U	15	7.5	0	
Acenaphthylene	210 U	7.8	3.9	0	
Anthracene	11 U	0.48	0.24	0	
Benzo(a)anthracene	11 U	0.85	0.425	0	0.0425
Benzo(a)pyrene	11 U	0.78	0.39	0	0.39
Benzo(b)fluoranthene	21 U	1.4	0	0	0.07
Benzo(k)fluoranthene	11 U	1.3	0	0	0.0065
Chrysene	11 U	0.97	0.485	0	0.000485
Dibenzo(a,h)anthracene	21 U	3.6	1.8	0	1.8
Fluoranthene	21 U	5.4	2.7	0	
Fluorene	21 U	1.4	0.7	0	
Indeno(1,2,3-cd)pyrene	11 U	0.83	0	0	0.0415
Naphthalene	110 U	7.1	3.55	0	
Phenanthrene	11 U	1.7	0.85	0	
Pyrene	11 U	10	5	0	
	SUM		268	0	2.4

PAH Chemicals	Sample PAI-10-SD-11-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	510 U	NA	255	0	
Acenaphthene	110 U	16	8	0	
Acenaphthylene	210 U	8.1	4.05	0	
Anthracene	11 U	0.5	0.25	0	
Benzo(a)anthracene	11 U	0.88	0.44	0	0.044
Benzo(a)pyrene	11 U	0.81	0.405	0	0.405
Benzo(b)fluoranthene	21 U	1.5	0	0	0.075
Benzo(k)fluoranthene	29 R	1.4	0	0	0.29
Chrysene	11 U	1	0.5	0	0.0005
Dibenzo(a,h)anthracene	21 U	3.8	1.9	0	1.9
Fluoranthene	21 U	5.7	2.85	0	
Fluorene	21 U	1.5	0.75	0	
Indeno(1,2,3-cd)pyrene	11 U	0.87	0	0	0.0435
Naphthalene	110 U	7.4	3.7	0	
Phenanthrene	11 U	1.7	0.85	0	
Pyrene	11 U	11	5.5	0	
	SUM		284	0	2.8

PAH Chemicals	Sample PAI-10-SD-12-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	530 U	NA	265	0	
Acenaphthene	110 U	16	8	0	
Acenaphthylene	220.0 U	8.2	4.1	0	
Anthracene	11.0 U	0.51	0.255	0	
Benzo(a)anthracene	11 U	0.9	0.45	0	0.045
Benzo(a)pyrene	11 U	0.82	0.41	0	0.41
Benzo(b)fluoranthene	22 U	1.5	0	0	0.075
Benzo(k)fluoranthene	11 U	1.4	0	0	0.007
Chrysene	11 U	1	0.5	0	0.0005
Dibenzo(a,h)anthracene	22 U	3.8	1.9	0	1.9
Fluoranthene	22 U	5.7	2.85	0	
Fluorene	22 U	1.5	0.75	0	
Indeno(1,2,3-cd)pyrene	11 U	0.88	0	0	0.044
Naphthalene	110 U	7.5	3.75	0	
Phenanthrene	11 U	1.8	0.9	0	
Pyrene	11 U	11	5.5	0	
	SUM		294	0	2.5

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 08/17/01	Date:		

PAH Chemicals	Sample PAI-10-SD-13-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	610 U	NA	305	0	
Acenaphthene	110 U	16	8	0	
Acenaphthylene	220.0 U	8.3	4.15	0	
Anthracene	11.0 U	0.51	0.255	0	
Benzo(a)anthracene	18 J	0.91	18	18	1.8
Benzo(a)pyrene	30	0.83	30	30	30
Benzo(b)fluoranthene	25 J	1.5	0	0	2.5
Benzo(k)fluoranthene	18	1.4	0	0	0.18
Chrysene	44 J	1	44	44	0.044
Dibenzo(a,h)anthracene	22 U	3.9	1.95	0	1.95
Fluoranthene	92	5.8	92	92	
Fluorene	22 U	1.5	0.75	0	
Indeno(1,2,3-cd)pyrene	11 U	0.9	0	0	0.045
Naphthalene	110 U	7.6	3.8	0	
Phenanthrene	11 U	1.8	0.9	0	
Pyrene	89	11	89	89	
	SUM		598	273	37

PAH Chemicals	Sample PAI-10-SD-14-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	880 U	NA	440	0	
Acenaphthene	160 U	23	11.5	0	
Acenaphthylene	310.0 U	12	6	0	
Anthracene	16.0 U	0.72	0.36	0	
Benzo(a)anthracene	16 U	1.3	0.65	0	0.065
Benzo(a)pyrene	31	1.2	31	31	31
Benzo(b)fluoranthene	31 U	2.1	0	0	0.105
Benzo(k)fluoranthene	16 U	2	0	0	0.01
Chrysene	16 U	1.5	0.75	0	0.00075
Dibenzo(a,h)anthracene	31 U	5.5	2.75	0	2.75
Fluoranthene	31 U	8.1	4.05	0	
Fluorene	31 U	2.1	1.05	0	
Indeno(1,2,3-cd)pyrene	26	1.3	0	0	2.6
Naphthalene	160 U	11	5.5	0	
Phenanthrene	16 U	2.5	1.25	0	
Pyrene	16 U	16	8	0	
	SUM		513	31	37

PAH Chemicals	Sample PAI-10-SD-14-02A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	580 U	NA	290	0	
Acenaphthene	160 U	23	11.5	0	
Acenaphthylene	310.0 U	12	6	0	
Anthracene	16.0 U	0.72	0.36	0	
Benzo(a)anthracene	16 U	1.3	0.65	0	0.065
Benzo(a)pyrene	21	1.2	21	21	21
Benzo(b)fluoranthene	31 U	2.1	0	0	0.105
Benzo(k)fluoranthene	16 U	2	0	0	0.01
Chrysene	16 U	1.5	0.75	0	0.00075
Dibenzo(a,h)anthracene	31 U	5.5	2.75	0	2.75
Fluoranthene	31 U	8.2	4.1	0	
Fluorene	31 U	2.1	1.05	0	
Indeno(1,2,3-cd)pyrene	16 U	1.3	0	0	0.065
Naphthalene	160 U	11	5.5	0	
Phenanthrene	16 U	2.5	1.25	0	
Pyrene	16 U	16	8	0	
	SUM		353	21	24

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SD-15-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	570 U	NA	285	0	
Acenaphthene	130 U	18	9	0	
Acenaphthylene	250.0 U	9.2	4.6	0	
Anthracene	13.0 U	0.57	0.285	0	
Benzo(a)anthracene	13 U	1	0.5	0	0.05
Benzo(a)pyrene	13 U	0.92	0.46	0	0.46
Benzo(b)fluoranthene	25 U	1.7	0	0	0.085
Benzo(k)fluoranthene	13 U	1.6	0	0	0.008
Chrysene	13 U	1.2	0.6	0	0.0006
Dibenzo(a,h)anthracene	25 U	4.3	2.15	0	2.15
Fluoranthene	25 U	6.4	3.2	0	
Fluorene	25 U	1.7	0.85	0	
Indeno(1,2,3-cd)pyrene	13 U	0.99	0	0	0.0495
Naphthalene	130 U	8.4	4.2	0	
Phenanthrene	13 U	2	1	0	
Pyrene	13 U	12	6	0	
	SUM		318	0	2.8

PAH Chemicals	Sample PAI-10-SD-16-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	810 U	NA	405	0	
Acenaphthene	170 U	24	12	0	
Acenaphthylene	330.0 U	13	6.5	0	
Anthracene	17.0 U	0.77	0.385	0	
Benzo(a)anthracene	17 U	1.4	0.7	0	0.07
Benzo(a)pyrene	22 J	1.3	22	22	22
Benzo(b)fluoranthene	33 U	2.3	0	0	0.115
Benzo(k)fluoranthene	17 U	2.1	0	0	0.0105
Chrysene	17 U	1.6	0.8	0	0.0008
Dibenzo(a,h)anthracene	33 U	5.9	2.95	0	2.95
Fluoranthene	33 U	8.8	4.4	0	
Fluorene	33 U	2.3	1.15	0	
Indeno(1,2,3-cd)pyrene	17 U	1.3	0	0	0.065
Naphthalene	170 U	11	5.5	0	
Phenanthrene	17 U	2.7	1.35	0	
Pyrene	17 U	17	8.5	0	
	SUM		471	22	25

PAH Chemicals	Sample PAI-10-SD-17-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	1200 U	NA	600	0	
Acenaphthene	110 U	16	8	0	
Acenaphthylene	210.0 U	8	4	0	
Anthracene	11.0 U	0.49	0.245	0	
Benzo(a)anthracene	11 U	0.87	0.435	0	0.0435
Benzo(a)pyrene	12	0.8	12	12	12
Benzo(b)fluoranthene	21 U	1.4	0	0	0.07
Benzo(k)fluoranthene	11 U	1.4	0	0	0.007
Chrysene	11 U	1	0.5	0	0.0005
Dibenzo(a,h)anthracene	21 U	3.7	1.85	0	1.85
Fluoranthene	21 U	5.6	2.8	0	
Fluorene	21 U	1.5	0.75	0	
Indeno(1,2,3-cd)pyrene	11 U	0.86	0	0	0.043
Naphthalene	110 U	7.3	3.65	0	
Phenanthrene	11 U	1.7	0.85	0	
Pyrene	11 U	11	5.5	0	
	SUM		641	12	14

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PAI-10-SD-18-01A Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	1000 U	NA	500	0	
Acenaphthene	200 U	29	14.5	0	
Acenaphthylene	390.0 U	15	7.5	0	
Anthracene	20.0 U	0.93	0.465	0	
Benzo(a)anthracene	20 U	1.6	0.8	0	0.08
Benzo(a)pyrene	38	1.5	38	38	38
Benzo(b)fluoranthene	39 U	2.7	0	0	0.135
Benzo(k)fluoranthene	20 U	2.6	0	0	0.013
Chrysene	20 U	1.9	0.95	0	0.00095
Dibenzo(a,h)anthracene	39 U	7	3.5	0	3.5
Fluoranthene	39 U	11	5.5	0	
Fluorene	39 U	2.7	1.35	0	
Indeno(1,2,3-cd)pyrene	20 U	1.6	0	0	0.08
Naphthalene	200 U	14	7	0	
Phenanthrene	20 U	3.2	1.6	0	
Pyrene	20 U	20	10	0	
	SUM		591	38	42

PAH Chemicals	Sample PAI-10-SD-19-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	570 U	240	120	0	
Acenaphthene	140 U	16	8	0	
Acenaphthylene	69 U	33	16.5	0	
Anthracene	2.8 U	1.2	0.6	0	
Benzo(a)anthracene	6.9 U	0.97	0.485	0	0.0485
Benzo(a)pyrene	6.9 U	1	0.5	0	0.5
Benzo(b)fluoranthene	2.8 U	1.8	0	0	0.09
Benzo(k)fluoranthene	2.8 U	0.97	0	0	0.00485
Chrysene	6.9 U	2.8	1.4	0	0.0014
Dibenzo(a,h)anthracene	11 U	3.6	1.8	0	1.8
Fluoranthene	6.9 U	6.3	3.15	0	
Fluorene	14 U	7.3	3.65	0	
Indeno(1,2,3-cd)pyrene	6.9 U	0.84	0	0	0.042
Naphthalene	69 U	21	10.5	0	
Phenanthrene	5.5 U	2	1	0	
Pyrene	14 U	7.1	3.55	0	
	SUM		171	0	2

PAH Chemicals	Sample PAI-10-SD-20-01 Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	830 U	350	175	0	
Acenaphthene	120 U	24	12	0	
Acenaphthylene	100 U	49	24.5	0	
Anthracene	4.1 U	1.8	0.9	0	
Benzo(a)anthracene	10 U	1.4	0.7	0	0.07
Benzo(a)pyrene	10 U	1.5	0.75	0	0.75
Benzo(b)fluoranthene	4.1 U	2.7	0	0	0.135
Benzo(k)fluoranthene	4.1 U	1.4	0	0	0.007
Chrysene	10 U	4.2	2.1	0	0.0021
Dibenzo(a,h)anthracene	16 U	5.4	2.7	0	2.7
Fluoranthene	10	9.3	10	10	
Fluorene	20 U	11	5.5	0	
Indeno(1,2,3-cd)pyrene	10 U	1.2	0	0	0.06
Naphthalene	100 U	31	15.5	0	
Phenanthrene	8.2 U	2.9	1.45	0	
Pyrene	20 U	10	5	0	
	SUM		246	0	4

CLIENT:	PARRIS ISLAND, SOUTH CAROLINA	JOB NUMBER:	7803 - DRAFT RI
SUBJECT:	SITE 12/SWMU10 - JERICHO ISLAND DISPOSAL AREA		
BASED ON:	PAH Data for Surface Soil and Sediment Samples from Site 12/SWMU 10 RI/RFI	DRAWING NUMBER:	
BY: JJB	CHECKED BY:	APPROVED BY:	DATE:
Date: 09/17/01	Date:		

PAH Chemicals	Sample PI-012-01 (35) Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	2000 U	NA	1000	0	
Acenaphthene	2000 U	NA	1000	0	
Acenaphthylene	2000 U	NA	1000	0	
Anthracene	2000 U	NA	1000	0	
Benzo(a)anthracene	2000 U	NA	1000	0	100
Benzo(a)pyrene	2000 U	NA	1000	0	1000
Benzo(b)fluoranthene	2000 U	NA	0	0	100
Benzo(k)fluoranthene	2000 U	NA	0	0	10
Chrysene	2000 U	NA	1000	0	1
Dibenzo(a,h)anthracene	2000 U	NA	1000	0	1000
Fluoranthene	2000 U	NA	1000	0	
Fluorene	2000 U	NA	1000	0	
Indeno(1,2,3-cd)pyrene	2000 U	NA	0	0	100
Naphthalene	2000 U	NA	1000	0	
Phenanthrene	2000 U	NA	1000	0	
Pyrene	2000 U	NA	1000	0	
	SUM		13000	0	2311

PAH Chemicals	Sample PI-012-02 (36) Concentration	MDL	Total PAH #1	Total PAH #2	BAP Equivalent
2-Methylnaphthalene	620 U	NA	310	0	
Acenaphthene	620 U	NA	310	0	
Acenaphthylene	620 U	NA	310	0	
Anthracene	620 U	NA	310	0	
Benzo(a)anthracene	620 U	NA	310	0	31
Benzo(a)pyrene	620 U	NA	310	0	310
Benzo(b)fluoranthene	620 U	NA	0	0	31
Benzo(k)fluoranthene	620 U	NA	0	0	3.1
Chrysene	620 U	NA	310	0	0.31
Dibenzo(a,h)anthracene	620 U	NA	310	0	310
Fluoranthene	620 U	NA	310	0	
Fluorene	620 U	NA	310	0	
Indeno(1,2,3-cd)pyrene	620 U	NA	0	0	31
Naphthalene	620 U	NA	310	0	
Phenanthrene	620 U	NA	310	0	
Pyrene	620 U	NA	310	0	
	SUM		4030	0	716

Conclusions

The following samples exceeded ecological screening criterion

Sample ID	Matrix	Total PAH Conc.	Criterion	Notes
PAI-10-SS-01-01	Soil	1021	1000	PAHs were not detected in sample. Exceedance due to elevated detection limits.
PAI-10-SS-08-01	Soil	1464	1000	
PAI-10-SS-08-02	Soil	16888	1000	*2001 sample reconfirms 1998 result.*
PAI-10-SS-12-01-D	Soil	5029	1000	2001 resample does not exceed criteria.
PAI-10-SS-14-01	Soil	1016	1000	PAHs were not detected in sample. Exceedance due to elevated detection limits.
PI-012-03(37)	Soil	1878	1000	
PI-012-01 (35)	Sediment	13000	1684	PAHs were not detected in sample. Exceedance due to elevated detection limits.
PI-012-02 (36)	Sediment	4030	1684	PAHs were not detected in sample. Exceedance due to elevated detection limits.

The following samples exceeded human health screening criterion

Sample ID	Matrix	B(a)P Eq. Conc.	Criterion	Notes
PAI-10-SS-08-02	Soil	3286	434	
PI-012-01 (35)	Sediment	2311	434	PAHs were not detected in sample. Exceedance due to elevated detection limits.
PI-012-02 (36)	Sediment	716	434	PAHs were not detected in sample. Exceedance due to elevated detection limits.

ATTACHMENT 1

SOIL AND SEDIMENT LABORATORY DATA

nsample	sample_dat	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SS-01-01	7/28/98	2-METHYLNAPHTHALENE	460 U	UG/KG	160	460	27	1
PAI-10-SS-01-01	7/28/98	ACENAPHTHENE	460 U	UG/KG	170	460	27	1
PAI-10-SS-01-01	7/28/98	ACENAPHTHYLENE	460 U	UG/KG	150	460	27	1
PAI-10-SS-01-01	7/28/98	ANTHRACENE	460 U	UG/KG	160	460	27	1
PAI-10-SS-01-01	7/28/98	BENZO(A)ANTHRACENE	460 U	UG/KG	160	460	27	1
PAI-10-SS-01-01	7/28/98	BENZO(A)PYRENE	460 U	UG/KG	210	460	27	1
PAI-10-SS-01-01	7/28/98	BENZO(B)FLUORANTHENE	460 U	UG/KG	190	460	27	1
PAI-10-SS-01-01	7/28/98	BENZO(K)FLUORANTHENE	460 U	UG/KG	170	460	27	1
PAI-10-SS-01-01	7/28/98	CHRYSENE	460 U	UG/KG	170	460	27	1
PAI-10-SS-01-01	7/28/98	DIBENZO(A,H)ANTHRACENE	460 U	UG/KG	150	460	27	1
PAI-10-SS-01-01	7/28/98	FLUORANTHENE	460 U	UG/KG	200	460	27	1
PAI-10-SS-01-01	7/28/98	FLUORENE	460 U	UG/KG	150	460	27	1
PAI-10-SS-01-01	7/28/98	INDENO(1,2,3-CD)PYRENE	460 U	UG/KG	190	460	27	1
PAI-10-SS-01-01	7/28/98	NAPHTHALENE	460 U	UG/KG	150	460	27	1
PAI-10-SS-01-01	7/28/98	PHENANTHRENE	460 U	UG/KG	22	460	27	1
PAI-10-SS-01-01	7/28/98	PYRENE	460 U	UG/KG	190	460	27	1
PAI-10-SS-02-01	7/28/98	2-METHYLNAPHTHALENE	390 U	UG/KG	130	390	14	1
PAI-10-SS-02-01	7/28/98	ACENAPHTHENE	390 U	UG/KG	140	390	14	1
PAI-10-SS-02-01	7/28/98	ACENAPHTHYLENE	390 U	UG/KG	130	390	14	1
PAI-10-SS-02-01	7/28/98	ANTHRACENE	390 U	UG/KG	140	390	14	1
PAI-10-SS-02-01	7/28/98	BENZO(A)ANTHRACENE	390 U	UG/KG	140	390	14	1
PAI-10-SS-02-01	7/28/98	BENZO(A)PYRENE	390 U	UG/KG	180	390	14	1
PAI-10-SS-02-01	7/28/98	BENZO(B)FLUORANTHENE	390 U	UG/KG	170	390	14	1
PAI-10-SS-02-01	7/28/98	BENZO(K)FLUORANTHENE	390 U	UG/KG	140	390	14	1
PAI-10-SS-02-01	7/28/98	CHRYSENE	390 U	UG/KG	150	390	14	1
PAI-10-SS-02-01	7/28/98	DIBENZO(A,H)ANTHRACENE	390 U	UG/KG	130	390	14	1
PAI-10-SS-02-01	7/28/98	FLUORANTHENE	390 U	UG/KG	170	390	14	1
PAI-10-SS-02-01	7/28/98	FLUORENE	390 U	UG/KG	130	390	14	1
PAI-10-SS-02-01	7/28/98	INDENO(1,2,3-CD)PYRENE	390 U	UG/KG	160	390	14	1
PAI-10-SS-02-01	7/28/98	NAPHTHALENE	390 U	UG/KG	130	390	14	1
PAI-10-SS-02-01	7/28/98	PHENANTHRENE	390 U	UG/KG	19	390	14	1
PAI-10-SS-02-01	7/28/98	PYRENE	390 U	UG/KG	160	390	14	1
PAI-10-SS-03-01	7/28/98	2-METHYLNAPHTHALENE	410 U	UG/KG	140	410	19	1
PAI-10-SS-03-01	7/28/98	ACENAPHTHENE	410 U	UG/KG	150	410	19	1
PAI-10-SS-03-01	7/28/98	ACENAPHTHYLENE	410 U	UG/KG	140	410	19	1
PAI-10-SS-03-01	7/28/98	ANTHRACENE	410 U	UG/KG	150	410	19	1
PAI-10-SS-03-01	7/28/98	BENZO(A)ANTHRACENE	410 U	UG/KG	150	410	19	1
PAI-10-SS-03-01	7/28/98	BENZO(A)PYRENE	410 U	UG/KG	190	410	19	1
PAI-10-SS-03-01	7/28/98	BENZO(B)FLUORANTHENE	410 U	UG/KG	180	410	19	1
PAI-10-SS-03-01	7/28/98	BENZO(K)FLUORANTHENE	410 U	UG/KG	150	410	19	1
PAI-10-SS-03-01	7/28/98	CHRYSENE	410 U	UG/KG	160	410	19	1
PAI-10-SS-03-01	7/28/98	DIBENZO(A,H)ANTHRACENE	410 U	UG/KG	140	410	19	1
PAI-10-SS-03-01	7/28/98	FLUORANTHENE	410 U	UG/KG	180	410	19	1
PAI-10-SS-03-01	7/28/98	FLUORENE	410 U	UG/KG	140	410	19	1
PAI-10-SS-03-01	7/28/98	INDENO(1,2,3-CD)PYRENE	410 U	UG/KG	170	410	19	1
PAI-10-SS-03-01	7/28/98	NAPHTHALENE	410 U	UG/KG	140	410	19	1
PAI-10-SS-03-01	7/28/98	PHENANTHRENE	410 U	UG/KG	20	410	19	1
PAI-10-SS-03-01	7/28/98	PYRENE	410 U	UG/KG	170	410	19	1
PAI-10-SS-04-01	7/28/98	2-METHYLNAPHTHALENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-04-01	7/28/98	ACENAPHTHENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-04-01	7/28/98	ACENAPHTHYLENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-04-01	7/28/98	ANTHRACENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-04-01	7/28/98	BENZO(A)ANTHRACENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-04-01	7/28/98	BENZO(A)PYRENE	370 U	UG/KG	170	370	10	1
PAI-10-SS-04-01	7/28/98	BENZO(B)FLUORANTHENE	370 U	UG/KG	160	370	10	1
PAI-10-SS-04-01	7/28/98	BENZO(K)FLUORANTHENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-04-01	7/28/98	CHRYSENE	370 U	UG/KG	140	370	10	1
PAI-10-SS-04-01	7/28/98	DIBENZO(A,H)ANTHRACENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-04-01	7/28/98	FLUORANTHENE	370 U	UG/KG	170	370	10	1
PAI-10-SS-04-01	7/28/98	FLUORENE	370 U	UG/KG	130	370	10	1

nsample	sample_dat	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SS-04-01	7/28/98	INDENO(1,2,3-CD)PYRENE	370 U	UG/KG	160	370	10	1
PAI-10-SS-04-01	7/28/98	NAPHTHALENE	370 U	UG/KG	120	370	10	1
PAI-10-SS-04-01	7/28/98	PHENANTHRENE	370 U	UG/KG	18	370	10	1
PAI-10-SS-04-01	7/28/98	PYRENE	24 J	UG/KG	160	370	10	1
PAI-10-SS-05-01	7/28/98	2-METHYLNAPHTHALENE	380 U	UG/KG	130	380	13	1
PAI-10-SS-05-01	7/28/98	ACENAPHTHENE	380 U	UG/KG	140	380	13	1
PAI-10-SS-05-01	7/28/98	ACENAPHTHYLENE	380 U	UG/KG	130	380	13	1
PAI-10-SS-05-01	7/28/98	ANTHRACENE	380 U	UG/KG	140	380	13	1
PAI-10-SS-05-01	7/28/98	BENZO(A)ANTHRACENE	380 U	UG/KG	140	380	13	1
PAI-10-SS-05-01	7/28/98	BENZO(A)PYRENE	380 U	UG/KG	180	380	13	1
PAI-10-SS-05-01	7/28/98	BENZO(B)FLUORANTHENE	380 U	UG/KG	160	380	13	1
PAI-10-SS-05-01	7/28/98	BENZO(K)FLUORANTHENE	380 U	UG/KG	140	380	13	1
PAI-10-SS-05-01	7/28/98	CHRYSENE	380 U	UG/KG	150	380	13	1
PAI-10-SS-05-01	7/28/98	DIBENZO(A,H)ANTHRACENE	380 U	UG/KG	130	380	13	1
PAI-10-SS-05-01	7/28/98	FLUORANTHENE	380 U	UG/KG	170	380	13	1
PAI-10-SS-05-01	7/28/98	FLUORENE	380 U	UG/KG	130	380	13	1
PAI-10-SS-05-01	7/28/98	INDENO(1,2,3-CD)PYRENE	380 U	UG/KG	160	380	13	1
PAI-10-SS-05-01	7/28/98	NAPHTHALENE	380 U	UG/KG	130	380	13	1
PAI-10-SS-05-01	7/28/98	PHENANTHRENE	380 U	UG/KG	19	380	13	1
PAI-10-SS-05-01	7/28/98	PYRENE	380 U	UG/KG	160	380	13	1
PAI-10-SS-06-01	7/28/98	2-METHYLNAPHTHALENE	350 U	UG/KG	120	350	4	1
PAI-10-SS-06-01	7/28/98	ACENAPHTHENE	350 U	UG/KG	130	350	4	1
PAI-10-SS-06-01	7/28/98	ACENAPHTHYLENE	350 U	UG/KG	120	350	4	1
PAI-10-SS-06-01	7/28/98	ANTHRACENE	350 U	UG/KG	120	350	4	1
PAI-10-SS-06-01	7/28/98	BENZO(A)ANTHRACENE	49 J	UG/KG	120	350	4	1
PAI-10-SS-06-01	7/28/98	BENZO(A)PYRENE	32 J	UG/KG	160	350	4	1
PAI-10-SS-06-01	7/28/98	BENZO(B)FLUORANTHENE	33 J	UG/KG	150	350	4	1
PAI-10-SS-06-01	7/28/98	BENZO(K)FLUORANTHENE	34 J	UG/KG	130	350	4	1
PAI-10-SS-06-01	7/28/98	CHRYSENE	47 J	UG/KG	130	350	4	1
PAI-10-SS-06-01	7/28/98	DIBENZO(A,H)ANTHRACENE	350 U	UG/KG	120	350	4	1
PAI-10-SS-06-01	7/28/98	FLUORANTHENE	89 J	UG/KG	160	350	4	1
PAI-10-SS-06-01	7/28/98	FLUORENE	350 U	UG/KG	120	350	4	1
PAI-10-SS-06-01	7/28/98	INDENO(1,2,3-CD)PYRENE	350 U	UG/KG	150	350	4	1
PAI-10-SS-06-01	7/28/98	NAPHTHALENE	350 U	UG/KG	120	350	4	1
PAI-10-SS-06-01	7/28/98	PHENANTHRENE	69 J	UG/KG	17	350	4	1
PAI-10-SS-06-01	7/28/98	PYRENE	71 J	UG/KG	150	350	4	1
PAI-10-SS-07-01	7/28/98	2-METHYLNAPHTHALENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-07-01	7/28/98	ACENAPHTHENE	370 U	UG/KG	140	370	10	1
PAI-10-SS-07-01	7/28/98	ACENAPHTHYLENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-07-01	7/28/98	ANTHRACENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-07-01	7/28/98	BENZO(A)ANTHRACENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-07-01	7/28/98	BENZO(A)PYRENE	370 U	UG/KG	170	370	10	1
PAI-10-SS-07-01	7/28/98	BENZO(B)FLUORANTHENE	370 U	UG/KG	160	370	10	1
PAI-10-SS-07-01	7/28/98	BENZO(K)FLUORANTHENE	370 U	UG/KG	140	370	10	1
PAI-10-SS-07-01	7/28/98	CHRYSENE	370 U	UG/KG	140	370	10	1
PAI-10-SS-07-01	7/28/98	DIBENZO(A,H)ANTHRACENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-07-01	7/28/98	FLUORANTHENE	370 U	UG/KG	170	370	10	1
PAI-10-SS-07-01	7/28/98	FLUORENE	370 U	UG/KG	130	370	10	1
PAI-10-SS-07-01	7/28/98	INDENO(1,2,3-CD)PYRENE	370 U	UG/KG	160	370	10	1
PAI-10-SS-07-01	7/28/98	NAPHTHALENE	370 U	UG/KG	120	370	10	1
PAI-10-SS-07-01	7/28/98	PHENANTHRENE	370 U	UG/KG	18	370	10	1
PAI-10-SS-07-01	7/28/98	PYRENE	370 U	UG/KG	160	370	10	1
PAI-10-SS-08-01	7/28/98	2-METHYLNAPHTHALENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-08-01	7/28/98	ACENAPHTHENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-08-01	7/28/98	ACENAPHTHYLENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-08-01	7/28/98	ANTHRACENE	24 J	UG/KG	130	360	8	1
PAI-10-SS-08-01	7/28/98	BENZO(A)ANTHRACENE	140 J	UG/KG	130	360	8	1
PAI-10-SS-08-01	7/28/98	BENZO(A)PYRENE	120 J	UG/KG	170	360	8	1
PAI-10-SS-08-01	7/28/98	BENZO(B)FLUORANTHENE	120 J	UG/KG	160	360	8	1
PAI-10-SS-08-01	7/28/98	BENZO(K)FLUORANTHENE	110 J	UG/KG	130	360	8	1

nsample	sample_dat	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SS-08-01	7/28/98	CHRYSENE	160 J	UG/KG	140	360	8	1
PAI-10-SS-08-01	7/28/98	DIBENZO(A,H)ANTHRACENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-08-01	7/28/98	FLUORANTHENE	280 J	UG/KG	160	360	8	1
PAI-10-SS-08-01	7/28/98	FLUORENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-08-01	7/28/98	INDENO(1,2,3-CD)PYRENE	69 J	UG/KG	150	360	8	1
PAI-10-SS-08-01	7/28/98	NAPHTHALENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-08-01	7/28/98	PHENANTHRENE	140 J	UG/KG	18	360	8	1
PAI-10-SS-08-01	7/28/98	PYRENE	230 J	UG/KG	150	360	8	1
PAI-10-SS-08-02	4/26/01	1-METHYLNAPHTHALENE	12 J	UG/KG	10	20	2	1
PAI-10-SS-08-02	4/26/01	2-METHYLNAPHTHALENE	9 J	UG/KG	2.51	20	2	1
PAI-10-SS-08-02	4/26/01	ACENAPHTHENE	30	UG/KG	5.35	20	2	1
PAI-10-SS-08-02	4/26/01	ACENAPHTHYLENE	32	UG/KG	4.13	20	2	1
PAI-10-SS-08-02	4/26/01	ANTHRACENE	350 J	UG/KG	5.05	20	2	1
PAI-10-SS-08-02	4/26/01	BENZO(A)ANTHRACENE	3100	UG/KG	3.8	20	2	1
PAI-10-SS-08-02	4/26/01	BENZO(A)PYRENE	1700	UG/KG	6.41	20	2	1
PAI-10-SS-08-02	4/26/01	BENZO(B)FLUORANTHENE	2900	UG/KG	4.38	20	2	1
PAI-10-SS-08-02	4/26/01	BENZO(K)FLUORANTHENE	1400	UG/KG	4.44	20	2	1
PAI-10-SS-08-02	4/26/01	CHRYSENE	1800	UG/KG	3.59	20	2	1
PAI-10-SS-08-02	4/26/01	DIBENZO(A,H)ANTHRACENE	840 J	UG/KG	5.82	20	2	1
PAI-10-SS-08-02	4/26/01	FLUORANTHENE	4000	UG/KG	4.3	20	2	1
PAI-10-SS-08-02	4/26/01	FLUORENE	17 J	UG/KG	3.26	20	2	1
PAI-10-SS-08-02	4/26/01	INDENO(1,2,3-CD)PYRENE	1300	UG/KG	7.43	20	2	1
PAI-10-SS-08-02	4/26/01	NAPHTHALENE	10 J	UG/KG	3.75	20	2	1
PAI-10-SS-08-02	4/26/01	PHENANTHRENE	1600	UG/KG	4.04	20	2	1
PAI-10-SS-08-02	4/26/01	PYRENE	3400	UG/KG	2.97	20	2	1
PAI-10-SS-09-01	7/28/98	2-METHYLNAPHTHALENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-09-01	7/28/98	ACENAPHTHENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-09-01	7/28/98	ACENAPHTHYLENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-09-01	7/28/98	ANTHRACENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-09-01	7/28/98	BENZO(A)ANTHRACENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-09-01	7/28/98	BENZO(A)PYRENE	360 U	UG/KG	170	360	8	1
PAI-10-SS-09-01	7/28/98	BENZO(B)FLUORANTHENE	360 U	UG/KG	160	360	8	1
PAI-10-SS-09-01	7/28/98	BENZO(K)FLUORANTHENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-09-01	7/28/98	CHRYSENE	360 U	UG/KG	140	360	8	1
PAI-10-SS-09-01	7/28/98	DIBENZO(A,H)ANTHRACENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-09-01	7/28/98	FLUORANTHENE	360 U	UG/KG	160	360	8	1
PAI-10-SS-09-01	7/28/98	FLUORENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-09-01	7/28/98	INDENO(1,2,3-CD)PYRENE	360 U	UG/KG	150	360	8	1
PAI-10-SS-09-01	7/28/98	NAPHTHALENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-09-01	7/28/98	PHENANTHRENE	360 U	UG/KG	18	360	8	1
PAI-10-SS-09-01	7/28/98	PYRENE	360 U	UG/KG	150	360	8	1
PAI-10-SS-10-01	7/28/98	2-METHYLNAPHTHALENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-10-01	7/28/98	ACENAPHTHENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-10-01	7/28/98	ACENAPHTHYLENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-10-01	7/28/98	ANTHRACENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-10-01	7/28/98	BENZO(A)ANTHRACENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-10-01	7/28/98	BENZO(A)PYRENE	360 U	UG/KG	170	360	8	1
PAI-10-SS-10-01	7/28/98	BENZO(B)FLUORANTHENE	360 U	UG/KG	160	360	8	1
PAI-10-SS-10-01	7/28/98	BENZO(K)FLUORANTHENE	360 U	UG/KG	130	360	8	1
PAI-10-SS-10-01	7/28/98	CHRYSENE	360 U	UG/KG	140	360	8	1
PAI-10-SS-10-01	7/28/98	DIBENZO(A,H)ANTHRACENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-10-01	7/28/98	FLUORANTHENE	360 U	UG/KG	160	360	8	1
PAI-10-SS-10-01	7/28/98	FLUORENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-10-01	7/28/98	INDENO(1,2,3-CD)PYRENE	360 U	UG/KG	150	360	8	1
PAI-10-SS-10-01	7/28/98	NAPHTHALENE	360 U	UG/KG	120	360	8	1
PAI-10-SS-10-01	7/28/98	PHENANTHRENE	360 U	UG/KG	18	360	8	1
PAI-10-SS-10-01	7/28/98	PYRENE	360 U	UG/KG	150	360	8	1
PAI-10-SS-11-01	8/6/98	2-METHYLNAPHTHALENE	350 U	UG/KG	120	350	1	6
PAI-10-SS-11-01	8/6/98	ACENAPHTHENE	350 U	UG/KG	130	350	1	6
PAI-10-SS-11-01	8/6/98	ACENAPHTHYLENE	350 U	UG/KG	120	350	1	6

nsample	sample_dat	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SS-11-01	8/6/98	ANTHRACENE	350 U	UG/KG	130	350	1	6
PAI-10-SS-11-01	8/6/98	BENZO(A)ANTHRACENE	350 U	UG/KG	130	350	1	6
PAI-10-SS-11-01	8/6/98	BENZO(A)PYRENE	350 U	UG/KG	170	350	1	6
PAI-10-SS-11-01	8/6/98	BENZO(B)FLUORANTHENE	350 U	UG/KG	150	350	1	6
PAI-10-SS-11-01	8/6/98	BENZO(K)FLUORANTHENE	350 U	UG/KG	130	350	1	6
PAI-10-SS-11-01	8/6/98	CHRYSENE	350 U	UG/KG	130	350	1	6
PAI-10-SS-11-01	8/6/98	DIBENZO(A,H)ANTHRACENE	350 U	UG/KG	120	350	1	6
PAI-10-SS-11-01	8/6/98	FLUORANTHENE	350 U	UG/KG	160	350	1	6
PAI-10-SS-11-01	8/6/98	FLUORENE	350 U	UG/KG	120	350	1	6
PAI-10-SS-11-01	8/6/98	NAPHTHALENE	350 U	UG/KG	120	350	1	6
PAI-10-SS-11-01	8/6/98	PHENANTHRENE	350 U	UG/KG	17	350	1	6
PAI-10-SS-11-01	8/6/98	PYRENE	350 U	UG/KG	150	350	1	6
PAI-10-SS-12-01	8/6/98	2-METHYLNAPHTHALENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01	8/6/98	ACENAPHTHENE	340 U	UG/KG	130	340	1	3
PAI-10-SS-12-01	8/6/98	ACENAPHTHYLENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01	8/6/98	ANTHRACENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01	8/6/98	BENZO(A)ANTHRACENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01	8/6/98	BENZO(A)PYRENE	340 U	UG/KG	160	340	1	3
PAI-10-SS-12-01	8/6/98	BENZO(B)FLUORANTHENE	340 U	UG/KG	150	340	1	3
PAI-10-SS-12-01	8/6/98	BENZO(K)FLUORANTHENE	340 U	UG/KG	130	340	1	3
PAI-10-SS-12-01	8/6/98	CHRYSENE	340 U	UG/KG	130	340	1	3
PAI-10-SS-12-01	8/6/98	DIBENZO(A,H)ANTHRACENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01	8/6/98	FLUORANTHENE	340 U	UG/KG	160	340	1	3
PAI-10-SS-12-01	8/6/98	FLUORENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01	8/6/98	NAPHTHALENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01	8/6/98	PHENANTHRENE	340 U	UG/KG	17	340	1	3
PAI-10-SS-12-01	8/6/98	PYRENE	340 U	UG/KG	150	340	1	3
PAI-10-SS-12-01-D	8/6/98	2-METHYLNAPHTHALENE	600	UG/KG	120	340	1	3
PAI-10-SS-12-01-D	8/6/98	ACENAPHTHENE	440	UG/KG	130	340	1	3
PAI-10-SS-12-01-D	8/6/98	ACENAPHTHYLENE	580	UG/KG	120	340	1	3
PAI-10-SS-12-01-D	8/6/98	ANTHRACENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01-D	8/6/98	BENZO(A)ANTHRACENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01-D	8/6/98	BENZO(A)PYRENE	340 U	UG/KG	160	340	1	3
PAI-10-SS-12-01-D	8/6/98	BENZO(B)FLUORANTHENE	340 U	UG/KG	150	340	1	3
PAI-10-SS-12-01-D	8/6/98	BENZO(K)FLUORANTHENE	340 U	UG/KG	130	340	1	3
PAI-10-SS-12-01-D	8/6/98	CHRYSENE	340 U	UG/KG	130	340	1	3
PAI-10-SS-12-01-D	8/6/98	DIBENZO(A,H)ANTHRACENE	340 U	UG/KG	120	340	1	3
PAI-10-SS-12-01-D	8/6/98	FLUORANTHENE	340 U	UG/KG	160	340	1	3
PAI-10-SS-12-01-D	8/6/98	FLUORENE	220 J	UG/KG	120	340	1	3
PAI-10-SS-12-01-D	8/6/98	NAPHTHALENE	2700	UG/KG	120	340	1	3
PAI-10-SS-12-01-D	8/6/98	PHENANTHRENE	340 U	UG/KG	17	340	1	3
PAI-10-SS-12-01-D	8/6/98	PYRENE	340 U	UG/KG	150	340	1	3
PAI-10-SS-12-02	4/26/01	1-METHYLNAPHTHALENE	20 U	UG/KG	10	20	3	1
PAI-10-SS-12-02	4/26/01	2-METHYLNAPHTHALENE	20 U	UG/KG	2.51	20	3	1
PAI-10-SS-12-02	4/26/01	ACENAPHTHENE	20 U	UG/KG	5.35	20	3	1
PAI-10-SS-12-02	4/26/01	ACENAPHTHYLENE	20 U	UG/KG	4.13	20	3	1
PAI-10-SS-12-02	4/26/01	ANTHRACENE	20 U	UG/KG	5.05	20	3	1
PAI-10-SS-12-02	4/26/01	BENZO(A)ANTHRACENE	33	UG/KG	3.8	20	3	1
PAI-10-SS-12-02	4/26/01	BENZO(A)PYRENE	33	UG/KG	6.41	20	3	1
PAI-10-SS-12-02	4/26/01	BENZO(B)FLUORANTHENE	53	UG/KG	4.38	20	3	1
PAI-10-SS-12-02	4/26/01	BENZO(K)FLUORANTHENE	15 J	UG/KG	4.44	20	3	1
PAI-10-SS-12-02	4/26/01	CHRYSENE	27	UG/KG	3.59	20	3	1
PAI-10-SS-12-02	4/26/01	DIBENZO(A,H)ANTHRACENE	20 U	UG/KG	5.82	20	3	1
PAI-10-SS-12-02	4/26/01	FLUORANTHENE	39	UG/KG	4.3	20	3	1
PAI-10-SS-12-02	4/26/01	FLUORENE	20 U	UG/KG	3.26	20	3	1
PAI-10-SS-12-02	4/26/01	INDENO(1,2,3-CD)PYRENE	22	UG/KG	7.43	20	3	1
PAI-10-SS-12-02	4/26/01	NAPHTHALENE	20 U	UG/KG	3.75	20	3	1
PAI-10-SS-12-02	4/26/01	PHENANTHRENE	16 J	UG/KG	4.04	20	3	1
PAI-10-SS-12-02	4/26/01	PYRENE	40	UG/KG	2.97	20	3	1
PAI-10-SS-13-01	8/6/98	2-METHYLNAPHTHALENE	350 U	UG/KG	120	350	1	4

nsample	sample_dat	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SS-13-01	8/6/98	ACENAPHTHENE	350 U	UG/KG	130	350	1	4
PAI-10-SS-13-01	8/6/98	ACENAPHTHYLENE	350 U	UG/KG	120	350	1	4
PAI-10-SS-13-01	8/6/98	ANTHRACENE	350 U	UG/KG	120	350	1	4
PAI-10-SS-13-01	8/6/98	BENZO(A)ANTHRACENE	350 U	UG/KG	120	350	1	4
PAI-10-SS-13-01	8/6/98	BENZO(A)PYRENE	350 U	UG/KG	160	350	1	4
PAI-10-SS-13-01	8/6/98	BENZO(B)FLUORANTHENE	350 U	UG/KG	150	350	1	4
PAI-10-SS-13-01	8/6/98	BENZO(K)FLUORANTHENE	350 U	UG/KG	130	350	1	4
PAI-10-SS-13-01	8/6/98	CHRYSENE	350 U	UG/KG	130	350	1	4
PAI-10-SS-13-01	8/6/98	DIBENZO(A,H)ANTHRACENE	350 U	UG/KG	120	350	1	4
PAI-10-SS-13-01	8/6/98	FLUORANTHENE	350 U	UG/KG	160	350	1	4
PAI-10-SS-13-01	8/6/98	FLUORENE	350 U	UG/KG	120	350	1	4
PAI-10-SS-13-01	8/6/98	NAPHTHALENE	350 U	UG/KG	120	350	1	4
PAI-10-SS-13-01	8/6/98	PHENANTHRENE	350 U	UG/KG	17	350	1	4
PAI-10-SS-13-01	8/6/98	PYRENE	350 U	UG/KG	150	350	1	4
PAI-10-SS-14-01	8/6/98	2-METHYLNAPHTHALENE	440 U	UG/KG	160	440	1	25
PAI-10-SS-14-01	8/6/98	ACENAPHTHENE	440 U	UG/KG	160	440	1	25
PAI-10-SS-14-01	8/6/98	ACENAPHTHYLENE	440 U	UG/KG	150	440	1	25
PAI-10-SS-14-01	8/6/98	ANTHRACENE	440 U	UG/KG	160	440	1	25
PAI-10-SS-14-01	8/6/98	BENZO(A)ANTHRACENE	440 U	UG/KG	160	440	1	25
PAI-10-SS-14-01	8/6/98	BENZO(A)PYRENE	440 U	UG/KG	210	440	1	25
PAI-10-SS-14-01	8/6/98	BENZO(B)FLUORANTHENE	440 U	UG/KG	190	440	1	25
PAI-10-SS-14-01	8/6/98	BENZO(K)FLUORANTHENE	440 U	UG/KG	160	440	1	25
PAI-10-SS-14-01	8/6/98	CHRYSENE	440 U	UG/KG	170	440	1	25
PAI-10-SS-14-01	8/6/98	DIBENZO(A,H)ANTHRACENE	440 U	UG/KG	150	440	1	25
PAI-10-SS-14-01	8/6/98	FLUORANTHENE	440 U	UG/KG	200	440	1	25
PAI-10-SS-14-01	8/6/98	FLUORENE	440 U	UG/KG	150	440	1	25
PAI-10-SS-14-01	8/6/98	NAPHTHALENE	440 U	UG/KG	150	440	1	25
PAI-10-SS-14-01	8/6/98	PHENANTHRENE	440 U	UG/KG	22	440	1	25
PAI-10-SS-14-01	8/6/98	PYRENE	440 U	UG/KG	190	440	1	25
PAI-10-SS-15-01	9/9/98	2-METHYLNAPHTHALENE	370 U	UG/KG	130	370	1	9
PAI-10-SS-15-01	9/9/98	ACENAPHTHENE	370 U	UG/KG	130	370	1	9
PAI-10-SS-15-01	9/9/98	ACENAPHTHYLENE	370 U	UG/KG	120	370	1	9
PAI-10-SS-15-01	9/9/98	ANTHRACENE	370 U	UG/KG	130	370	1	9
PAI-10-SS-15-01	9/9/98	BENZO(A)ANTHRACENE	370 U	UG/KG	130	370	1	9
PAI-10-SS-15-01	9/9/98	BENZO(A)PYRENE	370 U	UG/KG	170	370	1	9
PAI-10-SS-15-01	9/9/98	BENZO(B)FLUORANTHENE	370 U	UG/KG	160	370	1	9
PAI-10-SS-15-01	9/9/98	BENZO(K)FLUORANTHENE	370 U	UG/KG	130	370	1	9
PAI-10-SS-15-01	9/9/98	CHRYSENE	370 U	UG/KG	140	370	1	9
PAI-10-SS-15-01	9/9/98	DIBENZO(A,H)ANTHRACENE	370 U	UG/KG	120	370	1	9
PAI-10-SS-15-01	9/9/98	FLUORANTHENE	370 U	UG/KG	160	370	1	9
PAI-10-SS-15-01	9/9/98	FLUORENE	370 U	UG/KG	120	370	1	9
PAI-10-SS-15-01	9/9/98	INDENO(1,2,3-CD)PYRENE	370 U	UG/KG	150	370	1	9
PAI-10-SS-15-01	9/9/98	NAPHTHALENE	370 U	UG/KG	120	370	1	9
PAI-10-SS-15-01	9/9/98	PHENANTHRENE	370 U	UG/KG	18	370	1	9
PAI-10-SS-15-01	9/9/98	PYRENE	370 U	UG/KG	150	370	1	9
PAI-10-SS-15-01A	8/6/98	2-METHYLNAPHTHALENE	350 U	UG/KG	120	350	1	5
PAI-10-SS-15-01A	8/6/98	ACENAPHTHENE	350 U	UG/KG	130	350	1	5
PAI-10-SS-15-01A	8/6/98	ACENAPHTHYLENE	350 U	UG/KG	120	350	1	5
PAI-10-SS-15-01A	8/6/98	ANTHRACENE	350 U	UG/KG	130	350	1	5
PAI-10-SS-15-01A	8/6/98	BENZO(A)ANTHRACENE	350 U	UG/KG	130	350	1	5
PAI-10-SS-15-01A	8/6/98	BENZO(A)PYRENE	350 U	UG/KG	170	350	1	5
PAI-10-SS-15-01A	8/6/98	BENZO(B)FLUORANTHENE	350 U	UG/KG	150	350	1	5
PAI-10-SS-15-01A	8/6/98	BENZO(K)FLUORANTHENE	350 U	UG/KG	130	350	1	5
PAI-10-SS-15-01A	8/6/98	CHRYSENE	350 U	UG/KG	130	350	1	5
PAI-10-SS-15-01A	8/6/98	DIBENZO(A,H)ANTHRACENE	350 U	UG/KG	120	350	1	5
PAI-10-SS-15-01A	8/6/98	FLUORANTHENE	350 U	UG/KG	160	350	1	5
PAI-10-SS-15-01A	8/6/98	FLUORENE	350 U	UG/KG	120	350	1	5
PAI-10-SS-15-01A	8/6/98	NAPHTHALENE	350 U	UG/KG	120	350	1	5
PAI-10-SS-15-01A	8/6/98	PHENANTHRENE	350 U	UG/KG	17	350	1	5
PAI-10-SS-15-01A	8/6/98	PYRENE	350 U	UG/KG	150	350	1	5

nsample	sample_dat	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SS-16-01	9/9/98	2-METHYLNAPHTHALENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-16-01	9/9/98	ACENAPHTHENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-16-01	9/9/98	ACENAPHTHYLENE	360 U	UG/KG	120	360	1	8
PAI-10-SS-16-01	9/9/98	ANTHRACENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-16-01	9/9/98	BENZO(A)ANTHRACENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-16-01	9/9/98	BENZO(A)PYRENE	360 U	UG/KG	170	360	1	8
PAI-10-SS-16-01	9/9/98	BENZO(B)FLUORANTHENE	360 U	UG/KG	160	360	1	8
PAI-10-SS-16-01	9/9/98	BENZO(K)FLUORANTHENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-16-01	9/9/98	CHRYSENE	360 U	UG/KG	140	360	1	8
PAI-10-SS-16-01	9/9/98	DIBENZO(A,H)ANTHRACENE	360 U	UG/KG	120	360	1	8
PAI-10-SS-16-01	9/9/98	FLUORANTHENE	360 U	UG/KG	160	360	1	8
PAI-10-SS-16-01	9/9/98	FLUORENE	360 U	UG/KG	120	360	1	8
PAI-10-SS-16-01	9/9/98	INDENO(1,2,3-CD)PYRENE	360 U	UG/KG	150	360	1	8
PAI-10-SS-16-01	9/9/98	NAPHTHALENE	360 U	UG/KG	120	360	1	8
PAI-10-SS-16-01	9/9/98	PHENANTHRENE	360 U	UG/KG	18	360	1	8
PAI-10-SS-16-01	9/9/98	PYRENE	360 U	UG/KG	150	360	1	8
PAI-10-SS-17-01	9/9/98	2-METHYLNAPHTHALENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-17-01	9/9/98	ACENAPHTHENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-17-01	9/9/98	ACENAPHTHYLENE	360 U	UG/KG	120	360	1	8
PAI-10-SS-17-01	9/9/98	ANTHRACENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-17-01	9/9/98	BENZO(A)ANTHRACENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-17-01	9/9/98	BENZO(A)PYRENE	360 U	UG/KG	170	360	1	8
PAI-10-SS-17-01	9/9/98	BENZO(B)FLUORANTHENE	360 U	UG/KG	160	360	1	8
PAI-10-SS-17-01	9/9/98	BENZO(K)FLUORANTHENE	360 U	UG/KG	130	360	1	8
PAI-10-SS-17-01	9/9/98	CHRYSENE	360 U	UG/KG	140	360	1	8
PAI-10-SS-17-01	9/9/98	DIBENZO(A,H)ANTHRACENE	360 U	UG/KG	120	360	1	8
PAI-10-SS-17-01	9/9/98	FLUORANTHENE	360 U	UG/KG	160	360	1	8
PAI-10-SS-17-01	9/9/98	FLUORENE	360 U	UG/KG	120	360	1	8
PAI-10-SS-17-01	9/9/98	INDENO(1,2,3-CD)PYRENE	360 U	UG/KG	150	360	1	8
PAI-10-SS-17-01	9/9/98	NAPHTHALENE	360 U	UG/KG	120	360	1	8
PAI-10-SS-17-01	9/9/98	PHENANTHRENE	360 U	UG/KG	18	360	1	8
PAI-10-SS-17-01	9/9/98	PYRENE	360 U	UG/KG	150	360	1	8

nsample	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SD-001-01A	ACENAPHTHENE	120 U	UG/KG	18	120	46	1
PAI-10-SD-001-01A	ACENAPHTHYLENE	240 U	UG/KG	9	240	46	1
PAI-10-SD-001-01A	ANTHRACENE	12 U	UG/KG	0.56	12	46	1
PAI-10-SD-001-01A	BENZO(A)ANTHRACENE	12 U	UG/KG	0.99	12	46	1
PAI-10-SD-001-01A	BENZO(A)PYRENE	12 U	UG/KG	0.9	12	46	1
PAI-10-SD-001-01A	BENZO(B)FLUORANTHENE	24 U	UG/KG	1.6	24	46	1
PAI-10-SD-001-01A	BENZO(K)FLUORANTHENE	12 U	UG/KG	1.5	12	46	1
PAI-10-SD-001-01A	CHRYSENE	12 U	UG/KG	1.1	12	46	1
PAI-10-SD-001-01A	DIBENZO(A,H)ANTHRACENE	24 U	UG/KG	4.2	24	46	1
PAI-10-SD-001-01A	FLUORANTHENE	24 U	UG/KG	6.3	24	46	1
PAI-10-SD-001-01A	FLUORENE	24 U	UG/KG	1.6	24	46	1
PAI-10-SD-001-01A	INDENO(1,2,3-CD)PYRENE	12 U	UG/KG	0.97	12	46	1
PAI-10-SD-001-01A	NAPHTHALENE	120 U	UG/KG	8.3	120	46	1
PAI-10-SD-001-01A	PHENANTHRENE	12 U	UG/KG	1.9	12	46	1
PAI-10-SD-001-01A	PYRENE	12 U	UG/KG	12	12	46	1
PAI-10-SD-002-01A	ACENAPHTHENE	200 U	UG/KG	28	200	66	1
PAI-10-SD-002-01A	ACENAPHTHYLENE	380 U	UG/KG	15	380	66	1
PAI-10-SD-002-01A	ANTHRACENE	20 U	UG/KG	0.9	20	66	1
PAI-10-SD-002-01A	BENZO(A)ANTHRACENE	20 U	UG/KG	1.6	20	66	1
PAI-10-SD-002-01A	BENZO(A)PYRENE	20 UJ	UG/KG	1.5	20	66	1
PAI-10-SD-002-01A	BENZO(B)FLUORANTHENE	38 U	UG/KG	2.6	38	66	1
PAI-10-SD-002-01A	BENZO(K)FLUORANTHENE	20 U	UG/KG	2.5	20	66	1
PAI-10-SD-002-01A	CHRYSENE	20 U	UG/KG	1.8	20	66	1
PAI-10-SD-002-01A	DIBENZO(A,H)ANTHRACENE	38 U	UG/KG	6.8	38	66	1
PAI-10-SD-002-01A	FLUORANTHENE	38 U	UG/KG	10	38	66	1
PAI-10-SD-002-01A	FLUORENE	38 U	UG/KG	2.7	38	66	1
PAI-10-SD-002-01A	INDENO(1,2,3-CD)PYRENE	20 U	UG/KG	1.6	20	66	1
PAI-10-SD-002-01A	NAPHTHALENE	200 U	UG/KG	13	200	66	1
PAI-10-SD-002-01A	PHENANTHRENE	20 U	UG/KG	3.1	20	66	1
PAI-10-SD-002-01A	PYRENE	20 U	UG/KG	19	20	66	1
PAI-10-SD-002-01A-D	ACENAPHTHENE	200 U	UG/KG	29	200	67	1
PAI-10-SD-002-01A-D	ACENAPHTHYLENE	390 U	UG/KG	15	390	67	1
PAI-10-SD-002-01A-D	ANTHRACENE	20 U	UG/KG	0.91	20	67	1
PAI-10-SD-002-01A-D	BENZO(A)ANTHRACENE	20 U	UG/KG	1.6	20	67	1
PAI-10-SD-002-01A-D	BENZO(A)PYRENE	26 J	UG/KG	1.5	20	67	1
PAI-10-SD-002-01A-D	BENZO(B)FLUORANTHENE	39 U	UG/KG	2.7	39	67	1
PAI-10-SD-002-01A-D	BENZO(K)FLUORANTHENE	20 U	UG/KG	2.5	20	67	1
PAI-10-SD-002-01A-D	CHRYSENE	20 U	UG/KG	1.9	20	67	1
PAI-10-SD-002-01A-D	DIBENZO(A,H)ANTHRACENE	39 U	UG/KG	6.9	39	67	1
PAI-10-SD-002-01A-D	FLUORANTHENE	39 U	UG/KG	10	39	67	1
PAI-10-SD-002-01A-D	FLUORENE	39 U	UG/KG	2.7	39	67	1
PAI-10-SD-002-01A-D	INDENO(1,2,3-CD)PYRENE	20 U	UG/KG	1.6	20	67	1
PAI-10-SD-002-01A-D	NAPHTHALENE	200 U	UG/KG	14	200	67	1
PAI-10-SD-002-01A-D	PHENANTHRENE	20 U	UG/KG	3.2	20	67	1
PAI-10-SD-002-01A-D	PYRENE	20 U	UG/KG	20	20	67	1
PAI-10-SD-003-01A	ACENAPHTHENE	96 U	UG/KG	14	96	30	1
PAI-10-SD-003-01A	ACENAPHTHYLENE	190 U	UG/KG	7	190	30	1
PAI-10-SD-003-01A	ANTHRACENE	9.6 U	UG/KG	0.43	9.6	30	1
PAI-10-SD-003-01A	BENZO(A)ANTHRACENE	9.6 U	UG/KG	0.77	9.6	30	1
PAI-10-SD-003-01A	BENZO(A)PYRENE	9.6 U	UG/KG	0.7	9.6	30	1
PAI-10-SD-003-01A	BENZO(B)FLUORANTHENE	19 U	UG/KG	1.3	19	30	1
PAI-10-SD-003-01A	BENZO(K)FLUORANTHENE	9.6 U	UG/KG	1.2	9.6	30	1
PAI-10-SD-003-01A	CHRYSENE	9.6 U	UG/KG	0.88	9.6	30	1
PAI-10-SD-003-01A	DIBENZO(A,H)ANTHRACENE	19 U	UG/KG	3.3	19	30	1
PAI-10-SD-003-01A	FLUORANTHENE	19 U	UG/KG	4.9	19	30	1
PAI-10-SD-003-01A	FLUORENE	19 U	UG/KG	1.3	19	30	1
PAI-10-SD-003-01A	INDENO(1,2,3-CD)PYRENE	9.6 U	UG/KG	0.75	9.6	30	1

nsample	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SD-003-01A	NAPHTHALENE	96 U	UG/KG	6.4	96	30	1
PAI-10-SD-003-01A	PHENANTHRENE	9.6 U	UG/KG	1.5	9.6	30	1
PAI-10-SD-003-01A	PYRENE	9.6 U	UG/KG	9.4	9.6	30	1
PAI-10-SD-004-01A	ACENAPHTHENE	100 U	UG/KG	14	100	34	1
PAI-10-SD-004-01A	ACENAPHTHYLENE	200 U	UG/KG	7.4	200	34	1
PAI-10-SD-004-01A	ANTHRACENE	10 U	UG/KG	0.45	10	34	1
PAI-10-SD-004-01A	BENZO(A)ANTHRACENE	10 U	UG/KG	0.81	10	34	1
PAI-10-SD-004-01A	BENZO(A)PYRENE	10 U	UG/KG	0.74	10	34	1
PAI-10-SD-004-01A	BENZO(B)FLUORANTHENE	20 U	UG/KG	1.3	20	34	1
PAI-10-SD-004-01A	BENZO(K)FLUORANTHENE	10 U	UG/KG	1.3	10	34	1
PAI-10-SD-004-01A	CHRYSENE	10 U	UG/KG	0.92	10	34	1
PAI-10-SD-004-01A	DIBENZO(A,H)ANTHRACENE	20 U	UG/KG	3.5	20	34	1
PAI-10-SD-004-01A	FLUORANTHENE	20 U	UG/KG	5.2	20	34	1
PAI-10-SD-004-01A	FLUORENE	20 U	UG/KG	1.3	20	34	1
PAI-10-SD-004-01A	INDENO(1,2,3-CD)PYRENE	10 U	UG/KG	0.79	10	34	1
PAI-10-SD-004-01A	NAPHTHALENE	100 U	UG/KG	6.8	100	34	1
PAI-10-SD-004-01A	PHENANTHRENE	10 U	UG/KG	1.6	10	34	1
PAI-10-SD-004-01A	PYRENE	10 U	UG/KG	9.9	10	34	1
PAI-10-SD-005-01A	ACENAPHTHENE	97 U	UG/KG	14	97	31	1
PAI-10-SD-005-01A	ACENAPHTHYLENE	190 U	UG/KG	7.1	190	31	1
PAI-10-SD-005-01A	ANTHRACENE	9.7 U	UG/KG	0.44	9.7	31	1
PAI-10-SD-005-01A	BENZO(A)ANTHRACENE	9.7 U	UG/KG	0.78	9.7	31	1
PAI-10-SD-005-01A	BENZO(A)PYRENE	9.7 U	UG/KG	0.71	9.7	31	1
PAI-10-SD-005-01A	BENZO(B)FLUORANTHENE	19 U	UG/KG	1.3	19	31	1
PAI-10-SD-005-01A	BENZO(K)FLUORANTHENE	9.7 U	UG/KG	1.2	9.7	31	1
PAI-10-SD-005-01A	CHRYSENE	9.7 U	UG/KG	0.89	9.7	31	1
PAI-10-SD-005-01A	DIBENZO(A,H)ANTHRACENE	19 U	UG/KG	3.3	19	31	1
PAI-10-SD-005-01A	FLUORANTHENE	19 U	UG/KG	5	19	31	1
PAI-10-SD-005-01A	FLUORENE	19 U	UG/KG	1.3	19	31	1
PAI-10-SD-005-01A	INDENO(1,2,3-CD)PYRENE	9.7 U	UG/KG	0.77	9.7	31	1
PAI-10-SD-005-01A	NAPHTHALENE	97 U	UG/KG	6.5	97	31	1
PAI-10-SD-005-01A	PHENANTHRENE	9.7 U	UG/KG	1.5	9.7	31	1
PAI-10-SD-005-01A	PYRENE	9.7 U	UG/KG	9.5	9.7	31	1
PAI-10-SD-006-01A	ACENAPHTHENE	93 U	UG/KG	13	93	28	1
PAI-10-SD-006-01A	ACENAPHTHYLENE	180 U	UG/KG	6.8	180	28	1
PAI-10-SD-006-01A	ANTHRACENE	9.3 U	UG/KG	0.42	9.3	28	1
PAI-10-SD-006-01A	BENZO(A)ANTHRACENE	9.3 U	UG/KG	0.75	9.3	28	1
PAI-10-SD-006-01A	BENZO(A)PYRENE	9.3 U	UG/KG	0.69	9.3	28	1
PAI-10-SD-006-01A	BENZO(B)FLUORANTHENE	18 U	UG/KG	1.2	18	28	1
PAI-10-SD-006-01A	BENZO(K)FLUORANTHENE	9.3 U	UG/KG	1.2	9.3	28	1
PAI-10-SD-006-01A	CHRYSENE	9.3 U	UG/KG	0.86	9.3	28	1
PAI-10-SD-006-01A	DIBENZO(A,H)ANTHRACENE	18 U	UG/KG	3.2	18	28	1
PAI-10-SD-006-01A	FLUORANTHENE	18 U	UG/KG	4.8	18	28	1
PAI-10-SD-006-01A	FLUORENE	18 U	UG/KG	1.2	18	28	1
PAI-10-SD-006-01A	INDENO(1,2,3-CD)PYRENE	9.3 U	UG/KG	0.74	9.3	28	1
PAI-10-SD-006-01A	NAPHTHALENE	93 U	UG/KG	6.3	93	28	1
PAI-10-SD-006-01A	PHENANTHRENE	9.3 U	UG/KG	1.5	9.3	28	1
PAI-10-SD-006-01A	PYRENE	9.3 U	UG/KG	9.1	9.3	28	1
PAI-10-SD-007-01A	ACENAPHTHENE	100 U	UG/KG	15	100	35	1
PAI-10-SD-007-01A	ACENAPHTHYLENE	200 U	UG/KG	7.6	200	35	1
PAI-10-SD-007-01A	ANTHRACENE	10 U	UG/KG	0.46	10	35	1
PAI-10-SD-007-01A	BENZO(A)ANTHRACENE	10 U	UG/KG	0.82	10	35	1
PAI-10-SD-007-01A	BENZO(A)PYRENE	11	UG/KG	0.76	10	35	1
PAI-10-SD-007-01A	BENZO(B)FLUORANTHENE	20 U	UG/KG	1.4	20	35	1
PAI-10-SD-007-01A	BENZO(K)FLUORANTHENE	10 U	UG/KG	1.3	10	35	1
PAI-10-SD-007-01A	CHRYSENE	10 U	UG/KG	0.95	10	35	1
PAI-10-SD-007-01A	DIBENZO(A,H)ANTHRACENE	20 U	UG/KG	3.5	20	35	1

nsample	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SD-007-01A	FLUORANTHENE	20 U	UG/KG	5.3	20	35	1
PAI-10-SD-007-01A	FLUORENE	20 U	UG/KG	1.4	20	35	1
PAI-10-SD-007-01A	INDENO(1,2,3-CD)PYRENE	10 U	UG/KG	0.81	10	35	1
PAI-10-SD-007-01A	NAPHTHALENE	100 U	UG/KG	6.9	100	35	1
PAI-10-SD-007-01A	PHENANTHRENE	10 U	UG/KG	1.6	10	35	1
PAI-10-SD-007-01A	PYRENE	10 U	UG/KG	10	10	35	1
PAI-10-SD-008-01A	ACENAPHTHENE	270 U	UG/KG	38	270	75	1
PAI-10-SD-008-01A	ACENAPHTHYLENE	520 U	UG/KG	19	520	75	1
PAI-10-SD-008-01A	ANTHRACENE	27 U	UG/KG	1.2	27	75	1
PAI-10-SD-008-01A	BENZO(A)ANTHRACENE	27 U	UG/KG	2.1	27	75	1
PAI-10-SD-008-01A	BENZO(A)PYRENE	38	UG/KG	1.9	27	75	1
PAI-10-SD-008-01A	BENZO(B)FLUORANTHENE	120	UG/KG	3.5	52	75	1
PAI-10-SD-008-01A	BENZO(K)FLUORANTHENE	27 U	UG/KG	3.3	27	75	1
PAI-10-SD-008-01A	CHRYSENE	27 U	UG/KG	2.4	27	75	1
PAI-10-SD-008-01A	DIBENZO(A,H)ANTHRACENE	52 U	UG/KG	9.1	52	75	1
PAI-10-SD-008-01A	FLUORANTHENE	52 U	UG/KG	14	52	75	1
PAI-10-SD-008-01A	FLUORENE	52 U	UG/KG	3.5	52	75	1
PAI-10-SD-008-01A	INDENO(1,2,3-CD)PYRENE	27 U	UG/KG	2.1	27	75	1
PAI-10-SD-008-01A	NAPHTHALENE	270 U	UG/KG	18	270	75	1
PAI-10-SD-008-01A	PHENANTHRENE	27 U	UG/KG	4.2	27	75	1
PAI-10-SD-008-01A	PYRENE	27 U	UG/KG	26	27	75	1
PAI-10-SD-009-01A	ACENAPHTHENE	220 U	UG/KG	31	220	69	1
PAI-10-SD-009-01A	ACENAPHTHYLENE	420 U	UG/KG	16	420	69	1
PAI-10-SD-009-01A	ANTHRACENE	22 U	UG/KG	0.98	22	69	1
PAI-10-SD-009-01A	BENZO(A)ANTHRACENE	22 U	UG/KG	1.7	22	69	1
PAI-10-SD-009-01A	BENZO(A)PYRENE	29 J	UG/KG	1.6	22	69	1
PAI-10-SD-009-01A	BENZO(B)FLUORANTHENE	42 U	UG/KG	2.9	42	69	1
PAI-10-SD-009-01A	BENZO(K)FLUORANTHENE	22 U	UG/KG	2.7	22	69	1
PAI-10-SD-009-01A	CHRYSENE	22 U	UG/KG	2	22	69	1
PAI-10-SD-009-01A	DIBENZO(A,H)ANTHRACENE	42 U	UG/KG	7.5	42	69	1
PAI-10-SD-009-01A	FLUORANTHENE	42 U	UG/KG	11	42	69	1
PAI-10-SD-009-01A	FLUORENE	42 U	UG/KG	2.9	42	69	1
PAI-10-SD-009-01A	INDENO(1,2,3-CD)PYRENE	22 U	UG/KG	1.7	22	69	1
PAI-10-SD-009-01A	NAPHTHALENE	220 U	UG/KG	15	220	69	1
PAI-10-SD-009-01A	PHENANTHRENE	22 U	UG/KG	3.4	22	69	1
PAI-10-SD-009-01A	PYRENE	22 U	UG/KG	21	22	69	1
PAI-10-SD-010-01A	ACENAPHTHENE	110 U	UG/KG	15	110	37	1
PAI-10-SD-010-01A	ACENAPHTHYLENE	210 U	UG/KG	7.8	210	37	1
PAI-10-SD-010-01A	ANTHRACENE	11 U	UG/KG	0.48	11	37	1
PAI-10-SD-010-01A	BENZO(A)ANTHRACENE	11 U	UG/KG	0.85	11	37	1
PAI-10-SD-010-01A	BENZO(A)PYRENE	11 U	UG/KG	0.78	11	37	1
PAI-10-SD-010-01A	BENZO(B)FLUORANTHENE	21 U	UG/KG	1.4	21	37	1
PAI-10-SD-010-01A	BENZO(K)FLUORANTHENE	11 U	UG/KG	1.3	11	37	1
PAI-10-SD-010-01A	CHRYSENE	11 U	UG/KG	0.97	11	37	1
PAI-10-SD-010-01A	DIBENZO(A,H)ANTHRACENE	21 U	UG/KG	3.6	21	37	1
PAI-10-SD-010-01A	FLUORANTHENE	21 U	UG/KG	5.4	21	37	1
PAI-10-SD-010-01A	FLUORENE	21 U	UG/KG	1.4	21	37	1
PAI-10-SD-010-01A	INDENO(1,2,3-CD)PYRENE	11 U	UG/KG	0.83	11	37	1
PAI-10-SD-010-01A	NAPHTHALENE	110 U	UG/KG	7.1	110	37	1
PAI-10-SD-010-01A	PHENANTHRENE	11 U	UG/KG	1.7	11	37	1
PAI-10-SD-010-01A	PYRENE	11 U	UG/KG	10	11	37	1
PAI-10-SD-011-01A	ACENAPHTHENE	110 U	UG/KG	16	110	39	1
PAI-10-SD-011-01A	ACENAPHTHYLENE	210 U	UG/KG	8.1	210	39	1
PAI-10-SD-011-01A	ANTHRACENE	11 U	UG/KG	0.5	11	39	1
PAI-10-SD-011-01A	BENZO(A)ANTHRACENE	11 U	UG/KG	0.88	11	39	1
PAI-10-SD-011-01A	BENZO(A)PYRENE	11 U	UG/KG	0.81	11	39	1
PAI-10-SD-011-01A	BENZO(B)FLUORANTHENE	21 U	UG/KG	1.5	21	39	1

nsample	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SD-011-01A	BENZO(K)FLUORANTHENE	29 R	UG/KG	1.4	11	39	1
PAI-10-SD-011-01A	CHRYSENE	11 U	UG/KG	1	11	39	1
PAI-10-SD-011-01A	DIBENZO(A,H)ANTHRACENE	21 U	UG/KG	3.8	21	39	1
PAI-10-SD-011-01A	FLUORANTHENE	21 U	UG/KG	5.7	21	39	1
PAI-10-SD-011-01A	FLUORENE	21 U	UG/KG	1.5	21	39	1
PAI-10-SD-011-01A	INDENO(1,2,3-CD)PYRENE	11 U	UG/KG	0.87	11	39	1
PAI-10-SD-011-01A	NAPHTHALENE	110 U	UG/KG	7.4	110	39	1
PAI-10-SD-011-01A	PHENANTHRENE	11 U	UG/KG	1.7	11	39	1
PAI-10-SD-011-01A	PYRENE	11 U	UG/KG	11	11	39	1
PAI-10-SD-012-01A	ACENAPHTHENE	110 U	UG/KG	16	110	40	1
PAI-10-SD-012-01A	ACENAPHTHYLENE	220 U	UG/KG	8.2	220	40	1
PAI-10-SD-012-01A	ANTHRACENE	11 U	UG/KG	0.51	11	40	1
PAI-10-SD-012-01A	BENZO(A)ANTHRACENE	11 U	UG/KG	0.9	11	40	1
PAI-10-SD-012-01A	BENZO(A)PYRENE	11 U	UG/KG	0.82	11	40	1
PAI-10-SD-012-01A	BENZO(B)FLUORANTHENE	22 U	UG/KG	1.5	22	40	1
PAI-10-SD-012-01A	BENZO(K)FLUORANTHENE	11 U	UG/KG	1.4	11	40	1
PAI-10-SD-012-01A	CHRYSENE	11 U	UG/KG	1	11	40	1
PAI-10-SD-012-01A	DIBENZO(A,H)ANTHRACENE	22 U	UG/KG	3.8	22	40	1
PAI-10-SD-012-01A	FLUORANTHENE	22 U	UG/KG	5.7	22	40	1
PAI-10-SD-012-01A	FLUORENE	22 U	UG/KG	1.5	22	40	1
PAI-10-SD-012-01A	INDENO(1,2,3-CD)PYRENE	11 U	UG/KG	0.88	11	40	1
PAI-10-SD-012-01A	NAPHTHALENE	110 U	UG/KG	7.5	110	40	1
PAI-10-SD-012-01A	PHENANTHRENE	11 U	UG/KG	1.8	11	40	1
PAI-10-SD-012-01A	PYRENE	11 U	UG/KG	11	11	40	1
PAI-10-SD-013-01A	ACENAPHTHENE	110 U	UG/KG	16	110	41	1
PAI-10-SD-013-01A	ACENAPHTHYLENE	220 U	UG/KG	8.3	220	41	1
PAI-10-SD-013-01A	ANTHRACENE	11 U	UG/KG	0.51	11	41	1
PAI-10-SD-013-01A	BENZO(A)ANTHRACENE	18 J	UG/KG	0.91	11	41	1
PAI-10-SD-013-01A	BENZO(A)PYRENE	30	UG/KG	0.83	11	41	1
PAI-10-SD-013-01A	BENZO(B)FLUORANTHENE	25 J	UG/KG	1.5	22	41	1
PAI-10-SD-013-01A	BENZO(K)FLUORANTHENE	18	UG/KG	1.4	11	41	1
PAI-10-SD-013-01A	CHRYSENE	44 J	UG/KG	1	11	41	1
PAI-10-SD-013-01A	DIBENZO(A,H)ANTHRACENE	22 U	UG/KG	3.9	22	41	1
PAI-10-SD-013-01A	FLUORANTHENE	92	UG/KG	5.8	22	41	1
PAI-10-SD-013-01A	FLUORENE	22 U	UG/KG	1.5	22	41	1
PAI-10-SD-013-01A	INDENO(1,2,3-CD)PYRENE	11 U	UG/KG	0.9	11	41	1
PAI-10-SD-013-01A	NAPHTHALENE	110 U	UG/KG	7.6	110	41	1
PAI-10-SD-013-01A	PHENANTHRENE	11 U	UG/KG	1.8	11	41	1
PAI-10-SD-013-01A	PYRENE	89	UG/KG	11	11	41	1
PAI-10-SD-014-01A	ACENAPHTHENE	160 U	UG/KG	23	160	58	1
PAI-10-SD-014-01A	ACENAPHTHYLENE	310 U	UG/KG	12	310	58	1
PAI-10-SD-014-01A	ANTHRACENE	16 U	UG/KG	0.72	16	58	1
PAI-10-SD-014-01A	BENZO(A)ANTHRACENE	16 U	UG/KG	1.3	16	58	1
PAI-10-SD-014-01A	BENZO(A)PYRENE	31	UG/KG	1.2	16	58	1
PAI-10-SD-014-01A	BENZO(B)FLUORANTHENE	31 U	UG/KG	2.1	31	58	1
PAI-10-SD-014-01A	BENZO(K)FLUORANTHENE	16 U	UG/KG	2	16	58	1
PAI-10-SD-014-01A	CHRYSENE	16 U	UG/KG	1.5	16	58	1
PAI-10-SD-014-01A	DIBENZO(A,H)ANTHRACENE	31 U	UG/KG	5.5	31	58	1
PAI-10-SD-014-01A	FLUORANTHENE	31 U	UG/KG	8.1	31	58	1
PAI-10-SD-014-01A	FLUORENE	31 U	UG/KG	2.1	31	58	1
PAI-10-SD-014-01A	INDENO(1,2,3-CD)PYRENE	26	UG/KG	1.3	16	58	1
PAI-10-SD-014-01A	NAPHTHALENE	160 U	UG/KG	11	160	58	1
PAI-10-SD-014-01A	PHENANTHRENE	16 U	UG/KG	2.5	16	58	1
PAI-10-SD-014-01A	PYRENE	16 U	UG/KG	16	16	58	1
PAI-10-SD-014-02A	ACENAPHTHENE	160 U	UG/KG	23	160	58	1
PAI-10-SD-014-02A	ACENAPHTHYLENE	310 U	UG/KG	12	310	58	1
PAI-10-SD-014-02A	ANTHRACENE	16 U	UG/KG	0.72	16	58	1

nsample	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SD-014-02A	BENZO(A)ANTHRACENE	16 U	UG/KG	1.3	16	58	1
PAI-10-SD-014-02A	BENZO(A)PYRENE	21	UG/KG	1.2	16	58	1
PAI-10-SD-014-02A	BENZO(B)FLUORANTHENE	31 U	UG/KG	2.1	31	58	1
PAI-10-SD-014-02A	BENZO(K)FLUORANTHENE	16 U	UG/KG	2	16	58	1
PAI-10-SD-014-02A	CHRYSENE	16 U	UG/KG	1.5	16	58	1
PAI-10-SD-014-02A	DIBENZO(A,H)ANTHRACENE	31 U	UG/KG	5.5	31	58	1
PAI-10-SD-014-02A	FLUORANTHENE	31 U	UG/KG	8.2	31	58	1
PAI-10-SD-014-02A	FLUORENE	31 U	UG/KG	2.1	31	58	1
PAI-10-SD-014-02A	INDENO(1,2,3-CD)PYRENE	16 U	UG/KG	1.3	16	58	1
PAI-10-SD-014-02A	NAPHTHALENE	160 U	UG/KG	11	160	58	1
PAI-10-SD-014-02A	PHENANTHRENE	16 U	UG/KG	2.5	16	58	1
PAI-10-SD-014-02A	PYRENE	16 U	UG/KG	16	16	58	1
PAI-10-SD-015-01A	ACENAPHTHENE	130 U	UG/KG	18	130	47	1
PAI-10-SD-015-01A	ACENAPHTHYLENE	250 U	UG/KG	9.2	250	47	1
PAI-10-SD-015-01A	ANTHRACENE	13 U	UG/KG	0.57	13	47	1
PAI-10-SD-015-01A	BENZO(A)ANTHRACENE	13 U	UG/KG	1	13	47	1
PAI-10-SD-015-01A	BENZO(A)PYRENE	13 U	UG/KG	0.92	13	47	1
PAI-10-SD-015-01A	BENZO(B)FLUORANTHENE	25 U	UG/KG	1.7	25	47	1
PAI-10-SD-015-01A	BENZO(K)FLUORANTHENE	13 U	UG/KG	1.6	13	47	1
PAI-10-SD-015-01A	CHRYSENE	13 U	UG/KG	1.2	13	47	1
PAI-10-SD-015-01A	DIBENZO(A,H)ANTHRACENE	25 U	UG/KG	4.3	25	47	1
PAI-10-SD-015-01A	FLUORANTHENE	25 U	UG/KG	6.4	25	47	1
PAI-10-SD-015-01A	FLUORENE	25 U	UG/KG	1.7	25	47	1
PAI-10-SD-015-01A	INDENO(1,2,3-CD)PYRENE	13 U	UG/KG	0.99	13	47	1
PAI-10-SD-015-01A	NAPHTHALENE	130 U	UG/KG	8.4	130	47	1
PAI-10-SD-015-01A	PHENANTHRENE	13 U	UG/KG	2	13	47	1
PAI-10-SD-015-01A	PYRENE	13 U	UG/KG	12	13	47	1
PAI-10-SD-016-01A	ACENAPHTHENE	170 U	UG/KG	24	170	61	1
PAI-10-SD-016-01A	ACENAPHTHYLENE	330 U	UG/KG	13	330	61	1
PAI-10-SD-016-01A	ANTHRACENE	17 U	UG/KG	0.77	17	61	1
PAI-10-SD-016-01A	BENZO(A)ANTHRACENE	17 U	UG/KG	1.4	17	61	1
PAI-10-SD-016-01A	BENZO(A)PYRENE	22 J	UG/KG	1.3	17	61	1
PAI-10-SD-016-01A	BENZO(B)FLUORANTHENE	33 U	UG/KG	2.3	33	61	1
PAI-10-SD-016-01A	BENZO(K)FLUORANTHENE	17 U	UG/KG	2.1	17	61	1
PAI-10-SD-016-01A	CHRYSENE	17 U	UG/KG	1.6	17	61	1
PAI-10-SD-016-01A	DIBENZO(A,H)ANTHRACENE	33 U	UG/KG	5.9	33	61	1
PAI-10-SD-016-01A	FLUORANTHENE	33 U	UG/KG	8.8	33	61	1
PAI-10-SD-016-01A	FLUORENE	33 U	UG/KG	2.3	33	61	1
PAI-10-SD-016-01A	INDENO(1,2,3-CD)PYRENE	17 U	UG/KG	1.3	17	61	1
PAI-10-SD-016-01A	NAPHTHALENE	170 U	UG/KG	11	170	61	1
PAI-10-SD-016-01A	PHENANTHRENE	17 U	UG/KG	2.7	17	61	1
PAI-10-SD-016-01A	PYRENE	17 U	UG/KG	17	17	61	1
PAI-10-SD-017-01A	ACENAPHTHENE	110 U	UG/KG	16	110	38	1
PAI-10-SD-017-01A	ACENAPHTHYLENE	210 U	UG/KG	8	210	38	1
PAI-10-SD-017-01A	ANTHRACENE	11 U	UG/KG	0.49	11	38	1
PAI-10-SD-017-01A	BENZO(A)ANTHRACENE	11 U	UG/KG	0.87	11	38	1
PAI-10-SD-017-01A	BENZO(A)PYRENE	12	UG/KG	0.8	11	38	1
PAI-10-SD-017-01A	BENZO(B)FLUORANTHENE	21 U	UG/KG	1.4	21	38	1
PAI-10-SD-017-01A	BENZO(K)FLUORANTHENE	11 U	UG/KG	1.4	11	38	1
PAI-10-SD-017-01A	CHRYSENE	11 U	UG/KG	1	11	38	1
PAI-10-SD-017-01A	DIBENZO(A,H)ANTHRACENE	21 U	UG/KG	3.7	21	38	1
PAI-10-SD-017-01A	FLUORANTHENE	21 U	UG/KG	5.6	21	38	1
PAI-10-SD-017-01A	FLUORENE	21 U	UG/KG	1.5	21	38	1
PAI-10-SD-017-01A	INDENO(1,2,3-CD)PYRENE	11 U	UG/KG	0.86	11	38	1
PAI-10-SD-017-01A	NAPHTHALENE	110 U	UG/KG	7.3	110	38	1
PAI-10-SD-017-01A	PHENANTHRENE	11 U	UG/KG	1.7	11	38	1
PAI-10-SD-017-01A	PYRENE	11 U	UG/KG	11	11	38	1

nsample	parameter	ourresult	units	mdl	crdl_crql	pct_moist	dil_factor
PAI-10-SD-018-01A	ACENAPHTHENE	200 U	UG/KG	29	200	67	1
PAI-10-SD-018-01A	ACENAPHTHYLENE	390 U	UG/KG	15	390	67	1
PAI-10-SD-018-01A	ANTHRACENE	20 U	UG/KG	0.93	20	67	1
PAI-10-SD-018-01A	BENZO(A)ANTHRACENE	20 U	UG/KG	1.6	20	67	1
PAI-10-SD-018-01A	BENZO(A)PYRENE	38	UG/KG	1.5	20	67	1
PAI-10-SD-018-01A	BENZO(B)FLUORANTHENE	39 U	UG/KG	2.7	39	67	1
PAI-10-SD-018-01A	BENZO(K)FLUORANTHENE	20 U	UG/KG	2.6	20	67	1
PAI-10-SD-018-01A	CHRYSENE	20 U	UG/KG	1.9	20	67	1
PAI-10-SD-018-01A	DIBENZO(A,H)ANTHRACENE	39 U	UG/KG	7	39	67	1
PAI-10-SD-018-01A	FLUORANTHENE	39 U	UG/KG	11	39	67	1
PAI-10-SD-018-01A	FLUORENE	39 U	UG/KG	2.7	39	67	1
PAI-10-SD-018-01A	INDENO(1,2,3-CD)PYRENE	20 U	UG/KG	1.6	20	67	1
PAI-10-SD-018-01A	NAPHTHALENE	200 U	UG/KG	14	200	67	1
PAI-10-SD-018-01A	PHENANTHRENE	20 U	UG/KG	3.2	20	67	1
PAI-10-SD-018-01A	PYRENE	20 U	UG/KG	20	20	67	1
PAI-10-SD-19-01	2-METHYLNAPHTHALENE	570 U	UG/KG	240	0	41.4	1
PAI-10-SD-19-01	ACENAPHTHENE	140 U	UG/KG	16	0	41.4	1
PAI-10-SD-19-01	ACENAPHTHYLENE	69 U	UG/KG	33	0	41.4	1
PAI-10-SD-19-01	ANTHRACENE	2.8 U	UG/KG	1.2	0	41.4	1
PAI-10-SD-19-01	BENZO(A)ANTHRACENE	6.9 U	UG/KG	0.97	0	41.4	1
PAI-10-SD-19-01	BENZO(A)PYRENE	6.9 U	UG/KG	1	0	41.4	1
PAI-10-SD-19-01	BENZO(B)FLUORANTHENE	2.8 U	UG/KG	1.8	0	41.4	1
PAI-10-SD-19-01	BENZO(K)FLUORANTHENE	2.8 U	UG/KG	0.97	0	41.4	1
PAI-10-SD-19-01	CHRYSENE	6.9 U	UG/KG	2.8	0	41.4	1
PAI-10-SD-19-01	DIBENZO(A,H)ANTHRACENE	11 U	UG/KG	3.6	0	41.4	1
PAI-10-SD-19-01	FLUORANTHENE	6.9 U	UG/KG	6.3	0	41.4	1
PAI-10-SD-19-01	FLUORENE	14 U	UG/KG	7.3	0	41.4	1
PAI-10-SD-19-01	INDENO(1,2,3-CD)PYRENE	6.9 U	UG/KG	0.84	0	41.4	1
PAI-10-SD-19-01	NAPHTHALENE	69 U	UG/KG	21	0	41.4	1
PAI-10-SD-19-01	PHENANTHRENE	5.5 U	UG/KG	2	0	41.4	1
PAI-10-SD-19-01	PYRENE	14 U	UG/KG	7.1	0	41.4	1
PAI-10-SD-20-01	2-METHYLNAPHTHALENE	830 U	UG/KG	350	0	60.4	1
PAI-10-SD-20-01	ACENAPHTHENE	120 J	UG/KG	24	0	60.4	1
PAI-10-SD-20-01	ACENAPHTHYLENE	100 U	UG/KG	49	0	60.4	1
PAI-10-SD-20-01	ANTHRACENE	4.1 U	UG/KG	1.8	0	60.4	1
PAI-10-SD-20-01	BENZO(A)ANTHRACENE	10 U	UG/KG	1.4	0	60.4	1
PAI-10-SD-20-01	BENZO(A)PYRENE	10 U	UG/KG	1.5	0	60.4	1
PAI-10-SD-20-01	BENZO(B)FLUORANTHENE	4.1 U	UG/KG	2.7	0	60.4	1
PAI-10-SD-20-01	BENZO(K)FLUORANTHENE	4.1 U	UG/KG	1.4	0	60.4	1
PAI-10-SD-20-01	CHRYSENE	10 U	UG/KG	4.2	0	60.4	1
PAI-10-SD-20-01	DIBENZO(A,H)ANTHRACENE	16 U	UG/KG	5.4	0	60.4	1
PAI-10-SD-20-01	FLUORANTHENE	10	UG/KG	9.3	0	60.4	1
PAI-10-SD-20-01	FLUORENE	20 U	UG/KG	11	0	60.4	1
PAI-10-SD-20-01	INDENO(1,2,3-CD)PYRENE	10 U	UG/KG	1.2	0	60.4	1
PAI-10-SD-20-01	NAPHTHALENE	100 U	UG/KG	31	0	60.4	1
PAI-10-SD-20-01	PHENANTHRENE	8.2 U	UG/KG	2.9	0	60.4	1
PAI-10-SD-20-01	PYRENE	20 U	UG/KG	10	0	60.4	1