

**Report of Findings**  
**Quantification of Product Release**  
**Pier I - Tow Way Fuel Facility**  
**Naval Station Roosevelt Roads**  
**Ceiba, Puerto Rico**  
**Task Order #9**  
**Contract No. N62470-93-D-3033**

March 16, 2000





March 16, 2000

Tracking No. JPDGN-\_\_\_\_-009-Be  
Project No. 945809

LANTDIV NAVFACENGCOM  
Navel Health Care Support Facility, Building A  
3500 Hampton Blvd.  
Norfolk, VA 23511

Attn: Mr. Christopher Penny, Code 1823

*VIA Overnight Service*

**RE: TRANSMITTAL  
REPORT OF FINDINGS  
QUANTIFICATION OF PRODUCT RELEASE  
PIER 1 - TOW WAY FUEL FACILITY  
NAVAL STATION ROOSEVELT ROADS  
CEIBA, PUERTO RICO  
CONTRACT: N62470-93-D-3033, TASK ORDER # 9**

Dear Mr. Penny:

Enclosed is one copy of the Report of Findings for the study to quantify a product release near Pier 1 at the Tow Way Fuel Facility, Naval Station Roosevelt Roads, Ceiba, Puerto Rico.

If you have any questions regarding this transmittal or the project in general, please do not hesitate to contact me.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'WAB', is written over a large, stylized circular flourish.

William A. Buccille, P.E.  
Project Manager

WAB:wab

Attachment: Report of Findings

c: Madeline Rivera Ruiz, NS Roosevelt Roads  
Tim Gordon, EPA Region II  
Connie Crossley, Booz-Allen-Hamilton  
Luz Muriel, PREQB  
Mark Kimes, Baker  
John Tomik, CH<sub>2</sub>M Hill  
Dave Schweikert, J.A. Jones

**REPORT OF FINDINGS  
QUANTIFICATION OF PRODUCT RELEASE**

**Pier 1 - Tow Way Fuel Facility  
Naval Station Roosevelt Roads  
Ceiba, Puerto Rico  
Task Order # 9  
Contract No. N62470-93-D-3033**

**March 16, 2000**

***Prepared for:***

Department of the Navy  
Atlantic Division  
Naval Facilities Engineering Command  
Norfolk, Virginia

***And:***

J. A. Jones Environmental Services  
6135 Park South Drive  
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***Prepared by:***

McLaren/Hart Inc.  
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## **INTRODUCTION**

Between September 24<sup>th</sup> and 28<sup>th</sup>, McLaren\Hart, Inc. (McLaren/Hart) completed field activities leading to quantification/characterization of the product release near Pier 1 at the Tow Way Fuel Facility (TWFF), Naval Station Roosevelt Roads, Ceiba, Puerto Rico. McLaren\Hart performed this work as a subcontractor to J. A. Jones Environmental Services Company (J. A. Jones), under Task Order # 9 of the Petroleum, Oils and Lubricants (POL) Remedial Action Contract (RAC).

This Report presents a summary of the work performed and the results of the product release investigation. The following sections of this Report describe the project objectives, site conditions, release history, investigation approach, field activities, findings and recommendations for further study.

## **PROJECT OBJECTIVES**

The primary objective of the site activities was to estimate the horizontal extent and thickness of the product release encountered at the land-end of Fueling Pier 1. Secondary objectives included a review of existing documents, well gauging records, laboratory analytical results, and site history to determine the likely source and demonstrate potential flow route(s) of the product from the Tow Way Fuel Facility.

## **SITE DESCRIPTION**

The TWFF is located along the northern shore of Ensenada Honda on the eastern end of Naval Station Roosevelt Roads in town of Ceiba, Puerto Rico as shown on the Vicinity map Figure 1. The TWFF is bisected by Forrestal Drive, which runs approximately east to west near the TWFF as shown in Figure 2. Topography in the TWFF north of Forrestal Drive consists of a steeply sloping hill raising up from Forrestal Drive. The topography is influenced by grading to construct the storage tanks and Palua Drive which accesses the portion of the TWFF north of

Forrestal Drive. The portion of the TWFF south of Forrestal Drive is characterized as a man-made coastal plain with a slight grade toward Ensenada Honda. Pier 1 is located at the end of Palua Street (also known as Tow Way Road) in the southern portion of the TWFF.

The TWFF consists of seven underground storage tanks (USTs) containing diesel fuel and jet fuel. In the past, the USTs were also used to store Bunker C fuel. Previous investigations have documented that over a million gallons of petroleum product have been released to the ground through accidental spills. As a result, there is a free-floating product on top of the water table beneath the TWFF and down gradient areas.

#### **SITE GEOLOGY AND GROUNDWATER**

The surficial geology north of Forrestal Drive is predominately clay with varying amounts of weathered volcanic rock fragments. Depth to rock varies from less than 5 to over 30 feet-below ground surface (ft-bgs) depending on the proximity to the rock outcroppings. The rock is classified as a Gabbro volcanic rock. The upper layer of rock beneath the soil is weathered and can be penetrated with a rotary auger drill. The rock is less weathered with depth and becomes hard at depths ranging from 10 to 30 ft-bgs. The rock surface is irregular due to the folding and volcanic origin of the rock and generally slopes toward Ensenada Honda. Several bowls or depressions in the rock surface appear to exist in the area north of Forrestal Drive. A mound in the rock surface appears to be running perpendicular to Forrestal Drive near the fuel pump building (near UGW-6).

The geologic and soil conditions in the TWFF south of Forrestal Drive vary dramatically from conditions north of Forrestal Drive. The near surface soil south of Forrestal Drive primarily consists clay, silt and gravel fill material to a depth of approximately 10 ft-bgs. Natural sandy clay is encountered at depths below 10 ft-bgs. The groundwater table was located at the interface between the clay fill and the natural sandy clay deposit.

The groundwater flow is controlled by elevation differences in the TWFF, which creates a southwestern groundwater gradient toward Ensenada Honda. The groundwater surface is shown on Figure 2. The groundwater appears to be influenced by the rock surface as illustrated by the hump in the middle of the site, which generally coincides with the mound in the rock surface. Numerous utility trenches along Forrestal Drive consist of well-graded gravel fill. Free floating product movement generally follows the groundwater gradient but may also be influenced by the utility trenches along Palua Street and Forrestal Drive.

## **RELEASE HISTORY**

The product release near Pier 1 was discovered when free product was observed floating along the shoreline northwest of the pier in June 1999. Prior to appearance of floating product along the shoreline, approximately 15,000 gallons of fuel were captured at the Forrestal Sanitary Treatment Plant. The source of the fuel was eventually traced to the oil/water separator at the entrance to Pier 1. Reportedly, the contractor tasked with pressure testing fuel lines from the TWFF to Pier 1 discharged the residual water and fuel from the tested fuel lines into the oil/water separator on Pier 1. The quantity of fuel greatly exceeded the capacity of the separator and fuel flowed into the water outlet and eventually into the sanitary sewer system. The floating product observed along the shoreline was believed to have been due to a leaking joint where the PVC water discharge pipe from the oil/water separator enters the vitrified clay pipe (VCP) sanitary sewer line adjacent to the shoreline release.

Naval Station maintenance crews then excavated the entire PVC discharge line from the oil/water separator to the sanitary sewer and free floating product was encountered near where the PVC oil/water separator discharge line enters into the VCP sanitary sewer. Two 12-inch diameter temporary sumps were installed near the leaky joint and over 5,000 gallons of fluid (product/water mixture) were reported to have been recovered. This liquid was temporarily stored in a tanker trailer on the site for eventual sampling and off-site disposal. The product was

reported to be over 6 inches thick when the excavation was opened but was reduced to less than an inch thick when observed by McLaren\Hart on June 30, 1999.

## **APPROACH**

The investigation approach was based on a site visit and meeting with Naval Station personnel on June 30, 1999, and our understanding of the site conditions. Characterization of the product release was accomplished using direct push methods to access subsurface soil and ground water for observation and sampling. Soil samples were collected, visually examined and screened for organic vapors. A shallow small diameter temporary well was installed in most test holes and left in place several days for gauging and sampling at selected strategic locations.

Test hole installation began at the land end of the Fueling Pier 1, where the release was encountered in the pipe excavation. The activities proceeded inland working along Tow Way Road toward the intersection of Forrestal Drive. Initially focusing on areas near the buried fuel lines and utility conduits, the investigation extended outward from the utility trenches where product was encountered. Sample locations were initially spaced on a 50-foot grid pattern. The spacing was decreased to further define the product release in critical areas. Spacing was increased in other areas for economy of effort.

## **FIELD ACTIVITIES**

Field activities were conducted under the direction of a McLaren\Hart field engineer between September 24<sup>th</sup> and 28<sup>th</sup>. The field activities were conducted in accordance with the Site Specific Health and Safety Plan contained in the TWFF Work Plan prepared by McLaren-Hart dated August 16, 1996.

**Utility Location:** Prior to boring, buried utilities in the targeted area of the TWFF were identified using Level B Survey methods by Utility Search, Inc. of Virginia. These methods included

electro-magnetic, sonic and other remote, non-destructive tests. McLaren-Hart also enlisted the services of NSRR Utilities Engineer, Caleb Romero, to review available utility maps and as-built drawings, and assist with the utility location in the field. Located utilities were marked in the field with color-coded paint.

Utilities in the investigation area are shown on Figures 2 and 3. Significant buried utilities encountered include the fuel lines, and fresh water line and sanitary sewer line. Several active fuel pipelines run from the TWFF along the eastern side of Palua Street to the pier. The pipes are approximately 42 inches deep and are bedded in granular fill. The active fuel lines are believed to be constructed directly above abandoned fuel lines, however no as-built drawings were available to confirm this. The main PVC waterline runs along the north side of Forrestal Drive. A branch line runs across Forrestal Drive and along the eastern side of Palua Street to service Pier 1. Finally, a system of sanitary sewer lines runs along the south side of Forrestal Drive, along the western side of Palua Street to the pier and along the south side of the truck loading area. The sanitary sewer pipes are buried up to 10 feet deep. Other buried fuel lines and sanitary lines follow and cross Forrestal Drive west of the investigation area.

**Test Hole Installation:** A total of 39<sup>1</sup> direct push test holes were installed using a Geoprobe by Inland Pollution Services, Inc. (Figure 2). Direct push tests holes are identified as DP. The numbering begins with DP-32 so that numbers did not overlap previous direct push test holes at the site. Two-inch diameter macro-bore soil samples were collected in virgin acetate liners and visually screened for volatiles organic compounds (VOCs) using an organic vapor analyzer (OVA) by the field engineer. Generally, continuous soil samples were collected in each test hole from a depth of 2 ft-bgs to the bottom of the boring. The test holes were typically advanced to approximately 2 feet below the observed groundwater surface. Soil samples were collected for analysis from selected test holes. A log was prepared for each test hole showing the soil

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<sup>1</sup> Test hole DP-35 was terminated at a depth of 12 feet below the ground surface due to an obstruction. Test hole DP-35B was located 2 feet northwest of DP-35. DP-35B was advanced to a depth of 19 feet below the ground surface.

descriptions, depth, air-monitoring results and comments. Test hole logs are presented in Appendix A.

The location of each test hole was determined by a hand held GPS unit and transposed on to the site map.

**Temporary Well Installation:** Temporary wells (1-inch diameter PVC) were installed in 32 of the 39 test holes to a depth of approximately 2 feet below the ground water table. Wells were typically screened over a 5-foot interval with 0.20 inch slotted screen. Wells were gauged with an oil/water interface probe to determine the presence and thickness of free product and depth to groundwater. The majority of the temporary wells were monitored for two weeks. However, several of the wells were damaged by vehicular traffic and could not be monitored. Of the wells monitored, 19 wells accumulated measurable level of product and/or groundwater within the well. Temporary wells will be abandoned by removing the PVC screen and casing and filling the remaining void with soil.

**Sampling and Analysis:** Seventeen (17) of the soil samples collected were analyzed for Total Petroleum Hydrocarbon (TPH), Gasoline Range Organics (GRO) and Diesel Range Organics (DRO) by High Technologies Laboratory. Three soil and three groundwater/free product samples were sent to TEG Laboratory for product "finger printing." Results of the laboratory analysis are presented in Appendix B<sup>2</sup>.

## RESULTS

A summary of the direct push test holes is presented in Table 1, including the screening interval, free product thickness, sample depth. If applicable, sample depth, free product thickness, and analytical results are also presented. Detailed logs for individual test holes are included as Appendix A. The approximate horizontal extent of the free product plume(s) encountered in the

study area is shown on Figure 2. The approximate horizontal extent of soil contamination encountered in the study area is shown on Figure 3.

The limit of free product was not only estimated based on gauging of both temporary and existing monitoring wells in the TWFF, but also by interpretation of product found in the soil samples. In some cases, free product is indicated if the soil appeared saturated with free product regardless if free product did not accumulate in the temporary well. It was apparent some temporary (and existing) well screens were fouled by the thick viscous product encountered east of Tow Way Road in the vicinity of the truck loading area. Product thickness and groundwater data measurements of the monitoring and recovery wells in the TWFF were completed on September 29.

Review of the field data and analytical results indicate *two* distinct free product plumes (JP-5 and diesel range organic (DRO)) and *three* distinct soil contamination plumes (JP-5, diesel and gasoline range organic (GRO)) are present in the Pier 1 study area. The estimated limits of the free product plumes are shown in Figure 2 and the estimated limits of the soil contamination plumes are shown in Figure 3. The characteristics of the JP-5, diesel and gasoline plumes in the vicinity of Pier 1 are summarized in the table below:

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<sup>2</sup> The samples identified as "BAG" samples refer to soil samples obtained from the Geoprobe spoon. Samples identified as "JAR" samples refer to liquid samples of free product/water obtained from the temporary wells.

Product	Location	Free Product	Soil	Apparent Origin	Comments
JP-5	Adjacent utility trenches along Forrestal Drive and Tow Way Road	X	X	TWFF	Product appears fresh.
Diesel	Adjacent utility trenches along Tow Way Road (generally above JP-5 plume), also extends beneath truck loading area	X	X	TWFF and truck loading area	Black viscous product suspended in soil with floating black product in truck loading area. Reported past practice was to spray ground with oil for dust control.
Gasoline	Near joint between the oil/water separator water line and the sewer line near Pier 1		X	Oil/water separator	Fuel line testing

The vertical extent of product release in the truck loading area and utility trench along Palua Street is demonstrated in cross section A-A' in Figure 4. Free product was found in the truck loading area up to 6-feet-thick. JP-5 was found beneath the utility trenches along Palua Street, but not in the truck loading area. The JP-5 is generally found above the diesel plume.

JP-5 and diesel can be traced to the TWFF via the area beneath the utility trenches along Palua Street leading to Pier 1. The product appears to have crossed Forrestal Drive from the TWFF aided by the more permeable soil comprising one or more utility trenches. As evidenced by the soil conditions in DP-69, the soil extends to a depth of 10 ft-bgs near the intersection of Palua Street and Forrestal Drive. Heavy petroleum odor was encountered in both DP-68 and DP-69 at a depth of 4 ft-bgs, which corresponds to the bottom of the waterline trench. Since the water table is susceptible to dramatic seasonal fluctuation in the area, the product may mobilize through the trench during periods of elevated water table. In addition, it was reported that the active fuel lines were installed directly over the abandoned fuel lines. The depth of the

abandoned lines is not known. However, given the depth of the active fuel lines, the abandoned lines would be found at a depth of at least 6 to 7 ft-bgs.

It is likely a portion of the diesel fuel may have originated from the truck loading area. Viscous black diesel was encountered in the soil beneath the truck loading area. Mr. Carlos Brown of the Fuels Department indicated that several spills have occurred in the Upper TWFF over the past 25 years. In addition, 55-gallon drums of fuel and black oil were historically sprayed in the truck loading area for the purpose of dust control. The thick black product is apparently not penetrating the screen in existing monitoring wells.

Gasoline range fuel was encountered in DP-60 the land end of Pier 1. This appears to be an isolated occurrence and may be a result of surface release from a car, truck or an emergency power generator.

## **RECOMMENDATIONS**

The limits of product release(s) have been identified. Recommendations are presented to monitor the migration of the plume and further identify the travel routes from the source in the TWFF.

The JP-5 and diesel fuel following the utility trenches across Forrestal Drive can be monitored with additional monitoring wells installed to penetrate the granular backfill/bedding surrounding the waterline and fuel lines. Proposed well locations are presented in Figure 6. Wells adjacent to active pipelines could be installed by hand excavation to expose the utility then advanced with hollow-stem auger below the utility. An additional well may also be installed near the temporary recovery wells at the land end of Pier 1 to monitor conditions where the release was initially observed. Additional wells are not required to monitor the lateral migration of the product release. Several existing monitoring wells are located just beyond the limits of the JP-5 and diesel plumes.

The thick viscous product identified near the truck loading area is not mobile and is unlikely to appreciably migrate beyond the identified boundary. It is recommended that the stability this plume be verified via test borings on a regular schedule (e.g., annually).

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## **Tables**

TABLE 1, page 1 of 2  
SUMMARY OF DIRECT PUSH BORINGS

QUANTIFICATION OF PRODUCT RELEASE  
PIER 1 - TOW WAY FUEL FACILITY  
NAVAL STATION ROOSEVELT ROADS  
CEIBA, PUERTO RICO  
TASK ORDER #9

BORING/ WELL I. D.	SCREEN INTERVAL (ft-bgs)	OBSERVED FREE PRODUCT THICKNESS <sup>1</sup> (ft)	SAMPLE DEPTH (ft-bgs)	ANALYSIS RESULTS			COMMENTS
				GASOLINE RANGE OGANICS (GRO) (ppm)	DIESEL RANGE ORGANICS (DRO) (ppm)	TPH (EPA 8015B)	
DP-32	7-12		9.5-11	<20	71.3		Organic vapors in soil
DP-33	7-12		9-11	<20	1970		Soil smeared with product
DP-34	7-12	4	10-11	<20	86.5		Soil saturated with product
DP-35	7-12	1	12.5-13	<20	280		Soil smeared with clear product
DP-35B <sup>2</sup>	9-16	1					Black floating free product
DP-36	8-16	2	13-14	<20	846		Soil smeared with clear product, black floating free product
DP-36B		2	19	<20	134		
DP-37	10-15	3	7.5-9.7	<20	1600		Soil saturated with product
DP-38	11-16						
DP-39	5-10	1	9.7-10	<20	394		Soil saturated with product
DP-40	No Well						
DP-41	8-16	6	10-11			DF-#2	Soil saturated with black product
			15.9-16			DF-#2	Floating free product
DP-42	8-16	3	15.9-16	<20	110		Soil saturated with black product
DP-43	7-12	2					Soil saturated with black product
DP-44	7-12		10-11	<20	84.2		Organic vapors in soil
			8-9	<20	55		
DP-45	6-11						
DP-46	No Well						
DP-47	7-12	Sheen					Slight organic vapors in soil
DP-48	8-16	4	8-9	<20	135		
DP-49	5-10						
DP-50	7-12						

(1) Product thickness estimates based on observation of soil samples and temporary wells. Thick product fouled the oil/water interface probe.

(2) DP-35B is located 2 northwest of DP-35.

TABLE 1, page 2 of 2  
SUMMARY OF DIRECT PUSH BORINGS

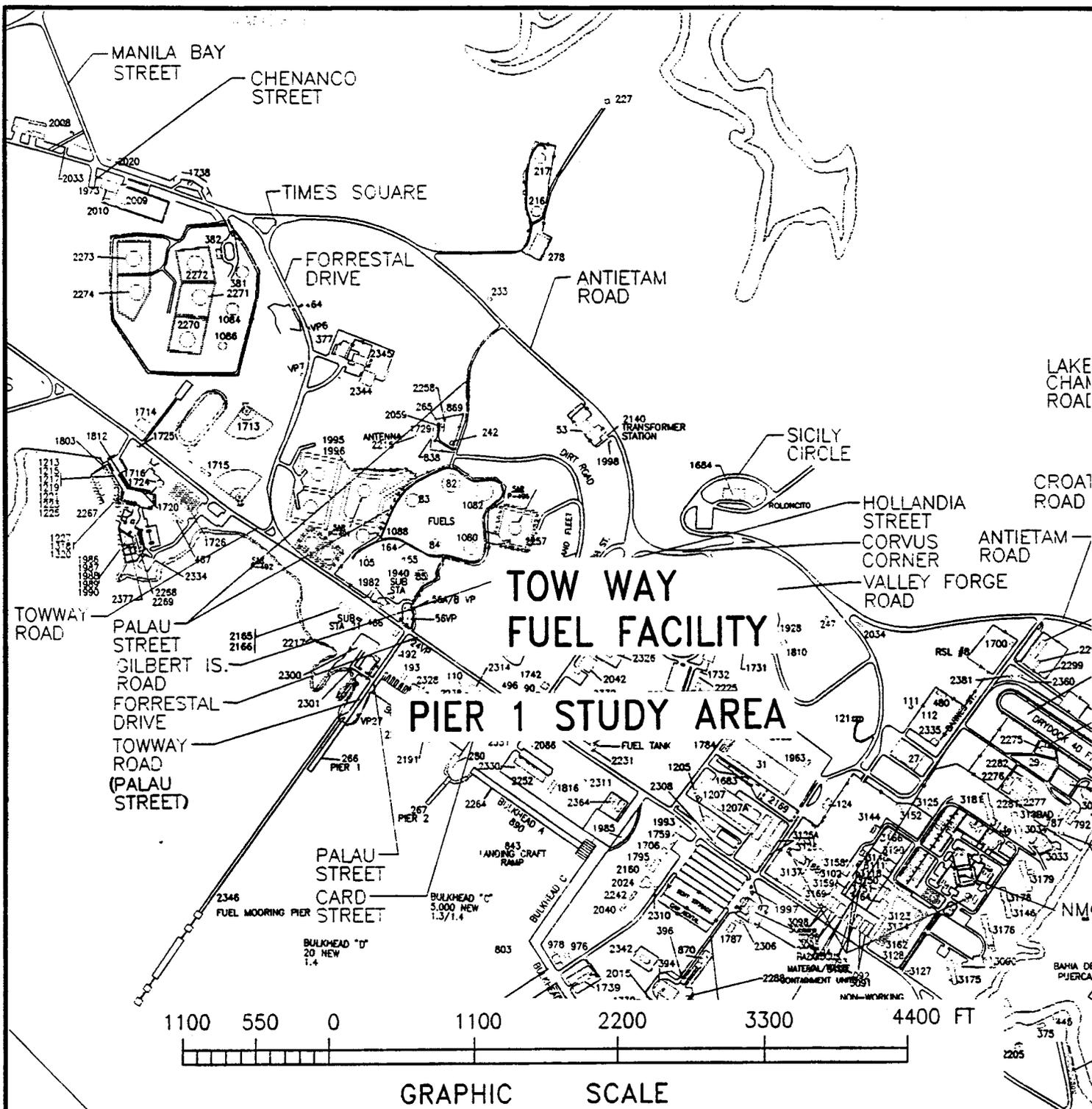
QUANTIFICATION OF PRODUCT RELEASE  
PIER 1 - TOW WAY FUEL FACILITY  
NAVAL STATION ROOSEVELT ROADS  
CEIBA, PUERTO RICO  
TASK ORDER #9

BORING/ WELL I. D.	SCREEN INTERVAL (ft-bgs)	OBSERVED FREE PRODUCT THICKNESS <sup>1</sup> (ft)	SAMPLE DEPTH (ft-bgs)	ANALYSIS RESULTS			COMMENTS
				GASOLINE RANGE OGANICS (GRO) (ppm)	DIESEL RANGE ORGANICS (DRO) (ppm)	TPH (EPA 8015B)	
DP-51	7-12	1					Soil saturated with product
DP-52	No Well						
DP-53	7-12	1					Soil saturated with black product
DP-54	No Well						
DP-55	5-9		7.9-8	<20	<50		Organic vapors in soil
DP-56	No Well		11.5-12	<20	<50		Organic vapors in soil
DP-57	7-12						
DP-58	7-12						
DP-59	7-12	1	10-11	<20	290		Soil saturated with product (JP-5)
DP-60	2-11		11-12	29.3	411		Organic vapors in soil
DP-61	7-12		7.5-8	<20	741		Organic vapors in soil
DP-62	7-12	3					Soil saturated with product (JP-5)
DP-63	7-12	5	8-9			JP-5	Soil saturated with product (JP-5)
			10-12			JP-5	
DP-64	7-12	2					Soil saturated with product (JP-5)
DP-65	7-12						Slight organic vapors in soil
DP-66	No Well	2					Installed between fuel lines, saturated with free product (JP-5 and diesel)
DP-67	8-16	3					Installed adjacent to fuel pit, soil saturated with DF and floating JP-5
DP-68	4-14	5	6-7			DF-#2	Installed adjacent to water line, soil saturated with DF and floating JP-5
			10-11			JP-5	
DP-69	No Well						Installed adjacent to water line, soil smeared with JP-5

(1) Product thickness estimates based on observation of soil samples and temporary wells. Thick product fouled the oil/water interface probe.

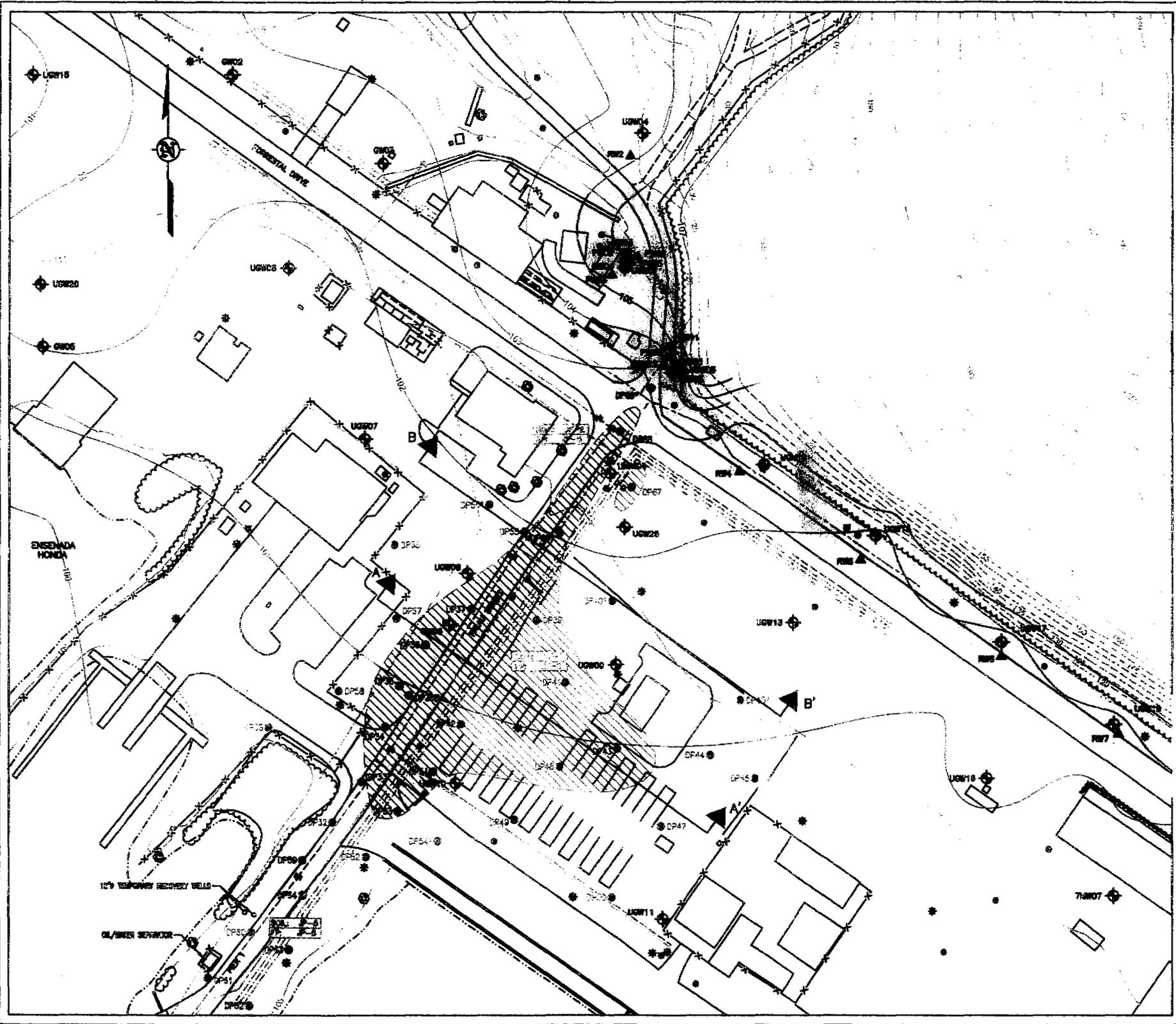
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## Figures



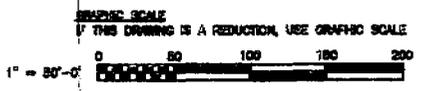
<b>QUANTIFICATION OF RELEASE – PIER 1</b>		
SITE LOCATION MAP		
FREE PRODUCT RECOVERY SYSTEM TOW WAY FUEL FACILITY ROOSEVELT ROADS CEIBA, PUERTO RICO		
CHECKED BY:	DWG. NO.	FIGURE NO.
APPROVED BY:	COLRFIG1	1





- LEGEND**
- DP44 ● DIRECT PUSH BORING LOCATION AND DESIGNATION (● INDICATES NO TEMPORARY WELL)
  - UGW-0 ◆ EXISTING MONITORING WELL LOCATION AND DESIGNATION
  - RW-1 ▲ McLAREN/ARMY PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
  - FW-1 ▲ TERNMAC PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
  - LIMITS OF JET PETROLEUM
  - LIMITS OF DIESEL FUEL
  - FUEL LINE
  - SANITARY LINE (AND MANHOLE)
  - WATER LINE
  - CONNECTED GROUNDWATER SURFACE CONTOUR ELEVATION (FEET) FROM FIGURE 3-4 OF BAKER QUARTERLY SUMMARY REPORT NO.3 (FEBRUARY 1, 1999 THROUGH APRIL 30, 1999)
  - FINGERPRINT ANALYSIS
  - BUILDING
  - WALL
  - FENCE

**REFERENCE:**  
 BAKER ENVIRONMENTAL DRAWINGS TITLED, "CONNECTED GROUNDWATER SURFACE CONTOUR MAP, APRIL 21, 1999, TOW WAY FUEL FARM, MARLBOROUGH STATION, ROOSEVELT ROAD, PUERTO RICO, FIGURE 3-13, SCALE: 1" = 200'.



**QUANTIFICATION OF RELEASE - PIER 1**

**FREE PRODUCT PLUME**

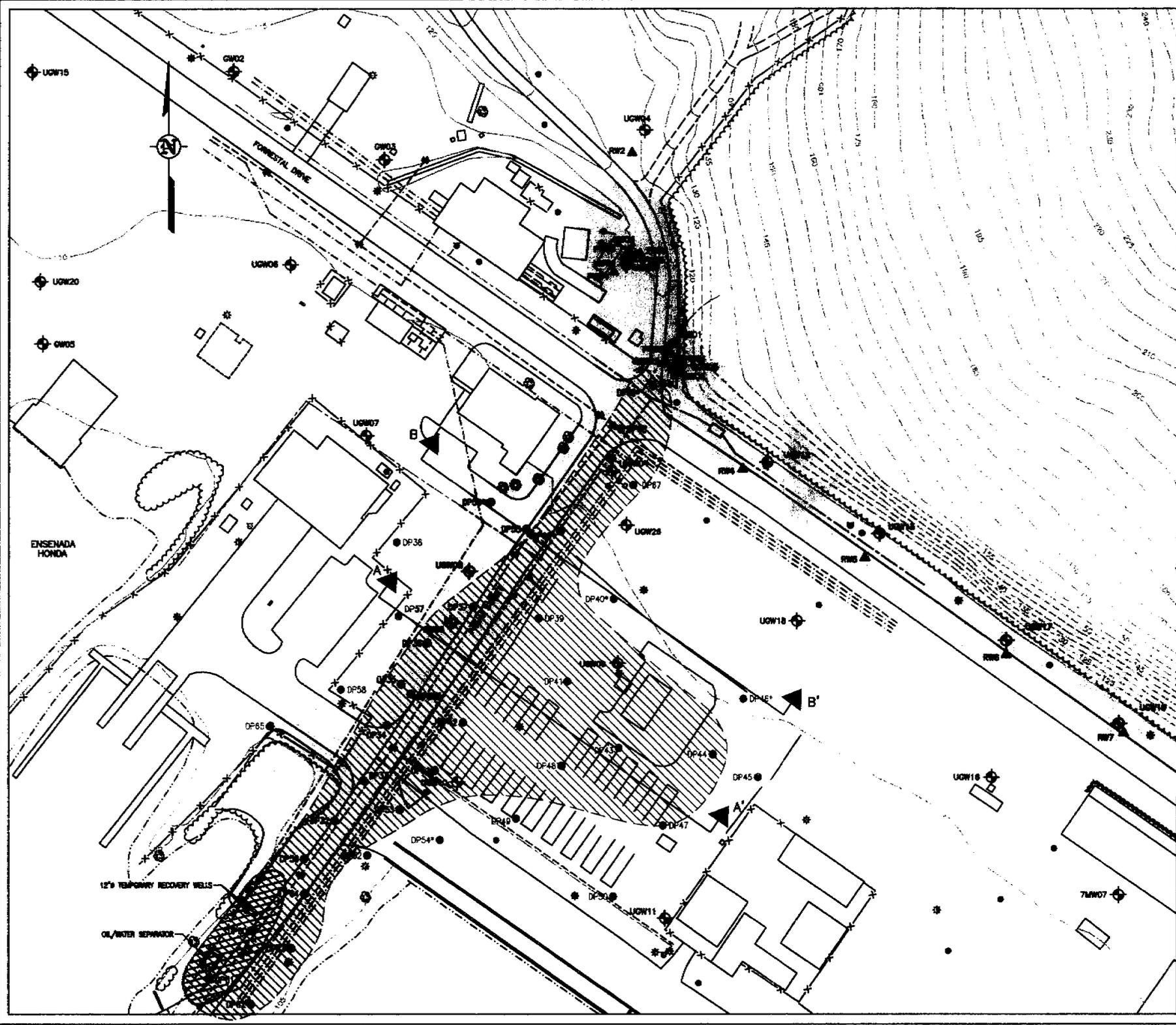
**FREE PRODUCT RECOVERY SYSTEM**  
 TOW WAY FUEL FACILITY  
 ROOSEVELT ROADS  
 CEIBA, PUERTO RICO

CHECKED BY: [Signature]      DWG. NO.: COLRFIG2      FIGURE NO.: 2  
 APPROVED BY: [Signature]



8      7      6      5      4      3      2      1

D  
C  
B  
A



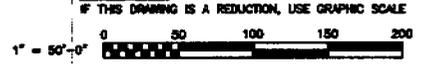
**LEGEND**

- DP 41-58 ● DIRECT PUSH BORING LOCATION AND DESIGNATION (\* INDICATES NO TEMPORARY WELL)
- UGW 0-100 ◉ EXISTING MONITORING WELL LOCATION AND DESIGNATION
- RM 1-7 ▲ MCLAREN/HART PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
- PW 1-7 ▲ TERRAMAC PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
- ▨ LIMITS OF JET PETROLEUM
- ▨ LIMITS OF DIESEL FUEL
- ▨ LIMITS OF GASOLINE RANGE ORGANICS
- FUEL LINE
- \*- SANITARY LINE (AND MANHOLE)
- WATER LINE
- ▭ BUILDING
- ▬ WALL
- x-x- FENCE

**REFERENCE:**

BAKER ENVIRONMENTAL DRAWING TITLED, "CORRECTED GROUNDWATER SURFACE CONTOUR MAP, APRIL 21, 1998, TOW WAY FUEL, FARM, NAVAL STORM ROOSEVELT ROADS, PUERTO RICO," FIGURE 3-13. SCALE: 1" = 200'.

**GRAPHIC SCALE**



**QUANTIFICATION OF RELEASE - PIER 1**

**SOIL CONTAMINATION PLUME**

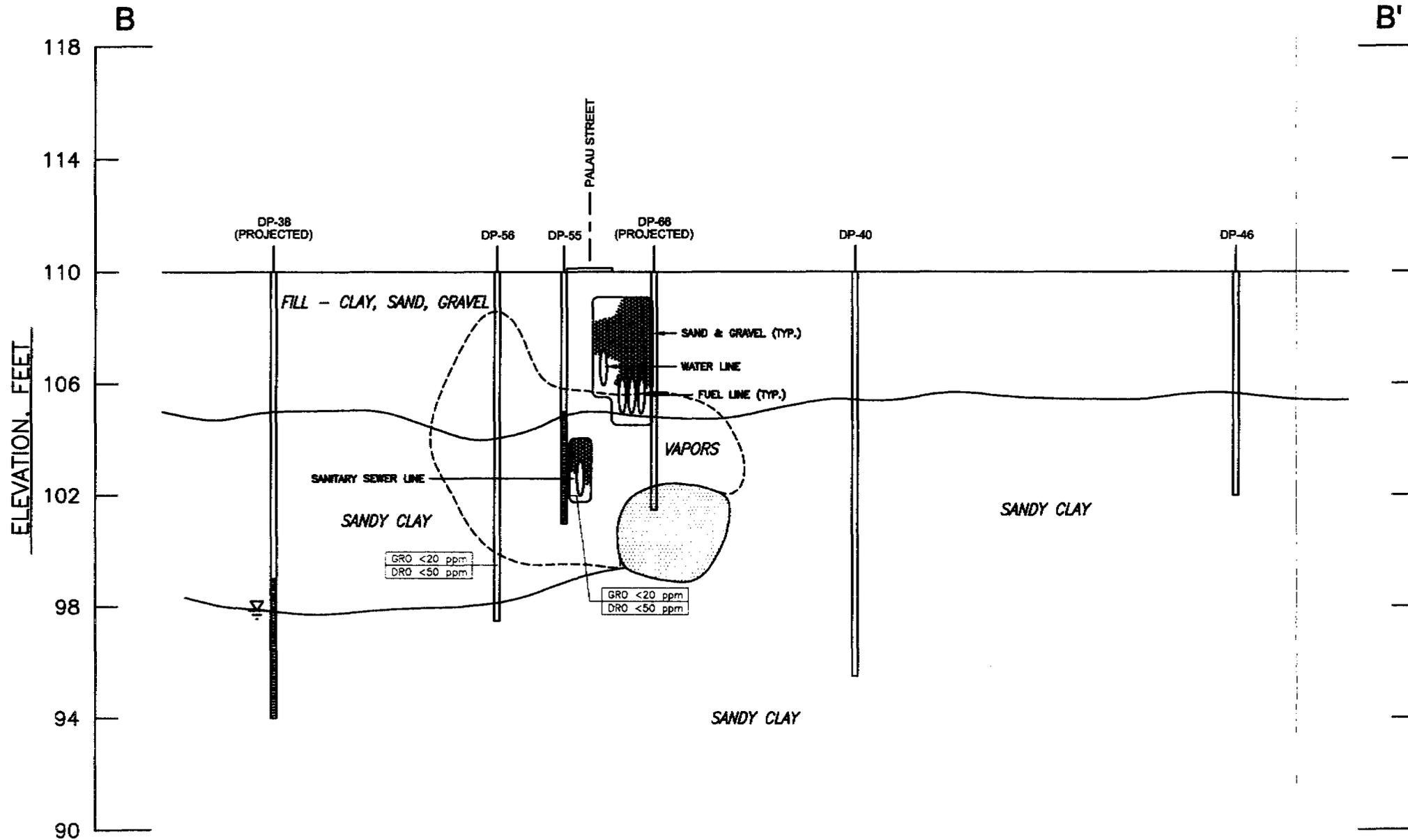
FREE PRODUCT RECOVERY SYSTEM  
TOW WAY FUEL FACILITY  
ROOSEVELT ROADS  
CEIBA, PUERTO RICO

CHECKED BY:  DWG. NO.: COLRFIG3 FIGURE NO. 3  
APPROVED BY:



8 7 6 5 4 3 2 1  
 D  
C  
B  
A





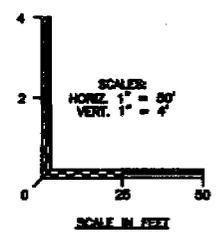
**LEGEND**

GRO <20 ppm | TPH ANALYSIS

▽ | WATER SURFACE

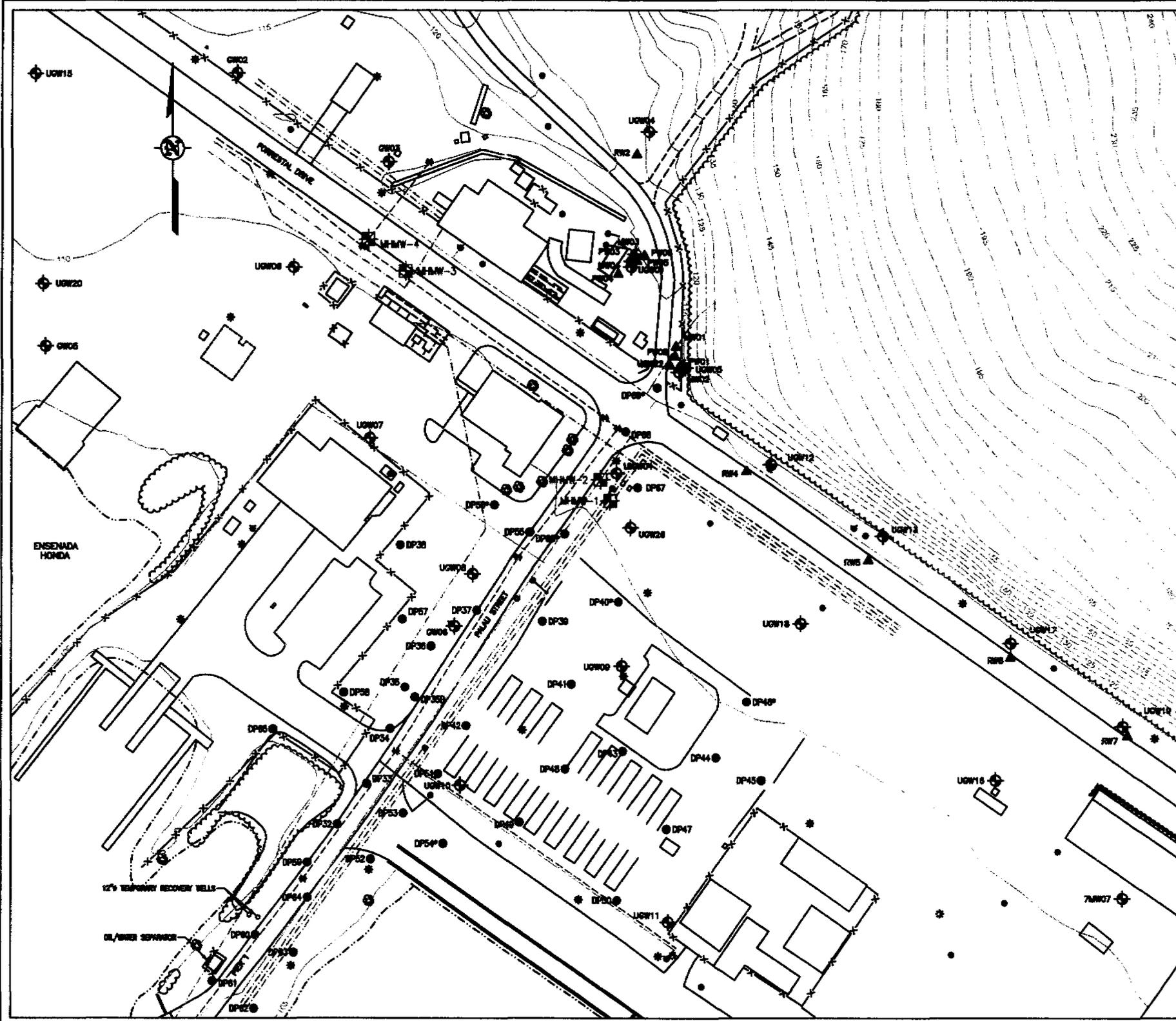
▬ | SCREENED INTERVAL

▭ | SOIL SATURATED WITH FREE PRODUCT



<b>FIGURE 5</b>	
<b>SECTION B-B'</b>	
ROOSEVELT ROADS U.S. NAVAL STATION - TOW WAY FUEL FACILITY, CEIBA, PUERTO RICO	
DRWG: J.S.S.	CHK'D: W.A.B.
SCALE AS SHOWN	DATE: 031000

S:\CADD\DWG\DWG\COLUMBIAS -MARTIN,2000 4-25PM



- LEGEND**
- MW-1 to MW-4 PROPOSED MONITORING WELL
  - DP44 DIRECT PUSH BORING LOCATION AND DESIGNATION (\* INDICATES NO TEMPORARY WELL)
  - UOW-1 to UOW-18 EXISTING MONITORING WELL LOCATION AND DESIGNATION
  - RM-1 McLAREN/WART PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
  - PW-1 TERRANIC PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
  - FUEL LINE
  - - - SANITARY LINE (AND MANHOLE)
  - - - WATER LINE
  - BUILDING
  - WALL
  - x - x - FENCE

- NOTES:**
1. INSTALL MW-1 & MW-3 TO INTERCEPT FUEL LINE GRANULAR BEDDING.
  2. INSTALL MW-2 TO INTERCEPT WATERLINE GRANULAR BEDDING.
  3. INSTALL MW-4 TO INTERCEPT SANITARY SEWER GRANULAR BEDDING.

**REFERENCE:**  
 BAKER ENVIRONMENTAL DRIVING TITLED, "CORRECTED GROUNDWATER SURFACE CONTOUR MAP, APRIL 21, 1986, TOW WAY FUEL, PARRA, MARAL STATION ROOSEVELT ROAD, PUERTO RICO, FIGURE 3-13. SCALE: 1" = 500'.



QUANTIFICATION OF RELEASE -- PIER 1		
PROPOSED MONITORING WELL LOCATIONS		
FREE PRODUCT RECOVERY SYSTEM TOW WAY FUEL FACILITY ROOSEVELT ROADS CEIBA, PUERTO RICO		
CHECKED BY:	DWG. NO.:	FIGURE NO.:
APPROVED BY:	COLRFIG6	6

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**Appendix A**

***Boring Logs***

	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-32</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing:	Eastings:	Start - Finish Date: 9/24/99 - 9/24/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
Memo: 1" dia. temporary well, screened 7'to12'		Date	Time	Depth bgs
		9/24/99		11.0

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			4/4	very stiff, reddish brown CLAY, moist		NA		
4 - 8			4/4	stiff, dark brown SANDY CLAY with some gravel, moist  stiff, reddish brown SANDY CLAY with some gravel, moist		NA		
8 - 12			2.3/4	very soft, dark gray SANDY CLAY with trace gravel, moist, heavy petroleum odor		NA		
12 - 16				End of boring at 12' bgs.				DP-32 9' [Bag Sample]

BASIC BORING LOG TOP.GPJ MHE\_PITT.GDT 12/22/99

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	Site: Navai Station, Roosevelt Roads	Boring ID: <b>DP-33</b>	
	Location: Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/24/99 - 9/24/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:	Surface Well Construction:	Borehole Diameter (in): 2	TOC Elevation (ft):
Memo: 1" dia. temporary well, screened 7'to12'		Groundwater Observations	
		Date: 9/24/99	Time: 11.5

Depth (ft)	Blows / 6 in Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 2			very stiff, reddish brown CLAY, moist				
2 - 4		NA	stiff, dark brown SANDY CLAY with some gravel, moist		NA		
4 - 8			soft, dark brown and gray SANDY CLAY with some gravel, moist, heavy petroleum odor				DP-33 7' [Bag Sample]
8 - 10	2.8/4		very soft, dark gray and reddish SANDY CLAY and GRAVEL, saturated, free product		NA		
10 - 12			End of boring at 12' bgs.				
12 - 14							
14 - 16							

BASIC BORING LOG T09.GPJ MH\_PITT.GDT 12/22/99

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	Site:	Naval Station, Roosevelt Roads		Boring ID:	<b>DP-34</b>
	Location:	Ceiba, PR			
Client:	J.A. Jones Environmental Services		Boring Location:	Northing:	Start - Finish Date:
			Pier 1	Easting:	9/24/99 - 9/24/99
Drilling Contractor:	IPSI	Driller:		Logged By:	Will Whitesell
Drilling Method:	Geoprobe		Drilling Equipment:	Sampling Method:	
				2" Macro	
Total Depth (ft):	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in):	TOC Elevation (ft):
12.0				2	
Original Surface Condition:	Surface Well Construction:		Groundwater Observations		
			Date	Time	Depth bgs
Memo:	1" dia. temporary well, screened 7'to12'		9/24/99		11.0

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			1.6/4	very soft, brown SANDY CLAY with trace gravel, moist		NA		
4 - 8			NA	very soft, dark gray SANDY CLAY with trace gravel, saturated free product		NA		DP-34 7'6" [Bag Sample]
8 - 12								DP-34 10.5' [Bag Sample]
12 - 16				End of boring at 12' bgs.				

BASIC BORING LOG T08.GPJ MH-PITT.GDT 12/29/99

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	Site:	Naval Station, Roosevelt Roads		Boring ID:	<b>DP-35</b>
	Location:	Ceiba, PR			
Client:	J.A. Jones Environmental Services		Boring Location:	Northing:	Start - Finish Date:
			Pier 1	Easting:	9/24/99 - 9/24/99
Drilling Contractor:	IPSI	Driller:		Logged By:	Will Whitesell
Drilling Method:	Geoprobe		Drilling Equipment:	Sampling Method:	
				2" Macro	
Total Depth (ft):	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in):	TOC Elevation (ft):
12.0				2	
Original Surface Condition:	Surface Well Construction:		Groundwater Observations		
			Date	Time	Depth bgs
Memo:	1" dia. temporary well, screened 7'to12'		9/24/99		11.0

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			2/4	stiff, reddish brown SANDY CLAY with trace gravel, moist		NA		
4 - 8			2.5/4	soft, dark gray SANDY CLAY with some gravel, moist, petroleum odor		NA		DP-35 7'5" [Bag Sample]
8 - 12				very soft, dark gray SANDY CLAY, saturated free product				
12 - 16				End of boring at 12' bgs.				



**McClaren Hart**  
INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-35b</b>	
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/24/99 - 9/24/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 19.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:		Surface Well Construction:	Groundwater Observations
Memo: 1" dia. temporary well, screened 9'to16', 16' to 19' bentonite chips		Date	Time
		Depth bgs	Notes

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2								
4								
6								
8								
10								
12			2/4	SAND with trace clay, saturated free product		NA		
13				gray, CLAY, moist				
14				brown, SANDY CLAY, moist, mild petroleum odor				
16			NA			NA		
18				refusal				
19				End of boring at 19' bgs.				
20								
22								
24								

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-36</b>	
	Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/24/99 - 9/24/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 19.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2 TOC Elevation (ft):
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
		Date	Time	Depth bgs
Memo: 1" dia. temporary well, screened 8'to16', 16' to 19' bentonite chips		9/24/99		14.0

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			4/4	soft, dark gray to reddish SANDY CLAY with trace gravel, moist		NA		
4 - 8			2.4/4	dark gray SANDY CLAY with gravel, saturated free product		NA		DP-36 7' [Bag Sample]
8 - 12			2.7/4			NA		DP-36 10' [Bag Sample]
12 - 16			3/3	reddish brown SANDY CLAY, wet		NA		DP-36 14' [Bag Sample]
16 - 19						NA		DP-36 16' [Bag Sample]
19 - 20				End of boring at 19' bgs.				
20 - 24								

BASIC BORING LOG T08.OPJ\_MHL\_PITT.GDT 1/22/99

	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-37</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/24/99 - 9/24/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 15.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
Memo: 1" dia. temporary well, screened 10'to15'		Date	Time	Depth bgs
		Notes		

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			3/4	soft, reddish to dark gray SANDY CLAY with gravel		NA		
4 - 8			3.5/4			NA		DP-37 7' [Bag Sample]
8 - 10				soft, black ORGANIC SILT, saturated free product				
10 - 12				light gray GRAVEL with silt and sand, wet				
12 - 14			3.8/3	COARSE SAND with gravel, saturated free product		NA		DP-37 11' [Bag Sample]
14 - 15				ligh brown COARSE SAND with clay and gravel				
15 - 16				refusal				
				End of boring at 15' bgs.				

BASIC BORING LOG T06.GPJ MH\_PITT.GDT 12/22/99

	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-38</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing:	Start - Finish Date: 9/25/99 - 9/25/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 16.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
		Date	Time	Depth bgs
Memo: 1" dia. temporary well, screened 11'to16'		9/25/99		12.0

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			1.3/4	loose, tan SAND with clay, moist		NA		
4 - 8			2.4/4	stiff, light gray SANDY CLAY with trace gravel, petroleum odor		NA		DP-38 [Bag Sample]
8 - 12			3/4	soft, light brown and reddish SANDY CLAY, moist, no odor		NA		
12 - 14				soft, gray SANDY CLAY with gravel, moist				
14 - 16				soft, light brown SANDY CLAY, wet		NA		
16				soft, dark gray ORGANIC CLAY, no odor				
16				End of boring at 16' bgs.				

BASIC BORING LOG T08.GPJ MH.PITT.GDT 12/29/99

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	Site:	Naval Station, Roosevelt Roads		Boring ID:	<h1 style="margin: 0;">DP-39</h1>
	Location:	Ceiba, PR			
Client:	J.A. Jones Environmental Services	Boring Location:	Pier 1	Northing:	Start - Finish Date: 9/25/99 - 9/25/99
Drilling Contractor:	IPSI	Driller:		Easting:	
Drilling Method:	Geoprobe		Drilling Equipment:	Sampling Method:	
Total Depth (ft):	10.0	Ground Elevation (ft):		Horiz Coor Sys:	
Original Surface Condition:		Surface Well Construction:		Borehole Diameter (in):	
				2	
				TOC Elevation (ft):	
				Groundwater Observations	
				Date	Time
				Depth bgs	Notes
Memo:					
1" dia. temporary well, screened 5'to10'					

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			3.1/4	soft, dark gray CLAY with trace sand and gravel, moist, heavy petroleum odor		NA		DP-39 4' [Jar Sample]
4 - 8			2/2	dense, reddish brown SAND with gravel, moist, mild petroleum odor		NA		
8 - 10				GRAVEL with dark brown clay, saturated free product loose, light brown COARSE SAND with gravel				DP-39 9'8" [Jar Sample]
10 - 16				End of boring at 10' bgs.				

BASIC BORING LOG TOP.GPJ MHL\_PITT.GDT 12/22/99

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-40</b>	
	Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing:	Start - Finish Date: 9/25/99 - 9/25/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 14.5	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
		Date	Time	Depth bgs
Memo:				Notes

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0				very stiff, light tan SANDY CLAY, moist, no odor				
2								
4								
6								
8			4/4			NA		
10								
12			4/3			NA		
14				refusal at 14'6"				
14.5				End of boring at 14.5' bgs.				
16								

BASIC BORING LOG TOR/GPJ MHL/PJT.GDT 12/22/99



**McClaren  
Hart** INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-41</b>	
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/25/99 - 9/25/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 16.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:	Surface Well Construction:	Borehole Diameter (in): 2	TOC Elevation (ft):
		Groundwater Observations	
Memo: 1" dia. temporary well, screened 8'to16'		Date: 9/25/99	Time: 8.0
		Depth bgs:	Notes:

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2				loose GRAVEL with sand				
4			1.7/4	free product		NA		
6								
8			3/4	soft, dark gray SANDY CLAY with gravel, saturated, free product		NA		
10				GRAVEL with soft brown clay, free product				DP-41 [Bag Sample]
12			2.4/4	soft, brown and gray SANDY CLAY with gravel, free product		NA		
14				very stiff, light brown and reddish SANDY CLAY with gravel, trace product				DP-41 15'11" [Jar Sample]
16				End of boring at 16' bgs.				

BASIC BORING LOG TOR GPJ MH PITT GDT 12/29/99

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-42</b>		
	Location: Ceiba, PR				
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/25/99 - 9/25/99		
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:		
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro			
Total Depth (ft): 16.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2 TOC Elevation (ft):	
Original Surface Condition:	Surface Well Construction:	Groundwater Observations			
Memo: 1" dia. temporary well, screened 8'to16'		Date	Time	Depth bgs	Notes

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			2/4	medium, light brown SANDY CLAY with gravel, no odor		NA		
4 - 8			1.3/4	soft, dark gray CLAY with trace sand and gravel, mild petroleum odor		NA		
8 - 12				free product				
12 - 16			1.3/4	very stiff, light brown to reddish SANDY CLAY with trace gravel, free product around 13'		NA		
16				dense, reddish orange COARSE SAND with gravel, wet				DP-42 [Jar Sample]
16				End of boring at 16' bgs.				

BASIC BORING LOG T08.GPJ MH\_PITT.GDT 12/2/99

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-43</b>		
	Location: Ceiba, PR				
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99		
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:		
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro			
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2 TOC Elevation (ft):	
Original Surface Condition:	Surface Well Construction:	Groundwater Observations			
Memo: 1" dia. temporary well, screened 7'to12'		Date	Time	Depth bgs	Notes
		9/27/99		11.0	

Depth (ft)	Blows / 6 in Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4		1.6/4	medium, light brown to reddish orange SANDY CLAY with gravel, moist, mild petroleum odor		NA		
4 - 8		3.8/4			NA		DP-43 8' [Jar Sample]
8 - 10			soft, dark gray CLAYEY SAND with gravel, saturated free product				
10 - 12			soft, dark gray ORGANIC CLAY with trace sand, petroleum odor				
12 - 16			End of boring at 12' bgs.				

BASIC BORING LOG T09.GPJ MHL.PITT.GDT 12/22/99

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**McLaren<sup>®</sup>  
Hart<sup>INC.</sup>**

Site: Naval Station, Roosevelt Roads	Boring ID: <b>DP-44</b>		
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	
Original Surface Condition:	Surface Well Construction:	Horiz Coor Sys:	
		Borehole Diameter (in): 2	
		TOC Elevation (ft):	
		Groundwater Observations	
		Date	Time
		Depth bgs	Notes
Memo: 1" dia. temporary well, screened 7'to12'			

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			2.8/4	stiff, dark brown SANDY CLAY with trace gravel, moist, no odor		NA		
4 - 8			3.8/4	soft, dark gray SANDY CLAY with trace gravel, moist, heavy petroleum odors		NA		DP-44 6' [Jar Sample]
8 - 10								DP-44 8'6" [Bag Sample]
10 - 12				stiff, light brown SANDY CLAY with trace gravel, moist, mild odor				DP-44 10' [Jar Sample]
12 - 16				End of boring at 12' bgs.				

BASIC BORING LOG T08.GPJ MH\_PITT.GDT 12/2/99

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-45</b>	
	Location: Ceiba, PR			
Client: J.A. Jones Environmental Services		Boring Location: Pier 1		Start - Finish Date: 9/27/99 - 9/27/99
Drilling Contractor: IPSI		Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe		Drilling Equipment:		Sampling Method: 2" Macro
Total Depth (ft): 11.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:		Surface Well Construction:		Groundwater Observations
				Date
				Time
				Depth bgs
				Notes
Memo: 1" dia. temporary well, screened 6'to11'				

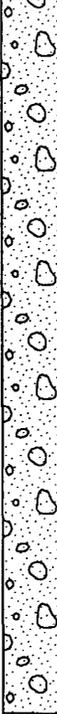
Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2				stiff, dark brown CLAY with some trace gravel and sand, no odor	Lithology			
4			2.5/4			NA		
8			3/3	stiff, light brown CLAY with coarse sand and trace gravel, moist, no odor		NA		
10								
12				End of boring at 11' bgs.				
14								
16								

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-46</b>	
	Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 8.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2 TOC Elevation (ft):
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
		Date	Time	Depth bgs
				Notes
Memo:				

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0				very stiff, tan CLAY with trace coarse sand, no odor	Lithology			
2								
4			3.8/4			NA		
6								
8				refusal at 8'				
				End of boring at 8' bgs.				
10								
12								
14								
16								

BASIC BORING LOG T05.GPJ MH\_PITT.GDT 12/22/98

	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-47</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
		Date	Time	Depth bgs
Memo: 1" dia. temporary well, screened 7'to12'		9/27/99		11.0

Depth (ft)	Blows / 6 in Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4		2.1/4	loose, coarse, light gray SAND with trace gravel, wet, mild petroleum odor		NA		
4 - 8		2.2/4			NA		DP-47 7'9" [Jar Sample]
8 - 12			soft, dark gray, organic SANDY CLAY, wet, petroleum odor dissipates at bottom of boring				DP-47 11'6" [Bag Sample]
12 - 16			End of boring at 12' bgs.				

BASIC BORING LOG T08.GPJ MH-PITT.GDT 12/29/99

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**McLaren  
Hart**  
INC.

Site: Naval Station, Roosevelt Roads	Boring ID: <b>DP-48</b>		
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 16.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:	Surface Well Construction:	Borehole Diameter (in): 2	TOC Elevation (ft):
		Groundwater Observations	
		Date	Time
		9/27/99	
		Depth bgs	Notes
		14.5	
Memo: 1" dia. temporary well, screened 8'to16'			

Depth (ft)	Blows / 6 in Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4		2/4	soft, light brown/reddish SANDY CLAY, with trace gravel, moist, no odor		NA		
4 - 8		2.8/4	soft, dark gray SANDY CLAY with trace gravel, wet, heavy petroleum odor		NA		DP-48 8' [Bag Sample]
8 - 12		3.8/4	soft, brown SANDY CLAY with trace gravel, saturated free product		NA		
12 - 16			stiff, light tan and reddish SANDY CLAY with trace gravel, trace product				
16			End of boring at 16' bgs.				

BASIC BORING LOG T09 GP J MM\_PITT.GDT 12/22/99

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**McLaren Hart**  
INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-49</b>	
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:	Surface Well Construction:	Borehole Diameter (in): 2	
		TOC Elevation (ft):	
		Groundwater Observations	
		Date	Time
		9/27/99	
		Depth bgs	Notes
		9.0	
Memo: 1" dia. temporary well, screened 5'to10'			

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			1.4/4	soft, light brown SANDY CLAY with trace gravel, no odor		NA		
4 - 8			2/4	loose, dark gray SAND and GRAVEL, wet, no odor		NA		DP-49 9' [Bag Sample]
8 - 12				dark gray, CLAYEY SAND, no odor				
12 - 16				End of boring at 12' bgs.				

BASIC BORING LOG T06.GPJ MHL.PITT.GDT 12/22/99

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	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-50</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing:	Start - Finish Date: 9/27/99 - 9/27/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
Memo: 1" dia. temporary well, screened 7'to12'		Date	Time	Depth bgs
		9/27/99		10.0

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0				loose, tan SAND with trace clay, wet, no odor				
2								
4			2/4			NA		
6								
8			2/4			NA		
10								
12				End of boring at 12' bgs.				
14								
16								

BASIC BORING LOG T09.GPJ MH\_PITT.GDT 12/22/99

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	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-51</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
Memo: 1" dia. temporary well, screened 7'to12'		Date	Time	Depth bgs
		9/27/99		11.0

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 2				soft, brown SANDY CLAY with trace gravel, moist	Lithology			
2 - 4			2.6/4	heavy petroleum odor		NA		
4 - 8			2/4	saturated free product		NA		DP-51 7'10" [Bag Sample]
8 - 10				soft, dark gray CLAY with trace sand				
10 - 12				End of boring at 12' bgs.				
12 - 14								
14 - 16								

BASIC BORING LOG T09.GPJ MH\_PITT.GDT 12/22/99

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	Site: Naval Station, Roosevelt Roads Location: Ceiba, PR		Boring ID: <b>DP-52</b>		
	Client: J. A. Jones Environmental Services		Boring Location: Pier 1		Start - Finish Date: 9/27/99 - 9/27/99
Drilling Contractor: IPSI		Driller:	Logged By: Will Whitesell		Boring Permit:
Drilling Method: Geoprobe		Drilling Equipment:		Sampling Method: 2" Macro	
Total Depth (ft): 6.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2	TOC Elevation (ft):
Original Surface Condition:		Surface Well Construction:		Groundwater Observations	
Memo:		Date		Time	Depth bgs
		Date		Time	Depth bgs
		Date		Time	Depth bgs
		Date		Time	Depth bgs

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 2				dense, gray SAND and GRAVEL, no odor				
2 - 4			0.1/2			NA		
4 - 6				refusal at 6'				
6 - 16				End of boring at 6' bgs.				



**McClaren  
Hart**  
INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-53</b>	
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:	Surface Well Construction:	Borehole Diameter (in): 2	TOC Elevation (ft):
		Groundwater Observations	
		Date	Time
		9/27/99	
		Depth bgs	Notes
		11.5	
Memo: 1" dia. temporary well, screened 7'to12'			

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0				GRAVEL with some sandy clay, mild petroleum odor				
2								
4			0.7/4	free product		NA		
6								
8			1.3/4	free product (black oil-like)		NA		
10								
12				End of boring at 12' bgs.				
14								
16								

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-54</b>	
	Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe		Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 7.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
		Date	Time	Depth bgs
				Notes
Memo:				

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0				GRAVEL AND SAND, no odor				
2								
4			2.5/3			NA		
6				refusal at 7'				
8				End of boring at 7' bgs.				
10								
12								
14								
16								

	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-55</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 9.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
Memo: 1" dia. temporary well, screened 5'to9'		Date	Time	Depth bgs
		Notes		

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			3.5/4	loose brown SAND, moist				
4 - 6				soft brown SANDY CLAY with trace gravel, moist, mild petroleum odor		NA		
6 - 8				stiff light gray CLAY with trace gravel, moist, heavy petroleum odor				
8 - 9			1/1	GRAVEL with some coarse sand, moist, heavy petroleum odor refusal at 9'		NA		DP-55 7'10"-8' [Bag Sample]
9 - 9.0				End of boring at 9' bgs.				

	Site:	Naval Station, Roosevelt Roads		Boring ID:	<h1 style="margin: 0;">DP-56</h1>
	Location:	Ceiba, PR			
Client:	J.A. Jones Environmental Services	Boring Location:	Pier I	Start - Finish Date:	9/27/99 - 9/27/99
Drilling Contractor:	IPSI	Driller:		Logged By:	Will Whitesell
Drilling Method:	Geoprobe		Drilling Equipment:	Sampling Method:	
Total Depth (ft):	12.5	Ground Elevation (ft):		Borehole Diameter (in):	2
Original Surface Condition:	Surface Well Construction:		Vertical Datum:	Horiz Coor Sys:	TOC Elevation (ft):
Memo: No well, hole collapsed			Groundwater Observations		
			Date	Time	Depth bgs

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			4/4	stiff, brown CLAY with trace sand, moist, petroleum odor		NA		
4 - 6				stiff, dark gray SANDY CLAY with trace gravel, moist, heavy petroleum odor				DP-56 6' [Bag Sample]
6 - 8			4/4	stiff brown CLAY with trace sand and gravel, moist, mild petroleum odor		NA		
8 - 10				stiff, dark gray/brown SANDY CLAY with trace gravel, moist, mild petroleum odor				DP-56 11'6" [Jar Sample]
10 - 12			0.3/1	stiff, light brown SANDY CLAY with trace gravel, moist, no odor refusal at 12'6"		NA		
12 - 12.5				End of boring at 12.5' bgs.				

	Site: Naval Station, Roosevelt Roads	Boring ID: <b>DP-57</b>	
	Location: Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:	Surface Well Construction:	Borehole Diameter (in): 2	TOC Elevation (ft):
Memo: 1" dia. temporary well, screened 7'to12'		Groundwater Observations	
		Date: 9/27/99	Time: 10.5

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			3/4	soft, light gray SANDY CLAY, moist grading to wet, no odor		NA		
4 - 8			3.5/4			NA		
8 - 12				soft, dark gray CLAY with trace sand, wet, no odor				
12 - 16				End of boring at 12' bgs.				

BASIC BORING LOG T08.GPJ MH-PITT.GDT 12/22/99

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	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-58</b>		
	Location: Ceiba, PR				
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/27/99 - 9/27/99		
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:		
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro			
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2 TOC Elevation (ft):	
Original Surface Condition:	Surface Well Construction:	Groundwater Observations			
Memo: 1" dia. temporary well, screened 7'to12'		Date	Time	Depth bgs	Notes
		9/27/99		10.5	

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2								
4			2.3/4	soft light tan SANDY CLAY, wet, no odor		NA		
8			2/4	soft dark grey CLAY with trace sand, wet, no odor		NA		
12				End of boring at 12' bgs.				
14								
16								

BASIC BORING LOG T08.GPJ MH\_PITT.GDT 12/22/99

4



**McLaren Hart**  
INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-59</b>	
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/28/99 - 9/28/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:		Surface Well Construction:	Groundwater Observations
Memo: 1" dia. temporary well, screened 7'to12'		Date: 9/28/99	Time: 10.5
		Depth bgs:	Notes:

Depth (ft)	Blows / 6 in Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2							
4		2/4	loose fine SAND, moist, no odor		NA		
6			soft brown SANDY CLAY with trace gravel, moist, mild petroleum odor				
8		1.3/4	wet, saturated with product		NA		
10			soft brown CLAY with trace sand, wet, trace product				DP-59-10' [Bottle Sample]
12			no odor				DP-59-12' [Baggy Sample]
12			End of boring at 12' bgs.				
14							
16							

BASIC BORING LOG T06.GPJ MHL\_PIT1.GDT 12/22/99

	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-60</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/28/99 - 9/28/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 16.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
Memo: 1" dia. temporary well, screened 2'to 11'		Date	Time	Depth bgs
		Notes		

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2								
4			3.4/4	soft to stiff brown SANDY CLAY with some gravel, moist, no odor		NA		
6				soft light and dark gray SANDY CLAY with some gravel, moist, heavy petroleum odor				
8			3/4	moist to wet		NA		
10				soft reddish brown CLAY with some sand, wet				DP-60 11' [Baggy Sample]
12			4/4	wet, heavy petroleum odor		NA		
14				wet, petroleum odor				
16				End of boring at 16' bgs.				

BASIC BORING LOG T09.GPJ MH.PITT.GDT 12/29/99



**McLaren Hart**  
INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-61</b>		
Location: Ceiba, PR				
Client: J.A. Jones Environmental Services		Boring Location: Pier 1	Northing: Easting:	
		Start - Finish Date: 9/28/99 - 9/28/99		
Drilling Contractor: IPSI		Driller:	Logged By: Will Whitesell	
Drilling Method: Geoprobe		Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	
		Borehole Diameter (in): 2	TOC Elevation (ft):	
Original Surface Condition:		Surface Well Construction:	Groundwater Observations	
			Date	Time
			Depth bgs	Notes
Memo: 1" dia. temporary well, screened 7'to12'			9/28/99	10.0

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2								
4			2.2/4	soft, dark gray SANDY CLAY, wet, heavy petroleum odor		NA		
8			0/4	no recovery		NA		DP-61-8' [Jar Sample]
12				End of boring at 12' bgs.				
14								
16								

BASIC BORING LOG TOR.GPJ MH.PITT.GDT 1/22/98

4

	Site:	Naval Station, Roosevelt Roads		Boring ID: <b>DP-62</b>
	Location:	Ceiba, PR		
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing:	Start - Finish Date: 9/28/99 - 9/28/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
Memo: 1" dia. temporary well, screened 7'to12'		Date	Time	Depth bgs
		Notes		

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			1.7/4	loose SAND and GRAVEL with trace brown clay, moist, heavy petroleum odor		NA		
4 - 8			0.7/4	soft, dark gray SANDY CLAY with trace gravel, wet, free product		NA		
8 - 12				GRAVEL with SANDY CLAY, saturated, free product				
12 - 16				End of boring at 12' bgs.				

BASIC BORING LOG TOP.GPJ MKL\_PITT.GDT 12/22/99



**McClaren  
Hart**  
INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-63</b>	
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/28/99 - 9/28/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:		Surface Well Construction:	Borehole Diameter (in): 2
		TOC Elevation (ft):	
		Groundwater Observations	
		Date	Time
		Depth bgs	Notes
Memo: 1" dia. temporary well, screened 7'to12'			

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			1.67/4	soft, SANDY CLAY with trace gravel		NA		
4 - 8			1/4	loose dark gray GRAVEL with sand, saturated product		NA		DP-63 8' [Bag Sample]
8 - 12				soft, dark gray CLAY with trace sand, saturated free product				DP-63 11' [Jar Sample]
12 - 16				End of boring at 12' bgs.				

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-64</b>		
	Location: Ceiba, PR				
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/28/99 - 9/28/99		
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:		
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro			
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2 TOC Elevation (ft):	
Original Surface Condition:	Surface Well Construction:	Groundwater Observations			
Memo: 1" dia. temporary well, screened 7'to12'. Between water and fuel lines		Date	Time	Depth bgs	Notes

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2								
4			1.8/4	soft, brown and reddish orange SANDY CLAY with some gravel, moist, petroleum odor		NA		
6				dark grey CLAY and GRAVEL with some sand, wet, some free product				
8			2.7/4	saturated, free product		NA		
10				stiff dark grey CLAY with trace sand, saturated, some free product				
12				stiff reddish brown CLAY with some gravel and trace sand, no odor				
12				End of boring at 12' bgs.				
14								
16								

BASIC BORING LOG TOP GFJ\_MKL\_PITT GDT 12/2/99

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-65</b>		
	Location: Ceiba, PR				
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/28/99 - 9/28/99		
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:		
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro			
Total Depth (ft): 12.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2 TOC Elevation (ft):	
Original Surface Condition:	Surface Well Construction:	Groundwater Observations			
Memo: 1" dia. temporary well, screened 7'to12'		Date	Time	Depth bgs	Notes

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2								
4			2.5/4	stiff brown CLAY with some gravel and some sand, no odor, damp to moist		NA		
6				soft reddish brown tan CLAY with some sand, moist, mild petroleum odor at 5.5 ft				DP-65 5'6" [Jar Sample]
8			3.8/4	SAND and GRAVEL with some soft dark grey CLAY, slight petroleum odor soft reddish brown CLAY with some sand, no odor		NA		
10								
12				End of boring at 12' bgs.				
14								
16								

BASIC BORING LOG TOR.GPJ MHL.PIT.GDT 12/22/99

	Site: Naval Station, Roosevelt Roads		Boring ID: DP-66		
	Location: Ceiba, PR				
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing:	Start - Finish Date: 9/28/99 - 9/28/99		
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:		
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro			
Total Depth (ft): 8.5	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2	
Original Surface Condition:	Surface Well Construction:	Groundwater Observations			
Memo:		Date	Time	Depth bgs	Notes

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0								
2								
4			2.3/4	loose brown SAND and trace gravel, moist, some petroleum odor		NA		
6				GRAVEL and coarse sand with trace clay, moist				
8			0.3/4	7'10" to 8' saturated, free product		NA		
				End of boring at 8.5' bgs.				
10								
12								
14								
16								

BASIC BORING LOG T09.GPJ MH\_PITT.GDT 12/22/99



**McLaren Hart**  
INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-67</b>	
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/28/99 - 9/28/99
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro	
Total Depth (ft): 16.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:
Original Surface Condition:		Surface Well Construction:	Borehole Diameter (in): 2
		TOC Elevation (ft):	
		Groundwater Observations	
		Date	Time
		9/28/99	
		Depth bgs	Notes
		12.5	
Memo: 1" dia. temporary well, screened 8'to16'			

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2								
4			2.8/4	soft, light brown SANDY CLAY, moist, petroleum odor		NA		
6				soft, dark grey SANDY CLAY, trace gravel, moist, heavy petroleum odor				
8			3.8/4	saturated, and free product		NA		
10				GRAVEL and dark grey SANDY CLAY, wet, free product				
12			3.8/4	very stiff light brown and reddish brown SANDY CLAY with some GRAVEL, heavy petroleum odor		NA		
14				coarse SAND and GRAVEL, saturated, free product				
16				very stiff reddish orange CLAY with trace SAND, moist, no odor				
16				End of boring at 16' bgs.				

BASIC BORING LOG T09.GPJ MHL\_PIT.GDT 12/22/99

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**McClaren Hart**  
INC.

Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-68</b>	
Location: Ceiba, PR			
Client: J.A. Jones Environmental Services		Boring Location: Pier 1	Start - Finish Date: 9/28/99 - 9/28/99
Drilling Contractor: IPSI		Driller:	Logged By: Will Whitesell
Drilling Method: Geoprobe		Drilling Equipment:	Sampling Method: 2" Macro
Total Depth (ft): 14.0	Ground Elevation (ft):	Vertical Datum:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations	
Memo: 1" dia. temporary well, screened 4'to14'		Date	Time
		Depth bgs	Notes

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
0 - 4			3/4	loose light brown SAND with some CLAY, damp, no odor		NA		
4 - 8			2.5/4	loose dark grey SAND and GRAVEL with some clay, moist, heavy petroleum odor		NA		
8 - 12			NA	GRAVEL and some sand, free product		NA		
12 - 14				End of boring at 14' bgs.				

BASIC BORING LOG T09.GPJ, MH\_PITT.GDT, 1/22/99

	Site: Naval Station, Roosevelt Roads		Boring ID: <b>DP-69</b>	
	Location: Ceiba, PR			
Client: J.A. Jones Environmental Services	Boring Location: Pier 1	Northing: Easting:	Start - Finish Date: 9/28/99 - 9/28/99	
Drilling Contractor: IPSI	Driller:	Logged By: Will Whitesell	Boring Permit:	
Drilling Method: Geoprobe	Drilling Equipment:	Sampling Method: 2" Macro		
Total Depth (ft): 10.0	Ground Elevation (ft):	Vertical Datum:	Horiz Coor Sys:	Borehole Diameter (in): 2
Original Surface Condition:	Surface Well Construction:	Groundwater Observations		
Memo:	Date		Time	Depth bgs
				Notes

Depth (ft)	Blows / 6 in	Sample	Recovery (ft)	Soil Description	Lithology	PID (ppm)	FID (ppm)	Sample Analysis
2			3/3	loose brown SAND and GRAVEL with trace clay, damp, slight odor		NA		
4			2.5/3	SAND and GRAVEL with some light brown clay, damp, slight petroleum odor		NA		
8			2/2	heavy petroleum odor		NA		
10			NA	wet, some oil staining and smear marks on gravel refusal at 10 feet		NA		
10				End of boring at 10' bgs.				

**Appendix B**

***Analytical Results***



World Leader In On-Site Sampling and Analysis

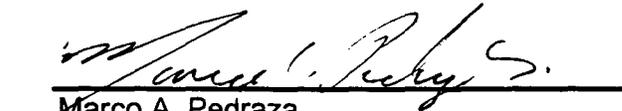
**McLAREN HART  
ROOSEVELT ROADS NAVAL BASE  
CEIBA, P.R.**

**TEG Project #99I0929MCH**

**TPH (Mod. EPA Method 8015B) ANALYSES**

SAMPLE NUMBER	DATE ANALYZED	DIESEL #2	JP - 5
METHOD BLANK	10/10/99	NEGATIVE	NEGATIVE
DP - 41 BAG	10/10/99	POSITIVE	NEGATIVE
DP - 41 JAR	10/10/99	POSITIVE	NEGATIVE
DP - 68 BAG	10/10/99	POSITIVE	NEGATIVE
DP - 68 JAR	10/10/99	NEGATIVE	POSITIVE
DP - 63 BAG	10/10/99	NEGATIVE	POSITIVE
DP - 63 JAR	10/10/99	NEGATIVE	POSITIVE

SAMPLING PERFORMED BY: McLAREN HART PERSONNEL  
NEGATIVE = DID NOT SHOW THE SPECIFIED HYDROCARBON FUEL PATTERN  
POSITIVE = SHOWS THE SAME OR SIMILAR HYDROCARBON FUEL PATTERN  
ANALYSES PERFORMED BY: MARCO A. PEDRAZA  
DATA REVIEWED BY: KEVIN SHELBURNE

  
Marco A. Pedraza  
Laboratory Manager



  
Kevin Shelburne  
Principal

# *Analysis Report*

*for*  
*J.A Jones*

***Project Description:*** # 945809

***HTL Report Number:*** 99-09-174

***Date of Submittal:*** 20-Oct-99

***Attention:*** Mr. Bill Buccille

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# Report Certification

Report No.: 99-09-174  
20-Oct-99

**Customer:** J.A Jones  
**Address:** 2 North Shore Suite 100  
Pittsburg, PA 15212  
**Telephone:** ( 412 ) 395-1400  
**Attention:** Mr. Bill Buccille

Dear Mr. Buccille :

Enclosed please find the report for the analyses you requested. A brief description of the procedures followed by the various analytical divisions at High Technology Laboratory (HTL) are found on the following pages. Results for the analyses performed at each analytical division are presented in separate pages.

The quality control data and other supporting documentation pertaining to these analyses, are kept on file at the laboratory for a period of three (3) years. These records will be made available to you upon request.

The results reported herein were obtained according to the analytical procedures described in our Laboratory SOP's and/or standard methods approved by regulatory agencies. At HTL, our laboratory and administrative procedures are supervised by qualified personnel and are performed following the guidelines of our Quality Assurance Manual.



A 622526

  
Federico Asmar, M.S.  
Laboratory Director  
Lic. No.2471

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# Summary

At HTL Environmental and Analytical Services analyses are performed by three (3) analytical divisions:

Wet Chemistry: Performs analysis for Inorganic and Organic (non-chromatographic) parameters

Metals: Performs analysis of Metals and some elements (such as Boron, Phosphorous and Silica) by Atomic Absorption Spectroscopy (FAAS, GFAAS and CVAAS) and/or Atomic Emission Spectroscopy (ICP-AES)

Organics: Performs analysis of Volatile and Semivolatile Organic Compounds (VOC and SVOC), Pesticides, Herbicides and Polychlorinated Biphenyl's (PCB's) using Gas Chromatography (GC) methods including GC/MS (GC/Mass Spectrometry)

The analyses performed by these analytical divisions are done following laboratory SOP's and/or methods approved by the Environmental Protection Agency (EPA) to obtain data that satisfies the requirements of:

40 CFR Parts 122 through 270 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846); Test procedures and guidelines which are recommended for use in conducting the evaluation and measurements needed to comply with the Resource Conservation and Recovery Act (RCRA) Public Law 94-580 (as amended).

## Reporting Limits (RL)

The RL for each parameter is the minimum concentration of a substance that can be reported with 99% confidence that the analyte concentration is greater than zero. This limit is determined from analysis of standards containing the analyte. The RL is greater or equal to the MDL (Method Detection Limit) as defined in the 40 CFR. Results expressed as "nd" or "< RL" means that either the analyte was not detected or the amount determined is below the RL for that particular parameter, therefore, an accurate value can not be determine.

## QAU Statement

Data reduction for each analysis was performed by the analyst (technician) performing the test followed by peer review of a person knowledgeable in that particular procedure and finally a data validation and QC (Quality Control) release was performed by the division supervisor or designee.

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**Analysis Results**  
**Diesel Range Organics (DRO)**  
**Gasoline Range Organics (GRO)**

HTL Sample ID	Sample Description	GRO Anal. Date	DRO Anal. Date	GRO	DRO
99-09-174-01	DP59	10/4/99	10/4/99	< 10.0	290
99-09-174-02	DP61 7'6" a 8'	10/4/99	10/4/99	< 20.0	741
99-09-174-03	DP 42 15' 10" a 16'	10/5/99	10/5/99	< 20.0	110
99-09-174-04	DP 56 11'6"	10/5/99	10/5/99	< 20.0	< 50.0
99-09-174-05	DP 44 10'	10/5/99	10/5/99	< 20.0	55.0
99-09-174-06	DP 39 9'8" a 10'	10/5/99	10/5/99	< 20.0	394
99-09-174-07	DP 44 8' a 9'	10/5/99	10/5/99	< 20.0	84.2
99-09-174-08	DP 37 24" a 26"	10/5/99	10/5/99	< 20.0	1,600
99-09-174-09	DP 36 19'	10/5/99	10/5/99	< 20.0	134
99-09-174-10	DP 35 12' 6" a 13'	10/6/99	10/6/99	< 20.0	280
99-09-174-11	DP 33 9' a 11'	10/6/99	10/6/99	< 20.0	1970
99-09-174-12	DP 48 8'	10/6/99	10/6/99	< 20.0	135
99-09-174-13	DP 32 9'6" a 11'	10/6/99	10/6/99	< 20.0	71.3
99-09-174-14	DP 34 10' a 11'	10/6/99	10/6/99	< 20.0	86.5
99-09-174-15	DP 55 7' 10" a 8'	10/6/99	10/6/99	< 20.0	< 50.0
99-09-174-16	DP 60 11'	10/6/99	10/6/99	29.3	411
99-09-174-17	DP 36 13' a 14'	10/6/99	10/6/99	< 20.0	846

Reporting Units are ppm.

ppm = Parts per Million (Liquid Samples = mg/L ; Solid Samples = mg/Kg)

RL = Reporting Limit (GRO = 20.0 ; DRO = 50.0)

The results presented in this table were generated after analysis and data reduction by qualified personnel assigned to the Wet-Chemistry and Organic Analytical Divisions as per QAU statement described in the summary



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