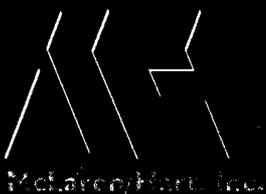


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Work Plan
Quantification of Product Release
Pier I - Tow Way Fuel Facility
Naval Station Roosevelt Roads
Ceiba, Puerto Rico
Task Order #9
Contract No. N62470-93-D-3033

September 8, 1999



SCIENCE : STRATEGY : TECHNOLOGY : SOLUTIONS

WORK PLAN

QUANTIFICATION OF PRODUCT RELEASE

**Pier1 - Tow Way Fuel Facility
Naval Station Roosevelt Roads
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Task Order # 9
Contract No. N62470-93-D-3033**

September 8, 1999

INTRODUCTION

McLaren\Hart, Inc. (McLaren\Hart), has prepared this Work Plan to conduct a supplemental site 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 is performing this work as a subcontractor to J. A. Jones Environmental Services Company (J. A. Jones), under Task Order # 9 for the Petroleum, Oils and Lubricants (POL) Remedial Action Contract (RAC).

McLaren/Hart was responsible for design and construction of the Free Product Recovery System at the nearby TWFF. McLaren\Hart has also been responsible for operation of this and two similar product recovery systems near the TWFF, since commissioning of the system in April 1997. In this capacity, McLaren\Hart provided day to day operation and maintenance, system evaluation/optimization, reporting and management services for the product recovery system. McLaren\Hart is familiar with the site operations, and subsurface and environmental conditions relative to fuel storage and distribution at the TWFF and adjacent areas.

This Work Plan presents our approach to quantify the product release and provides details of the scope of work and related activities. The following sections of this Work Plan describe the project objectives, site history and environmental conditions, investigation approach, detailed scope of work, health and safety plan, project management, project schedule and deliverables.

PROJECT OBJECTIVES

The primary objective of the site activities is to estimate the horizontal extent and thickness of the product release encountered at the land-end of Fueling Pier 1. Secondary objectives include review of existing documents, well gauging records, laboratory analytical results, and site history to determine the likely source and demonstrate the flow route(s) of the product from the Tow Way Fuel Facility. The final deliverable of this activity will be a brief report to document the field activities and summarize our conclusions as to the characteristics and source of the product release. In addition, recommendations for additional field activities (if necessary), and control and remediation of the release will be presented.

SITE CONDITIONS

The TWFF is located on the eastern end of Naval Station Roosevelt Roads adjacent to the fueling port, which is located in Ensenada Honda. The TWFF consists of nine 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.

GEOLOGY AND TOPOGRAPHY

The TWFF is bisected by Forestal Drive, into the upper as lower TWFF shown in Figure 1. The upper TWFF northeast of Forestal drive consist of a steeply sloping hill raising up from Forestal Drive and contains the nine USTs. The lower TWFF southwest of Forestal Drive consists of a man-made flat coastal plain.

The site geology consists of fine sand, silt and clay overlying weathered and unweathered volcanic rock. Numerous utility trenches along Forestal Drive consist of well-graded gravel fill. The soil material southwest of Forestal Drive is believed to be primarily silt, sand and clay fill material with the soil thickness typically increasing closer to Ensenada Honda. The soil thickness ranges from 5 feet at the toe of slope adjacent to Forestal Drive to 40 feet.

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 12 to 50 feet below the ground surface. 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 above Forestal Drive. A mound in the rock surface appears to be running perpendicular to Forestal Drive near the fuel pump building (near UGW-6).

The groundwater flow is controlled by elevation differences between the Upper and Lower TWFF, which creates a southwestern groundwater gradient toward Ensenada Honda. 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. The groundwater table is also significantly influenced by seasonal rainfall.

Free floating product movement generally follows the groundwater gradient but is also influenced by the utility trenches along Forestal Drive and the compacted soil beneath Forestal Drive.

RELEASE HISTORY

The product release near Pier 1 was discovered when free product was observed floating along the shoreline north west of the pier in June 1999. At that time the release was believed to have been due to a leaking PVC line from the oil/water separator on the pier to the sanitary sewer line adjacent to the shoreline release. Previous to appearance of product floating along the shoreline release, approximately 15,000 gallons of fuel were captured at the Naval Station sanitary treatment plant. The source of the fuel was traced to the oil/water separator at the pier. Apparently, the contractor pressure testing fuel lines 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.

Naval Station maintenance crews then excavated the entire PVC discharge line from the oil/water separator to the sanitary sewer. Product was encountered near where the PVC oil/water separator discharge line enters into the vitrified clay pipe (VCP) sanitary sewer. Several temporary sumps were installed and over 5,000 gallons of primarily product was recovered and stored in a tanker trailer on the site. The product was reported to be over 6 inches thick when the excavation was opened and was reduced to less than an inch thick by June 30, 1999.

Coincidentally with pressure testing of the fuel lines, a water main break occurred on the bluff above Forestal Drive east of the Tow Way Fuel Facility. Some theorize that the water may have infiltrated the ground causing a rise in the ground water table and in turn mobilizing the floating product releases known to exist in the fuel farm and along Forestal Drive.

The source of the product is not known. However, evidence indicates the product likely travels or at least is accumulating along buried fuel lines and utility trenches.

APPROACH

The approach presented is based on our site visit and meeting with Naval Station personnel of June 30, 1999, and our understanding of the site conditions. Characterization/quantification of the product release will be accomplished using direct push methods to access subsurface soil and ground water for observation and sampling. Soil samples will be collected, visually examined and screened for organic vapors (VOCs). A shallow small diameter temporary well will be installed in each test hole and left in place several days for gauging and possibly sampling.

The test holes installation will begin at the land end of Fueling Pier 1 where the release was encountered in the pipe excavation. The activities will proceed inland working toward the intersection of Forestal Drive and Palua Road. Initially focusing on areas near the buried fuel lines and utility conduits, the probes will extend outward from the utility trenches where product is encountered. Initially, sample locations will be spaced at approximate 50-foot centers along the utility corridor as shown in Figure 2. The field program will be continuously evaluated and modified to best quantify the release.

Should free product be encountered, a test hole will be installed on either side (maintaining the approximate 50-foot spacing pattern) of the hole where free product is encountered. Intermediate test holes will be installed at the discretion of the field engineer to further define the product release in critical areas.

SCOPE OF WORK

McLaren/Hart has developed the following scope of work to characterize the product release encountered at Pier 1:

Utility Location: Buried utilities in the vicinity of Pier 1 and between Pier 1 and the Tow Way Fuel Facility will be identified using Level B Survey methods by Utility Search, Inc. of Virginia. These methods include electro-magnetic, sonic and other remote, non-destructive tests. McLaren/Hart will also meet with appropriate Naval Station Public Works Department personnel to obtain and review available as-built utility location drawings. Results of previous utility location studies will also be referenced. Located utilities will be marked in the field with color-coded paint and flags. A drawing of the utilities will be prepared and submitted with the final report.

Test Hole Installation: Test holes will be installed using direct push methods (geoprobe or hydropunch) to access subsurface soil and ground water for observation and sampling. Geoprobe work will be done by SoilTech of San Juan, Puerto Rico. Should soil conditions be such that direct push methods cannot be used, the test holes will be augered. Two-foot soil samples will be collected in virgin acetate liners. Each will be visually examined and screened for VOCs using an OVA by the McLaren/Hart field engineer. A log will be prepared for each test hole showing the soil description, depth, air monitoring results and comments.

Temporary Well Installation: Following soil sampling, a shallow 3/4-inch diameter temporary well will be installed in each test hole to a depth of approximately 2 feet below the ground water table. Wells will be screened from 5 feet below the ground surface to the bottom of the well with PVC 0.20 inch slotted screen. The wells will be gauged with an oil/water interface probe to determine the presence and thickness of free product. The wells will be left in place several days for additional gauging and possible sampling. The temporary wells may be removed after 48 hours and any open holes backfilled with soil. Pavement will be replaced with like materials.

Well casing will be reused to the extent practical. Test hole cuttings will be used to backfill test holes and excess cuttings will be spread on the ground surface near the test hole. We estimate 25 to 40 test holes may be required to characterize the product release depending on site conditions.

As-Built Test Hole Location: Each test hole and sample location will be determined using a hand held ground positional system (GPS) unit to within a horizontal tolerance of 1 foot. These locations will be recorded and documented on the site map in the final report.

Groundwater Sampling: Several samples of free floating product will be obtained from the temporary wells and will be sent to a laboratory for product "finger printing." Samples will be collected by a qualified engineer as described in Section 2.0 of the TWFF Work Plan¹.

Reporting: A brief report will be prepared to document the field activities and summarize our conclusions as to the characteristics and source of the product release. A drawing will be included illustrating the test hole and temporary well locations, buried utilities and the extent and measured thickness of the product. In addition, recommendations for additional investigations (if necessary), and control and remediation of the release will be presented.

PROJECT MANAGEMENT

Field activities will be conducted under the direction of McLaren\Hart. The project will be managed by Mr. Bill Buccille, Senior Project Manager. Mr. Will Whitesell will act as the site Health and Safety Officer and Site Quality Control Administrator. A contractor's field log will be prepared each day to document field activities. The field activities will be conducted in accordance with the Site Specific Health and Safety Plan contained in the TWFF Work Plan.

¹ McLaren\Hart (formerly PDG Environmental Services, Inc.), Work Plan, D. O. #0009, Free Product Recovery System for the Tow Way Fuel Facility, Naval Station Roosevelt Roads, Prepared for J. A. Jones Environmental Services, Charlotte, NC, Contract No. 62470-93-D-3033, August 16, 1996

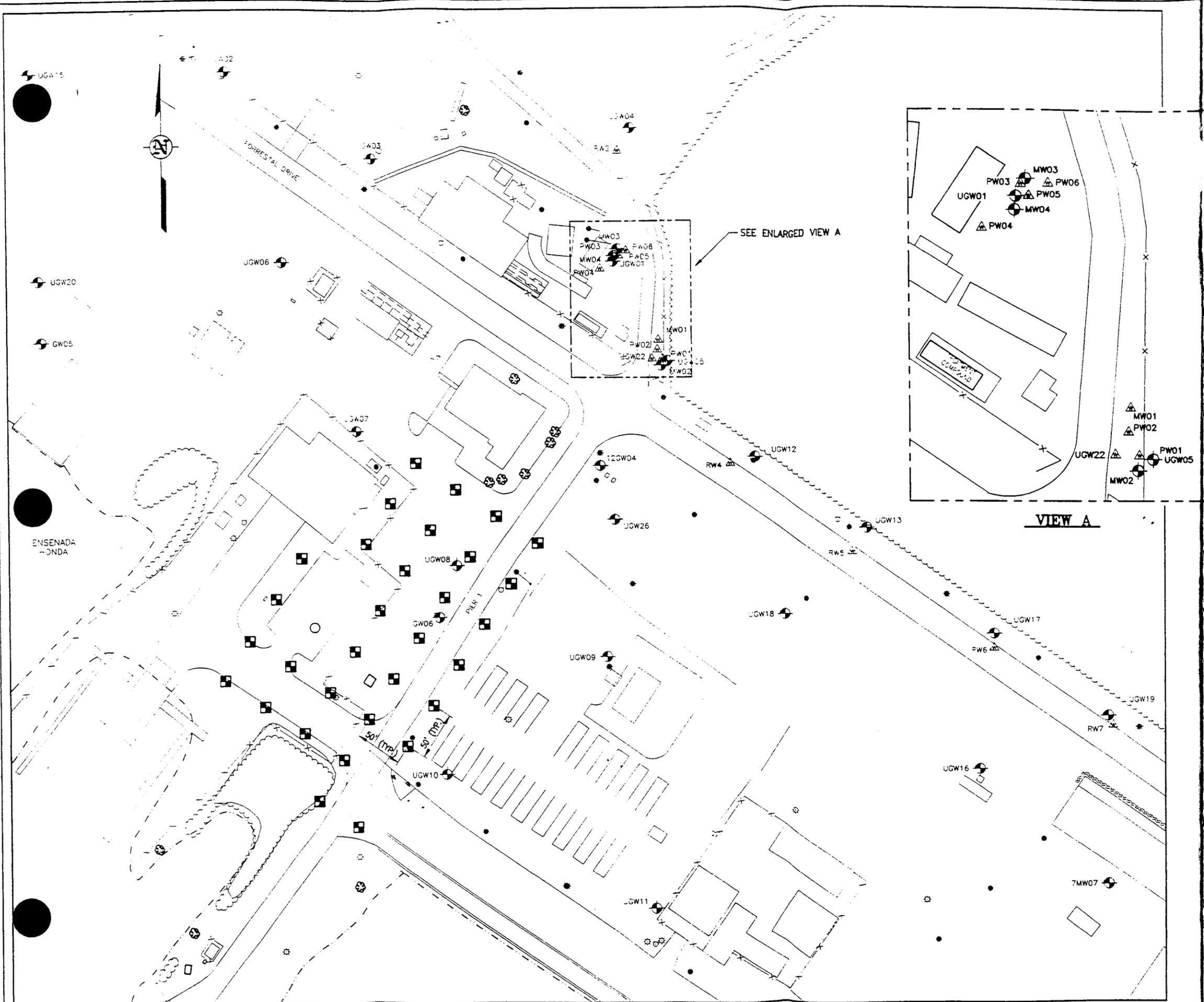
SCHEDULE

Field activities are scheduled to begin September 14. Utility clearance will be conducted on September 14 and 15. The geoprobe rig will be mobilized on September 15. We estimate from 5 to 10 test holes/wells can be installed per day. An allowance of 7 days geoprobe time is included providing up to 70 test holes, if necessary.

The draft report will be submitted within two weeks following completion of field activities. A final investigation report can be completed within one week of receipt of comments on the draft report from the Navy.

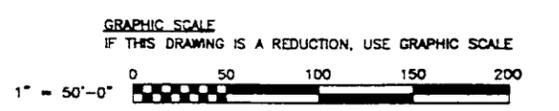
CLOSING

This work will be conducted under POL RAC Task Order 09.

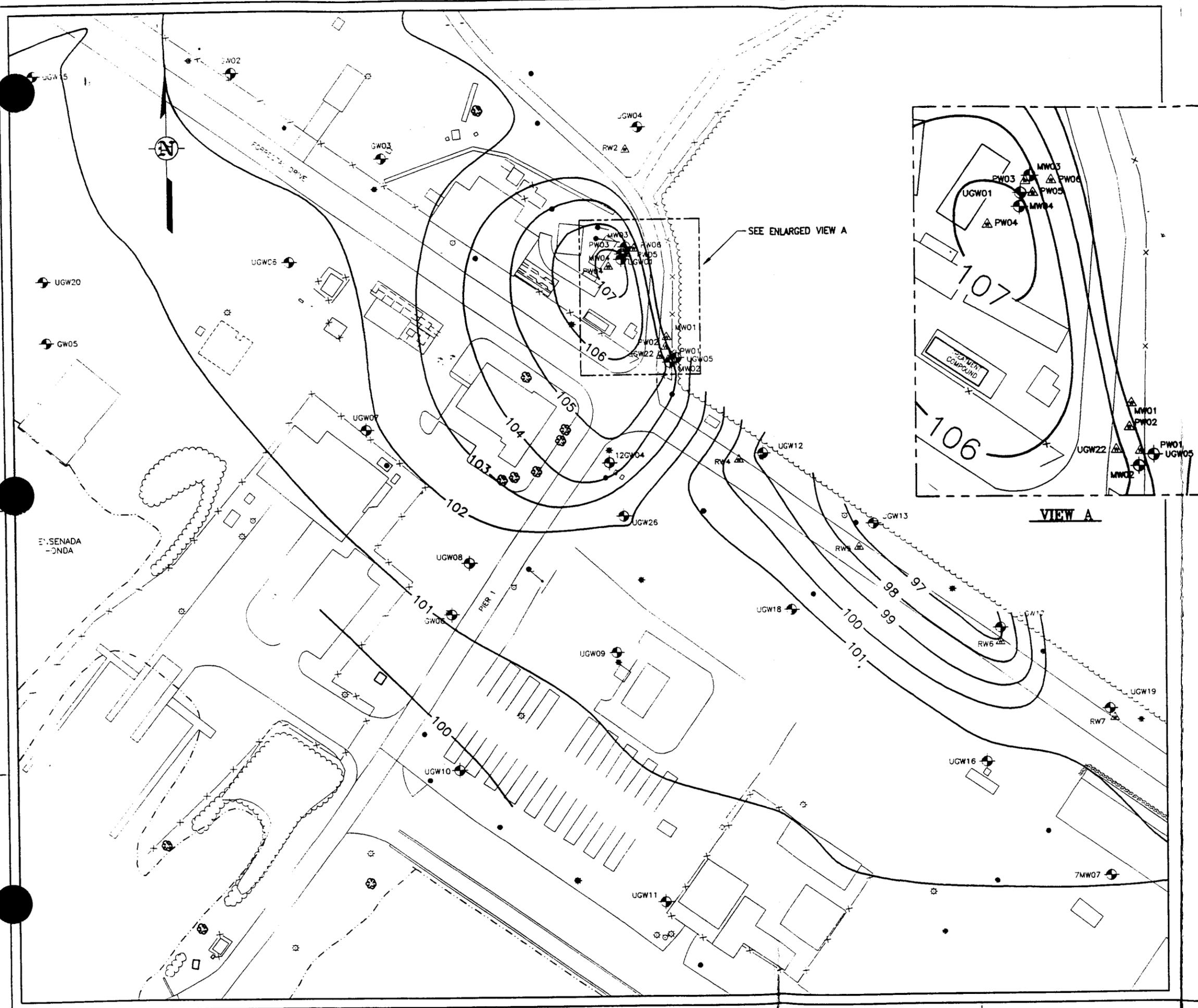


- LEGEND**
- PROPOSED DIRECT PUSH BORING LOCATION
 - EXISTING MONITORING WELL LOCATION AND DESIGNATION
 - MCLAREN/HART PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
 - TERRAVAC PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
 - BUILDING
 - WALL
 - FENCE

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

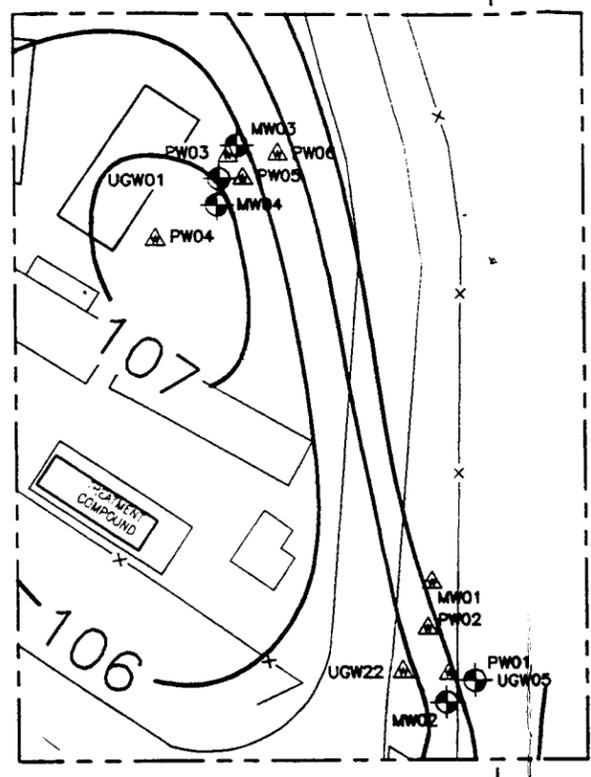


SITE INVESTIGATION - PIER 1		
TEST HOLE LAYOUT		
FREE PRODUCT RECOVERY SYSTEM TOW WAY FUEL FACILITY ROOSEVELT ROADS CEIBA, PUERTO RICO		
CHECKED BY:	DWG. NO.:	FIGURE NO.:
APPROVED BY:	45809D32	2



- LEGEND**
- UGW-9 EXISTING MONITORING WELL LOCATION AND DESIGNATION
 - PW-1 McLAREN/HART PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
 - TERRAVAC TERRAVAC PRODUCT RECOVERY WELL LOCATION AND DESIGNATION
 - 104 APPROXIMATE GROUNDWATER CONTOUR (DASHED WHERE INFERRED)
 - BUILDING
 - WALL
 - FENCE

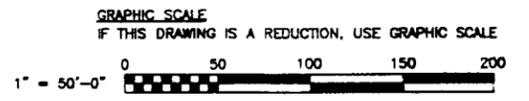
SEE ENLARGED VIEW A



VIEW A

NOTE:
WATER LEVELS MEASURED ON APRIL 21, 1998.

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



SITE INVESTIGATION - PIER 1		
CORRECTED GROUNDWATER SURFACE		
FREE PRODUCT RECOVERY SYSTEM TOW WAY FUEL FACILITY ROOSEVELT ROADS CEIBA, PUERTO RICO		
CHECKED BY:	DWG. NO.:	FIGURE NO.
APPROVED BY:	45809033	1

D
C
B
A