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TECHNICAL MEMORANDUM FOR FREE PRODUCT DETERMINATION AT ALPHA DELTA  
PIERS NS MAYPORT FL  
8/1/2004  
TETRA TECH NUS

**Technical Memorandum  
Free Product Determination  
Alpha/Delta Piers**

**Naval Station Mayport  
Mayport, Florida**



**Southern Division  
Naval Facilities Engineering Command  
Contract Number N62467-94-D-0888  
Contract Task Order 0255**

August 2004

TECHNICAL MEMORANDUM  
FREE PRODUCT DETERMINATION  
FOR  
ALPHA/DELTA PIERS

NAVAL STATION MAYPORT  
MAYPORT, FLORIDA

COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION-NAVY (CLEAN) CONTRACT

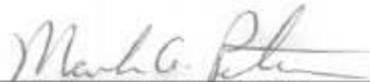
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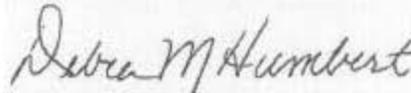
AUGUST 2004

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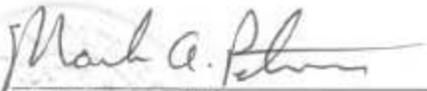


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**PROFESSIONAL CERTIFICATION**

Technical Memorandum  
Free Product Determination  
Alpha/Delta Piers  
Naval Station Mayport  
Mayport, Florida

This Technical Memorandum of Free Product Determination for the Alpha/Delta Piers at Naval Station Mayport was prepared in general accordance with Chapter 62-770 of the Florida Administrative Code under the direct supervision of the undersigned geologist using geologic and hydrogeologic principles standard to the profession at the time the report was prepared. If conditions are determined to exist that differ from those described, the undersigned geologist should be notified to evaluate the effects of additional information on the assessment described in this report. This report was developed specifically for the referenced site and should not be construed to apply to any other site.



Mark Peterson, P.G.  
Florida License Number PG-0001852

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August 16, 2004

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## ACRONYMS

ABB-ES	ABB Environmental Services
bls	Below Land Surface
CA	Contamination Assessment
CAR	Contamination Assessment Report
CLEAN	Comprehensive Long-term Environmental Action Navy
CTO	Contract Task Order
DFM	Diesel Fuel Marine
EMD	Electromagnetic Detection
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FID	Flame Ionization Detector
FISC	Fleet Industrial Supply Center
FPD	Free Product Determination
ft	Feet (or Foot)
GC	Gas Chromatography
GCTLs	Groundwater Cleanup Target Levels
GPR	Ground Penetrating Radar
LNAPL	Light Nonaqueous Phase Liquid
MS	Mass Spectrometer
NAVFAC EFD SOUTH	Southern Division, Naval Facilities Engineering Command
NAVSTA	Naval Station
OVA	Organic Vapor Analyzer
PCW	Product Contact Water
ppm	Parts per Million
RAP	Remedial Action Plan
RAPA	Remedial Action Plan Addendum
SIM	Selected Ion Monitoring
SOP	Standard Operating Procedure
TOC	Top-of-Casing
TINUS	Tetra Tech NUS, Inc.
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

## EXECUTIVE SUMMARY

Tetra Tech NUS, Inc. (TtNUS) has completed a free product determination (FPD) at the Alpha/Delta Piers, Naval Station (NAVSTA) Mayport, Mayport, Florida.

For this FPD, TtNUS completed the following:

- Reviewed available United States Navy documents.
- Advanced 12 soil borings and performed a soil vapor survey in the unsaturated zone to determine areas of excessively contaminated soil, if present.
- Converted 12 soil borings into piezometers for the purpose of delineating the extent of free product.
- Collected product samples in an attempt to fingerprint the source of the free product.

The investigation was focused on a grassy area that parallels the Alpha/Delta Piers. The subject site is located east of Building 2 at the bottom of a grass covered hill and extends southeast to the Alpha/Delta Piers and south across Maddox Avenue into an adjoining asphalt parking lot.

"Excessively contaminated soil," as defined by Chapter 62-770.200(12), Florida Administrative Code (FAC), was identified during the soil vapor survey performed in and around the potential source areas. The soil surrounds a utility and should not be disturbed.

The free product was monitored during high and low tide cycles and was found to be more pervasive during low tide.

Fingerprint analyses were completed on a sample of free product collected from source area monitoring well MPT-1406-MW-16 (MW-16) and compared to fingerprint analyses of diesel fuel marine (DFM) and oily waste. Results of these analyses indicate that the free product collected from monitoring well MW-16 is an old source of petroleum that had been biodegrading for approximately 20 years.

A Remedial Action Plan (RAP) Addendum (RAPA) is recommended to address the longstanding issue of free product at the Alpha/Delta Piers. The recovery of the free product is essential in eliminating the 1985 release of petroleum. Recovery wells are recommended to be installed and filtered with automated skimming pumps for product recovery. It has been demonstrated that the free product is mobile due to tidal influences and, therefore, a 24-hour operational recovery system should be effective in removing free product as it occurs.

## **1.0 INTRODUCTION**

### **1.1 PURPOSE AND SCOPE**

TiNUS performed a FPD at the Alpha/Delta Piers, NAVSTA Mayport, for the Southern Division, Naval Facilities Engineering Command (NAVFAC EFD SOUTH) under Contract Task Order (CTO) 0255 of the Comprehensive Long-term Environmental Action Navy (CLEAN) III Contract Number N62467-94-D-0888. The data collected during the investigation was used to prepare this report of findings. Information from the field investigation has been assimilated into this Technical Memorandum to provide a characterization of site conditions from which to base future courses of action. It is not the intent of this investigation to define the extent of free product, but to document subsurface structures in the area of known free product and observe the effects of tidal influences on free product thickness.

The Alpha/Delta Piers were the subject of a 1992 Contamination Assessment (CA) performed by ABB Environmental Services, Inc. (ABB-ES) to investigate magnitude and extent of contamination resulting from various product-loss events, most notably a valve break in a DFM pipeline discovered in 1985 and a discharge from a DFM pipeline in 1989 that was caused when a valve was hit during excavation operations. Based upon quantities subsequently recovered from a nearby manhole, the composite volume of released product was estimated to be between 500 and 1000 gallons. In 1992, 234 tons of soil impacted by DFM and/or oily waste were excavated and removed from the site during installation of a potable water pipeline. Over the past years, the free product levels at monitoring well MW-16 and the nearby manhole have been monitored. Within the past couple of years of monitoring, free product has not been identified in the manhole and has only been sporadically observed in monitoring well MW-16. Product thicknesses in MW-16 have recently ranged from 0 to approximately 0.5 foot (ft).

The purpose of this FPD is to:

- Determine the origin of the free product.
- Identify any objects remaining in the ground that may be the source of a continuing release or are acting as conduits for migration of released contaminants.
- Obtain an understanding about mobility of free product.
- Determine an appropriate follow up action.

### **1.2 FACILITY AND SITE LOCATION**

NAVSTA Mayport is located within the corporate limits of the City of Jacksonville, Duval County, Florida, approximately 12 miles northeast of downtown Jacksonville and adjacent to the town of Mayport. A Site Vicinity Map showing NAVSTA Mayport's location in northeastern Florida is provided as Figure 1-1. The station complex is located on the northern end of a peninsula bounded by the Atlantic Ocean to the east and the St. Johns River to the north and west. NAVSTA Mayport occupies the entire northern part of the peninsula except for the town of Mayport, which is located to the west between the station and the St. Johns River. The Alpha/Delta Piers are located near the center of the base on the southern side of the turning basin as illustrated on Figure 1-2.

### **1.3 SITE DESCRIPTION**

A site plan depicting the subject site and its surroundings is provided as Figure 1-3. The study site is a grassy area located south of Building 2 on the western side of Maddox Avenue where Maddox Avenue terminates at the piers. A chain link fence separates the grassy area and an asphalt parking lot to the north from the turning basin. Building 2, which formerly housed the turning basin operations, is situated approximately 75 ft west of the site on a large grass-covered mound. The mound is manmade, stands approximately 15 ft above the surrounding grounds, and appears to contain some chunks of concrete. Photographs of the site were taken from on top of the mound and at the base to pictorially depict the site and its surrounding features. Photographs of the site are presented as Appendix A.

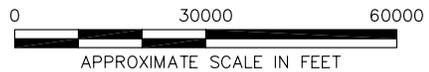
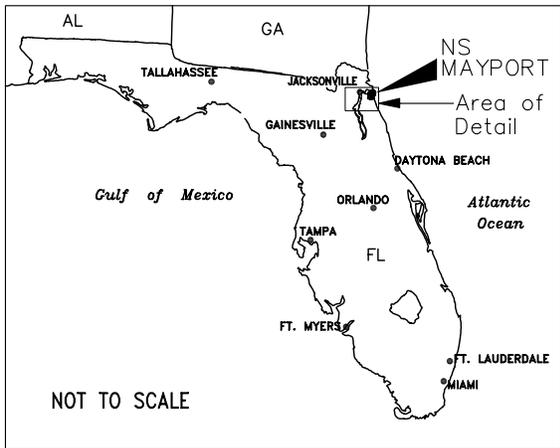
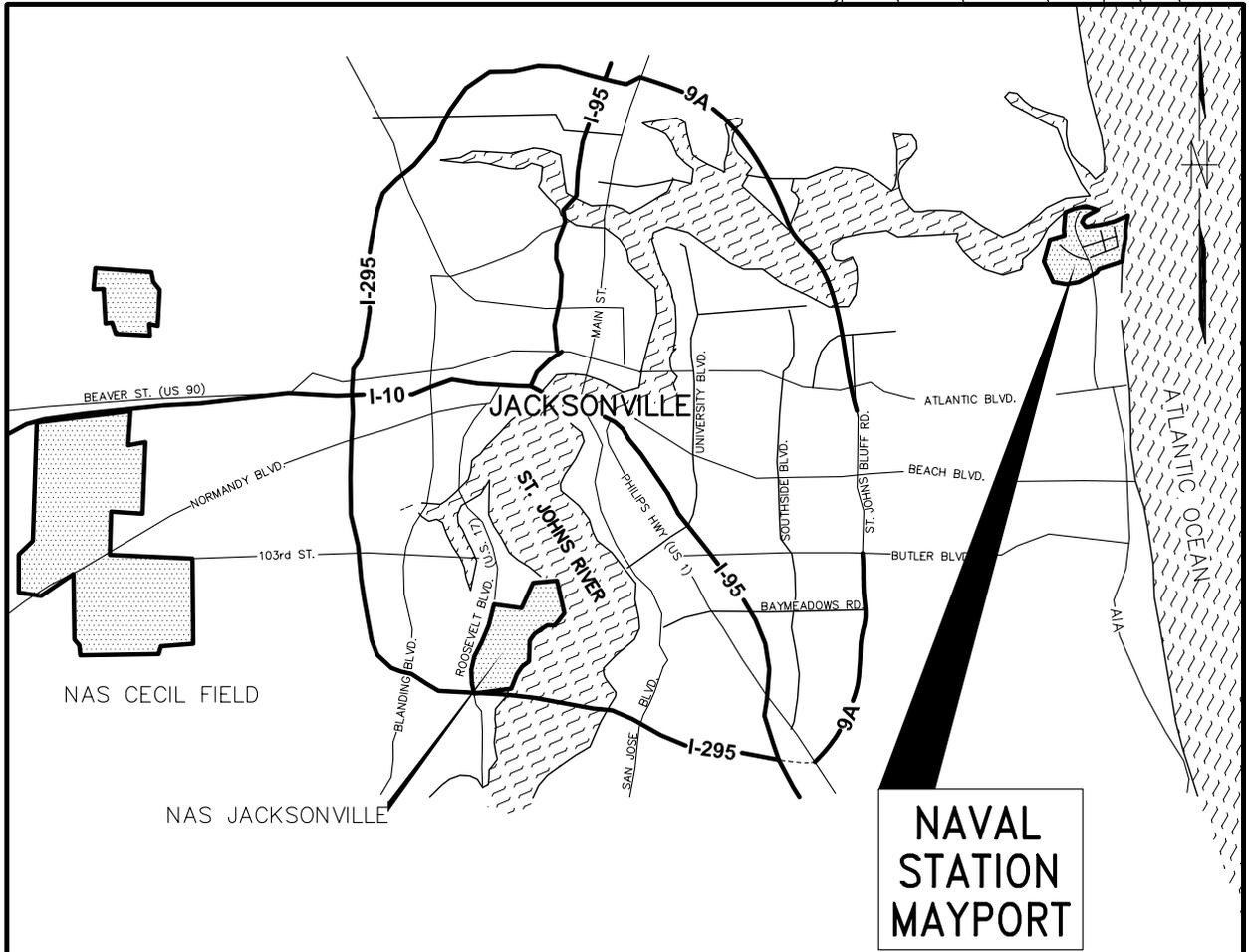
As presented in the photographs, a concrete sidewalk and steps traverse the grass area and connect Building 2 to the parking area. A storm sewer manhole and a telephone manhole are both in the grassy area north of the sidewalk near the fence. The telephone manhole is the previously-referenced entity where free product has been observed in the past. Several permanent monitoring wells, most installed by ABB-ES during the 1992 CA, are present within the grass covered area, Maddox Avenue, the parking lot, and piers. Historically, MW-16 is the only monitoring well in which free product has been observed.

### **1.4 SITE INVESTIGATIVE AND REMEDIAL HISTORY**

#### **1.4.1 Background**

In 1985, product loss was discovered in a DFM pipeline, and a broken valve was detected at the junction of the Alpha/Delta piers. The loss of product was estimated to be between 500 and 1000 gallons. The valve was repaired, and an unknown quantity of product was recovered immediately after completion of repairs and, apparently, for some time afterward. A current employee who remembers the spill stated that a pit was left open at the point of the release for a lengthy period of time, and vacuum trucks were used to remove product and product contact water (PCW) from the excavation.

Because of the initial release in 1985, various efforts such as assessments and remedial actions have been undertaken to remove the impacts of the release. In 1988, an estimated 400 gallons of water and

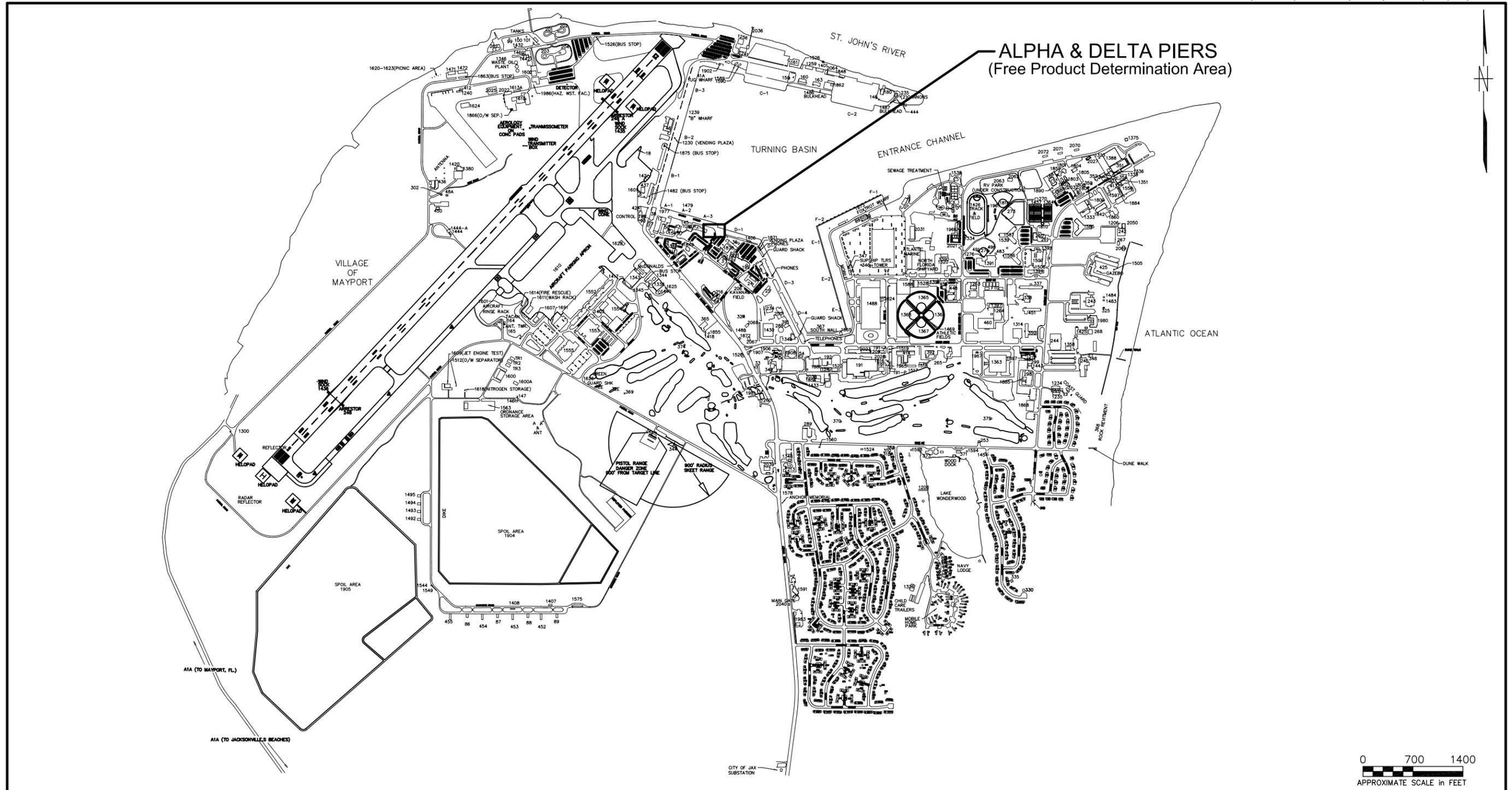


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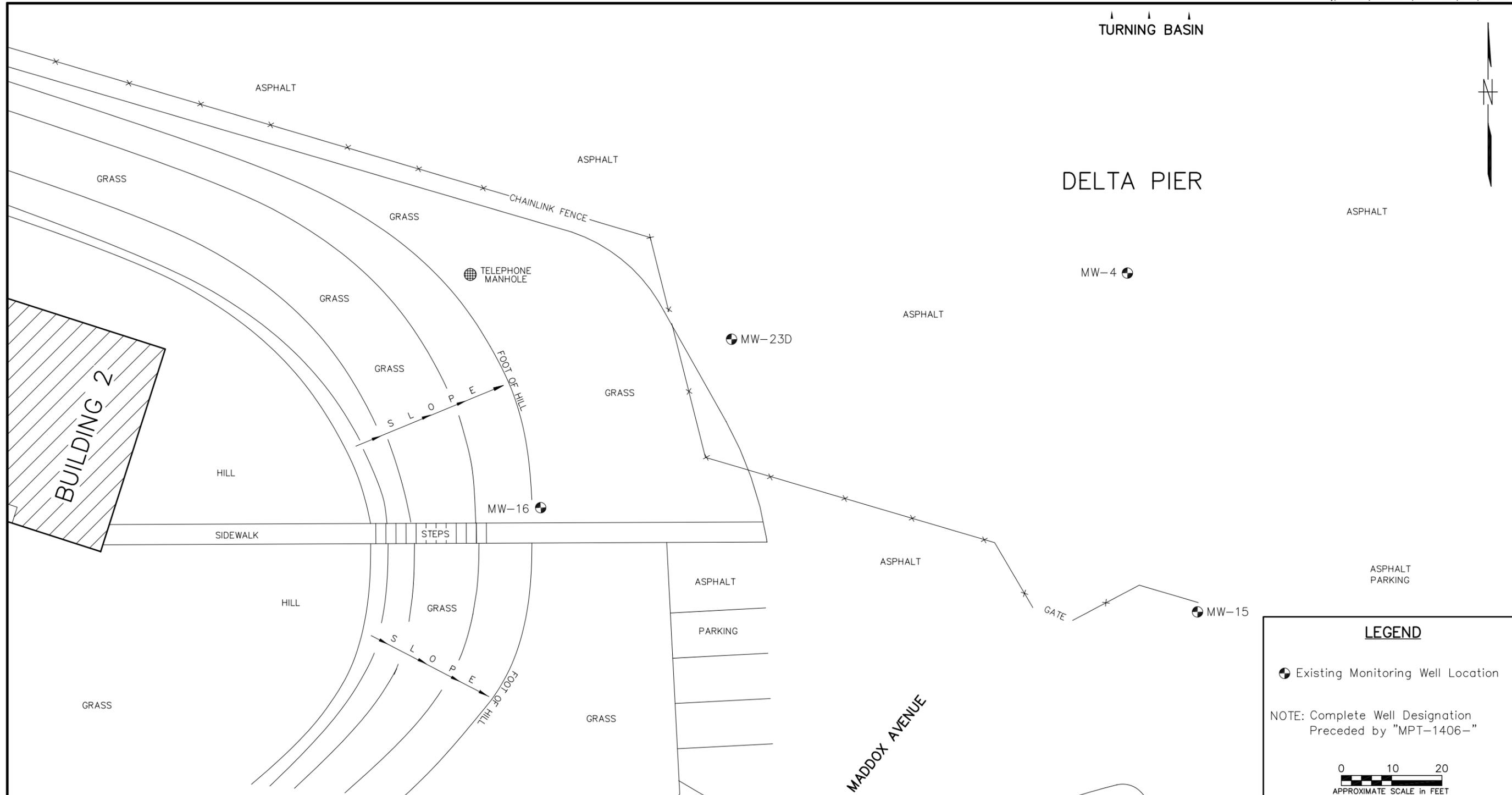


SITE VICINITY MAP  
FREE PRODUCT DETERMINATION REPORT  
ALPHA AND DELTA PIERS  
NAVAL STATION MAYPORT  
MAYPORT, FLORIDA

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TURNING BASIN

DELTA PIER

ASPHALT

BUILDING 2

HILL

SIDEWALK

STEPS

MW-16

MW-23D

MW-4

ASPHALT

GATE

MW-15

ASPHALT PARKING

ASPHALT

PARKING

MADDOX AVENUE

**LEGEND**

⊕ Existing Monitoring Well Location

NOTE: Complete Well Designation Preceded by "MPT-1406-"



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SITE PLAN  
FREE PRODUCT DETERMINATION REPORT  
ALPHA AND DELTA PIERS  
NAVAL STATION MAYPORT  
MAYPORT, FLORIDA

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100 gallons of free product were recovered from a telephone manhole located south of the 1985 pipeline break. In the spring of 1992, during the installation of a new water line southeast of the original spill, the aftermath of the spill was felt again when an undocumented amount of PCW and 234 tons of petroleum impacted soils were required for removal. No organic vapor analyzer (OVA) readings were performed on the removed soil. The soil was removed for disposal following the footprint of the waterline located near the junction of the Alpha/Delta Piers. All soil in this footprint was identified as being contaminated, and any soil encountered was removed for disposal. The excavated area included a portion of the current grass-covered area north of the sidewalk, which is part of the TtNUS investigation.

In September 1989, a DFM pipeline valve was hit during excavation operations at the western end of Alpha Pier releasing approximately 10 gallons of product. A test indicated that the petroleum in the excavated soil was both DFM and oily waste. The DFM pipeline was repaired, abating the source of the release. Four months later, a structural competency test was conducted on the Alpha/Delta Piers oily waste main pipeline. Test results identified a leak in the system at the Delta Pier near its junction with Alpha Pier. Mr. Sam Arp, a supervisor for Johnson Controls, assisted in the tightness test in 1990 and recalls that the leak was in a gravity feed drain that had come loose at a riser near the Alpha/Delta Piers. The leaking drain was repaired, and an unspecified amount of impacted soil was reportedly excavated. The amount of petroleum released due to the loose pipe was reported to be minimal. It has been learned that yearly tightness tests are part of the maintenance plan for the DFM pipeline, and it was reported that the pipeline passed the latest tightness test.

#### **1.4.2 Contamination Assessment**

As a result of these product-loss events, a CA was performed by ABB-ES from June 1992 through September 1992. Results of this investigation are documented in a Contamination Assessment Report (CAR) (ABB-ES, 1992) and in a CAR addendum submitted in March 1993 (ABB-ES, 1993a). The CAR documents an additional area of concern located at the D1-2 oily waste riser near the western end of Delta Pier. The release was identified in the area of the riser, but the riser was listed as out of commission since 1990 and, therefore, soil and groundwater contamination at the Alpha/Delta Piers was attributed to the 1985 DFM pipeline leak and the release from the oily waste riser. A portion of the CAR Addendum that summarizes the work completed is provided as Appendix B.

#### **1.4.3 Remedial Action Plan (RAP) Monitoring and Free Product Recovery, 1996 to 2003**

In December 1993, a RAP was submitted by ABB-ES (ABB-ES, 1993b), and a revised RAP was approved by the Florida Department of Environmental Protection (FDEP) in February 1994. In accordance with the RAP, a monitoring program was implemented that began in June 1996 and ended October 1997 which

included, in part, monitoring of wells MW-16 and MW-06 (on Alpha Pier, north of MW-16 and the 1985 DFM release location) and two manholes for light nonaqueous phase liquid (LNAPL). Free product was identified in monitoring well MW-16 during this monitoring. Two rounds of quarterly groundwater samples (September and December 1996) were collected from select monitoring wells during this period. The executive summary portion of the RAP is provided in Appendix B.

Between May 1998 and September 2000, personnel at the Environmental Division, NAVSTA Mayport, monitored wells MW-06 and MW-16 for LNAPL on a monthly basis and two manholes on a quarterly basis. During this period, approximately 11 gallons of product were recovered, mostly from the telephone manhole near MW-16 (7.7 gallons). Slightly more than one-half gallon of LNAPL was recovered from MW-16 during this period. No product was recovered from MW-06, and it was subsequently dropped from the LNAPL monitoring program.

NAVSTA Mayport removed 1350 gallons of product and PCW from manholes at the Alpha/Delta Piers during two events in 2001 (February and November) and used vacuum extraction to remove LNAPL and PCW from MW-16 on December 4, 2001, and March 29, 2002. The initial product thickness in the well before the first vacuum extraction event was 3.5 ft and before the second event was 0.24 ft. During the two vacuum extraction events, slightly more than 3000 gallons of liquid were reportedly removed from MW-16.

NAVFAC EFD SOUTH contracted the United States Army Corps of Engineers (USACE) to perform free product measurements and groundwater monitoring of six select wells (MW-4, MW-5, MW-6, MW-9, MW-15, and MW-23D) at the Alpha/Delta Piers in July 2000, before the second vacuum extraction event at MW-16. The selected wells were those other than MW-16 considered most likely to be impacted by the historical releases at the Alpha/Delta Piers. Free product was not detected in any of the six wells, and only two of the wells (MW-4 and MW-23D) had constituents reported at concentrations exceeding FDEP groundwater cleanup target levels (GCTLs). On the day of sampling, 1.16 ft of free product was present in MW-16. A copy of the USACE Groundwater Monitoring Report is provided as Appendix B (USACE, 2001).

From the second vacuum extraction event (March 29, 2002) through August 2003, product levels were monitored, and LNAPL and PCW were bailed monthly from MW-16 by a NAVSTA Mayport representative. The cumulative volume of liquid removed during this period was approximately 21 to 22 gallons. Initial product thicknesses in MW-16 during this period ranged from 0 (June 10, 2002) to 2 ft, 5 inches (December 12, 2002). The practice of free product removal was temporarily halted during the FPD investigation performed by TtNUS. Product thicknesses recorded by the NAVSTA Mayport Environmental Department between April 2002 and August 2003 are provided in Appendix B.

## **1.5 PURPOSE OF CURRENT INVESTIGATION**

The purpose of this FPD was to determine if any objects, such as storage tanks or piping, remain in the ground that may be a continuing source of a release or that may be acting as a conduit for product migration and to obtain some understanding of the origin, constitution, magnitude, and preferred migration pathway(s) of previously-released product. It has been assumed that the source of the free product encountered in the manholes and MW-16 was the 1985 break in the DFM pipeline valve; however, it has not been confirmed. Given that free product is still present almost 20 years later justifies an inquiry to confirm or deny the presence of a continuing release, possibly from a heretofore unknown source.

## **2.0 ASSESSMENT METHODOLOGY**

### **2.1 QUALITY ASSURANCE**

The site investigation was conducted in general accordance with the FDEP Standard Operating Procedure (SOP) SOP 00/001 (FDEP, 2000). Soil screening procedures were adhered to, but no groundwater or soil samples were collected for laboratory analysis as determined by the NAVSTA Mayport Partnering Team in a November 2003 meeting. The rationale for this decision was based on the known facts that groundwater in the immediate area of monitoring well MW-16 is contaminated, and that groundwater analytical data presented by the USACE has effectively defined the lateral and vertical extent of groundwater contamination in the area.

### **2.2 ASSESSMENT OBJECTIVE AND STRATEGY**

The assessment objective was to determine lateral extent, migration pattern(s), and source of the free product. Initially, the Alpha/Delta Piers were scanned using ground penetrating radar (GPR) and electromagnetic detection (EMD) to locate shallow subsurface structures, if present. These geophysical methods were to be used in conjunction with an innovative technology using sound waves as an unobtrusive means to determine the presence of free product. This technology was subsequently deemed unusable due to the nature of site operations and conditions. As an alternative to the sound wave technology, multiple soil samples were collected and screened for organic vapors using an OVA equipped with a flame ionization detector (FID), and 12 temporary piezometers were installed to determine the extent of the free product. Tidal influences were measured at monitoring well MW-16 and the 12 piezometers to determine what effect, if any, tidal fluctuations have on free product levels. To determine product type, a sample of free product was collected from MW-16 for fingerprint analysis, and samples of known petroleum product from potential sources were fingerprinted for comparison.

### **2.3 SUBSURFACE INVESTIGATION METHODS**

#### **2.3.1 Ground Penetrating Radar and Electromagnetic Scanning**

Between August 31 and September 4, 2002, representatives of TiNUS conducted a geophysical survey to screen for shallow subsurface structures such as utilities or underground storage tanks at the Alpha/Delta Piers. The purpose of the screening was to find potential source(s) of free product or conduit(s) facilitating the transportation of free product. The area screened included an area extending approximately 200 ft south of Building 2 including the grassy area, parts of Maddox Avenue, the asphalt parking lot. The area of investigation also included a portion of the Alpha/Delta Piers north and east of Building 2. GPR and EMD

instrumentation were used to screen for subsurface objects. Once objects were located, their locations were marked on land surface, and the positions of the objects were recorded using a Trimble XRS Pro global positioning system unit.

### **2.3.2 Soil Borings**

Between September 19 and September 25, 2003, 12 soil borings were completed by a TtNUS representative using a stainless steel hand auger assembly. Borings were placed strategically around MW-16 in a flat part of the grassy area approximately 75 ft east of Building 2 as shown on Figure 2-1. Soil borings ranged in depth from approximately 9 ft below land surface (bls) (SB1 thru SB10 and SB-12) to 12 ft bls (SB-11).

Soil samples were collected at the 12 soil boring locations from the vadose zone at 2-ft vertical intervals beginning at 1 ft bls. The samples were collected using a stainless steel hand auger that was cleaned prior to collection of each sample according to FDEP SOPs described in document SOP 01/001 (FDEP, 2001). Samples were screened for organic vapors using an OVA-FID instrument following methods described in Chapter 62-770.200(2), FAC. The water table was encountered at an average depth of 3.5 ft bls across the site. At one boring location (SB-11), samples were screened for organic vapors into the saturated zone to a depth of 9 ft bls. Samples were also visually inspected for evidence of petroleum contamination.

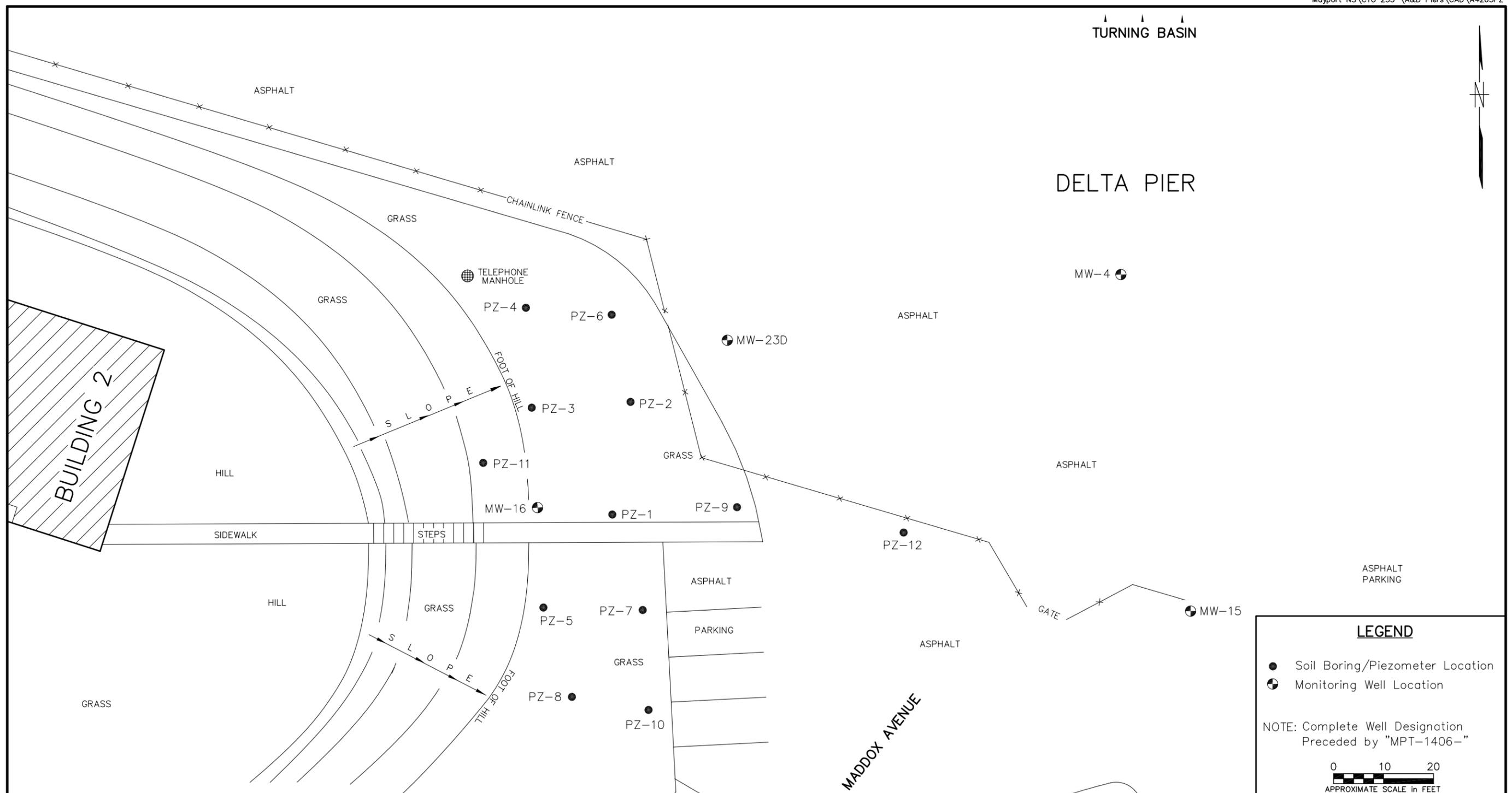
### **2.3.3 Piezometer Installation**

After collection of soil samples for OVA-FID analysis, each of the 12 soil borings was advanced below the water table to an approximate depth of 10 to 12 ft bls and converted to a temporary piezometer. An appropriate length of 1.5-inch diameter, Schedule 40 polyvinyl chloride .010-inch millimeter-slotted well screen was inserted into each borehole, and the annular space was backfilled with native sediment (i.e., fine sand). Slip caps were placed on the piezometers to prevent infiltration of rain water.

A construction diagram of a typical piezometer is provided as Appendix C. Piezometer locations are shown in Figure 2-1.

### **2.3.4 Product Thickness and Depth to Groundwater Measurements**

On multiple occasions between October 3 and November 7, 2003, a TtNUS representative recorded product thickness and depth-to-water measurements at MW-16 and the piezometers using an oil/water interface probe. The piezometers were installed several at a time as the investigation expanded so that the number of gauging points gradually increased during this observation period. Product thickness was calculated by subtracting the depth-to-product from depth-to-water where present. Measurements were



**LEGEND**

- Soil Boring/Piezometer Location
- ⊕ Monitoring Well Location

NOTE: Complete Well Designation Preceded by "MPT-1406-"

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APPROXIMATE SCALE in FEET

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SOIL BORING AND PIEZOMETER LOCATIONS  
 FREE PRODUCT DETERMINATION REPORT  
 ALPHA AND DELTA PIERS  
 NAVAL STATION MAYPORT  
 MAYPORT, FLORIDA

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taken within 2 hours of high or low tide to determine the effect, if any, of tidal fluctuations on product thickness.

Product thickness data recorded by the NAVSTA Mayport Facilities Environmental Department between October 2002 and August 2003 (see Appendix B) were used to supplement the TtNUS data for this report. Historical tidal charts were used to ensure that measurements were taken within 2 hours of the high or low tides. If the reading was not taken within this 2-hour window, the data was not used.

### **2.3.5 Petroleum Fingerprinting**

On December 10, 2002, a TtNUS employee collected a free product sample from monitoring well MW-16 using a disposable Teflon<sup>®</sup> bailer. Product samples were also collected from the oily waste dispenser line located in Building 5450 maintained by Public Works Center and from an active DFM line at the Fleet Industrial Supply Center (FISC). These samples were shipped via overnight delivery to Battelle Laboratory in Duxbury, Massachusetts for fingerprint analysis and comparison interpretation. A copy of the petroleum fingerprint report is presented as Appendix D. The criteria for comparison of samples included type(s) and degree(s) of weathering of petroleum product(s) and a list of constituents that comprise the petroleum samples. The chemical analysis performed on the three samples to achieve this objective included the following:

- 1) Whole oil chromatographic fingerprinting using qualitative gas chromatography (GC) equipped with a full scan mass spectrometer (MS) and FID.
- 2) Quantitative volatile organic compound (VOC) analysis of gasoline related VOC via full scan purge-and-trap GC/MS using modified United States Environmental Protection Agency (USEPA) Method 8260.
- 3) Quantitative alkyl lead analysis of organic lead species historically used in leaded gasoline via GC/MS using selected ion monitoring (SIM) according to modified USEPA Method 8270.
- 4) Quantitative semi-volatile organic compound analysis of decalins, benzothiophenes, and non-alkylated and alkylated polycyclic aromatic hydrocarbons using SIM in accordance with USEPA Method 8270.

Results of the fingerprinting analysis are provided in Section 3.4.

## **3.0 RESULTS OF INVESTIGATION**

### **3.1 GROUND PENETRATING RADAR AND ELECROMAGNETIC SCANNING RESULTS AND UTILITY LOCATIONS**

Underground structures located during the GPR and EMD surveys are depicted on Figure 31. This technology is not capable of identifying construction material, size, or purpose of underground objects. Linear objects of unknown origin and varying lengths were identified. Several disconnected linear and oval structures, whose original purpose is unknown, were identified in the grassy area south of Building 2. None of the unknown subsurface structures identified appeared to be associated with the current petroleum distribution system. Temporary well TW-10 was installed in an oval identified at the base of the hill south of the sidewalk. No structures were identified in the oval that would indicate the presence of an underground storage tank.

Based on the findings of the GPR and EM survey, there are numerous abandoned lines within pier area. To determine the active utility lines, a map from the NAVSTA Mayport Facilities Department was obtained. A portion of the base-wide utility map has been provided as Figure 3-2. Utilities that bisect the area of free product include a water line, underground electric, oily waste line, storm sewer, and sanitary sewer. The telephone line was not part of the base map, but has been added to the base-wide utility map.

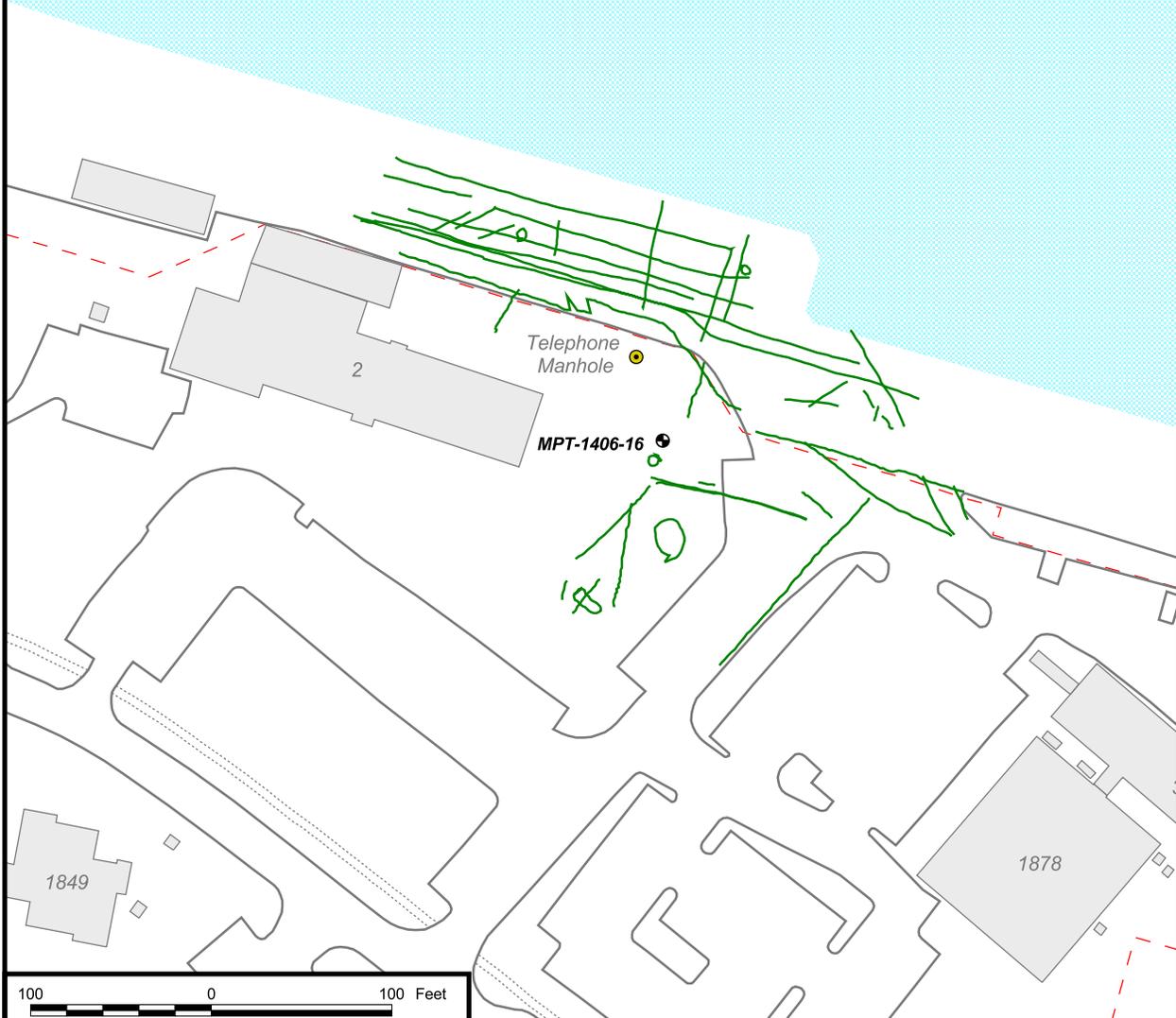
Based on the utility maps, two potential sources of petroleum are located in the area. The first is the oily waste line that runs parallel to the turning basin with spurs that extend from the main line to ship access points located along the pier. This line is located near the center of the pier. The second potential source is the DFM line, which also parallels the turning basis and runs along the fence that outlines the pier. Fingers or spurs extend from the main line to access points located in small enclosures along the pier.

### **3.2 SHALLOW SUBSURFACE LITHOLOGY**

Sediments encountered during piezometer installation consisted of fine to medium grained, very pale brown to brown sands with some shell hash. Thin lenses of olive green clay, 1 inch or less in thickness, were encountered from 4.5 ft to 5.0 ft bls in soil borings SB-7, SB-8, and SB-9. In all borings except SB-7, SB-8, and SB-10, a strong petroleum odor associated with gray staining was observed. Staining and odor was commonly observed from 3.5 ft bls (base of backfill) to total depth (12 ft bls). A petroleum sheen was present on the sand particles beginning at approximately 1 ft below the first occurrence of staining. A photograph showing the different soils from land surface to 7 ft bls is provided in Appendix A.

**LEGEND**

-  Monitoring Well
-  Located Subsurface Structure
-  Building/Structure
-  Paved Surface
-  Sidewalk
-  Fence
-  Surface Water



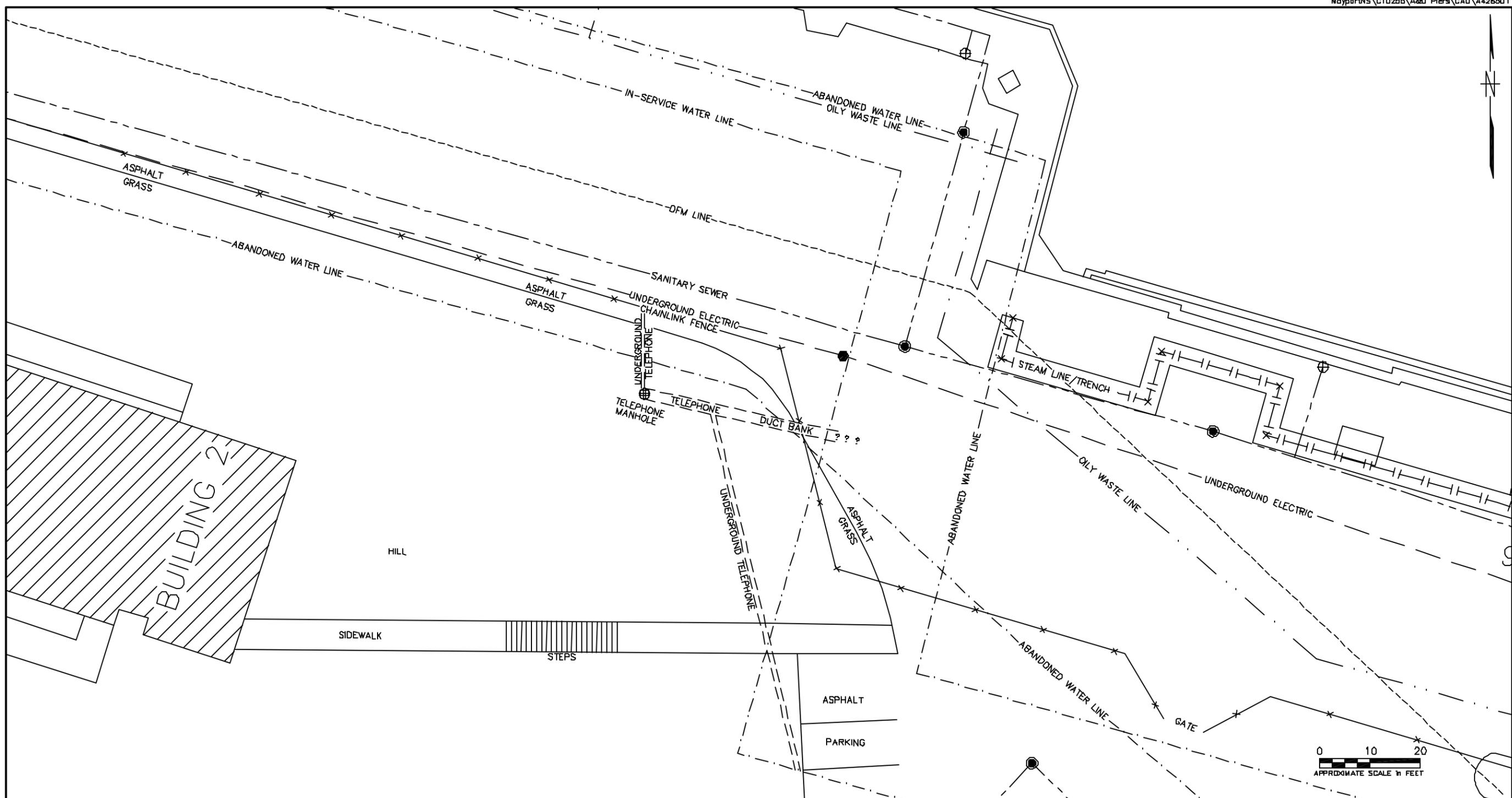
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CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	



GPR AND EMD SURVEY RESULTS  
 ALPHA AND DELTA PIERS  
 NAVAL STATION MAYPORT  
 MAYPORT, FLORIDA

CONTRACT NUMBER 4265	
APPROVED BY	DATE
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APPROVED BY	DATE
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DRAWING NO. FIGURE 3-1	REV 0

P:\GIS\MAYPORT\_NSI\APR\ALPHA\_DELTA\_PIERS.APR EM AND GPR SURVEY RESULTS 6/21/04 JAL



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES	DRAWN BY	DATE		UTILITY LOCATIONS FREE PRODUCT DETERMINATION REPORT ALPHA AND DELTA PIERS NAVAL STATION MAYPORT MAYPORT, FLORIDA		CONTRACT NO.	4265
							LLK	3/29/04		CHECKED BY	DATE	APPROVED BY	DATE
										COST/SCHED- AREA		APPROVED BY	DATE
										SCALE		DRAWING NO.	REV.
										AS NOTED		FIGURE 3-2	0

### **3.3 SOIL SCREENING RESULTS**

A total of 27 samples were screened for organic vapors using the OVA-FID. Results are listed on Table 3-1 and depicted on Figure 33. The only samples collected in the vadose zone producing an instrument response above background were those collected from boring SB-12 at 1 ft bls [798 parts per million (ppm)] and 3 ft bls (1597 ppm). Soils are considered “excessively contaminated” by the FDEP if they produce an instrument response greater than 50 ppm. Two samples collected at SB-11 within the capillary region did record elevated vapor readings of 200 ppm at 7 ft bls and 1740 ppm at 9 ft bls. These readings should not be considered as part of the soil vapor measurements used to determine soil impacts because the impacts to these samples were caused by the groundwater.

Soil boring SB-12 is located near the gated entrance to the pier at the end of Maddox Avenue within a rectangular patch of newer asphalt. The soil underlying the asphalt at this location has been disturbed, inferring an excavation in the area. The stained sands were encountered just below the asphalt and continued to 12 ft bls at this location. Based on the utility location map provided by the base, an abandoned water line is located near the boring.

### **3.4 FREE PRODUCT THICKNESS MEASUREMENTS AND FINGERPRINT ANALYSIS**

#### **3.4.1 Free Product Thickness Measurements**

Product thickness measurements used for this FPD were recorded by TtNUS and a NAVSTA Mayport Environmental Department member and are listed in Table 3-2. Free product measurements taken within two hours of high or low tide were graphed. TtNUS collected product thickness measurements during September 19, 2003, through October 14, 2003. During this time, the 12 piezometers and monitoring well MW-16 were gauged for free product. Supplementary data from October 2002 to September 2003 were provided by the NAVSTA Mayport Environmental Department’s monthly monitoring of MW-16.

Figures 3-4 and 3-5 are bar graphs depicting high tide and low tide charted piezometer product thickness measurements for data obtained between September 19 and October 14, 2003. It is evident from a review of both sets of data that free product thickness at the gauging points is apt to be greater in volume and more widespread during low tide periods compared to high tide periods. Although free product is sometimes present in the piezometers during the high tide measurements, the volume of free product during high tide had diminished from the time of low tide. This increased presence of free product is further evident in that the greatest thickness of free product was measured in PZ-06 at 0.8 ft. During this period of time, 9 out of the 12 piezometers had recordable amounts of free product. Piezometers PZ-08, PZ-10, and PZ-12 did not have recorded thickness levels of free product.

**Table 3-1  
Soil Vapor Results**

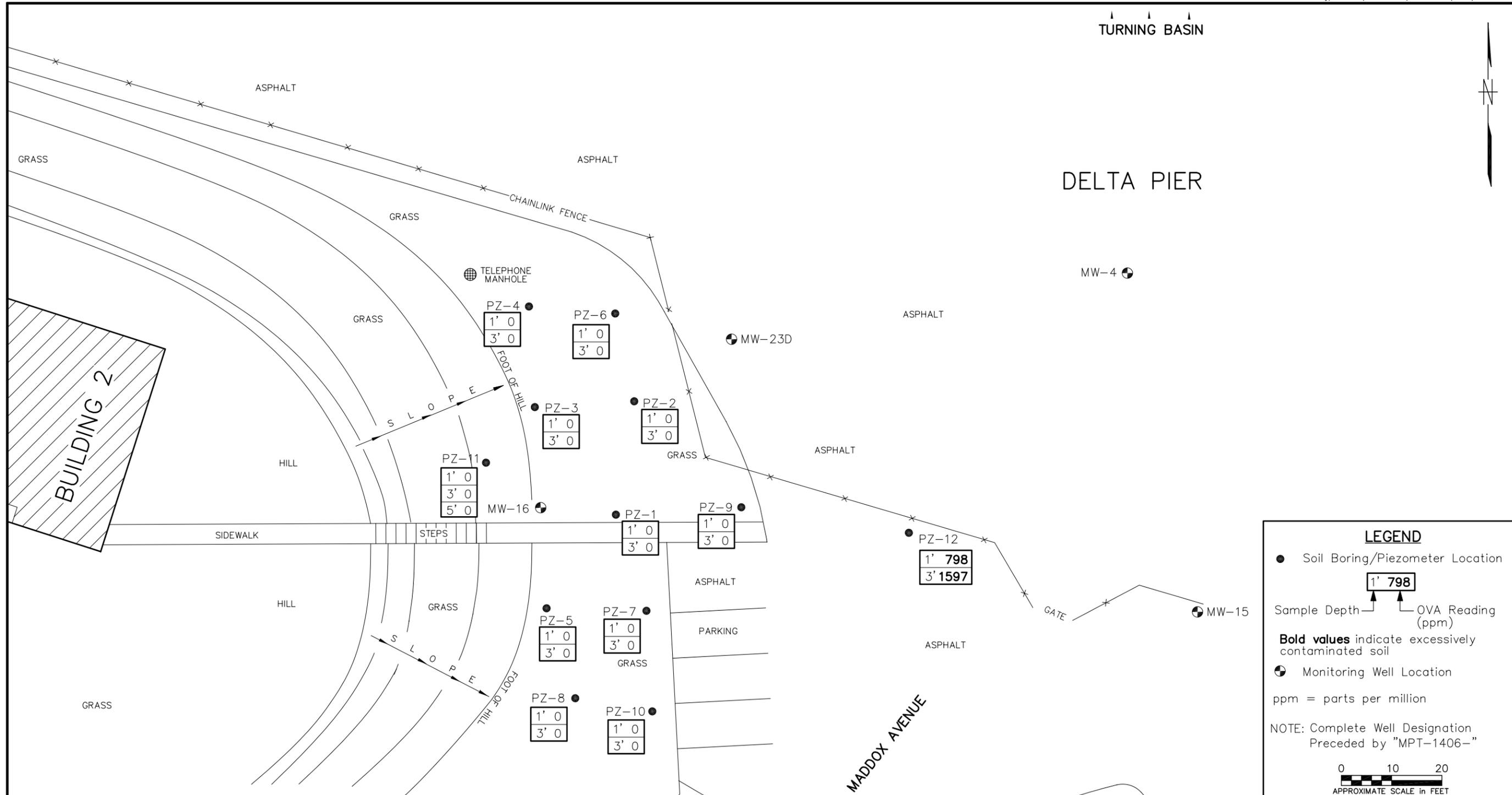
Free Product Determination Report  
Alpha/Delta Piers  
Naval Station Mayport  
Mayport, Florida

Soil Boring Number	Date of Measurement	Sample Depth (ft bls)	Headspace Readings (ppm)		
			Total Organic Reading	Carbon Filtered Reading	Net Reading
SB-01	9/18/2003	1	0	0	0
		3	0	0	0
SB-02	9/18/2003	1	0	0	0
		3	0	0	0
SB-03	9/19/2003	1	0	0	0
		3	0	0	0
SB-04	9/19/2003	1	0	0	0
		3	0	0	0
SB-05	9/19/2003	1	0	0	0
		3	0	0	0
SB-06	9/19/2003	1	0	0	0
		3	0	0	0
SB-07	9/22/2003	1	0	0	0
		3	0	0	0
SB-08	9/22/2003	1	0	0	0
		3	0	0	0
SB-09	9/22/2003	1	0	0	0
		3	0	0	0
SB-10	9/22/2003	1	0	0	0
		3	0	0	0
SB-11	9/25/2003	1	0	0	0
		3	0	0	0
		5	0	0	0
		7*	240	40	200
		9*	1740	400	1340
SB-12	9/25/2003	1	840	42	<b>798</b>
		3	1622	25	<b>1597</b>

**Notes:**

**Bold** = excessively contaminated soil per Chapter 63-770, FAC

\* = sample collected within or below the capillary region influenced by the groundwater



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY: LLK  
 DATE: 4/27/04  
 CHECKED BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 COST/SCHED-AREA: \_\_\_\_\_  
 SCALE: AS NOTED



ORGANIC VAPOR HEADSPACE MEASUREMENTS  
 FREE PRODUCT DETERMINATION REPORT  
 ALPHA AND DELTA PIERS  
 NAVAL STATION MAYPORT  
 MAYPORT, FLORIDA

CONTRACT NO.	4265
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DRAWING NO.	REV.
FIGURE 3-3	0

**Table 3-2  
Product Thickness Measurements versus Tides**

Free Product Determination Report  
Alpha/Delta Piers  
Naval Station Mayport  
Mayport, Florida

LOW TIDE							
Location	Date						
	10/7/2002	12/2/2002	4/2/2003	9/24/2004	9/29/2003	9/30/2003	10/3/2003
PZ-01	0	0	0	0.02	0.03	0.03	0
PZ-02	0	0	0	0.2	0.04	0.02	0
PZ-03	0	0	0	0.49	0.08	0.08	0
PZ-04	0	0	0	0	0	0.02	0
PZ-05	0	0	0	0.33	0.03	0.02	0
PZ-06	0	0	0	0.64	0.45	0.01	0.8
PZ-07	0	0	0	0.03	0	0	0
PZ-08	0	0	0	0	0	0	0
PZ-09	0	0	0	0.05	0	0	0
PZ-10	0	0	0	0	0	0	0
PZ-11	0	0	0	NM	0	0.01	0
PZ-12	0	0	0	NM	0	0	0
MW-16	1.25	2.42	1.01	0.49	0.12	0.27	0.29
HIGH TIDE							
Location	Date						
	11/7/2002	8/4/2003	9/23/2003	9/26/2003	9/29/2003	9/30/2003	10/3/2003
PZ-01	0	0	0	0	NM	0	0
PZ-02	0	0	0	0.08	NM	0	0
PZ-03	0	0	0.51	0	NM	0	0
PZ-04	0	0	0	0	NM	0	0
PZ-05	0	0	0.33	0	NM	0	0
PZ-06	0	0	0.57	0	NM	0	0
PZ-07	0	0	0.01	0	NM	0	0
PZ-08	0	0	0	0	NM	0	0
PZ-09	0	0	0	0	NM	0	0
PZ-10	0	0	0	0	NM	0	0
PZ-11	0	0	0	0	NM	0	0
PZ-12	0	0	0	0	NM	0	0
MW-16	0.42	0.02	0.41	0.01	NM	0.01	0.05
<b>Notes:</b> NM = not measured							

### Free Product Measurements (High Tide)

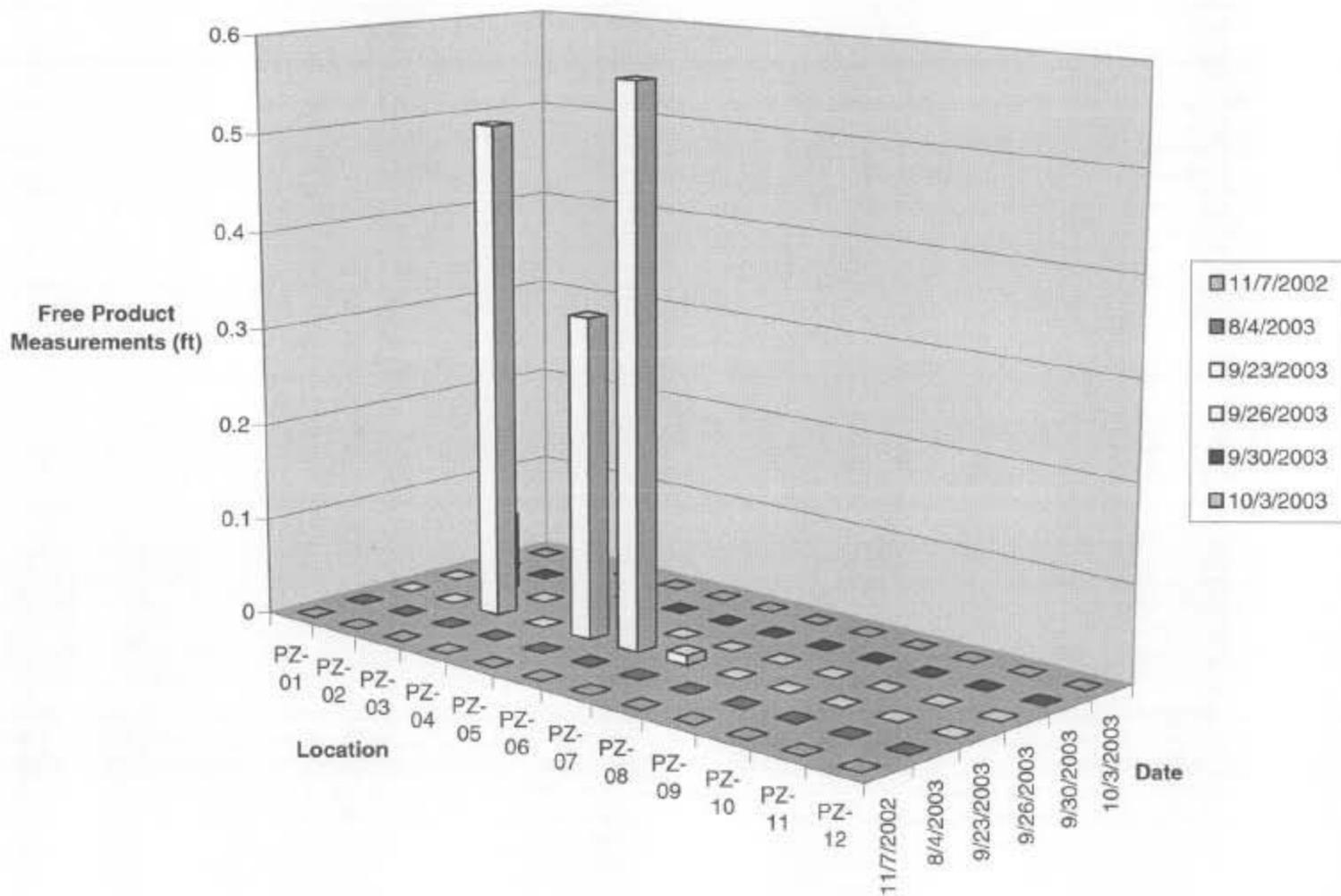


FIGURE 3-4

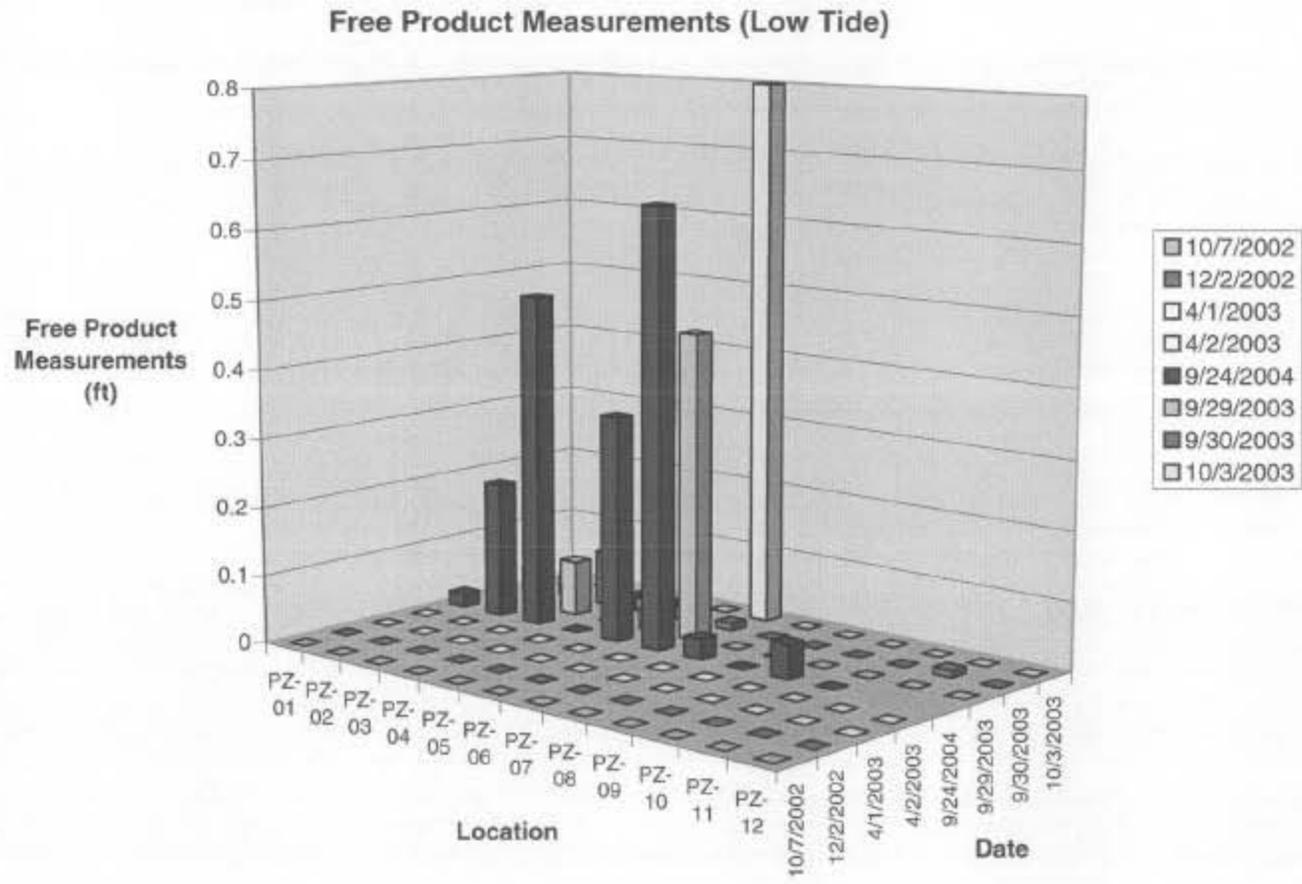


FIGURE 3-5

Figure 3-6 contains two bar graphs that contrast the free product measurements taken at high and low tides between October 2002 and October 2003. Based on gauging of free product for a full year, the overall three thickest product readings were gauged at MW-16 at 2.42 ft, 1.25 ft, and 1.01 ft in December 2002, October 2002, and April 2003, respectively. All three measurements were taken during low tide. It is clearly evident when looking at Figure 3-6 that there is more free product in monitoring well MW-16 during low tide than at high tide.

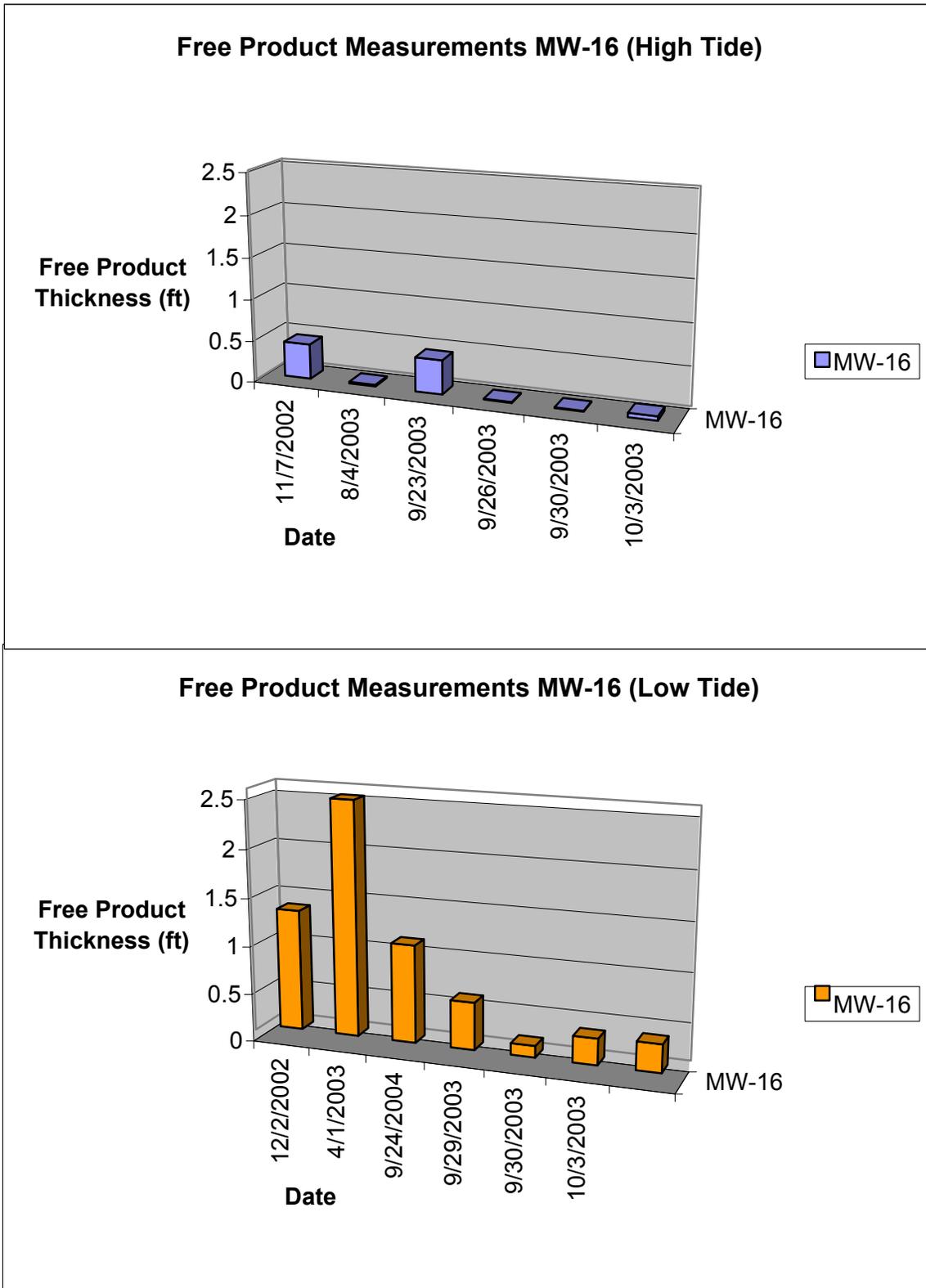
To further strengthen the observation that more product is present during low tide, same day high tide and low tide product thickness measurements for well MW-16 were recorded on September 30 and October 3, 2003. These measurements were taken in an attempt to show the contrast of thickness within a daily tidal cycle. On September 30 and October 3, 2003, the high tide measurements were 0.01 ft and 0.05 ft, respectively, and the low tide measurements were 0.27 ft and 0.29 ft, respectively. Although the data sets are limited in number of replications, they support the findings of increased product thickness occurrences during low tide. Figure 36 presents two graphs that demonstrate this contrast of product thicknesses within monitoring well MW-16 during the same of day high and low tide measurements. Based the findings of this investigation, increased product thickness levels occur during low tide in the area surrounding monitoring well MW-16.

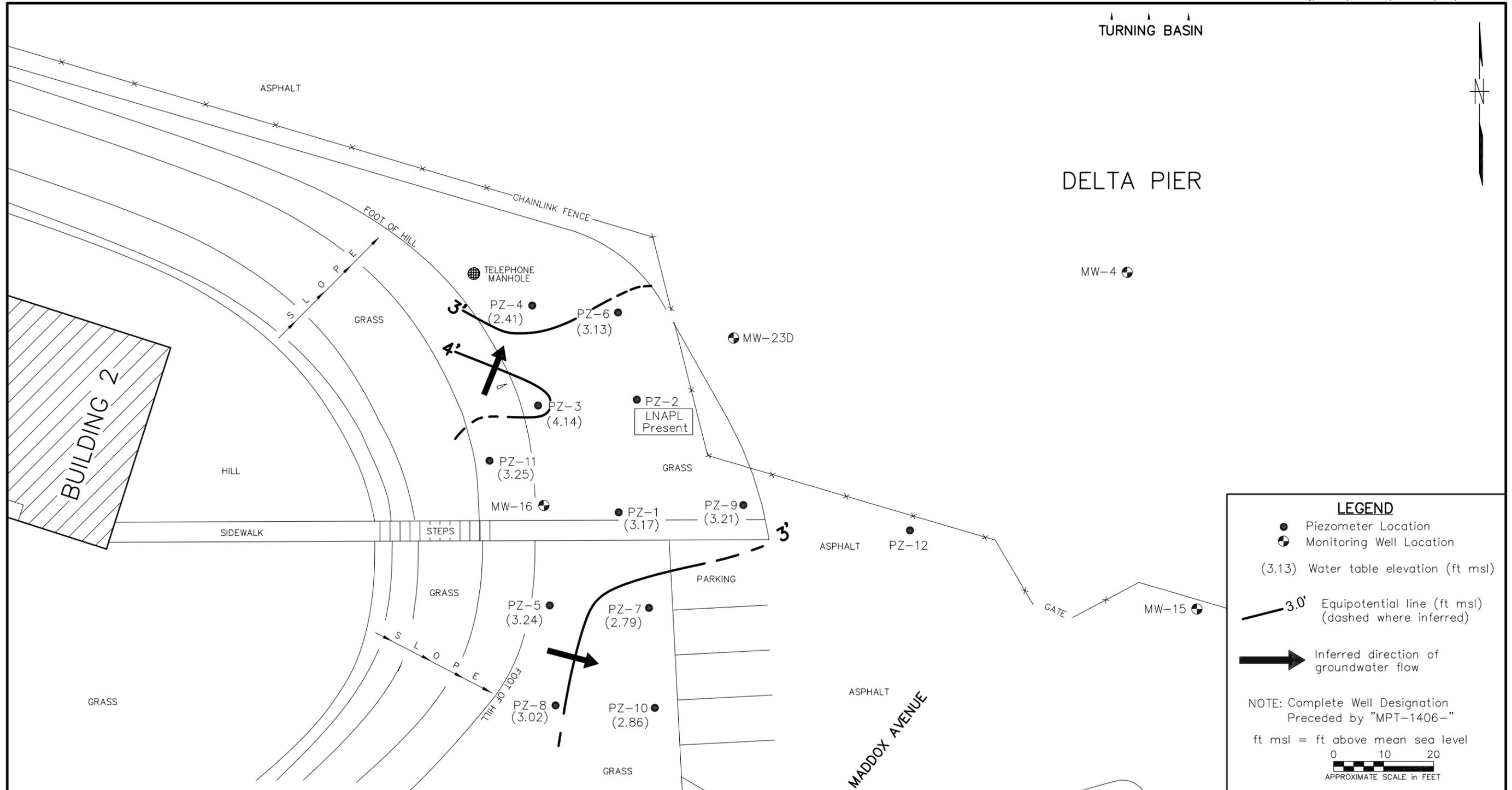
#### **3.4.2 Groundwater Flow Direction**

Depth to water was measured from the top-of-casing (TOC) of the piezometers on several occasions during the observation period. The TOC elevations of the piezometers were surveyed relative to a known United States Geological Survey benchmark by Island Surveying and Mapping Company on October 22, 2003. TtNUS determined groundwater elevation at the piezometer locations by subtracting the depth-to-water measurements from the surveyed TOC elevations.

A review of historical groundwater contour figures for the entire Alpha/Delta Pier area from the 1992 CAR (ABB-ES, 1992) depict the groundwater flowing radially from Building 2 (which sets upon a hill) toward the turning basin. Based on TtNUS' groundwater elevation measurements, the groundwater flow in the area of well MW-16 is in a northeasterly direction towards the turning basin. Groundwater elevation contour maps (potentiometric maps) were generated from depth-to-water measurements obtained on September 26 and October 3, 2003, and are provided as Figures 3-7 and 3-8, respectively. Table 3-3 provides a listing of groundwater elevations.

FIGURE 3-6





**LEGEND**

- Piezometer Location
- ⊕ Monitoring Well Location
- (3.13) Water table elevation (ft msl)
- 3.0' Equipotential line (ft msl) (dashed where inferred)
- ➔ Inferred direction of groundwater flow

NOTE: Complete Well Designation Preceded by "MPT-1406-"  
ft msl = ft above mean sea level

0 10 20  
APPROXIMATE SCALE in FEET

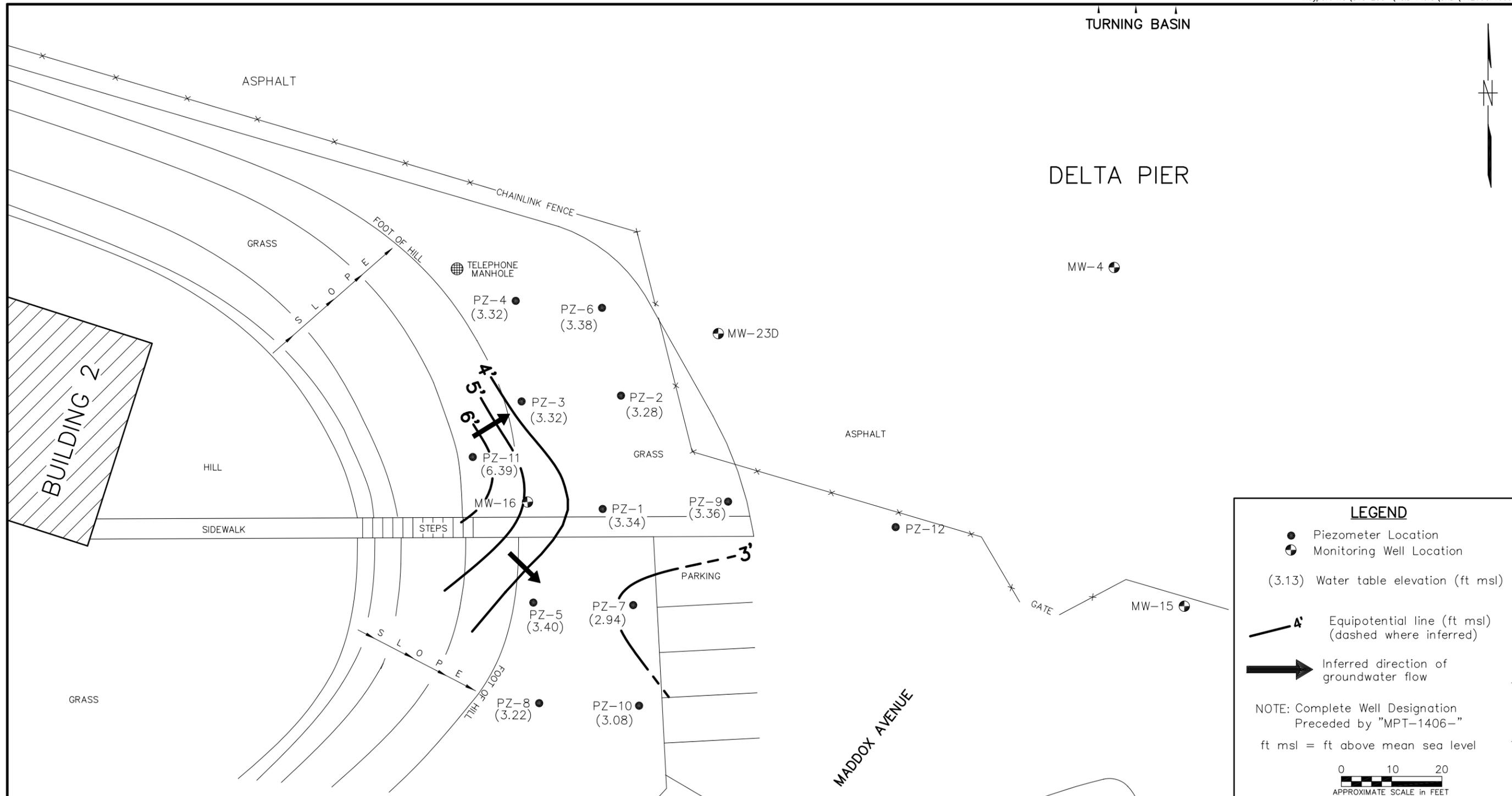
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY LLK DATE 3/24/04  
 CHECKED BY DATE  
 COST/SCHED-AREA  
 SCALE AS NOTED



GROUNDWATER ELEVATION CONTOUR MAP  
 SEPTEMBER 26, 2003  
 FREE PRODUCT DETERMINATION REPORT  
 ALPHA-DELTA PIER  
 NAVAL STATION MAYPORT  
 MAYPORT, FLORIDA

CONTRACT NO. 4265	REV. 0
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DRAWING NO. FIGURE 3-7	



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY LLK 3/24/04  
 CHECKED BY DATE  
 COST/SCHED-AREA  
 SCALE AS NOTED



GROUNDWATER ELEVATION CONTOUR MAP  
 OCTOBER 3, 2003  
 FREE PRODUCT DETERMINATION REPORT  
 ALPHA AND DELTA PIERS  
 NAVAL STATION MAYPORT  
 MAYPORT, FLORIDA

CONTRACT NO.	4265
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	FIGURE 3-8
REV.	0

**Table 3-3**  
**Groundwater Elevation Measurements**

Free Product Determination Report  
Alpha and Delta Piers  
Naval Station Mayport  
Mayport, Florida

Monitoring Well ID	Screened Interval/ Depth (ft bls)	Surveyed TOC Elevation (ft)	Depth to Water Measurement Below TOC (10/3/03) (ft)	MSL Water Table Elevation (ft)	Depth to Water Measurement Below TOC (9/26/03) (ft)	MSL Water Table Elevation (ft)
PZ-1	~ 9' to land surface	9.08	5.74	3.34	5.91	3.17
PZ-2	~ 9' to land surface	9.06	5.78	3.28	product	product
PZ-3	~ 9' to land surface	10.26	6.94	3.32	7.20	3.06
PZ-4	~ 9' to land surface	9.01	5.69	3.32	5.96	3.05
PZ-5	~ 9' to land surface	9.66	6.26	3.40	6.42	3.24
PZ-6	~ 9' to land surface	9.75	6.37	3.38	6.62	3.13
PZ-7	~ 9' to land surface	7.99	5.05	2.94	5.20	2.79
PZ-8	~ 9' to land surface	9.99	6.77	3.22	6.97	3.02
PZ-9	~ 9' to land surface	8.17	4.81	3.36	4.96	3.21
PZ-10	~ 9' to land surface	10.13	7.05	3.08	7.27	2.86
PZ-11	~ 9' to land surface	11.84	5.45	6.39	8.64	3.20
PZ-12	~ 11' to land surface	6.67	not measured	not measured	not measured	not measured
MW-16	*	8.69	product	product	product	product

**Notes:**  
Groundwater measurements were taken 10/03/03 and 9/26/03.  
Piezometers were installed and measured on August 1, 2002.  
\* = Monitoring well MW-16 is an existing well.

### 3.4.3 Fingerprint Analysis

Provided in Appendix D is a complete laboratory report by Battelle Laboratories summarizing fingerprint analysis on the three product samples. Samples are referenced as follows:

Battelle Report / This document

1. MPT MW-1406 = MPT 1406-MW-16 or MW-16
2. MPT-FISC = DFM
3. MPT-Used Oil = Oily waste line

The three samples were different in either odor or color and source. The DFM sample was a golden amber color and had the typical diesel odor. This fuel is similar to that used to fuel a diesel engine. The oily waste dispenser line sample was black in color and had a diesel and solvent-like odor. The oil waste dispenser line is a gravity fed line that services the ships docked at the pier providing a disposal conduit to an oil and water separator. The sample from MW-16 was also dark in color and had a diesel odor. The sample collected from the well was typical of what has been present throughout this investigation. Photographs of the three samples are provided in Appendix A.

A determination of the molecular makeup of each sample was achieved by performing the four analyses described in Section 23.5. Based on the findings of the fingerprint analysis, the three submitted samples are independent of each other. The following is a description of each.

#### 1. Product from Monitoring Well MW-16

The product collected from monitoring well MW-16 exclusively consists of moderately weathered, middle distillate fuel (diesel fuel #2 or fuel oil #2). The absence of the n-alkanes separates this sample from the other samples and indicates that the fuel has experienced moderate weathering due to biodegradation. Some degree of evaporation or "water-washing" is present, although this is not significant. Battelle scientist Yakov Galperin stated that this level of degradation is indicative of a product approximately 20 years old or a spill that would have occurred around 1984.

#### 2. Marine Diesel collected from FISC

The sample of marine diesel collected from FISC exclusively consists of an unweathered, middle distillate fuel (diesel #2 or fuel oil #2).

#### 3. Oily Waste Line

The sample collected from the oily waste line consists of unweathered, middle distillate fuel (diesel #2 or fuel oil #2). The telltale characteristic of this sample is the presence of heavier petroleum product

(e.g., lubrication oil or waste oil), which constitutes a very small percentage of the mass compared to the middle distillate component. These trace quantities of heavier petroleum product are indicative of the waste disposed via the oily waste line.

Based on the fingerprint analysis, it appears that the source for the free product found at Alpha/Delta Pier is historical in nature and is not reflective of a recent release. Battelle's findings corroborates the likely source to have been the historical release that occurred during 1985.

## 4.0 SUMMARY AND CONCLUSIONS

Based on the findings, the following are the summary and conclusions of this investigation:

GRP and EM information derived from this technology identified unknown linear and oval subsurface structures were in the area of concern, but none of these structures appeared to be part of an existing or former petroleum distribution system.

Soil OVA data collected from the unsaturated zone at the 12 boring locations were field screened for organic vapors using an OVA-FID. "Excessively contaminated" soil (organic vapor content greater than 50 ppm) was only identified at boring SB-12. Organic vapor concentrations measured at this location were 798 ppm (1 ft bls) and 1597 ppm (3 ft bls). This was an anomalous location; however, where the asphalt had been breached and repaired, the underlying soil was disturbed, and a utility line had apparently been repaired.

Free product was detected over an area of approximately 60 ft by 60 ft, although the lateral extent was not completely defined. Significant free product thickness appears to be restricted to well MW-16 and piezometers PZ-3, PZ-5, and PZ-6. Of all the piezometers and monitoring wells measured during September and October 2003, PZ-6 had the greatest product thickness measurement recorded (0.8 ft).

Tidal influences significantly impacted free product thickness. Maximum detections for the piezometers and monitoring well were during low tide.

The USACE groundwater results from a May 2001 Monitoring Report record groundwater impacts for wells in and around the Alpha/Delta Pier area (USACE, 2001). The results of the sampling analysis indicated that the plume is not extending into the surrounding area. Of the seven wells sampled, only two (MW-16 and MW-4) exceeded the GCTLs. Monitoring well MW-16 (which is the well TtNUS has been monitoring for free product thicknesses) exceeded the GCTL of total recoverable petroleum hydrocarbons with a concentration of 42 milligrams per liter. Monitoring well MW-4 is located about 160 ft northeast of MW-16 in the pier area and exceeded the GCTL of acenaphthene with a concentration of 20.9 micrograms per liter. No other wells exceeded the GCTLs. Neither free product nor dissolved groundwater concentrations exceeding GCTLs are widespread at the Alpha/Delta Piers. There is no substantial evidence that a previously unidentified source or recent source has contributed to the contamination documented in the study area.

## 5.0 RECOMMENDATIONS

TiNUS recommends a RAPA be completed to address the free product. Part of the RAPA would be the installation of recovery wells into the surficial aquifer to provide more access to the free product. The RAPA should also include a more aggressive approach to LNAPL removal using automated skimmers. Automated product removal is effective in removing all but one-eighth of an inch of free product. The removal of the remaining one-eighth of an inch of free product can be achieved by inserting absorbent material into the wells. This absorbent material will need to be maintained on an as-needed basis. The installation of product skimmers and the use of absorbent materials is a low-cost means to remove product in an area where a large number of utilities are present. Bi-annual reports detailing work completed should be submitted to the FDEP. The benefits to this more aggressive approach are two-fold. First, this approach will quickly remove the free product from the surficial aquifer and, second, it will limit the ongoing man hours that are required to monitor this site.

Monthly monitoring should be continued until the free product is removed. Since predicting presence of free product is nebulous, the monitoring of the free product should be continued on a monthly basis with quarterly monitoring of the nearby manholes. This monitoring will provide information detailing the effectiveness of the automated product removal. The data can be added to the bi-annual report detailing the work completed, observation, and recommendations as necessary.

## REFERENCES

ABB-ES (ABB Environmental Services, Inc.), 1992. Contamination Assessment Report, Alpha/Delta Piers Naval Station Mayport, Mayport, Florida. November.

ABB-ES, 1993a. Contamination Assessment Report Addendum, Alpha/Delta Piers, Naval Station Mayport, Mayport, Florida. March.

ABB-ES, 1993b. Remedial Action Plan, Alpha/Delta Piers, Naval Station Mayport, Mayport, Florida. December.

FDEP (Florida Department of Environmental Protection), 1999a. Chapter 62-770, FAC, Petroleum Contamination Cleanup Criteria.

FDEP, 1999b. Chapter 62-777, FAC, Contaminant Cleanup Target Levels.

FDEP, 2000. Standard Operating Procedures SOP 00/001.

FDEP, 2001. Standard Operating Procedures SOP 01/001.

USEPA (United States Environmental Protection Agency), 1997. Standard Operating Procedures.

USACE (United States Army Corps of Engineers), 2001. Groundwater Monitoring Report, Mayport Naval Station Alpha/Delta Piers. May.

**APPENDIX A**  
**PHOTOGRAPHS**

## Appendix A Photos



A photo taken on top of the hill upon which Building 2 is built.  
This view is facing east towards Maddox Road.



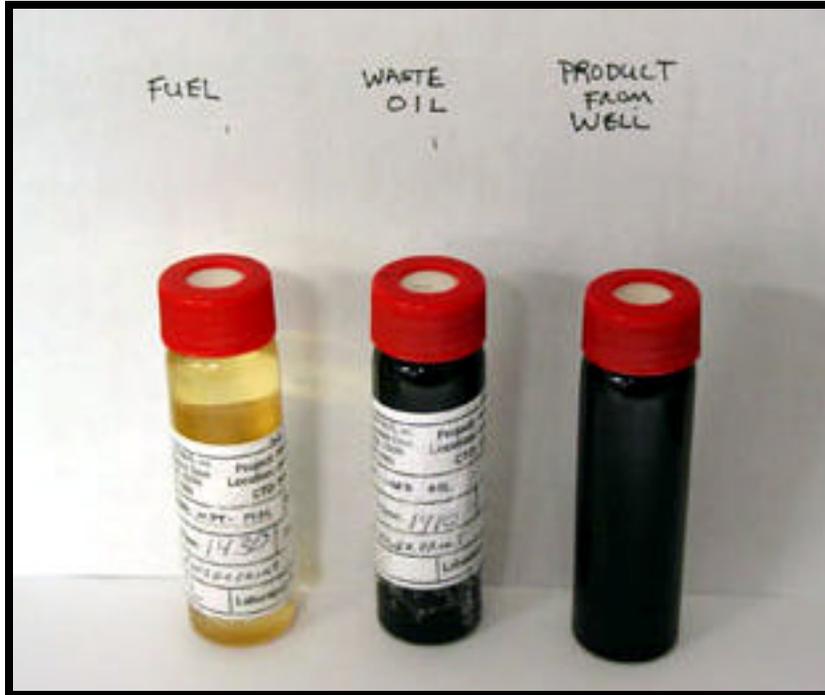
A view of the site looking north at the base of the hill located east of Building 2.  
White stake-like objects in foreground were piezometers.



This is a panoramic view of the site looking east along the turning basin.  
The photo was taken from the sidewalk that leads to Building 2.



A photo of soil collected at soil boring SB-7.  
Soil characteristics from SB-7 are typical of the site surrounding monitoring well MW-16.  
The top 3 ft of soil is light brown in color, which changes at approximately 4 ft bls.  
This change in color is due to petroleum staining or smearing of product.  
The presence of free product at 5 ft bls has stained the soil above and below it.  
Note the similar dark gray colored soils at depths of 4 and 7 ft bls.



Three product samples taken on December 10, 2002.

**APPENDIX B**  
**HISTORICAL DOCUMENTATION**

**CONTAMINATION ASSESSMENT REPORT  
ADDENDUM**

**ALPHA-DELTA PIER  
NAVAL STATION MAYPORT  
MAYPORT, FLORIDA**

**UIC: N65928**

**Contract No. N62467-89-D-0317**

**Prepared by:**

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Naval Facilities Engineering Command  
2155 Eagle Drive  
North Charleston, South Carolina 29418**

**Carl Loop, Code 1847, Engineer-in-Charge**

**March 1993**

## INTRODUCTION

The Alpha-Delta Pier site is located in the southwest part of the Turning Basin at Naval Station (NAVSTA) Mayport, Duval County, Florida. In 1985, it was discovered that a diesel fuel marine (DFM) pipeline valve was broken. The resulting loss of product was estimated to be greater than 500 gallons. The DFM pipeline was repaired and the contaminant source abated. In 1988, free product and water were recovered from a manhole located south of the 1985 pipeline break. The amount of free product recovered is estimated to be between 500 and 1,000 gallons. In January 1993, approximately 50 gallons of free product and water were also removed from the manhole. In the Spring of 1992, 234 tons of petroleum-laden soils were removed from the site as a new potable water pipeline was being installed. The contaminated soil was incinerated. The oil and water mixture from dewatering was separated, and the oil discarded to the oily waste treatment system. The quantity of oily waste treated at the facility is unknown.

In September 1989, a DFM pipeline valve was hit during excavation operations at the west end of Alpha Pier. It was estimated that less than 10 gallons of product was lost. Tests indicated that the petroleum in the excavated soil was both DFM and oily waste.

Structural competency tests were conducted on the Alpha Pier oily waste main pipeline in January 1990. Test results indicated that product loss had occurred and that leaky storm sewers were receiving petroleum from (1) oily waste lines along Alpha Pier, (2) product-laden soil and groundwater along Alpha-Delta Pier, and/or (3) both.

## CONTAMINATION ASSESSMENT

As a result of the various product-loss events at the Alpha-Delta Pier site, a contamination assessment (CA) was performed by ABB Environmental Services, Inc. (ABB-ES), from June 1992 through September 1992. The objectives of the CA were to identify petroleum contaminants and their likely sources at the site, assess the degree and extent of petroleum contamination in the soil and groundwater, and recommend feasible actions, if necessary, to attain compliance with State regulations.

Fifty-nine soil gas borings, 24 soil borings, 22 shallow monitoring wells, and 2 deep monitoring wells were completed at the site. Soil gas samples, organic vapor analysis samples, gas chromatograph samples, and soil and groundwater quality samples were collected at the site. Soil and groundwater quality samples were analyzed for petroleum constituents of the used oil analytical group as defined in the Florida Department of Environmental Regulation (FDER) Chapter 17-770, Florida Administrative Code (FAC). Figure 1 shows the location of the monitoring wells and the results of the laboratory analyses.

During the CA investigation a previously unknown area of contamination was detected. Evidence indicates that the D1-2 oily waste riser, a waste receptacle at the Delta Pier, is leaky. This riser has not been in service for the last 3 years; therefore, the contaminant source should be abated.

A Contamination Assessment Report (CAR) was submitted to FDER in December 1992. In January 1993, FDER requested additional information about soil contamination and line tightness tests at the site. The findings, conclusions, recommenda-

tions, and interim remedial actions implemented at the site are summarized in this Contamination Assessment Report Addendum (CARA), and additional information about soil contamination and line tightness tests is provided.

### FINDINGS

- Sediments encountered during drilling operations were mostly fill material. Sediments typically consisted of very fine-grained sand, silt, shell material, and construction debris, such as concrete. Naturally occurring sediments consisted of fine-grained sand and shell beds.
- Only the surficial, unconfined aquifer was encountered during drilling operations. The base of this aquifer was not determined during the field investigation. A literature search indicates that the base of the aquifer is approximately 70 feet below land surface (bls).
- Water in the upper part of the unconfined surficial aquifer is classified as G-II. Generally, over much of the facility, groundwater at depths greater than 40 feet bls becomes brackish and is classified as G-III. At the site, groundwater becomes brackish at depths greater than 50 feet bls.
- Groundwater beneath much of the site was encountered at approximately 4.0 feet bls. At the relict beach ridge, inland of the pier, water was encountered at 17 feet bls.
- The overall direction of groundwater flow is northerly toward the bulkheads and Turning Basin.
- Excessively contaminated soil was detected beneath the Alpha and Delta 1 piers. Excessively contaminated soil is located near and west of the D1-2 oily waste riser and in the vicinity of the 1985 diesel fuel marine pipeline break (Figure 1).
- Contaminants detected in the soil include total recoverable petroleum hydrocarbons, extractable organics, naphthalenes, volatile organic aromatics, petroleum-related tentatively identified compounds, arsenic, barium, chromium, and lead.
- Approximately 2 inches of free product was measured in monitoring well MPT-1406-16. The product appears to be degraded. Free product was not detected in any other monitoring well. Free product was detected in two utility manholes. Both manholes are located between monitoring well MPT-1406-16 and the location of the 1985 diesel fuel marine pipeline break. Free product was measured at 1¼ inches in one manhole and 1½ inches in the other. Free product was not detected in any other manhole.
- Groundwater contaminants identified during the CA investigation include total volatile aromatic hydrocarbons (benzene, ethylbenzene, toluene, and xylenes), polynuclear aromatic hydrocarbons, total naphthalenes (naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene), total recoverable petroleum hydrocarbon, tentatively identified compounds, arsenic, chromium, and lead.

- Concentrations of contaminants in groundwater quality samples that equal or exceed standards or target levels as established by the FDER include benzene, polynuclear aromatic hydrocarbons, total naphthalenes, and total recoverable petroleum hydrocarbons.
- Groundwater contamination is located at two areas: (1) in the vicinity and west of the oily waste riser, D1-2; and (2) in the vicinity of the 1985 diesel fuel marine pipeline break. In general, contamination appears to be restricted to the pier areas. At the 1985 diesel fuel marine pipeline break, contamination extends from the bulkhead to approximately 150 feet inland along Maddox Avenue (Figure 1).
- The diesel fuel marine pipeline has been repaired. The oily waste riser has been taken out of service. The sources of contamination have been abated.
- Evidence of contamination was not found during this investigation at a location in the western part of Alpha Pier where a fuel pipeline was damaged.
- A petroleum sheen has been reported in the Turning Basin. The sheen emanates from storm drain discharge water that empties into the basin. Absorbent booms have been placed at these points of discharge.
- There are 25 production and potable water wells in the vicinity of the facility. Five potable water wells at the facility are within a  $\frac{1}{4}$ -mile radius of the site. All five wells are greater than 1,000 feet deep and screened in the Floridan aquifer system.
- Hydraulic conductivity (K) values ranged from 9.06 to 33.20 feet per day. The hydraulic gradient (I) was calculated to be 0.007 foot per foot. Based on the K of 21.13 foot per day and I of 0.007, the average linear pore water velocity (V) in the surficial aquifer at the site was calculated to be 0.59 foot per day.
- There is no documentation on the extent of excavation for the 1985 or 1989 DFM valve repairs. It is believed that no soil removal was initiated, and if a fuel/water mixture was encountered, it was disposed of in the oily waste treatment system. It is a policy of NAVSTA Mayport to dispose of any fuel/water mixture encountered during construction in the oily waste system so that it may be reused. The free product recovered from the manhole in the past has been disposed of in this manner. There is now in place a quarterly schedule for checking the manholes and removing any free product. The amount of free product is being measured and recorded. The last removal occurred in January 1993 and was approximately 50 gallons. We believe that between 1,000 and 2,000 gallons of free product have been recovered from the manholes since the valve break occurred. The limits of excavation during a recent water line replacement contract are documented and delineated in Figure A-1-1 (Appendix A-1). There were no OVA readings performed on the soil removed. The contract identified the entire area near the Alpha-Delta Pier as being contaminated and any soil encountered was to be removed and disposed of in accordance with State regulations. Copies of the manifests and incineration statements from the transportation and disposal of this soil (234 tons) are attached as Appendix A-2.

18,000 gallons of the fuel/water mixture from dewatering was disposed of in the oily waste treatment system.

#### CONCLUSIONS

- The sources of contamination at the Alpha-Delta Pier were a broken pipeline and an oily waste riser. These sources have been abated.
- Soil at the site is excessively contaminated as defined by FDER Chapter 17-770, FAC. Soil contamination is confined to only the upper 4 feet above the water table.
- Groundwater in the unconfined surficial aquifer has been adversely impacted by petroleum constituents and contaminant levels exceed FDER Chapter 17-770, FAC, groundwater cleanup target levels.
- Potable water wells have not been nor are expected to be impacted by contaminants from the Alpha-Delta Pier site.

#### RECOMMENDATIONS

- Monitoring and maintenance of containment booms at points of discharge to the Turning Basin should be continued until a more permanent solution to abating petroleum discharge to the basin can be found.
- Due to the presence of free product and because concentrations of the contaminants in the soil and groundwater beneath the site exceed the FDER Chapter 17-770, FAC, cleanup target levels, ABB Environmental Services recommends that a remedial action plan be prepared to address the contamination and initiate an appropriate course of action.

#### REMEDIAL ACTIONS

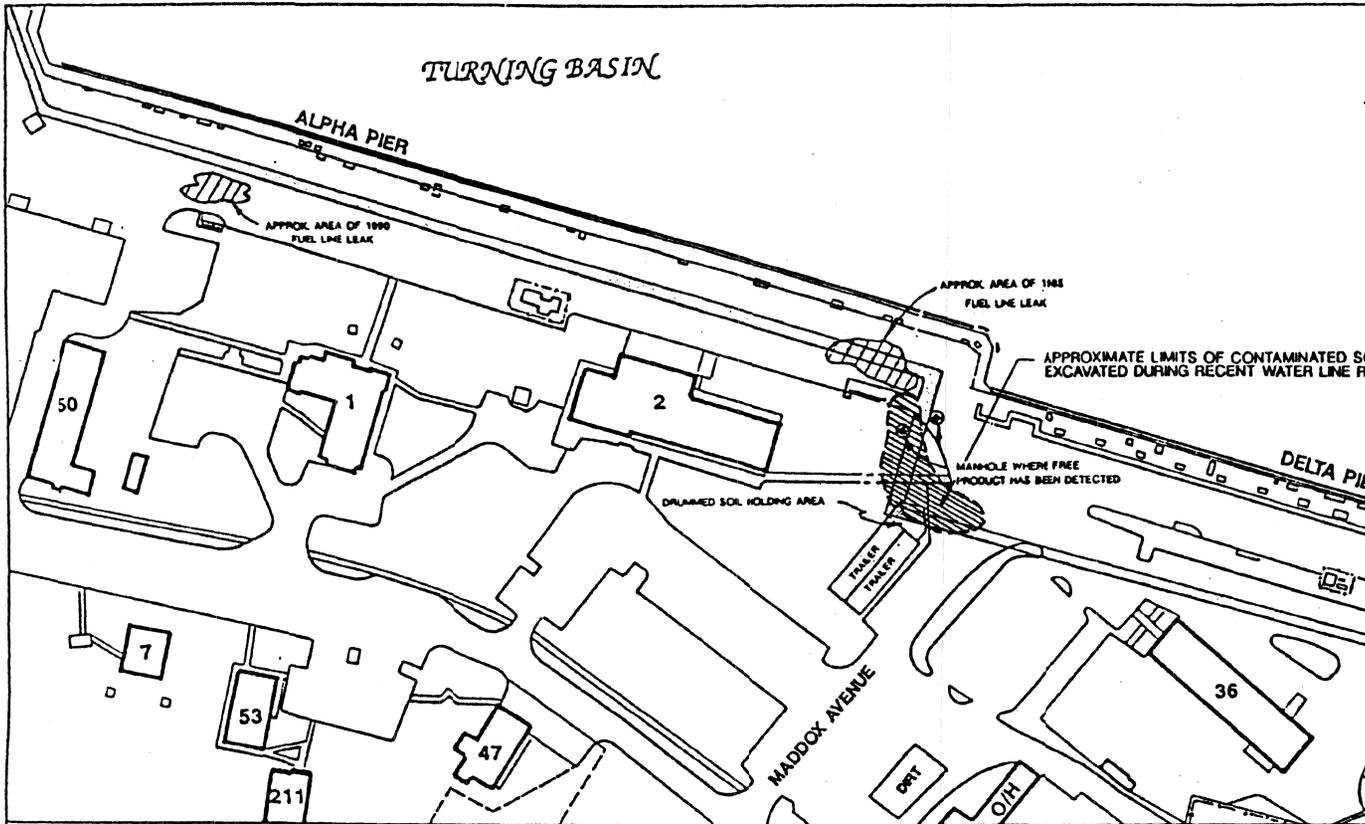
- Since the submittal of the Contamination Assessment Report (CAR) for this site, free product has been recovered from the 1985 diesel fuel pipeline break site. Measures to recover additional free product were implemented in January 1993.
- Absorbent booms have been placed at the points of discharge of the storm sewers.

#### SPILL CONTAINMENT INITIATIVES

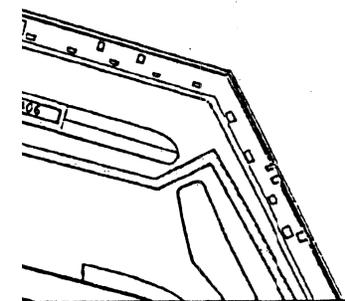
- A pipeline tightness test was performed February 5, 1993, on the entire DFM system. The system was judged to be tight. The next test is scheduled for the first week of July 1993.
- A petroleum products management program is in effect at the facility. This program accounts for all volumes of product handled at the fuel farm and at all piers. Also in place are procedures and action plans to address leaks, spills, and other uncontrolled discharges of petroleum products, as well as emergency remedial plans. NAVSTA Mayport currently operates under accepted procedures detailed in the facility's Spill Prevention Control and Containment (SPCC) Plan.

ALPHA DELTA

3R

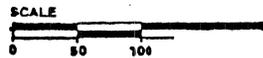


NG BASIN



**LEGEND**

-  APPROX LOCATION OF KNOWN FUEL LEAKS
-  NEWLY INSTALLED POTABLE WATER LINE
-  MANHOLE COVER



**FIGURE A-1-1**

**KNOWN FUEL SPILL LOCATIONS**



**CONTAMINATION  
ASSESSMENT REPORT  
ADDENDUM  
ALPHA DELTA PIER  
NAVAL STATION  
MAYPORT, FLORIDA**

## EXECUTIVE SUMMARY

Groundwater contamination exceeding regulatory standards has been identified at the Alpha Delta Piers at Naval Station (NAVSTA) Mayport, Florida. Free product has been observed at the site in the past, but currently appears to be absent. Contaminated groundwater and possibly free product infiltrate a storm drainage pipe and discharge to the turning basin. The surficial aquifer in the vicinity of NAVSTA Mayport is classified according to the criteria specified in Chapter 17-3, Florida Administrative Code, as G-III.

A remedial strategy of containment and source abatement is proposed. The proposed containment actions will prevent future discharges of contaminated groundwater from the site into the turning basin. Source abatement actions will include monitoring and removal of any free product that may be present. A program is proposed that will allow for monitoring of the site conditions during the remedial activities.

**GROUND-WATER MONITORING REPORT**

**MAYPORT NAVAL STATION  
ALPHA-DELTA PIERS**

**MAYPORT, FLORIDA**

**PREPARED FOR**

**UNITED STATES NAVY  
SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
CHARLESTON, SOUTH CAROLINA**

**PREPARED BY**

**U.S. ARMY CORPS OF ENGINEERS  
SAVANNAH DISTRICT  
SAVANNAH, GEORGIA**

**MAY 2001**

## **INTRODUCTION**

This ground-water monitoring report of selected monitoring wells on Alpha-Delta Piers at Mayport Naval Station, Mayport, Florida is a result of a request by the Florida Department of Environmental Protection (FDEP) that the Southern Division, Naval Facilities Engineering Command (NAVFACENGCOM) Charleston, South Carolina perform supplemental sampling at the site. This sampling is being performed as part of the Remedial Action Plan (RAP) phase at the site.

## **BACKGROUND**

In 1985, it was discovered that a diesel fuel marine (DFM) pipeline that passes through the Alpha-Delta Piers area was broken and that more than 500 gallons of fuel had been lost. The pipeline was repaired and the source of contamination abated. Free product and water were recovered at the time of the pipeline repair; however, the amount of free product recovered is unknown. In 1989, free product and water were removed from a manhole located near the pipeline break. In the spring of 1992, petroleum contaminated soils were removed during the installation of a new water line at the site.

A Contamination Assessment Report (CAR) for the site was prepared and submitted by ABB Environmental Services Inc. in November 1992. After submittal of a CAR Addendum, ABB submitted a Remedial Action Plan (RAP) in December 1993. A revised RAP was submitted and approved by FDEP in August 1994.

In accordance with the approved RAP, a monitoring program was conducted from June 1996 through October 1997. Two monitoring wells, MPT-1406-6 and MPT-1406-16, and two utility manholes were monitored for LNAPL. Also, two rounds of quarterly ground-water samples were collected in September and December of 1996.

LNAPL has been present in the utility manhole north of monitoring well MPT-1406-16 and in MPT-1406-16 since the startup of site assessment activities at Alpha-Delta Piers. In two quarterly sampling events in 1996 (September and December), well MPT-1406-3 indicated naphthalene, and MPT-1406-4 indicated benzene, acenaphthene, and naphthalene.

## **SUMMARY OF GROUND-WATER MONITORING AND ANALYSIS**

This report covers a sampling event at Alpha-Delta Piers, which occurred on 9 MAY 2001. All wells sampled were checked for free product petroleum using an oil/water interface probe. Monitoring wells MPT-1406-4, MPT-1406-5, MPT-1406-6, MPT-1406-9, MPT-1406-15, MPT-1406-16 and MPT-1406-23D were sampled. All wells sampled were purged of a minimum of three volumes using a Teflon bailer. Well purging continued until field parameters (pH, specific conductance, and temperature) stabilized. Field water quality parameters for all wells sampled are contained in table 2 (attachment 4). Ground-water samples were collected using a Teflon bailer and placed in appropriate containers. The samples were properly preserved, stored on ice, and delivered to the laboratory for analysis.

All monitor well samples were analyzed for EPA Methods 8260B, 8270C, and Florida petroleum residual organics (FL PRO). Chain of custody was maintained on the samples throughout the sampling period. Sampling procedures were conducted according to U.S. Army Corps of Engineers, Savannah District's FDEP-approved Comprehensive Quality Assurance Plan No. 910026G. Laboratory analyses were performed according to the laboratory's FDEP-approved Generic Quality Assurance Plan.

A summary of Laboratory analytical results of the samples from wells is shown in table 1 (attachment 1) and on the data summary map (attachment 2).

Three wells, MPT-1406-4, MPT-1406-6 and MPT-1406-16 indicated FL PRO above reporting limits at 2.82 mg/l, 1.36 mg/l and 42.4 mg/l respectively. FL PRO in MPT-1406-16 exceeds the regulatory limit of 5 mg/l.

Three wells indicated PAH compounds above reporting limits. MPT-1406-4 indicated acenaphthene at 20.9 ug/l, anthracene at 0.77 ug/l, fluoranthene at 3.96 ug/l, fluorene at 15.1 ug/l, phenanthrene at 0.47 ug/l, pyrene at 2.96 ug/l. MPT-1406-6 indicated fluorene at 0.88 ug/l. MPT-1406-16 indicated acenaphthene at 3.14 ug/l, fluorene at 10.5 ug/l, phenanthrene at 11.7 ug/l, pyrene at 1.47 ug/l, bis(2-ethylhexyl)phthalate at 3.85 ug/l, 1-methylnaphthalene at 25.7 ug/l. Acenaphthene in MPT-1406-4 exceeds the regulatory limit of 20 ug/l.

Two wells contained VOC's above reporting limits. MPT-1406-4 contained sec-butylbenzene at 1.4 ug/l, and isopropylbenzene at 1.49 ug/l. MPT-1406-16 contained sec-butylbenzene at 3.37 ug/l, and xylenes at 2.86 ug/l. No wells contained VOC's in sufficient concentrations to be above regulatory limits.

As noted on table 1, the reporting limit for 1,2-dibromoethane (EDB) of 1.0 ug/l for all samples is above the regulatory limit of 0.02 ug/l.

Field water quality parameters are listed in table 2 (attachment 4), and laboratory analytical data are contained in attachment 5.

### **FREE PRODUCT MONITORING AND REMOVAL**

Naval Station (NAVSTA) Mayport conducted free product monitoring and removal on monitoring wells MPT-1406-6 and MPT-1406-16 on a monthly basis and on the utility manholes on a quarterly basis (see NAVSTA letters in attachment 3). From the period of May 1998 to September 2001, a total of 11 gallons were recovered.

Subsequent product recovery was conducted in March of 2001 by the Corps of Engineers as part of continuing monitoring of the site. Approximately 500 gallons of mixed product/water were recovered at that time.

### **SUMMARY AND CONCLUSIONS**

These latest analytical results are similar to previous samplings, with the exception of the current presence of VOC's and minor variations in PAH compounds. Free product was detected in monitoring well MPT-1406-16 during the last sampling event. The lack of free product during this sampling event indicates that the free product recovery actions currently being taken are apparently having some effect and should be continued.

The measurement of free product petroleum in monitoring well MPT-1406-16 during previous sampling events and the product recovery from MPT-1406-16 and the utility manholes/sumps indicates, as in the past, that the accumulation of product in wells is variable and is probably somewhat influenced by rainfall events as well as by pumping and removal.

TABLE 1

## SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

## ALPHA-DELTA PIERS

MAYPORT NAVAL STATION  
MAYPORT FLORIDA

09 MAY 2001

## MONITOR WELL NUMBER

PARAMETER	MPT 1406-4-5-01	MPT 1406-5-5-01	MPT 1406-5-5-01 DUPLICATE	MPT 1406-6-5-01	MPT 1406-9-5-01	MPT 1406-15-5-01	MPT 1406-16-5-01	MPT 1406-23-5-01	RINSATE BLANK	TRIP BLANK	Cleanup Target MCL
<b>Florida PRO</b>											
Petroleum Residual Organics, mg/l	2.82	< 0.20	< 0.20	1.36	< 0.20	< 0.20	42.4	< 0.20	< 0.20	NA	5 mg/l
<b>Extractable Organics (8270C)</b>											
Acenaphthene, ug/l	20.90	<1.00	<1.00	<1.00	<5.00	<1.00	3.14	<1.00	<1.00	NA	20 ug/l
Acenaphthylene, ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	NA	210 ug/l
Anthracene, ug/l	0.77	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	2100 ug/l
Benzo (a) anthracene, ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NA	0.2 ug/l
Benzo (a) pyrene, ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NA	0.2 mg/l
Benzo (b) fluoranthene, ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NA	0.2 ug/l
Benzo (g,h,i) perylene, ug/l	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NA	210 ug/l
Benzo (k) fluoranthene, ug/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA	0.5 ug/l
4-Bromophenyl-phenylether, ug/l	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	NA	
Butylbenzylphthalate, ug/l	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	NA	
Carbozole, ug/l	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	NA	
4-Chloro-3-methylphenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
4-Chloroaniline, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Bis(2-chloroethoxy)methane, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Bis(2-chloroethyl)ether, ug/l	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	NA	
Bis(2-chloroisopropyl)ether, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2-Chloronaphthalene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2-Chlorophenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
4-Chlorophenyl-phenylether, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Chrysene, ug/l	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NA	5 ug/l
Dibenzofuran, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Dibenzo(a,h) anthracene, ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NA	0.2 ug/l
1,2-Dichlorobenzene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
1,3-Dichlorobenzene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
1,4-Dichlorobenzene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
3,3-Dichlorobenzidene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2,4-Dichlorophenol, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NA	
Diethylphthalate, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2,4-Dimethylphenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Dimethylphthalate, ug/l	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	NA	
Di-n-Butylphthalate, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
4,6-Dinitro-2-methylphenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2,4-Dinitrophenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2,4-Dinitrotoluene, ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	NA	
2,6-Dinitrotoluene, ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	NA	
Di-n-octylphthalate, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Fluoranthene, ug/l	3.96	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	NA	280 ug/l
Fluorene, ug/l	15.1	<1.00	<1.00	0.88	<1.00	<1.00	10.5	<1.00	<1.00	NA	280 ug/l

TABLE 1

## SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

## ALPHA-DELTA PIERS

MAYPORT NAVAL STATION  
MAYPORT FLORIDA

09 MAY 2001

## MONITOR WELL NUMBER

PARAMETER	MPT 1406-4-5-01	MPT 1406-5-5-01	MPT 1406-5-5-01 DUPLICATE	MPT 1406-6-5-01	MPT 1406-9-5-01	MPT 1406-15-5-01	MPT 1406-16-5-01	MPT 1406-23D-5-01	RINSATE BLANK	TRIP BLANK	Cleanup Target MCL
<b>Florida PRO</b>											
Petroleum Residual Organics, mg/l	2.82	< 0.20	< 0.20	1.36	< 0.20	< 0.20	42.4	< 0.20	< 0.20	NA	5 mg/l
<b>Extractable Organics (8270C)</b>											
Acenaphthene, ug/l	20.90	<1.00	<1.00	<1.00	<5.00	<1.00	3.14	<1.00	<1.00	NA	20 ug/l
Acenaphthylene, ug/l	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	NA	210 ug/l
Anthracene, ug/l	0.77	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	2100 ug/l
Benzo (a) anthracene, ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NA	0.2 ug/l
Benzo (a) pyrene, ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NA	0.2 mg/l
Benzo (b) fluoranthene, ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NA	0.2 ug/l
Benzo (g,h,i) perylene, ug/l	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NA	210 ug/l
Benzo (k) fluoranthene, ug/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	NA	0.5 ug/l
4-Bromophenyl-phenylether, ug/l	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	NA	
Butylbenzylphthalate, ug/l	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	NA	
Carbazole, ug/l	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	NA	
4-Chloro-3-methylphenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
4-Chloroaniline, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Bis(2-chloroethoxy)methane, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Bis(2-chloroethyl)ether, ug/l	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	<4.00	NA	
Bis(2-chloroisopropyl)ether, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2-Chloronaphthalene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2-Chlorophenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
4-Chlorophenyl-phenylether, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Chrysene, ug/l	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	NA	5 ug/l
Dibenzofuran, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Dibenzo(a,h) anthracene, ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	NA	0.2 ug/l
1,2-Dichlorobenzene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
1,3-Dichlorobenzene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
1,4-Dichlorobenzene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
3,3-Dichlorobenzidene, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2,4-Dichlorophenol, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	NA	
Diethylphthalate, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2,4-Dimethylphenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Dimethylphthalate, ug/l	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	NA	
Di-n-Butylphthalate, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
4,6-Dinitro-2-methylphenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2,4-Dinitrophenol, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
2,4-Dinitrotoluene, ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	NA	
2,6-Dinitrotoluene, ug/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	NA	
Di-n-octylphthalate, ug/l	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	<10.00	NA	
Fluoranthene, ug/l	3.96	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	NA	280 ug/l
Fluorene, ug/l	15.1	<1.00	<1.00	0.88	<1.00	<1.00	10.5	<1.00	<1.00	NA	280 ug/l





TABLE 1

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

ALPHA-DELTA PIERS

MAYPORT NAVAL STATION  
MAYPORT FLORIDA

09 MAY 2001

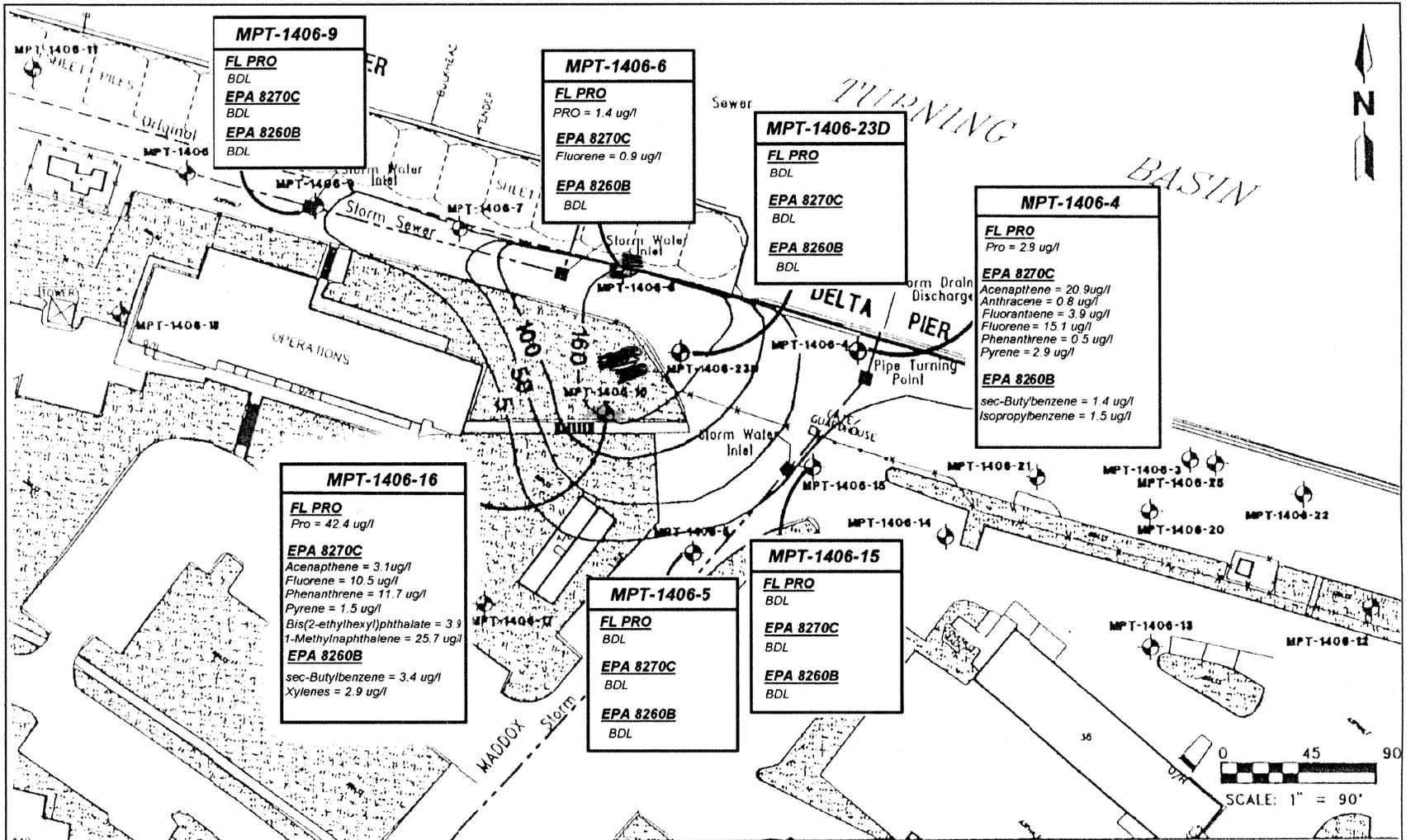
MONITOR WELL NUMBER

PARAMETER	MPT 1406-4-5-01	MPT 1406-5-5-01	MPT 1406-5-5-01 DUPLICATE	MPT 1406-6-5-01	MPT 1403-9-5-01	MPT 1406-15-5-01	MPT 1406-16-5-01	MPT 1406-23-5-01	RINSATE BLANK	TRIP BLANK	Cleanup Target MCL
	Trichloroethene, ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00			
1,2,3-Trichloropropane, ug/l	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 0.200	< 1.00	
1,2,4-Trimethylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	
1,2,5-Trimethylbenzene	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	
Vinyl Chloride, ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	
Xylenes, ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	<b>2.86</b>	< 1.00	< 1.00	< 1.00	20 ug/l
Bromodichloromethane, ug/l	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	
Trichlorofluoromethane, ug/l	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	

ICP SCAN 200.7											
Arsenic, mg/l	<0.0050	<0.0050	<b>0.0065</b>	<0.0050	<b>0.0065</b>	<0.0050	<b>0.0058</b>	<0.0050	<0.0050	NA	NA
Barium, mg/l	<b>0.0390</b>	< 0.0300	< 0.0300	<b>0.007</b>	<b>0.0130</b>	<b>0.008</b>	<b>0.0030</b>	<b>0.0058</b>	< 0.0300	NA	NA
Cadmium, mg/l	< 0.00010	<0.00010	<0.00010	<b>0.001</b>	< 0.00010	0.00010	<b>0.00020</b>	<b>0.0001</b>	<0.00010	NA	NA
Chromium, mg/l	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	NA	NA
Lead, mg/l	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	< 0.0030	<b>0.0059</b>	< 0.0030	NA	NA
Mercury, mg/l	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	< 0.00020	NA	NA
Selenium, mg/l	<b>0.0050</b>	< 0.0050	< 0.0050	< 0.0050	< 0.0050	<b>0.0062</b>	< 0.0050	< 0.0050	< 0.0050	NA	NA
Silver, mg/l	< 0.010	< 0.010	<b>0.0022</b>	< 0.003	< 0.0100	<b>0.0038</b>	<b>0.0020</b>	< 0.0100	< 0.010	NA	NA

- Notes: - NA = Not Analyzed  
 - \* Well contained 1.78' of free product petroleum - not sampled.  
 - \*\* Detection limit exceeds regulatory limit.  
 - Shaded value indicates regulatory limit exceeded.

NOTE: GROUND-WATER ANALYTICAL RESULTS  
 FROM SAMPLING EVENT ON 9 MAY 2001.  
 SAMPLES ANALYZED FOR FLORIDA  
 PRO AND EPA METHODS 8270C, AND 8260B.



**MPT-1406-9**  
**FL PRO**  
 BDL  
**EPA 8270C**  
 BDL  
**EPA 8260B**  
 BDL

**MPT-1406-6**  
**FL PRO**  
 PRO = 1.4 ug/l  
**EPA 8270C**  
 Fluorene = 0.9 ug/l  
**EPA 8260B**  
 BDL

**MPT-1406-23D**  
**FL PRO**  
 BDL  
**EPA 8270C**  
 BDL  
**EPA 8260B**  
 BDL

**MPT-1406-4**  
**FL PRO**  
 Pro = 2.9 ug/l  
**EPA 8270C**  
 Acenaphthene = 20.9 ug/l  
 Anthracene = 0.8 ug/l  
 Fluoranthene = 3.9 ug/l  
 Fluorene = 15.1 ug/l  
 Phenanthrene = 0.5 ug/l  
 Pyrene = 2.9 ug/l  
**EPA 8260B**  
 sec-Butylbenzene = 1.4 ug/l  
 Isopropylbenzene = 1.5 ug/l

**MPT-1406-16**  
**FL PRO**  
 Pro = 42.4 ug/l  
**EPA 8270C**  
 Acenaphthene = 3.1 ug/l  
 Fluorene = 10.5 ug/l  
 Phenanthrene = 11.7 ug/l  
 Pyrene = 1.5 ug/l  
 Bis(2-ethylhexyl)phthalate = 3.9  
 1-Methylnaphthalene = 25.7 ug/l  
**EPA 8260B**  
 sec-Butylbenzene = 3.4 ug/l  
 Xylenes = 2.9 ug/l

**MPT-1406-5**  
**FL PRO**  
 BDL  
**EPA 8270C**  
 BDL  
**EPA 8260B**  
 BDL

**MPT-1406-15**  
**FL PRO**  
 BDL  
**EPA 8270C**  
 BDL  
**EPA 8260B**  
 BDL

**LEGEND**

- Monitoring well location
- Contamination isoconcentration line  
 (all concentrations in parts per million ppm)  
 (Isocontours from ABB CAR, 1992)

**GROUND-WATER  
 MONITORING WELL LOCATIONS**



**ALPHA DELTA PIERS  
 U.S. NAVAL STATION  
 MAYPORT, FLORIDA**

**DEPARTMENT OF THE NAVY**

NAVAL STATION

MAYPORT, FLORIDA 32228-0112

IN REPLY REFER TO:

5090.16

Ser N4E406 2,015

OCT 16 2000

Mr. Jim Cason  
Technical Review Section  
Florida Department of Environmental Protection  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400

Dear Mr. Cason:

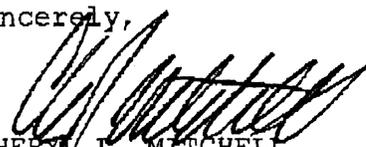
SUBJECT: QUARTERLY FREE PRODUCT MONITORING OF ALPHA-DELTA PIERS,  
NAVAL STATION MAYPORT

Naval Station (NAVSTA) Mayport submits the quarterly Free Product Recovery Alpha-Delta Piers monitoring and recovery results as an enclosure. During the fourth quarter of fiscal year 2000 monitoring, 0.003 gallons of product were recovered from well MPT-1406-16. The utility manholes were not checked during this quarter. Since monitoring began in May 1998, a total of 11.027 gallons of product has been recovered.

NAVSTA Mayport requests authorization to stop monitoring well MPT-1406-6. This well has shown no product since monitoring began in 1998.

If you have any questions, my point of contact is Mr. Randy Bishop, N4E4, at 904-270-6730 x203.

Sincerely,

  
CHERYL L. MITCHELL  
Director, Environmental Division  
By direction of the  
Commanding Officer

Enclosure (1)

Copy to: (w/o encl)  
Commander, Navy Region Southeast (N46E)  
Southern Division, Naval Facilities Engineering Command (Code 1848)

FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number \_\_\_\_\_

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
8-4-03	1401	Y	N	-	1/4	800 ml	R. Lewis	
8-4-03	1402	Y	N	-	1/8	800 ml	R. Lewis	
						1.6 L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

COMMENTS:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION  
 Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
6-9-03	1323	Y	N	-	1/4	350 mL	K. Louis	
6-9-03	1324	Y	N	-	1/8	400 mL	K. Louis	
						.75L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:  
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 \_\_\_\_\_  
 \_\_\_\_\_

FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
5-5-03	1448	Y	N	-	1	820 mL	K. Louie	
5-5-03	1449	Y	N	-	1/4	750 mL	K. Louie	
5-5-03	1451	Y	N	-	1/16	700 mL	K. Louie	
						227 L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

COMMENTS:  
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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER HPT-406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name HARBOR OPS Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
4-1-03	1403	Y	Y	1	1/2	(1) 500 mL	K. Louie	
	1405			-	4	(5) 450 mL		
	1406				2	450		
	1407				1 1/2	(1) 350		
	1408				1	450		
	1409				1/2	450		
	1411				1/4	450		
4-2-03	1255	Y	Y	-	9	(8) 850 ML		
	1256			-	2	850		
	1257			-	1/2	850		
	1258			-	1/4	850		
	1259			-	1/4	850		
	1300			-	1/8	250		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01". 8 2L  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

1458  
 4000  
 5100  
 2250

COMMENTS:  
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 \_\_\_\_\_  
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FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number Bldg 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
03-03-03	1912	Y	N	-	8	~700 mL	K. Loxie	
	1912	Y	N		4/4	700 ML		
	1913	Y	N		2	~800 ML		
	1913	Y	N		1	800 ML		
	1913	Y	N		1/2	800 ML		
	1914	Y	N		1/4	800 ML		
	1914	Y	N		1/16	800 ML		
			N			5.4 L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:

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FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number \_\_\_\_\_

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
2-3-03	1346	Y	N	-	2/4	500 mL	K. Lorie	
2-3-03	1346	Y	N	-	3/4	500 mL	↓	
2-3-03	1347	Y	N	-	1/4	500 mL		
2-3-03	1347	Y	N	-	1/16	500 mL		
						2L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:  
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FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number \_\_\_\_\_

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
1-21-03	1312	Y	N	-	10	650 mL	K. Louie	
	1312	Y	N	-	2 1/2	600 mL		
	1313	Y	N	-	1/2	600 mL		
	1313	Y	N	-	3/4	600 mL		
	1314	Y	N	-	1/4	600 mL		
	1314	Y	N	-	1/4	600 mL		
	1314	Y	N	-	1/8	600 mL		
	1315	Y	N	-	1/8	600 mL		
↓	1315	Y	N	-	1/16	600 mL	↓	
				-	-	5.4 L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:

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FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number \_\_\_\_\_

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
12-2-02	1314	Y	N	2	5	650 ML	K. Louie	
	1314	Y	N	-	10	700 ML		
	1314	Y	N	-	2	600 ML		
	1315	Y	N	-	1 1/2	550 ML		
				-	1 1/2	500 ML		
				-	3/4	500 ML		
				-	1/2	500 ML		
				-	1/2	500 ML		
				-	1/2	500 ML		
				-	1/8	500 ML		
				-	1/8	500 ML		
				-	1/16	500 ML		

ES: Depth of product measurements to the nearest 1/8" or 0.01'. 6.5L

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:

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FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number \_\_\_\_\_

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
11-7-02	1245	Y	Y	-	5	700 ml	K. Lowe	
	1245			-	4	700 ml		
	1246			-	3	850		
	1246			-	1	850		
	1247			-	1	850		
	1247			-	1/2	850		
	1248			-	1/16	750		
						5.5L		

- NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

COMMENTS:

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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number Bldg 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
<u>10-7-02</u>	<u>1328</u>	<u>Y</u>	<u>Y</u>	<u>1</u>	<u>3</u>	<u>~ 800 mL</u>	<u>K. Louie</u>	
	<u>1328</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>4</u>	<u>800 mL</u>		
	<u>1329</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>2 1/2</u>	<u>800 mL</u>		
	<u>1329</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>2 1/2</u>	<u>800 mL</u>		
	<u>1330</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>2</u>	<u>800 mL</u>		
	<u>1330</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>1 1/4</u>	<u>800 mL</u>		
	<u>1331</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>1 1/4</u>	<u>800 mL</u>		
	<u>1331</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>1</u>	<u>900 mL</u>		
	<u>1332</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>1</u>	<u>900 mL</u>		
	<u>1332</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>1/2</u>	<u>900 mL</u>		
	<u>1333</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>1/8</u>	<u>800 mL</u>		
<u>✓</u>	<u>1333</u>	<u>Y</u>	<u>Y</u>	<u>-</u>	<u>1/16</u>	<u>800 mL</u>		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01". <sup>10.L</sup>

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:

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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
9-3-02	1309	Y	Y	0	4	950 mL	K. Louie	
	1310				8	950 mL		
	1310				6	900 mL		
	1311				2	600 mL		
	1311				2	800 mL		
	1312				3/4	900 mL		
	1313				1/2	850 mL		
	1313				1/2	850 mL		
	1314				1/8	850 mL		
	1314				1/16	850 mL		
						8.5 L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:

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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
8-9-02	1320	Y	Y	-	8	~ 850 mL	K. Louie	
	1321	Y	Y	-	2/2	~ 850 mL		
	1322	Y	Y	-	1/2	~ 850 mL		
	1322	Y	Y	-	3/4	~ 850 mL		
	1323	Y	Y	-	1/4	~ 850 mL		
	1324	Y	Y	-	1/4	~ 850 mL		
✓	1324	Y	Y	-	1/16	~ 850 mL	✓	
						G.O.		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:

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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number \_\_\_\_\_

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
7-2-02	1315	Y	Y	-	10	~ 900 mL	K. Louie	
	1316			-	4	~ 900 mL		
	1317			-	2 1/2	~ 900 mL		
	1317			-	2	~ 850 mL		
	1318			-	1 1/2	~ 900 mL		
	1319			-	3/4	~ 900 mL		
	1320			-	1/2	~ 900 mL		
	1321			-	1/8	~ 900 mL		
	1322			-	1/16	~ 900 mL		
						81L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:

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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
6-10-02	1315	N	Y	-	-	700 mL .7L	K. Louie	water w/ sheen

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

COMMENTS:  
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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
5-6-02	1259	Y	Y	-	4	900 mL	K. Louie	
	1300			-	1/4	800 mL		
	1301			-	3/4	850 mL		
	1302			-	1/2	950 mL		
	1303			-	1/2	800 mL		
	1304			-	1/4	750 mL		
	1305			-	1/4	800 mL		
	1306			-	1/16	800 mL		
						5.7 L		

ES: Depth of product measurements to the nearest 1/8" or 0.01'.

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS: Need back cap for the monitor well (Now do not have cap)

FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER/ PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
4-9-02	1440	Y	Y		8	750 mL	K. Love	
↓	1509	Y	Y		1/4	800 mL	↓	
	1508	Y	Y		1/4	750 mL		
↓	1506	Y	Y		1/4	700 mL		
	1505	Y	Y		1/8	700 mL	↓	
						3.7 L		

NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

COMMENTS:  
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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
2-5-02	1337	Y	Y	-	8	750 mL	K. Louie	
	1338			-	3	850 mL		
	1339			-	1	800 mL		
	1340			-	1/2	950 mL		
	1341			-	1/4	800 mL		
	1342			-	1/8	850 mL		
✓	1343	↓	↓	-	1/16	800 mL	↓	

NOTES: Depth of product measurements to the nearest 1/8" or 0.01".  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:  
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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
2-11-02	1323	Y	Y	1	2	~ 700 mL	K. LOUIE	
	1324			-	8			
	1325			-	6			
	1327			-	4			
	1328			-	2			
	1329			-	1 1/2			
	1330			-	1			
	1332			-	1			
	1333			-	1/2			
	1334			-	1/2			
	1335			-	1/2			
	1336			-	1/2			

TES: Depth of product measurements to the nearest 1/8" or 0.01'.

Inspection equipment must be thoroughly cleaned between wells.

Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:

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FORM #6  
US NAVY  
MONITORING WELL INSPECTION FORM  
WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number \_\_\_\_\_

DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
2-11-02	1338	Y	Y	-	1/2	~ 700 mL	K. LOUIE	
	1339	Y	Y	-	1/4			
	1340			-	1/4			
	1341			-	1/4			
	1342			-	3/16			
	1343			-	3/16			
	1344			-	1/8			
	1345			-	1/16			

- NOTES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:  
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 \_\_\_\_\_  
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FORM #6  
 US NAVY  
 MONITORING WELL INSPECTION FORM  
 WELL ID NUMBER MPT-1406-16

Activity Name: MAYPORT NAVAL STATION

Facility Name ALPHA / DELTA PIER Bldg Number 2

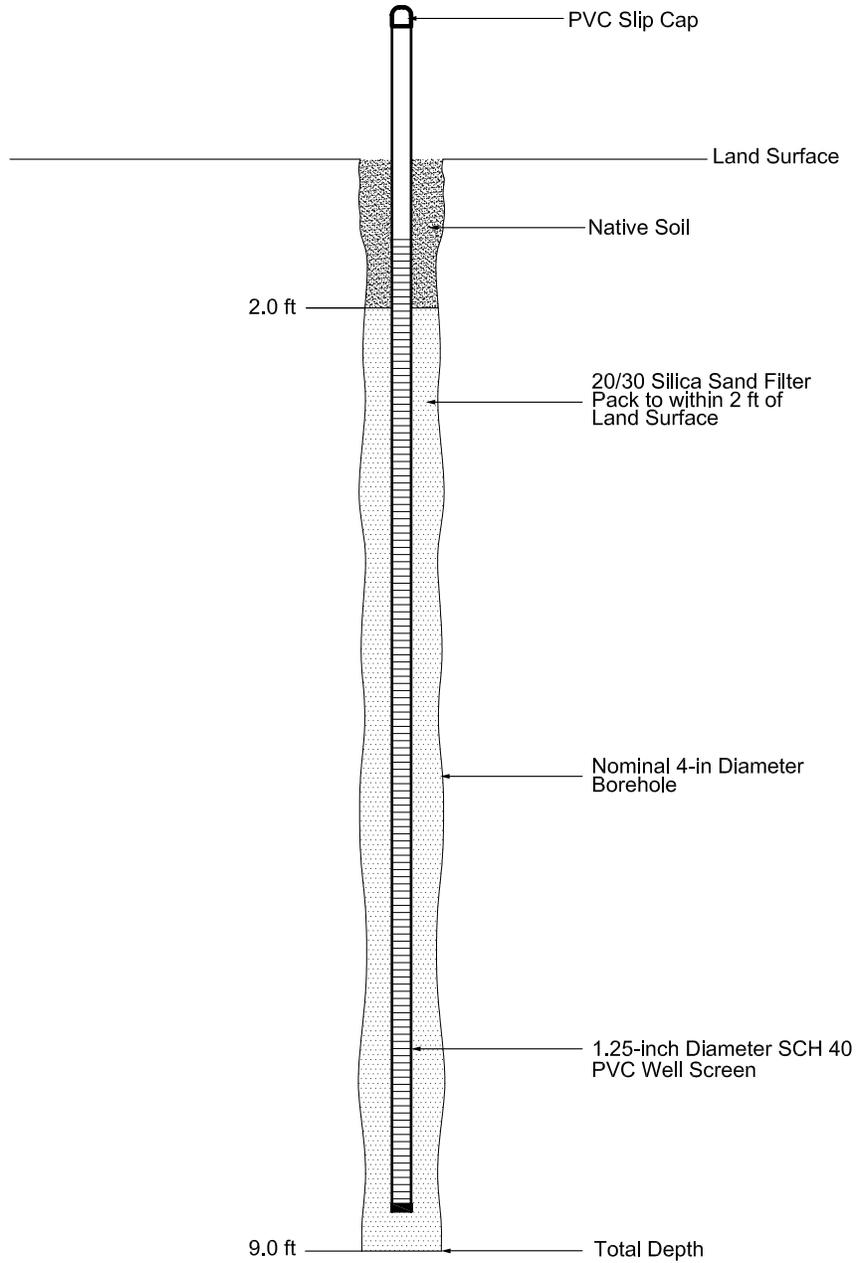
DATE	TIME	PETROLEUM ODOR? (Y/N)	FLOATING PRODUCT? (Y/N)	PRODUCT THICKNESS		AMOUNT OF WATER, PRODUCT REMOVED	TECH. NAME	COMMENTS
				FEET	IN			
1-15-02	0945	N	N	—	—	700 ML	R. LOUIE	WATER W/ SHEEN

ES: Depth of product measurements to the nearest 1/8" or 0.01'.  
 Inspection equipment must be thoroughly cleaned between wells.  
 Suspected releases must be reported to EPA or state agency within 24 hours.

REMARKS:  
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 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**APPENDIX C**

**TYPICAL PIEZOMETER CONSTRUCTION DIAGRAM**



**CONSTRUCTION DETAIL OF  
TYPICAL PIEZOMETER**

DRAWN BY LLK	DATE 6/24/04
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE AS NOTED	



TYPICAL PIEZOMETER CONSTRUCTION DETAIL  
FREE PRODUCT DETERMINATION REPORT  
ALPHA AND DELTA PIERS  
NAVAL STATION MAYPORT  
MAYPORT, FLORIDA

CONTRACT NO. 4265	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO. C-1	REV. 0

**APPENDIX D**  
**FINGERPRINT ANALYTICAL REPORT**

January 30, 2003

Duxbury Operations  
397 Washington Street  
Duxbury, Massachusetts 02332  
Telephone 781-934-0571  
Fax: 781-934-2124

Mr. David Siefken  
Tetra Tech  
8640 Phillips Highway  
Suite 16  
Jacksonville, FL 32256  
(904) 636-6125

Dear Mr. Siefken:

Battelle is pleased to provide you with results surrounding our investigation of three non-aqueous phase liquids (NAPL) recently collected in connection with the site investigation at the Mayport NUS Naval Station in Jacksonville, Florida.

This letter summarizes the results for the three NAPL samples collected on December 10 and December 13, 2002 by Tetra Tech personnel (see table below). The samples were shipped and delivered via overnight courier and received by our laboratory on December 17, 2003. Each sample was given a unique Battelle laboratory ID (see below). Copies of the chain-of-custody (COC) document and Battelle's log-in sheet are attached.

Sample ID	Sample Type	Battelle ID	Analysis Performed
MPT-Used Oil	NAPL	U2031	VOC/SVOC/Alkyl Lead/Fingerprint Analysis
MPT-MW-1406	NAPL	U2032	VOC/SVOC/Alkyl Lead/Fingerprint Analysis
MPT-FISC	NAPL	U2033	VOC/SVOC/Alkyl Lead/Fingerprint Analysis

The objective of this study was to determine the detailed chemical character of the three NAPL samples and, in turn provide an assessment as to the type(s) and degree(s) of weathering of the petroleum product(s) comprising the NAPLs. The chemical analyses performed on the three NAPL samples to achieve this objective included:

- 1) *Whole Oil Chromatographic Fingerprinting* using qualitative high-resolution gas chromatography (GC) using both full scan mass spectrometer (MS) and flame ionization detector (FID) detection;
- 2) *Quantitative volatile organic compound (VOC) analysis* of gasoline-related VOC via full scan purge-and-trap GC/MS using a modified EPA Method 8260; and
- 3) *Quantitative alkyl lead analysis* of organic lead species historically used in leaded gasolines via GC/MS using selected ion monitoring (SIM) according to a modified EPA Method 8270.
- 4) *Quantitative semi-volatile organic compound (SVOC) analysis* of decalins, benzothiophenes, and non-alkylated and alkylated polycyclic

January 30, 2003

aromatic hydrocarbons (PAH) via GC/MS using selected ion monitoring (SIM) according to a modified EPA Method 8270.

#### *Quality Control/Quality Assurance*

A strict quality control program was in place for this project and its staff, ensuring that sample tracking, sample preparation, and analytical instrument operation all met the quality control criteria detailed in the project's quality assurance project plan (QAPP). Battelle's Quality Assurance Unit (QAU), which remained independent of all work activities pertaining to this project, monitored the laboratory components of the project according to existing Battelle SOPs to ensure the accuracy, integrity, and completeness of the data.

An analytical and instrumental quality control program was in place to verify the consistency and stability of the analytical instruments and monitor the procedural efficiency of both sample handling and extraction. Each laboratory task and analysis contained, when applicable, a procedural blank (PB) to ensure that no sample contamination or cross-contamination occurred, a laboratory control sample (LCS) to monitor sample handling technique and extraction efficiency, a set of independently prepared laboratory duplicates to verify preparatory lab techniques and analytical precision and accuracy, and surrogate internal standards to monitor extraction efficiency were all employed as internal quality control (QC) samples.

Instrumental QC checks were in place to verify that the analytical methods were initially and continually in control. All instrument analyses employed a minimum 5-point initial calibration curve (ICC) to generate individual relative response factors (RRF) of the target analytes (or their response factor designates), with continuing calibration check (CCC) standards run periodically to verify ongoing instrumental integrity. The whole oil fingerprint analyses (GC/MS/Full Scan) employed an analytical range continuing calibration check to monitor the response of the instrument in the volatile range.

## **RESULTS AND DISCUSSION**

The whole oil chromatographic fingerprints (GC/FID only), tabulated VOC concentration data and corresponding GC/MS total ion chromatograms, tabulated SVOC (PAH) concentration data, and tabulated alkyl lead concentration data for the three NAPL samples are attached to this letter. In the sections that follow the chemical characteristics for the three NAPL samples are presented and discussed.

#### ***MPT-USED OIL***

Whole oil chromatographic analysis of the MPT-Used Oil demonstrated that it was overwhelming comprised of compounds that boiled within the C<sub>9</sub> to C<sub>27</sub> range. These compounds included a homologous suite of resolved *n*-alkanes over this carbon range that increased in abundance toward a maximum at *n*-C<sub>15</sub>. Other resolved peaks included various acyclic isoprenoids including pristane (Pr) and phytane (Ph) in a (Pr/Ph) ratio of approximately 1.1. An unresolved complex mixture (UCM) of compounds, which appears as a 'hump' on the chromatogram, was also present. This also reached a maximum around C<sub>15</sub>. Notably, a minor secondary UCM (hump) could be observed in the C<sub>27</sub> to C<sub>31</sub> carbon range.

January 30, 2003

Our analysis of VOC determined that the MPT-Used Oil contained only 1.7 wt% VOCs (17,700 mg/kg of total VOC). The VOC were composed mostly of C<sub>8</sub>+ compounds including *n*-alkanes and C<sub>2</sub>-C<sub>4</sub> alkylbenzenes. (Note that the trace detections of *tert*-butyl alcohol and methyl-*tert*-butyl ether; TBA and MTBE, are due to laboratory contamination.) The analysis of alkyl lead in the MPT-Used Oil revealed no detectable compounds.

The analysis of SVOC revealed that the MPT-Used Oil contained decalins, benzothiophenes, and PAH. The latter had a total concentration of approximately 18,000 mg/kg. The most abundant PAH were the 2-ring naphthalenes and 3-ring fluorenes and phenanthrenes. Virtually no PAH with 4 or more rings were detected. Notably, the concentration of dibenzothiophenes (sulfur-containing PAH) was relatively high, with ratios of C2-dibenzothiophene/C2-phenanthrenes (D2/P2) and C3-dibenzothiophene/C3-phenanthrenes (D3/P3) ratios of 1.4 and 1.8, respectively.

Collectively, the results reveal that the MPT-Used Oil overwhelmingly consists of a middle distillate fuel consistent with diesel fuel #2 or fuel oil #2. The predominance of *n*-alkanes indicates that the fuel has not experienced any significant weathering due to biodegradation. The presence of some aromatic VOC further indicates that the fuel has not experienced significant evaporation or water-washing. There is no evidence for the presence of an automotive gasoline (leaded or unleaded) component. Finally, the small UCM in the C<sub>27</sub> to C<sub>31</sub> carbon range suggests the MPT-Used Oil may contain a small percentage of a heavier petroleum (e.g., lubricating oil or waste oil). However, as aforementioned, the overwhelming mass of the MPT-Used Oil is consistent with an unweathered, middle distillate fuel (diesel fuel #2 or fuel oil #2).

#### ***MPT-FISC***

Whole oil chromatographic analysis of the MPT-FISC sample demonstrated that it was overwhelming comprised of compounds that boiled within the C<sub>9</sub> to C<sub>27</sub> range. As with the MPT-Used Oil (described above), these compounds included a homologous suite of resolved *n*-alkanes with a maximum at *n*-C<sub>15</sub>. Other resolved peaks included various acyclic isoprenoids including pristane (Pr) and phytane (Ph) in a (Pr/Ph) ratio of approximately 1.1. A comparison of the *n*-alkane 'envelop' reveals that the MPT-FISC sample contains slightly less C<sub>15</sub>-*n*-alkanes than the MPT-Used Oil (described above). An unresolved complex mixture (UCM) of compounds, which appears as a 'hump' on the chromatogram, was also present. This also reached a maximum around C<sub>15</sub>. Unlike the MPT-Used Oil (described above), the MPT-FISC sample had no minor secondary UCM (hump) observed in the C<sub>27</sub> to C<sub>31</sub> carbon range.

Our analysis of VOC determined that the MPT-FISC sample contained only 1.7 wt% VOCs (16,991 mg/kg of total VOC). The VOC were composed mostly of C<sub>8</sub>+ compounds including *n*-alkanes and C<sub>2</sub>-C<sub>4</sub> alkylbenzenes. (Note that the trace detections of *tert*-butyl alcohol and methyl-*tert*-butyl ether; TBA and MTBE, are due to laboratory contamination.) The analysis of alkyl lead in the MPT-FISC sample revealed no detectable compounds.

The analysis of SVOC revealed that the MPT-FISC sample contained decalins, benzothiophenes, and PAH. The latter had a total concentration of approximately 20,300 mg/kg. The most abundant PAH were the 2-ring naphthalenes and 3-ring fluorenes and phenanthrenes. Virtually no PAH with 4 or more rings were detected. Notably, the concentration of dibenzothiophenes (sulfur-containing PAH) was relatively high, with D2/P2 and D3/P3 ratios of 2.3 and 2.7, respectively. These are markedly higher than observed in the MPT-Used Oil (described above).

Collectively, the results reveal that the MPT-FISC sample overwhelmingly consists of a middle distillate fuel consistent with diesel fuel #2 or fuel oil #2. The predominance of *n*-alkanes indicates that the fuel has not experienced any significant weathering due to biodegradation. There is no evidence for significant evaporation or water-washing. There is no evidence for the presence of an automotive gasoline (leaded or unleaded) or heavier petroleum (e.g., lubricating oil or waste oil) component. Thus, the overwhelming mass of the MPT-FISC sample is consistent with an unweathered, middle distillate fuel (diesel fuel #2 or fuel oil #2).

#### ***MPT-MW-1406***

Whole oil chromatographic analysis of the MPT-MW-1406 sample demonstrated that it was overwhelming comprised of compounds that boiled within the C<sub>10</sub> to C<sub>27</sub> range. Unlike the other samples (described above), there are no resolved *n*-alkanes evident. The most prominent resolved compounds are acyclic isoprenoids including pristane (Pr) and phytane (Ph), which exhibit a (Pr/Ph) ratio of approximately 2.0. The absence of *n*-alkanes enhances the UCM hump, which is the dominant feature of the chromatogram. The UCM reaches a maximum around C<sub>17</sub>. An unresolved complex mixture (UCM) of compounds, which appears as a 'hump' on the chromatogram, was also present. This also reached a maximum around C<sub>15</sub>. The MPT-MW-1406 sample had no minor secondary UCM (hump) observed in the C<sub>27</sub> to C<sub>31</sub> carbon range.

Our analysis of VOC determined that the MPT-MW-1406 sample contained only 0.3 wt% VOCs (3221 mg/kg of total VOC). The VOC were composed mostly of C<sub>3</sub>-C<sub>4</sub> alkylbenzenes. (Note that the trace detections of *tert*-butyl alcohol and methyl-*tert*-butyl ether; TBA and MTBE, are due to laboratory contamination.) The analysis of alkyl lead in the MPT-MW-1406 sample revealed no detectable compounds.

The analysis of SVOC revealed that the MPT-MW-1406 sample contained decalins, benzothiophenes, and PAH. The latter had a total concentration of approximately 30,600 mg/kg. As in the other samples, the most abundant PAH were the 2-ring and 3-ring PAH. Notably, the concentration of dibenzothiophenes (sulfur-containing PAH) was relatively low, with D2/P2 and D3/P3 ratios of 0.7 and 0.9, respectively. These are markedly lower than observed in the MPT-Used Oil or MPT-FISC (described above).

Collectively, the results reveal that the MPT-MW-1406 sample overwhelmingly consists of a middle distillate fuel consistent with diesel fuel #2 or fuel oil #2. The absence of *n*-alkanes indicates that the fuel has experienced moderate weathering due to biodegradation. Some degree of evaporation or water-washing is likely, although this is not significant. There is no evidence for the presence of an automotive gasoline (leaded or unleaded) or heavier petroleum (e.g., lubricating oil or waste oil) component. Thus, the overwhelming mass of the MPT-MW-1406 sample is consistent with a moderately weathered, middle distillate fuel (diesel fuel #2 or fuel oil #2).

## **CONCLUSIONS**

Detailed chemical analysis of the three NAPL samples collected from the Mayport NUS Naval Station has revealed their compositions and the degrees of weathering.

- The MPT-Used Oil overwhelming consists of an unweathered, middle distillate fuel (diesel fuel #2 or fuel oil #2). There also is evidence for a trace amount of a

January 30, 2003

heavier petroleum product (e.g., lubricating oil or waste oil), which constitutes a very small percentage of the mass compared to the middle distillate component.

- The MPT-FISC oil exclusively consists of an unweathered, middle distillate fuel (diesel fuel #2 or fuel oil #2).
- The MPT-MW-1406 oil exclusively consists of a moderately weathered, middle distillate fuel (diesel fuel #2 or fuel oil #2).

Further comparison among these three samples was beyond the scope of this initial assessment. However, if this is determined to be necessary the available data should be sufficient to assess any 'genetic' relationship(s) between these samples.

Please let us know if you have any questions.

Sincerely,



Scott A. Stout, Ph.D., R.G.  
Geochemistry Research Leader



Richard M. Uhler  
Principal Research Scientist

Attachments:

Chain-of-Custody documents  
GC/FID chromatograms  
VOC Data Tables  
VOC GC/MS total ion chromatograms  
SVOC (PAH) Data Tables  
SVOC (PAH) Histograms  
Alkyl Lead Data Tables



Project Number: N4265 Client: TETRATECH  
 Received by: Fahey, Jessica Date/Time Received: Monday, December 16, 2002 10:30 AM  
 No. of Shipping Containers: 1

**SHIPMENT**

Method of Delivery: Commercial Carrier Tracking Number: 8371 1005 8660  
 COC Forms:  Shipped with samples  No Forms

**Cooler(s)/Box(es)**

Container #	Container Type	Seal Method	Seal Condition	Container Condition	Temp (°C)	Total Samples
1 of 1	Cooler	Tape	Intact	Intact	12.3	3

**Samples**

Sample Labels:  Sample labels agree with COC forms  
 Discrepancies (see Sample Custody Corrective Action Form)

Container Seals:  Tape  Custody Seals  Other Seals (See sample Log)  
 Seals intact for each shipping container  
 Seals broken (See sample log for impacted samples)

Condition of Samples:  Sample containers intact  
 Sample containers broken/leaking (See Custody Corrective Action Form)

Temperature upon receipt (°C): 12.3 Temperature Blank used  Yes  No  
 (Note: If temperature upon receipt differs from required conditions, see sample log comment field)

Samples Acidified:  Yes  No  Unknown

Initial pH 5-9?:  Yes  No  NA  
 If no, individual sample adjustments on the Auxiliary Sample Receipt Form

Total Residual Chlorine Present?:  Yes  No  NA  
 If yes, individual sample adjustments on the Auxiliary Sample Receipt Form

Head Space <1% in samples for water VOC analysis:  Yes  No  NA  
 Individual sample deviations noted on sample log

Samples Containers:  
 Samples returned in PC-grade jars:  Yes  No  Unknown /Lot No.: Unknown

Storage Location: Lower Cold Room Refrigerator BDO IDs Assigned: U2031 - U2033

Samples logged in by: Fahey, Jessica Date/Time: 12/17/2002 11:41 AM

Approved By: \_\_\_\_\_ Approved On: \_\_\_\_\_

Authorized By: \_\_\_\_\_ Authorized On: \_\_\_\_\_





TETRA TECH NUS, INC.

CHAIN OF CUSTODY

NUMBER

PAGE \_\_\_ OF \_\_\_

PROJECT NO: N4265		SITE NAME: MAGNET		PROJECT MANAGER AND PHONE NUMBER MARK REESCH / 904-636-6125			LABORATORY NAME AND CONTACT: BATTELLE / Richard Uhler											
SAMPLERS (SIGNATURE) 				FIELD OPERATIONS LEADER AND PHONE NUMBER Pete Lavette / 904-636-6125			ADDRESS 397 WASHINGTON STREET											
				CARRIER/WAYBILL NUMBER 8371-1005-8660			CITY, STATE DUXBURY, MA 02332											
STANDARD TAT <input checked="" type="checkbox"/> RUSH TAT <input type="checkbox"/> <input type="checkbox"/> 24 hr. <input type="checkbox"/> 48 hr. <input type="checkbox"/> 72 hr. <input type="checkbox"/> 7 day <input type="checkbox"/> 14 day				CONTAINER TYPE PLASTIC (P) or GLASS (G) <u>GL</u>			PRESERVATIVE USED											
				MATRIX			GRAB (G) COMP (C)			No. OF CONTAINERS			TYPE OF ANALYSIS FINGERPRINT - 6L			COMMENTS		
DATE YEAR	TIME	SAMPLE ID																
12/10	1410	MPT - USED OIL		Product	3		X										U2031	
12/13	1030	MPT - MW - 1406		L	3		X											U2032
12/10	1430	MPT - FISC		L	3		X											U2033
1. RELINQUISHED BY				DATE	TIME	1. RECEIVED BY			DATE	TIME	2. RECEIVED BY			DATE	TIME	3. RECEIVED BY		
2. RELINQUISHED BY				DATE	TIME	2. RECEIVED BY			DATE	TIME	3. RECEIVED BY			DATE	TIME	3. RECEIVED BY		
3. RELINQUISHED BY				DATE	TIME	3. RECEIVED BY			DATE	TIME	3. RECEIVED BY			DATE	TIME	3. RECEIVED BY		
COMMENTS																		

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE)

YELLOW (FIELD COPY)

PINK (FILE COPY)



... Putting Technology To Work

ShpNo SHP-021217-01

Battelle Project No: \_\_\_\_\_

Sample Receipt Form Details

Approved:  Authorizes:

Project Number: N4265 Client: TETRATECH

Received by: Fahey, Jessica Date/Time Received: Monday, December 16, 2002 10:30 AM

No. of Shipping Containers: 1

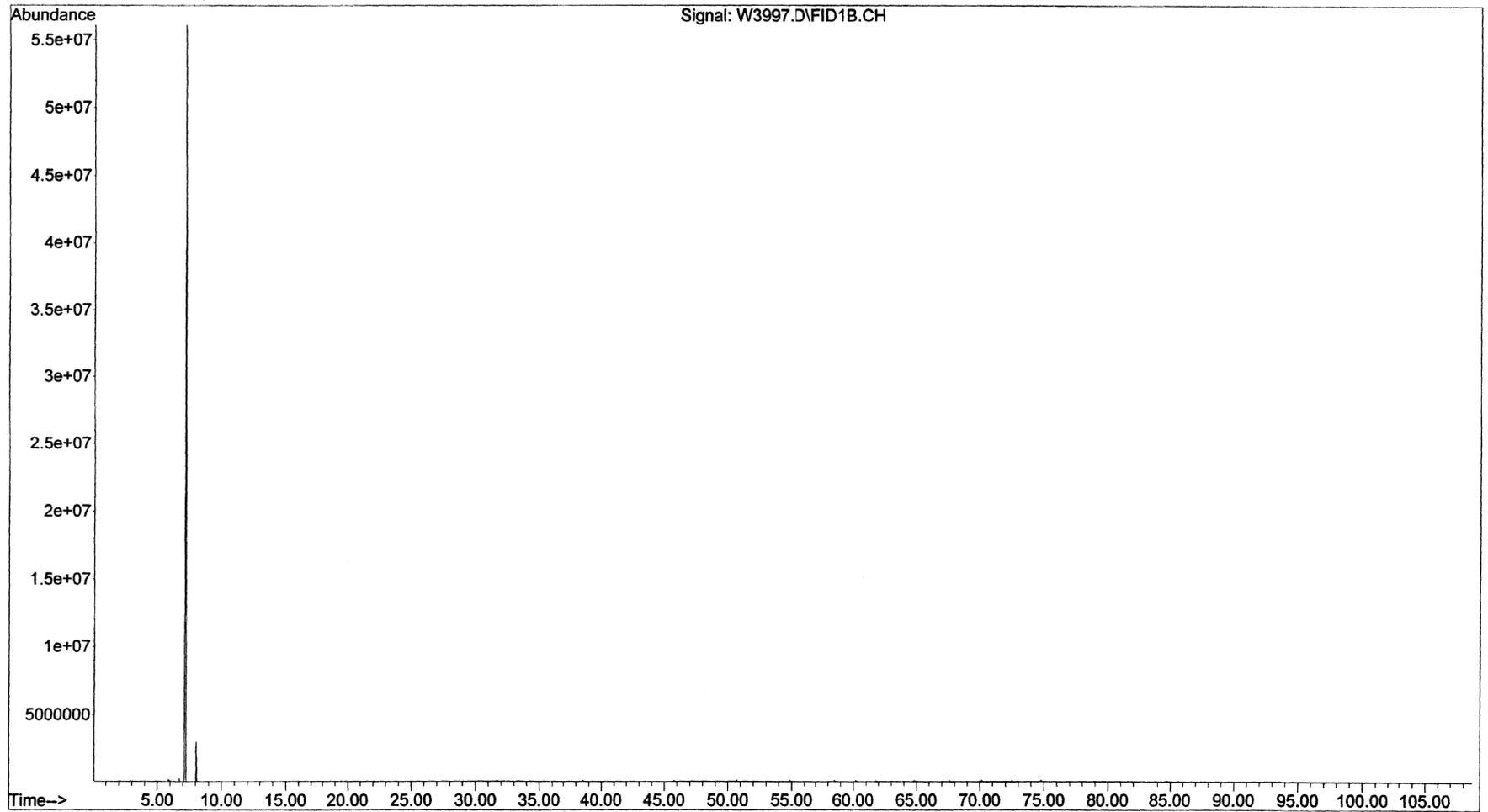
BDO Id:	Client Sample ID:	Collection Date:	Login Date:	Ctrs:	Matrix:	Temp:	pH:	TRC:	VOC:	Stored In:	Loc:	No:	Comments:
U2031	MPT-USED OIL	12/10/02 14:10	12/17/02 11:45	3	PRODUCT	12.3	NA	NA	NA	Cold Room Refrig			
U2032	MPT-MW-1406	12/13/02 10:30	12/17/02 11:46	3	PRODUCT	12.3	NA	NA	NA	Cold Room Refrig			
U2033	MPT-FISC	12/10/02 14:30	12/17/02 11:46	3	PRODUCT	12.3	NA	NA	NA	Cold Room Refrig			

Total Samples: 3



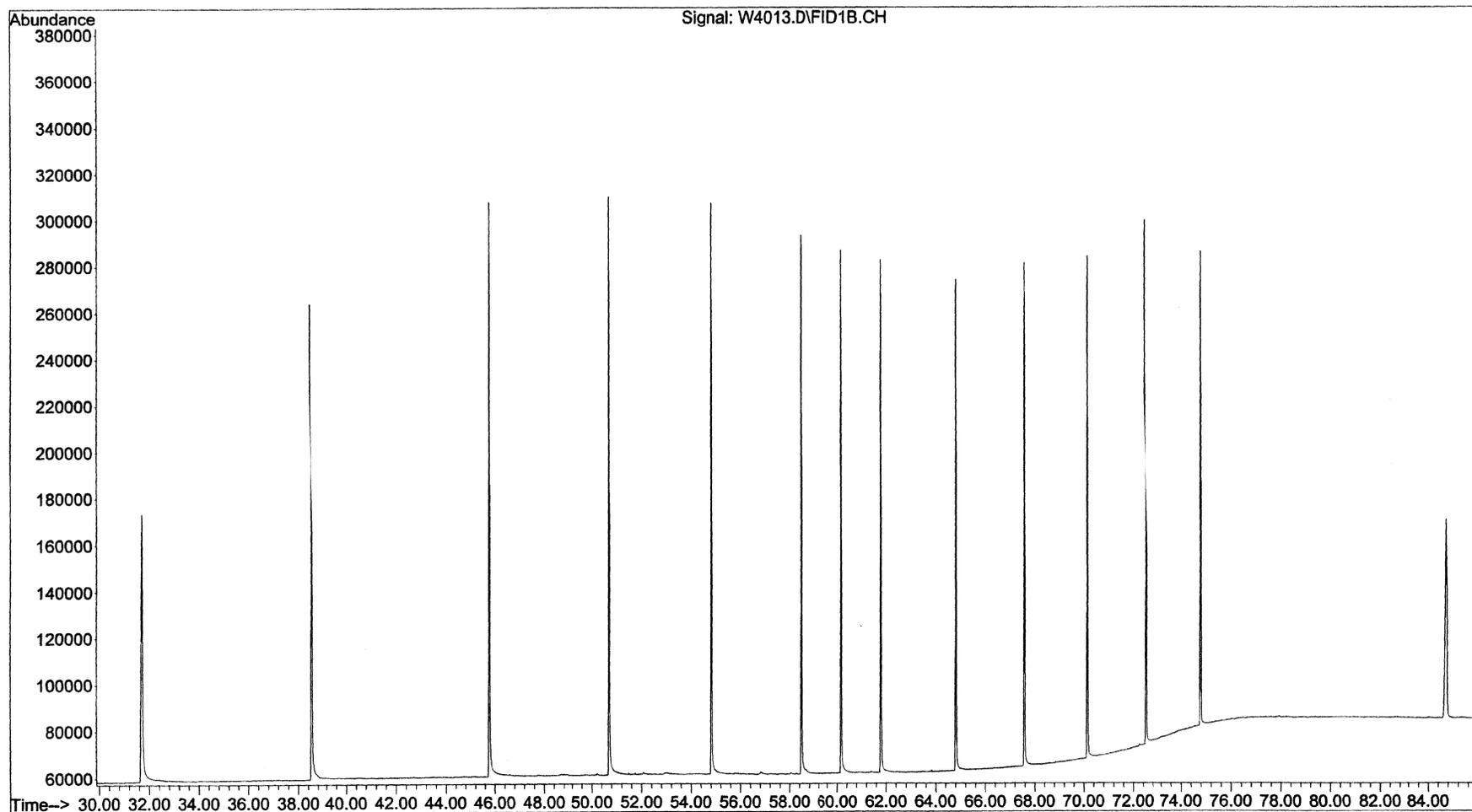
Privileged and Confidential  
Prepared at the Request of Legal Counsel  
in Anticipation of Litigation  
at the Direction of Trial Counsel

File : M:\A\DATA\SQW0084\W3997.D  
Operator : TH  
Acquired : 21 Jan 2003 2:50 pm using AcqMethod HYDR200L  
Instrument : GCMS-5  
Sample Name: 02-0221-01  
Misc Info :  
Vial Number: 1



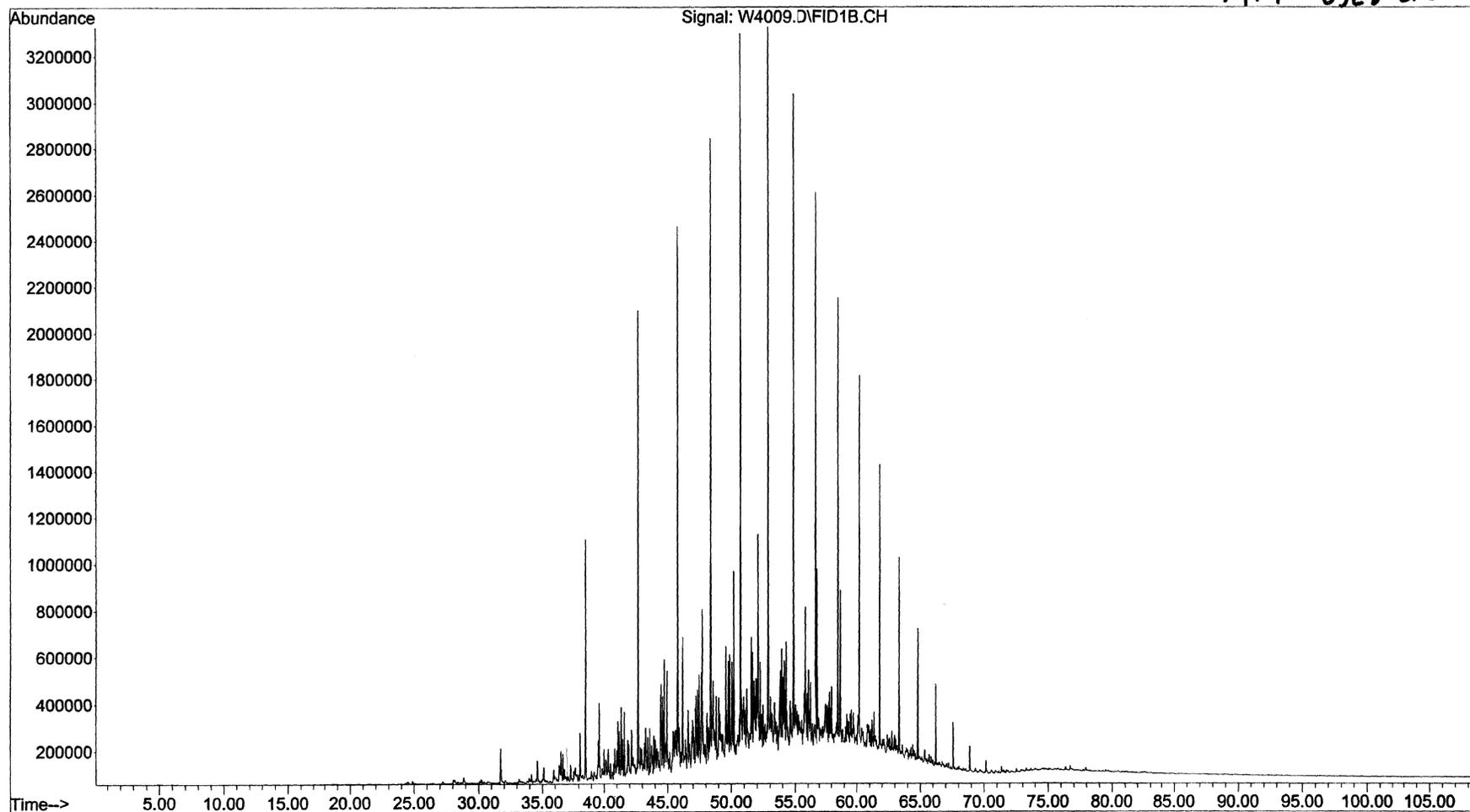
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Operator : TH  
Acquired : 22 Jan 2003 8:29 am using AcqMethod HYDR200L  
Instrument : GCMS-5  
Sample Name: 02-0221-01  
Misc Info :  
Vial Number: 9

Not Legal and Confidential  
Produced at the direction of Legal Counsel  
in the prosecution of the case  
at the direction of the Court.



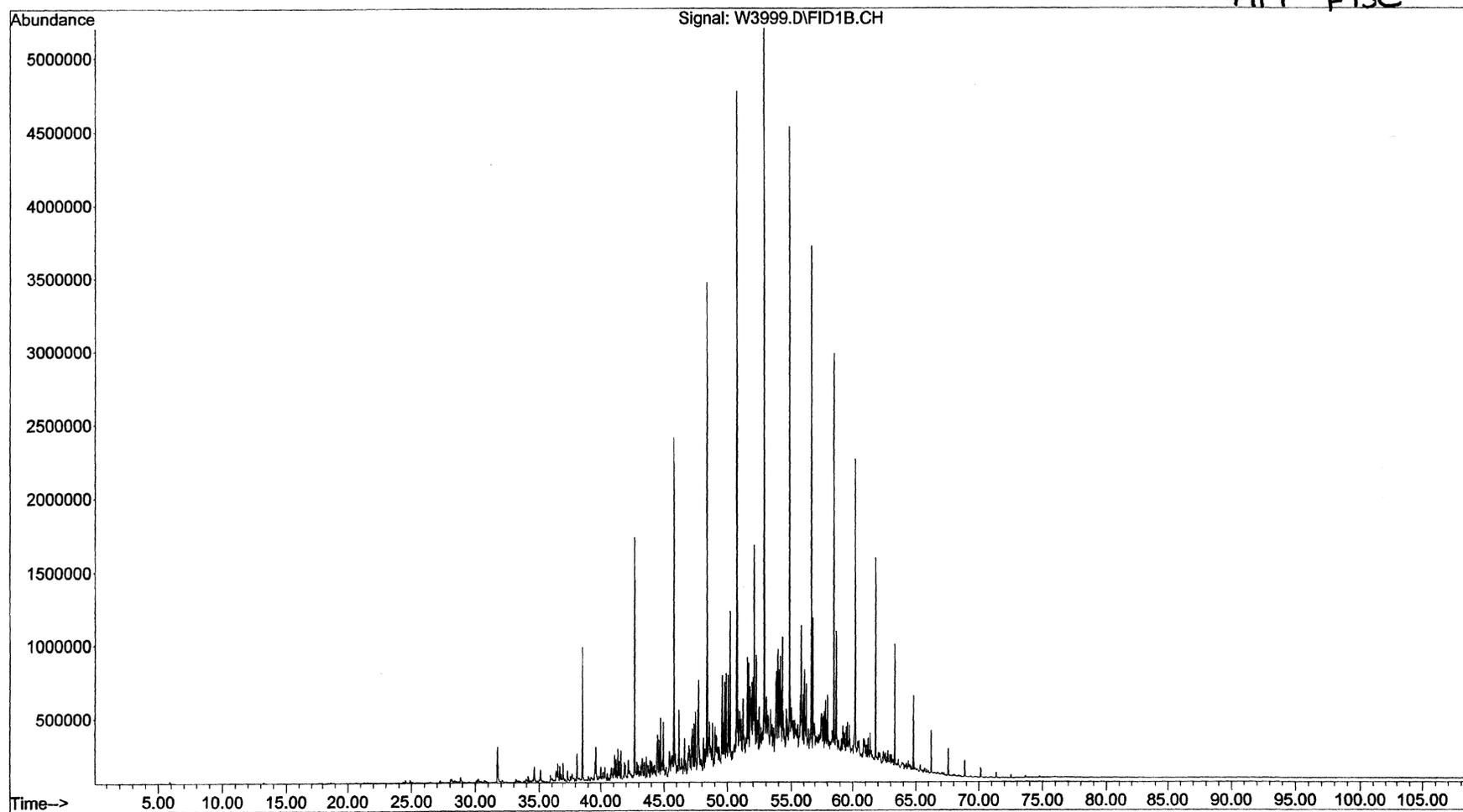
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Operator : TH  
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Instrument : GCMS-5  
Sample Name: U2031-WO  
Misc Info :  
Vial Number: 7

MPT-USED OIL



File : M:\A\DATA\SQW0084\W3999.D  
Operator : TH  
Acquired : 21 Jan 2003 4:55 pm using AcqMethod HYDR200L  
Instrument : GCMS-5  
Sample Name: U2033-WO  
Misc Info :  
Vial Number: 2

MPT-FISC





**(VOC) Concentrations in mg/kg**

Client ID:	Procedural Blank	MPT-USED OIL	MPT-MW-1406	MPT-FISC
Battelle ID:	AB879PB	U2031-V-D	U2032-V-D	U2033-V-D
Batch ID:	03-0037	03-0037	03-0037	03-0037
Analytical Method:	8260M	8260M	8260M	8260M
Sample Matrix:	Product	Product	Product	Product
Sample Weight (mg)	22.00	22.50	25.20	20.70
Dilution Factor:	200.00	200.00	200.00	200.00
Secondary Dilution:	NA	NA	NA	NA
Units:	mg/kg	mg/kg	mg/kg	mg/kg

Abbv.	Target Compound				
IP	Isopentane	0 U	0 U	0 U	0 U
1-P	1-Pentene	0 U	0 U	0 U	0 U
2M1B	2-Methyl-1-Butene	0 U	0 U	0 U	0 U
C5	n-C5 (Pentane)	0 U	11 J	0 U	22 J
t2P	trans-2-Pentene	0 U	0 U	0 U	0 U
c2P	cis-2-Pentene	0 U	0 U	0 U	0 U
TBA	t-Butanol (TBA)	511 LC	561 LC	662 LC	771 LC
22DMB	2,2-Dimethylbutane (Neohexane)	0 U	0 U	0 U	0 U
CYP	Cyclopentane	0 U	0 U	0 U	0 U
MTBE	Methyl tert butyl ether (MTBE)	17 LC	19 LC	16 LC	28 LC
2MP	2-Methylpentane	0 U	0 U	0 U	21 J
3MP	3-Methylpentane	0 U	5 J	4 J	14 J
1-H	1-Hexene	0 U	0 U	0 U	0 U
C6	n-C6 (Hexane)	11 J	17 J	8 J	36 J
DIPE	Di-isopropyl ether (DIPE)	0 U	0 U	0 U	0 U
t2H	trans-2-Hexene	0 U	0 U	0 U	0 U
2MP2	2-Methylpentene-2	0 U	0 U	0 U	0 U
c2H	cis-2-Hexene	0 U	0 U	0 U	0 U
ETBE	Ethyl tert butyl ether (ETBE)	0 U	0 U	0 U	0 U
MCYP	Methylcyclopentane	0 U	8 J	0 U	17 J
EDC	1,2-Dichloroethane (EDC)	0 U	0 U	0 U	0 U
22DMP	2,2-Dimethylpentane	0 U	0 U	0 U	0 U
24DMP	2,4-Dimethylpentane	0 U	0 U	0 U	0 U
B	Benzene	0 U	6 J	2 J	10 J
THIO	Thiophene	0 U	0 U	0 U	0 U
CYH	Cyclohexane	0 U	0 U	0 U	23 J
2MH	2-Methylhexane	0 U	12 J	0 U	29 J
23DMP	2,3-Dimethylpentane	0 U	0 U	11 J	20 J
TAME	Tert amyl methyl ether (TAME)	0 U	0 U	0 U	0 U
3MH	3-Methylhexane	0 U	18 J	0 U	48 J
TCE	Trichloroethane (TCE)	0 U	0 U	0 U	0 U
2M1H	2-Methyl-1-Hexene	0 U	0 U	0 U	0 U
ISO	2,2,4-Trimethylpentane	0 U	0 U	5 J	6 J
t3H	trans-3-Heptene	0 U	0 U	0 J	0 U
C7	n-C7 (Heptane)	0 U	44 J	0 U	110 J
c3H	cis-3-Heptene	0 U	0 U	0 U	0 U
t2H	trans-2-Heptene	0 U	0 U	0 U	0 U
c2H	cis-2-Heptene	0 U	0 U	0 U	0 U
MCYH	Methylcyclohexane	0 U	47 J	16 J	125 J
24DMH	2,4-Dimethylhexane	0 U	0 U	14 J	12 J
124TCYP	ctc-1,2,4-Trimethylcyclopentane	0 U	10 J	28 J	16 J
123TCYP	ctc-1,2,3-Trimethylcyclopentane	0 U	10 J	16 J	18 J
234TMP	2,3,4-Trimethylpentane	0 U	19 J	22 J	27 J
T	Toluene	6 J	42 J	3 J	133 J
233TMP	2,3,3-Trimethylpentane	0 U	0 U	0 U	0 U
2MTHIO	2-Methylthiophene	0 U	0 U	0 U	0 U
23DMH	2,3-Dimethylhexane	0 U	8 J	17 J	19 J
3MTHIO	3-Methylthiophene	0 U	0 U	0 U	0 U
2MHEP	2-Methylheptane	0 U	73 J	15 J	137 J
EDB	1,2-Dibromoethane (EDB)	0 U	0 U	0 U	0 U
1-Oct	1-Octene	0 U	0 U	0 U	0 U
22DMHEP	2,2-Dimethylheptane	0 U	0 U	0 U	0 U
PCE	Tetrachloroethylene (PCE)	0 U	0 U	0 U	0 U
C8	n-C8 (Octane)	0 U	236	0 U	443
t2OCT	trans-2-Octene	0 U	0 U	0 U	0 U

**Surrogate Recoveries (%)**

1,4-Difluorobenzene	100	100	101	101
Chlorobenzene-d5	101	101	101	100
1,4-Dichlorobenzene-d4	101	97	100	97

J: Analyte detected below RL

U: Analyte not detected

N: QC value outside the accuracy or precision DQO objective

D: Reflects secondary dilution analysis for target analyte

NA: Not Applicable

LC: Lab Contaminant



**(VOC) Concentrations in mg/kg**

Client ID:	Procedural Blank	MPT-USED OIL	MPT-MW-1406	MPT-FISC
Battelle ID:	AB879PB	U2031-V-D	U2032-V-D	U2033-V-D
Batch ID:	03-0037	03-0037	03-0037	03-0037
Analytical Method:	8260M	8260M	8260M	8260M
Sample Matrix:	Product	Product	Product	Product
Sample Weight (mg):	22.00	22.50	25.20	20.70
Dilution Factor:	200.00	200.00	200.00	200.00
Secondary Dilution:	NA	NA	NA	NA
Units:	mg/kg	mg/kg	mg/kg	mg/kg

Abbv.	Target Compound				
IPCYP	Isopropylcyclopentane	0 U	8 J	16 J	13 J
c2OCT	Cis-2-octene	0 U	0 U	0 U	0 U
224TMH	2,2,4-Trimethylhexane	0 U	4 J	13 J	7 J
24DMHE	2,4-Dimethylheptane	0 U	24 J	48 J	39 J
ECYHE	Ethylcyclohexane	0 U	98 J	67 J	172 J
26DMHEP	2,6-Dimethylheptane	0 U	67 J	131 J	96 J
114T	1,1,4-Trimethylcyclohexane	0 U	14 J	49 J	24 J
E	Ethylbenzene	5 J	105 J	0 U	188 J
2ETHIO	2-Ethylthiophene	0 U	0 U	0 U	0 U
ctt124	ctt-1,2,4-Trimethylcyclohexane	0 U	54 J	125	78 J
MX	m-Xylene	7 J	308	0 U	548
PX	p-Xylene	7 J	140 J	0 U	218
23DMHEP	2,3-Dimethylheptane	0 U	129	198	227
4MOCT	4-Methyloctane	0 U	115 J	0 U	161 J
2MOCT	2-Methyloctane	0 U	129 J	0 U	202
CTC124	ctc-1,2,4-Trimethylcyclohexane	0 U	39 J	73	45 J
112TMCY1	1,1,2-Trimethylcyclohexane	0 U	54 J	109	59 J
OX	o-Xylene	6 J	232	0 U	371
1NON	1-Nonene	0 U	0 U	0 U	0 U
t3NON	trans-3-Nonene	0 U	0 U	0 U	0 U
c3NON	cis-3-Nonene	0 U	0 U	0 U	0 U
C9	n-C9 (Nonane)	0 U	1138	0 U	1750
t2NON	trans 2-Nonene	0 U	0 U	0 U	0 U
IPB	Isopropylbenzene	0 U	81	52 J	105
c2NON	cis-2-Nonene	0 U	0 U	0 U	0 U
IPCYH	Isopropylcyclohexane	0 U	66 J	96 J	75 J
22DMOCT	2,2-Dimethyloctane	0 U	28 J	34 J	31 J
nBCPEN	n-Butylcyclopentane	0 U	145	63 J	171
33DMOCT	3,3-Dimethyloctane	0 U	186	185	211
PROPB	Propylbenzene	0 U	219	68 J	255
1M3EB	1-Methyl-3-Ethylbenzene	0 U	686	0 U	794
1M4EB	1-Methyl-4-Ethylbenzene	0 U	282	0 U	346
135TMB	1,3,5-Trimethylbenzene	0 U	320	0 U	337
1M2E	1-Methyl-2-Ethylbenzene	0 U	504	0 U	588
3MNON	3-Methylnonane	0 U	342	0 U	319
124TMB	1,2,4-Trimethylbenzene	0 U	1366	5 J	1398
1-DEC	1-Decene	0 U	0 U	0 U	0 U
secBUT	sec-Butylbenzene	0 U	254	120	257
C10	n-C10 (Decane)	30 J	1763	0 U	1613
123TMB	1,2,3-Trimethylbenzene	24 J	633	3 J	573
IND	Indane (Indan)	0 U	166 J	133 J	139 J
13DEB	1,3-Diethylbenzene (m-Diethyl Benzene)	0 U	224	203	189 J
14DEB	1,4-Diethylbenzene (p-Diethyl Benzene)	0 U	508	63 J	385
13DE5EB	1,3-Dimethyl-5-Ethylbenzene	0 U	477	0 U	363
12DEB	1,2-Diethylbenzene	0 U	165	123	148
1M2PB	1-Methyl-2-n-Propylbenzene	0 U	757	4 J	673
12DM4EB	1,2-Dimethyl-4-Ethylbenzene	0 U	599	0 U	488
13DM2EB	1,3-Dimethyl-2-Ethylbenzene	0 U	312	282	233
C11	n-C11 (Undecane)	0 E	1243 E	0 E	1048 E
1245TMB	1,2,4,5-Tetramethylbenzene	0 U	125	146	86
1235TMB	1,2,3,5-Tetramethylbenzene	0 U	585	10 J	470
1234TMB	1,2,3,4-Tetramethylbenzene	0 U	741	603	492
nPB	n-Pentylbenzene	0 U	438	200	358
BT	Benzothiophene (Thianaphthene)	0 E	0 E	0 E	0 E
MMT	MMT (Manganese)	0 E	0 E	0 E	0 E
C12	n-C12 (Dodecane)	49 E	682 E	0 E	700 E

**Surrogate Recoveries (%)**

1,4-Difluorobenzene	100	100	101	101
Chlorobenzene-d5	101	101	101	100
1,4-Dichlorobenzene-d4	101	97	100	97

J: Analyte detected below RL  
 U: Analyte not detected  
 N: QC value outside the accuracy or precision DQO objective  
 D: Reflects secondary dilution analysis for target analyte  
 NA: Not Applicable  
 LC: Lab Contaminant



**Laboratory Control Sample VOC Data**

Client ID: Laboratory Control Sample  
 Battelle ID: AB880LCS  
 Batch ID: 03-0037  
 Analytical Method: 8260M  
 Sample Matrix: Product  
 Dilution Factor: 200.00  
 Units: ng

Target Analytes	Amount Found (ng)	Amount Spiked (ng)	Percent Recovery (%)
n-C5 (Pentane)	445.69	401.80	111
Methyl tert butyl ether (MTBE)	422.30	401.52	105
n-C6 (Hexane)	384.21	401.32	96
Benzene	417.43	401.52	104
Toluene	388.40	401.44	97
n-C8 (Octane)	358.71	401.44	89
Ethylbenzene	393.97	401.56	98
m-Xylene	425.56	401.24	106
p-Xylene	437.13	401.28	109
o-Xylene	392.47	401.72	98
n-C10 (Decane)	355.34	401.84	88
1,2,3-Trimethylbenzene	364.11	401.44	91
n-C12 (Dodecane)	428.71	401.72	107

Surrogate Recovery %:

1,4-Difluorobenzene	407.90	400	102
Chlorobenzene-d5	410.21	400	103
1,4-Dichlorobenzene-d4	419.16	400	105

J: Analyte detected below RL  
 U: Analyte not detected  
 N: QC value outside the accuracy or precision DQO objective  
 D: Reflects secondary dilution analysis for target analyte  
 NA: Not Applicable  
 LC: Lab Contaminant

**Sample Duplicate VOC Results in mg/kg**

Client ID:	MPT-USED OIL	MPT-USED OIL	
Battelle ID:	U2031-V-D	U2031DUP-V-D	
Batch ID:	03-0037	03-0037	
Analytical Method:	8260M	8260M	
Sample Matrix:	Product	Product	
Sample Weight (mg):	22.50	20.90	
Dilution Factor:	200.00	200.00	
Secondary Dilution:	NA	NA	RPD
Units:	mg/kg	mg/kg	(%)

Abbv.	Target Compound			
IPCYP	Isopropylcyclopentane	8 J	8 J	1
c2OCT	Cis-2-octene	0 U	0 U	NA
224TMH	2,2,4-Trimethylhexane	4 J	4 J	7
24DMHE	2,4-Dimethylheptane	24 J	24 J	0
ECYHE	Ethylcyclohexane	98 J	96 J	2
26DMHEP	2,6-Dimethylheptane	67 J	63 J	7
114T	1,1,4-Trimethylcyclohexane	14 J	18 J	25
E	Ethylbenzene	105 J	107 J	2
2ETHIO	2-Ethylthiophene	0 U	0 U	NA
ctt124	ctt-1,2,4-Trimethylcyclohexane	54 J	55 J	1
MX	m-Xylene	308	289	6
PX	p-Xylene	140 J	154	10
23DMHEP	2,3-Dimethylheptane	129	103	23
4MOCT	4-Methyloctane	115 J	122 J	5
2MOCT	2-Methyloctane	129 J	122 J	5
CTC124	ctc-1,2,4-Trimethylcyclohexane	39 J	39 J	0
112TMCYH	1,1,2-Trimethylcyclohexane	54 J	53 J	2
OX	o-Xylene	232	237	2
1NON	1-Nonene	0 U	0 U	NA
t3NON	trans-3-Nonene	0 U	0 U	NA
c3NON	cis-3-Nonene	0 U	0 U	NA
C9	n-C9 (Nonane)	1138	1139	0
t2NON	trans-2-Nonene	0 U	0 U	NA
IPB	Isopropylbenzene	81	85	4
c2NON	cis-2-Nonene	0 U	0 U	NA
IPCYH	Isopropylcyclohexane	66 J	68 J	2
22DMOCT	2,2-Dimethyloctane	28 J	33 J	19
nBCPEN	n-Butylcyclopentane	145	156	7
33DMOCT	3,3-Dimethyloctane	186	193	4
PROPB	Propylbenzene	219	222	1
1M3EB	1-Methyl-3-Ethylbenzene	686	699	2
1M4EB	1-Methyl-4-Ethylbenzene	282	286	1
135TMB	1,3,5-Trimethylbenzene	320	325	2
1M2E	1-Methyl-2-Ethylbenzene	504	504	0
3MNON	3-Methylnonane	342	351	3
124TMB	1,2,4-Trimethylbenzene	1366	1405	3
1-DEC	1-Decene	0 U	0 U	NA
secBUT	sec-Butylbenzene	254	260	2
C10	n-C10 (Decane)	1763	2018	13
123TMB	1,2,3-Trimethylbenzene	633	650	3
IND	Indane (Indan)	166 J	173 J	4
13DEB	1,3-Diethylbenzene (m-Diethyl Benzene)	224	235	5
14DEB	1,4-Diethylbenzene (p-Diethyl Benzene)	508	509	0
13DE5EB	1,3-Dimethyl-5-Ethylbenzene	477	504	5
12DEB	1,2-Diethylbenzene	165	177	7
1M2PB	1-Methyl-2-n-Propylbenzene	757	793	5
12DM4EB	1,2-Dimethyl-4-Ethylbenzene	599	652	9
13DM2EB	1,3-Dimethyl-2-Ethylbenzene	312	327	5
C11	n-C11 (Undecane)	1243 E	1620 E	26
1245TMB	1,2,4,5-Tetramethylbenzene	125	129	4
1235TMB	1,2,3,5-Tetramethylbenzene	585	629	7
1234TMB	1,2,3,4-Tetramethylbenzene	741	823	11
nPB	n-Pentylbenzene	438	473	8
BT	Benzothiophene (Thianaphthene)	0 E	0 E	NA
MMT	MMT (Manganese)	0 E	0 E	NA
C12	n-C12 (Dodecane)	682 E	1037 E	41 N

<b>Surrogate Recoveries (%)</b>		
1,4-Difluorobenzene	100	100
Chlorobenzene-d5	101	101
1,4-Dichlorobenzene-d4	97	101

J: Analyte detected below RL  
 U: Analyte not detected  
 N: QC value outside the accuracy or precision DQO objective  
 D: Reflects secondary dilution analysis for target analyte  
 NA: Not Applicable  
 LC: Lab Contaminant

**Sample Duplicate VOC Results in mg/kg**

Client ID:	MPT-USED OIL	MPT-USED OIL	
Battelle ID:	U2031-V-D	U2031DUP-V-D	
Batch ID:	03-0037	03-0037	
Analytical Method:	8260M	8260M	
Sample Matrix:	Product	Product	
Sample Weight (mg):	22.50	20.90	
Dilution Factor:	200.00	200.00	
Secondary Dilution:	NA	NA	RPD
Units:	mg/kg	mg/kg	(%)

Abbv.	Target Compound			
IP	Isopentane	0 U	0 U	NA
1-P	1-Pentene	0 U	0 U	NA
2M1B	2-Methyl-1-Butene	0 U	0 U	NA
C5	n-C5 (Pentane)	11 J	0 U	NA
12P	trans-2-Pentene	0 U	0 U	NA
c2P	cis-2-Pentene	0 U	0 U	NA
TBA	t-Butanol (TBA)	561 LC	627 LC	11
22DMB	2,2-Dimethylbutane (Neohexane)	0 U	0 U	NA
CYP	Cyclopentane	0 U	0 U	NA
MTBE	Methyl tert butyl ether (MTBE)	19 LC	19 LC	4
2MP	2-Methylpentane	0 U	0 U	NA
3MP	3-Methylpentane	5 J	6 J	7
1-H	1-Hexene	0 U	0 U	NA
C6	n-C6 (Hexane)	17 J	16 J	7
DIPE	Di-isopropyl ether (DIPE)	0 U	0 U	NA
12H	trans-2-Hexene	0 U	0 U	NA
2MP2	2-Methylpentene-2	0 U	0 U	NA
c2H	cis-2-Hexene	0 U	0 U	NA
ETBE	Ethyl tert butyl ether (ETBE)	0 U	0 U	NA
MCYP	Methylcyclopentane	8 J	8 J	0
EDC	1,2 Dichloroethane (EDC)	0 U	0 U	NA
22DMP	2,2-Dimethylpentane	0 U	0 U	NA
24DMP	2,4-Dimethylpentane	0 U	0 U	NA
B	Benzene	6 J	5 J	15
THIO	Thiophene	0 U	0 U	NA
CYH	Cyclohexane	0 U	0 U	NA
2MH	2-Methylhexane	12 J	11 J	6
23DMP	2,3-Dimethylpentane	0 U	0 U	NA
TAME	Tert amyl methyl ether (TAME)	0 U	0 U	NA
3MH	3-Methylhexane	18 J	20 J	12
TCE	Trichloroethane (TCE)	0 U	0 U	NA
2M1H	2-Methyl-1-Hexene	0 U	0 U	NA
ISO	2,2,4-Trimethylpentane	0 U	0 U	NA
13H	trans-3-Heptene	0 U	0 U	NA
C7	n-C7 (Heptane)	44 J	38 J	15
c3H	cis-3-Heptene	0 U	0 U	NA
12H	trans-2-Heptene	0 U	0 U	NA
c2H	cis-2-Heptene	0 U	0 U	NA
MCYH	Methylcyclohexane	47 J	44 J	5
24DMH	2,4-Dimethylhexane	0 U	0 U	NA
124TCYP	ctc-1,2,4-Trimethylcyclopentane	10 J	9 J	4
123TCYP	ctc-1,2,3-Trimethylcyclopentane	10 J	8 J	13
234TMP	2,3,4-Trimethylpentane	19 J	18 J	6
T	Toluene	42 J	40 J	5
233TMP	2,3,3-Trimethylpentane	0 U	0 U	NA
2MTHIO	2-Methylthiophene	0 U	0 U	NA
23DMH	2,3-Dimethylhexane	8 J	10 J	15
3MTHIO	3-Methylthiophene	0 U	0 U	NA
2MHEP	2-Methylheptane	73 J	68 J	6
EDB	1,2 Dibromoethane (EDB)	0 U	0 U	NA
1-Oct	1-Octene	0 U	0 U	NA
22DMHEP	2,2-Dimethylheptane	0 U	0 U	NA
PCE	Tetrachloroethylene (PCE)	0 U	0 U	NA
C8	n-C8 (Octane)	236	218	8
12OCT	trans-2-Octene	0 U	0 U	NA

**Surrogate Recoveries (%)**

1,4-Difluorobenzene	100	100
Chlorobenzene-d5	101	
1,4-Dichlorobenzene-d4	97	101

J: Analyte detected below RL

U: Analyte not detected

N: QC value outside the accuracy or precision DQO objective

D: Reflects secondary dilution analysis for target analyte

NA: Not Applicable

LC: Lab Contaminant

Quantitation Report (QT Reviewed)

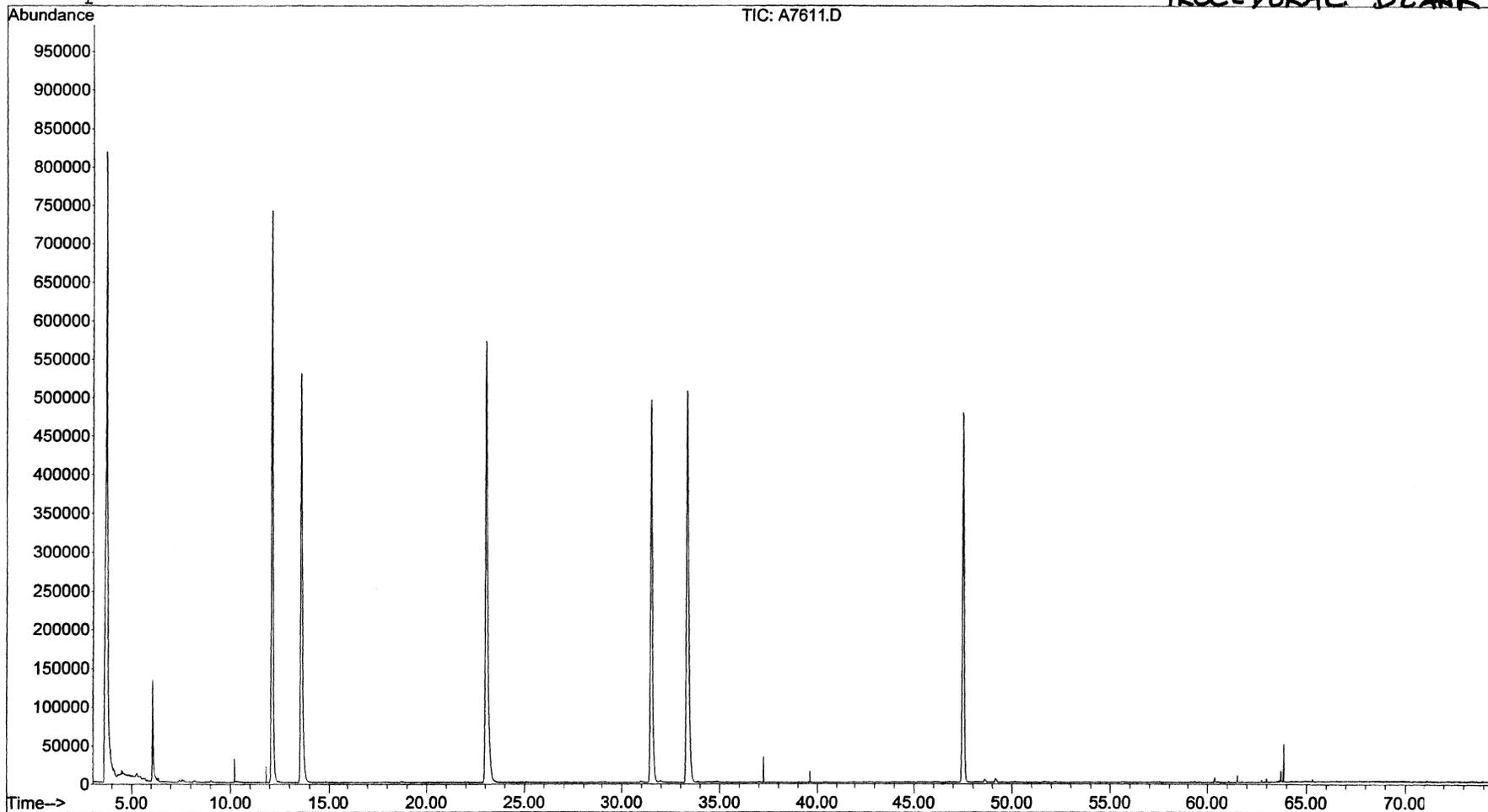
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Acq On : 17 Jan 2003 12:54 pm  
Sample : AB879PB  
Misc : EPS 8/26/02  
MS Integration Params: RTEINT.P  
Quant Time: Jan 17 14:24 2003

Vial: 12  
Operator: TH  
Inst : GC/MS Ins  
Multiplr: 1.00

Quant Results File: SA089PNO.RES

Method : N:\A\DATA\SA089PNO.M (RTE Integrator)  
Title : PIANO2001  
Last Update : Fri Jan 17 10:49:12 2003  
Response via : Initial Calibration

*PROCEDURAL BLANK*



Quantitation Report (QT Reviewed)

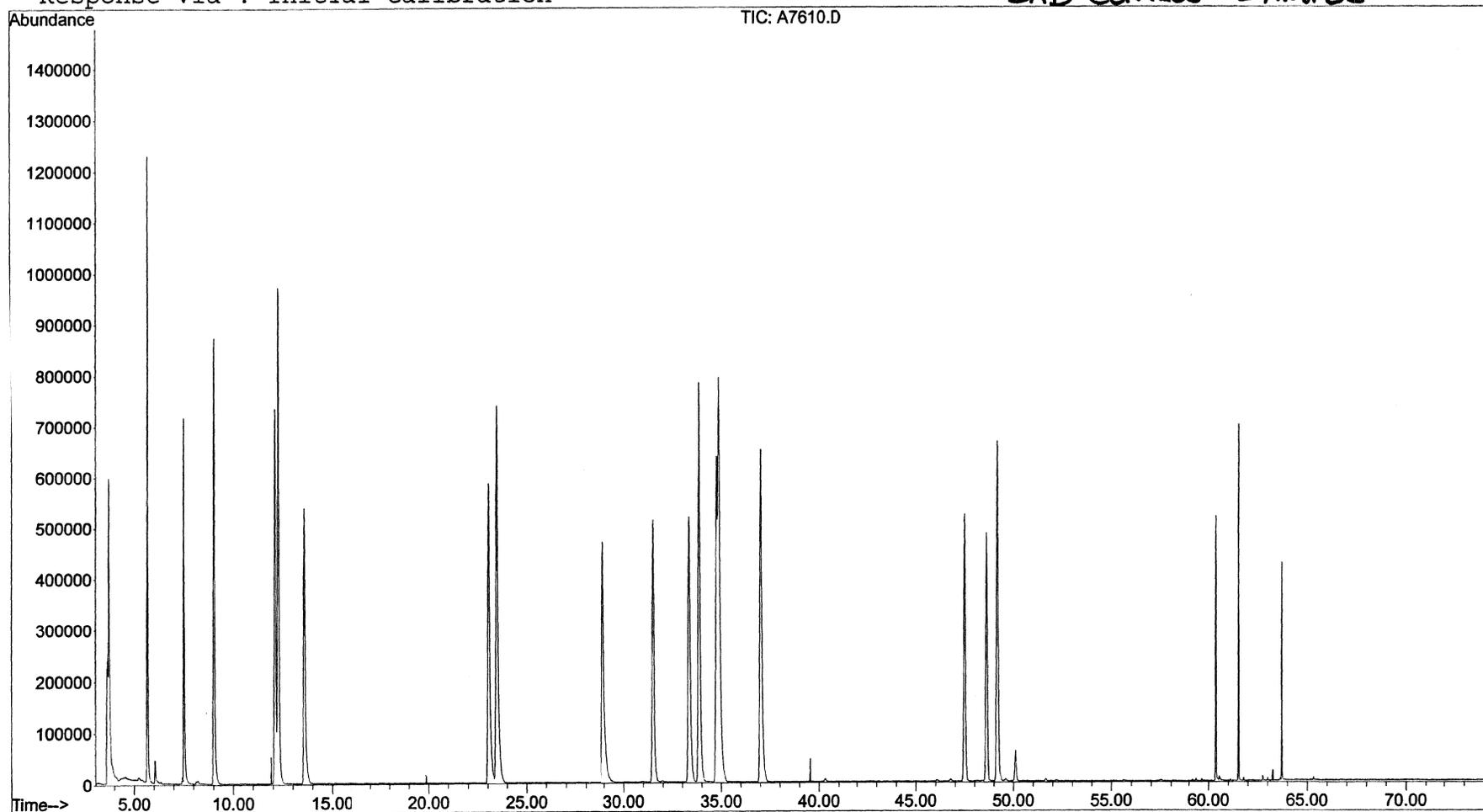
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Sample : AB880LCS  
Misc : EPS 8/26/02  
MS Integration Params: RTEINT.P  
Quant Time: Jan 17 13:26 2003

Vial: 11  
Operator: TH  
Inst : GC/MS Ins  
Multiplr: 1.00

Quant Results File: SA089PNO.RES

Method : N:\A\DATA\SA089PNO.M (RTE Integrator)  
Title : PIANO2001  
Last Update : Fri Jan 17 10:49:12 2003  
Response via : Initial Calibration

LAB CONTROL SAMPLE



Quantitation Report (QT Reviewed)

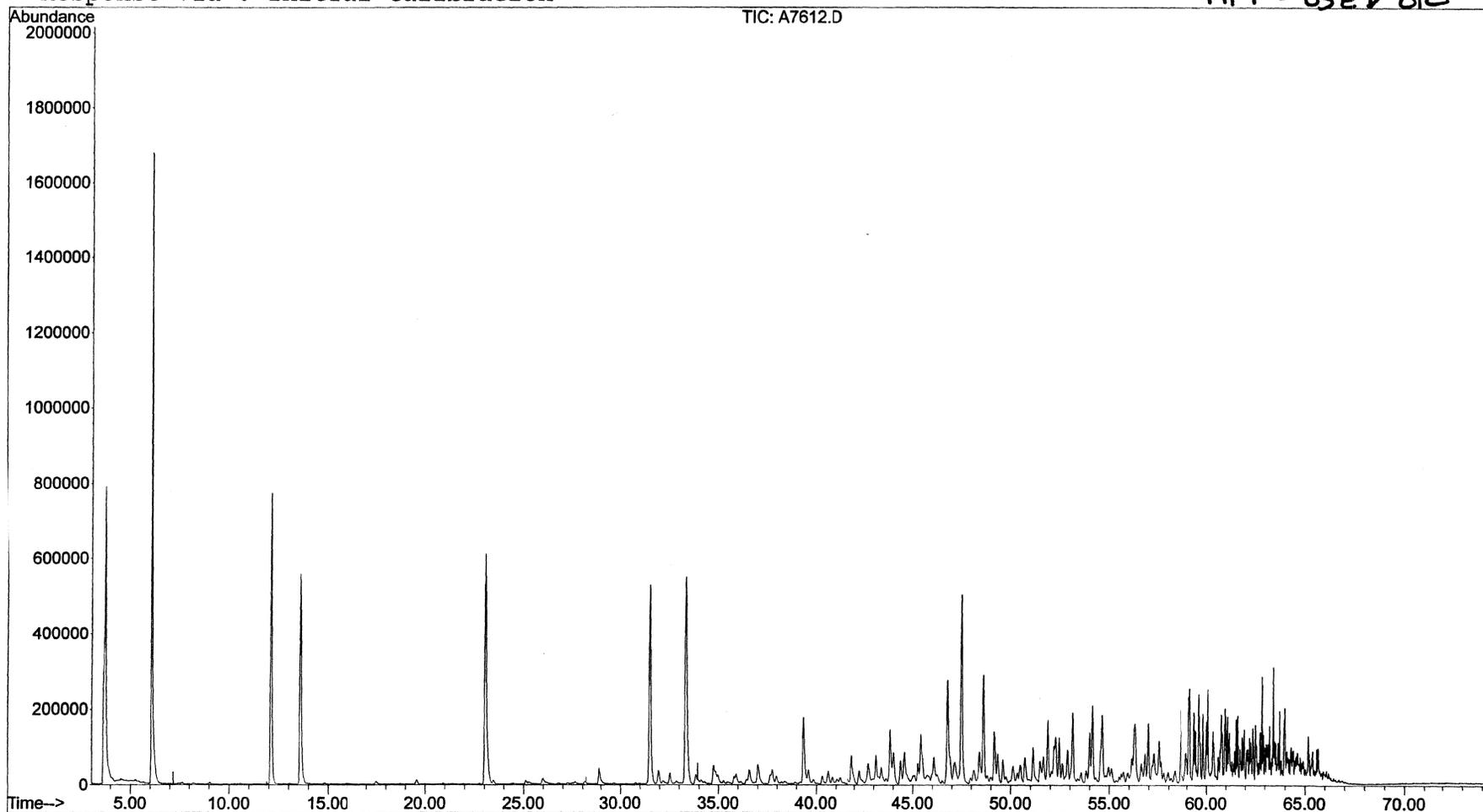
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Sample : V2031-V-D  
Misc : EPS 8/26/02  
MS Integration Params: RTEINT.P  
Quant Time: Jan 17 17:03 2003

Vial: 13  
Operator: TH  
Inst : GC/MS Ins  
Multiplr: 1.00

Quant Results File: SA089PNO.RES

Method : N:\A\DATA\SA089PNO.M (RTE Integrator)  
Title : PIANO2001  
Last Update : Fri Jan 17 10:49:12 2003  
Response via : Initial Calibration

MPT - USED OIL



Quantitation Report (QT Reviewed)

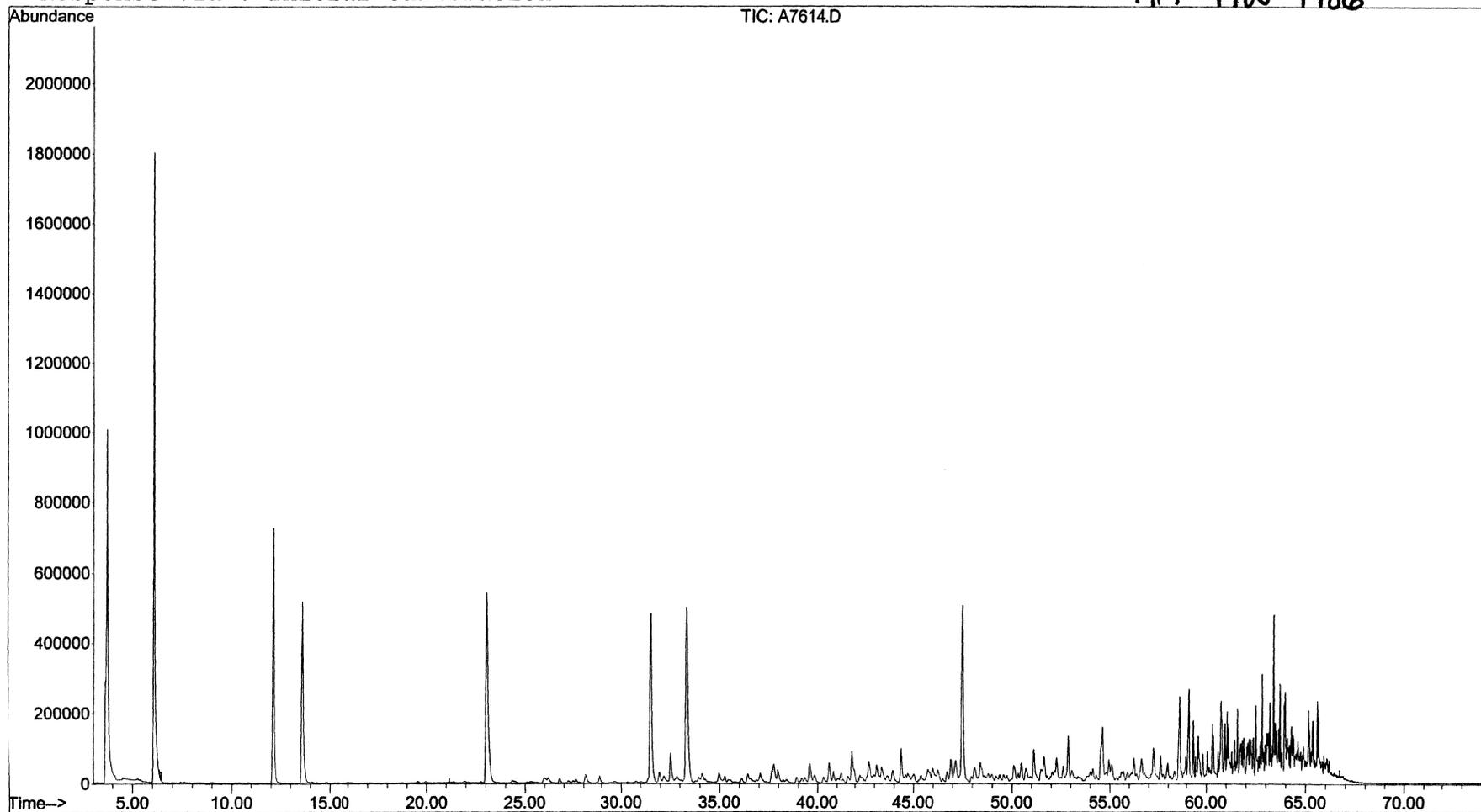
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Sample : V2032-V-D  
Misc : EPS 8/26/02  
MS Integration Params: RTEINT.P  
Quant Time: Jan 20 8:59 2003

Vial: 15  
Operator: TH  
Inst : GC/MS Ins  
Multiplr: 1.00

Quant Results File: SA089PNO.RES

Method : N:\A\DATA\SA089PNO.M (RTE Integrator)  
Title : PIANO2001  
Last Update : Fri Jan 17 10:49:12 2003  
Response via : Initial Calibration

MPT-MW-1406



Quantitation Report (QT Reviewed)

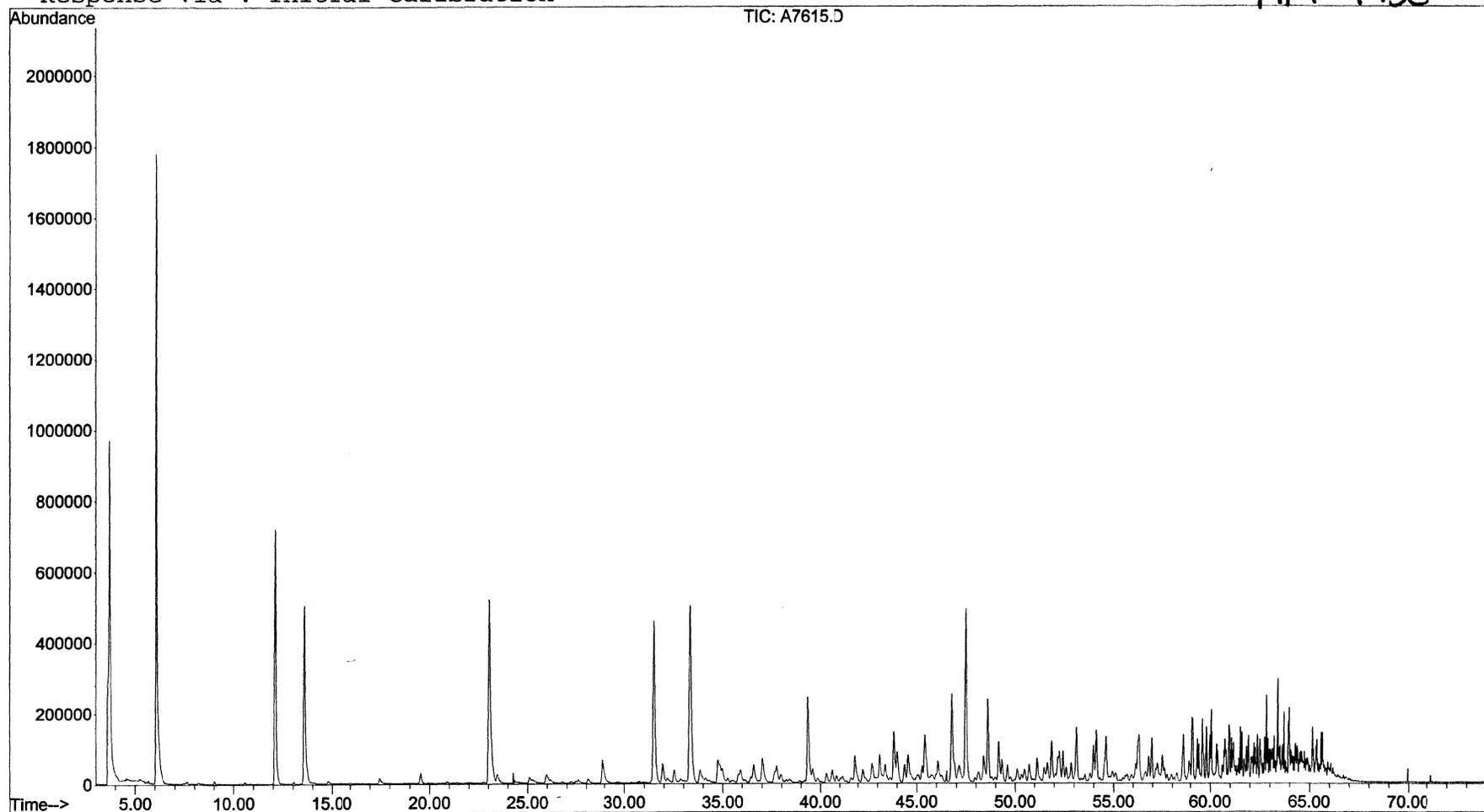
Data File : N:\A\DATA\SQVA089\A7615.D  
Acq On : 17 Jan 2003 6:27 pm  
Sample : V2033-V-D  
Misc : EPS 8/26/02  
MS Integration Params: RTEINT.P  
Quant Time: Jan 20 9:49 2003

Vial: 16  
Operator: TH  
Inst : GC/MS Ins  
Multiplr: 1.00

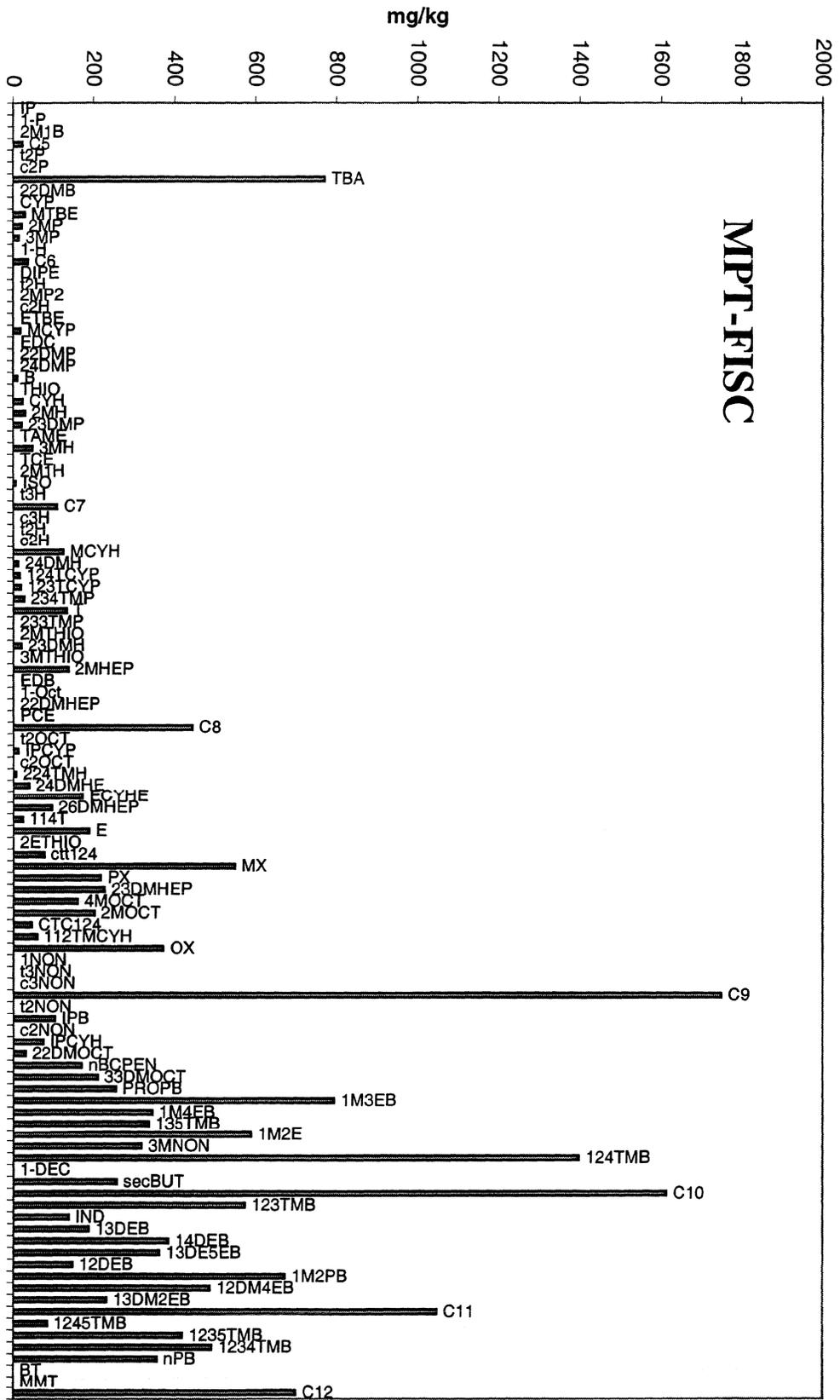
Quant Results File: SA089PNO.RES

Method : N:\A\DATA\SA089PNO.M (RTE Integrator)  
Title : PIANO2001  
Last Update : Fri Jan 17 10:49:12 2003  
Response via : Initial Calibration

MPT-FISC











Project Name Mayport NUS Site Investigation  
 Project Number N005502

Client Sample ID	MPT-USED OIL	MPT-USED OIL	MPT-MW-1406	MPT-F15C
Battelle Sample ID	U2031-D	U2031DUP-D	U2032-D	U2033-D
Battelle Batch ID	03-0036	03-0036	03-0036	03-0036
Analytical Method	8270M	8270M	8270M	8270M
Matrix	Product	Product	Product	Product
Sample Weight (mg)	52.20	50.00	53.80	53.20
Primary Dilution Factor	10.00	10.00	10.00	10.00
PIV (ul)	1400.00	1400.00	1400.00	1400.00
Min Reporting Limit	2.68	2.80	2.60	2.63
Amount Units	mg/kg	mg/kg	mg/kg	mg/kg
Decalin	645	610	821	396
C1-Decalin	1060	1020	1380	666
C2-Decalin	1130	1070	1580	837
C3-Decalin	897	979	1740	786
C4-Decalin	676	392	1510	747
Benzo (b) thiophene	22	21.3	U	13.9
C1-Benzo (b) thiophene	91.8	87	142	79.5
C2-Benzo (b) thiophene	254	265	409	344
C3-Benzo (b) thiophene	548	519	630	770
C4-Benzo (b) thiophene	407	381	537	520
Naphthalene	536	510	574	362
C1-Naphthalenes	1790	1700	2740	1610
C2-Naphthalenes	3500	3310	5970	4150
C3-Naphthalenes	2980	2810	5540	3620
C4-Naphthalenes	1680	1600	3560	1850
Acenaphthylene	14	13	20.3	15.6
Acenaphthene	70.8	63.7	146	66.1
Biphenyl	302	285	U	294
Dibenzofuran	65.5	59.8	110	69.6
Fluorene	174	164	360	209
C1-Fluorenes	482	455	949	532
C2-Fluorenes	714	658	1400	733
C3-Fluorenes	556	532	1070	501
Anthracene	U	U	U	U
Phenanthrene	273	254	786	303
C1-Phenanthrenes/Anthracenes	624	595	1550	616
C2-Phenanthrenes/Anthracenes	679	638	1520	579
C3-Phenanthrenes/Anthracenes	354	342	766	297
C4-Phenanthrenes/Anthracenes	117	110	220	96
Dibenzothiophene	300	282	U	605
C1-Dibenzothiophenes	730	692	907	1190
C2-Dibenzothiophenes	942	897	1070	1350
C3-Dibenzothiophenes	665	609	706	793
C4-Dibenzothiophenes	264	248	248	296
Fluoranthene	7.25	6.8	27.1	3.05
Pyrene	36.3	33.6	79.6	16.6
Benzo(b)fluorene	2.37 J	1.9 J	5.35	1.13 J
C1-Fluoranthenes/Pyrenes	55.7	53.7	117	35
C2-Fluoranthenes/Pyrenes	52.2	54.7	99.1	43.7
C3-Fluoranthenes/Pyrenes	21.8	22.3	33.5	27.5
Benzo(a)anthracene	U	U	3.86	U
Chrysene	6.18	5.95	13.9	7.19
C1-Chrysenes	7.17	7.42	11.3	10.1
C2-Chrysenes	U	U	U	U
C3-Chrysenes	U	U	U	U
C4-Chrysenes	U	U	U	U
Benzo(b)fluoranthene	U	U	U	U
Benzo(k)fluoranthene	U	U	U	U
Benzo(a)fluoranthene	U	U	U	U
Benzo(e)pyrene	U	U	U	U
Benzo(a)pyrene	U	U	U	U
Perylene	U	U	U	U
Indeno(1,2,3-c,d)pyrene	U	U	U	U
Dibenz(a,h)anthracene	U	U	U	U
Benzo(g,h,i)perylene	U	U	U	U
Total PAH (excludes decalins and benzothiophenes)	18001.27	17013.87	30603.01	20280.57
D2/P2	1.39	1.41	0.70	2.33
D3/P3	1.88	1.78	0.92	2.67
Surrogate Recoveries (%)				
Naphthalene-d8	97	95	98	97
Phenanthrene-d10	92	91	88	91
Chrysene-d12	96	95	96	100

J=Result < Sample RL.  
 U= Not Detected.  
 D= Values reported using secondary dilution factor.  
 N= Outside of DQO.  
 ME= Matrix Interference. Estimated Value.



Project Name Mayport NUS Site Investigation  
Project Number N005502

Client Sample ID	Laboratory Control Sample		
Battelle Sample ID	AB678LCS		
Battelle Batch ID	03-0036		
Analytical Method	8270M		
Matrix	Product		
Sample Weight (mg)	1.00		
Primary Dilution Factor	1.00		
PIV (ul)	1500.00		
Min Reporting Limit	15.00		
Amount Units	FK61	ng	% Recovery Q
Decalin	538	432	80
C1-Decalin		U	
C2-Decalin		U	
C3-Decalin		U	
C4-Decalin		U	
Benzo (b) thiophene	501	493	98
C1-Benzo (b) thiophene		U	
C2-Benzo (b) thiophene		U	
C3-Benzo (b) thiophene		U	
C4-Benzo (b) thiophene		U	
Naphthalene	501	512	102
C1-Naphthalenes		U	
C2-Naphthalenes		U	
C3-Naphthalenes		U	
C4-Naphthalenes		U	
Acenaphthylene	500	418	84
Acenaphthene	501	481	96
Biphenyl	501	484	97
Dibenzofuran	500	501	100
Fluorene	500	515	103
C1-Fluorenes		U	
C2-Fluorenes		U	
C3-Fluorenes		U	
Anthracene	500	477	95
Phenanthrene	504	506	100
C1-Phenanthrenes/Anthracenes		U	
C2-Phenanthrenes/Anthracenes		U	
C3-Phenanthrenes/Anthracenes		U	
C4-Phenanthrenes/Anthracenes		U	
Dibenzothiophene	501	428	85
C1-Dibenzothiophenes		U	
C2-Dibenzothiophenes		U	
C3-Dibenzothiophenes		U	
C4-Dibenzothiophenes		U	
Fluoranthene	512	433	85
Pyrene	500	430	86
Benzo(b)fluorene		U	
C1-Fluoranthenes/Pyrenes		U	
C2-Fluoranthenes/Pyrenes		U	
C3-Fluoranthenes/Pyrenes		U	
Benzo(a)anthracene	501	405	81
Chrysene	502	464	92
C1-Chrysenes		U	
C2-Chrysenes		U	
C3-Chrysenes		U	
C4-Chrysenes		U	
Benzo(b)fluoranthene	501	422	84
Benzo(j,k)fluoranthene	501	504	101
Benzo(a)fluoranthene		U	
Benzo(e)pyrene	494	430	87
Benzo(a)pyrene	501	435	87
Perylene	500	376	75
Indeno(1,2,3-c,d)pyrene	501	298	60
Dibenzo(a,h)anthracene	500	328	66
Benzo(g,h,i)perylene	501	390	78

Surrogate Recoveries (%)  
Naphthalene-d8 104  
Phenanthrene-d10 102  
Chrysene-d12 94

J=Result < Sample RL  
U= Not Detected  
D= Values reported using secondary dilution factor.  
N= Outside of DQO  
ME= Matrix Interference Estimated Value



Project Name Mayport NUS Site Investigation  
Project Number N005502

Client Sample ID	MPT-USED OIL	MPT-USED OIL		
Battelle Sample ID	U2031-D	U2031DUP-D		
Battelle Batch ID	03-0036	03-0036		
Analytical Method	8270M	8270M		
Matrix	Product	Product		
Sample Weight (mg)	52.20	50.00		
Primary Dilution Factor	10.00	10.00		
PIV (ul)	1400.00	1400.00		
Min Reporting Limit	2.68	2.80		
Amount Units	mg/kg	mg/kg	RPD(%)	Q
Decalin	645	610	5.58	
C1-Decalin	1060	1020	3.00	
C2-Decalin	1130	1070	5.45	
C3-Decalin	897	979	8.74	
C4-Decalin	676	392	53.2	
Benzo (b) thiophene	22	21.3	NA	
C1-Benzo (b) thiophene	91.8	87	5.37	
C2-Benzo (b) thiophene	254	265	4.24	
C3-Benzo (b) thiophene	548	519	5.44	
C4-Benzo (b) thiophene	407	381	6.6	
Naphthalene	536	510	4.97	
C1-Naphthalenes	1790	1700	5.16	
C2-Naphthalenes	3500	3310	5.58	
C3-Naphthalenes	2980	2810	5.87	
C4-Naphthalenes	1680	1600	4.88	
Acenaphthylene	14	13	NA	
Acenaphthene	70.8	63.7	10.6	
Biphenyl	302	285	5.79	
Dibenzofuran	65.5	59.8	9.1	
Fluorene	174	164	5.92	
C1-Fluorenes	482	455	5.75	
C2-Fluorenes	714	658	8.16	
C3-Fluorenes	556	532	4.41	
Anthracene	U	U		
Phenanthrene	273	254	7.21	
C1-Phenanthrenes/Anthracenes	624	595	4.76	
C2-Phenanthrenes/Anthracenes	679	638	6.23	
C3-Phenanthrenes/Anthracenes	354	342	3.45	
C4-Phenanthrenes/Anthracenes	117	110	6.17	
Dibenzothiophene	300	282	6.18	
C1-Dibenzothiophenes	730	682	5.34	
C2-Dibenzothiophenes	942	897	4.89	
C3-Dibenzothiophenes	665	609	8.79	
C4-Dibenzothiophenes	264	248	6.25	
Fluoranthene	7.25	6.8	NA	
Pyrene	36.3	33.6	7.72	
Benzo(b)fluorene	2.37 J	1.9 J	NA	
C1-Fluoranthenes/Pyrenes	55.7	53.7	3.66	
C2-Fluoranthenes/Pyrenes	52.2	54.7	4.68	
C3-Fluoranthenes/Pyrenes	21.8	22.3	NA	
Benzo(a)anthracene	U	U		
Chrysene	6.18	5.95	NA	
C1-Chrysenes	7.17	7.42	NA	
C2-Chrysenes	U	U		
C3-Chrysenes	U	U		
C4-Chrysenes	U	U		
Benzo(b)fluoranthene	U	U		
Benzo(k)fluoranthene	U	U		
Benzo(a)fluoranthene	U	U		
Benzo(e)pyrene	U	U		
Benzo(3)pyrene	U	U		
Perylene	U	U		
Indeno(1,2,3-c,d)pyrene	U	U		
Dibenz(a,h)anthracene	U	U		
Benzo(g,h)perylene	U	U		
Surrogate Recoveries (%)				
Naphthalene-d8	97	95	1.22	
Phenanthrene-d10	92	91	1.38	
Chrysene-d12	96	95	0.52	

J=Result < Sample RL  
U= Not Detected  
D= Values reported using secondary dilution factor.  
N= Outside of DQO.  
ME= Matrix Interference Estimated Value.



Project Name Mayport NUS Site Investigation  
 Project Number N005502

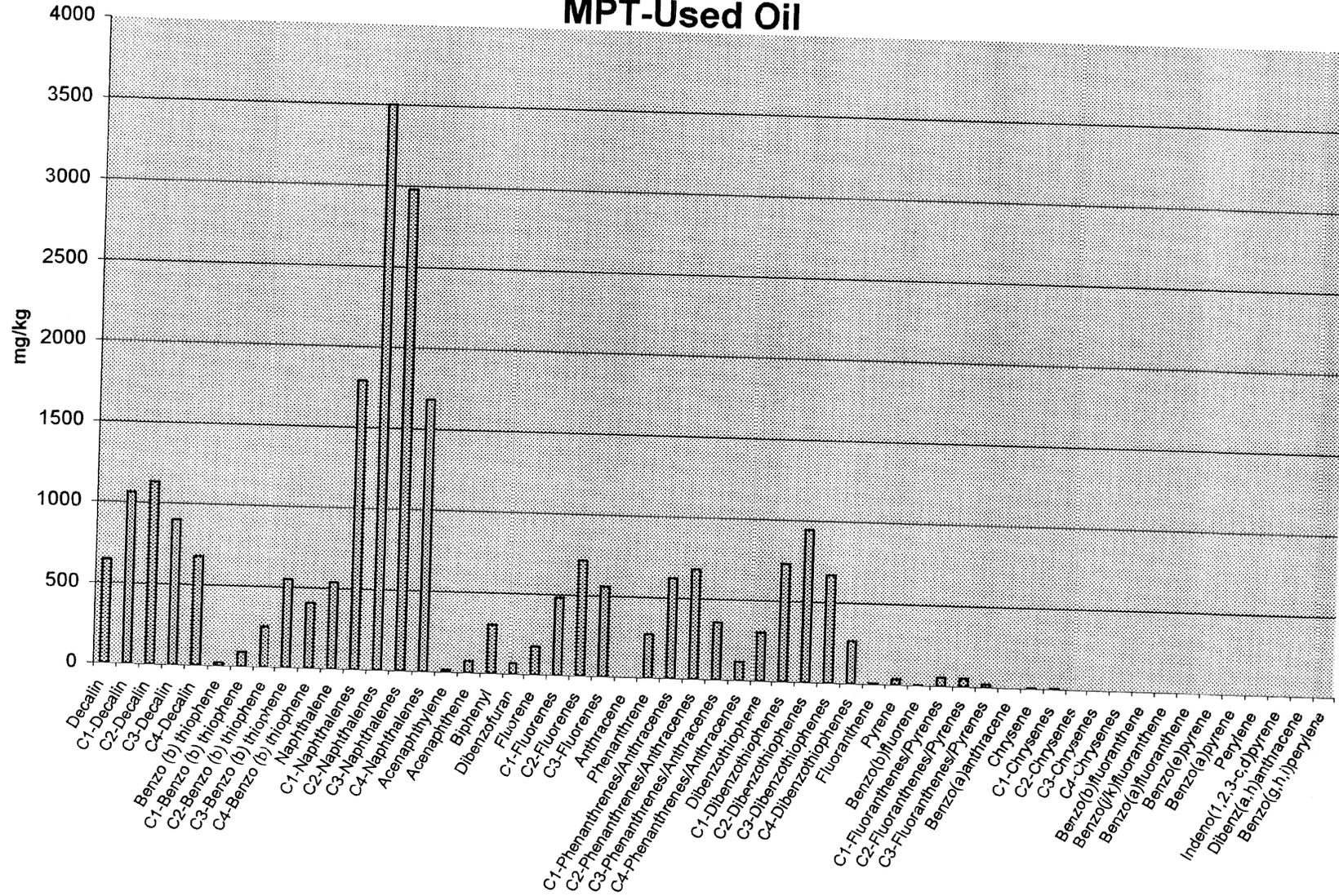
Client Sample ID	Procedural Blank
Battelle Sample ID	AB877PB
Battelle Batch ID	03-0036
Analytical Method	8270M
Matrix	Product
Sample Weight (mg)	53.00
Primary Dilution Factor	1.00
PIV (ul)	1400.00
Min Reporting Limit	0.264
Amount Units	mg/kg

Decalin	U
C1-Decalin	U
C2-Decalin	U
C3-Decalin	U
C4-Decalin	U
Benzo (b) thiophene	U
C1-Benzo (b) thiophene	U
C2-Benzo (b) thiophene	U
C3-Benzo (b) thiophene	U
C4-Benzo (b) thiophene	U
Naphthalene	U
C1-Naphthalenes	U
C2-Naphthalenes	U
C3-Naphthalenes	U
C4-Naphthalenes	U
Acenaphthylene	U
Acenaphthene	U
Biphenyl	U
Dibenzofuran	U
Fluorene	U
C1-Fluorenes	U
C2-Fluorenes	U
C3-Fluorenes	U
Anthracene	U
Phenanthrene	U
C1-Phenanthrenes/Anthracenes	U
C2-Phenanthrenes/Anthracenes	U
C3-Phenanthrenes/Anthracenes	U
C4-Phenanthrenes/Anthracenes	U
Dibenzothiophene	U
C1-Dibenzothiophenes	U
C2-Dibenzothiophenes	U
C3-Dibenzothiophenes	U
C4-Dibenzothiophenes	U
Fluoranthene	U
Pyrene	U
Benzo(b)fluorene	U
C1-Fluoranthenes/Pyrenes	U
C2-Fluoranthenes/Pyrenes	U
C3-Fluoranthenes/Pyrenes	U
Benzo(a)anthracene	U
Chrysene	U
C1-Chysenes	U
C2-Chysenes	U
C3-Chysenes	U
C4-Chysenes	U
Benzo(b)fluoranthene	U
Benzo(j,k)fluoranthene	U
Benzo(a)fluoranthene	U
Benzo(e)pyrene	U
Benzo(a)pyrene	U
Perylene	U
Indeno(1,2,3-c,d)pyrene	U
Dibenz(a,h)anthracene	U
Benzo(g,h,i)perylene	U

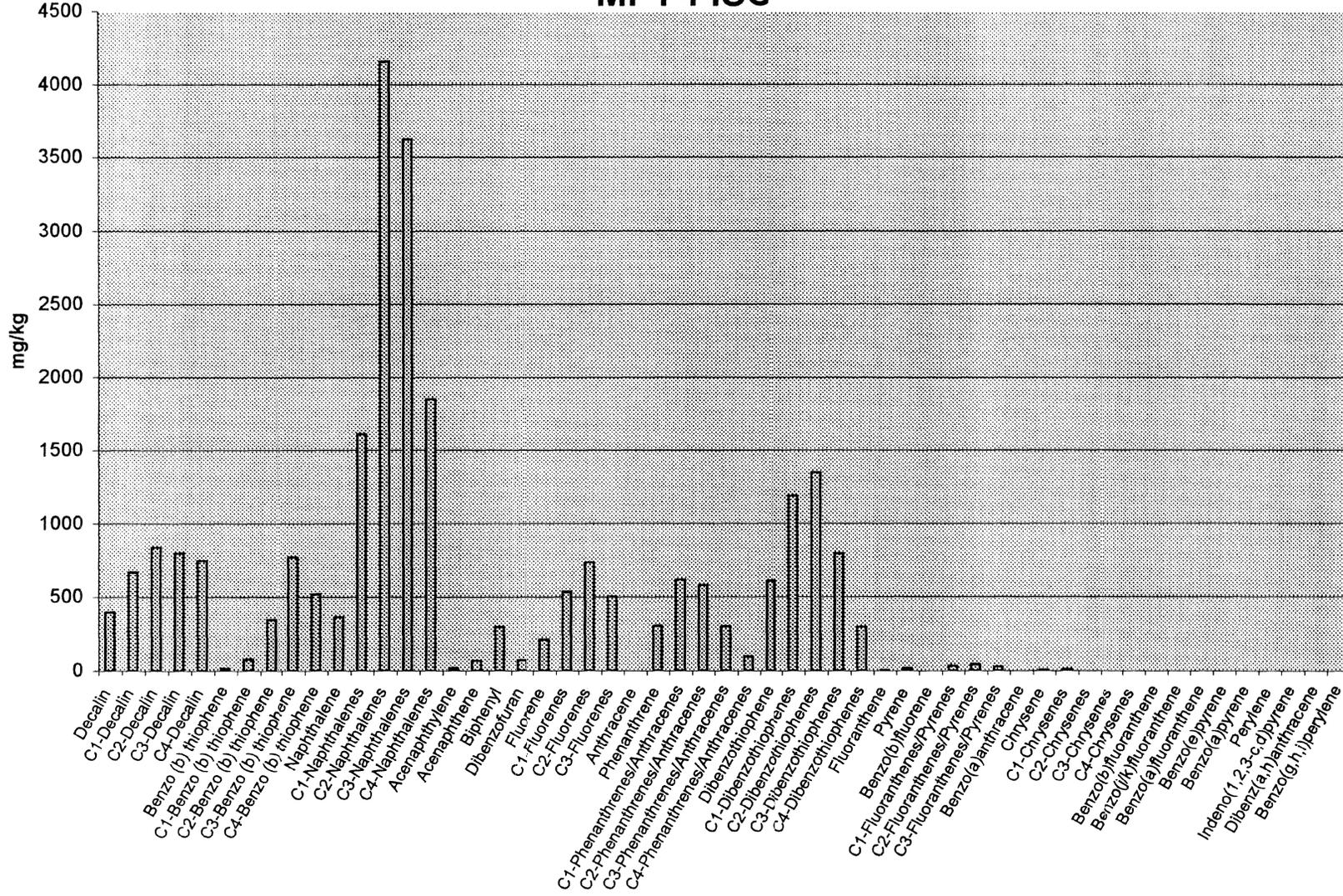
Surrogate Recoveries (%)	
Naphthalene-d8	105
Phenanthrene-d10	96
Chrysene-d12	91

J=Result < Sample RL  
 U= Not Detected.  
 D= Values reported using secondary dilution factor  
 N= Outside of DQO.  
 ME= Matrix Interference Estimated Value

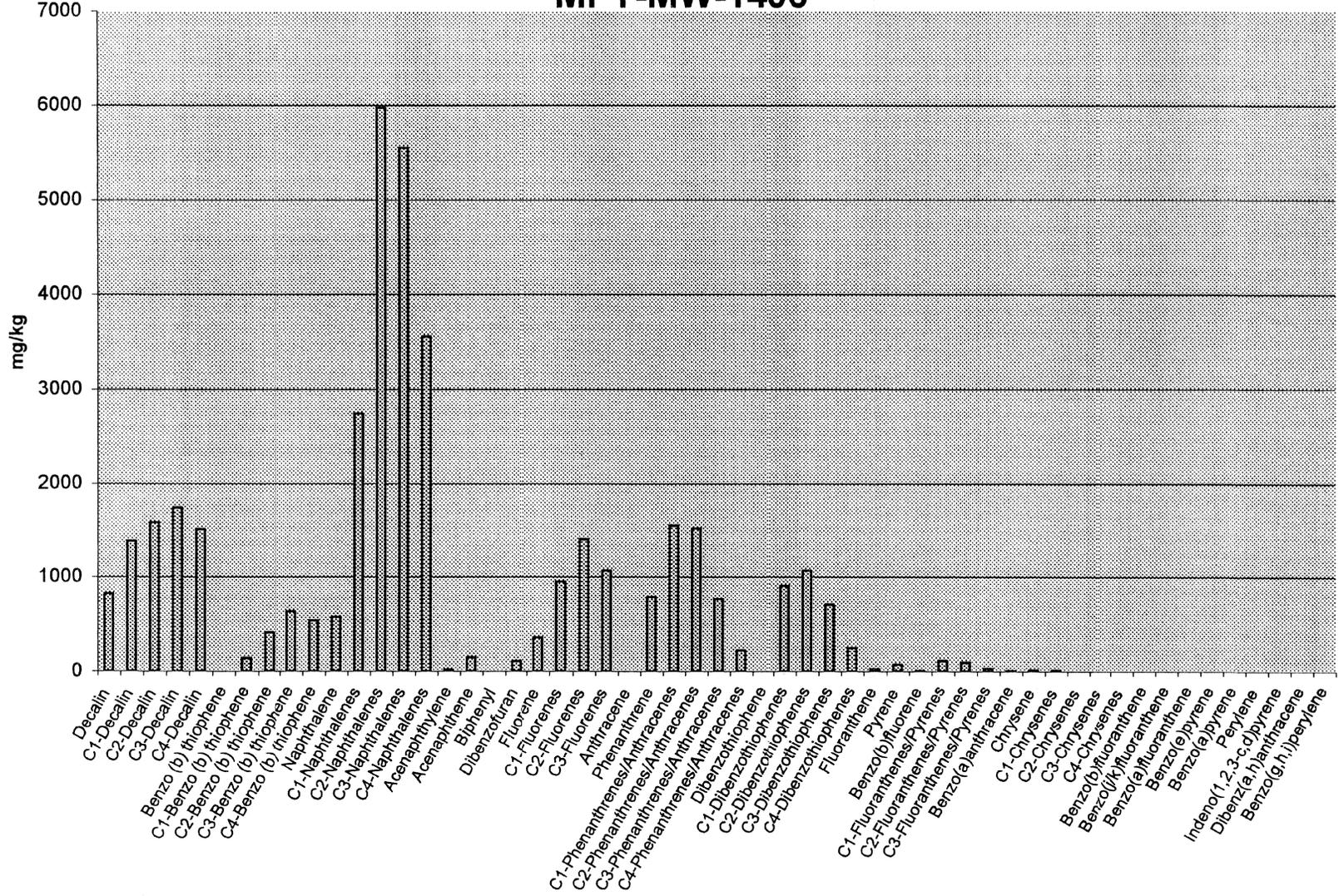
# MPT-Used Oil



# MPT-FISC



# MPT-MW-1406





Laboratory: Battelle

Project: Mayport NUS Site Investigation / Exxon Clarksburg NJ Site Investigation

Data reported in mg/kg oil weight

Client ID:	Procedural Blank	MPT-USED OIL	MPT-USED OIL	MPT-MW-1406	MPT-FISC
Battelle ID:	AB881PB	U2031-pb	U2031DUP-pb	U2032-pb	U2033-pb
Batch:	03-0038	03-0038	03-0038	03-0038	03-0038
Matrix:	Product	Product	Product	Product	Product
Sample Weight (mg):	53.000	52.200	50.000	53.800	53.200
Reporting Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg

Analyte:

TML (Tetramethyl Lead)	ND	ND	ND	ND	ND
TMEL (Trimethyl-ethyl Lead)	ND	ND	ND	ND	ND
DEDML (Diethyl-dimethyl Lead)	ND	ND	ND	ND	ND
MTEL (Methyl-triethyl Lead)	ND	ND	ND	ND	ND
TEL (Tetraethyl Lead)	ND	ND	ND	ND	ND

ND-Not Detected