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TECHNICAL MEMORANDUM 2 RESULTS OF FIELD INVESTIGATION MCB CAMP LEJEUNE
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DEWBERRY & DAVIS

**TECHNICAL MEMORANDUM NO. 2
RESULTS OF FIELD INVESTIGATION**

Prepared for:

Public Works Division
Marine Corps Base, Camp Lejeune

Contract N62470-C090-6796

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1.0 EXECUTIVE SUMMARY

On November 26 through 30, 1990 field work was performed at four waste oil tank sites at Camp Lejeune, North Carolina to assess the potential for contamination at the site due to releases from the tanks, to assess the presence of lead based paint on the tanks and asbestos. Furthermore, samples of the tank contents, already considered hazardous, were obtained to provide additional information on the chemical characteristics of the oils and sludges. The four sites included Holcomb Boulevard, Midway Park (Building 45), New River Air Station and Tarawa Terrace.

The tank contents were sampled and tested in the laboratory for the following:

- Volatile Organic Compounds (VOCs) - VOCs are a scan of 34 priority pollutants.
- Toxicity Characteristic Leaching Procedure (TCLP) - The TCLP procedure is utilized to characterize hazardous wastes. Of the tanks sampled, only the Midway site yielded a sludge that was applicable for the leachate extraction. The other samples were waste oil samples, which could not be extracted, and therefore, the concentrations are total concentrations.
- Additional Hazardous Classifications - These classifications include Reactivity as total available hydrogen cyanide and total available hydrogen sulfide, Ignitability by the material's flashpoint, and Corrosivity as the material's pH.
- Polychlorinated Biphenyls (PCBs) - PCBs are a carcinogen regulated under the Toxic Substance Control Act (TSCA).

The soil and groundwater samples were tested in the laboratory for the following:

- Total Petroleum Hydrocarbons (TPH) - TPH is an indicator of petroleum releases.
- Volatile Organic Compounds (VOC's) - The same as discussed above.
- Total Organic Halides (TOX) - TOX is an indicator of halogenated compounds, which would include hydrocarbons, solvents, pesticides and herbicides. These were tested on the Midway groundwater samples only.
- Polychlorinated Biphenyls (PCBs) - The same as discussed above.

5889-5891 (SUMM-34)

Holcomb Boulevard. The laboratory data indicates some soil sample TPH levels that exceed the established action level of 10 ppm. The positive readings at relatively high levels strongly indicate a release. Furthermore, the VOC levels, although low, also support this indication. It is believed that the contamination is due to surface spills, however, the extent is not believed, at this time, to be wide spread. Furthermore, it is believed that lower permeable sandy silts underlying the surface sands may have hindered the vertical migration and prevented contamination of the groundwater.

Based on the asbestos sampling performed at the site approximately 640 linear feet of piping has coating containing asbestos.

Tests indicate that lead based paint, though present, should not present a problem.

AST 5-781 (PR-84)

Midway Park. There was a large concern for contamination at this site, therefore monitor wells were installed to assess groundwater contamination, in addition to the soil sampling. The laboratory data indicates some soil sample TPH levels that exceed the action level of 10 ppm. Furthermore, the VOC levels, although low, also support this indication. The TOX levels in the groundwater samples are very low and may be due to a number of sources other than the waste oil tank, including pesticides and herbicides used at the facility or from contamination in the laboratory from preparation chemicals. Although the groundwater samples do not indicate excessive levels of contaminants, this does not indicate that the groundwater has not been impacted. Many of the chlorinated compounds associated with the tank contents are immiscible in water and are more dense, and therefore, will sink and would not migrate toward the shallow wells. The extent of contamination is not believed, at this time, to be wide spread. The source of contamination may be due to surface spills or leaking underground piping.

PCBs were detected in the soil sample from monitor well MPMW-2 and may be due to migration of PCBs from transformers that were reportedly once stored north-northeast of the tank site. Drainage from that area appears to be towards the area of monitor well MPMW-2. Although the level of 2 ppm does not appear high, it may indicate higher levels of PCB contamination in the former transformer storage area.

The four samples tested for asbestos indicated levels below regulatory levels requiring abatement.

Tests indicate lead based paint, though present, should not present a problem.

AS421 (FR-86)

New River Air Station. The laboratory data indicates some soil sample TPH levels that exceed the action level of 10 ppm. The positive readings at relatively high levels strongly indicate a release. Furthermore, the VOC levels, although low, also support this indication. It is believed that the contamination is due to surface spills, however, the extent is not believed, at this time, to be wide spread. Furthermore, it is believed that lower permeable organic silts and lower clays underlying the surface sands may have hindered the vertical migration and prevented contamination of the groundwater. Also, the high organic content of the organic silt may allow for increased adsorption of the contaminants to soil particles, thus decreasing migration.

Based on the asbestos sampling performed at the site, two of four samples collected for asbestos testing had positive results. An estimated 150 square feet of foam beneath the tanks will require removal.

Tests indicate that lead based paint, though present, should not present a problem.

Tarawa Terrace. The laboratory data indicates some soil sample TPH levels that exceed the action level of 10 ppm. The relatively high levels indicate a release. Furthermore, the VOC levels, although low, also support this indication. It is believed that the contamination is due to surface spills, however, the extent is not believed, at this time, to be wide spread. Also, the high organic content of the organic silt may allow for increased adsorption of the contaminants to soil particles, thus decreasing migration.

Based on the asbestos sampling performed at the site approximately 280 linear feet of piping insulation, 175 square feet of boiler cover and 25 mudded joints contain asbestos.

Tests indicate that lead based paint, though present, should not present a problem.

The accuracy of the TPH levels indicated by the tests may be suspect, due to errors with the gas Chromatograph (GC) method comparing what is suspected to be waste oil contamination against diesel and kerosene "signatures" in the GC, since the particular waste oil was not in the GC's "library". Furthermore, possible errors associated with the Infrared Spectrophotometry (IR) method, which measures all hydrocarbons, including naturally occurring hydrocarbons that may be associated with decaying organic matter. However, positive readings at relatively high levels by these methods do strongly indicate a release. For the purpose of assessing gross contamination, the results are acceptable.

Additional sample locations, deeper sampling and possibly monitor wells would be required to ascertain the full extent of contamination at these sites. If the extent of contamination is limited, then in accordance with the North Carolina Guidelines for Remediation of Soil Contaminated by Petroleum, the soil might be remediated by removing the contaminated soil, properly disposing or treating it, and confirming the remediation by laboratory testing of soil samples from the limits of the excavation. If a release of a hazardous substance has occurred, or is suspected, the soil itself is considered to be hazardous until proven otherwise, and the Hazardous Waste Section - Division of Solid Waste Management - Department of the Environment, Health and Natural Resources must be informed. Furthermore, the Division of Hazardous Waste may impose additional requirements for investigation and remediation.

Based on the presence of PCBs at the Midway Park site, further investigation of the former transformer storage area may be warranted.

The lead based paint on the tanks should pose no disposal problems, but the contractor performing the demolition should be aware of the presence of the paint and should take proper precautions during demolition. Asbestos removal should be accomplished in accordance with OSHA regulations.

The work for this project has been carried out in accordance with reasonable and prudent site characterization study investigative techniques and procedures. No warranty or guarantee, either written or implied, is applicable to this work. The contaminants detected during this study and the concentrations at which they were detected are for the samples obtained, and may not represent all contaminants at the site or their maximum concentrations. Dewberry & Davis does not accept any responsibility for searching for or identifying any or all hazardous or toxic waste or substances, or pollution or contamination due to the presence of hazardous or toxic wastes or substances, except those expressly described in this study. Dewberry & Davis assumes no responsibility for conditions which did not come to its actual knowledge or for conditions not recognized as environmentally unacceptable at the time this report was prepared. The information in this report has been prepared solely for the use of the Public Works Division, Marine Corps Base, Camp Lejeune. Its use by other parties shall be at their own risk.

2.0 INTRODUCTION

This report presents a summary of the results of the environmental field and laboratory investigations at four Camp Lejeune waste oil tank sites, performed in accordance with Dewberry & Davis contract number 93160. The scope of the investigation included assessing the potential for gross contamination due to releases from the waste oil tanks,

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assessing the presence of asbestos at the sites and lead based paint on the exterior of the tanks, and providing updated chemical data on the contents of the tanks. The four sites were Holcomb Boulevard, Midway Park (Building 45), New River Air Station and Tarawa Terrace.

Tests indicate lead based paint, though present, should not present a problem.

3.0 INVESTIGATION, SAMPLING AND LABORATORY TESTING

This section provides general descriptions for the investigation approach, the sampling methods and the laboratory testing performed. Laboratory results are discussed and presented in the report in "parts per million" (ppm). This is analogous to milligrams per kilograms (mg/kg) for the soils and waste oils and milligrams per liter (mg/l) for leachate and water samples, both of which are the units utilized on the laboratory documentation in the appendices (Appendices 1 through 4). The results and their implications at each site are discussed individually in subsequent sections.

3.1 Tank Contents. The contents of the subject tanks had previously been determined to be hazardous in closure plans prepared by the Facilities Department, Camp Lejeune (May 18, 1989) and will continue to be considered hazardous for the purpose of this study. The testing of the tank contents was performed to provide additional information for remediation contractors bidding on the clean up and demolition of these tanks.

Sampling was conducted on November 26 and 27, 1990. Samples were obtained by either a stainless steel sludge sampler with a disposable acrylic inner sleeve or in a glass container or sampling bag lowered on a rope. The stainless steel sludge sampler was decontaminated by washing in soap and water, a 20 percent methanol solution, a trisodium phosphate solution and rinsed in distilled, deionized water. The rope and glass container or sample bag were used on individual tanks only. The samples were placed in containers prepared by the testing laboratory, kept on ice in coolers and shipped overnight to the laboratory. Chain of custody forms were prepared for each shipment of samples. Laboratory testing was performed by Central Virginia Laboratories and Consultants, Inc. of Lynchburg, Virginia. A second laboratory utilized for secondary testing was Free-Col Laboratories of Meadville, Pennsylvania.

The tank contents were sampled and tested in the laboratory for the following:

- Volatile Organic Compounds (VOCs) - VOCs are a scan of 34 priority pollutants. The compounds were tested by two methods: EPA Method 8010 for 29 halogenated volatile organic compounds, including 1,1,2 Trichlorotrifluoroethane as a scan for freon; and, EPA Method 8020 for 9 aromatic volatile organics. Only those compounds that were detected above their detection limits were included in the data tables, but the entire list of compounds and their detection limits are included on the laboratory data sheets in the appendices. As a check, a duplicate sample of the Midway Park sample was tested for Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX), which are included with the aromatic volatile organics.
- Toxicity Characteristic Leaching Procedure (TCLP) - The TCLP procedure is utilized to characterize hazardous wastes. The "TC" list includes 25 organic chemicals, 8 metals, 4 insecticides and 2 herbicides regulated under the Resource Conservation and Recovery Act (RCRA). This procedure consists of extracting leachate from the material to be tested, determining the concentrations in the leachate and comparing those concentrations to regulatory levels. Of the tanks sampled, only the Midway site yielded a sludge that was applicable for the leachate extraction. The other samples were waste oil samples, which could not be extracted, and therefore, the concentrations are total concentrations. Due to the nature of testing waste oil for the TCLP constituents, the detection limits for many of the constituents were much higher than the regulatory levels. Only those compounds that were detected above their detection limits were included in the data tables, but the entire list of compounds, their detection limits and regulatory levels are included on the laboratory data sheets in Appendices 1 through 4.
- Additional Hazardous Classifications - These classifications include Reactivity as total available hydrogen cyanide and total available hydrogen sulfide, Ignitability by the material's flashpoint, and Corrosivity as the material's pH.
- Polychlorinated Biphenyls (PCBs) - PCBs are a carcinogen regulated under the Toxic Substance Control Act (TSCA). Substances containing PCB's that are regulated include, but are not limited to, dielectric fluids, contaminated solvents, oils and waste oils, heat transfer fluids, hydraulic fluids and sludges, spoils and soils contaminated as a result of spills.

It should be noted that in addition to the hazardous waste criteria for TCLP, Reactivity, Ignitability and Corrosivity, a material or compound may be classified as hazardous by being listed as such under RCRA.

3.2 Soils and Water. Soil and groundwater samples were obtained to assess gross contamination. Soil samples were obtained at all four sites. Due to the concern for a large potential for a suspected release at the Midway Park site, monitor wells were installed at the site and groundwater samples were obtained. Soil samples were obtained generally every 20 to 25 feet along piping, both above ground and below ground, and were located, if feasible, near ports, connections and seams. If piping was not in close proximity to tanks which had their bases on the ground, additional samples were taken around the perimeter of the tanks.

The North Carolina Department of Environment, Health and Natural Resources, Division of Environmental Management has an "action level", for Total Petroleum Hydrocarbons (TPH) in soil, of 10 ppm indicating that further investigative and/or remedial steps are required. The action level for soils contaminated with Halogenated Hydrocarbons, which are associated with the waste oil tank contents, is based on the Division of Solid Waste Management's Action Level Method Detection Limit, which varies for different compounds and is based on cumulative concentrations. Furthermore, if a release of a hazardous substance has occurred, or is suspected, the soil itself is considered to be hazardous until proven otherwise, and the Hazardous Waste Section - Division of Solid Waste Management - Department of the Environment, Health and Natural Resources must be informed.

Soil samples were obtained by either from soil borings using standard split spoons driven inside 3-3/4 inch inside diameter hollow stem augers or by using a 2-1/2 inch diameter hand auger. The soil borings were generally advanced to three feet, with the final split spoon sample driven to five feet. The hand augers were generally advanced to four feet. The augers and split spoons were decontaminated by washing with a high pressure steam cleaner and the hand auger was decontaminated in the same manner as the stainless steel sludge sampler (Section 3.1). The monitor wells at Midway were installed through 6 inch inside diameter hollow stem augers, and consisted of two inch inside diameter PVC well screen and casing. The monitor wells are discussed in the Midway Section of this report (Section 6.1). Soil boring and monitor well construction were performed by Law Engineering of Raleigh, North Carolina. Sampling was conducted under the direction of the field engineer, who also maintained boring descriptions, developed and sampled the monitor wells and performed the hand augers. The soil and groundwater field work was performed November 27 through 30, 1990.

The samples were placed in containers prepared by the testing laboratory, kept on ice in coolers and shipped overnight to the laboratory. Chain of custody forms were prepared for each shipment of samples. Laboratory testing was performed by Central Virginia Laboratories and Consultants, Inc. of Lynchburg, Virginia. A second laboratory utilized for secondary testing was Free-Col Laboratories of Meadville, Pennsylvania.

The soil and groundwater samples were tested in the laboratory for the following:

- Total Petroleum Hydrocarbons (TPH) - TPH is an indicator of petroleum releases. Two methods were utilized. 1) EPA Method 5030 & 8020, which utilizes a gas chromatograph (GC) method and 2) EPA Method 418.1, which utilizes an infrared spectrophotometry (IR) method, both of which have been modified for soils. The GC method will analyze the contaminant against a known compound (e.g. No. 2 diesel, kerosene, gasoline), but this was very difficult for waste oil and No. 6 diesel which were present at some sites. Therefore, as an indicator for gross hydrocarbon contamination the IR method was run, but this method records all hydrocarbons, including naturally occurring hydrocarbons (i.e. methane from decomposing organic material).
- Volatile Organic Compounds (VOC's) - The same as discussed for the tank contents in Section 3.1.
- Total Organic Halides (TOX) - TOX is an indicator of halogenated compounds, which would include hydrocarbons, solvents, pesticides and herbicides halogenated with chlorine, bromine or iodine (fluoridated halogens not included). These were tested on the Midway groundwater samples only.
- Polychlorinated Biphenyls (PCBs) - The same as discussed for the tank contents in Section 3.1. These were tested for on soil and water samples from the monitor wells at Midway only, due to the reported proximity of an old transformer storage area.

Secondary soil samples were sent to a different laboratory for TPH analysis as a check on the first laboratory. The second laboratory tested by the IR method. Even though care was taken in splitting the samples, the laboratories only use a small portion of the sample submitted, which may be a source of difference in the results. Furthermore, the laboratories claim that even using calibrated, in-house, quality control samples, the results may vary by 25 percent. As mentioned previously, the IR method measures all hydrocarbons, while the GC method is more compound specific and therefore, the two results are difficult to correlate. However, the secondary laboratory was a reasonable quality control check for gross hydrocarbon contamination.

3.3 Asbestos. On December 11, 1990, OSHA and the North Carolina Department of Environmental Health and Human Resources Certified Asbestos Inspectors of Carolina Environmental conducted an on-site inspection and asbestos sample collection at Holcomb Boulevard, Tarawa Terrace, Midway Park and the New River Marine Corps Air Station. The purpose of the survey was to locate and identify friable and non-friable asbestos containing materials (ACM) at the site. Samples were analyzed by Polarized Light Microscopy (PLM), resulting in identifiable ACMs at Holcomb Boulevard, Tarawa Terrace and the Marine Corps Air Station. A copy of the Carolina Environmental report is included in Appendix 5.

3.4 Lead Based Paint. Lead was used by the painting industry as a major paint ingredient for many years prior to and through World War II. During the 1950's, the use of other pigment materials became widespread; however lead compounds were still used in some pigments and as a drying agent. Federal regulatory efforts began in 1971 and have intensified, particularly in the area of housing and exposure to children. Currently, the trigger level used for treatment actions as a hazardous waste is 0.5% lead content by weight.

Sampling and testing procedures for the presence of lead in tank coatings for this project have been derived from methods developed in conjunction with Department of Housing and Urban Development (HUD) abatement projects. The thickness of the coating was checked to determine if a uniform coverage existed. Areas which had thicker coatings had additional samples taken. Using a sharpened wood chisel, an area of approximately one (1) square inch was scraped to bare metal. A plastic sample bag was taped directly below the sample area to capture all of the coating. The sample bag was sealed, labeled, and shipped to a laboratory for analysis. At the laboratory, ASTM 3335 (atomic absorption spectroscopy) was performed.

Samples were taken at Camp Lejeune on November 26 and 27, 1990. Samples were sent to Tracor Technology Resources on December 4, 1990 for analysis using ASTM 3335. Results of the analysis are included in Appendix 5.

4.0 REGIONAL GEOLOGY

Camp Lejeune is situated in the Atlantic Coastal Plain Physiographic Province, which in North Carolina is characterized by a broad flat surface that slopes gently to the southeast. The area is underlain by an eastern thickening succession of sands silts and clays from Cretaceous sediments that unconformably overlie crystalline basement rocks up through Recent sediments. The wedge of sediments in the Camp Lejeune area is approximately 2000 to 2500 feet thick.

A State Geological map indicates that the western half of the base (which is believed to include all four sites, but the Holcomb Boulevard site may be further to the east) is underlain by the Miocene age Duplin Marl, which is equivalent in age to the Yorktown Formation to the north. The Duplin Marl is usually covered by thin deposits of Pleistocene terrace sands. The eastern half is underlain by undifferentiated surficial deposits, which may, in part, overlie some of the western half of the base. The Pleistocene deposits are, in various places, overlain by Recent aged dune sands and peats.

The investigation at Camp Lejeune primarily involved the upper four to five feet of sediments, with the exception of the two monitor wells at Midway, which were advanced to approximately 20 feet. The soils encountered consisted primarily of sands at Holcomb Boulevard and Midway Park and sands with a lower, thin layer of organic silts and peats at New River and Tarawa Terrace.

5.0 HOLCOMB BOULEVARD

5.1 Tank Contents. The results for the laboratory testing on the sample from the Holcomb Boulevard tank are presented in Table 1. The tank sampled was designated S-891. At the time of sampling (11/27/90), there was approximately 7 feet of product in the tank, with an approximate volume of 24,600 gallons. The other contaminated tank (S-889) was completely full, with an approximate volume of 17,400 gallons. The other two tanks (S-888 and S-890) are not considered contaminated. Tank S-891 was sampled utilizing the stainless steel sludge sampler. The leachate extraction procedure was not applicable to the waste oil sample, therefore, the TCLP parameters are total concentrations and many of the detection limits are above the regulatory levels.

TABLE 1

**CAMP LEJEUNE HAZARDOUS WASTE OIL TANKS
LABORATORY RESULTS OF TANK CONTENTS**

SITE	HOLCOMB	MIDWAY	NEW RIVER	TARAWA	
DATE SAMPLED	11/27/90	11/26/90	11/27/90	11/26/90	
TANK DESIGNATION	891	S-781	AS421	STT-66	
ESTIMATED VOLUME	24600 GAL	5100 GAL	330 GAL	450 GAL	
VOC'S					MCL
CHLOROBENZENE	0.607	0.597	ND	ND	0.06
CHLOROFORM	ND	0.914	5.27	ND	0.1
CHLOROMETHANE	ND	0.547	ND	ND	--
1,1-DICHLOROETHANE	ND	0.294/1.9	ND	1.45	--
1,1-DICHLOROETHENE	3.69	ND	ND	ND	--
METHYLENE CHLORIDE	ND	0.562	0.542	ND	--
TETRACHLOROETHENE	ND	0.709	ND	5.12	--
1,1,1-TRICHLOROETHANE	11.1	2.00/13.0	ND	4.43	0.2
TRICHLOROETHENE	2.23	314.0	1.08	ND	--
TRICHLOROFLUOROMETHANE	2.06	1.18	1.39	2.94	--
1,1,2-TRICHLOROTRI- FLUOROETHANE	ND	10.5	0.513	ND	--
BENZENE	7.31	2.78/11.0	ND	3.15	0.005
1,2-DICHLOROBENZENE	ND	0.213	ND	ND	0.62
ETHYLBENZENE	19.7	6.97/39.0	0.571	22.6	0.68
TOLUENE	6.20	20.5/96.0	2.80	7.12	2.0
TOTAL XYLENES	73.7	23.2/260.0	3.97	87.9	0.44
TCLP					REG. LEVEL
ARSENIC	0.100	0.002	0.151	0.100	5.0
BARIUM	15	1.8	ND	40	100.0
BENZENE	7.31	ND	ND	3.15	0.50
CADMIUM	2.24	0.138	1.01	1.74	1.0
CHLOROFORM	ND	ND	5.27	ND	6.0
CHROMIUM	80	0.14	55	95	5.0
1,1-DICHLOROETHYLENE	3.69	ND	ND	ND	0.70
LEAD	20	0.4	15	25	5.0
MERCURY	ND	ND	2.40	0.200	0.2
METHYL ETHYL KETONE	11.2	ND	7.19	20.4	200.0
TRICHLOROETHYLENE	2.23	6.13	1.08	ND	0.5
TETRACHLOROETHYLENE	ND	ND	ND	5.12	0.7

TABLE 1

(CONTINUED)

**CAMP LEJEUNE HAZARDOUS WASTE OIL TANKS
LABORATORY RESULTS OF TANK CONTENTS**

SITE	HOLCOMB	MIDWAY	NEW RIVER	TARAWA
DATE SAMPLED	11/27/90	11/26/90	11/27/90	11/26/90
TANK DESIGNATION	891	S-781	AS421	STT-66
OTHER				
PCB	<5.0	<0.200	<5.0	<5.0
REACTIVITY				
TOTAL HYDROGEN CYANIDE	<5	<5	<5	<5
TOTAL HYDROGEN SULFIDE	<10	<10	<10	<10
IGNITABILITY				
FLASHPOINT	>212 F	>212 F	>212.2 F	208.4 F
CORROSIVITY				
pH	9.0 S.U.	5.88 S.U.	5.31 S.U.	7.25 S.U.

- NOTES:
- 1) ALL RESULTS ARE PRESENTED IN PARTS PER MILLION (PPM), WHICH IS ANALOGOUS TO MILLIGRAMS PER KILOGRAM FOR THE VOC'S, PCB'S, REACTIVITY AND THE TCLP FOR HOLCOMB, NEW RIVER AND TARAWA. PPM IS ANALOGOUS TO MILLIGRAMS PER LITER FOR THE TCLP FOR MIDWAY. FLASHPOINT IS IN DEGREES FAHRENHEIT (F) AND pH IS IN STANDARD UNITS.
 - 2) VOLATILE ORGANIC COMPOUNDS (VOC) IS A PARTIAL LIST CONSISTING OF 34 CHEMICALS. THOSE NOT INCLUDED IN THE TABLE WERE BELOW THEIR DETECTION LIMITS. THE DETECTION LIMIT FOR VOC'S WERE 0.125 PPM AT MIDWAY AND 0.500 PPM AT THE OTHER SITES.
 - 3) TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) WAS ONLY APPLICABLE TO THE MIDWAY SITE; THE OTHER SITES CONSISTED OF OIL SAMPLES FOR WHICH THE EXTRACTION WAS NOT APPLICABLE. THEREFORE, THE RESULTS FOR THOSE THREE SITES ARE FOR TOTAL CONCENTRATIONS IN THE WASTE OIL, WHILE THE RESULTS FOR MIDWAY ARE FOR THE LEACHATE FROM THE SLUDGE SAMPLED.
 - 4) ND - NOT DETECTED; "<" - LESS THAN THE DETECTION LIMIT.
 - 5) "0.294/1.9" FOR MIDWAY INDICATE RESULTS FROM FIRST AND SECOND LABORATORIES.
 - 6) S.U. - STANDARD UNITS
 - 7) F - DEGREES FAHRENHEIT
 - 8) MCL - MAXIMUM CONTAMINANT LEVEL

The VOC's that were detected in the sample above their detection levels included Chlorobenzene, 1,1-Dichloroethene, 1,1,1-Trichloroethane, Trichloroethene, Trichlorofluoromethane, Benzene, Toluene, Ethylbenzene and Total Xylenes. For those detected VOCs with established maximum contaminant levels (MCL) or maximum contaminant level goals (MCLG), the concentrations in the waste oil exceed those MCL/MCLG's on the order of 50 to 200 times. All of the detected VOCs are commonly associated with petroleum and chlorinated solvents.

The TCLP constituents detected in the sample above their detection limits included Benzene, 1,1-Dichloroethylene, Methyl Ethyl Ketone, Trichloroethylene, Arsenic, Barium, Cadmium, Chromium and Lead. Those that exceeded their regulatory levels included:

- Benzene (7.31 ppm vs. 0.50 ppm)
- 1,1-Dichloroethylene (3.69 ppm vs. 0.70 ppm)
- Trichloroethylene (2.23 ppm vs. 0.50 ppm)
- Cadmium (2.24 ppm vs 1.0 ppm)
- Chromium (80.0 ppm vs. 5.0 ppm)
- Lead (20.0 ppm vs. 5.0 ppm).

The sample did not contain PCBs above the detection limit of 5.0 ppm and it was not hazardous by reactivity, ignitability or corrosivity.

5.2 Site Geology. The site was investigated by six hand augers advanced to a depth of 2 to 4.5 feet. The locations of the hand augers are shown on the Holcomb Boulevard Site sheet (a part of the contract documents.) The general locations are as follows:

- HBHA-1 was near the valves for tank S-891.
- HBHA-2 was next to the site's pumps.
- HBHA-3 was near the valves for tank S-889.
- HBHA-4 was along the piping between tanks S-889 and S-888.
- HBHA-5 and 6 were by the valves for tank S-888 and the plugged ends of the piping.

A surface sample was obtained at the outfall of a PVC pipe to the west of the site that drains the bermed area.

The soils encountered at each of the test locations are described in Table 2. HBHA-3 and 5 each encountered approximately 2 feet of fine sand with little silt then refused on the concrete foundations of the tanks. The other hand augers encountered approximately 1 to 2 feet of tan to orangish tan, fine sand with little silt then grading with depth to orangish tan to orange, sand with some silt or silt and sand. The silt and sand layer may be continuous over the site (although it can not be certain based on the limited investigation) and may provide some protection against vertical migration of spilled or leaked contaminants. Groundwater was not encountered within the depth investigated. The only odors encountered during the sampling was in a grey fine sand and silt for the one foot above the foundation encountered in HBHA-5. The odor was similar to that associated to decaying petroleum product. Furthermore, this was the only sample encountered that was grey in color or wet, possibly indicating contamination.

5.3 Laboratory Results. The laboratory test results for the soil samples obtained at the Holcomb Boulevard site are presented in Table 3. TPH levels were recorded above the detection limit of 10 ppm for the following samples:

- HBHA-4: 2318 ppm by GC as diesel
- HBHA-5: 5180 ppm by GC as kerosene and 5200 ppm by IR
- HBHA-6: 40 ppm by GC as diesel and 900 ppm by IR

The samples from the other hand augers and the surface sample at the drain outfall indicated TPH levels below the detection limit of 10 ppm.

Sample HBHA-5 was tested for VOC,s and indicated detectable limits of Toluene, Ethylbenzene, Total Xylenes, Tetrachloroethene and 1,1,1-Trichloroethane. With the exception of Tetrachloroethene (detected at 0.017 ppm), for which a maximum contaminant level (MCL) or maximum contaminant level goal (MCLG) has not yet been established, all of the VOCs detected were below the MCL or MCLG for that compound:

- Toluene: 0.070 ppm vs. 2.0 ppm
- Ethylbenzene: 0.154 ppm vs. 0.68 ppm
- Total Xylenes: 0.242 ppm vs. 0.440 ppm
- 1,1,1-Trichloroethane: 0.044 ppm vs. 0.20 ppm

TABLE 2

SOIL DESCRIPTIONS
HOLCOMB BOULEVARD WASTE OIL TANKS

LOCATION	DEPTH	DESCRIPTIONS	DEPTH/ TPH
HBHA-1	0'-2'	TAN TO ORANGISH TAN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	0'-4.5' <10 PPM
	2'	GRADING WITH SOME SMALL SILTY CLAY NODULES.	
	3'	6" LENS WITH SOME SILT.	
	4'-4.5'	GRADING WITH SOME SILT.	
HBHA-2	0'-2'	TAN TO ORANGISH TAN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	0'-4.5' <10 PPM
	2'	GRADING WITH SOME SILT.	
	3'-4.5'	MOTTLED LIGHT ORANGE AND TAN SILT AND VERY FINE SAND, NO ODOR, MOIST.	
HBHA-3	0'-2'	TAN FINE SAND, LITTLE SILT, NO ODOR, MOIST. @ 6" THERE IS A 3" LAYER OF DARK BROWN SAND.	0'-2' <10 PPM
	2'	REFUSAL ON CONCRETE (TANK FOUNDATION).	
HBHA-4	0'-1'	BROWN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	0'-4' 2318 PPM DIESEL
	1'-2'	TAN TO ORANGISH TAN FINE SAND, LITTLE SILT.	
	2'-2.5'	GRADING WITH SOME SILT.	
	2.5'-3.2'	ORANGE-TAN SILT AND FINE SAND, NO ODOR, MOIST.	
HBHA-5	3.2'-4'	ORANGISH TAN FINE SAND, SOME SILT, NO ODOR.	0'-2' 5180 PPM KEROSENE
	0'-1'	TAN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	
	1'-2'	GREY FINE SAND AND SILT, DEGRADED PETROLEUM ODOR, WET.	
HBHA-6	2'	REFUSAL ON CONCRETE (TANK FOUNDATION).	0'-4' 40 PPM DIESEL 900 PPM TOTAL BY IR
	0'-1'	TAN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	
	1'-1.5'	BROWN TO DARK BROWN FINE SAND, SOME SILT, NO ODOR, MOIST.	
	1.5'-2.5'	TAN TO ORANGISH TAN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	
	2.5'-3'	GRADING WITH SOME SILT.	
	3'-4'	ORANGE SILT AND FINE SAND, NO ODOR, MOIST.	

- NOTES:
- 1) DEPTHS ARE APPROXIMATE.
 - 2) TPH - TOTAL PETROLEUM HYDROCARBONS.
 - 3) PPM- CONCENTRATION IN PARTS PER MILLION, WHICH IS
ANALOGOUS TO MILLIGRAMS PER KILOGRAM.
 - 4) IR - INFRARED SPECTROPHOTOMETRY METHOD

TABLE 3

HOLCOMB BOULEVARD WASTE OIL TANKS
LABORATORY RESULTS OF SOIL SAMPLES

SAMPLE	DEPTH	TPH	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	V19	V20
HBHA-1	0'-4.5'	ND	--	--	--	--	--	--
HBHA-2	0'-4.5'	ND	--	--	--	--	--	--
HBHA-3	0'-2'	ND	--	--	--	--	--	--
HBHA-4	0'-4'	2318 D	--	--	--	--	--	--
HBHA-5	0'-2'	5180 K 5200 IR*	ND	0.070	0.154	0.242	0.017	0.044
HBHA-6	0'-4'	40 D 900 IR	--	--	--	--	--	--
HBSS-1	SURFACE	ND	--	--	--	--	--	--

- NOTES: 1) ALL RESULTS ARE PRESENTED IN PARTS PER MILLION (PPM), WHICH IS ANALOGOUS TO MILLIGRAMS PER KILOGRAM.
- 2) TPH- TOTAL PETROLEUM HYDROCARBONS. METHOD IS BY GAS CHROMATOGRAPH (GC); "D" INDICATES DIESEL, "K" - INDICATES KEROSENE. "IR" - INDICATES INFRARED SPECTROPHOTOMETRY METHOD IN LIEU OF OR IN ADDITION TO GC METHOD. "*" - INDICATES TEST RESULTS FROM SECOND LABORATORY.
- 3) VOLATILE ORGANIC COMPOUNDS (VOC) ARE 34 COMMON PRIORITY POLLUTANTS. V19 - TETRACHLOROETHENE, V20 - 1,1,1 TRICHLOROETHANE. INCLUDES BENZENE, TOLUENE, ETHYLBENZENE, TOTAL XYLENE (BTEX). ALL OTHER COMPOUNDS WERE BELOW THEIR DETECTION LIMITS.
- 4) "ND" - NOT DETECTED. DETECTION LIMITS: TPH IN SOIL = 10 PPM, VOC AND BTEX IN SOIL = 0.005 PPM.

5.4 Asbestos. A total of two material samples on the tank piping were collected at the Holcomb Boulevard site. The following are those materials identified as ACMs:

<u>Sample Number</u>	<u>Location</u>	<u>Material</u>	<u>ACM Content</u>	<u>Approx. Quantity</u>
HB01	Tank	Pipe Coating	5% Chrysotile	300 LF
HB02	Tank	Pipe Coating	5% Chrysotile	320 LF

As this is not a limited area, full containment with negative air will be required for asbestos removal per OSHA regulations. This removal can be accomplished via a glove bag with negative air pressure.

5.5 Lead Based Paint. Paint samples for percentage of lead testing were taken from tanks S-888, S-889, and S-890. The results were:

<u>Sample Identification</u>	<u>Percent Lead</u>
S-888	4.72
S-889	10.52
S-890	7.88

Although all of the above samples indicate lead levels above the 0.5% trigger levels, it is not recommended that the Contractor remove all existing paint prior beginning painting operations. The coating on the tanks is in good condition, with minimal rust spots. Rather than produce airborne contamination, it may be prudent to repair small areas and encapsulate the existing coating with a new layer of paint. In light of this encapsulation option, we do not feel that excessive lead levels are a problem at this site.

5.6 Conclusions. The laboratory data indicates some soil sample TPH levels that exceed the action level of 10 ppm. These were at hand auger locations HBHA-4, 5 and 6. The accuracy of the levels indicated by the tests may be suspect, due to errors with the GC method comparing what is suspected to be waste oil contamination against diesel and kerosene "signatures" in the GC, as well as the possible errors associated with the IR method that have been discussed (Section 3.2). However, the positive readings at relatively high levels do strongly indicate a release. Furthermore, the VOC levels, although low, also support this indication.

It is believed that the contamination is due to surface spills, however, the extent is not believed, at this time, to be wide spread. Furthermore, it is believed that the lower permeable sandy silts underlying the surface sands may have hindered the vertical migration and prevented contamination of the groundwater. Additional sample locations, deeper sampling and possibly monitor wells would be required to ascertain the full extent of contamination. If the extent of contamination is limited, then in accordance with the North Carolina Guidelines for Remediation of Soil Contaminated by Petroleum, the soil might be remediated by removing the contaminated soil, properly disposing or treating it, and confirming the remediation by laboratory testing of soil samples from the limits of the excavation. However, since the suspected contaminant has been determined to be a hazardous waste, the contaminated soil itself may be considered to be hazardous and the Division of Hazardous Waste may impose additional requirements for investigation and remediation.

Based on the asbestos sampling performed at the site approximately 640 linear feet of piping has coating containing asbestos. Removal should be performed in accordance with OSHA regulations.

Tests indicate lead based paint, though present, should not present a problem.

6.0 MIDWAY PARK (BUILDING 45)

6.1 Tank Contents. The results for the laboratory testing on the sludge sample from the Midway Park tank are presented in Table 4. The tank sampled was designated S-781. At the time of sampling (11/26/90), there was approximately 7 inches of sludge in the tank, for an approximate volume of 5,100 gallons. The tank was sampled utilizing a stainless steel sludge sampler. The leachate extraction procedure was applicable to the sludge sample, therefore, the TCLP parameters are for the extracted leachate.

The VOC's that were detected in the sample above their detection limits included Chlorobenzene, Chloroform, Chloromethane, 1,1-Dichloroethane, Methylene Chloride, Tetrachloroethene, 1,1,1-Trichloroethane, Trichloroethene, Trichlorofluoromethane, 1,1,2-Trichlorotrifluoroethane (Freon), Benzene, 1,2-Dichlorobenzene, Toluene, Ethylbenzene and Total Xylenes. For those detected VOCs with established maximum contaminant levels (MCL) or maximum contaminant level goals (MCLG), the concentrations in the sludge exceed those MCL/MCLG's on the order of 10 to 200 times, with the exception of 1,2-Dichlorobenzene, which was below its MCL of 0.62 ppm. All of the detected VOCs are commonly associated with petroleum and chlorinated solvents, or their degenerative products.

TABLE 4

**CAMP LEJEUNE HAZARDOUS WASTE OIL TANKS
LABORATORY RESULTS OF TANK CONTENTS**

SITE	HOLCOMB	MIDWAY	NEW RIVER	TARAWA	
DATE SAMPLED	11/27/90	11/26/90	11/27/90	11/26/90	
TANK DESIGNATION	891	S-781	AS421	STT-66	
ESTIMATED VOLUME	24600 GAL	5100 GAL	330 GAL	450 GAL	
VOC'S					MCL
CHLOROBENZENE	0.607	0.597	ND	ND	0.06
CHLOROFORM	ND	0.914	5.27	ND	0.1
CHLOROMETHANE	ND	0.547	ND	ND	--
1,1-DICHLOROETHANE	ND	0.294/1.9	ND	1.46	--
1,1-DICHLOROETHENE	3.69	ND	ND	ND	--
METHYLENE CHLORIDE	ND	0.562	0.542	ND	--
TETRACHLOROETHENE	ND	0.709	ND	5.12	--
1,1,1-TRICHLOROETHANE	11.1	2.00/13.0	ND	4.43	0.2
TRICHLOROETHENE	2.23	314.0	1.08	ND	--
TRICHLOROFLUOROMETHANE	2.06	1.18	1.39	2.94	--
1,1,2-TRICHLOROTRI- FLUOROETHANE	ND	10.5	0.513	ND	--
BENZENE	7.31	2.78/11.0	ND	3.15	0.005
1,2-DICHLOROENZENE	ND	0.213	ND	ND	0.62
ETHLYBENZENE	19.7	6.97/39.0	0.571	22.6	0.68
TOLUENE	6.20	20.5/96.0	2.80	7.12	2.0
TOTAL XYLENES	73.7	23.2/260.0	3.97	87.9	0.44
TCLP					REG. LEVEL
ARSENIC	0.100	0.002	0.151	0.100	5.0
BARIUM	15	1.8	ND	40	100.0
BENZENE	7.31	ND	ND	3.15	0.50
CADMIUM	2.24	0.138	1.01	1.74	1.0
CHLOROFORM	ND	ND	5.27	ND	6.0
CHROMIUM	80	0.14	55	95	5.0
1,1-DICHLOROETHYLENE	3.69	ND	ND	ND	0.70
LEAD	20	0.4	15	25	5.0
MERCURY	ND	ND	2.40	0.200	0.2
METHYL ETHYL KETONE	11.2	ND	7.19	20.4	200.0
TRICHLOROETHYLENE	2.23	6.13	1.08	ND	0.5
TETRACHLOROETHYLENE	ND	ND	ND	5.12	0.7

TABLE 4
(CONTINUED)

**CAMP LEJEUNE HAZARDOUS WASTE OIL TANKS
LABORATORY RESULTS OF TANK CONTENTS**

SITE	HOLCOMB	MIDWAY	NEW RIVER	TARAWA
DATE SAMPLED	11/27/90	11/26/90	11/27/90	11/26/90
TANK DESIGNATION	891	S-781	AS421	STT-66
OTHER				
PCB	<5.0	<0.200	<5.0	<5.0
REACTIVITY				
TOTAL HYDROGEN CYANIDE	<5	<5	<5	<5
TOTAL HYDROGEN SULFIDE	<10	<10	<10	<10
IGNITABILITY				
FLASHPOINT	>212 F	>212 F	>212.2 F	208.4 F
CORROSIVITY				
pH	9.0 S.U.	5.88 S.U.	5.31 S.U.	7.25 S.U.

- NOTES:**
- 1) ALL RESULTS ARE PRESENTED IN PARTS PER MILLION (PPM), WHICH IS ANALOGOUS TO MILLIGRAMS PER KILOGRAM FOR THE VOC'S, PCB'S, REACTIVITY AND THE TCLP FOR HOLCOMB, NEW RIVER AND TARAWA. PPM IS ANALOGOUS TO MILLIGRAMS PER LITER FOR THE TCLP FOR MIDWAY. FLASHPOINT IS IN DEGREES FAHRENHEIT (F) AND pH IS IN STANDARD UNITS.
 - 2) VOLATILE ORGANIC COMPOUNDS (VOC) IS A PARTIAL LIST CONSISTING OF 34 CHEMICALS. THOSE NOT INCLUDED IN THE TABLE WERE BELOW THEIR DETECTION LIMITS. THE DETECTION LIMIT FOR VOC'S WERE 0.125 PPM AT MIDWAY AND 0.500 PPM AT THE OTHER SITES.
 - 3) TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) WAS ONLY APPLICABLE TO THE MIDWAY SITE; THE OTHER SITES CONSISTED OF OIL SAMPLES FOR WHICH THE EXTRACTION WAS NOT APPLICABLE. THEREFORE, THE RESULTS FOR THOSE THREE SITES ARE FOR TOTAL CONCENTRATIONS IN THE WASTE OIL, WHILE THE RESULTS FOR MIDWAY ARE FOR THE LEACHATE FROM THE SLUDGE SAMPLED.
 - 4) ND - NOT DETECTED; "<" - LESS THAN THE DETECTION LIMIT.
 - 5) "0.294/1.9" FOR MIDWAY INDICATE RESULTS FROM FIRST AND SECOND LABORATORIES.
 - 6) S.U. - STANDARD UNITS
 - 7) F - DEGREES FAHRENHEIT
 - 8) MCL - MAXIMUM CONTAMINANT LEVEL

The TCLP constituents detected in the sample leachate above their detection limits include Trichloroethylene, Arsenic, Barium, Cadmium, Chromium and Lead. Only Trichloroethylene exceeded its regulatory level; 6.13 ppm vs. 0.5 ppm.

The sample did not contain PCBs above the detection limit of 5.0 ppm and was not hazardous by reactivity, ignitability or corrosivity.

6.2 Site Geology. The site was investigated by five hand augers advanced to a depth of 1 to 4.5 feet, five soil borings advanced to a depth of 5 feet and two monitor wells advanced to a depth of 20 feet. The test locations are shown on the Midway Park Site sheet in the sleeve at the back of this report. The general locations are as follows:

- Hand augers MPHA-1, 2, 3 and 4 were around the perimeter of the tank, inside the brick containment wall.
- Hand auger MPHA 5 was near the pump house where piping was suspected to enter.
- Soil boring MPSB-1 was located near the suspected vicinity of the underground piping halfway between the tank and pump house.
- Soil borings MPSB 2, 3, 4 and 5 were located along the suspected vicinity of underground piping from the pump house southeast toward the main building.

A surface sample was obtained of a black tar/asphalt substance on the surface within the brick containment wall (sample MPHA-4A). The monitor wells, MPMW-1 and 2 were installed to the northwest and north-northwest of the tank near the perimeter fence, in attempt to intercept the suspected downgradient flow of groundwater at the site.

The soils encountered at each of the hand auger and soil boring location are described in Table 5. The soils encountered in the monitor wells are presented in boring logs (Plates 1 and 2). The soils encountered at all test locations were almost exclusively very fine to fine sands with trace to no silt. These sands were grey to brown to orange in the upper few feet, then graded to light tan to orangish tan and near white with depth. MPHA-5 encountered approximately 1 foot of fine sand with little silt then refused on the concrete associated with the pump house (four attempts were made). Some wood debris was encountered at an approximate depth of 3 feet in soil boring MPSB-3 and some wood and concrete debris was

TABLE 5

SOIL DESCRIPTIONS
MIDWAY PARK WASTE OIL TANK

LOCATION	DEPTH	DESCRIPTIONS	DEPTH/ TPH	BLOW COUNT
MPHA-1	0'-1'	BROWN AND DARK GREY FINE SAND, NO ODOR, MOIST.	0'-1'	N/A
	1'-2'	GRADING BROWN TO TAN.	<10 PPM	
	2'-3'	GRADING TAN TO LIGHT TAN.	2'-4'	
	3'-4'	GRADING LIGHT TAN TO WHITE.	<10 PPM	
MPHA-2	0'-1'	BROWN AND GREY FINE SAND, OCCASIONAL PIECES OF TAR OR ASPHALT, NO ODOR, MOIST.	0'-1'	N/A
	1'-2'	GRADING DARK ORANGISH TAN, NO TAR/ASPHALT.	<10 PPM	
	2'-3'	GRADING LIGHT ORANGISH TAN.	1'-4'	
	3'-4'	GRADING LIGHT TAN TO NEAR WHITE.	<10 PPM	
MPHA-3	0'-1'	TAN FINE SAND, TRACE SILT, NO ODOR, MOIST.	0'-4.5'	N/A
	1'-1.5'	GRADING LIGHT BROWN, LITTLE SILT.	<10 PPM	
	1.5'-3'	GRADING YELLOWISH TAN.		
	3'-4.5'	GRADING LIGHT BROWN.		
MPHA-4	0'	SOME TAR/ASPHALT ON SURFACE.	0'	N/A
	0'-1'	ORANGISH TAN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	<10 PPM	
	1'-2'	GRADING LIGHT TAN, TRACE SILT.	0'-4'	
	2'-4'	GRADING LIGHT TAN TO WHITE.	<10 PPM	
MPHA-5	0'-1'	BROWN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	0'-1'	N/A
	1'	REFUSAL ON CONCRETE.	<10 PPM	
MPSB-1	0'-1'	2" TOP SOIL. BROWN FINE SAND, LITTLE SILT, NO ODOR, MOIST.	0'-5'	0'-2'
	1'-4.5'	GRADING TAN AND BROWN, TRACE SILT.	1200 PPM	2-5-9-9
	4.5'-5'	GRADING ORANGE.		3'-5' 3-3-4-2
MPSB-2	0'-0.5'	CRUSHED GRAVEL.	0'-5'	0'-2'
	0.5'-1'	GREY FINE SAND, TRACE SILT, NO ODOR, MOIST.	2200 PPM	9-11-16-16
	1'-1.5'	GRADING BROWN, TRACE GRAVEL.		3'-5'
	1.5'-2'	GRADING LAYERED BROWN AND BLACK, MODERATE PETROLEUM ODOR.		3-3-4-2
	3'-4.5'	TAN FINE SAND, TRACE SILT, NO ODOR, MOIST.		
4.5'-5'	GRADING ORANGE.			
MPSB-3	0'-0.5'	CRUSHED GRAVEL.	2'-5'	
	0.5'-1'	DARK BROWN FINE SAND, NO ODOR, MOIST.	<10 PPM	1'-3'
	1'-2'	GRADING MOTTLED BROWN AND ORANGE, LITTLE GRAVEL.		11-9-7-7
	2'-2.7'	GRADING MOTTLED TAN AND BLACK.		
	2.7'-3'	GRADING DARK ORANGE BROWN AND TAN, PIECE OF WOOD IN SPOON.		3'-5'
	3'-4'	GRADING TAN, 2" WOOD.		4-4-8-4
4'-5'	GRADING ORANGE.			
MPSB-4	0'-0.5'	CRUSHED GRAVEL.	1'-5'	1'-3'
	0.5'-5'	MOTTLED ORANGE AND TAN FINE SAND, TRACE SILT, NO ODOR, MOIST.	<10 PPM	11-12-9-6 3'-5' 2-2-1-2

TABLE 5
(CONTINUED)
SOIL DESCRIPTIONS
MIDWAY PARK WASTE OIL TANK

LOCATION	DEPTH	DESCRIPTIONS	DEPTH/ TPH	BLOW COUNT
MPSB-5	0'-0.5'	CRUSHED GRAVEL.	3'-5'	
	0.5'-1.8'	ORANGISH BROWN FINE SAND, NO ODOR, MOIST.	<10 PPM	1'-3'
	1.8'-2.5'	5" WOOD AND CONCRETE IN SPOON. CONCRETE OBSTRUCTION IN SIDE OF BORING AT 2'.		5-8-4-3
	2.5'-5'	DARK ORANGE BROWN FINE SAND, TRACE SILT, NO ODOR, MOIST. PIECE OF WOOD AT 4.5'.		3'-5' 2-1-1-2

- NOTES:
- 1) DEPTHS ARE APPROXIMATE.
 - 2) TPH - TOTAL PETROLEUM HYDROCARBONS.
 - 3) PPM- CONCENTRATION IN PARTS PER MILLION, WHICH IS ANALOGOUS TO MILLIGRAMS PER KILOGRAM.
 - 4) BLOW COUNTS ARE THE NUMBER OF BLOWS REQUIRED TO DRIVE A STANDARD SPLIT SPOON 2 FEET IN 6 INCH INCRIMENTS.
 - 5) SEE INDIVIDUAL LOGS FOR MONITOR WELLS MPMW-1 AND MPMW-2.

encountered in soil boring MPSB-5. Groundwater was not encountered within the depth investigated by the hand augers and soil borings. Groundwater levels in the monitor wells stabilized at an approximate depth of 8.5 feet. The only odors encountered during the sampling was a moderate petroleum odor in a layered brown and black fine sand at an approximate depth of 1.5 to 2 feet in soil boring MPSB-2.

The monitor wells were constructed of 2 inch inside diameter PVC. Fifteen feet of screen was set at a depth of 18 to 23 feet to insure the water table was intersected, filter sand was placed in the annular space to approximately 2 feet above the screen, a bentonite clay seal was placed for 2 feet above the sand and the remainder was filled with grout to the surface. A locking steel casing was set to protect the well. The wells were developed by surging the well with a plunger on the end of stainless steel rods. This surging action sets the filter sand by removing fine soil particles and breaking the bridging action between sand grains. The monitor wells were then purged until relatively clean water was being removed and consistent levels of pH, temperature and conductivity were obtained. Approximately fifteen gallons (approximately eight volumes of water present in the well) were purged from monitor well MPMW-1 and approximately ten gallons (approximately eight volumes of water present in the well) were purged from monitor well MPMW-2. The wells were allowed to fully recharge before sampling. Sampling was performed by using a decontaminated, clear PVC bailer. No floating product or odors were noticed during sampling. Copies of the well permits for this site are included in Appendix 7.

6.3 Laboratory Results. The laboratory test results for the soil samples obtained at the Midway Park site are presented in Table 6. TPH levels were recorded above the detection limit of 10 ppm for soil samples from the following test locations:

- MPSB-1: 1200 ppm by IR
- MPSB-2: 2200 ppm by IR at one laboratory and 1480 ppm by IR at the second laboratory
- MPMW-1: 20 ppm by GC as diesel and 2400 ppm by IR at 0 to 2 feet and <10 ppm by GC as diesel and 70 ppm by IR at 3 to 5 feet

The samples from the other hand augers and the surface sample of tar/asphalt material within the containment wall indicated TPH levels below the detection limit of 10 ppm.