

Report

**Site Assessment
Tanks AS419 - A421
Marine Corps Air Station
New River
North Carolina
Contract N62470-90-R-7626**

**Naval Facilities Engineering Command
Norfolk, Virginia**

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O'BRIEN & GERE

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REPORT

SITE ASSESSMENT
TANKS AS419 - AS421
MARINE CORPS AIR STATION
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CONTRACT # N62470-90-R-7626

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SECTION 1 - INTRODUCTION

1.01 Purpose and Scope

The objective of this report is to present information that has been gathered regarding any subsurface contamination in the vicinity of tanks AS419 - AS421 at Marine Corps Air Station, New River, North Carolina. O'Brien & Gere Engineers, Inc. (OBG) has completed a site investigation which included monitoring well installation, penetrometer probes, soil borings, ground water elevation and free product monitoring, soil and ground water sampling and analysis and in-situ permeability testing. This report presents a site assessment, a risk assessment, a remediation assessment and recommendations for corrective actions for the study area.

1.02 Site History and Description

The study area is located at Marine Corps Air Station, New River, North Carolina. The site is located on the southwest corner of Foster Street and Campbell Street. Two hundred feet to the south is the air station fire station (Building AS502). Approximately 800 feet beyond the fire station, to the south, lies the air station's taxiway. To the west lie large machinery buildings, aircraft hangers and the Base commissary building. Across Foster Street, to the east, is an area under construction with plans to build a new aircraft hanger. Farther to the east, approximately 4,000 feet is the New River. To the north of the site are office type buildings.

The site includes three above ground storage tanks, each with a 25,000 gallon capacity, surrounded by an earthen berm and a pump house. Previously used as storage for Fuel oil #6, and then for waste oil, the tanks have now been emptied, except for 2 to 3 inches of product with an estimated volume of 330 gallons remaining. In November 1990, Dewberry and Davis completed 8 soil borings around the pump house and tanks (Exhibit B). Total Petroleum Hydrocarbon (TPH) concentrations, using the gas chromatograph method, were recorded ranging from below method detection limits to 211 mg/kg (by GC method).

SECTION 2 - SITE ASSESSMENT

2.01 Hydrogeology

2.01.1 Subsurface Field Investigation

In order to explore the site's geological conditions and delineate the vertical and horizontal extent of a contaminant plume, fourteen monitoring wells (seven nested pairs), four soil borings and ten penetrometers were completed in the study area.

Site field activities were completed between January 21 and 29 1992. In accordance with drilling procedures outlined in Appendix E, and under the supervision of an OBG geologist, drilling operations were performed by ATEC Associates, Inc. (ATEC), of Raleigh, N.C. Figure 3 is an illustration of the various drill locations.

Initially, four shallow monitoring wells (MW1, 3, 5, 7) were installed in order to establish a ground water flow direction. Then ten hydropunches (H1 - H10) were completed in order to provide a preliminary delineation of the horizontal extent of contamination. Finally, the remaining monitoring wells (MW2, 4, 6, 8, 9, 10, 11, 12, 13 and 14), and four soil borings (B1 - B4) were completed in an effort to define the vertical and horizontal extent of contamination.

To delineate the boundary of a possible dissolved plume, ten hydropunches were installed. Hydropunch installation involved pushing the hydropunch apparatus to approximately 4 feet below the water table and then retrieving a ground water sample. Ground water collected from the hydropunch, and any subsurface sample

recovered during field activities, were screened in the field for volatile organics using an Organic Vapor Monitor (OVM).

Monitoring Wells were installed in nested pairs, comprising of one shallow well and one deep well. Each monitoring well was constructed of 2" I.D., schedule 40, PVC, with 10 feet of 0.01 slot screen. Shallow wells (odd numbered) were installed to a depth of 15 feet below grade with the exception of monitoring well MW3, which was installed to a depth of 14 feet below grade. Within 3 feet of each shallow well a deep monitoring well (even numbered) was emplaced to a depth of 30 feet below grade. Appendix A contains well construction diagrams for each well. Soil borings were terminated at the water table which was encountered between 7 and 10 feet below grade. Cuttings generated from drilling activities were contained in 55 gallon drums, labelled, placed on wooden pallets and left at the site for management by Activity personnel.

Split spoon samples were collected during the drilling of the 7 deep wells and the 4 soil borings. Split spoon sampling occurred continuously from 0 to 6 feet below grade and in 5 foot intervals thereafter in accordance with ASTM D-1586. Detailed lithologic descriptions of each soil sample were recorded on bore logs located in Appendix A. Each soil sample was screened for Volatile Organics with an OVM. Two soil samples from each deep well and soil boring were selected for laboratory analysis as discussed in section 2.02.2.

Following installation it was necessary to remove fine grained materials that may have entered the well during installation. This was accomplished by continuous low yield pumping in all of the monitoring wells. Each well's horizontal location and top of casing elevation was established by a survey conducted by Robert H. Davis, RLS (Exhibit A).

2.01.2 Geologic Conditions

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 (USGS, 1988). The Camp LeJeune area overlies Cretaceous sediments of sands, silts and clays that thicken towards the east and reach a thickness of approximately 2500 feet. The investigation at New River Air Station involved the upper 30 feet of sediments. Split spoon samples (Appendix A) revealed a subsurface geology characterized by sand, silt and clays. The upper 2 feet of material is identified as a sandy topsoil. Below the topsoil lies silty clays, sandy clays, and clayey sands till approximately 9 feet below grade. Overlain by the clay rich material is a coarse gray sand until roughly 15 feet below grade. Sediments collected from deeper than 15 feet below surface are found to be medium grained, greenish gray sand with streaks of green, very fine sand with silt and clay. Overlain by the greenish gray sand, towards 26 feet below grade, is a layer of dark green sand, found to overlie a formation of calcareous, fossiliferous, very compacted, gravel

and sand. Figures 6 and 7 present an approximate geologic cross section of the study area.

2.01.3 Aquifer Testing

Hydraulic permeability (or conductivity) was estimated with the performance of in-situ permeability tests conducted on all the wells (MW1 - MW14). The test involves removing several gallons of water from each well, creating a potential for flow into the well from the surrounding aquifer. The rate at which the ground water re-enters the well is monitored until the well's static water level is approached. Ground water levels during the tests were measured with an electronic oil/water interface probe. Values of hydraulic conductivity were calculated based on the change in water level versus the change in time using Horselov's formula. Appendix D contains the test data and the results are summarized on Table 2. Using this method, the geometric mean for hydraulic conductivity was calculated to be 6.6 gpd/ft².

2.01.4 Ground Water Flow

Ground water elevations were gauged in all of the monitoring wells at the site. Using an electronic oil/water interface probe ground water was measured to be between 5 and 9 feet below the top of well casing. After installation, each well was surveyed to establish top of casing elevation above mean sea level (AMSL) to an accuracy of 0.01 feet. From these elevations, the ground water elevation in each well can be determined. Using the elevational data summarized on Table 1, ground water contour maps were derived. Figure 4 illustrates the ground water flow in the upper portion of

the aquifer, monitored by the shallow wells. Figure 5 depicts the flow pattern monitored by the deep wells. Locally and surficially, ground water flow in the tank area appears to have a radial pattern skewing to the east, however the deep wells indicate a northeast flow direction.

With an estimated hydraulic gradient of 0.002 ft/ft and an effective porosity of 0.40, the flow velocity of the ground water can be approximated at 0.004 ft/day or 1.58 ft/yr.

2.02 Environmental Assessment

2.02.1 Free Product Characterization

With an electronic oil/water interface probe each well was gauged for ground water elevations and the presence of free product. Free product was not detected in any of the wells.

2.02.2 Air Characterization

During all field activities ambient air and sample head space was monitored for volatile organics using an OVM. At no time did the workers' breathing zone or the ambient air quality exceed 1 ppm. As each sample, both soil and liquid, was collected the OVM was used to monitor the head space. Ground water obtained from each hydropunch location was also gauged for volatile organics using the OVM. Of the ten hydropunches completed only one indicated a head space reading above instrument detection limits. Hydropunch location H4 registered an OVM value of 4 ppm.

2.02.3 Soil Characterization

Two soil samples from each soil boring and deep monitoring well were selected for laboratory analysis. At each location a

sample from the water table and five feet above the water table was sent to Environmental Testing Services, Inc., in Norfolk, Virginia, for analysis of TPH (California TPH method). Five water table samples (MW2, 4, 6, 8 and 12) were also analyzed for flash point (Pensky-Martin closed cup technique) and pH (EPA Method 1.50.1). Two water table samples (MW2 and 6) were selected for TCLP analysis. Laboratory results are presented in Appendix C.

Flash point testing on five soil samples was negative at the maximum temperature tested (110°C).

Each constituent of the TCLP analysis was below method detection limits, with the exception of barium. Barium was found to exist in concentrations ranging from 1.70 mg/l to 2.14 mg/l; however, these values are below the regulatory level of 100.0 mg/l.

Each soil sample was analyzed for TPH. TPH values ranged from below method detection limits to 124 mg/kg. All but one of the samples were below the North Carolina action level of 10 mg/kg. Soil boring B2 demonstrated a TPH value of 124 mg/kg. This sample was obtained from 5 feet above the water table, suggesting a surficial source. The water table sample collected at B2 did not exhibit TPH above method detection limits.

2.02.4 Ground Water Characterization

Between January 23 and 28, 1992 ground water samples were collected from each monitoring well and hydropunch. Hydropunch sampling was accomplished by the methods previously described in Section 2.01.1. Ground water samples from each monitoring well were obtained by using a stainless steel bailer and following the

procedures dictated in Appendix F. Prior to sample collection, each monitoring well was purged of three times the well's volume. Ground water samples were sent to OBG Laboratories in Syracuse, N.Y. for analysis by EPA methods 8010, 8020, 8100 and Toxicity Characteristic Leaching Procedure (TCLP). EPA methods 8010, 8020, and 8100 are derived from EPA methods 601, 602 and 610, respectively. They utilize the same technique and include the same parameters. Laboratory results are available for review in Appendix B.

Five wells contained constituent concentrations above the North Carolina Ground Water Standards (MW3, MW4, MW6, MW10 and MW12). Tetrachloroethylene was found in MW3, MW10 and MW12. Concentrations of tetrachloroethylene in these wells ranged from 0.004 ppm (MW3 and MW12) to 0.210 ppm (MW10) compared to the State standard of 0.0007 ppm. Trichloroethylene was discovered in three wells, MW4, MW6 and MW10. The range of trichloroethylene in these wells was 0.004 ppm (MW6) to 0.280 ppm (MW4) in comparison to the State requirement of 0.0028 ppm. The only well to exhibit a benzene concentration above the 0.001 ppm State standard was MW4 with a value of 0.006 ppm. Other parameters which were above method detection limits included 1,2-Dichloroethylene (MW4 and MW10), 1,1-Dichloroethylene (MW10), and chloroethane (MW10), however, none of these constituents are regulated by the state of North Carolina. None of the hydropunch samples, which circumscribe the tank area and also lie between monitoring wells 10 and 12 and the tanks indicate any parameters above method detection limits.

These "clean" samples indicate that the tank area is not the source for the chlorinated solvents found in these wells. This is supported by the absence of most of these substances in the tanks, as reported by Dewberry & Davis (Exhibit B).

At the time of sampling specific conductivity and pH measurements were obtained from each of the monitoring wells. These measurements are summarized on Table 3.

2.03 Quality Assurance/Quality Control

Throughout field operations steps were taken to maintain quality assurance and quality control (QA/QC). Field instruments such as the OVM, pH meter, and Specific conductivity meter were calibrated on site and daily. The OVM was calibrated to 100 ppm isobutylene. Specific conductivity and pH meters were calibrated to standardized solutions.

Sampling equipment was decontaminated by using a series of rinses involving distilled water, non-phosphate detergent, methanol and dilute nitric acid. A rinse blank (field blank) was included in the analysis to confirm the decontamination process effectiveness.

Standard laboratory QA/QC procedures were applied in accordance with the referenced EPA Methods. In addition, trip blanks and duplicate samples were used.

SECTION 3 - RISK ASSESSMENT

3.01 Introduction

This section presents an evaluation of the risk to human health associated with the former operation of three aboveground waste oil storage tanks, AS-419, AS-420 and AS-421, located at the Marine Corps Air Station, New River, North Carolina. This risk assessment specifically addresses the risk to human health related to identified environmental contamination in the immediate area of the tank, resulting from the past operation of the tank. The results of this risk assessment are used in developing a corrective action/remedial action strategy, as presented in Section 4 of this report.

The associated field investigation for this project is previously described in Sections 1 and 2 of this report, and is summarized in Section 3.03.

This risk assessment has been prepared for the Naval Facilities Engineering Command, Atlantic Division and MCB Camp Lejeune. MCB Camp Lejeune will submit this document to the North Carolina Department of Environment, Health and Natural Resources (DEHNR). The DEHNR will then make a determination regarding potential corrective action requirements, as discussed in Section 4 of this report. Criteria discussed and/or used in this risk assessment are drawn from DEHNR and parallel U.S. Environmental Protection Agency (EPA) regulations and/or guidelines, where applicable. This document is consistent with typical goals of performing risk assessments related to environmental contamination.

The primary guidance document applied is the EPA's "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual". As such, it analyzes potential site-related acute and chronic health risks to on-site and off-site receptors, under both current and future use scenarios.

3.02 Site-Specific Descriptive Information

3.02.1 History

The three 25,000 gallon tanks were installed in 1954 for storage of #6 fuel oil and used for such until 1979. From 1979 until 1988 the tanks were used for waste oil storage. The tanks were emptied in 1988, according to Tom Morris, Environmental Management Department MCB Camp Lejeune. Mr. Morris is O'Brien & Gere Engineers, Inc. environmental contact for this project. The tanks currently remain empty, with the exception of 2 - 3 inches of residual product at the bottom of each tank.

According to Mr. Morris, a spill occurred in the tank area (date, quantity and details unknown).

Preliminary site investigations were conducted in November 1990 by Dewberry and Davis. This investigation included soil borings in the area of the tanks. Soil samples were analyzed for total petroleum hydrocarbons (TPH) by both California GC Method and EPA IR method 418.1 and for volatile organic compounds (VOC) (EPA Method 8010/8020). TPH results from two soil samples are as follows (as reported in the Dewberry and Davis report):

- Sample NRSB-5, near the valves on the west sides of the tanks, 1 - 2 feet below grade. 211 ppm diesel (GC method), 7000 ppm total (IR method).

- Sample NRSB-7, near the valves on the east sides of the tanks, 0.5 - 2 feet below grade. 70 ppm diesel (GC), 7500 total (IR). A sample from the same boring, at 3.5 - 4 feet was 200 ppm total (IR).

Results of the other nine soil boring samples were below the detection limit of 10 ppm. Soil samples analyzed for VOC's (34 priority pollutants; EPA Methods 8010/8020) yielded 0.006 ppm chloroform, 0.03 ppm methylene chloride, 0.035 ppm 1,1,1-trichloroethane, and 0.061 ppm 1,1,2-trichlorotrifluoroethane. Dewberry & Davis concluded that, based on the locations and concentrations of the detected compounds, the results are likely related to localized surface spills.

3.02.2 Site & Surrounding Area Description

The tanks are located on the southwest corner of Foster Street and Campbell Street at the Air Station. The base fire station is located 200 feet to the south; the air station's taxiway is located 800 feet further south of the fire station. Large machinery buildings, aircraft hangars and the base's commissary building are located to the west. Further east on Foster Street is an area recently graded, for construction of an aircraft hangar. Office buildings are located north of the site. The nearest surface water body is the New River, located approximately 4000 feet to the east.

The tanks are surrounded by an earthen berm. Ground cover in the immediate area of the tanks is grassy; surrounding area cover consists of buildings and pavement. The tanks are connected by piping and a hose to a small building which likely served as a pump house. A storm water drainage ditch runs around the outside of the berm. Steam lines are located overhead in the area of the tanks.

It appears that storm water lines run underground in the area of the tanks. No surface contamination was observed in the tank area.

According to Mr. Morris, all buildings in the area of the tanks are constructed on concrete slab. There are no known tunnels, underground storage areas, or similar underground spaces, according to Mr. Morris.

A map of the site is presented as Figure 3.

3.02.3 Demographics

The population at Marine Corps Air Station, New River includes military personnel and their families, as well as civilian employees. The tank area itself is adjacent to office buildings, machinery buildings and the fire station (i.e., buildings in which people work approximately 8 a.m. to 5 p.m.). Daily vehicular traffic passes near the tanks along Foster Street and Campbell Street, but not directly through the tank area. Foot traffic around the tanks is possible, as there is no base regulation or fencing prohibiting such.

The tanks are inspected weekly, according to Mr. Morris.

3.03 Current Site Data

The site investigation involved the installation, development and sampling of seven shallow monitoring wells and seven deep monitoring wells (as nested pairs; MW1 - MW14), four soil borings (B1 - B4), and ten hydropunches (H1 - H10). These are described in detail in Section 2.01 of this report.

3.03.1 Soil Data

Two soil samples from each of the four soil borings, and two soil samples from each of the seven deep monitoring wells were selected for laboratory analyses for TPH (California GC/FID method). Deep samples were collected at the water table (14' - 16' depth), and shallow samples were collected five feet above the water table (9' - 11' depth). Five deep soil samples (MW2, MW4, MW6, MW8, and MW12) were analyzed for flashpoint and pH. Two deep soil samples (MW2 and MW6) were selected for full-scan toxicity characteristic leaching procedure (TCLP) analyses.

The pH results ranged from 4.8 to 7.6; flashpoint tests were negative; the TCLP results were below EPA regulatory criteria for this procedure.

Soil TPH results were below the North Carolina action level of 10 mg/kg for 21 of the 22 samples. The TPH concentration from boring B2, at a depth of 4 - 6 feet, was 125 mg/kg.

3.03.1.1 Soil Data Evaluation

Fourteen of the 22 soil samples results were below the detection limit of 1 mg/kg, while detected concentrations (below 10 mg/kg) ranged from 1.13 to 4.06 mg/kg. One sample (B2, 4' - 6') yielded results exceeding the North Carolina criterion. Results of the sample from B2 at 8 - 10 feet were below the detection limit. Based on these results, it appears that the occurrence of 125 mg/kg in B2 (4' - 6') is an isolated incident.

As a conservative approach the presence of TPH in subsurface soils at B2 will be addressed as a potential source for exposure in this risk assessment.

3.03.2 Ground Water Data

No free product was detected in the fourteen ground water monitoring wells, nor was free product detected in the ten hydropunches.

Ground water samples from each monitoring well and hydropunch were analyzed for volatile organic compounds by SW-846 methods 8010 and 8020. Ground water samples from MW5 were analyzed for TCLP compounds. Section 2 of this report provides additional details on the analytical scheme.

TCLP results from the MW5 ground water sample were less than detection limits for metals, volatiles, pesticides and herbicides. The 8010/8020 results were below method detection limits, with the exception of the following compounds (concentrations given in mg/l):

<u>Cmpd.</u>	<u>MW2</u>	<u>MW3</u>	<u>MW4</u>	<u>MW6</u>	<u>MW8</u>	<u>MW10</u>	<u>MW12</u>	<u>H9</u>	<u>NC</u>	<u>MCL</u>
benzene	nd	nd	.006	.001	nd	nd	nd	nd	.001	.005
toluene	.350	nd	nd	nd	.002	nd	.001	nd	1.0	2.0*
1,1-DCA	nd	nd	nd	nd	nd	.750	nd	nd	na	na
1,2-DCE	nd	nd	.094	nd	nd	.076	nd	nd	na	.07*
TCE	nd	nd	.280	.004	nd	.077	.001	nd	.0028	0.005
perc	nd	.004	nd	nd	nd	.210	.004	nd	.0007	na
chloro-ethane	nd	nd	nd	nd	nd	.012	nd	nd	na	na
1,1,1-TCA	nd	nd	nd	nd	nd	nd	nd	.002	0.2	0.2

KEY:

1,1-DCA = 1,1-dichloroethane
1,2-DCE = 1,2-dichloroethylene (total)
TCE = trichloroethylene
Perc = perchloroethylene (or tetrachloroethylene)
1,1,1-TCA = 1,1,1-trichloroethane
NC = North Carolina criteria (explained below)
MCL = maximum contaminant level (explained below)

Results of analyses of field blanks and trip blanks were all below detection limits.

The North Carolina standards are the ground water quality standards, as dictated in Title 15, Subchapter 2L, Section 0.0200, of the North Carolina Administrative Code, dated 12/1/89. The standard applies to Class GA waters, which are considered to be drinkable in their natural state (i.e., potable water supplies).

MCL's are the Maximum Contaminant Level allowable for drinking water, under the National Primary Drinking Water Regulations. Those marked with the * indicate proposed limits; all others are final and current limits.

"n/a" indicates that there is no established criterion for this chemical.

3.03.2.2 Ground Water Data Evaluation

Eight organic compounds were detected in ground water samples; none of the detected compounds were detected in the field or trip blanks. Therefore, it is assumed that they are related to the site. These compounds are:

benzene	trichloroethylene
toluene	perchloroethylene
1,1dichloroethane	chloroethane
1,2dichloroethylene	1,1,1-trichloroethane

Of these, benzene, trichloroethylene and perchloroethylene were detected above their corresponding NC standard in one or more samples. Toluene and 1,1,1-trichloroethane were detected below the NC standards. 1,1-dichloroethane, 1,2-dichloroethylene and chloroethane do not have standards established by North Carolina.

These eight compounds will be considered in assessing the potential risk related to the presence of these organic compounds in the site ground water.

Except for MW3, the other six wells in which contaminants were detected are deep wells. Three compounds were detected in MW12, which is approximately 100 feet from the tanks; five compounds were detected in MW10, which is approximately 150 feet southeast of the tanks. The other well locations are within 50 feet of the tank.

Based on data collected from the seven shallow wells, localized and surficial ground water flow is in a radial pattern skewing to the east. Deep wells indicate a northeast flow direction. Ground water flow velocity is calculated to be approximately 1.6 feet/year.

3.03.3 Ambient Air Data

Ambient air quality was monitored during field activities with a photoionizing organic vapor detector (PID) with a 10.2 eV lamp. PID readings were recorded from the breathing zone of the on-site workers and at the ground surface every 15 to 30 minutes. The PID readings did not exceed the detection limit of the PID (1 ppm) at any time during the ambient air monitoring.

3.04 Identification of Chemicals and Media of Concern

Based on the results of the site investigation, as described in the previous section, the environmental contaminants to be considered for exposure scenarios in the groundwater are:

benzene	trichloroethylene
toluene	perchloroethylene
1,1dichloroethane	chloroethane
1,2dichloroethylene	1,1,1-trichloroethane,

3.05 Risk Assessment Approach

3.05.1 Introduction

This risk assessment addresses the potential for exposure to the ground water contaminants and TPH-contaminated subsurface soils in the area of AS-419, AS-420 and AS-421 tanks, under current and reasonably anticipated future conditions and site uses. Four potential exposure pathways are considered in assessing potential risk related to the identified contamination: 1) air, 2) surface water, 3) ground water, and 4) soil.

In the analysis of each exposure pathway, four key components are considered:

1. known source;
2. mechanisms for release and medium/vehicle for transport of contaminant(s);
3. potential receptor populations; and
4. exposure route (uptake by the receptor - e.g., ingestion).

If an exposure pathway has these four components, it is considered as a complete exposure pathway. If an exposure pathway lacks one of these necessary components it is concluded that there is no potential for exposure via that incomplete pathway; therefore, no risk. Each pathway is analyzed separately in the following sections. Each analysis includes the following:

1. a description of the waste source;
2. mechanisms for release and transport of contamination in the environment;
3. the time frame of potential releases (i.e., continuous or episodic);
4. the existence of potential receptor populations;
5. potential exposure scenarios;
6. potential uptake routes (ingestion, inhalation, dermal absorption);

Should all of the above be present, it is determined that the exposure pathway is complete, and further quantitative analysis is then made. Exposure point concentrations are estimated, followed by exposure intakes. Exposure scenarios may include current and future use conditions, children and adult exposures, and both carcinogenic and non-carcinogenic effects of chemicals involved in the exposure, as applicable. The calculated exposure intake is then compared to human-health based reference data, and an assessment of the potential for adverse health effects is then made. Details of this quantitative analysis process are presented for the exposure pathway(s) to which it is applied.

3.05.2 Air Exposure Pathway

Three potential mechanisms for release of identified contamination to the air are considered in assessing potential risks related to the air exposure pathway:

- 1) episodic fugitive dust emissions of contaminated soil particulates;
- 2) continuous emissions of volatile components of soil or ground water contamination, through the soil, to the ambient air at the site; and
- 3) continuous emissions of volatile components of soil or ground water contamination, through soils, into subsurface structures at the site.

3.05.2.1 Potential Exposure to Fugitive Dust Emissions

Episodic releases of contaminated fugitive dusts to the general atmosphere would result if contaminated surface and/or subsurface soils were exposed to surface scouring action (e.g., wind, vehicle traffic, foot traffic).

No surface contamination was visually observed. Subsurface contamination was detected at a depth of 4 - 6 feet in one sample which was inside the berm. Thus, based on the available analytical information, fugitive emissions would require scouring actions on subsurface contaminated soils at least four feet below grade. The detected contamination is covered by 4 - 6 feet of soil, which is then covered by grass. Traffic in the immediate area of the tanks is limited to foot traffic, due to the presence of the berm and the vertical supports for the overhead steam lines. These conditions eliminate the potential for regular site activities (limited foot traffic) to result in scouring actions on subsurface contaminated soils. Therefore, there is no potential for exposure to fugitive dust emissions from contaminated soil particulates.

Based on information provided by Tom Morris, there are no plans to alter the site; use of the area will not undergo substantial change with respect to land use or operations in the foreseeable future. Based on this, there is no potential for scouring actions to impact existing contaminated subsurface soils under future use conditions.

3.05.2.2 Potential Exposure to Volatile Emissions in the General Atmosphere

Volatilization involves evaporation of volatile components from contaminated media. Vapors can then migrate up through the soils to release at the soil surface under certain conditions.

The eight identified ground water contaminants include volatile compounds. Thus, it is likely that these compounds present in site ground water would volatilize. However, volatilization of trace concentrations (all eight compounds detected at less than 1 ppm) of these organic compounds from the ground water, through approximately 15 feet of soil, would result in insignificant quantities entering the ambient atmosphere. Volatilized portions would then be subject to dilution and dispersion by the general atmosphere. As such, potential exposure to vapors volatilized from ground water via subsurface soils would be insignificant.

Additionally, volatilization from TPH contaminated subsurface soils is possible. Based on the available information on the nature of the waste petroleum oils previously stored in tanks AS-419, AS-420 and AS-421, such oils may contain trace amounts of volatile organic compounds. Based on the past use of the tanks, and the proximity of B2 to the tanks, it is assumed that the TPH concentrations detected in B2 (125 mg/kg) are a result of the presence of waste oils, and therefore may indicate the potential presence of trace amounts of volatile organic compounds. However, the four to six feet of soil cover would both inhibit and dilute

such volatilization, to the extent that the release of such vapors into the general atmosphere would be insignificant. Soil interactions such as adsorption and degradation, as well as dilution and dispersion actions of ambient air movement, would result in minimal concentrations of such vapors with respect to concern for human exposure. Field monitoring supports this. The ambient air monitoring conducted throughout the field activities, which temporarily disturbed and exposed subsurface soils, indicated that no volatile organic compounds were detected in the breathing zone of the workers, with a detection limit of 1 ppm.

Based on the above discussions, no significant vapor emissions related to subsurface soil or ground water contamination are reasonably expected in the area of the tanks. Thus, the risk potentially associated with volatile emissions from subsurface media is negligible.

3.05.2.3 Potential Exposure to Volatile Emissions Released into Subsurface Structures

There are no subsurface structures located at the New River Air Station tank site. In general, there are no subsurface structures at Camp LeJeune, due to the high water table. Most buildings are constructed on slab.

Thus, no identified receptor population area exist to complete this exposure pathway. Based on this, the exposure pathway for volatile constituents of site contaminants that might migrate through soils into on-site subsurface structures is incomplete. As such, there is no risk of exposure via this mechanism.

3.05.2.4 Conclusion on Air Exposure Pathway

There is no significant risk of exposure via the air exposure pathway.

3.05.3 Surface Water Exposure Pathway

Three mechanisms for release of identified contamination to surface waters are considered in assessing risks related to the surface water exposure pathway:

- 1) contamination of surface water by contact with surface contamination;
- 2) contamination of surface water by ground water discharge; and
- 3) contamination of surface water by storm water drainage discharge.

There are no identified surface water bodies in the study area. The nearest surface water is the New River, located approximately 4000 feet to the east.

3.05.3.1 Potential Exposure to Contaminated Surface Water in Contact with Surface Contamination

No surface contamination in the immediate area of the tank was observed. As stated above, no surface water bodies in the study area exist. The potential exposure pathway is incomplete. Therefore no risk is associated with this pathway.

3.05.3.2 Potential Exposure to Contaminated Surface Water via Ground Water Discharge

Based on information obtained from this investigation on ground water flow, it is likely that ground water from the area of the tanks eventually discharges to the New River. At an estimated ground water flow rate of less than two feet per year, and a distance of 4000 feet, ground water from the study area would

likely flow via natural migration pathways and discharge to the New River hundreds of years in the future. The potential for exposures occurring in surface water contaminated by ground water flowing from the site to the New River so far in the future is beyond both the current and reasonably anticipated future use/conditions scenarios. In addition, the trace concentrations of the eight organic compounds would have decreased by natural mechanisms such as degradation and volatilization. As such, the prolonged migration would lead to negligible concentrations remaining upon discharge to the New River.

Therefore, the potential impact of site-related ground water on surface water is negligible.

3.05.3.3 Potential Exposure to Contaminated Surface Water via Storm Water Drainage Discharge

Based on observations made in the field, and a figure provided by Mr. Morris ("Surface Water Drainage Sub-Basin at MCAS New River, MCB Camp LeJeune", by Water and Air Research, Inc.), it appears that subsurface storm water drainage exists at the air station. According to the figure, the drainage basin in the area of the tanks leads to the New River. As such, ground water from the site may infiltrate into the drainage basin, and be transported and released to the New River. While this transport is likely faster than the natural ground water flow, this ground water infiltrate would be subject to dilution by the surrounding surface water draining into the basin. In addition, the trace amounts of the ground water contaminants would also be subject to degradation and

volatilization over the transport (basin) route. Based on these considerations, negligible concentrations of identified ground water contaminants would remain upon discharge to the New River via the surface water drainage route.

3.05.3.4 Conclusion on Surface Water Exposure Pathway

There is no significant human health risk, based on current and reasonably anticipated future use scenarios via the surface water pathway.

3.05.4 Ground Water Exposure Pathway

Two mechanisms for release of identified contamination to or through ground waters are considered in assessing risks related to the ground water exposure pathway:

- 1) Direct withdrawal and use/consumption of contaminated ground water (contamination, as detected, or contamination via leaching from subsurface soils); and
- 2) Exposure to ground water during subsurface disturbance.

3.05.4.1 Potential Exposure via Contaminated Ground Water Use/Consumption

There are no identified ground water users. According to Tom Morris, the ground water of the shallow aquifer at Marine Corps Air Station, New River is not used for human consumption or other operations/purposes which might lead to potential human exposure. Potable ground water use in the area is limited to a deeper aquifer (known as the Castle Hayne aquifer) approximately 150' below the ground surface. There are no known users/uses of the shallow aquifer (15' below grade). Thus there is no receptor population.

Based on the lack of a receptor population, under both current and future use consideration, this exposure pathway is incomplete, and therefore there is no risk to human health related to use/consumption of the ground water at the tank area.

3.05.4.2 Potential Exposure via Disturbance/Contact with Ground Water

Based on information provided by Tom Morris, there are no current nor anticipated plans to change the use of the study area; i.e., there are no known nor anticipated subsurface disturbance activities to take place in the study area. Therefore, there is no potential for exposure via contact with ground waters.

3.05.4.3 Conclusion on Ground Water Pathway

There is no potential for exposure, and therefore no significant risk related to the ground water exposure pathway.

3.05.5 Soil Exposure (Direct Contact) Pathway

One mechanism for exposure related to identified contamination is considered in assessing risks related to the soil exposure pathway:

1. Direct contact.

Subsurface soil contamination exceeding the North Carolina criterion was detected at a concentration of 125 mg/kg, from boring B2, at a depth of 4 - 6 feet.

3.05.5.1 Potential Exposure via Direct Contact with Contaminated Subsurface Soils

No current or anticipated disturbance of contaminated subsurface soils exists (see also discussion in Sections 3.05.02.1 and 3.05.04.3). Thus, no potential for direct contact with contaminated subsurface soils under current or anticipated future conditions exists.

In summary, under current and anticipated future conditions, there is no potential for exposure related to direct contact with the contaminated subsurface soils.

Based on the above assessment, there is no significant risk associated with the TPH-contaminated subsurface soils and ground water contamination in the area of tanks AS-419, AS-420 and AS-421 at the Marine Corps Air Station, New River, North Carolina related to the past operations of the tank.

3.06 Conclusion

The presence of eight organic compounds in the ground water, detected at eight different sampling locations (seven monitoring wells and one hydropunch) indicates that the ground water has been impacted. Six of the eight compounds detected were either in excess of the North Carolina ground water standards, or have no published regulatory standard for comparison. As stated above, potential exposure under current and anticipated future land uses do not include ground water use or consumption.

However, if site use is changed in the future to a previously unanticipated use, such that ground water is accessed (for potable or nonpotable uses), then additional consideration should be given at that time to the potential health effects related to the presence of benzene, trichloroethylene, toluene, perchloroethylene, 1,1-dichloroethane, chloroethane, 1,2-dichloroethylene, and 1,1,1-trichloroethane detected in the site ground water under this investigation.

SECTION 4 - REMEDIATION ASSESSMENT

4.01 Remedial Technologies

The Risk Assessment indicates that there is an absence of any identifiable complete exposure pathways (i.e. no risk) at this time. However, organic compounds are present in the ground water above North Carolina State Regulations. The incidence of TPH in the soil at B2 appears to be a localized, isolated spill occurrence. In order to address the necessity of ground water remediation the following technologies have been considered.

Air Stripping

An air-stripping treatment system removes volatile organics from the ground water through a chemical process involving the mass transfer of organics from the aqueous phase to the gaseous phase. The volatile organics desorb from the ground water into the passing air stream in accordance with Henry's Law. The process usually occurs within a cylindrical tower containing packing. The packing provides surface area upon which the desorption process can occur. The turbulent conditions within the tower are caused by the air stream flowing upward, counter-currently to the water. The water exits the base of the packed bed and is collected in a sump below the injection point of the air. The air stream passes through a demisting pad prior to exhausting to the atmosphere. This pad removes entrained water droplets through an impingement process.

Alternatively, a low profile air stripper (typically less than five feet high) may be used to remove volatile organics from the ground water. A low profile air stripper consists of multiple

trays, each of which receives a source of clean air. Since each tray receives a source of clean air a greater stripping efficiency is achieved.

The performance of an air stripper depends upon the temperature of the ground water, the type of packing selected, the packing bed depth or tray interval spacing, the air to liquid ratio, and the concentration of contaminants in ground water. The solvents detected in the ground water at this site have been successfully removed from ground water using this technology.

Carbon Adsorption

A granular activated carbon (GAC) treatment system removes the volatile organics from the ground water through physical adsorption of the organic molecules onto the porous carbon surface. Ground water would be pumped from the aquifer directly into a pressure vessel housing the GAC. As the ground water flows downward over the carbon, the zone of contaminant saturation moves down the bed. "Breakthrough" occurs when the zone of contaminant saturation has moved completely down the bed, exhausting all the carbon, and allowing volatile organics to exit the bed with the water flow. The movement of this zone of saturation is a function of the organic's adsorption capacity (or loading onto the carbon), the concentration of contaminants in the ground water, the operating temperature and pressure of the system, and the quality of the ground water with respect to solids, hardness, and other water quality parameters.

Once the carbon has been exhausted, the bed must be regenerated in order to resume its intended function. Several procedures are available for regenerating the bed, ranging from disposal of the exhausted carbon and replacement with new, virgin carbon to thermal regeneration of the exhausted carbon. Additionally available are disposable carbon units (i.e. 55 gallon drums) that can be returned to the manufacturer for replacement. Carbon adsorption would be considered applicable at this location.

Bioremediation

Bioremediation is a process by which the growth and activity of naturally occurring microorganisms are stimulated to degrade the compounds of interest. Stimulation of microbial growth and activity for hydrocarbon removal is accomplished through the addition of oxygen and nutrients. There are several factors that dictate the appropriateness of biodegradation. These include, but are not limited to the following: availability of oxygen and nutrients; type of hydrocarbon present and characteristics of the contaminated soils.

Bioremediation can be implemented in-situ or ex-situ. To implement in-situ bioremediation, wells and infiltration galleries are used to transport oxygen and nutrients to the subsurface. To implement ex-situ bioremediation, ground water is pumped above ground and treated.

Due to substances present, the low concentrations and distribution of the organic compounds at the site, bioremediation

does not appear to be an appropriate selection of remedial technology.

4.02 Recommendations

While there is no risk associated with the study area of Tanks AS419 - AS421, low concentrations of volatile organics were found to be present in the ground water. During a previous investigation, two out of nine soil samples analyzed exhibited TPH concentrations above method detection limits. Both of these samples were found in the near surface soil and contained approximately 7,000 ppm of TPH. During this investigation only one out of twenty two soil samples revealed a TPH level above 10 mg/kg (124 ppm). The location and depth of soils containing TPH concentrations above the North Carolina Action level of 10 mg/kg suggest the source to be from localized surficial spills. Investigations to determine the lateral and vertical extent of the chlorinated compounds should be continued using the appropriate sampling and testing protocols. Remediation of the ground water could be implemented effectively using recovery wells and air stripping.

REFERENCES

Dewberry & Davis, January 1991. Technical Memorandum No.2 Results of Field Investigation, Marine Corps Base, Camp Lejeune, North Carolina.

O'Brien & Gere Engineers Inc., July 1988. Contaminated Groundwater Study, Camp Lejeune, North Carolina.

Lloyd, O.Jr. and Daniel, C.III; U.S.Geological Survey, 1988. Water Resources Investigations Report 88-4034.

Tables



TABLE 1
GROUNDWATER ELEVATIONS
Tanks AS419 - AS421
Marine Corps Air Station, New River, North Carolina

WELL #	TOP OF CASING ELEVATION (AMSL) (in feet)	DEPTH TO WATER 1/29/92 (in feet)	GROUNDWATER ELEVATION (AMSL) (in feet)
MW1	19.16	7.65	11.51
MW2	18.64	7.34	11.30
MW3	17.96	6.45	11.51
MW4	17.93	6.67	11.26
MW5	19.21	7.70	11.51
MW6	18.98	7.61	11.37
MW7	19.90	8.45	11.45
MW8	19.68	8.56	11.12
MW9	18.30	6.87	11.43
MW10	17.75	6.55	11.20
MW11	19.58	7.92	11.66
MW12	18.50	7.38	11.12
MW13	16.67	5.56	11.11
MW14	16.71	5.90	10.81

TABLE 2

IN-SITU PERMEABILITY SUMMARY
TANKS AS419 - AS421

Marine Corps Air Station, New River, North Carolina

WELL #	HYDRAULIC CONDUCTIVITY	
	FT/SEC	GPD/FT ²
MW1	1.3 X 10 ⁻⁵	8.4
MW2	4.5 X 10 ⁻⁶	2.9
MW3	2.1 X 10 ⁻⁵	13.5
MW4	8.8 X 10 ⁻⁶	5.7
MW5	2.0 X 10 ⁻⁶	1.32
MW6	6.7 X 10 ⁻⁶	4.3
MW7	2.6 X 10 ⁻⁵	17.1
MW8	2.0 X 10 ⁻⁶	1.3
MW9	5.2 X 10 ⁻⁵	33.6
MW10	1.4 X 10 ⁻⁵	9.0
MW11	2.6 X 10 ⁻⁶	1.65
MW12	8.8 X 10 ⁻⁶	5.7
MW13	3.0 X 10 ⁻⁵	19.6
MW14	3.8 X 10 ⁻⁵	24.5
GEOMETRIC MEAN	1.0 X 10 ⁻⁵	6.6

TABLE 3
 SPECIFIC CONDUCTIVITY AND pH MEASUREMENTS
 Tanks AS419 - AS421
 Marine Corps Air Station, New River, North Carolina

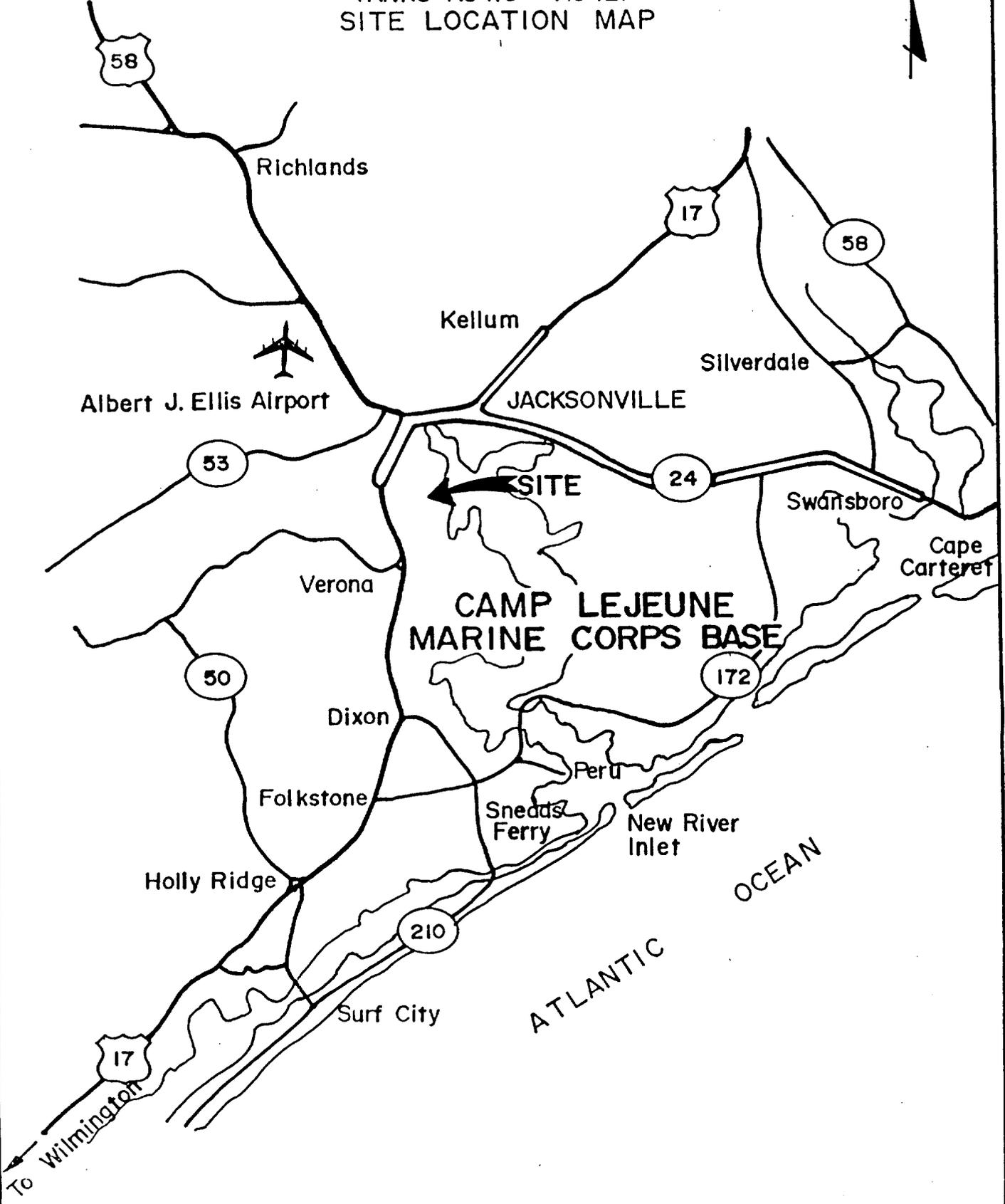
WELL #	pH (STANDARD UNITS)	SPECIFIC CONDUCTIVITY (uMHOS/CM)
MW1	8.5	276
MW2	8.9	1125
MW3	7.0	280
MW4	7.5	800
MW5	6.6	325
MW6	6.6	740
MW7	8.5	505
MW8	8.0	1330
MW9	7.5	206
MW10	6.0	201
MW11	7.7	390
MW12	7.8	490
MW13	6.0	231
MW14	7.5	1154

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Figures



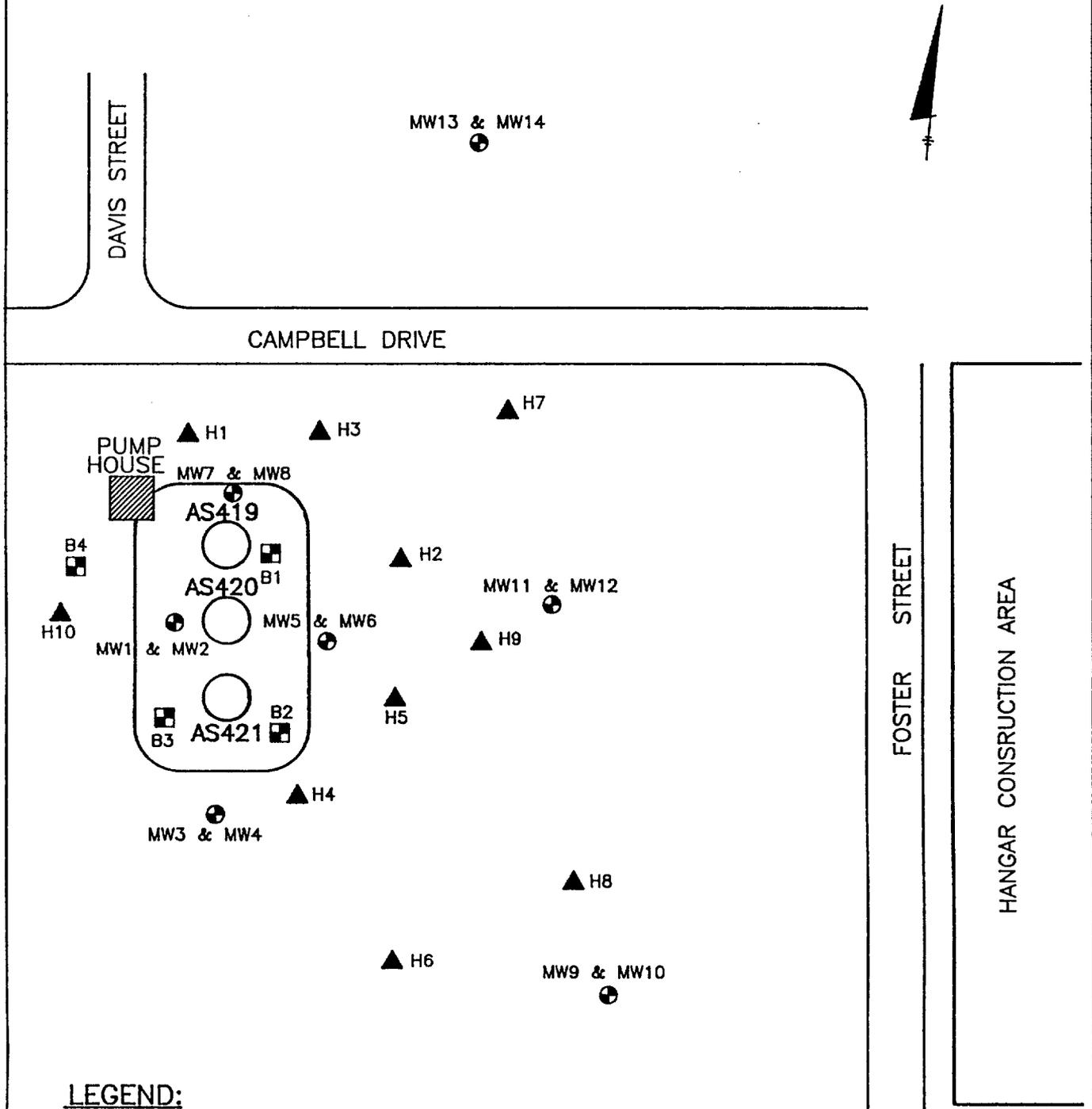
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA
TANKS AS419 - AS421
SITE LOCATION MAP



653397

SCALE: NONE

MARINE CORPS AIR STATION
 NEW RIVER, NORTH CAROLINA
 TANKS AS419 - AS421
 SUBSURFACE INVESTIGATION LOCATIONS



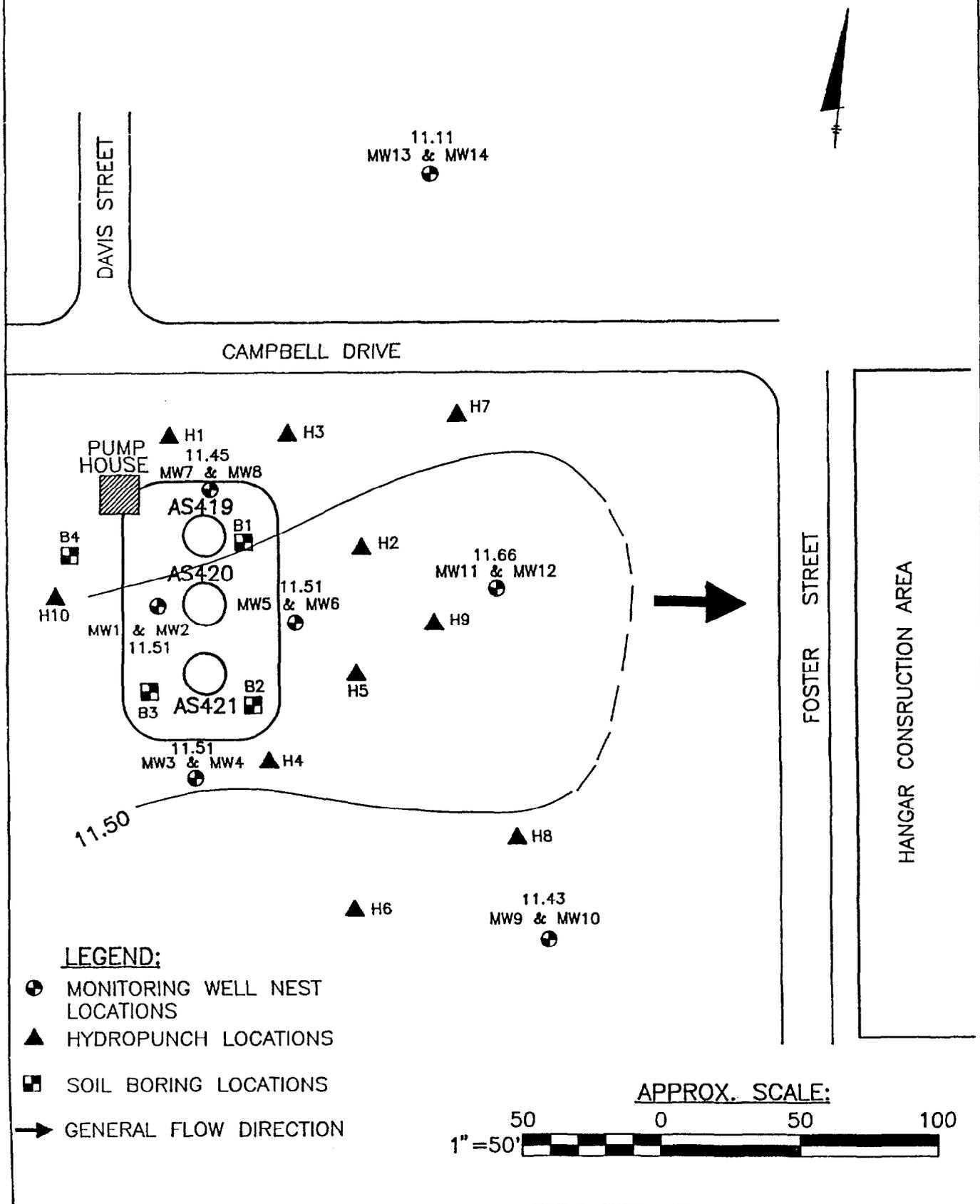
LEGEND:

- ⊕ MONITORING WELL NEST LOCATIONS
- ▲ HYDROPUNCH LOCATIONS
- SOIL BORING LOCATIONS

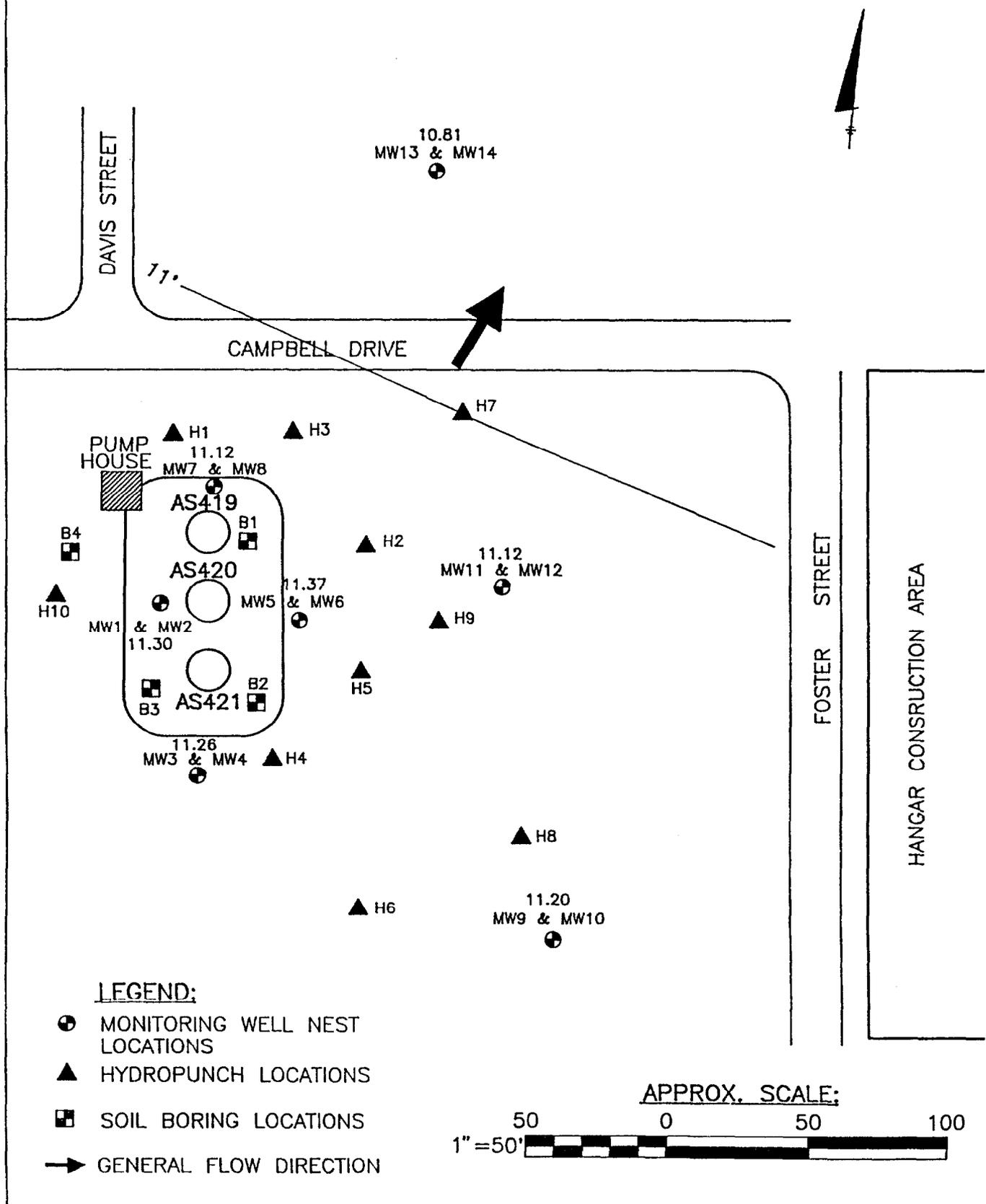
APPROX. SCALE:



MARINE CORPS AIR STATION
 NEW RIVER, NORTH CAROLINA
 TANKS AS419 - AS421
 GROUNDWATER CONTOUR MAP
 SHALLOW WELLS - JAN. 29, 1992



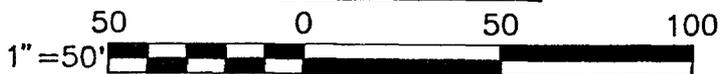
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 NEW RIVER, NORTH CAROLINA
 TANKS AS419 - AS421
 GROUNDWATER CONTOUR MAP
 DEEP WELLS - JAN. 29, 1992



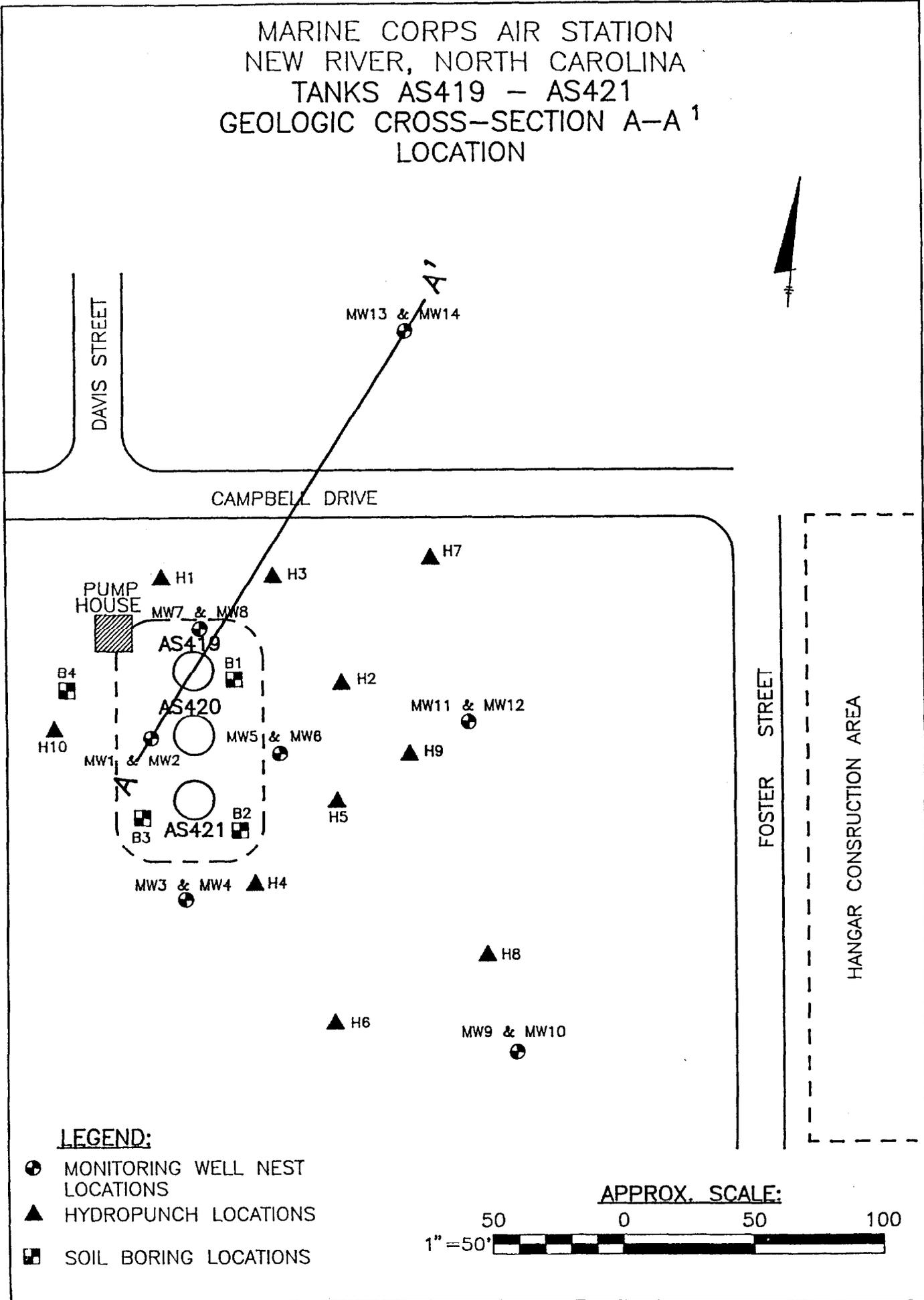
LEGEND:

- ⊕ MONITORING WELL NEST LOCATIONS
- ▲ HYDROPUNCH LOCATIONS
- SOIL BORING LOCATIONS
- ➔ GENERAL FLOW DIRECTION

APPROX. SCALE:



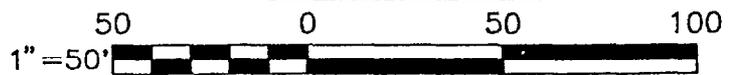
MARINE CORPS AIR STATION
 NEW RIVER, NORTH CAROLINA
 TANKS AS419 - AS421
 GEOLOGIC CROSS-SECTION A-A'¹
 LOCATION



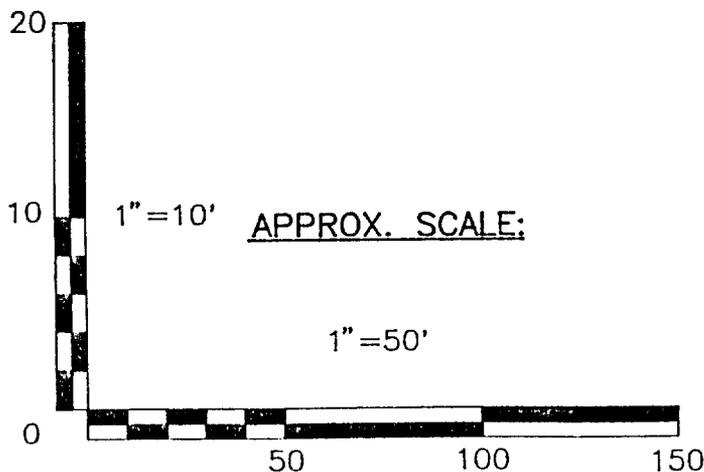
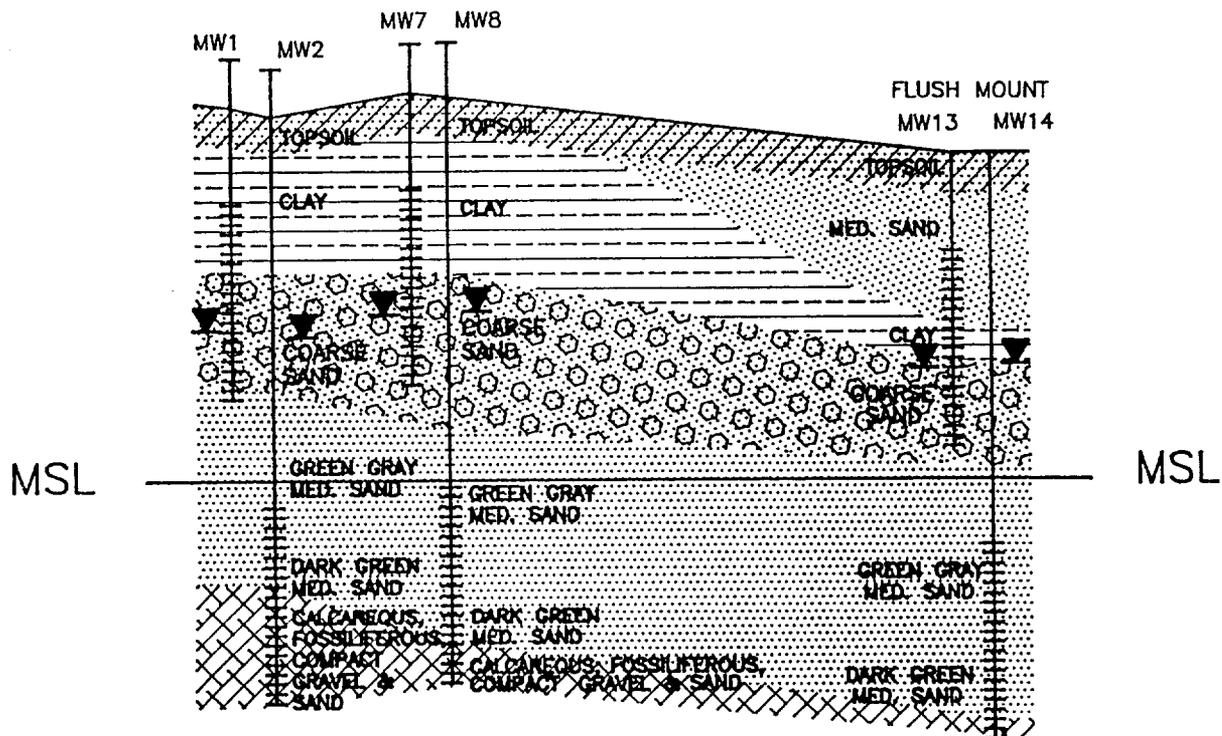
LEGEND:

- ⊙ MONITORING WELL NEST LOCATIONS
- ▲ HYDROPUNCH LOCATIONS
- SOIL BORING LOCATIONS

APPROX. SCALE:



MARINE CORPS AIR STATION
 NEW RIVER, NORTH CAROLINA
 TANKS AS419 - AS421
 GEOLOGIC CROSS-SECTION A-A¹
 LOCATION - JAN. 29, 1992

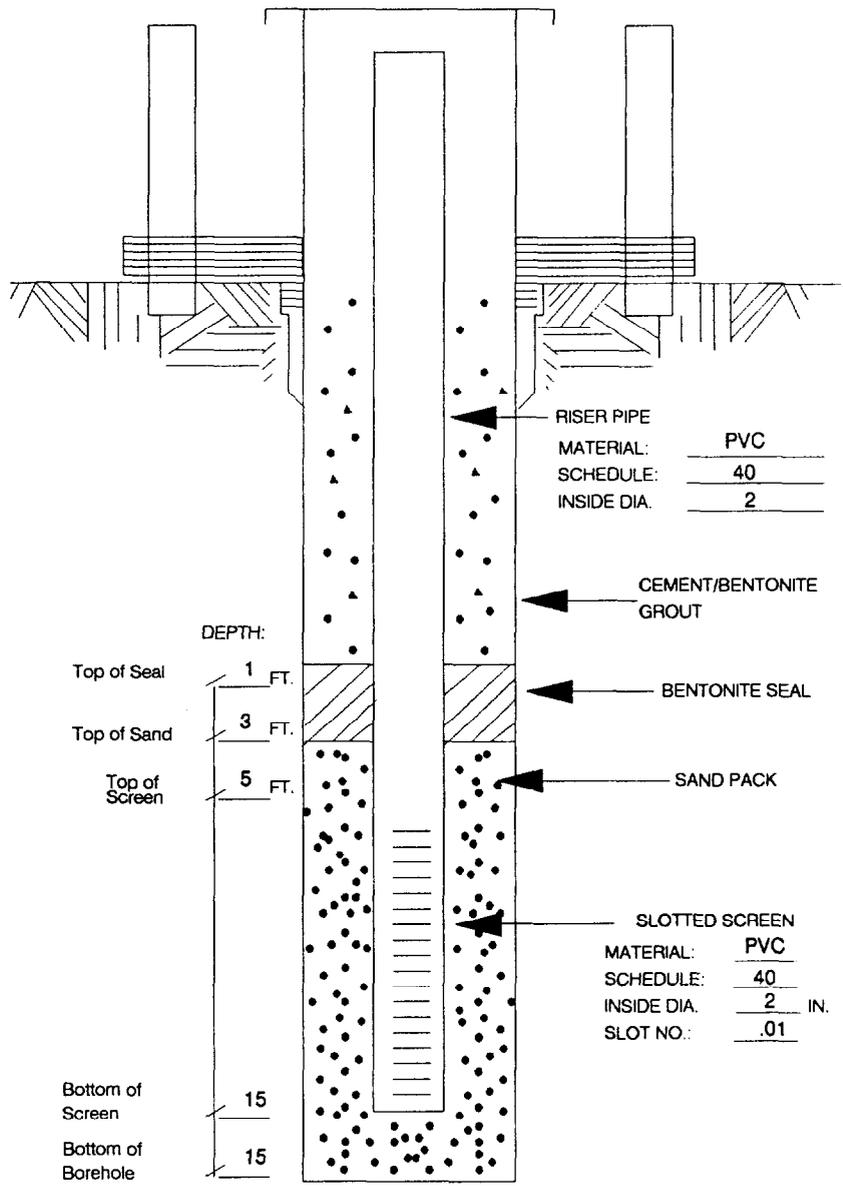


- LEGEND:**
- GROUNDWATER ELEVATION
 - MONITORING WELL
 - SCREENED INTERVAL

Appendices



APPENDIX A



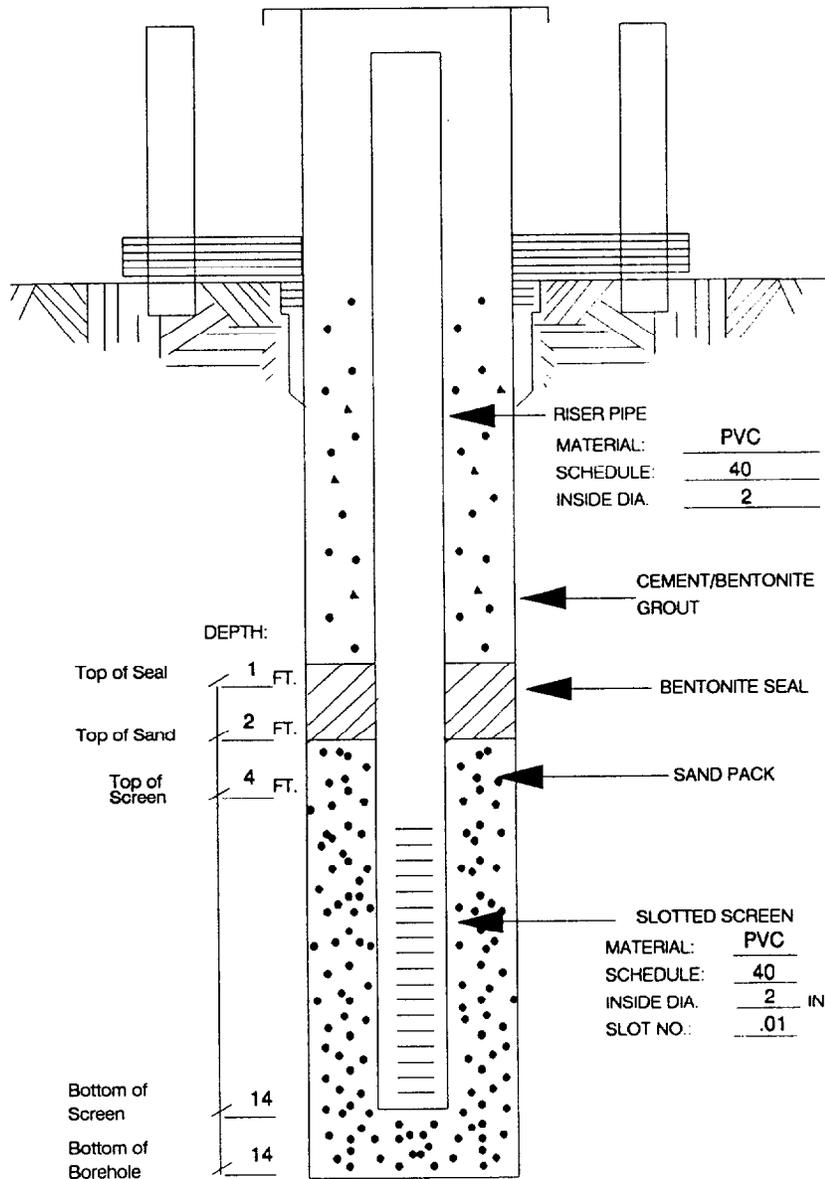
TYPICAL OVERBURDEN MONITORING WELL

N.T.S.

New River

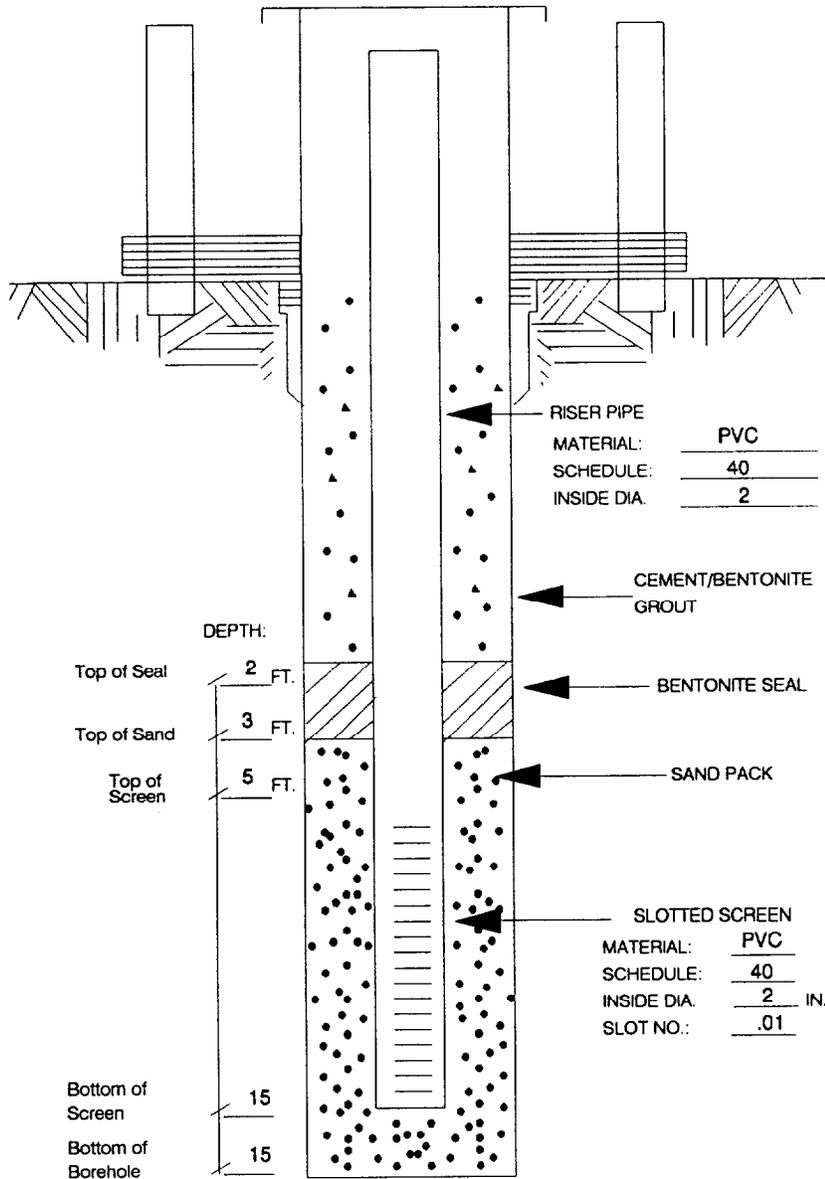
MW-1

1/21/92



TYPICAL OVERBURDEN MONITORING WELL
 N.T.S.

New River
 MW-3
 1/21/92



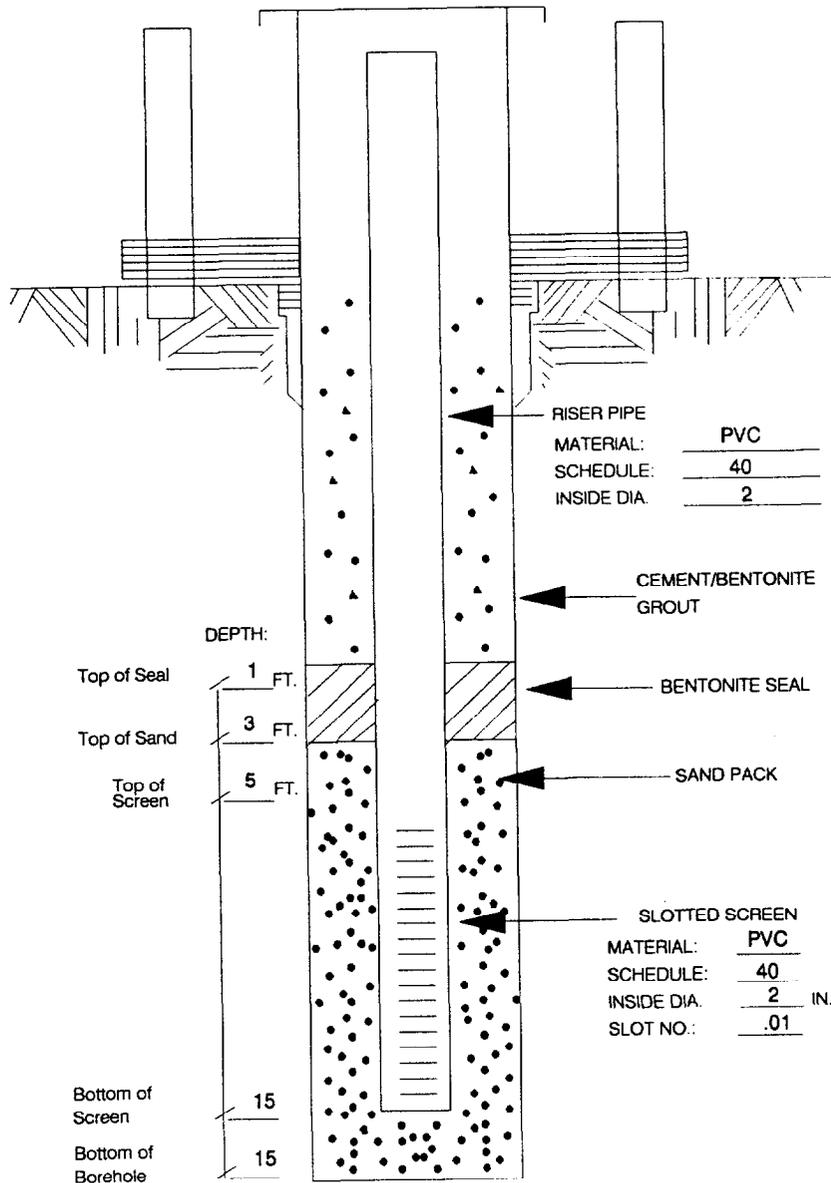
TYPICAL OVERBURDEN MONITORING WELL

N.T.S.

New River

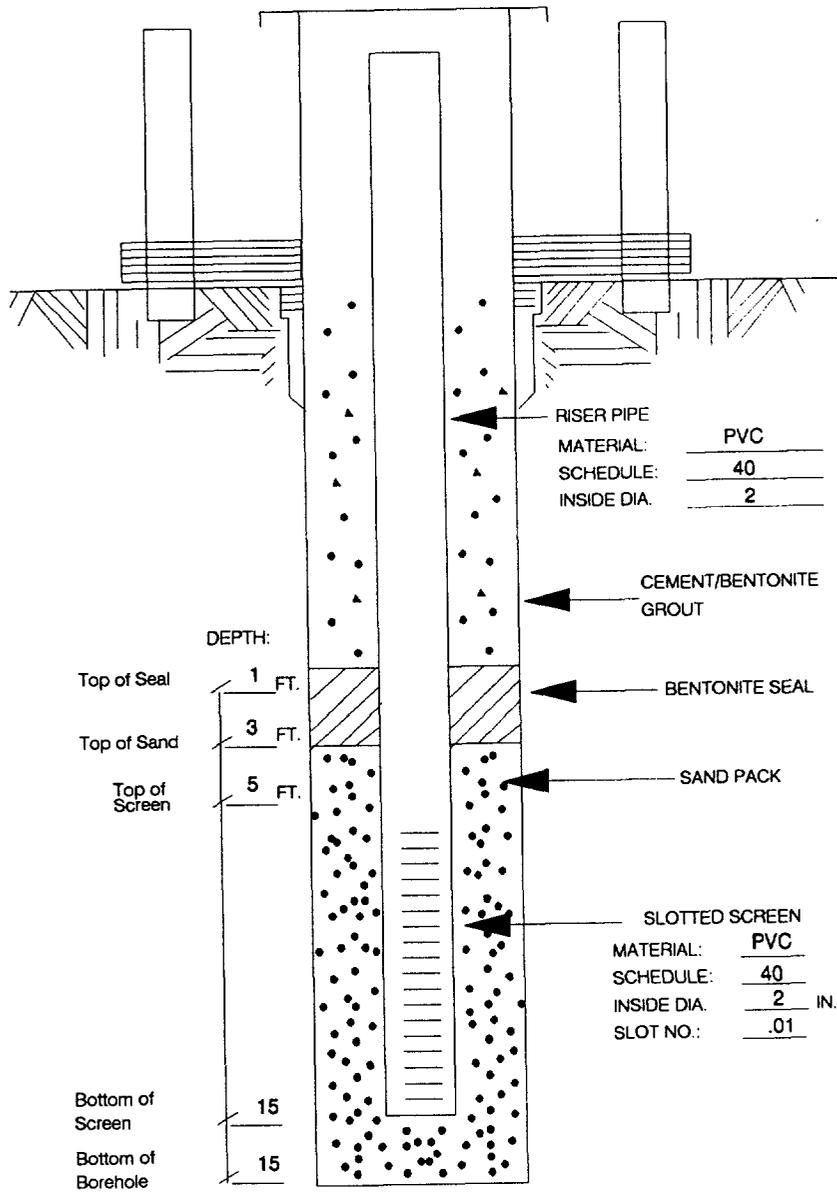
MW-5

1/21/92



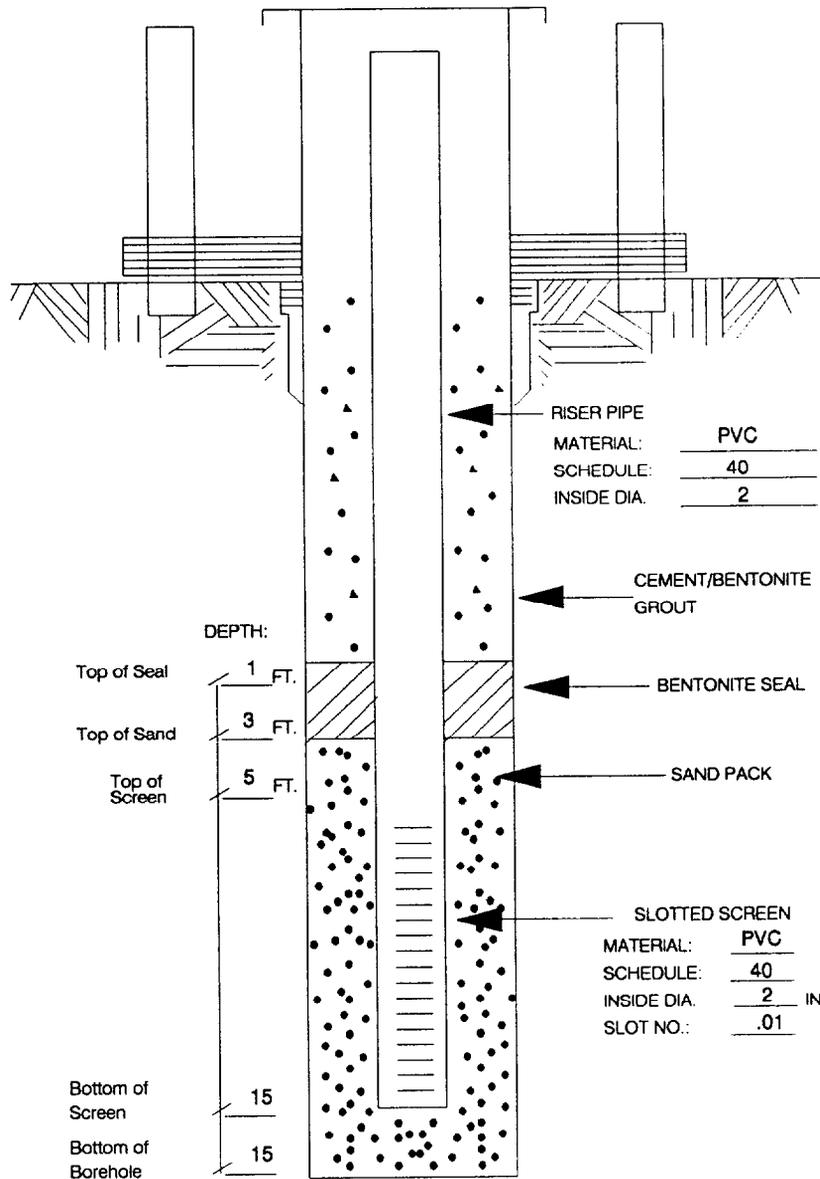
TYPICAL OVERBURDEN MONITORING WELL
 N.T.S.

New River
 MW-7
 1/21/92



TYPICAL OVERBURDEN MONITORING WELL
N.T.S.

New River
MW-9
1/24/92



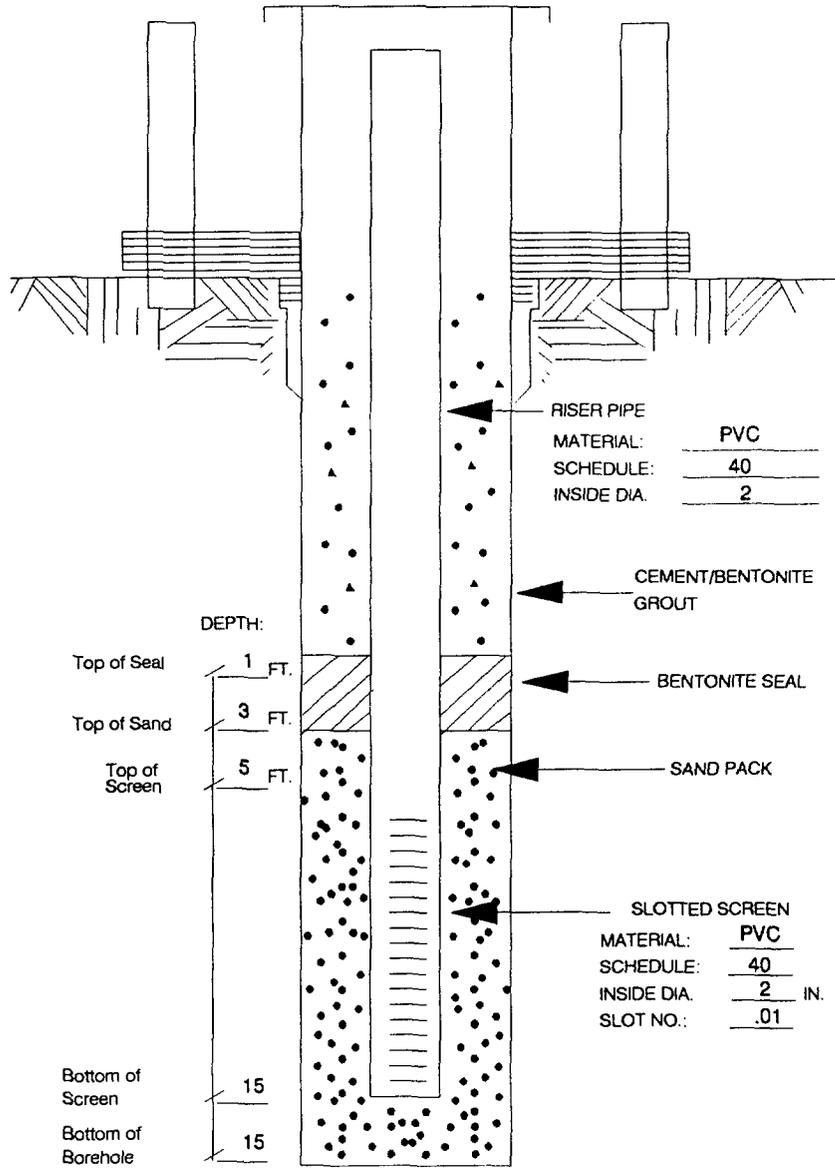
TYPICAL OVERBURDEN MONITORING WELL

N.T.S.

New River

MW-11

1/24/92



TYPICAL OVERBURDEN MONITORING WELL
N.T.S.

New River
MW-13
1/27/92

APPENDIX B



LABORATORIES, INC.

WS

Volatile Organics

Method 8010/8020

CLIENT UNITED STATES NAVY

JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

matrix: Water

DATE COLLECTED 1-29-92

DATE RECEIVED 1-31-92

DATE ANALYZED 2-5-92

DESCRIPTION:

SAMPLE NO.:

	mw-1	mw-2	mw-3	mw-4	mw-5	mw-6
	P1961	P1962	P1963	P1964	P1965	P1967
Benzene	<10	<10	<10	6.000	<10	<10
Benzyl chloride	<10.	<100.	<10.	<10.	<10.	<10.
Bis (2-chloroethoxy) methane	<5000	<5000	<5000	<5000	<5000	<5000
Bromobenzene	<5.	<50.	<5.	<5.	<5.	<5.
Bromodichloromethane	<10	<10	<10	<10	<10	<10
Bromoform	<10.	<100.	<10.	<10.	<10.	<10.
Bromomethane	<10	<100	<10	<10	<10	<10
Carbon tetrachloride	<1.	<10.	<1.	<1.	<1.	<1.
Chlorobenzene	↓	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<10	<100.	<10.	<10.	<10.	<10.
Chloroform	<1.	<10.	<1.	<1.	<1.	<1.
1-Chlorohexane	<10	<100.	<10.	<10.	<10.	<10.
Chloromethane	<10.	<100.	<10.	<10.	<10.	<10.
Chloromethylmethyl ether	<100	<1000.	<100.	<100.	<100.	<100.
2-Chlorotoluene	<5.	<50.	<5.	<5.	<5.	<5.
4-Chlorotoluene	<5	<50.	<5.	<5.	<5.	<5.
Dibromochloromethane	<1.	<10.	<1.	<10.	<1.	<1.
Dibromomethane	<10	<100.	<10.	<10.	<10.	<10.
1,2-Dichlorobenzene	<5.	<50.	<5.	<5.	<5.	<5.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10	<100.	<10.	<10.	<10.	<10.



LABORATORIES, INC. *US*

Volatile Organics Method 8010/8020

CLIENT UNITED STATES NAVY

JOB NO. 3543.006.517

DESCRIPTION New River, N.C.

matrix = water

DATE COLLECTED 1-29-92

DATE RECEIVED 1-31-92

DATE ANALYZED 2-5,6-92

DESCRIPTION:	mw-1	mw-2	mw-3	mw-4	mw-5	mw-6
SAMPLE NO.:	P1961	P1962	P1963	P1964	P1965	P1967
1,1-Dichloroethane	<10	<10	<1	<1	<1	<1
1,2-Dichloroethane						
1,1-Dichloroethylene				ND		
1,2-Dichloroethylene (total)				94.04		
Dichloromethane				<1		
1,2-Dichloropropane				<10		
cis-1,3-Dichloropropylene						
trans-1,3-Dichloropropylene						
Ethylbenzene	✓	✓	✓	<1	✓	✓
1,1,2,2-Tetrachloroethane	<10	<100	<10	<10	<10	<10
1,1,1,2-Tetrachloroethane	<1	<10	<1	<1	<1	<1
Tetrachloroethylene		<10	0.0074			
Toluene		350.37	<1			
1,1,1-Trichloroethane		<10				
1,1,2-Trichloroethane				<10		
Trichloroethylene				0.0025 280.280		0.0021 4.004
Trichlorofluoromethane				<1		<1
1,2,3-Trichloropropane						
Vinyl chloride	✓	✓	✓	✓	✓	✓
Xylene (total)	<3	<30	<3	<3	<3	<3

Comments:

Methodology: USEPA SW-846, November 1988, 3rd Edition

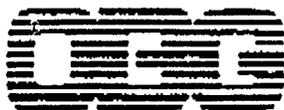
Certification No.: 315

Units: *µg/L*

Page 2 of 2

Authorized: _____

Date: _____



LABORATORIES, INC.

WS

Volatile Organics Method 8010/8020

CLIENT UNITED STATES NAVY JOB NO. 3543 001.517

DESCRIPTION New River, N.C.

matrix: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92 DATE ANALYZED 2-6-92

DESCRIPTION:	mw-7	mw-8	mw-9	mw-9 Dup.	mw-10	mw-11
SAMPLE NO.:	P1968	P1969	P1970	P1971	P1972	P1973
Benzene	<10	<10	<10	<10	<10	<10
Benzyl chloride	<10	<10	<10	<10	<100	<10
Bis (2-chloroethoxy) methane	<5000	<5000	<5000	<5000	<50000	<5000
Bromobenzene	<5	<5	<5	<5	<50	<5
Bromodichloromethane	<1	<1	<1	<1	<10	<1
Bromoform	<10	<10	<10	<10	<100	<10
Bromomethane	<10	<10	<10	<10	<100	<10
Carbon tetrachloride	<1	<1	<1	<1	<10	<1
Chlorobenzene	↓	↓	↓	↓	<10	↓
Chloroethane	↓	↓	↓	↓	12,012	↓
2-Chloroethylvinyl ether	<10	<10	<10	<10	<100	<10
Chloroform	<1	<1	<1	<1	<10	<1
1-Chlorohexane	<10	<10	<10	<10	<100	<10
Chloromethane	<10	<10	<10	<10	<100	<10
Chloromethylmethyl ether	<100	<100	<100	<100	<1000	<100
2-Chlorotoluene	<5	<5	<5	<5	<50	<5
4-Chlorotoluene	<5	<5	<5	<5	<50	<5
Dibromochloromethane	<1	<1	<1	<1	<10	<1
Dibromomethane	<10	<10	<10	<10	<100	<10
1,2-Dichlorobenzene	<5	<5	<5	<5	<50	<5
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10	<10	<10	<10	<100	<10



LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT UNITED STATES NAVY ^{US}

JOB NO. 3543.001.517

DESCRIPTION New River NC.

Matrix Water

DATE COLLECTED 1-29-92

DATE RECEIVED 1-31-92

DATE ANALYZED 2-6-92

DESCRIPTION:	MW-7	MW-8	MW-9	MW-9 Dup	MW-10	MW-11
SAMPLE NO.:	P1968	P1969	P1970	P1971	PA72	P1973
1,1-Dichloroethane	<L	<L	35.	<L	150.10	<L
1,2-Dichloroethane					<10.	
1,1-Dichloroethylene					<10.	
1,2-Dichloroethylene (total)					76.076	
Dichloromethane					<10.	
1,2-Dichloropropane						
cis-1,3-Dichloropropylene						
trans-1,3-Dichloropropylene						
Ethylbenzene	✓	✓	✓	✓	✓	✓
1,1,2,2-Tetrachloroethane	<10.	<10.	<10.	<10.	<1000.	<10.
1,1,1,2-Tetrachloroethane	<1.	<1.	<1.	<1.	<10.	<1.
Tetrachloroethylene		<1.			210.210	
Toluene		102.00			<10.	
1,1,1-Trichloroethane		<1.				
1,1,2-Trichloroethane					77.071	
Trichloroethylene					<10.	
Trichlorofluoromethane						
1,2,3-Trichloropropane						
Vinyl chloride	✓	✓	✓	✓	✓	✓
Xylene (total)	<3.	<3.	<3.	<3.	<30.	<3.

Comments:

Methodology: USEPA SW-846, November 1988, 3rd Edition

Certification No.: 315

Units: µg/L

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Authorized: _____

Date: _____



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WS

Volatile Organics

Method 8010/8020

CLIENT UNITED STATES NAVY

JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

matrix: Water

DATE COLLECTED 1-29-92

DATE RECEIVED 1-31-92

DATE ANALYZED 2-6-92

DESCRIPTION:

SAMPLE NO.:

	mw-12	mw-13	mw-14	Field Blank	QC Trip Blank
	P1974	P1975	P1976	P1977	P1978
Benzene	<1	<1	<1	<1	<1
Benzyl chloride	<10.	<10.	<10.	<10.	<10.
Bis (2-chloroethoxy) methane	<5000.	<5000.	<5000.	<5000.	<5000.
Bromobenzene	<5.	<5.	<5.	<5.	<5.
Bromodichloromethane	<1	<1	<1	<1	<1
Bromoform	<10.	<10.	<10.	<10.	<10.
Bromomethane	<10	<10	<10	<10	<10
Carbon tetrachloride	<1.	<1.	<1.	<1.	<1.
Chlorobenzene	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<10.	<10.	<10.	<10.	<10.
Chloroform	<1.	<1.	<1.	<1.	<1.
1-Chlorohexane	<10.	<10.	<10.	<10.	<10.
Chloromethane	<10.	<10.	<10.	<10.	<10.
Chloromethylmethyl ether	<100.	<100.	<100.	<100.	<100.
2-Chlorotoluene	<5.	<5.	<5.	<5.	<5.
4-Chlorotoluene	<5.	<5.	<5.	<5.	<5.
Dibromochloromethane	<1.	<1.	<1.	<1.	<1.
Dibromomethane	<10.	<10.	<10.	<10.	<10.
1,2-Dichlorobenzene	<5.	<5.	<5.	<5.	<5.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10.	<10.	<10.	<10.	<10.

Authorized: _____

Date: _____



LABORATORIES, INC.

US

Volatile Organics Method 8010/8020

CLIENT UNITED STATES NAVY

JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

matrix: Water

DATE COLLECTED 1-29-92

DATE RECEIVED 1-31-92

DATE ANALYZED 2-6-92

DESCRIPTION:	MW-12	MW-13	MW-14	Field Blank	GC Trap Blank
SAMPLE NO.:	P1974	P1975	PA76	P1977	P1978
1,1-Dichloroethane	<L	<L	<L	<L	<L
1,2-Dichloroethane	↓	↓	↓	↓	↓
1,1,1-Trichloroethylene	↓	↓	↓	↓	↓
1,2-Dichloroethylene (total)	↓	↓	↓	↓	↓
Dichloromethane	↓	↓	↓	↓	↓
1,2-Dichloropropane	↓	↓	↓	↓	↓
cis-1,3-Dichloropropylene	↓	↓	↓	↓	↓
trans-1,3-Dichloropropylene	↓	↓	↓	↓	↓
Ethylbenzene	↓	↓	↓	↓	↓
1,1,2,2-Tetrachloroethane	<10.	<10.	<10.	<10.	<10.
1,1,1,2-Tetrachloroethane	<1.	<1.	<1.	<1.	<1.
Tetrachloroethylene	.0007 (4.004)	↓	↓	↓	↓
Toluene	↓ .001 ✓	↓	↓	↓	↓
1,1,1-Trichloroethane	<1.	↓	↓	↓	↓
1,1,2-Trichloroethane	<1.	↓	↓	↓	↓
Trichloroethylene	.0028 1.001 ✓	↓	↓	↓	↓
Trichlorofluoromethane	<L	↓	↓	↓	↓
1,2,3-Trichloropropane	↓	↓	↓	↓	↓
Vinyl chloride	↓	↓	↓	↓	↓
Xylene (total)	<3.	<3.	<3.	<3.	<3.

Comments:

Methodology: USEPA, SW-846, November 1986, 3rd Edition

Certification No.: 315

Units: µg/L

Authorized: _____

Date: _____



Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River Air Station Tanks AS419-421, NC

MATRIX: Water

DATE COLLECTED 1-23-92 DATE RECEIVED 1-24-92 DATE ANALYZED 1-31, 2-4-92

DESCRIPTION:	H1	H2	H3	H4	H5	H6
SAMPLE NO.:	P1471	P1472	P1473	P1474	P1475	P1476
Benzene	<1.	<1.	<1.	<1.	<1.	<1.
Benzyl chloride	<10.	<10.	<10.	<10.	<10.	<10.
Bis (2-chloroethoxy) methane	<500.	<500.	<500.	<500.	<500.	<500.
Bromobenzene	<5.	<5.	<5.	<5.	<5.	<5.
Bromodichloromethane	<1.	<1.	<1.	<1.	<1.	<1.
Bromoform	<10.	<10.	<10.	<10.	<10.	<10.
Bromomethane	<1.	<1.	<1.	<1.	<1.	<1.
Carbon tetrachloride	↓	↓	↓	↓	↓	↓
Chlorobenzene	↓	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<10.	<10.	<10.	<10.	<10.	<10.
Chloroform	<1.	<1.	<1.	<1.	<1.	<1.
1-Chlorohexane	<10.	<10.	<10.	<10.	<10.	<10.
Chloromethane	<1.	<1.	<1.	<1.	<1.	<1.
Chloromethylmethyl ether	<100.	<100.	<100.	<100.	<100.	<100.
2-Chlorotoluene	<5.	<5.	<5.	<5.	<5.	<5.
4-Chlorotoluene	<5.	<5.	<5.	<5.	<5.	<5.
Dibromochloromethane	<1.	<1.	<1.	<1.	<1.	<1.
Dibromomethane	<10.	<10.	<10.	<10.	<10.	<10.
1,2-Dichlorobenzene	<5.	<5.	<5.	<5.	<5.	<5.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10.	<10.	<10.	<10.	<10.	<10.

Authorized: Monika Santucci

Date: February 13, 1992



LABORATORIES, INC.

Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River Air Station Tanks AS419-421, NC

MATRIX: Water

DATE COLLECTED 1-23-92 DATE RECEIVED 1-24-92 DATE ANALYZED 1-31, 2-4-92

DESCRIPTION:	H1	H2	H3	H4	H5	H6
SAMPLE NO.:	P1471	P1472	P1473	P1474	P1475	P1476
1,1-Dichloroethane	<1.	<1.	<1.	<1.	<1.	<1.
1,2-Dichloroethane						
1,1-Dichloroethylene						
1,2-Dichloroethylene (total)						
Dichloromethane						
1,2-Dichloropropane						
cis-1,3-Dichloropropylene						
trans-1,3-Dichloropropylene						
Ethylbenzene						
1,1,1,2-Tetrachloroethane						
1,1,2-Tetrachloroethane						
Tetrachloroethylene						
oluene						
1,1,1-Trichloroethane						
1,1,2-Trichloroethane						
Trichloroethylene						
Trichlorofluoromethane						
1,2,3-Trichloropropane						
Vinyl chloride						
Xylene (total)	<3.	<3.	<3.	<3.	<3.	<3.

Comments:

Methodology: USEPA, SW-846, November 1986, 3rd Edition

Certification No.: 315

Units: µg/l

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Authorized: Monika Santusa



Volatile Organics

Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River Air Station Tanks AS419-421, NC

MATRIX: Water

DATE COLLECTED 1-23-92 DATE RECEIVED 1-24-92 DATE ANALYZED 1-31-92

DESCRIPTION:	H7	H8	H9	H10	QC Trip Blank
SAMPLE NO.:	P1477	P1478	P1479	P1480	P1481
Benzene	<1.	<1.	<1.	<1.	<1.
Benzyl chloride	<10.	<10.	<10.	<10.	<10.
Bis (2-chloroethoxy) methane	<500.	<500.	<500.	<500.	<500.
Bromobenzene	<5.	<5.	<5.	<5.	<5.
Bromodichloromethane	<1.	<1.	<1.	<1.	<1.
Bromoform	<10.	<10.	<10.	<10.	<10.
Bromomethane	<1.	<1.	<1.	<1.	<1.
Carbon tetrachloride	↓	↓	↓	↓	↓
Chlorobenzene	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<10.	<10.	<10.	<10.	<10.
Chloroform	<1.	<1.	<1.	<1.	<1.
1-Chlorohexane	<10.	<10.	<10.	<10.	<10.
Chloromethane	<1.	<1.	<1.	<1.	<1.
Chloromethyl(methyl) ether	<100.	<100.	<100.	<100.	<100.
2-Chlorotoluene	<5.	<5.	<5.	<5.	<5.
4-Chlorotoluene	<5.	<5.	<5.	<5.	<5.
Dibromochloromethane	<1.	<1.	<1.	<1.	<1.
Dibromomethane	<10.	<10.	<10.	<10.	<10.
1,2-Dichlorobenzene	<5.	<5.	<5.	<5.	<5.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10.	<10.	<10.	<10.	<10.

Authorized: Monika Santucci

Date: February 13, 1992



Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River Air Station Tanks AS419-421, NC

MATRIX: Water

DATE COLLECTED 1-23-92 DATE RECEIVED 1-24-92 DATE ANALYZED 1-31-92

DESCRIPTION:	H7	H8	H9	H10	QC Trip Blank
SAMPLE NO.:	P1477	P1478	P1479	P1480	P1481
1,1-Dichloroethane	<1.	<1.	<1.	<1.	<1.
1,2-Dichloroethane					
1,1-Dichloroethylene					
1,2-Dichloroethylene (total)					
Dichloromethane					
1,2-Dichloropropane					
cis-1,3-Dichloropropylene					
trans-1,3-Dichloropropylene					
Ethylbenzene					
1,1,2,2-Tetrachloroethane					
1,1,1,2-Tetrachloroethane					
Tetrachloroethylene					
Toluene					
1,1,1-Trichloroethane			2.		
1,1,2-Trichloroethane			<1.		
Trichloroethylene					
Trichlorofluoromethane					
1,2,3-Trichloropropane					
Vinyl chloride					
Xylene (total)	<3.	<3.	<3.	<3.	<3.

Comments:

Methodology: USEPA, SW-846, November 1986, 3rd Edition

Certification No.: 315

Units: µg/l

Authorized: Moira Santucci

Date: February 13, 1992



Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

MATRIX: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92 DATE ANALYZED 2-5,6-92

DESCRIPTION:	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
SAMPLE NO.:	P1961	P1962	P1963	P1964	P1965	P1967
Benzene	<1.	<10.	<1.	6.	<1.	1.
Benzyl chloride	<10.	<100.	<10.	<10.	<10.	<10.
Bis (2-chloroethoxy) methane	<5000.	<50,000.	<5000.	<5000.	<5000.	<5000.
Bromobenzene	<5.	<50.	<5.	<5.	<5.	<5.
Bromodichloromethane	<1.	<10.	<1.	<1.	<1.	<1.
Bromoform	<10.	<100.	<10.	<10.	<10.	<10.
Bromomethane	<10.	<100.	<10.	<10.	<10.	<10.
Carbon tetrachloride	<1.	<10.	<1.	<1.	<1.	<1.
Chlorobenzene	↓	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<10.	<100.	<10.	<10.	<10.	<10.
Chloroform	<1.	<10.	<1.	<1.	<1.	<1.
1-Chlorohexane	<10.	<100.	<10.	<10.	<10.	<10.
Chloromethane	<10.	<100.	<10.	<10.	<10.	<10.
Chloromethylmethyl ether	<100.	<1000.	<100.	<100.	<100.	<100.
2-Chlorotoluene	<5.	<50.	<5.	<5.	<5.	<5.
4-Chlorotoluene	<5.	<50.	<5.	<5.	<5.	<5.
Dibromochloromethane	<1.	<10.	<1.	<10.	<1.	<1.
Dibromomethane	<10.	<100.	<10.	<10.	<10.	<10.
1,2-Dichlorobenzene	<5.	<50.	<5.	<5.	<5.	<5.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10.	<100.	<10.	<10.	<10.	<10.

Authorized: Monika Santucci

Date: March 17, 1992



Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

MATRIX: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92 DATE ANALYZED 2-5,6-92

DESCRIPTION:	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
SAMPLE NO.:	P1961	P1962	P1963	P1964	P1965	P1967
1,1-Dichloroethane	<1.	<10.	<1.	<1.	<1.	<1.
1,2-Dichloroethane	↓	↓	↓	↓	↓	↓
1,1-Dichloroethylene	↓	↓	↓	↓	↓	↓
1,2-Dichloroethylene (total)	↓	↓	↓	94.	↓	↓
Dichloromethane	↓	↓	↓	<1.	↓	↓
1,2-Dichloropropane	↓	↓	↓	<10.	↓	↓
cis-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
trans-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
Ethylbenzene	↓	↓	↓	<1.	↓	↓
1,1,2,2-Tetrachloroethane	<10.	<100.	<10.	<10.	<10.	<10.
1,1,1,2-Tetrachloroethane	<1.	<10.	<1.	<1.	<1.	<1.
Tetrachloroethylene	↓	<10.	4.	↓	↓	↓
Toluene	↓	350.	<1.	↓	↓	↓
1,1,1-Trichloroethane	↓	<10.	↓	↓	↓	↓
1,1,2-Trichloroethane	↓	↓	↓	<10.	↓	↓
Trichloroethylene	↓	↓	↓	280.	↓	4.
Trichlorofluoromethane	↓	↓	↓	<1.	↓	<1.
1,2,3-Trichloropropane	↓	↓	↓	↓	↓	↓
Vinyl chloride	↓	↓	↓	↓	↓	↓
Xylene (total)	<3.	<30.	<3.	<3.	<3.	<3.

Comments:

Methodology: USEPA, SW-846, November 1986, 3rd Edition

Certification No.: 315

Units: µg/l

Authorized: Monika Santucci

Date: March 17, 1992



Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

MATRIX: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92 DATE ANALYZED 2-6-92

DESCRIPTION:	MW-7	MW-8	MW-9	MW-9 Dup.	MW-10	MW-11
SAMPLE NO.:	P1968	P1969	P1970	P1971	P1972	P1973
Benzene	<1.	<1.	<1.	<1.	<10.	<1.
Benzyl chloride	<10.	<10.	<10.	<10.	<100.	<10.
Bis (2-chloroethoxy) methane	<5000.	<5000.	<5000.	<5000.	<50,000.	<5000.
Bromobenzene	<5.	<5.	<5.	<5.	<50.	<5.
Bromodichloromethane	<1.	<1.	<1.	<1.	<10.	<1.
Bromoform	<10.	<10.	<10.	<10.	<100.	<10.
Bromomethane	<10.	<10.	<10.	<10.	<100.	<10.
Carbon tetrachloride	<1.	<1.	<1.	<1.	<10.	<1.
Chlorobenzene	↓	↓	↓	↓	<10.	↓
Chloroethane	↓	↓	↓	↓	12.	↓
2-Chloroethylvinyl ether	<10.	<10.	<10.	<10.	<100.	<10.
Chloroform	<1.	<1.	<1.	<1.	<10.	<1.
1-Chlorohexane	<10.	<10.	<10.	<10.	<100.	<10.
Chloromethane	<10.	<10.	<10.	<10.	<100.	<10.
Chloromethylmethyl ether	<100.	<100.	<100.	<100.	<1000.	<100.
2-Chlorotoluene	<5.	<5.	<5.	<5.	<50.	<5.
4-Chlorotoluene	<5.	<5.	<5.	<5.	<50.	<5.
Dibromochloromethane	<1.	<1.	<1.	<1.	<10.	<1.
Dibromomethane	<10.	<10.	<10.	<10.	<100.	<10.
1,2-Dichlorobenzene	<5.	<5.	<5.	<5.	<50.	<5.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10.	<10.	<10.	<10.	<100.	<10.

Authorized: Monika Santucci

Date: March 17, 1992



Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

MATRIX: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92 DATE ANALYZED 2-6-92

DESCRIPTION:	MW-7	MW-8	MW-9	MW-9 Dup.	MW-10	MW-11
SAMPLE NO.:	P1968	P1969	P1970	P1971	P1972	P1973
1,1-Dichloroethane	<1.	<1.	<1.	<1.	150.	<1.
1,2-Dichloroethane	↓	↓	↓	↓	<10.	↓
1,1-Dichloroethylene	↓	↓	↓	↓	<10.	↓
1,2-Dichloroethylene (total)	↓	↓	↓	↓	76.	↓
Dichloromethane	↓	↓	↓	↓	<10.	↓
1,2-Dichloropropane	↓	↓	↓	↓	↓	↓
cis-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
trans-1,3-Dichloropropylene	↓	↓	↓	↓	↓	↓
Ethylbenzene	↓	↓	↓	↓	↓	↓
1,1,2,2-Tetrachloroethane	<10.	<10.	<10.	<10.	<1000.	<10.
1,1,1,2-Tetrachloroethane	<1.	<1.	<1.	<1.	<10.	<1.
Tetrachloroethylene	↓	<1.	↓	↓	210.	↓
Toluene	↓	2.	↓	↓	<10.	↓
1,1,1-Trichloroethane	↓	<1.	↓	↓	↓	↓
1,1,2-Trichloroethane	↓	↓	↓	↓	↓	↓
Trichloroethylene	↓	↓	↓	↓	77.	↓
Trichlorofluoromethane	↓	↓	↓	↓	<10.	↓
1,2,3-Trichloropropane	↓	↓	↓	↓	↓	↓
Vinyl chloride	↓	↓	↓	↓	↓	↓
Xylene (total)	<3.	<3.	<3.	<3.	<30.	<3.

Comments:

Methodology: USEPA, SW-846, November 1986, 3rd Edition

Certification No.: 315

Units: µg/l

Authorized: Monika Santucci

Date: March 17, 1992



Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

MATRIX: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92 DATE ANALYZED 2-6-92

DESCRIPTION:	MW-12	MW-13	MW-14	Field Blank	QC Trip Blank
SAMPLE NO.:	P1974	P1975	P1976	P1977	P1978
Benzene	<1.	<1.	<1.	<1.	<1.
Benzyl chloride	<10.	<10.	<10.	<10.	<10.
Bis (2-chloroethoxy) methane	<5000.	<5000.	<5000.	<5000.	<5000.
Bromobenzene	<5.	<5.	<5.	<5.	<5.
Bromodichloromethane	<1.	<1.	<1.	<1.	<1.
Bromoform	<10.	<10.	<10.	<10.	<10.
Bromomethane	<10.	<10.	<10.	<10.	<10.
Carbon tetrachloride	<1.	<1.	<1.	<1.	<1.
Chlorobenzene	↓	↓	↓	↓	↓
Chloroethane	↓	↓	↓	↓	↓
2-Chloroethylvinyl ether	<10.	<10.	<10.	<10.	<10.
Chloroform	<1.	<1.	<1.	<1.	<1.
1-Chlorohexane	<10.	<10.	<10.	<10.	<10.
Chloromethane	<10.	<10.	<10.	<10.	<10.
Chloromethylmethyl ether	<100.	<100.	<100.	<100.	<100.
2-Chlorotoluene	<5.	<5.	<5.	<5.	<5.
4-Chlorotoluene	<5.	<5.	<5.	<5.	<5.
Dibromochloromethane	<1.	<1.	<1.	<1.	<1.
Dibromomethane	<10.	<10.	<10.	<10.	<10.
1,2-Dichlorobenzene	<5.	<5.	<5.	<5.	<5.
1,3-Dichlorobenzene	↓	↓	↓	↓	↓
1,4-Dichlorobenzene	↓	↓	↓	↓	↓
Dichlorodifluoromethane	<10.	<10.	<10.	<10.	<10.



Volatile Organics Method 8010/8020

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

MATRIX: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92 DATE ANALYZED 2-6-92

DESCRIPTION:	MW-12	MW-13	MW-14	Field Blank	QC Trip Blank
SAMPLE NO.:	P1974	P1975	P1976	P1977	P1978
1,1-Dichloroethane	<1.	<1.	<1.	<1.	<1.
1,2-Dichloroethane	↓	↓	↓	↓	↓
1,1-Dichloroethylene					
1,2-Dichloroethylene (total)					
Dichloromethane					
1,2-Dichloropropane					
cis-1,3-Dichloropropylene					
trans-1,3-Dichloropropylene					
Ethylbenzene	↓	↓	↓	↓	↓
1,1,2,2-Tetrachloroethane	<10.	<10.	<10.	<10.	<10.
1,1,1,2-Tetrachloroethane	<1.	<1.	<1.	<1.	<1.
Tetrachloroethylene	4.				
Toluene	1.				
1,1,1-Trichloroethane	<1.				
1,1,2-Trichloroethane	<1.				
Trichloroethylene	1.				
Trichlorofluoromethane	<1.				
1,2,3-Trichloropropane	↓	↓	↓	↓	↓
Vinyl chloride					
Xylene (total)	<3.	<3.	<3.	<3.	<3.

Comments:

Methodology: USEPA, SW-846, November 1986, 3rd Edition

Certification No.: 315

Units: µg/l

Page 2 of 2

Authorized: Monika Santucci

Date: March 17, 1992



Laboratory Report

CLIENT U.S. NAVY JOB NO. 3543.001.517
 DESCRIPTION New River, N.C.
Toxicity Characteristic Leaching Procedure MATRIX: Water
 DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92

Description:

MW-5

Sample #

P1966

TCLP Volatile Organics:

BENZENE	<0.05
CARBON TETRACHLORIDE	<0.05
CHLOROBENZENE	<10.0
CHLOROFORM	<0.60
1,2-DICHLOROETHANE	<0.05
1,1-DICHLOROETHYLENE	<0.07
METHYL ETHYL KETONE	<20.0
TETRACHLOROETHYLENE	<0.07
TRICHLOROETHYLENE	<0.05
VINYL CHLORIDE	<0.02

Analytical Record:

Date Leachate Created 2-3-92

Date Analyzed 2-10-92

Comments:

Certification No.: 315

Units: mg/l

Authorized:

Monika Santucci

Date: March 17, 1992



LABORATORIES, INC.

Laboratory Report

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

Toxicity Characteristic Leaching Procedure MATRIX: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92

Description:

MW-5

Sample #

P1966

TCLP Pesticides/Herbicides:

CHLORDANE <0.01

ENDRIN <0.005

HEPTACHLOR <0.005

HEPTACHLOR EPOXIDE <0.005

LINDANE <0.005

METHOXYCHLOR <0.01

TOXAPHENE <0.05

2,4-D <0.1

2,4,5-TP (SILVEX) <0.1

Analytical Record:

Date Leachate Created 2-4-92

Date Herbicide Extracted 2-11-92

Date Pesticide Extracted 2-10-92

Date Herbicide Analyzed 2-14-92

Date Pesticide Analyzed 2-13-92

Comments:

Certification No.: 315

Units: mg/l

Authorized: Monika Santucci

Date: March 17, 1992



Laboratory Report

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

MATRIX: Water

Date Analyzed 2-12-92 DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92

Description:	MW-1	MW-3	MW-5
Sample #	P1961	P1963	P1975
ACENAPHTHENE	<10.	<10.	<10.
ACENAPHTHYLENE			
ANTHRACENE			
BENZO(a)ANTHRACENE			
BENZO(a)PYRENE			
BENZO(b)FLUORANTHENE			
BENZO(k)FLUORANTHENE			
BENZO(g,h,i)PERYLENE			
CHRYSENE			
DIBENZ(a,h)ANTHRACENE			
FLUORANTHENE			
FLUORENE			
INDENO(1,2,3-cd)PYRENE			
NAPHTHALENE			
PHENANTHRENE			
PYRENE			

Comments:

Certification No.: 315

Units: $\mu\text{g}/\text{l}$

Authorized: Monika Santucci

Date: March 17, 1992



LABORATORIES, INC.

Laboratory Report

CLIENT U.S. NAVY JOB NO. 3543.001.517

DESCRIPTION New River, N.C.

Toxicity Characteristic Leaching Procedure MATRIX: Water

DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92

Description:

MW-5

Sample #

P1966

TCLP Semivolatile Organics:

o-CRESOL

<0.1

m-CRESOL

p-CRESOL

TOTAL CRESOL

1,4-DICHLOROBENZENE

2,4-DINITROTOLUENE

HEXACHLOROBENZENE

HEXACHLOROBUTADIENE

HEXACHLOROETHANE

NITROBENZENE

PENTACHLOROPHENOL

<0.5

PYRIDINE

<1.0

2,4,5-TRICHLOROPHENOL

<0.5

2,4,6-TRICHLOROPHENOL

<0.1

Analytical Record:

Date Leachate Created 2-5-92

Date Extracted 2-5-92

Date Analyzed 2-10-92

Comments:

Certification No.: 315

Units: mg/l

Authorized: Monika Santucci

Date: March 17, 1992



Laboratory Report

CLIENT U.S. NAVY JOB NO. 3543.001.517
DESCRIPTION New River, N.C.
Toxicity Characteristic Leaching Procedure MATRIX: Water
DATE COLLECTED 1-29-92 DATE RECEIVED 1-31-92

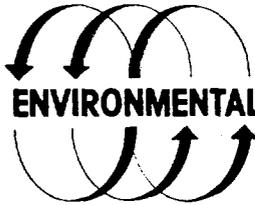
Description:	MW-5			
Sample #	P1966			
TCLP Metals:				
ARSENIC	<0.5			
BARIUM	<10.			
CADMIUM	<0.1			
CHROMIUM	<0.5			
LEAD	<0.5			
MERCURY	<0.0005			
SELENIUM	<0.1			
SILVER	<0.5			

Comments:

Certification No.: 315
Units: mg/l

Authorized: Monika Santucci

APPENDIX C



ENVIRONMENTAL TESTING SERVICES, INC.

P.O. Box 12715 • 888 Norfolk Square • Norfolk, Virginia 23502 • (804) 461-ETSI (3874) • Fax (804) 461-0379

February 18, 1992
Page 1 of 6

ANALYTICAL SERVICES REPORT SHEET

Customer:

Ms. Tina Bickerstaff
O'Brien & Gere Engineers, Inc.
440 Viking Drive
Virginia Beach, Virginia 23452

Sample Description:

22 soil samples delivered on
January 31, 1992 designated
as New River Sampling
Program.

RESULTS

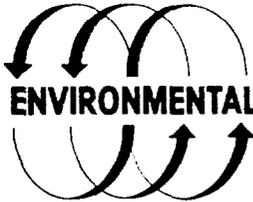
I. Total Petroleum Hydrocarbons: California Method GC/FID.

<u>Sample ID</u>	<u>TPH in mg/kg</u>
B1 2-4	4.06
B1 6-8	<1.00
B2 4-6	124
B2 8-10	<1.00
B3 2-4	<1.00
B3 6-8	<1.00
B4 4-6	<1.00
B4 8-10	<1.00
MW2 2-4	<1.00
MW2 6-8	3.51
MW4 2-4	1.49
MW4 6-8	3.80
MW6 2-4	<1.00
MW6 6-8	<1.00
MW8 4-6	1.94
MW8 8-10	1.13
MW10 2-4	<1.00
MW10 6-8	<1.00
MW12 2-4	<1.00
MW12 6-8	1.26
MW14 2-4	<1.00
MW14 6-8	<1.00

Anne S. Burnett

Anne S. Burnett
Quality Control Officer

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II. pH Analysis: EPA SW-846 Method 9045.

<u>Sample ID</u>	<u>pH</u>
MW2 6-8	6.84
MW4 6-8	4.83
MW6 6-8	4.98
MW8 8-10	4.79
MW12 6-8	7.57

III. Flashpoint: EPA SW-846 Method 1010.

<u>Sample ID</u>	<u>Flashpoint</u>
MW2 6-8	Negative to 110°C
MW4 6-8	Negative to 110°C
MW6 6-8	Negative to 110°C
MW8 8-10	Negative to 110°C
MW12 6-8	Negative to 110°C

IV. Toxicity Characteristic Leaching Process (TCLP): EPA SW 846 Method 1311.

(Results presented in mg/l)

<u>Sample ID</u>	
MW2 6-8	See attached compound list
MW6 6-8	See attached compound list

Anne S. Burnett

Anne S. Burnett
Quality Control Officer

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**TOXICITY CHARACTERISTICS LEACHING PROCESS (TCLP)
CONSTITUENT AND REGULATORY LEVELS**

Toxicity Characteristic Leaching Process (TCLP): EPA Manual SW-846 Method 1311.

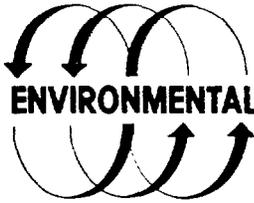
Sample ID: MW2 6-8

<u>Compound</u>	<u>Concentration (mg/l)</u>	<u>Regulatory Level (mg/l)</u>
Arsenic	<0.050	5.0
Barium	1.70	100.0
Benzene	<0.009	0.5
Cadium	<0.010	1.0
Carbon tetrachloride	<0.005	0.5
Chlordane	<0.008	0.03
Chlorobenzene	<0.005	100.0
Chloroform	<0.005	6.0
Chromium	<0.050	5.0
o-Cresol	<0.020	200.0
m-Cresol	<0.040	200.0
p-Cresol	<0.040	200.0
Cresol	<0.005	200.0
2,4-D	<0.010	10.0
1,4-Dichlorobenzene	<0.005	7.5
1,2-Dichloroethane	<0.005	0.5
1,1-Dichloroethylene	<0.005	0.7
2,4-Dinitrotoluene	<0.008	0.13



Anne S. Burnett
Quality Control Officer

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**TOXICITY CHARACTERISTICS LEACHING PROCESS (TCLP)
CONSTITUENT AND REGULATORY LEVELS
CONTINUED**

Sample ID: MW2 6-8

<u>Compound</u>	<u>Concentration (mg/l)</u>	<u>Regulatory Level (mg/l)</u>
Endrin	<0.005	0.02
Heptachlor (and its hydroxide)	<0.004	0.008
Hexachlorobenzene	<0.010	0.13
Hexachloro-1,3-butadiene	<0.010	0.5
Hexachloroethane	<0.010	3.0
Lead	<0.010	5.0
Lindane	<0.002	0.4
Mercury	<0.002	0.2
Methoxychlor	<0.010	10.0
Methyl ethyl ketone	<0.005	200.0
Nitrobenzene	<0.010	2.0
Pentachlorophenol	<0.020	100.0
Pyridine	<0.010	5.0
Selenium	<0.050	1.0
Silver	<0.010	5.0
Tetrachloroethylene	<0.005	0.7
Toxaphene	<0.010	0.5
Trichloroethylene	<0.005	0.5
2,4,5-Trichlorophenol	<0.010	400.0
2,4,6-Trichlorophenol	<0.010	2.0
2,4,5-TP (Silvex)	<0.005	1.0
Vinyl chloride	<0.010	0.2

Anne S. Burnett
Quality Control Officer

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**TOXICITY CHARACTERISTICS LEACHING PROCESS (TCLP)
CONSTITUENT AND REGULATORY LEVELS**

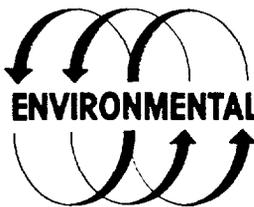
Toxicity Characteristic Leaching Process (TCLP): EPA Manual SW-846 Method 1311.

Sample ID: MW6 6-8

<u>Compound</u>	<u>Concentration (mg/l)</u>	<u>Regulatory Level (mg/l)</u>
Arsenic	<0.050	5.0
Barium	2.14	100.0
Benzene	<0.009	0.5
Cadium	<0.010	1.0
Carbon tetrachloride	<0.005	0.5
Chlordane	<0.008	0.03
Chlorobenzene	<0.005	100.0
Chloroform	<0.005	6.0
Chromium	<0.050	5.0
o-Cresol	<0.020	200.0
m-Cresol	<0.040	200.0
p-Cresol	<0.040	200.0
Cresol	<0.005	200.0
2,4-D	<0.010	10.0
1,4-Dichlorobenzene	<0.005	7.5
1,2-Dichloroethane	<0.005	0.5
1,1-Dichloroethylene	<0.005	0.7
2,4-Dinitrotoluene	<0.008	0.13

Anne S. Burnett
Quality Control Officer

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Page 6 of 6

TOXICITY CHARACTERISTICS LEACHING PROCESS (TCLP) CONSTITUENT AND REGULATORY LEVELS CONTINUED

Sample ID: MW6 6-8

<u>Compound</u>	<u>Concentration (mg/l)</u>	<u>Regulatory Level (mg/l)</u>
Endrin	<0.005	0.02
Heptachlor (and its hydroxide)	<0.004	0.008
Hexachlorobenzene	<0.010	0.13
Hexachloro-1,3-butadiene	<0.010	0.5
Hexachloroethane	<0.010	3.0
Lead	<0.010	5.0
Lindane	<0.002	0.4
Mercury	<0.002	0.2
Methoxychlor	<0.010	10.0
Methyl ethyl ketone	<0.005	200.0
Nitrobenzene	<0.010	2.0
Pentachlorophenol	<0.020	100.0
Pyridine	<0.010	5.0
Selenium	<0.050	1.0
Silver	<0.010	5.0
Tetrachloroethylene	<0.005	0.7
Toxaphene	<0.010	0.5
Trichloroethylene	<0.005	0.5
2,4,5-Trichlorophenol	<0.010	400.0
2,4,6-Trichlorophenol	<0.010	2.0
2,4,5-TP (Silvex)	<0.005	1.0
Vinyl chloride	<0.010	0.2

Anne S. Burnett
Quality Control Officer

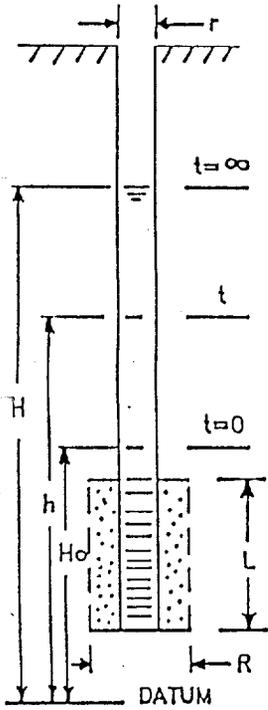
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APPENDIX D

IN-SITU PERMEABILITY TEST FIELD LOG

PROJECT AS 419-421
 WELL NUMBER MW 6
 DATE 1-28-92

LOCATION NEW RIVER
 ELEVATION _____



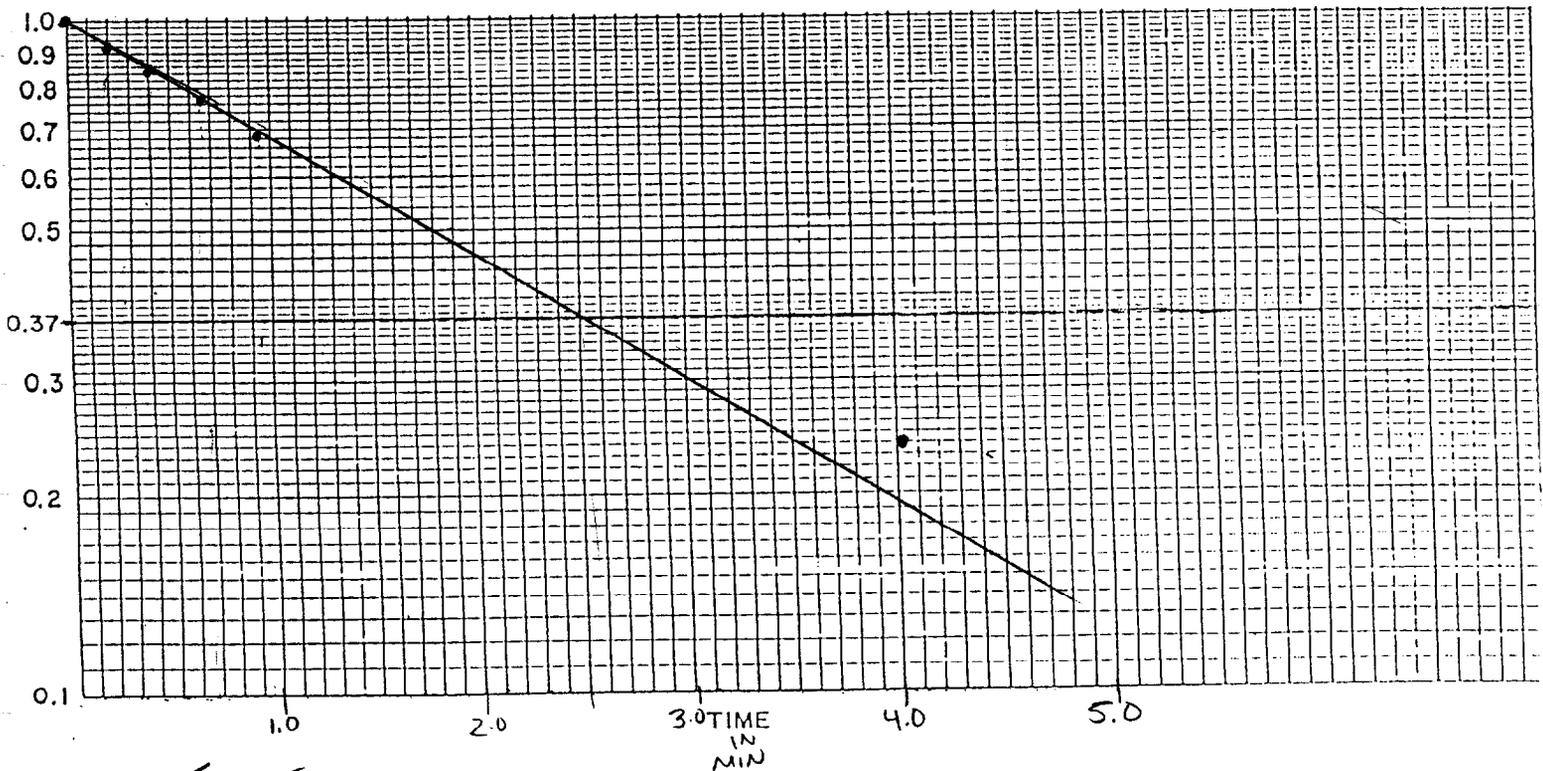
STATIC HEAD (H) 7.86
 PIPE RADIUS (r) .08
 SCREEN RADIUS (R) .35
 SCREEN LENGTH (L) 10.0
 INITIAL HEAD (H₀) 21.0

HYDRAULIC CONDUCTIVITY :

$$K = \frac{r^2 \ln(L/R)}{2LT_0}$$

$$K = \frac{(0.08^2) \ln(10/.35)}{2(10.150) 3000} = 6.7 \times 10^{-6} \text{ ft/sec} (6.464 \times 10^5) = 4.3 \text{ gpd/ft}^2$$

TIME sec	DEPTH	WATER		H-h H-H ₀ -13.14
		t MIN	h	
0		0	21.0	1
12		.20	20.0	.92
24		.40	19.0	.85
39		.65	18.0	.77
55		.92	17.0	.69
72		1.20	16.0	.62
241		4.01	11.0	.24

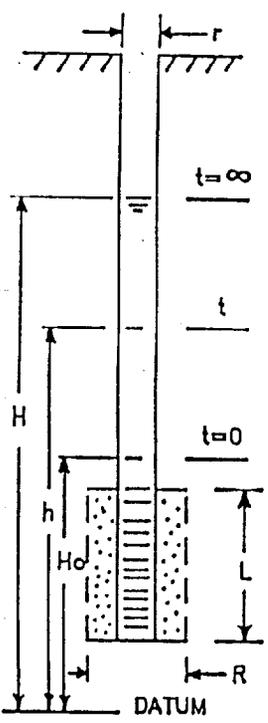


$T_0 = 25 \text{ min} = 1500 \text{ sec}$

IN-SITU PERMEABILITY TEST FIELD LOG

PROJECT AS 419-421
 WELL NUMBER MW10
 DATE 1-27-92

LOCATION New River
 ELEVATION _____



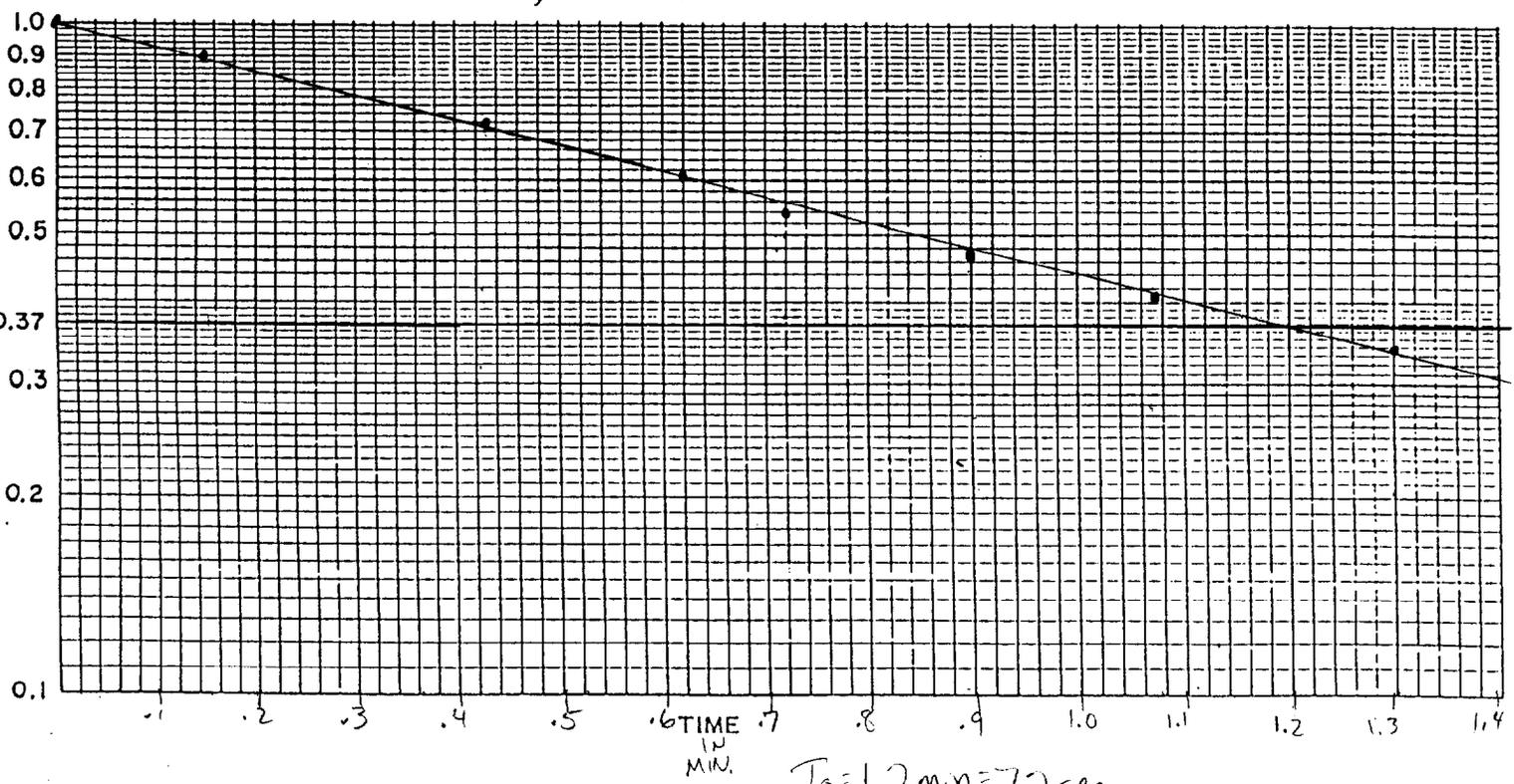
STATIC HEAD (H) 6.77
 PIPE RADIUS (r) .08
 SCREEN RADIUS (R) .35
 SCREEN LENGTH (L) 10'
 INITIAL HEAD (Ho) 2.2

HYDRAULIC CONDUCTIVITY :

$$K = r^2 \ln(L/R)$$

$$K = \frac{2LT_0}{2(10.72)} = \frac{(0.08^2) \ln(10/.35)}{2(10.72)} = 1.4 \times 10^{-5} \text{ ft/sec} (6.464 \times 10^5) = 9.0 \text{ gpd/ft}^2$$

TIME <u>sec</u>	DEPTH	t <u>MIN</u>	h	H-h H-Ho-15.23
0		0	22.0	1
9		.15	20.3	.89
26		.43	17.6	.71
37		.62	16.0	.61
43		.72	15.0	.54
54		.90	14.0	.47
64		1.07	13.0	.41
78		1.30	12.0	.34
116		1.93	10.0	.21
206		3.43	8.0	.08



APPENDIX E

UST MONITORING WELL CONSTRUCTION

AND

FIELD OPERATIONS

REQUIREMENTS

Well permits required by state agencies are the responsibility of the contractor. All monitoring wells will be installed in accordance with the following Navy UST monitoring well specifications.

DRILLING

During the drilling program, boreholes will be advanced using conventional hollow stem auger drilling methods. If it is the opinion of the contractor that air or mud rotary drill methods are necessary, approval must be obtained from the EIC. Presentation of justification for a boring method change shall be presented prior to drilling.

The wells will be constructed of flush joint threaded PVC well screen and riser casing depending on conditions encountered during borehole completion.

Well construction details are shown in Figures A-1 and A-2. A drill mounted on an All-Terrain-Vehicle (ATV) may be required for access to remote areas. Each rig will use necessary tools, supplies and equipment supplied by the contractor to drill each site. Drill crews should consist of an experienced driller and a driller assistant for work on each rig. A geologist, experienced in hazardous waste site investigations, shall be on site to monitor the drillers efforts and for air monitoring/safety control. Additional contractor personnel may be needed to transport water to the rigs, clean tools, assist in the installation of the security and marker pipes, construct the concrete aprons/collars and develop the wells. A potable water source on base will be designated by the Government.

Standard penetration tests will be performed in accordance with ASTM D-1586. Standard penetration tests will be performed at the following depths: 0.0-foot to 1.5-foot; 1.5-foot to 3.0-foot; 3.0-foot to 4.5-foot; and 5-foot centers thereafter. A boring log of the soil type, stratification, consistency and groundwater level will be prepared.

Groundwater sampling using a Hydropunch penetrometer (or similar penetrometer probe) and the corresponding laboratory analysis will be used to help define the lateral and horizontal extent of the contamination. The Hydropunch sample shall be obtained from either the upper or lower portion of the aquifer as needed. The use of augering to provide a pilot hole shall not be used. The Hydropunch operation shall not produce soil debris or excess groundwater. The proposed location of Hydropunch penetrometer sampling shall be detailed in the preliminary well location plan.

Attachment (b)

SAMPLING

Two soil samples will be obtained from each boring/well in accordance with ASTM Method D-1586 for split barrel sampling. The first sample will be obtained from 2 to 5 feet below ground surface. The second soil sample will be from the water table to 5 feet above the water table. Each soil sample will be screened in the field using an HNu photoionizer, organic vapor detector or similar type direct readout instrument to identify the presence of petroleum product within the soils. This field screening will provide a preliminary indication of the vertical and horizontal extent of petroleum contamination in order to select the optimum locations of other monitoring wells during the drilling program. Based on the field screening, monitoring wells will be installed at the locations where the most significant accumulation of fuel is encountered. Groundwater sample shall be obtained from each well and penetrometer probe after development is completed per the instructions below.

DEVELOPMENT

After completion of the soil sampling and drilling to the specified depth, 2-inch or 4-inch (as required by the EIC) I.D. flush-threaded Schedule 40 PVC (Schedule 80 in traffic areas) monitoring wells with slotted screens and well casings will be installed in the borehole. A 5 to 15-foot section of 0.01 inch slotted PVC well screen should be used in each well. Deep/shallow well pairs are to be used to obtain samples from both the upper and lower portions of the surficial aquifer. A sand pack will be placed around each slotted well screen extending to 2 feet above the top of the screen. A bentonite seal (minimum thickness - 1 ft.) will be placed on top of the sand pack. Finally, a ground mixture of two parts sand and one part cement, thoroughly mixed with the specified amount of potable water, will be placed in the borehole and rodded to insure a proper seal.

All wells will be developed following their installation to remove fine ground materials that may have entered the well during construction. This will be accomplished by either bailing or continuous low yield pumping. Equipment used for well installation, that may have come in contact with potentially contaminated material will be decontaminated with a high pressure steam clean wash followed by a potable supply water rinse. For the purpose of this scope of work, it is assumed that all fluid generated from well development and equipment decontamination can be disposed of on the ground at each respective well site.

After development, a standard slug permeability test will be done at each 2" monitoring well that does not contain product.

Soil removed from the borehole will be containerized in DOT approved barrels and properly identified. It is expected that sampling required for this effort will suffice for determining if the material is hazardous. The drill equipment and tools will be cleaned prior to drilling each well using a portable decontamination system/operation supplied by the contractor. Wash water at the sites will not be contained, unless otherwise directed by the Government, and may seep into the ground locally.

Supplies and equipment will be transported to the lay-down area designated on the station by the Government. Any office space, trailers, etc., required for drilling, subsequent sampling and shipping shall be arranged and provided by the contractor.

WELL HEAD COMPLETION

A 4-inch diameter security pipe with a hinged locking cap will be installed on the well casing top having an embedment depth of 2.5 feet into the grout.

There are two acceptable methods of completing the wellheads.

In non-traffic areas the acceptable method of finishing a wellhead is shown in figure A-1. Each well will be marked with three Schedule 40 steel pipes, 3-inch I.D., imbedded in a minimum of 2.5-foot of 3,000 psi concrete. (The concrete used to secure the three pipes will be poured at the same time and be an integral part of the 5-foot by 5-foot by 0.5-foot concrete apron described above.). The security pipes will extend a minimum 2.5 feet and maximum 4.0 feet above the ground surface. The steel marker pipes will be filled with concrete and painted day-glo yellow or an equivalent.

In traffic areas (and non-traffic areas where required), a "flush" manhole type cover shall be built into a concrete pad as shown in figure A-2. If the well as installed through a paved or concrete surface, the annular space between the casing and the bore hole shall be grouted to a depth of at least 2.5 feet and finished with a concrete collar. If the well was not installed through a concrete or paved medium and still finished as a high traffic area well, a concrete apron measuring 5-foot by 5-foot by 0.5 foot will be constructed around each well. This apron/collar will be constructed of 3,000 psi ready-mixed concrete. The concrete will be crowned to provide and to meet the finished grade of surrounding pavement as required. The concrete pads can be constructed within five days after all of the wells have been installed.

In all finishing methods, the well covers will be properly labeled by metal stamping on the exterior of the security pipe locking cap and by labeling vertically on the exterior of the security pipe or manhole cover as appropriate. The labeling shall consist of the letters UGW (UST Groundwater) (to describe the medium and the reason for the well) and a number specific to each well.

A sign reading "NOT FOR POTABLE USE OR DISPOSAL" SHALL BE FIRMLY ATTACHED TO EACH WELL.

* The contractor or project team may supplement these requirements, but may not modify or delete them, in total or in part, without prior approval of the Contracting Officer.

APPENDIX F

GROUNDWATER SAMPLING PROTOCOL

Use of the following procedures for sampling of ground water observation wells is dependent upon the size and depth of the well to be sampled and the presence of immiscible petroleum product in the well. To obtain representative ground water samples from wells containing only a few gallons of ground water and no product present, the bailing procedure is preferred. To obtain representative ground water samples from wells containing more than a few gallons if an immiscible product layer is apparent, the pumping procedure generally facilitates more representative sampling. Each of these procedures is explained in detail below.

1. Identify the well and record the location on the Ground Water Sampling Field Log, Attachment A.
2. Put on a new pair of disposable gloves.
3. Cut a slit in the center of the plastic sheet, and slip it over the well creating clean surface onto which the sampling equipment can be positioned.
4. Clean all meters, tools, equipment, etc., before placing on the plastic sheet.
5. Using an electric well probe, measure the depth of the water tube and the bottom of the well. Record this information in the Ground Water Sampling Field Log.
6. Clean the well depth probe with an acetone soaked towel and rinse it with distilled water after use.
7. Compute the volume of water in the well, and record this volume on the Ground Water Sampling Field Log.
8. Attach enough polypropylene rope to a bailer to reach the bottom of the well, and lower the bailer slowly into the well making certain to submerge it only far enough to fill one-half full. The purpose of this is to recover any oil film, if one is present on the water table.

9. Pull the bailer out of the well keeping the polypropylene rope on the plastic sheet. Empty the ground water from the bailer into a glass quart container and observe its appearance. NOTE: This sample will not undergo laboratory analysis, and is collected to observe the physical appearance of the ground water only.
10. Record the physical appearance of the ground water on the Ground Water Sampling Field Log.
11. Lower the bailer to the bottom of the well and agitate the bailer up and down to resuspend any material settled in the well.
12. Initiate bailing the well from the well bottom. All groundwater should be dumped from the bailer into a graduated pail to measure the quantity of water removed from the well.
13. Continue bailing the well throughout the water column and from the bottom until three times the volume of groundwater in the well has been removed, or until the well is bailed dry. If the well is bailed dry, allow sufficient time (several hours to overnight) for the well to recover before proceeding with Step 13. Record this information on the Groundwater Sampling Field Log.
14. Remove the sampling bottles from their transport containers and prepare the bottles for receiving samples. Inspect all labels to insure proper sample identification. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for convenient filling.
15. To minimize agitation of the water in the well, initiate sampling by lowering the bailer slowly into the well making certain to submerged it only far enough to fill it completely. Fill each sample container following the instructions listed in the Sample Containerization Procedures, Attachment B. Return each sample bottle to its proper transport container.
16. If the sample bottle cannot be filled quickly, keep them cool with the caps on until they are filled. The vials (3) labeled purgeable priority pollutant analysis should be filled from one bailer than securely capped. NOTE: Samples must not be allowed to freeze
17. Record the physical appearance of the groundwater observed during sampling on the Groundwater Sampling Field Log.

18. After the last sample has been collected, record the data and time, and, and if required, empty one bailer of water from the surface of the water in the well into the 200 ml beaker and measure and record the pH , conductivity and temperature of the ground water following the procedures outlined in the equipment operation manuals. Record this information on the Ground Water Sampling Field Log. The 200 ml beaker must then be rinsed with distilled water prior to reuse.
19. Begin the Chain of Custody Record.
20. Replace the well cap, and lock the well protection assembly before leaving the well location.
21. Place the polypropylene rope, gloves, rags and plastic sheeting into a plastic bag for disposal.
22. Clean the bailer by rinsing with control water and then distilled water. Store the clean bailer in a fresh plastic bag.

Sampling Procedures (PUMP)

1. Identify the well and record the location on the Ground Water Sampling Field Log.
2. Put on a new pair of disposable gloves.
3. Cut a slit in the center of the plastic sheet, and slip it over the well creating a clean surface onto which the sampling equipment can be positioned.
4. Clean all meters, tools, equipment, etc., before placing on the plastic sheet.
5. Using an electric well probe, measure the depth of the water tube and the bottom of the well. Record this information in the Ground Water Sampling Field Log.
6. Clean the well depth probe with an acetone soaked towel and rinse it with distilled water after use.
7. Compute the volume of water in the well, and record this volume on the Ground Water Sampling Field Log.
8. Attach enough polypropylene rope to a bailer to reach the bottom of the well, and lower the bailer slowly into the well making certain to submerge it only far enough to fill one-half full. The purpose of this is to recover any oil film, if one is present on the water table.

9. Pull the bailer out of the well keeping the polypropylene rope on the plastic sheet. Empty the ground water from the bailer into a glass quart container and observe its appearance. NOTE: This sample will not undergo laboratory analysis, and is collected to observe the physical appearance of the ground water only.
10. Record the physical appearance of the ground water on the Ground Water Sampling Field Log.
11. Prepare the submersible pump for operation. A pump with a packer inflated above the screened interval is preferred.
12. Lower the bailer to just below the top of the water column and pump the ground water into a graduated pail. Pumping should continue until sufficient well volumes have been removed or the well is pumped dry. If the well is pumped dry, allow sufficient time for the well to recover before proceeding with Step 16. Record this information on the Ground Water Sampling Field Log.
13. Remove the sampling bottles from their transport containers and prepare the bottles for receiving samples. Inspect all labels to insure proper sample identification. Sample bottles should be kept cool with their caps on until they are ready to receive samples. Arrange the sampling containers to allow for convenient filling.
14. With submersible pump raised to a level just below the surface of the water in the well, fill each sample container following the instructions listed in the Sample Containerization Procedures. Return each sampling bottle to its proper transport container. NOTE: A clean bottom loading stainless steel or Teflon bailer should be used to collect the sample used to fill the sample vials labeled purgeable priority pollutant analysis. Gently lower the bailer into the water to minimize agitation of the water. The vials (2) should be filled from one bailer.
15. If the sample bottle cannot be filled quickly, keep them cool with the caps on until they are filled. The vials (3) labeled purgeable priority pollutant analysis should be filled from one bailer than securely capped. NOTE: Samples must not be allowed to freeze.
16. Record the physical appearance of the groundwater observed during sampling on the Groundwater Sampling Field Log.

17. After the last sample has been collected, record the data and time, and, and if required, empty one bailer of water from the surface of the water in the well into the 200 ml beaker and measure and record the pH, conductivity and temperature of the ground water following the procedures outlined in the equipment operation manuals. Record this information on the Ground Water Sampling Field Log. The 200 ml beaker must then be rinsed with distilled water prior to reuse.
18. Begin the Chain of Custody Record. A separate form is required for each well with the required analysis listed individually.
19. Remove the submersible pump from the well and clean the pump and necessary tubing both internally and externally. Cleaning is comprised of rinses with a source water and acetone or methanol mixture, and distilled water using disposable towers and separate wash basins. The pump should then be returned to its covered storage box.
20. Replace the well cap, and lock the well protection assembly before leaving the well location.
21. Place the gloves, towels, disposable shoe covers and plastic sheet into a plastic bag for disposal.

Exhibits



EXHIBIT A

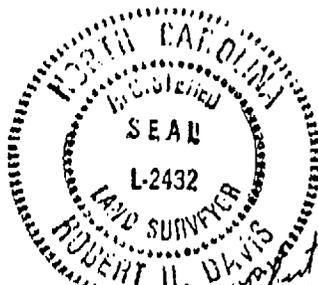
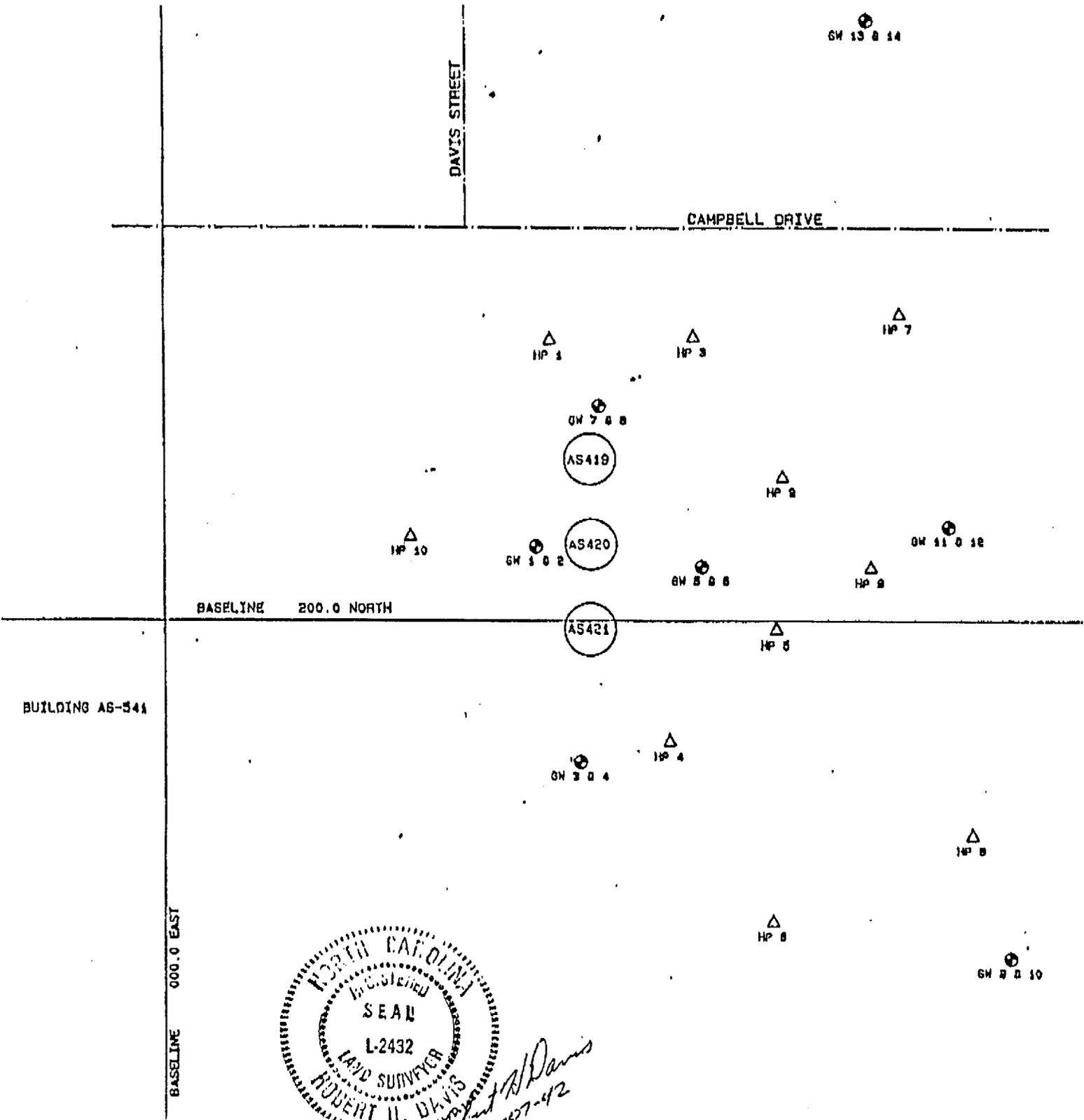


ROBERT H. DAVIS, RLS
SURVEYORS AND PLANNERS
7175 HIGHWAY 70 EAST
NEW BERN, NORTH CAROLINA 28562
919-636-2109

Tim Bickerstaff

JOB 91130 07 O'Brien & Gere
SHEET NO. 1 OF 2
CALCULATED BY R. Davis DATE 02-07-92
CHECKED BY R. Davis DATE 02-07-92
SCALE 1" = 40'

For 804-431-9006



Robert H. Davis
02-07-92



ROBERT H. DAVIS, RLS
SURVEYORS AND PLANNERS
 7175 HIGHWAY 70 EAST
 NEW BERN, NORTH CAROLINA 28562
 919-636-2109

Tina Bickerstaff

JOB 91130 07 O'Brien & Co.

SHEET NO. 2 OF 2

CALCULATED BY R. Davis DATE 03-07-92

CHECKED BY R. Davis DATE 03-07-92

SCALE As Shown

Point	Northing	Easting	Elevation
HP 01	282.7	113.1	17.47
HP 02	242.3	181.0	16.44
HP 03	283.5	155.1	16.63
HP 04	165.4	147.7	15.44
HP 05	197.2	179.0	16.13
HP 06	111.7	177.9	15.21
HP 07	290.2	215.4	14.53
HP 08	137.7	236.1	15.72
HP 09	215.4	206.6	16.52
HP 10	224.7	72.2	16.83
GW 01	221.9	108.7	19.14
GW 02	221.9	108.7	18.64
GW 03	159.5	121.5	17.96
GW 04	159.5	121.5	17.93
GW 05	215.9	157.2	19.21
GW 06	215.9	157.2	18.98
GW 07	263.4	127.4	19.90
GW 08	263.4	127.4	19.68
GW 09	100.9	247.3	18.30
GW 10	100.9	247.3	17.75
GW 11	227.8	229.4	19.58
GW 12	227.8	229.4	18.50
GW 13	377.3	206.1	14.67
GW 14	377.3	206.1	14.71

Note: Elevations based on line marked on cadastre for aerial line at new hangar site. Elevation pointed on is 18.00'

Floor level of Bldg AS 5A1 is 22.10'
 & Intx of Campbell & Davis is 16.79'

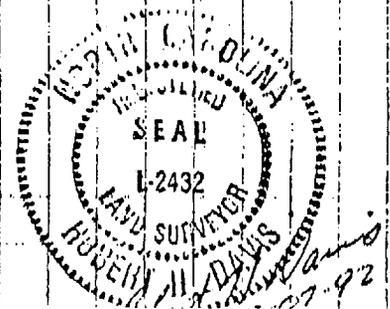


EXHIBIT B

The PCBs detected in the soil sample from monitor well MPMW-2 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. PCBs are regulated under TSCA and the cleanup of PCB contamination is dependent on when the release occurred. Spills or releases after 1987 are subjected to cleanup standards in TSCA, while older contamination falls under the jurisdiction of the Regional Office of the Environmental Protection Agency (EPA), which will determine applicable clean up levels.

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.

7.0 NEW RIVER AIR STATION

7.1 Tank Contents. The results for the laboratory testing on the sample from the New River Air Station tank are presented in Table 7. The tank sampled was designated AS-421. At the time of sampling (11/27/90), there was approximately 2 to 3 inches of product in the tank, for an approximate volume of 330 gallons. The other tanks (AS-419 and AS420) each had similar volumes. The tank was sampled utilizing a clean sample jar lowered on a rope. 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.

The VOC's that were detected in the sample above their detection levels included Chloroform, Methylene Chloride, Trichloroethene, Trichlorofluoromethane, 1,1,2-Trichlorotrifluoroethane (Freon), Toluene, Ethylbenzene and Total Xylenes. 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 Chloroform, Methyl Ethyl Ketone, Trichloroethylene, Arsenic, Cadmium, Chromium, Lead and Mercury. Those that exceeded their regulatory levels included:

- Trichloroethylene: 1.08 ppm vs. 0.50 ppm
- Cadmium: 1.01 ppm vs 1.0 ppm
- Chromium: 55.0 ppm vs. 5.0 ppm
- Lead: 15.0 ppm vs. 5.0 ppm
- Mercury: 2.40 ppm vs. 0.2 ppm

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

7.2 Site Geology. The site was investigated by eight soil borings advanced to a depth of 4 to 5 feet. The locations of the soil borings are shown on the New River Air Station Site sheet (a part of the Contract Drawings). The general locations are as follows:

- NRSB-1 was near the front of the pump house
- NRSB-2 was near the rear of the pump house where the piping exited
- NRSB-3, 4 and 5 were near the valves on the west sides of the tanks
- NRSB-6, 7 and 8 were near the valves on the east sides of the tanks.

The soils encountered at each of the test locations are described in Table 8. A generalized subsurface is presented in Figure 1. The soils conditions encountered almost exclusively consisted of 1 to 2 feet of fine sand with varying amounts of silt and silty clay, which is underlain by 1 to 1.5 feet of soft, black organic silt with varying amounts of sand and larger organic matter (roots), which in turn is underlain by a soft, low to moderately plastic clay with varying amounts of sand. The organic silt and sand layer and underlying sandy clay layer appear to 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, but the organic silt layer was wet in places and may contain a small perched water table. The only odors encountered during the sampling was in a sample from NRSB-5 at a depth of approximately 1 foot, which had a slight petroleum odor.

7.3 Laboratory Results. The laboratory test results for the soil samples obtained at the New River Air Station site are presented in Table 9. TPH levels were recorded above the detection limit of 10 ppm for the following samples:

- NRSB-5: 211 ppm by GC as diesel, 7000 ppm by IR at the first laboratory and 2750 ppm by IR at the second laboratory
- NRSB-7: 70 ppm by GC as diesel and 7500 ppm by IR at 0.5 to 2 feet and 200 ppm by IR at 3.5 to 4 feet.

The samples from the other soil borings indicated TPH levels below the detection limit of 10 ppm.

Sample NRSB-4 was tested for VOC,s and indicated detectable limits of Chloroform, Methylene Chloride, 1,1,1-Trichloroethane and 1,1,2-Trichlorotrifluoroethane (Freon). With the exception Methylene Chloride (detected at 0.030 ppm) and Trichlorotrifluoroethane (Freon) (detected at 0.061 ppm), for which maximum contaminant levels (MCL) or maximum contaminant level goals (MCLG) have not yet been established, the other two VOCs detected were below the MCL or MCLG for that compound:

- Chloroform: 0.006 ppm vs. 0.1 ppm
- 1,1,1-Trichloroethane: 0.035 ppm vs. 0.20 ppm

Methylene Chloride commonly contaminates samples via diffusion through the sample container septum during shipment and storage. Furthermore, in lieu of an established MCL, a calculated health based level (Representative Regulatory Equivalent Number) for Methylene Chloride in potable water is 0.046 ppm, which is greater than the soil sample concentration of 0.030 ppm. No such calculated number exists for the Freon.

7.4 Asbestos. Four samples were collected and analyzed by PLM for this site, with two having positive results for ACM.

<u>Sample No.</u>	<u>Location</u>	<u>Material</u>	<u>ACM Content</u>	<u>Approx. Quantity</u>
AS19	Beneath Tanks	Foam	25% Chrysotile	75 SF
AS21	Beneath Tanks	Foam	25% Chrysotile	75 SF

The removal of this ACM will be difficult as it is below the tanks. A program of full containment must be utilized, however, in all likelihood should be employed after the top and walls of the tank have been removed.

7.5 Lead Based Paint. Two paint samples for percentage of lead testing were taken. The results are:

<u>Sample Identification</u>	<u>Percent Lead</u>
AS-420	0.20
AS-421	10.81

The above results were a test performed on the coatings only. The current guidelines are a percentage of lead by weight. Including the base metal in this test procedure will dramatically decrease the percentage of lead by weight. Based upon this criteria, it appears that the levels of lead in the tank coating are below trigger levels. The Contractor should be made aware that lead is a part of the existing coating system, and that caution should be exercised to minimize release of lead powders, particularly in cutting operations.

7.6 Conclusions. The laboratory data indicates some soil sample TPH levels that exceed the action level of 10 ppm. These were at soil boring locations NRSB-5 and 7. 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 a diesel "signature" in the GC, as well as the possible errors associated with the IR method, including measuring naturally occurring hydrocarbons that may be associated with decaying organic matter in the organic silt layer, that have already 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 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. 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, two of four samples collected for asbestos testing had positive results. An estimated 150 square feet of foam beneath the tanks will require removal in accordance with OSHA regulations.

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

TABLE 8
SOIL DESCRIPTIONS
NEW RIVER AIR STATION WASTE OIL TANKS

ATION	DEPTH	DESCRIPTIONS	DEPTH/ TPH	BLOW COUNT
SB-1	0'-1'	GRAVEL AND LIGHT ORANGE BROWN FINE SAND, SOME SILTY CLAY, NO ODOR, MOIST.		
	1'-1.2'	LIGHT ORANGE TAN FINE TO COARSE SAND, SOME SILT, NO ODOR, MOIST.		1'-3' 7-4-5-4
	1.5'	GRADING GREY WITH GRAVEL.		
	1.5'-2'	DARK GREY FINE SAND AND SILT, NO ODOR, MOIST.	2'-4'	
	2'-3.8'	MOTTLED BLACK AND GREY ORGANIC SILT, SOME FINE SAND, OCCASIONAL FINE SAND SEAM, VERY MOIST.	<10 PPM	3'-5' 3-3-4-3
	3.8'-4.4'	MOTTLED GREY, TAN AND ORANGE MODERATELY PLASTIC CLAY, SOME FINE SAND.		
SB-2	0'-2.3'	BROWN TO TAN FINE SAND, SOME SILT TO SILTY CLAY, NO ODOR, MOIST.	2'-4'	1'-3'
	2.3'-2.7'	TAN FINE TO COARSE SAND, LITTLE GRAVEL, SOME SILTY CLAY, NO ODOR, MOIST.	<10 PPM	4-3-8-10
	2.7'-4'	DARK BROWN TO BLACK FINE SAND, SOME SILT, LITTLE ROOTS, MOIST (POSSIBLE OLD TOP SOIL).		3'-5'
	4'-5'	MOTTLED GREY AND TAN SILTY CLAY TO MODERATELY PLASTIC CLAY AND FINE SAND, LITTLE ROOTS, MOIST.		2-1-2-2
SB-3	0'-3'	2" TOPSOIL. MOTTLED GREY AND TAN FINE SAND, GRADING TO SILTY CLAY AND FINE SAND, NO ODOR, MOIST (LITTLE RECOVERY).	0'-1'	1'-3'
	3'-5'	MOTTLED GREY, DARK GREY AND TAN, LOW PLASTICITY CLAY, SOME FINE SAND, NO ODOR, WET, VERY SOFT.	<10 PPM 1'-5' <10 PPM	3-2-1/12" 3'-5' 1/12"-1/12"
SB-4	0'-2.3'	2" TOP SOIL INTERLAYERED TAN AND DARK BROWN FINE SAND, NO ODOR, MOIST.	0'-4'	0'-2'
	2.3'-3.3'	MOTTLED BLACK AND GREY ORGANIC SILT, SOME FINE SAND, OCCASIONAL FINE SAND SEAM, VERY MOIST.	<10 PPM	3-2-2-1 2'-4'
	3.3'-4'	MOTTLED GREY AND TAN SILTY CLAY TO MODERATELY PLASTIC CLAY AND FINE SAND, MOIST.		3-2-2-3
SB-5	0'-0.8'	2" TOP SOIL. BROWN TO TAN FINE SAND, SOME SILT TO SILTY CLAY, NO ODOR, MOIST.		0'-2' 1-3-5-1
	0.8'-1.2'	TAN AND BROWN FINE TO COARSE SAND AND GRAVEL, SLIGHT PETROLEUM ODOR, MOIST.	1'-2'	
	1.2'-1.5'	GREY TO BLACK FINE SAND, LITTLE SILT, MOIST.	211 PPM	
	1.5'-3'	GREY AND BLACK SILTY CLAY TO ORGANIC SILT, TRACE FINE SAND, WET.	DIESEL	3'-5'
	3'-5'	MOTTLED GREY AND TAN SILTY CLAY TO MODERATELY PLASTIC CLAY AND FINE SAND, VERY SOFT, WET.	7000 PPM TOTAL	1-1-1-1

TABLE 8
(CONTINUED)
SOIL DESCRIPTIONS
NEW RIVER AIR STATION WASTE OIL TANKS

LOCATION	DEPTH	DESCRIPTIONS	DEPTH/ TPH	BLOW COUNT
RSB-6	0'-1' 1'-1.4' 1.4'-2' 3'-5'	2" TOP SOIL INTERLAYERED TAN AND DARK BROWN FINE SAND, NO ODOR, MOIST. TAN FINE TO COARSE SAND, LITTLE GRAVEL, LITTLE SILT, NO ODOR, MOIST. BLACK ORGANIC SILT AND FINE SAND, MOIST. MOTTLED GREY AND TAN SILTY CLAY TO MODERATELY PLASTIC CLAY AND FINE SAND, SOFT, VERY MOIST.	0.5'-2' <10 PPM 3.5' <10 PPM	0'-2' 1-4-5-2 3'-5' 1-2-2-2
RSB-7	0'-1' 1'-1.7' 1.7'-2' 3'-5'	TAN FINE SAND, TRACE SILT, NO ODOR, MOIST. GRADING GREY WITH SOME CRUSHED GRAVEL. BLACK ORGANIC SILT AND FINE SAND, MOIST. MOTTLED GREY AND TAN SILTY CLAY TO MODERATELY PLASTIC CLAY AND FINE SAND, SOFT, VERY MOIST.	0.5'-2' 70 PPM DIESEL 7500 PPM TOTAL 3.5'-4' 200 PPM TOTAL	0'-2' 1-4-8-2 3'-5' 1-1-1-2
RSB-8	0'-1.7' 1.7'-2' 3'-5'	TAN FINE SAND, TRACE SILT, NO ODOR, MOIST. BLACK ORGANIC SILT AND FINE SAND, MOIST. MOTTLED GREY AND TAN SILTY CLAY TO MODERATELY PLASTIC CLAY AND FINE SAND, SOFT, VERY MOIST.	3'-5' <10 PPM	0'-2' 1-4-3-3 3'-5' 1-1-2-2

- 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.

TABLE 9

**NEW RIVER AIR STATION WASTE OIL TANKS
LABORATORY RESULTS OF SOIL SAMPLES**

SAMPLE	DEPTH	TPH	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	V7	V17	V20	V25
SB-1	2'-4'	ND	---	---	---	---	---	---	---	---
SB-2	2'-4'	ND	---	---	---	---	---	---	---	---
SB-3A	0'-1'	ND	---	---	---	---	---	---	---	---
SB-3B	1'-5'	ND	---	---	---	---	---	---	---	---
SB-4	0'-4'	ND	ND	ND	ND	ND	0.006	0.030	0.035	0.061
SB-5	1'-2'	211 D 7000 IR 2750 IR*	---	---	---	---	---	---	---	---
SB-6A	0.5'-2'	ND	---	---	---	---	---	---	---	---
SB-6B	3.5'	ND	---	---	---	---	---	---	---	---
SB-7A	0.5'-2'	70 D 7500 IR	---	---	---	---	---	---	---	---
SB-7B	3.5'-4'	200 IR	---	---	---	---	---	---	---	---
SB-8	3'-5'	ND	---	---	---	---	---	---	---	---

- NOTES:
- 1) ALL RESULTS ARE PRESENTED IN PARTS PER MILLION (PPM), WHICH IS ANALOGOUS TO MILLIGRAMS PER KILOGRAM.
 - 2) TPH- TOTAL PETROLEUM HYDROCARBONS. TEST METHOD IS BY GAS CHROMATOGRAPH (GC); "D" - INDICATES DIESEL, "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. V7 - CHLOROFORM, V17 MEHYLENE CHLORIDE, V20 - 1,1,1 TRICHLOROETHANE, V25 - 1,1,2 TRICHLOROTRIFLUOROETHANE (FREON). INCLUDES BENZENE, TOLUENE, ETHYLBENZENE AND TOTAL XYLENES (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.