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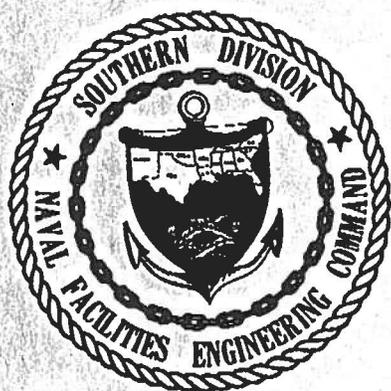
FINAL CONTAMINATION ASSESSMENT PLAN AND HEALTH AND SAFETY PLAN FOR
ALPHA-DELTA PIER NS MAYPORT FL
8/1/1991
ABB ENVIRONMENTAL SERVICES



FINAL

**AUGUST 1991
CONTAMINATION ASSESSMENT PLAN
HEALTH AND SAFETY PLAN**

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



**SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
29411-0068**

CONTAMINATION ASSESSMENT PLAN
ALPHA-DELTA PIER
NAVAL STATION MAYPORT, FLORIDA

CTO NO.: 00016

Contract Number N62467-89-D-0317

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AUGUST 1991

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1.0 INTRODUCTION

ABB Environmental Services Inc. (ABB-ES) has been contracted by the Naval Facilities Engineering Command, Southern Division (SDIV) to prepare a Contamination Assessment Plan (CAP) for the Alpha-Delta Pier at Naval Station Mayport, Florida. The CAP outlines a field investigation and sampling program that will assess the source(s) of contamination at the pier area and delineate their extent. The following report presents the site location, summarizes previous investigations, and develops the rationale for the proposed field investigation to be implemented under the Contamination Assessment (CA).

2.0 BACKGROUND

2.1 SITE DESCRIPTION. The U.S. Naval Station (NS) at Mayport, Florida, is located about 15 miles east-northeast of downtown Jacksonville, Florida (see Figure 1). The Naval Station was established in 1942 on approximately 700 acres of land. The original mission of the station included use of patrol craft, target, and rescue boats. The station was placed in caretaker status in 1946, reopened in 1948, and in 1952 was assigned an aircraft carrier. Today NS Mayport is primarily involved in intermediate level maintenance of equipment, ships, aircraft, and other support units assigned to the portion of the Second Fleet stationed at the facility.

The Alpha-Delta Pier study area is an approximately 1,450 feet long by 100 feet wide pier located on the southwest side of the turning basin. The pier is primarily used for the docking, resupplying, and maintenance of Navy ships.

2.2 SITE HISTORY. The Alpha-Delta Pier area consists of sheet pile bulkheads with a predominately asphalt roadway cap (see Figure 2). There are existing underground utilities throughout the pier area. The source of the petroleum contamination at the Alpha-Delta pier has been reported to be a pipeline system that transports waste oil, Diesel Fuel Marine (DFM), and JP-5 fuel. All pipelines are connected to a fuel farm. Fuel receipts are handled at the fuel farm and distributed along the pipelines to ships. The pipelines are of steel construction and vary between 6 and 12 inches in diameter.

The waste oil discharge line used by off loading navy vessels does not allow for in-line sampling for hazardous wastes until it is discharged into a common receiving vessel. This does not allow for specific vessel identification should hazardous contaminants be encountered. The waste oil line is a gravity system for the majority of its length; therefore, pressure testing of the pipeline would not provide adequate information on system leakage. The gravity system eventually feeds into a riser where it transitions into a pressurized system. From this point the system could be pressure tested for leaks.

The DFM fuel pipeline system, which is used for ship bunkering, is regularly tested by the Naval Supply Center (NSC) Fuel Department. No leaks were reported to have been found in any of the pressurized lines based upon testing conducted by the NSC Fuel Department in 1990.

During periods of rain, a sheen is in evidence at the discharge of storm sewers into the Turning Basin between Buildings No. 28 and 36. However, base personnel have been unable to adequately identify the origin of this contamination. In conjunction with this apparent release, there are several locations along Alpha pier and where Alpha pier meets Bravo pier that have shown indications of waste oil contamination when exposed during construction episodes. The DFM line used for ship bunkering is the suspect line with respect to this leakage. Sections of this line are over 25 years in age and the line does not employ cathodic protection.

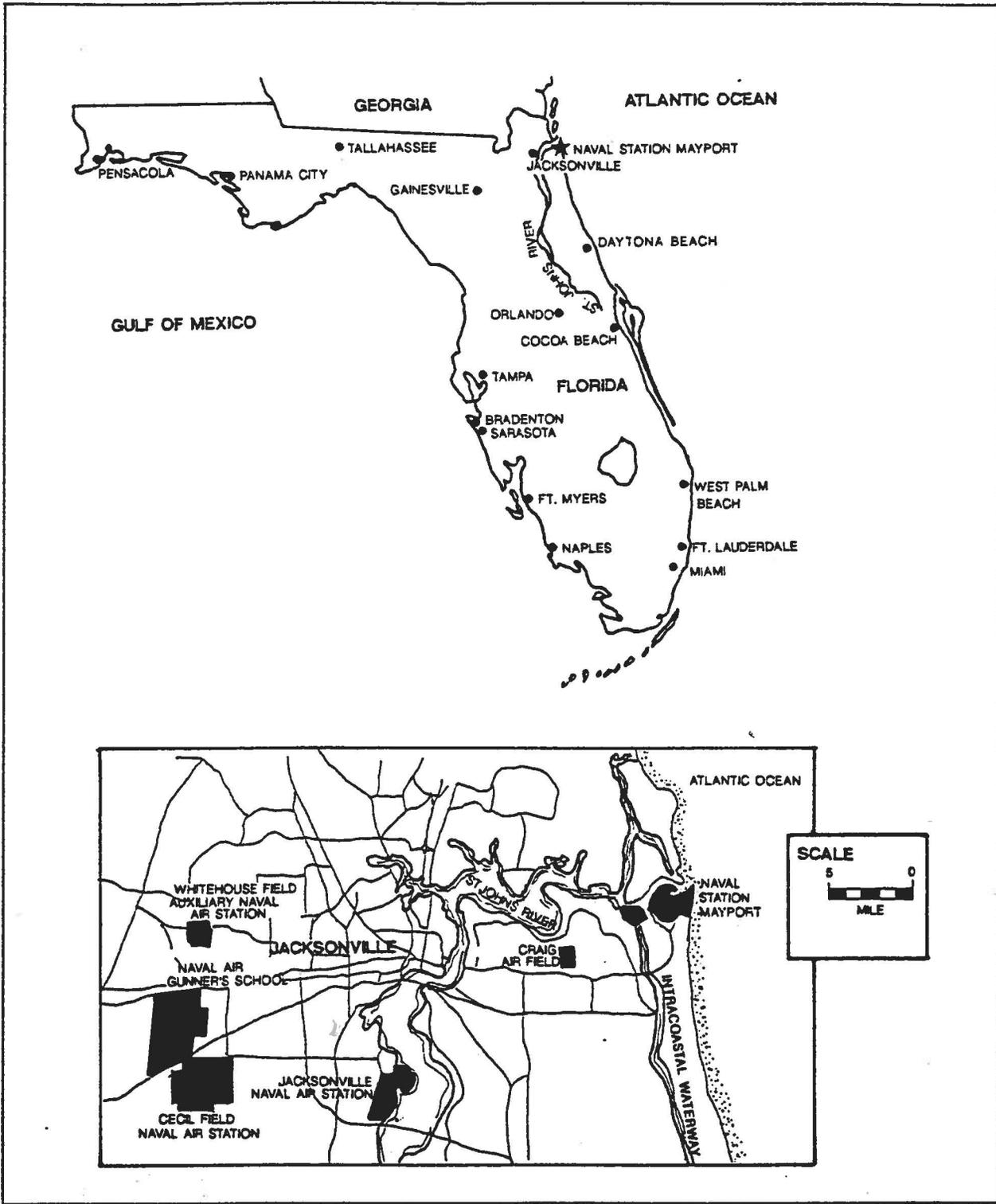
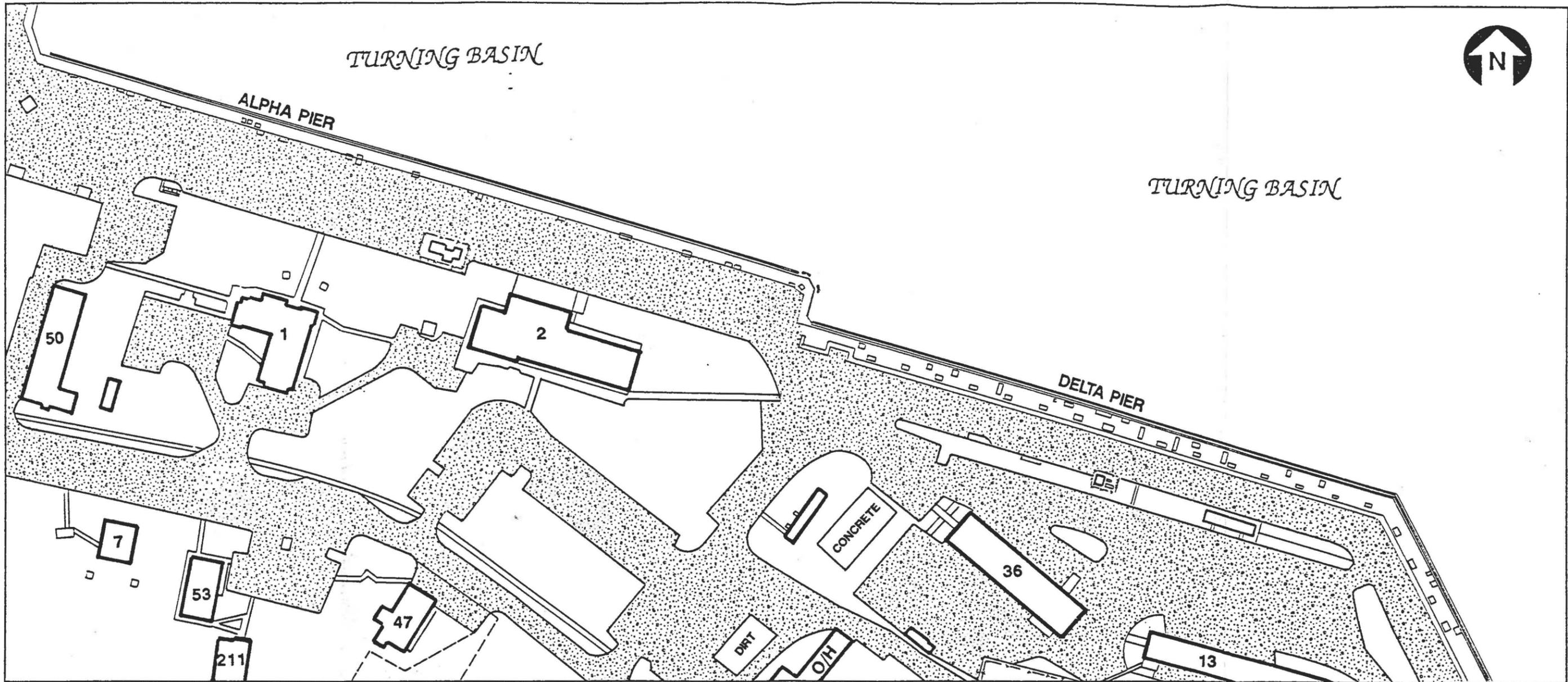


FIGURE 1
FACILITY LOCATION MAP



CONTAMINATION
ASSESSMENT PLAN
NAVAL STATION
MAYPORT, FLORIDA



LEGEND
 ASPHALT

FIGURE 2
SITE MAP

SCALE

 0 50 100 200 FT



CONTAMINATION
ASSESSMENT PLAN
NAVAL STATION
MAYPORT, FLORIDA

2.3 HYDROGEOLOGY. The general hydrogeology in the Duval County area is discussed in the regional hydrogeology section. The hydrogeologic conditions that exist beneath the Alpha-Delta Pier site are presented in the site-specific hydrogeology section.

2.3.1 Regional Duval County, in northeast Florida, is underlain by three water bearing zones. These zones include a shallow aquifer system, a secondary artesian aquifer, and the Floridan aquifer system.

The rock formations that underlie the surface provide most of the water needs in the area. These formations, from youngest to oldest, include undifferentiated deposits of Pleistocene and Recent Age; deposits of the late Miocene or Pliocene Age; the Hawthorn Formation of the Middle Miocene Age; the Inglis, Williston, and Crystal River Formations of the Ocala Group of Eocene Age; and the Avon Park, Lake City, and Oldsmar Limestones, all of the Eocene Age. The Floridan aquifer system occurs in the formations of the Eocene Age and the limestone in the base of the Hawthorn Formation. The most extensive aquifers in the shallow aquifer system occur in surficial sand beds and a zone of limestone, shell, and sand at the base of the Upper Miocene or Pliocene deposits.

The top of the Floridan aquifer system is between 300 and 550 feet below sea level and is the principal source of freshwater in northeast Florida (Leve, 1968). The water in this aquifer is confined under artesian pressure by impermeable beds in the Miocene to Recent deposits. Water is contained within the Floridan aquifer system in the soft, porous limestone and porous dolomite beds. Relatively impermeable, hard, massive dolomite and limestone layers form the relatively impermeable beds that restrict the vertical movement of the water.

Geraghty and Miller (1983) report that groundwater in the Floridan aquifer in the vicinity of Mayport is moving southward toward areas of heavy pumpage along the coast. Floridan aquifer wells in the vicinity of NS Mayport are under sufficient artesian pressure to flow at the surface, indicating an upward hydraulic gradient between the Floridan and surficial aquifers.

The secondary artesian aquifer is intermittent, occurring at depths of 70 to 350 feet below land surface (bls), and consists of sand and limestone lenses interbedded in the clayey sands and sandy clays of the Hawthorn Formation. It is situated between the surficial aquifer and the underlying Floridan aquifer system. Spechler (1982) noted that the most productive zone is notably absent in the Mayport area and consequently this aquifer is not used as a sole source of water supply due to low yields. Water levels in the secondary artesian aquifer indicate that groundwater flow in the Mayport area is toward the northeast (Fairchild, 1972).

The shallow aquifer system consists of the sand and shell zones in the Pleistocene and Recent deposits; shell, limestone, and sand zones in the Pliocene or upper Miocene deposits, and the limestone and sand zones in the clayey sand and sandy clay confining beds in the upper part of the Hawthorn Formation. Not only do these deposits change vertically, but they also change laterally. Therefore, the water bearing zones and the confining beds are discontinuous. The most laterally extensive water bearing zone is about 10 to 40 feet thick and

occurs as either a limestone, a shell, or a sand bed near the base of the Pliocene or upper Miocene deposits. It can be found from 50 to 150 feet bls throughout most of Duval County (Causey and Phelps, 1978; Franks, 1980).

2.3.2 Site Specific The subsurface materials that will be encountered under the Alpha-Delta pier are anticipated to be sands, construction debris, crushed limerock, and other fill material that have been placed behind the pier bulkhead over the years. No native undisturbed soils are expected to be encountered during this investigation.

The surficial aquifer at NS Mayport is not used as a source of water supply. Water quality in the aquifer is high in dissolved solids and would preclude its use as a future source of potable water supply. In the area of the Alpha-Delta pier, the water table will be tidally influenced and salinity levels are expected to be high.

3.0 INVENTORY OF NEARBY POTABLE WELLS

ABB-ES, with the cooperation of the Environmental Coordinator at NS Mayport, will conduct an inventory of identified wells in the area of the Alpha-Delta pier that could possibly be used as potable water supply sources. A 7-1/2-minute U.S. Geological Survey (USGS) topographic map will be used to locate the investigated area and the location of any water supply wells within a 1/4-mile radius of the area.

4.0 PROPOSED ASSESSMENT PLAN

4.1 FIELD INVESTIGATION. The field investigation for the Alpha-Delta pier site will consist of three tasks: (1) a start-up meeting, (2) a soil gas and groundwater screening program, and (3) a monitoring well installation and subsequent groundwater quality sampling program.

Task 1: The start-up meeting will be held onsite at NS Mayport. All personnel associated with the investigation will review the scope of work in the Contamination Assessment Plan (CAP) and Health and Safety Plan (HASP).

Task 2: A soil gas and groundwater screening program will consist of installing as many as 65 shallow soil borings in the site area for collecting soil gas samples for analyses. A shallow soil gas wellpoint system will be hydraulically pushed to a depth immediately above the water table and a soil gas sample collected which will be screened for benzene, ethyl benzene, toluene, and xylenes (BETX) using a portable gas chromatograph (GC). In addition, as many as 8 temporary stainless steel wellpoints using the KV Macho System or equivalent will be installed at the site in areas that are inaccessible to the vehicle containing the soil gas probe. A groundwater sample will be collected from each of the temporary wellpoints and analyzed for BETX on the portable GC. The proposed locations of the soil gas borings and temporary wellpoints are shown on Figure 3. The screening of soil and groundwater samples from wellpoints will help in assessing the extent of the contamination and provide information for placement of monitoring wells at the site.

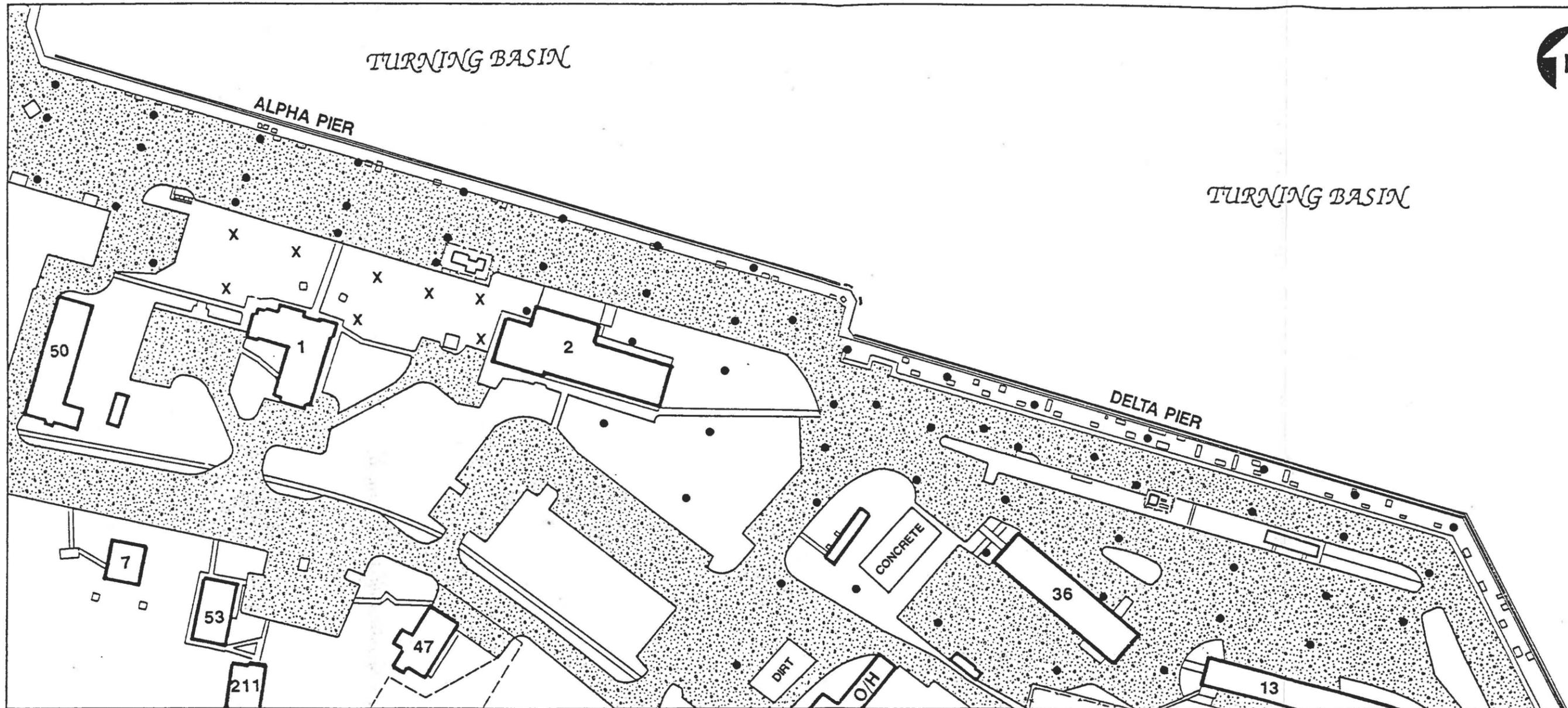
Task 3: Following the soil gas and groundwater screening program, as many as 25 monitoring wells will be installed at select locations to assess the groundwater contamination at the pier (Figure 4). Boreholes will be advanced with a hollow-stem auger drill rig. At each boring, sediment samples will be collected immediately above the water table. These samples will be retrieved using a split-spoon sampler. Samples will be screened by a field GC measuring for concentrations of BETX. Based upon the results of the initial split-spoon samples, additional samples may be collected with depth at 5-foot intervals until several clean samples are obtained.

In addition, soil samples will be collected from each borehole at various depths and at the water table. The soil samples will be screened using an organic vapor analyzer (OVA) with a flame ionization detector (FID) to assess the degree of contamination in the soils. The soil screening will be conducted following Florida Department of Environmental Regulation (FDER) Chapter 17-770.200(2), Florida Administrative Code (FAC), guidelines. The screening of the soil samples will be used to assess the horizontal and vertical extent of the soil contamination at the site. In addition to the screening analysis, 10 soil samples will be collected and sent to a laboratory for analysis of the unknown petroleum analytical group as defined in FDER Chapter 17-770.600(8)(c), FAC. Along with the soil samples, a duplicate soil sample, a field blank, an equipment blank, and a trip blank will be collected and analyzed.



TURNING BASIN

TURNING BASIN



LEGEND

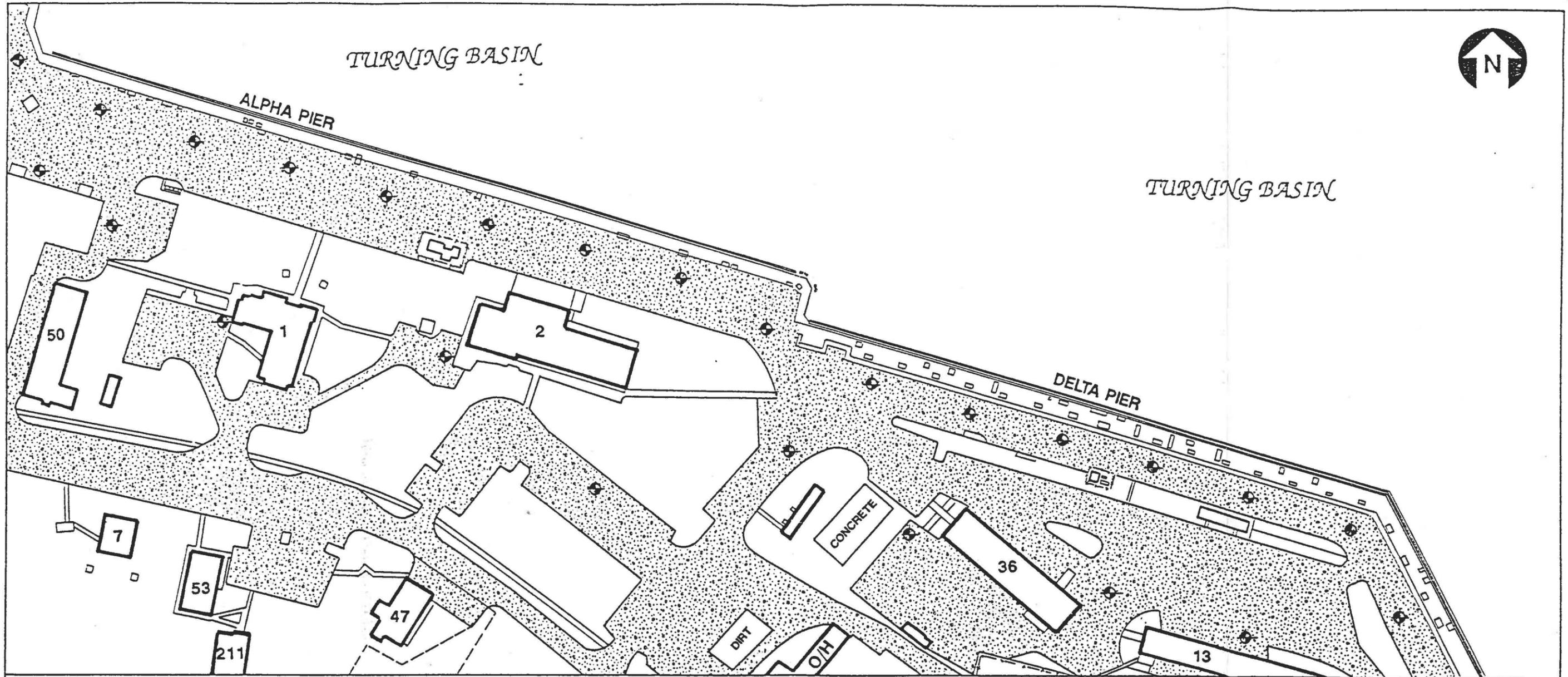
-  ASPHALT
-  PROPOSED TEMPORARY WELLPOINTS
-  PROPOSED SOIL GAS BORINGS

FIGURE 3
PROPOSED SOIL BORING AND
WELLPOINT LOCATIONS



CONTAMINATION
ASSESSMENT PLAN

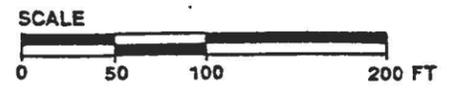
NAVAL STATION
MAYPORT, FLORIDA



LEGEND

-  ASPHALT
-  PROPOSED MONITORING WELL LOCATIONS

**FIGURE 4
PROPOSED MONITORING WELL
LOCATIONS**



**CONTAMINATION
ASSESSMENT PLAN**

**NAVAL STATION
MAYPORT, FLORIDA**

Up to 25 shallow monitoring wells will be installed at the site to a depth of approximately 15 feet bls (Figure 4). The monitoring wells will be constructed of 2-inch (inside diameter), schedule 40, flush-threaded, polyvinyl chloride (PVC) screen and casing. Screen length will be 10 feet with a slotted screen opening of 0.010 inch. At least 2 feet of screen will be placed above the water table to accommodate seasonal fluctuations of the water table. The screen will be surrounded with a quartz sand filter pack of 6/20 size (or of an acceptable equivalent) to at least 1 foot above the top of the screen. A 1-foot bentonite seal will be placed above the filter pack. The remaining annulus will be grouted with neat cement. A locking, watertight cap will be installed on each well. The monitoring wells will be finished below grade in a subsurface vault and protected with a metal manhole assembly and traffic bearing cover. A diagram of a typical monitoring well is illustrated in Figure 5.

Detailed information of monitoring well construction, lithologic descriptions, split-spoon samples, and other pertinent data will be graphically displayed in boring logs. These data will be included in a Contamination Assessment Report (CAR). Soils will be classified in accordance with the Unified Soil Classification System.

Upon completion, all newly installed monitoring wells will be developed by pumping or bailing until the purged water is clear and relatively free of sediment to assure a good hydraulic connection with the surrounding aquifer. Aquifer tests will be conducted to estimate the hydraulic properties of the water table aquifer at the site. Rising head slug tests will be performed on a minimum of three wells to collect data for calculating the hydraulic conductivities. Hydraulic conductivities will be calculated by using ABB-ES's in-house program AQTESOLV (Geraghty & Miller, Inc., 1989). A measuring point for groundwater elevation will be established at the top-of-casing of each well. A Florida-licensed professional surveyor will survey the horizontal and vertical coordinates for each of the monitoring wells into either the U.S. Geological Survey (USGS) North America Datum (NAD) '27 or the base coordinate grid system.

Groundwater samples will be collected from the new monitoring wells if they do not contain free-floating petroleum product. In addition to the monitoring well samples, three duplicate samples, two field blanks, two equipment blanks, and five trip blanks will be collected and analyzed. Groundwater samples will be collected with Teflon™ bailers.

All groundwater and soil samples will be shipped via overnight carrier to an approved analytical laboratory. Sampling and the subsequent analytical program will comply with the ABB-ES FDER-approved Comprehensive Quality Assurance Program Plan (CompQAPP). All groundwater and soil samples will be analyzed for the parameters listed in the FDER Chapter 17-770.600(8)(c), FAC, unknown petroleum analytical group.

During this field investigation, ABB-ES personnel and their subcontractors will coordinate efforts with site personnel to dispose of contaminated fluids and soils on site. No drums will be supplied by ABB-ES or the subcontractors. It will be the Navy's responsibility to dispose of any hazardous waste.

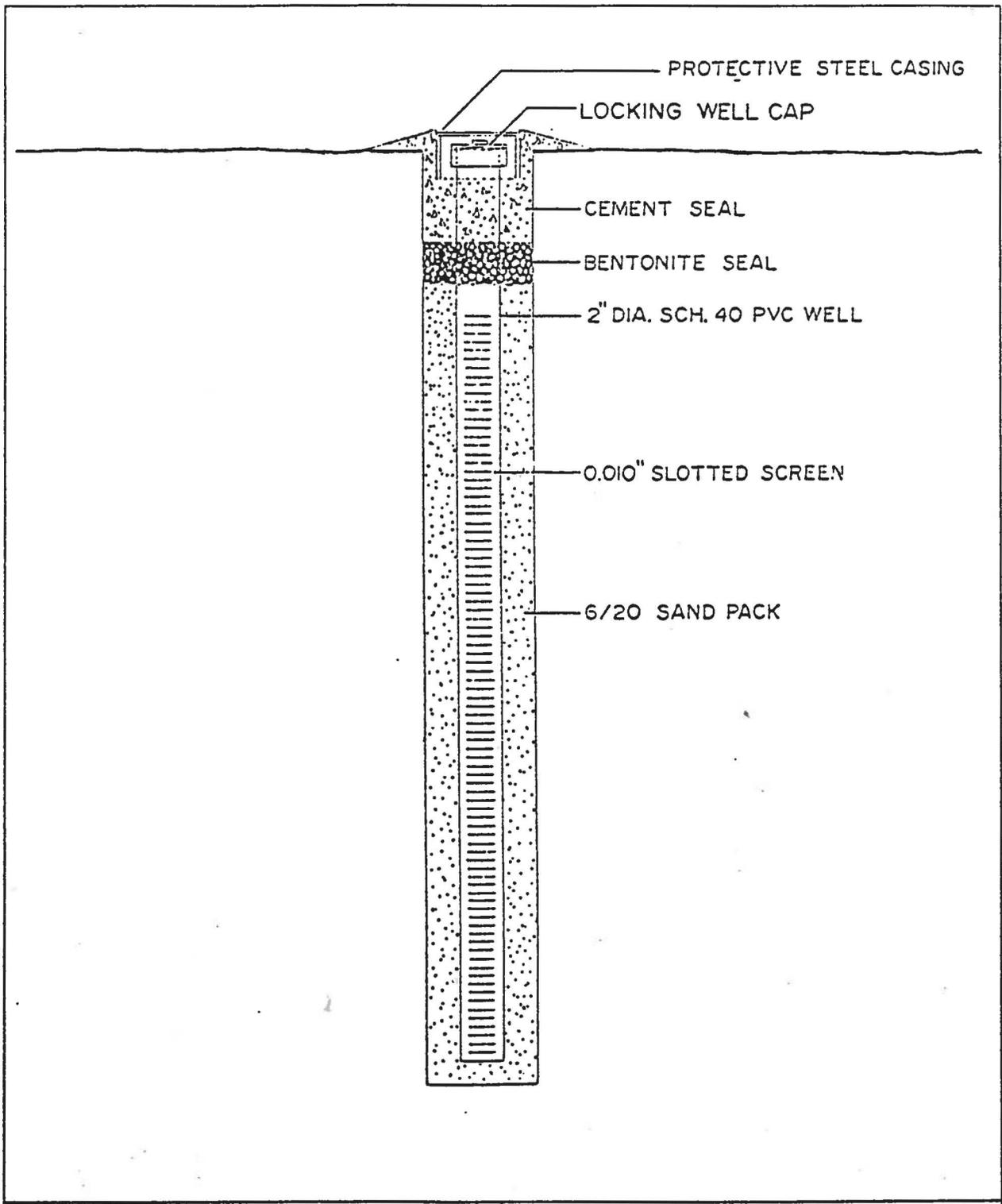


FIGURE 5
TYPICAL MONITORING WELL
INSTALLATION DETAIL



CONTAMINATION
ASSESSMENT PLAN
NAVAL STATION
MAYPORT, FLORIDA

4.2 PREPARATION OF REPORTS. Upon completion of the field investigations and receipt of the laboratory analytical results of the groundwater samples, draft, draft final, and final CARs will be prepared and submitted to SDIV and NS Mayport for review and approval. The reports will discuss site background information, site conditions, findings, and recommendations for the Alpha-Delta pier site at NS Mayport. Recommendations will also be made as to the need for any follow-up reports. Site location maps, locations of monitoring wells, groundwater contour maps, and contamination delineation maps will be included with the reports.

Based on the findings, conclusions, and recommendations of the final CARs; draft (90 percent), draft-final (100 percent), and final follow-up reports will be prepared for the Alpha-Delta pier site at NS Mayport. The reports shall be either No Further Action Proposals (NOFAPs), Monitoring Only (MO) Proposals, or Preliminary Remedial Action Plans (PRAPs).

For the purpose of costing the project, it will be assumed that a PRAP will be developed for Alpha-Delta pier site. The PRAP will include the following items:

- o summary sheet of the Contamination Assessment Report;
- o general discussion of the technical and economic feasibility of remediation alternatives and more detailed information on the most feasible remedial system;
- o general discussion of the rationale for the selected system;
- o comparison of contaminant levels found with existing State and U.S. Environmental Protection Agency (USEPA) cleanup criteria in tabular format;
- o disposition and expected contamination concentrations in any effluent from the proposed cleanup method;
- o cost estimates and schedules for the design, construction startup, and operation phases;
- o designation of monitoring wells and proposed methodology for verifying accomplishment of PRAP goals (cleanup levels);
- o general discussion of the treatment of contaminated soils; and
- o recommendations for conducting pilot studies and obtaining additional information.

The PRAP, as described herein, is not intended to fulfill the Remedial Action Plan (RAP) requirements of Chapter 17.770, FAC. The PRAP will compare as many as four remedial technologies for cleanup of both groundwater and soil, and the selected technology will be justified based on technical and economic feasibility. A conceptual design and rationale for the design will be provided for the most feasible remedial technology.

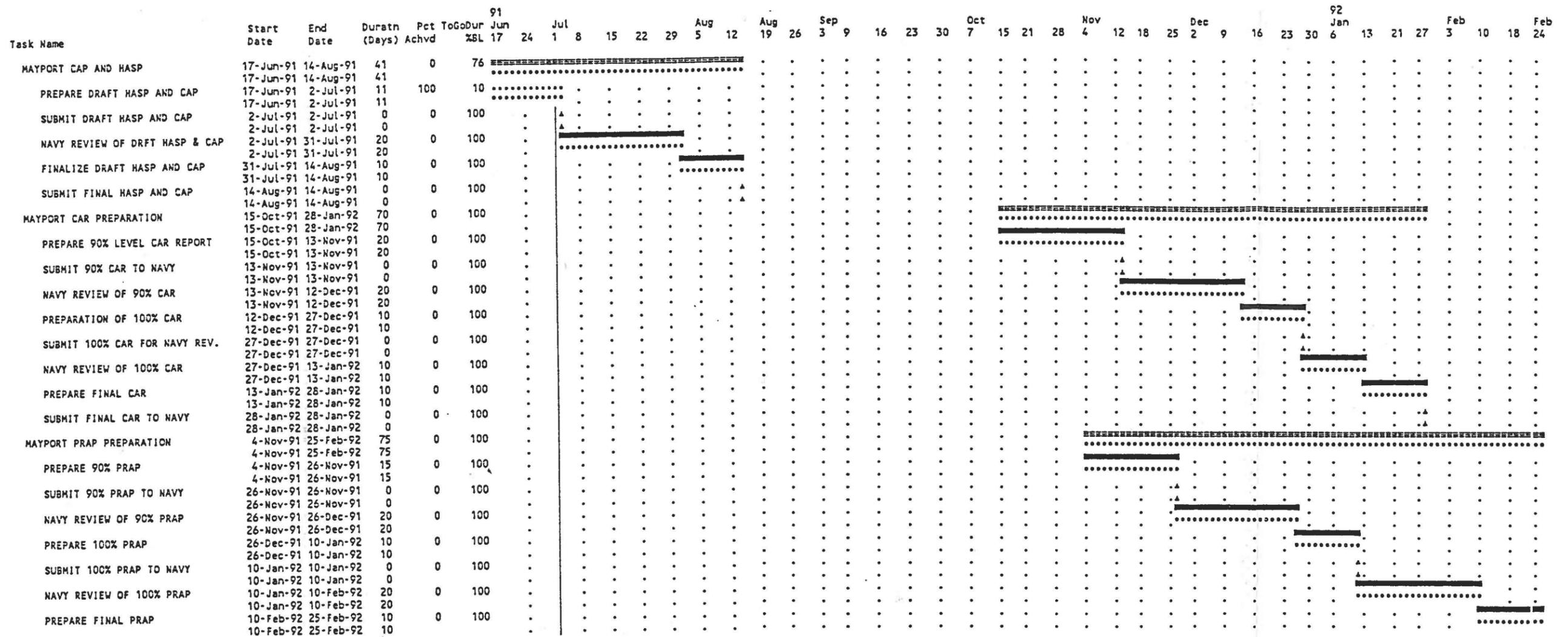
It is ABB-ES' understanding that Southern Division will develop performance specifications for those site remediation measures that are based on the PRAP and CAR for the Alpha-Delta pier site at NS Mayport. While these documents will provide some of the information necessary to develop performance specifications, neither document will be biddable. Additional site information that may be needed to develop the performance specifications but not included in this scope is as follows:

- o existing conditions site survey plans;
- o locations of existing utilities; and
- o location and availability of electricity.

5.0 SCHEDULE

A projected schedule to complete the Contamination Assessment field investigation program at the Alpha-Delta pier site at NS Mayport is approximately 5-1/2 weeks. This includes mobilization, drilling, sampling, surveying, aquifer testing, and demobilization. The field investigation work is scheduled to begin the week of August 26, 1991. Upon completion of the field investigation, approximately 3 weeks will be required before receipt of the laboratory analyses of the groundwater samples that were collected during the investigation. A 90% draft Contamination Assessment Report for the site will be prepared and submitted to SDIV by November 13, 1991. If time schedules for report review are followed, 90% draft follow-up reports have been scheduled to be delivered to SDIV by November 26, 1991. A Gantt Chart outlining the project schedule is presented as Figure 6.

SCHEDULE



LEGEND

[Solid bar] Detail Task [Dashed bar] Summary Task [Dotted bar] Baseline
 [Bar with dots] (Progress) [Bar with dashes] (Progress) [Two arrows] Conflict
 [Bar with gaps] (Slack) [Bar with dots] (Slack) [Bar with gap] Resource delay
 Progress shows Percent Achieved on Actual [Triangle] Milestone
 Scale: 8 hours per character

FIGURE 6
NAVAL STATION MAYPORT
ALPHA-DELTA PIER
GANTT CHART


CONTAMINATION ASSESSMENT PLAN
NAVAL STATION MAYPORT, FLORIDA

SITE-SPECIFIC HEALTH AND SAFETY PLAN

FOR

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

CTO NO.: 00016

Contract Number N62467-89-D-0317

Prepared by:

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AUGUST 1991

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Site Specific Health and Safety Plan

REFERENCES

The following chapters of the Comprehensive Long-term Environmental Action Navy (CLEAN) Program District I Generic Health and Safety Plan (HASP) are applicable for the work anticipated at the site:

- 2.0 AUTHORITY AND RESPONSIBILITY OF HEALTH AND SAFETY PERSONNEL
- 3.0 TRAINING PROGRAM
- 4.0 MEDICAL SURVEILLANCE PROGRAM
- 5.0 ENGINEERING CONTROLS
- 6.0 PERSONAL PROTECTIVE LEVEL DETERMINATION
- 7.0 MONITORING EQUIPMENT
- 8.0 ZONATION
- 9.0 WORK PRACTICES
- 10.0 CONFINED SPACE ENTRY PROCEDURES
- 11.0 EXCAVATION AND TRENCHING
- 12.0 TEMPERATURE EXTREMES
 - HEAT STRESS
 - COLD STRESS
- 13.0 DECONTAMINATION
- 14.0 EMERGENCY PLANNING
- 15.0 HEALTH AND SAFETY FORMS AND DATA SHEETS
 - HEALTH AND SAFETY AUDIT FORM
 - ACCIDENT REPORT FORM
 - HEALTH AND SAFETY OFFICER (HSO) CHECKLIST FOR FIELD OPERATIONS
 - MATERIAL SAFETY DATA SHEETS
 - LIQUI-NOX
 - ETHYL ALCOHOL (denatured)
 - TRISODIUM PHOSPHATE
 - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) POSTER
 - DAILY HEALTH AND SAFETY AUDIT FORM

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Site Specific Health and Safety Plan

REFERENCES (continued)

- ___ 16.0 RESPIRATORY PROTECTION PROGRAM
- ___ 17.0 OTHER
 - ___ ILLUMINATION
 - ___ SANITATION
 - ___ HEALTH AND SAFETY AUDIT PROCEDURES

1.0 GENERAL

1.1 SCOPE AND PURPOSE. This Health and Safety Plan (HASP) has been prepared in conformance with the Navy CLEAN Program District I (CLEAN) HASP and is intended to meet the requirements of 29 Code of Federal Regulations (CFR) 1910.120. As such, the HASP addresses those activities associated with field operations for this project. Compliance with this HASP is required for all ABB-ES personnel, contractor personnel, or third parties entering the site.

1.2 PROJECT PERSONNEL.

1.2.1 Project Manager The project manager (PM) is the individual with overall project management responsibilities. Those responsibilities as they relate to health and safety include provision for the development of this site-specific HASP, the necessary resources to meet requirements of this HASP, the coordination of staff assignments to ensure that personnel assigned to the project meet medical and training requirements, and the means and materials necessary to resolve any health and safety issues that are identified or that develop on the project.

1.2.2 General Site Supervisor The General Site Supervisor is either the PM or the PM's designee who is on-site and vested with the authority by the PM to carry out day-to-day site operations, including interfacing with the site Health and Safety Officer (HSO).

1.2.3 Health and Safety Officer The HSO for this project has been designated by the PM with concurrence of the Health and Safety Supervisor (HSS) or Health and Safety Manager (HSM). The HSO will have at least an indirect line of reporting to the HSM through the HSS for the duration of his/her assignment as project HSO. The HSO is responsible for developing and implementing this site-specific HASP in accordance with the CLEAN HASP. The HSO will investigate all accidents, illnesses, and incidents occurring on-site. The HSO will also conduct safety briefings and site-specific training for on-site personnel. As necessary, the HSO will accompany all U.S. Environmental Protection Agency (USEPA), Occupational Safety and Health Administration (OSHA), or other governmental agency personnel visiting an ABB-ES site in response to health and safety issues. The HSO, in consultation with the HSS or HSM, is responsible for updating and modifying this HASP as site or environmental conditions change.

1.3 TRAINING. Training is defined under the CLEAN HASP, and all personnel entering potentially contaminated areas of this site must meet the requirements of 29 CFR 1910.120. Personnel without the required training will not be permitted in any area with potential for exposure to toxic substances or harmful physical agents (i.e., downrange). Refer to Chapter 3.0 of the CLEAN HASP for further information.

1.4 MEDICAL SURVEILLANCE. All personnel entering potentially contaminated areas of this site will be medically qualified for site assignment through a medical surveillance program outlined in the CLEAN HASP. Personnel who have not received medical clearance will not be permitted in any area with potential for exposure to toxic substances or harmful physical agents (i.e., downrange). Refer to Chapter 4.0 of the CLEAN HASP for further information.

2.0 SITE CHARACTERIZATION AND ANALYSIS

2.1 SITE NAME, LOCATION, AND SIZE. The U.S. Naval Station (NS) at Mayport, Florida, is located about 15 miles east-northeast of downtown Jacksonville, Florida. The Naval Station was established in 1942 on approximately 700 acres of land. The Alpha-Delta Pier study area is an approximately 1,450 feet long by 100 feet wide pier located on the southwest side of the turning basin.

2.2 SITE HISTORY AND LAYOUT. The Alpha-Delta Pier area consists of sheet pile bulkheads with a predominately asphalt roadway cap. The source of the petroleum contamination is believed to be a pipeline system that transports waste oil, Diesel Fuel Marine (DFM), and JP-5 fuel. All pipelines are connected to the fuel farm.

During periods of rain, a sheen is in evidence at the discharge of storm sewers between Buildings No. 28 and 36. However, base personnel have been unable to adequately identify the origin of this contamination. In conjunction with this apparent indication, there are several locations along Alpha and Bravo pier that have shown indications of waste oil contamination when exposed during construction episodes. The DFM line, used for ship bunkering, is the suspect line with respect to this leakage. Sections of this line are over 25 years in age and are reported not to have cathodic protection at this time.

2.3 SCOPE OF WORK (WORK PLAN). ABB-ES will conduct a contamination assessment investigation at the Alpha-Delta Pier. The investigation will include a preliminary shallow soil gas and groundwater wellpoint study to collect soil gas and groundwater samples for screening on a portable gas chromatograph for petroleum constituents followed by the drilling and installation of monitoring wells and sampling of groundwater from the wells.

3.0 TASK ANALYSIS

3.1 TASK ONE.

3.1.1 Hazardous Substances The contaminants of concern known or suspected to be present on-site, along with any established exposure limits for those substances, are listed in Table 3-1.

3.1.2 Site Risks The following are the health hazards and safety hazards that are expected to be encountered at the site.

3.1.2.1 Health Hazards Contaminants to which personnel may be exposed are JP-5 jet fuel, waste oil, diesel fuel marine, and their constituents. The waste oil is water contaminated JP-5 and DFM. The primary constituents of JP-5 jet fuel and diesel fuel marine that represent potential health hazards are described below and summarized in Table 3-1.

BENZENE is a colorless liquid with a pleasant aromatic odor. It is a moderate irritant in small amounts both as a gas and as a liquid. If inhaled in large amounts it attacks the central nervous system, possibly resulting in coma and/or respiratory arrest. Chronic poisoning causes leukemia.

ETHYL BENZENE is a colorless aromatic liquid. It is a moderate skin irritant in gaseous form. Inhalation of high concentrations of the gas may cause temporary irritation of the nose, dizziness, and depression. The liquid form can blister the skin if not washed off immediately.

TOLUENE is a colorless liquid with a pleasant aromatic odor. It is a mild skin irritant. Inhalation of high concentrations of the gas can cause temporary smarting of the eyes or irritation of the respiratory system. If the liquid form is allowed to remain on the skin for a long period of time, smarting and reddening of the skin may occur. Ingestion or aspiration of the liquid causes depressed respiration and pulmonary edema, and can result in kidney or liver damage.

XYLENE is a colorless, liquid with a sweet odor. It is a moderate skin irritant. When present as a gas in high concentrations, it can cause temporary slight smarting of the eyes or irritation of the respiratory system, headache, and dizziness. The liquid form may cause smarting or reddening of the skin if not washed off immediately. If the liquid is aspirated into the lungs it can result in severe coughing, distress, and rapidly developing pulmonary edema. If ingested, nausea, vomiting, cramps, headache, and coma can occur and may be fatal. Ingestion may also result in kidney and liver damage.

POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs), for the purposes of this plan and study, include those listed as parameters for USEPA Method 610. Some of the more notable PAHs from this method include acenaphthene, anthracene, chrysene, fluorene, naphthalene, phenanthrene, and pyrene. Details of these compounds are listed in Section 4.0.

**Table 3-1
Contaminants of Concern**

Site Specific Health and Safety Plan
Naval Station
Mayport, Florida

Chemical	Approximate odor threshold (ppm)	Permissible exposure limits (ppm)	Threshold limit value (ppm)	Physical characteristics	Dermal toxicity	Remarks
Benzene	4.7	1	1	Colorless liquid, pleasant aromatic odor.	Moderate skin irritant.	Inhalation of large amounts attacks central nervous system (CNS); chronic poisoning causes leukemia.
Ethyl benzene	140	100	100	Colorless liquid, aromatic odor.	Moderate skin irritant.	Liquid blisters skin; inhalation results in dizziness, depression.
Toluene	0.17	100	100	Colorless liquid, pleasant aromatic odor.	Mild skin irritant.	Ingestion or aspiration can cause pulmonary edema, depressed respiration, and kidney and liver damage.
Xylene	0.05	100	100	Colorless liquid, aromatic odor.	Moderate skin irritant.	Inhalation causes headache and dizziness; vapors irritate eyes; can be fatal if ingested.
Naphthalene	-	10	10	Colorless to brown solid with an odor of mothballs.	Moderate skin irritant.	Inhalation causes headache and confusion; vapors irritate eyes.
Lead	-	-	-	Soft, ductile, gray, metal, soluble in water containing a weak acid.	-	Lead poisoning may cause fatigue, anemia, abdominal pains, and neurological damage.

Notes: ppm = parts per million.

All activities at this site will be conducted in unconfined areas. This will minimize the chances of exposure of on-site personnel to either high vapor concentrations or strong liquid concentrations of any of the substances described above.

3.1.2.2 Safety Hazards Safety hazards include those hazards to which personnel may be exposed that are unrelated to hazardous wastes. These include hazards such as heat stress, operation and presence around heavy equipment, lifting of objects, vehicle traffic, and snake bites. Extreme caution should be practiced by all personnel while conducting work around drill rigs, backhoes, and other heavy equipment. During hot days, personnel should take time to drink fluids and cool off to avoid overheating and symptoms related to heat stress.

Lifting of heavy objects should be done with caution. Personnel should assist one another with moving heavy objects or use the appropriate equipment to accomplish these tasks.

Power substations, powerlines, underground utilities, and underground pipelines are to be avoided during drilling operations. Necessary work permits for

activities at the Naval activities will be obtained from the Public Works Department or the appropriate department (e.g., fire department, etc.).

3.1.2.3 **Conclusions and Risk Assessment** Based on all of the available information (nature of the work, potential onsite chemicals and their properties, exposure limits, etc.), hazards associated with conducting the described field work are considered to be low, assuming appropriate health and safety practices are maintained.

3.1.3 Protective Measures The following are the protective measures that will be used at the site.

3.1.3.1 **Engineering Controls** Whenever needed, engineering controls (i.e., fans to blow volatilized chemicals away from the work area) will be used.

3.1.3.2 **Levels of Protection** A level D work uniform will be used at the site. Level D Protection should only be used when the atmosphere contains no known hazard, all potential airborne contaminants can be monitored for, and work functions preclude splash, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemical.

3.1.4 Monitoring It is intended that real time monitoring instrumentation will be used to monitor the work environment in order to ensure the appropriate level of protection for the site team.

3.1.4.1 **Air Sampling** To the extent feasible, the presence of airborne contaminants will be evaluated through the use of direct reading instrumentation. Information gathered will be used to ensure the adequacy of the levels of protection being used at the site, and may be used as the basis for upgrading or downgrading the levels of protection in conformance with action levels provided in this HASP and at the direction of the site HSO.

The following sampling equipment will be used at the site. Refer to Chapter 7.0 of the CLEAN HASP for information on the calibration and maintenance of the equipment.

1. Organic Vapor Analyzer (OVA)

If the OVA detects a steady measurable quantity of organic vapors greater than 5 parts per million (ppm; above background conditions) in the breathing zone, the field team will withdraw from the site until health and safety conditions at the site are reevaluated.

3.1.4.2 **Personal Monitoring** Personal monitoring will be undertaken to characterize the personal exposure of high risk employees to the hazardous substances they may encounter on-site. Personal monitoring will be conducted on a representative basis. Personnel who are represented by the sampling will be noted in field logs.

The following personal monitoring equipment will be used at the site. Refer to Chapter 7.0 of the CLEAN HASP for information on the maintenance and calibration of the equipment.

1. Thermoluminescent Dosimetry Body Badge

REFERENCES

- Causey, L.V., and Phelps, G.G., 1978, Availability and quality of water from shallow aquifers in Duval County, Florida: U.S. Geological Survey Water-Resources Investigations 78-92, 36 p.
- Fairchild, R.W., 1972, The shallow aquifer system in Duval County, Florida: Florida Bureau of Geology Report of Investigations No. 59, 50 p.
- Franks, B.J., 1980, The surficial aquifer at the U.S. Naval Station near Mayport, Florida: U.S. Geological Survey Open-File Report 80-765, 13 p.
- Geraghty and Miller, Inc., 1983, Hydrogeologic assessment and ground-water monitoring plan, U.S. Naval Station, Mayport, Florida.
- Geraghty and Miller, 1989, AQTESOLV, aquifer test design and analysis: Computer program version 1.00.
- Leve, G.W., 1968, The Floridan aquifer in northeast Florida: Groundwater, vol. 6, no. 2, p. 19-29.
- Spechler, R.M., 1982, Generalized configuration of the top of the limestone unit of the lower part of the surficial aquifer, Duval County, Florida: U.S. Geological Survey Water-Resources Investigations Open-File Report 82-336, 1 sheet.

4.0 DATA SHEETS

BENZENE

BNZ

Common Synonyms Benzol Benzole		Watery liquid Floats on water. Flammable, irritating vapor is produced. Freezing point is 42°F.	Colorless	Gasoline-like odor
Avoid contact with liquid and vapor. Keep people away. Wear goggles and self-contained breathing apparatus. Shut off ignition sources and call fire department. Stop discharge if possible. Stop spraying and use water spray to knock down vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.				
Fire		FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemical foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.		
Exposure		CALL FOR MEDICAL AID VAPOR Irritating to eyes, nose and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID Irritating to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected area with plenty of water. If in EYES, hold eyelids open and flush with plenty of water. If SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.		
Water Pollution		HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and waste officials. Notify operators of nearby water intakes.		
1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-high flammability. Restrict access.		2. LABEL 2.1 Category: Flammable liquid 2.2 Class: 3		
3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Aromatic Hydrocarbon 3.2 Formula: C ₆ H ₆ 3.3 IMDG/UN Designation: 3.2/1114 3.4 DOT ID No.: 1114 3.5 CAS Registry No.: 71-42-2		4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Aromatic, rather pleasant aromatic odor; characteristic odor		
5. HEALTH HAZARDS 5.1 Personal Protective Equipment: Hydrocarbon vapor canister, supplied air or a hose mask; hydrocarbon-insoluble rubber or plastic gloves; chemical goggles or face splash shield; hydrocarbon-insoluble apron such as neoprene. 5.2 Symptoms Following Exposure: Dizziness, exsitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction. Coma and possible death. 5.3 Treatment of Exposure: SKIN: flush with water followed by soap and water; remove contaminated clothing and wash skin. EYES: flush with plenty of water until irritation subsides. INHALATION: remove from exposure immediately. Call a physician. IF breathing is irregular or stopped, start resuscitation, administer oxygen. 5.4 Threshold Limit Value: 10 ppm 5.5 Short Term Inhalation Limit: 75 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 3; LD ₅₀ = 50 to 500 mg/kg 5.7 Late Toxicity: Leukemia 5.8 Vapor (Gas) Irritant Characteristics: If present in high concentrations, vapors may cause irritation of eyes or respiratory system. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smearing and reddening of the skin. 5.10 Odor Threshold: 4.58 ppm 5.11 IDLM Value: 2,000 ppm				

6. FIRE HAZARDS 6.1 Flash Point: 12°F C.C. 6.2 Flammable Limits in Air: 1.3%-7.5% 6.3 Fire Extinguishing Agents: Dry chemical, foam, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back 6.7 Ignition Temperature: 1057°F 6.8 Electrical Hazard: Class I, Group D 6.9 Burning Rate: 6.0 mm/min. 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available		10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U-V-W																																					
7. CHEMICAL REACTIVITY 7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 32		11. HAZARD CLASSIFICATIONS 11.1 Code of Federal Regulations: Flammable liquid 11.2 HAS Hazard Rating for Bulk Water Transportation: <table border="1"> <thead> <tr> <th>Category</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>Flre.....</td> <td>3</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td>Vapor irritant.....</td> <td>1</td> </tr> <tr> <td>Liquid or Solid Irritant.....</td> <td>1</td> </tr> <tr> <td>Poisons.....</td> <td>3</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td>Human Toxicity.....</td> <td>3</td> </tr> <tr> <td>Aquatic Toxicity.....</td> <td>1</td> </tr> <tr> <td>Aesthetic Effect.....</td> <td>3</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>Other Chemicals.....</td> <td>2</td> </tr> <tr> <td>Water.....</td> <td>1</td> </tr> <tr> <td>Self Reaction.....</td> <td>0</td> </tr> </tbody> </table> 11.3 NFPA Hazard Classification: <table border="1"> <thead> <tr> <th>Category</th> <th>Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue).....</td> <td>2</td> </tr> <tr> <td>Flammability (Red).....</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow).....</td> <td>0</td> </tr> </tbody> </table>		Category	Rating	Flre.....	3	Health		Vapor irritant.....	1	Liquid or Solid Irritant.....	1	Poisons.....	3	Water Pollution		Human Toxicity.....	3	Aquatic Toxicity.....	1	Aesthetic Effect.....	3	Reactivity		Other Chemicals.....	2	Water.....	1	Self Reaction.....	0	Category	Classification	Health Hazard (Blue).....	2	Flammability (Red).....	3	Reactivity (Yellow).....	0
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Reactivity (Yellow).....	0																																						
8. WATER POLLUTION 8.1 Aquatic Toxicity: 5 ppm/6 hr/minnow/lethal/distilled water 20 ppm/24 hr/sunfish/TL ₅₀ /tap water 8.2 Waterway Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 1.2 lb/lb, 10 days 8.4 Food Chain Concentration Potential: None		12. PHYSICAL AND CHEMICAL PROPERTIES 12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 78.11 12.3 Boiling Point at 1 atm: 176°F = 80.1°C = 353.3°K 12.4 Freezing Point: 42.0°F = 5.5°C = 278.7°K 12.5 Critical Temperature: 552.0°F = 295.5°C = 562.1°K 12.6 Critical Pressure: 710 psia = 48.3 atm = 4.89 MN/m ² 12.7 Specific Gravity: 0.879 at 20°C (liquid) 12.8 Liquid Surface Tension: 28.5 dynes/cm = 0.0285 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 35.0 dynes/cm = 0.035 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: 2.7 12.11 Ratio of Specific Heats of Vapor (Gas): 1.061 12.12 Latent Heat of Vaporization: 165 Btu/lb = 84.1 cal/g = 3.54 x 10 ⁴ J/kg 12.13 Heat of Combustion: -17,460 Btu/lb = -959E cal/g = -406.0 x 10 ⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: 30.45 cal/g 12.18 Limiting Value: Data not available 12.19 Reid Vapor Pressure: 3.22 psia																																					
9. SHIPPING INFORMATION 9.1 Grades of Purty: industrial pure99+% Thiophene-free99+% Nitration99+% Industrial 90%85+% Reagent95+% 9.2 Storage Temperature: Open 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-vacuum		NOTES																																					

o-CRESOL

CRO

<p>Common Synonyms</p> <p>p-Hydroxytoluene 2-Methylphenol o-Toluid 2-Cresol</p>	<p>Solid crystals or liquid. Colorless to yellow. Sweet, tarry odor.</p> <p>Sinks and mixes slowly with water.</p>
<p>Avoid contact with liquid or solid. Keep people away. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Stop discharge if possible. Call fire department. Notify local health and pollution control agencies. Isolate and remove discharged material.</p>	
<p>Fire</p>	<p>COMBUSTIBLE POISONOUS GASES MAY BE PRODUCED IN FIRE. Wear goggles and self-contained breathing apparatus. Extinguish with water fog, dry chemical, foam or carbon dioxide. Cool exposed containers with water.</p>
<p>Exposure</p>	<p>CALL FOR MEDICAL AID</p> <p>LIQUID OR SOLID Will burn skin and eyes. Poisonous if swallowed, inhaled or if skin is exposed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES: Hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting.</p>
<p>Water Pollution</p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes.</p> <p>Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-water contaminant, poison. Restrict access. Should be removed. Chemical and physical treatment.</p>	<p>2. LABEL</p> <p>2.1 Category: Corrosive 2.2 Class: 8</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Phenols, cresols 3.2 Formula: C₇H₈O 3.3 HMO/UN Designation: 6.1/2076 3.4 DOT ID No.: 2076 3.5 CAS Registry No.: 95-49-7</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Solid or liquid 4.2 Color: Colorless to yellow. 4.3 Odor: Phenolic, tarry</p>
<p style="text-align: center;">5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Chemical goggles or face shields, full protective clothing including boots and gloves, and respiratory protective apparatus. 5.2 Symptoms Following Exposure: INHALATION, INGESTION OR SKIN ABSORPTION: Central nervous system depression, muscular weakness, gastroenteric disturbances, convulsions and death. EYES: can cause burns. SKIN: Corrosive action may produce severe burns. 5.3 Treatment of Exposure: Call a doctor. INHALATION: Move to fresh air. Oxygen inhalation for respiratory distress. If needed, give artificial respiration. EYES: irrigate with copious quantities of running water for 15 min. Hold eyelids open. If physician not available irrigate for an additional 15 min. SKIN: Remove all contaminated clothing. Wash with soap and water until all odor is gone. Then wash contaminated areas with alcohol or glycerin. Then use more water. INGESTION: Drink large quantities of liquid (salt water, weak sodium bicarbonate solution, milk or gruel) followed by demulcent such as raw egg white or corn starch paste. Induce vomiting, if not spontaneous. Keep up until vomitus is free of Cresol odor. 5.4 Threshold Limit Value: 5 ppm. Skin absorption can contribute to exposure. 5.5 Short Term Inhalation Limits: 10 ppm. 5.6 Toxicity by Ingestion: Grade 3; LD₅₀ = 50 - 500 mg/kg. 5.7 Late Toxicity: May produce neoplasms or act as tumor promoters. Central nervous system damage, chronic gastritis, possible liver and kidney damage, and lesions of heart and brain. Dermatitis may result. 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Fairly severe skin irritant. May cause pain and second-degree burns after a few minutes contact. 5.10 Odor Threshold: 0.65 ppm detection in water, 0.26 ppm recognition in air. 5.11 IDLM Value: 250 ppm</p>	

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 172°F C.C. 6.2 Flammable Limits in Air: 1.35% 6.3 Fire Extinguishing Agents: Water may be used to blanket fire. CO₂, dry chemical, foam, water spray. 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion: Products: Emits highly toxic fumes. 6.6 Behavior in Fire: Vapors form explosive mixtures with air. 6.7 Ignition Temperature: 1110°F. 6.8 Electrical Hazard: Data not available 6.9 Burning Rate: Data not available 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) SS</p>
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Corrosives: Not pertinent 7.5 Polymerization: Will not occur. 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 21</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Corrosive material 11.2 NAS Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classifications: Category Classification Health Hazard (Blue) 3 Flammability (Red) 2 Reactivity (Yellow) 0</p>
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 49.1-15 ppm/24-96 hr/goldfish/TL₅₀/soft water 22.2-20.8 ppm/24-96 hr/bluegill/TL₅₀/soft water 18-13.4 ppm/24-96 hr/tathead minnow/TL₅₀/hard water 18-50 ppm/24-96 hr/puppy/TL₅₀/hard water 8.2 Waterfowl Toxicity: Chronic water fowl toxic limit is 25 ppm. 8.3 Biological Oxygen Demand (BOD): 1.64 lb/lb, 5 days. 8.4 Food Chain Concentration Potential: None</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Solid 12.2 Molecular Weight: 108.134. 12.3 Boiling Point at 1 atm: 376°F = 191°C = 464.2°K 12.4 Freezing Point: 88°F = 31°C = 304.2°K 12.5 Critical Temperature: 795.9°F = 424.4°C = 657.6°K 12.6 Critical Pressure: 726.0 psia = 49.4 atm = 5.00 MN/m² 12.7 Specific Gravity: 1.05 at 20°C. 12.8 Liquid Surface Tension: 40.3 dynes/cm = 0.0403 N/m at 20°C. 12.9 Liquid Water Intercritical Tension: 32.7 dynes/cm = 0.0327 N/m at 20°C. 12.10 Vapor (Gas) Specific Gravity: 3.72. 12.11 Ratio of Specific Heats of Vapor (Gas): > 1. 12.12 Latent Heat of Vaporization: 178.4 Btu/lb = 95.12 cal/g = 4.15 X 10⁴ J/kg. 12.13 Heat of Combustion: -1994 Btu/lb = -774 cal/g = -325 X 10³ J/kg. 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available</p>
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: 80-98% containing 2-20% phenol, 96.2% with 0.2% phenol and 0.8% meta and para isomers. 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open</p>	<p>NOTES</p>

ETHYL BENZENE

ETB

<p>Common Synonyms Phenylethane EB</p>	<p>Liquid</p>	<p>Colorless</p>	<p>Sweet, gasoline-like odor</p>
<p>Floats on water. Flammable, irritating vapor is produced.</p>			
<p>Avoid contact with liquid and vapor. Avoid direct eye contact. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Shut off ignition sources and call fire department. Stop discharge if possible. Stay downwind and use water spray to knock down vapor. Isolate and remove damaged material. Notify local health and pollution control agencies.</p>			
Fire	<p>FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Avoid contact with open flames, sparks, and rubber overclothing (including gloves). Extinguish with dry chemicals, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>		
Exposure	<p>VAPOR Irritating to eyes, nose and throat. If inhaled, will cause dizziness or difficult breathing. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Will burn skin and eyes. Irritating if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. If in EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water. DO NOT INDUCE VOMITING.</p>		
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Fouling to shorelines. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>		
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Mechanical containment Should be removed Chemical and physical treatment</p>		<p>2. LABEL 2.1 Category: Flammable liquid 2.2 Class: 3</p>	
<p>3. CHEMICAL DESIGNATIONS 3.1 CG Competibility Class: Aromatic hydrocarbon 3.2 Formula: C₈H₁₀ 3.3 IMO/IUN Designation: 3.3/1175 3.4 DOT ID No.: 1175 3.5 CAS Registry No.: 100-41-4</p>		<p>4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Aromatic</p>	
5. HEALTH HAZARDS			
<p>5.1 Personal Protective Equipment: Self-contained breathing apparatus; safety goggles. 5.2 Symptoms Following Exposure: Inhalation may cause irritation of nose, dizziness, depression. Moderate irritation of eye with corneal injury possible. Irritates skin and may cause blisters. 5.3 Treatment of Exposure: INHALATION: If ill effects occur, remove victim to fresh air, keep him warm and quiet, and get medical help promptly; if breathing stops, give artificial respiration. INGESTION: induce vomiting only upon physician's approval; material in lung may cause chemical pneumonitis. SKIN AND EYES: promptly flush with plenty of water (15 min. for eyes) and get medical attention; remove and wash contaminated clothing before reuse. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limit: 200 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 2; LD₅₀ = 0.5 to 5 g/kg (rat) 5.7 Late Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure. 5.10 Odor Threshold: 140 ppm 5.11 IDLH Value: 2,000 ppm</p>			

<p style="text-align: center;">6. FIRE HAZARDS</p> <p>6.1 Flash Point: 80°F O.C., 55°F C.C. 6.2 Flammable Limits in Air: 1.0%-6.7% 6.3 Fire Extinguishing Agents: Foam (most effective), water fog, carbon dioxide or dry chemical. 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion: Products: irritating vapors are generated when heated. 6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to the source of ignition and flash back. 6.7 Ignition Temperature: 560°F 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: 5.6 mm/min. 6.10 Adiabatic Flame Temperature: Data Not Available</p> <p style="text-align: right;"><i>(Continued)</i></p>	<p style="text-align: center;">10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U</p>																																				
<p style="text-align: center;">7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data Not Available 7.8 Reactivity Group: 32</p>	<p style="text-align: center;">11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Flammable liquid 11.2 NAS Hazard Rating for Bulk Water Transportation:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire</td> <td>3</td> </tr> <tr> <td colspan="2">Health</td> </tr> <tr> <td>Vapor Irritant</td> <td>2</td> </tr> <tr> <td>Liquid or Solid Irritant</td> <td>2</td> </tr> <tr> <td>Poisons</td> <td>2</td> </tr> <tr> <td colspan="2">Water Pollution</td> </tr> <tr> <td>Human Toxicity</td> <td>1</td> </tr> <tr> <td>Aquatic Toxicity</td> <td>3</td> </tr> <tr> <td>Aesthetic Effect</td> <td>2</td> </tr> <tr> <td colspan="2">Reactivity</td> </tr> <tr> <td>Other Chemicals</td> <td>1</td> </tr> <tr> <td>Water</td> <td>0</td> </tr> <tr> <td>Sol. Reaction</td> <td>0</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td>2</td> </tr> <tr> <td>Flammability (Red)</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>0</td> </tr> </tbody> </table>	Category	Rating	Fire	3	Health		Vapor Irritant	2	Liquid or Solid Irritant	2	Poisons	2	Water Pollution		Human Toxicity	1	Aquatic Toxicity	3	Aesthetic Effect	2	Reactivity		Other Chemicals	1	Water	0	Sol. Reaction	0	Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	0
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<p style="text-align: center;">8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 29 ppm/96 hr/bluegill/TL₅₀/fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 2.8% (theor.), 5 days 8.4 Food Chain Concentration Potential: None</p>	<p style="text-align: center;">12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 18°C and 1 atm: Liquid 12.2 Molecular Weight: 106.17 12.3 Boiling Point at 1 atm: 277.2°F = 136.2°C = 409.4°K 12.4 Freezing Point: -138°F = -95°C = 178°K 12.5 Critical Temperature: 651.0°F = 343.9°C = 617.1°K 12.6 Critical Pressure: 522 psia = 35.8 atm = 3.61 MN/m² 12.7 Specific Gravity: 0.867 at 20°C (liquid) 12.8 Liquid Surface Tension: 26.2 dynes/cm = 0.0262 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 35.46 dynes/cm = 0.03546 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.071 12.12 Latent Heat of Vaporization: 144 Btu/lb = 80.1 cal/g = 3.35 X 10⁴ J/kg 12.13 Heat of Combustion: -17,780 Btu/lb = -9677 cal/g = -413.5 X 10³ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.20 Heat of Fusion: Data Not Available 12.26 Limiting Value: Data Not Available 12.27 Reid Vapor Pressure: 0.4 psia</p>																																				
<p style="text-align: center;">9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Research grade: 99.96%; pure grade: 99.5%; technical grade: 99.0% 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) or pressure-vacuum</p>																																					
<p style="text-align: center;">6. FIRE HAZARDS (Continued)</p> <p>6.11 Stoichiometric Air to Fuel Ratio: Data Not Available 6.12 Flame Temperature: Data Not Available</p>																																					

ETHYLENE DIBROMIDE

EDB

<p>Common Synonyms</p> <p>1, 2-Dibromoethane Ethylene Bromide Bromolene sym-Dibromoethane Dow-Tume 40, W-10, W-1E, W-4E Glycol dibromide</p>		<p>Liquid</p> <p>Sinks in water. Poisonous vapor is produced. Freezing point is 50°F.</p>		<p>Colorless</p>		<p>Sweet odor</p>																																							
<p>Stop discharge if possible. Keep people away. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>																																													
<p>Fire</p>		<p>Not flammable. POISONOUS GASES ARE PRODUCED WHEN HEATED. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Cool exposed containers with water.</p>																																											
<p>Exposure</p>		<p>CALL FOR MEDICAL AID</p> <p>VAPOR POISONOUS IF INHALED. Irritating to eyes, nose and throat. Move to "fresh" air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Irritating to skin and eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES: Hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.</p>																																											
<p>Water Pollution</p>		<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>																																											
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Should be removed. Chemical and physical treatment.</p>				<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>																																									
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Competibility Class: Halogenated hydrocarbon 3.2 Formula: BrCH₂CH₂Br 3.3 IMDG/UN Designation: 6.1/1805 3.4 DOT ID No.: 1805 3.5 CAS Registry No.: 106-93-4</p>				<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Mildly sweet, like chloroform</p>																																									
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Canister type mask or self-contained air mask; neoprene gloves; chemical safety goggles. 5.2 Symptoms Following Exposure: Local inflammation, blisters and ulcers on skin; irritation in lungs and organic injury to liver and kidneys; may be absorbed through skin. 5.3 Treatment of Exposure: Remove from exposure. Remove contaminated clothing. Wash skin with soap and water. Flush eyes with plenty of water. Consult physician. 5.4 Threshold Limit Value: 2 ppm 5.5 Short Term Inhalation Limit: 50 ppm for 5 min. 5.6 Toxicity by Ingestion: Grade 3; LD₅₀ = 50 to 500 mg/kg 5.7 Late Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Odor Threshold: Data not available 5.11 IDLH Value: 400 ppm</p>																																													
<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: Not flammable 6.2 Flammable Limits in Air: Not flammable 6.3 Fire Extinguishing Agents: Not pertinent 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion Products: Decomposition gases are toxic and irritating. 6.6 Behavior in Fire: Decomposes into toxic irritating gases. Reacts with hot metals such as aluminum and magnesium. 6.7 Ignition Temperature: Not flammable 6.8 Electrical Hazards: Not pertinent 6.9 Burning Rate: Not flammable 6.10 Adiabatic Flame Temperature: Data Not Available 6.11 Stoichiometric Air to Fuel Ratio: Data Not Available 6.12 Flame Temperature: Data Not Available</p>																																													
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data Not Available 7.8 Reactivity Group: 36</p>																																													
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 18 mg/l/48 hr/bluegill/fresh water 8.2 Waterflow Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: None</p>																																													
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Commercial 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-vacuum</p>																																													
<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X</p>																																													
<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: OWM-A 11.2 NAS Hazard Rating for Bulk Water Transportation:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: right;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire.....</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td> Vapor Irritant.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td> Liquid or Solid Irritant.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td> Poisons.....</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td> Human Toxicity.....</td> <td style="text-align: right;">3</td> </tr> <tr> <td> Aquatic Toxicity.....</td> <td style="text-align: right;">3</td> </tr> <tr> <td> Aesthetic Effect.....</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td> Other Chemicals.....</td> <td style="text-align: right;">1</td> </tr> <tr> <td> Water.....</td> <td style="text-align: right;">0</td> </tr> <tr> <td> Salt Reaction.....</td> <td style="text-align: right;">0</td> </tr> <tr> <td>11.3 NFPA Hazard Classification:</td> <td></td> </tr> <tr> <td> Category.....</td> <td style="text-align: right;">Classification</td> </tr> <tr> <td> Health Hazard (Blue).....</td> <td style="text-align: right;">3</td> </tr> <tr> <td> Flammability (Red).....</td> <td style="text-align: right;">0</td> </tr> <tr> <td> Reactivity (Yellow).....</td> <td style="text-align: right;">0</td> </tr> </tbody> </table>								Category	Rating	Fire.....	0	Health		Vapor Irritant.....	1	Liquid or Solid Irritant.....	1	Poisons.....	3	Water Pollution		Human Toxicity.....	3	Aquatic Toxicity.....	3	Aesthetic Effect.....	2	Reactivity		Other Chemicals.....	1	Water.....	0	Salt Reaction.....	0	11.3 NFPA Hazard Classification:		Category.....	Classification	Health Hazard (Blue).....	3	Flammability (Red).....	0	Reactivity (Yellow).....	0
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<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 187.86 12.3 Boiling Point at 1 atm: 266°F = 121°C = 404°K 12.4 Freezing Point: 49.8°F = 9.8°C = 283.0°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 2.180 at 20°C (liquid) 12.8 Liquid Surface Tension: 36.75 dynes/cm = 0.03675 N/m at 20°C 12.9 Liquid Water Intercalate Tension: 36.54 dynes/cm = 0.03654 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.100 12.12 Latent Heat of Vaporization: 82.1 Btu/lb = 46.6 cal/g = 1.91 X 10⁴ J/kg 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 13.76 cal/g 12.26 Limiting Value: Data Not Available 12.27 Reid Vapor Pressure: 0.4 psia</p>																																													
<p>NOTES</p>																																													

TETRAETHYL LEAD

TEL

<p>Common Synonyms TEL Lead tetraethyl</p>	<p>Dily liquid Colorless, but generally dyed red Fruity odor</p> <p>Sinks in water. Poisonous, flammable vapor is produced.</p>
<p>AVOID CONTACT WITH LIQUID AND VAPOR. Keep people away. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Stop discharge if possible. Call fire department. Stay upwind and use water spray to "knock down" vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>	
<p style="text-align: center;">Fire</p>	<p>Combustible. POISONOUS GASES ARE PRODUCED IN FIRE. Containers may explode in fire. Vapor may explode if ignited in an enclosed area. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Combat fires from behind barrier or protected location. Flood discharge area with water. Extinguish with water, dry chemical, foam, or carbon dioxide. Cool exposed containers with water.</p>
<p style="text-align: center;">Exposure</p>	<p>CALL FOR MEDICAL AID</p> <p>VAPOR POISONOUS IF INHALED OR IF SKIN IS EXPOSED. Irritating to eyes. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Will burn eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES: Hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p>
<p style="text-align: center;">Water Pollution</p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>
<p style="text-align: center;">1. RESPONSE TO DISCHARGE (See Response Methods Handbook)</p> <p>Issue warning-poison, water contaminant Restrict access Should be removed Chemical and physical treatment</p>	<p style="text-align: center;">2. LABEL</p> <p>2.1 Category: Poison 2.2 Class: 6</p>
<p style="text-align: center;">3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Not listed 3.2 Formula: Pb(C₂H₅)₄ 3.3 IMDG/UN Designation: 6.1/1649 3.4 DOT ID No.: 1649 3.5 CAS Registry No.: 75-00-2</p>	<p style="text-align: center;">4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Dyed red or other distinctive color. 4.3 Odor: Sweet</p>
<p style="text-align: center;">5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Organic vapor type canister face mask for short periods; air line type for longer periods; neoprene-coated, liquid-proof gloves; protective goggles or face shield; white or light-colored clothing; rubber shoes or boots.</p> <p>5.2 Symptoms Following Exposure: Increased urinary output of lead. If a large degree of absorption from inhalation or skin contact, may cause anemia, excitability, delirium, coma and death. Do not confuse with inorganic lead.</p> <p>5.3 Treatment of Exposure: Remove victim from contaminated area and consult physician immediately. INGESTION: induce vomiting. SKIN: wash immediately with kerosene or similar petroleum distillate followed by soap and water.</p> <p>5.4 Threshold Limit Value: 0.1 mg/m³ 5.5 Short Term Inhalation Limit: 0.15 mg Pb/m³ for 30 min. 5.6 Toxicity by Ingestion: Oral rat LD₅₀ = 17 mg/kg 5.7 Lethal Toxicity: Lead poisoning 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Causes smarting of the skin and first-degree burns on short exposure; may cause secondary burns on long exposure. 5.10 Odor Threshold: Data not available 5.11 IDLM Value: 40 mg/m³</p>	

<p style="text-align: center;">6. FIRE HAZARDS</p> <p>6.1 Flash Point: 200°F C.C.; 165°F D.C. 6.2 Flammable Limits in Air: - Data not available 6.3 Fire Extinguishing Agents: Water, foam, dry chemical, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion Products: Toxic gases are generated in fires. 6.6 Behavior in Fire: May explode in fires. 6.7 Ignition Temperature: Decomposes above 230°F 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Data not available 6.10 Adiabatic Flame Temperature: Data not available</p> <p style="text-align: right;"><i>(Continued)</i></p>	<p style="text-align: center;">10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-X-Y</p> <p style="text-align: center;">11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Poison, B 11.2 NAS Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health hazard (Blue)</td> <td>3</td> </tr> <tr> <td>Flammability (Red)</td> <td>2</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>3</td> </tr> </tbody> </table>	Category	Classification	Health hazard (Blue)	3	Flammability (Red)	2	Reactivity (Yellow)	3
Category	Classification								
Health hazard (Blue)	3								
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Reactivity (Yellow)	3								
<p style="text-align: center;">7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: Rust and some metals cause decomposition. 7.3 Stability During Transport: Stable below 230°F. At higher temperatures, may detonate or explode when confined. 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available</p>	<p style="text-align: center;">12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 18°C and 1 atm: Liquid 12.2 Molecular Weight: 325.44 12.3 Boiling Point at 1 atm: Decomposes 12.4 Freezing Point: -215°F = -137°C = 136°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.833 at 20°C (liquid) 12.8 Liquid Surface Tension: 28.5 dynes/cm = 0.0285 N/m at (est.) 25°C 12.9 Liquid Water Interfacial Tension: (est.) 40 dynes/cm = 0.04 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: (est.) -7,870 Btu/lb = -4,380 cal/g = -183 X 10³ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available</p>								
<p style="text-align: center;">8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 0.20 mg/l/96 hr/bluegill/TL₅₀/fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: Data not available</p>	<p style="text-align: center;">9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Technical 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-vacuum</p>								
<p style="text-align: center;">6. FIRE HAZARDS (Continued)</p> <p>6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>									

TOLUENE

TOL

<p>Common Synonyms</p> <p>Toluol Methylbenzene Methylbenzol</p>		<p>Water Solub</p> <p>Floats on water. Flammable, irritating vapor is produced.</p>	<p>Colorless</p>	<p>Pleasant odor</p>
<p>Stop discharge if possible. Keep people away. Shut off ignition sources and call fire department. Stay upwind and use water spray to "knock down" vapor. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>				
<p>Fire</p>		<p>FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemical foam, or carbon dioxide. Water may be ineffective or fire. Cool exposed containers with water.</p>		
<p>Exposure</p>		<p>CALL FOR MEDICAL AID</p> <p>VAPOR Irritating to eyes, nose and throat. If inhaled, will cause nausea, vomiting, headache, dizziness, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing difficult, give oxygen.</p> <p>LIQUID Irritating to skin and eyes. If swallowed, will cause nausea, vomiting or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>		
<p>Water Pollution</p>		<p>Dangerous to aquatic life in high concentrations. Fouling to shorelines. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>		
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-high flammability Evacuate area</p>		<p>2. LABEL</p> <p>2.1 Category: Flammable liquid 2.2 Class: 3</p>		
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Aromatic hydrocarbon 3.2 Formula: C₇H₈ 3.3 IMD/UN Designation: 2.2/1264 3.4 DOT ID No.: 1264 3.5 CAS Registry No.: 106-86-3</p>		<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Pungent; aromatic, benzene-like; distinct, pleasant</p>		
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Air-supplied mask; goggles or face shield; plastic gloves. 5.2 Symptoms Following Exposure: Vapors irritate eyes and upper respiratory tract; cause dizziness, headache, anesthesia, respiratory arrest. Liquid irritates eyes and causes drying of skin. If aspirated, causes coughing, gagging, distress, and rapidly developing pulmonary edema. If ingested causes vomiting, griping, diarrhea, depressed respiration. 5.3 Treatment of Exposure: INHALATION: remove to fresh air, give artificial respiration and oxygen if needed; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limit: 600 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 2; LD₅₀ = 0.5 to 5 g/kg 5.7 Late Toxicity: Kidney and liver damage may follow ingestion. 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Odor Threshold: 0.17 ppm 5.11 IDLH Value: 2,000 ppm</p>				

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 40°F C.C.; 55°F O.G. 6.2 Flammable Limits in Air: 1.27%-7% 6.3 Fire Extinguishing Agents: Carbon dioxide or dry chemical for small fires, ordinary foam for large fires. 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Vapor is heavier than air and may travel a considerable distance to a source of ignition and flash back. 6.7 Ignition Temperature: 987°F 6.8 Electrical Hazard: Class I, Group D 6.9 Burning Rate: 5.7 mm/min. 6.10 Adiabatic Flame Temperature: Data not available</p> <p style="text-align: right;">(Continued)</p>		<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U</p>																																					
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 32</p>		<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Flammable liquid 11.2 NFPA Hazard Rating for Bulk Water Transportation:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>Fire</td> <td>3</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td>Vapor Irritant</td> <td>1</td> </tr> <tr> <td>Liquid or Solid Irritant</td> <td>1</td> </tr> <tr> <td>Poisons</td> <td>2</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td>Human Toxicity</td> <td>1</td> </tr> <tr> <td>Aquatic Toxicity</td> <td>3</td> </tr> <tr> <td>Aesthetic Effect</td> <td>2</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>Other Chemicals</td> <td>1</td> </tr> <tr> <td>Water</td> <td>0</td> </tr> <tr> <td>Self Reaction</td> <td>0</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification:</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td>2</td> </tr> <tr> <td>Flammability (Red)</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>0</td> </tr> </tbody> </table>		Category	Rating	Fire	3	Health		Vapor Irritant	1	Liquid or Solid Irritant	1	Poisons	2	Water Pollution		Human Toxicity	1	Aquatic Toxicity	3	Aesthetic Effect	2	Reactivity		Other Chemicals	1	Water	0	Self Reaction	0	Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	0
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<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 1180 mg/l/96 hr/sunfish/TL₅₀/fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0%, 5 days, 32% (mean), 8 days 8.4 Food Chain Concentration Potential: None</p>		<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 92.14 12.3 Boiling Point at 1 atm: 231.1°F = 110.6°C = 383.8°K 12.4 Freezing Point: -139°F = -95.0°C = 178.2°K 12.5 Critical Temperature: 605.4°F = 318.2°C = 591.8°K 12.6 Critical Pressure: 596.1 psi = 40.55 atm = 4.108 MN/m² 12.7 Specific Gravity: 0.867 at 20°C (liquid) 12.8 Liquid Surface Tension: 25.0 dynes/cm = 0.0290 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 36.1 dynes/cm = 0.0361 N/m at 25°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.089 12.12 Latent Heat of Vaporization: 155 Btu/lb = 86.1 cal/g = 3.61 X 10⁴ J/kg 12.13 Heat of Combustion: -17,430 Btu/lb = -9686 cal/g = -405.5 X 10⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 17.17 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: 1.1 psi</p>																																					
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Research, reagent, industrial: 99.8 + %; industrial: contains 84 + %, with 5% toluene and small amounts of benzene and nonaromatic hydrocarbons; 90/120: less pure than industrial. 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) or pressure-vacuum</p>		<p>6. FIRE HAZARDS (Continued)</p> <p>6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>																																					

m-XYLENE

XL M

Common Synonyms 3-Dimethylbenzene <i>m</i> -Xylol		Watery liquid	Colorless	Sweet odor
Floats on water. Flammable, irritating vapor is produced.				
Stop discharge if possible. Keep people away. Call fire department. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.				
Fire		FLAMMABLE Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear self-contained breathing apparatus. Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective or fire. Cool exposed containers with water.		
Exposure		CALL FOR MEDICAL AID. VAPOR Irritating to eyes, nose, and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped give artificial respiration. If breathing is difficult give oxygen. LIQUID Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.		
Water Pollution		HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Floating to shorelines. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.		
1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-high flammability. Evacuate area. Should be removed. Chemical and physical treatment.		2. LABEL 2.1 Category: Flammable liquid 2.2 Class: 3		
3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Aromatic hydrocarbon 3.2 Formula: m-C ₆ H ₄ (CH ₃) ₂ 3.3 IMO/UN Designation: 3.2/1307 3.4 DOT ID No.: 1307 3.5 CAS Registry No.: 106-36-3		4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Like benzene, characteristic aromatic		
5. HEALTH HAZARDS				
5.1 Personal Protective Equipment: Approved canister or air-supplied mask; goggles or face shield; plastic gloves and boots. 5.2 Symptoms Following Exposure: Vapors cause headache and dizziness. Liquid irritates eyes and skin. If taken into lungs, causes severe coughing, distress, and rapidly developing pulmonary edema. If ingested, causes nausea, vomiting, cramps, headache, and coma; can be fatal. Kidney and liver damage can occur. 5.3 Treatment of Exposure: INHALATION: remove to fresh air; administer artificial respiration and oxygen if required; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limit: 300 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 3; LD ₅₀ = 50 to 500 g/kg 5.7 Late Toxicity: Kidney and liver damage. 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 5.10 Odor Threshold: 0.05 ppm 5.11 IDLH Value: 10,000 ppm				

6. FIRE HAZARDS 6.1 Flash Point: 64°F C.C. 6.2 Flammable Limits in Air: 1.1%-6.4% 6.3 Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective. 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. 6.7 Ignition Temperature: 966°F 6.8 Electrical Hazard: Class I, Group D 6.9 Burning Rate: 5.6 mm/min. 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available		10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U																																					
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8. WATER POLLUTION 8.1 Aquatic Toxicity: 22 ppm/96 hr/bluegill/TL ₅₀ /fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0 lb/lb, 5 days; 0% (theor.), 8 days 8.4 Food Chain Concentration Potential: Data not available		12. PHYSICAL AND CHEMICAL PROPERTIES 12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 106.16 12.3 Boiling Point at 1 atm: 265.4°F = 131.9°C = 405.1°K 12.4 Freezing Point: -54.2°F = -47.9°C = 225.2°K 12.5 Critical Temperature: 650.8°F = 343.8°C = 617.0°K 12.6 Critical Pressure: 513.8 atm = 34.95 psia = 3.540 MN/m ² 12.7 Specific Gravity: 0.864 at 20°C (liquid) 12.8 Liquid Surface Tension: 29.8 dynes/cm = 0.0298 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 36.4 dynes/cm = 0.0364 N/m at 30°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.071 12.12 Latent Heat of Vaporization: 147 Btu/lb = 81.8 cal/g = 3.43 X 10 ³ J/kg 12.13 Heat of Combustion: -17,554 Btu/lb = -9752.4 cal/g = -406.31 X 10 ³ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 26.01 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: 0.34 psia																																					
9. SHIPPING INFORMATION 9.1 Grades or Purities: Research: 99.99%; Pure: 99.9%; Technical: 95.2% 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) or pressure-relief		NOTES																																					

Diesel Oil (fuel oil No. 2)

Physical and Chemical Description: Diesel oil is a flammable, slightly viscous brown liquid obtained from the distillation of crude petroleum. Diesel oil is a mixture of hydrocarbons, predominately unbranched alkanes of 10 to 16 carbon atoms with smaller amounts of aromatic and polynuclear aromatic hydrocarbons (PAHs). Diesel oil floats on water, having a specific gravity of less than 1.

Uses: Diesel oil is used as fuel for trucks, ships, and trains.

Toxicity: Because of their water solubility and carcinogenicity, benzene and PAHs are the chemicals of health concern in diesel oil. Benzene, found in trace amounts in diesel oil, is known to cause leukemia, a cancer of the blood-forming cells. PAHs as a class (1 to 10 percent in diesel) are considered to be carcinogenic to a number of animal species. Benzo(a)pyrene is one of the most commonly found and carcinogenic PAHs. The alkanes of 10 to 16 carbon atoms, which make up the bulk of diesel oil, are of less concern due to their very low water solubility and low toxicity.

Concentration Guidelines and Standards: The maximum tolerable concentration for diesel oil in drinking water is 100 micrograms per liter ($\mu\text{g}/\text{l}$), due to organoleptic (taste and smell) considerations. The USEPA Office of Drinking Water recommends that the short-term concentrations of PAHs in drinking water not exceed 25 $\mu\text{g}/\text{l}$. This is the 7-day, suggested, no adverse response level (SNARL) and does not take into account the long-term cancer risk. These concentrations should be tolerated only in emergency situations where no other higher quality water source is available.

Naphthalene (C_{10}H_8)

Physical and Chemical Description: Naphthalene is a white crystalline solid with a characteristic "moth ball" odor. Naphthalene is more dense than water, with a specific gravity of 1.145, and has a solubility of 30,000 to 40,000 $\mu\text{g}/\text{l}$ at 25 °C. It melts at 80 °C but will sublime (volatilize from a solid) at room temperature. Naphthalene is considered a polynuclear aromatic hydrocarbon (PAH).

Uses: Naphthalene is an intermediate in dye production and the formation of solvents, lubricants, and motor fuels. It is used directly as a moth repellent.

Toxicity: Naphthalene may be absorbed by inhalation, ingestion, or skin or eye contact. Chronic exposure can cause cataracts, kidney disease, and red blood cell breakdown, especially in infants and individuals deficient in the enzyme G6PD. Naphthalene has been shown to be nonmutagenic and noncarcinogenic.

Classification: Hazardous Substance (USEPA)
Hazardous Waste (USEPA)
Priority Toxic Pollutant (USEPA)

Persistence: Naphthalene can oxidize in the presence of light and air, 50 percent after 14 days in one study. Microbial degradation has also been demonstrated in the laboratory in solutions as concentrated as 3.3 $\mu\text{g}/\text{l}$. Little breakdown is expected, however, under the dark, anaerobic conditions characteristic of in-situ groundwater.

Phenanthrene (C₁₄H₁₀)

Physical and Chemical Description: Phenanthrene is a colorless, monoclinic crystal soluble in water (1,000 to 1,300 µg/l at 25 °C) and has a specific gravity of 1.179. Phenanthrene is a PAH.

Uses: Phenanthrene is used in dyes and explosives and is a natural constituent of coal tar and of diesel oil (0.35 percent).

Toxicity: Phenanthrene has been identified as a mild allergen and human dermal photosensitizer. Limited acute and chronic animal experiments show it to be of low to moderate toxicity.

Classification: none

Fluorene (C₁₃H₁₀)

Physical and Chemical Description: Fluorene is a combustible, white solid having a density of 1.20 and a water solubility of 1,980 µg/l.

Uses: Fluorene is used in the manufacture of dyestuffs.

Toxicity: Little specific information is available about the toxicity of fluorene but it is a polynuclear aromatic hydrocarbon (PAH), a group that contains known human carcinogens.

Classification: none

5.0 SITE CONTROL

5.1 ZONATION. Due to the nature of the work (multiple soil borings and monitoring well sampling throughout the study area) and the properties of the potential chemicals found onsite, typical exclusion, contamination reduction, and support zones are not necessary or practical at all locations. Therefore, where appropriate, a "floating" exclusion zone in the perimeter of the sampling site will be established to eliminate access to the area by individuals not working on the project or involved in the assessment work. The perimeter will be at least 20 feet in radius and moved accordingly as the assessment points are moved.

5.2 COMMUNICATIONS. When radio communication is not used, the following air horn signals will be employed:

HELP	three short blasts	(. . .)
EVACUATION	three long blasts	(_ _ _)
ALL CLEAR	alternating long and short blasts	(_ . _ .)

5.3 WORK PRACTICES. General work practices to be used during ABB-ES projects are described in Chapter 9.0 of the CLEAN HASP. Work at the site will be conducted according to these established protocol and guidelines for the safety and health of all involved. Specific work practices necessary for this project or those that are of significant concern are described as follows.

- o Work and sampling will be conducted in Level D clothing and equipment.

6.0 DECONTAMINATION AND DISPOSAL

All personnel and/or equipment leaving contaminated areas of the site will be subject to decontamination, which will take place in the contamination reduction zone. General decontamination practices used during ABB-ES projects are described in Chapter 13.0 of the CLEAN HASP.

6.1 PERSONNEL DECONTAMINATION. All personnel leaving the study area are subject to decontamination (as necessary). The decontamination procedure required will be determined by the nature and level of contamination found at the sites. At a minimum, site personnel will remove loose soils from boots and clothing before leaving the site. More thorough decontamination procedures will be observed as dictated by site conditions. These procedures are described in Chapter 13.0 of the CLEAN HASP.

6.1.1 Small Equipment Decontamination Small equipment will be protected from contamination as much as possible by keeping the equipment covered when at the site and placing the equipment on plastic sheeting, not the ground. Sampling equipment used at the site will be used only once or will be field cleaned between samples with soapy water (Alconox), rinsed with clean water, rinsed with an approved Quality Assurance/Quality Control solvent, and final rinsed with organic free water.

6.1.2 Heavy Equipment Decontamination Drilling equipment will be protected from contamination as much as possible by placing the equipment on plastic sheeting, not the ground. The drill rig and associated drilling equipment will be cleaned with high pressure water or high pressure steam followed by a soap and water wash and rinse. Loose material will be removed by brush. The person performing this activity will be at the level of protection used during the field investigation.

6.2 COLLECTION AND DISPOSAL OF DECONTAMINATION PRODUCTS. All disposable protective gear, decontamination fluids (for both personnel and equipment), and other disposable materials will be disposed of at the site. Decontamination fluids (e.g., isopropanol from split spoons and groundwater sampling pumps) will be stored in amber glass bottles. Disposable materials (e.g., gloves and Tyveks™) will be bagged and disposed of properly.

7.0 EMERGENCY AND CONTINGENCY PLANNING

This section identifies emergency and contingency planning that has been undertaken for operations at this site. Most sections of the CLEAN HASP provide information that would be used under emergency conditions. General emergency planning information is addressed in Chapter 14.0 of the CLEAN HASP. The following subsections present site-specific emergency and contingency planning information.

7.1 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATIONS. The site HSO or the Health and Safety designee is the primary authority for directing operations at the site under emergency conditions. All communications both on- and off-site will be directed through the HSO or designee.

7.2 EVACUATION. Evacuation procedures at the site will follow those procedures discussed in Chapter 14.5 of the CLEAN HASP for upwind withdrawal, site evacuation, and evacuation of the surrounding area. Evacuation from the base will be conducted by travelling west on Macon Street at the Alpha Pier to the guard gate. Turn left (south) on Maine Street and proceed on Maine Street off the base. Maine Street will turn into Old Mayport Road (Highway 1A).

7.3 EMERGENCY MEDICAL TREATMENT AND FIRST AID. Any personnel injured on-site will be rendered first aid as appropriate and transported to competent medical facilities for further examination and/or treatment. The preferred method of transport would be through professional emergency transportation means; however, when this is not readily available or would result in excessive delay, other transport will be authorized. Under no circumstances will injured persons transport themselves to a medical facility for emergency treatment.

8.2 HEALTH AND SAFETY PLAN (HASP) APPROVALS. By their signatures, the undersigned certify that this HASP will be used for the protection of the health and safety of all persons entering this site.

 _____	<u>8/20/91</u>
Health and Safety Officer	Date
 _____	<u>8/21/91</u>
Project Manager	Date
 _____	<u>8/21/91</u>
Health and Safety Manager/Supervisor	Date

8.3 FIELD TEAM REVIEW. I have read and reviewed the health and safety information in the HASP. I understand the information and will comply with the requirements of the HASP.

NAME: _____

DATE: _____

SITE/PROJECT: _____

8.4 MEDICAL DATA SHEET. This Medical Data Sheet will be completed by all on-site personnel and kept in the Support Zone during site operations. It is not a substitute for the Medical Surveillance Program requirements consistent with the CLEAN HASP. This data sheet will accompany any personnel when medical assistance or transport to hospital facilities is required. If more space is required, use the back of this sheet.

Project: _____

Name: _____

Address: _____

Home Telephone: Area Code () _____

Age: _____ Height: _____ Weight: _____

In case of emergency, contact: _____

Address: _____

Telephone: Area Code () _____

Do you wear contact lenses? Yes () No ()

Allergies: _____

List medication(s) taken regularly: _____

Particular sensitivities: _____

Previous/current medical conditions or exposures to hazardous chemicals:

Name of Personal Physician: _____

Telephone: Area Code () _____

8.5 EMERGENCY TELEPHONE NUMBERS.

Police Department (Local)	(904) 246-7331
Rescue Service (Local)	(904) 744-4545
Hospital (First Coast Medical Center)	(904) 247-2900
Fire Department (Local)	(904) 249-2381
Poison Control Center	(800) 962-1253
National Response Center	(800) 424-8802
Regional USEPA Emergency Response	(800) 414-8802
Site HSO: <u>Allan Stodghill</u>	(904) 656-1293
General Site Supervisor: <u>Ken Busen</u>	(904) 656-1293
Project Manager: <u>Peter Redfern</u>	(904) 656-1293
ABB Environmental HSM: <u>C.E. Sundquist</u>	(207) 775-5401 x101

8.6 ROUTES TO EMERGENCY MEDICAL FACILITIES. The primary source of medical assistance for the site is:

First Coast Medical Center
1350 13th Ave. South
Jacksonville, Florida

DIRECTIONS TO PRIMARY: Travel approximately 7.8 miles south on Highway A1A from the Mayport Naval Station to 13th Ave.; turn right; travel approximately 0.6 mile; the hospital will be on the left (see Figure 8-1)

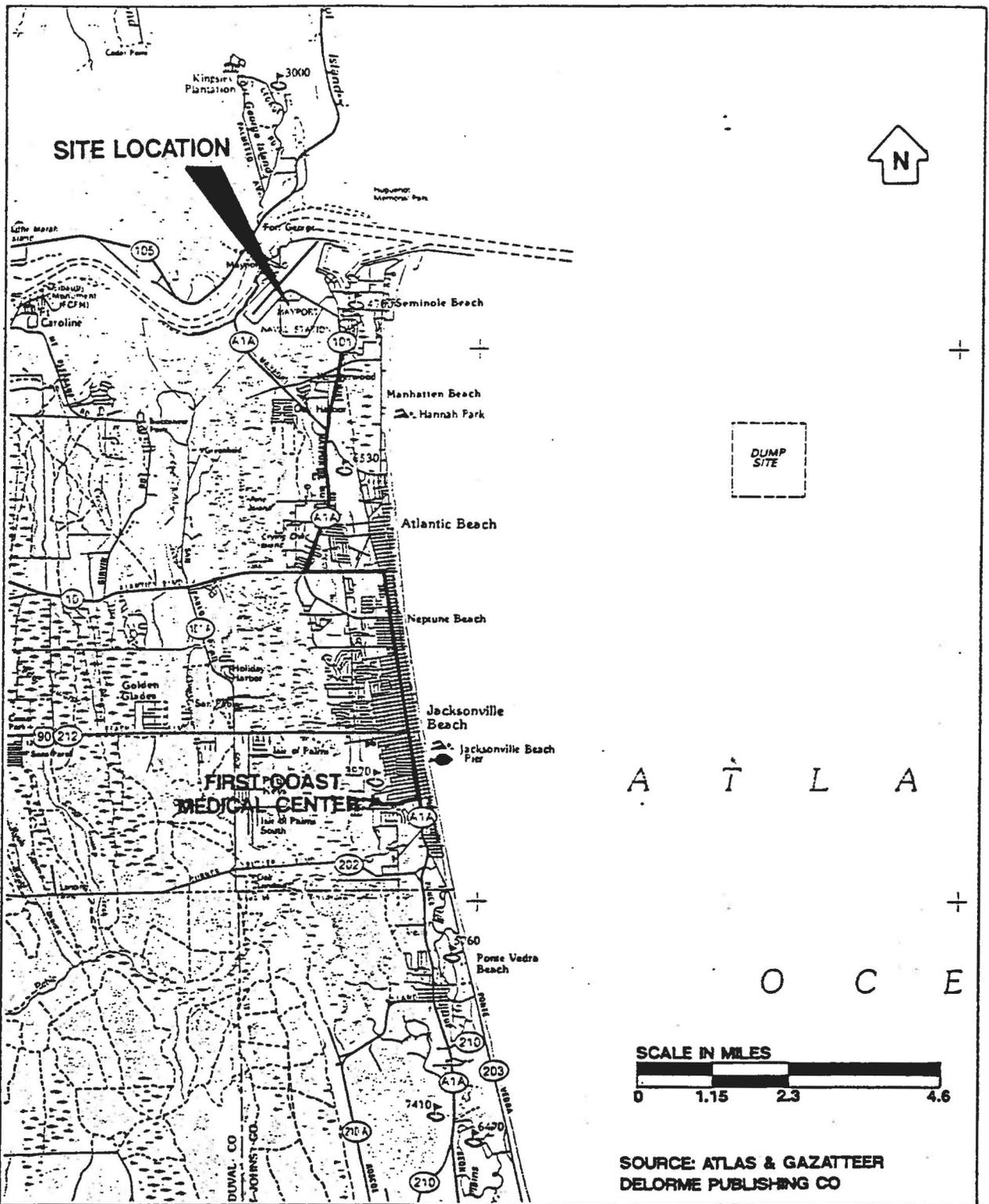


FIGURE 8-1

ROUTE TO FIRST COAST MEDICAL CENTER



HEALTH AND SAFETY PLAN

**NAVAL STATION
MAYPORT, FLORIDA**

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Requirements of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides the employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discrimination.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to \$1,000 for each serious violation and for optional penalties of up to \$1,000 for each nonserious violation. Penalties of up to \$1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to \$10,000 for each such violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of up to \$250,000 (or \$500,000 if the employer is a corporation), or by imprisonment for up to six months, or by both. Conviction of an employer after a first conviction doubles these maximum penalties.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for health such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State labor or Health department or a State university.

POSTING INSTRUCTIONS

Employees in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta, Georgia	(404) 347-3573
Boston, Massachusetts	(617) 565-7164
Chicago, Illinois	(312) 353-2220
Dallas, Texas	(214) 767-4731
Denver, Colorado	(303) 844-3061
Kansas City, Missouri	(816) 426-5861
New York, New York	(212) 557-2525
Philadelphia, Pennsylvania	(215) 596-1201
San Francisco, California	(415) 995-5672
Seattle, Washington	(206) 442-5930

Washington, D.C.
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Elizabeth Dole, Secretary of Labor
U.S. Department of Labor
Occupational Safety and Health Administration

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or a facsimile) in a conspicuous place where notices to employees are customarily posted.