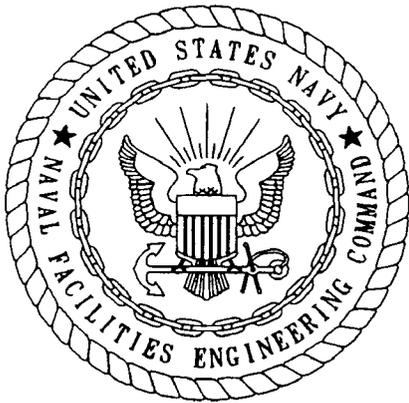


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CONTAMINATION ASSESSMENT PLAN AND SITE SPECIFIC HEALTH AND SAFETY PLAN  
FUEL FARM NAS KEY WEST FL  
7/1/1993  
ABB ENVIRONMENTAL SERVICES INC

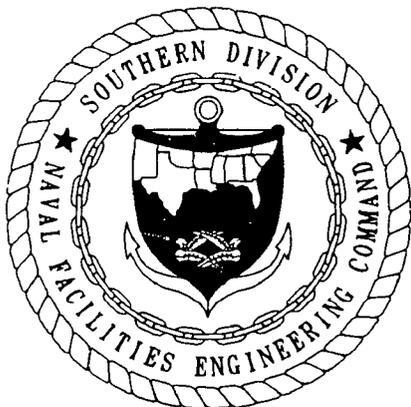


**CONTAMINATION ASSESSMENT PLAN AND  
SITE-SPECIFIC HEALTH AND SAFETY PLAN  
FUEL FARM**

**TRUMBO POINT, NAVAL AIR STATION KEY WEST  
KEY WEST, FLORIDA**

**CONTRACT TASK ORDER NO. 093  
NAVY CLEAN - DISTRICT I  
CONTRACT NO. N62467-89-D-0317**

**JULY 1993**



**SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
NORTH CHARLESTON, SOUTH CAROLINA  
29419-9010**

**CONTAMINATION ASSESSMENT PLAN**

**FUEL FARM  
TRUMBO POINT, NAVAL AIR STATION KEY WEST  
KEY WEST, FLORIDA**

**Contract Task Order 093**

**Contract Number N62467-89-D-0317**

**Prepared by:**

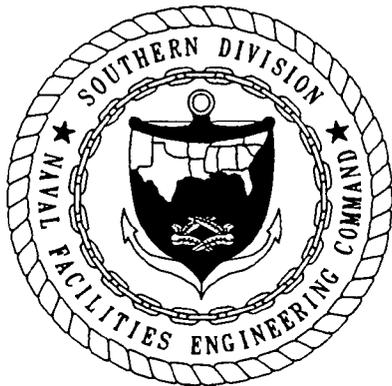
**ABB Environmental Services, Inc.  
2590 Executive Center Circle East  
Tallahassee, Florida 32301-5001**

**Prepared for:**

**Department of the Navy, Southern Division  
Naval Facilities Engineering Command  
2155 Eagle Drive  
North Charleston, South Carolina 29418**

**Luis Vazquez, Engineer-In-Charge**

**July 1993**



## FOREWORD

Subtitle I of the Hazardous and Solid Waste Amendments (HSWA) of 1984 to the Solid Waste Disposal Act (SWDA) of 1965 established a national regulatory program for managing underground storage tanks (USTs) containing hazardous materials, especially petroleum products. Hazardous wastes stored in USTs were already regulated under the Resource Conservation and Recovery Act (RCRA) of 1976, which was also an amendment to SWDA. Subtitle I requires that the U.S. Environmental Protection Agency (USEPA) promulgate UST regulations. The program was designed to be administered by the individual States, who were allowed to develop more stringent standards, but not less stringent standards. Local governments were permitted to establish regulatory programs and standards that are more stringent, but not less stringent than either State or Federal regulations. The USEPA UST regulations are found in the Code of Federal Regulations, Title 40, Part 280 (40 CFR 280) (*Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks*) and Title 40 CFR 281 (*Approval of State Underground Storage Tank Programs*). Title 40 CFR 280 was revised and published on September 23, 1988, and became effective December 22, 1988.

The Navy's UST program policy is to comply with all Federal, State, and local regulations pertaining to USTs. This report was prepared to satisfy the requirements of the Florida Department of Environmental Protection (FDEP), formerly Florida Department of Environmental Regulation (FDER) Chapter 17-770, Florida Administrative Code (FAC) (*State Underground Petroleum Environmental Response*) regulations on petroleum contamination in Florida's environment as a result of spills or leaking tanks or piping.

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## GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
AST	aboveground storage tank
BTEX	benzene, toluene, ethylbenzene, and xylenes
bls	below land surface
CA	Contamination Assessment
CAP	Contamination Assessment Plan
CompQAP	Comprehensive Quality Assurance Plan
CNO	Chief of Naval Operations
CTO	Contract Task Order
DFM	Diesel Fuel Marine
EIC	Engineer-in-Charge
FAC	Florida Administrative Code
FAR	Federal Acquisition Regulations
FDER	Florida Department of Environmental Regulation
FID	flame ionization detector
GC	gas chromatograph
HASP	Health and Safety Plan
HSWA	Hazardous and Solid Waste Amendments of 1984
ID	inside diameter
MTBE	methyl tert-butyl ether
NAS	Naval Air Station
OVA	organic vapor analyzer
PCAR	Preliminary Contamination Assessment Report
PCB	polychlorinated biphenyls
POA	Plan of Action
ppm	parts per million
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
SWDA	Solid Waste Disposal Act of 1965
TDS	total dissolved solids
TPFF	Trumbo Point Fuel Farm

GLOSSARY (Continued)

USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank

## 1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), has been contracted by Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) to prepare a Contamination Assessment Plan (CAP) for the Trumbo Point Fuel Farm (TPFF), Naval Air Station (NAS) Key West, Key West, Florida. The CAP outlines a field investigation and sampling program that will assess the source(s) of contamination in the vicinity of the TPFF and delineate the extent of any contamination detected. The following plan 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. Naval Air Station Key West (NAS Key West), Monroe County, Florida, is located approximately 150 miles southwest of Miami. Key West is strategically significant because it is 90 miles north of Cuba and is the closest point in the United States to the West Indies and Central and South America.

NAS Key West, a complex of activities located in numerous areas of the lower Florida Keys, encompasses approximately 5,000 acres. The majority of these activities are concentrated on Boca Chica Key and Key West. NAS Key West, the host activity, is situated on Boca Chica Key and encompasses 3,250 acres.

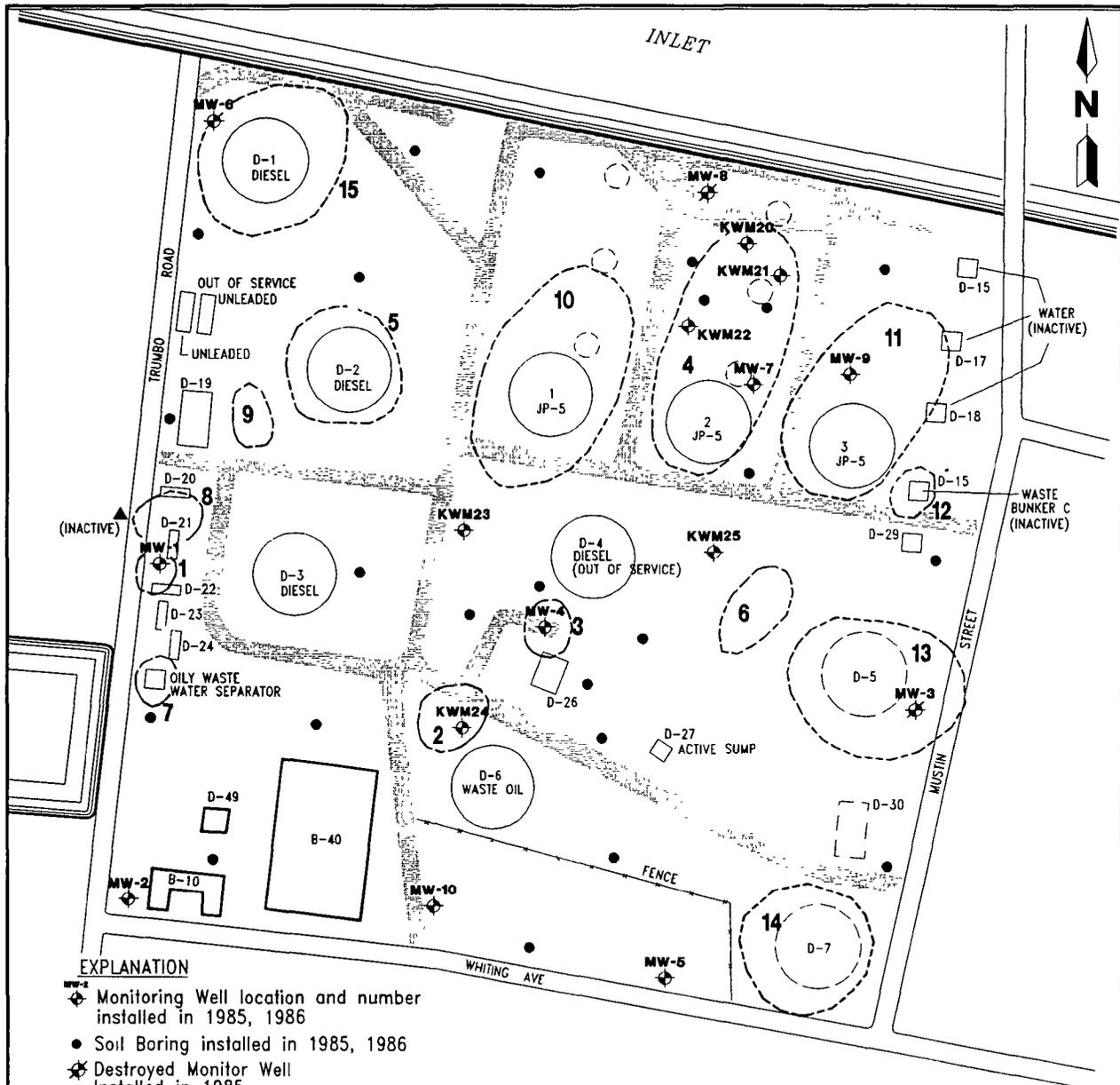
NAS Key West's mission is to maintain and operate facilities and provide services and materials to support operations of aviation activities and units designated by the Chief of Naval Operations (CNO).

The TPF is located along the northern shore of Key West, south of Fleming Key. The TPF is bordered to the north by Florida Bay, to the west by Trumbo Road (Figure 2-1), to the east by Mustin Street, and to the south by Whiting Avenue. Piers D-1, D-2, and D-3, west of Trumbo Avenue, serve as a fuel depot for ships and aircraft (Geraghty & Miller, 1988). Piers D-1 and D-3 are operated by the U.S. Navy; Pier D-2 is operated by the U.S. Coast Guard (USCG). The areas to the south and east of the site are privately owned properties.

The TPF has been used as a fuel storage and distribution point since 1942 (International Technology Corporation, 1991). Fuels that have reportedly been stored and transported at the site include No. 6 fuel oil, Bunker C oil, diesel oil, aviation gasoline, and JP-4 and JP-5 jet fuels (Geraghty & Miller, 1987). According to Navy personnel, the TPF is currently used to store and dispense Diesel Fuel Marine (DFM), JP-5 fuels, and gasoline. Currently in operation at the TPF are 11 underground storage tanks (USTs), five aboveground storage tanks (ASTs), and associated above and below ground pipelines.

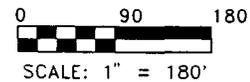
2.2 SITE HISTORY. In 1981, there was a reported release of DFM from a corroded pipeline located between tank D-4 and the D-26 pump house (see Figure 2-1). Contamination investigations were conducted from 1985 to 1991. These investigations indicated that significant petroleum contamination is present in soil and groundwater at the site (Geraghty & Miller, 1985; 1987; 1988; International Technology Corporation, 1991).

In 1985, Geraghty & Miller installed 10 groundwater monitoring wells at the site. Free petroleum product was detected in two wells. During a subsequent investigation conducted in 1987, an additional 15 soil borings and 6 monitoring wells were installed at the site. Samples were collected from six monitoring wells and analyzed for purgeable aromatic compounds and base-neutral extractable compounds. Analytical results indicated the presence of dissolved petroleum constituents in the groundwater. In addition, petroleum free product was observed in five monitoring wells. Free product thickness was reported to vary between 0.2 to 5.8 feet. Additional site investigation and remedial action was recommended (Geraghty & Miller, 1987).



**EXPLANATION**

- ◆ Monitoring Well location and number installed in 1985, 1986
- Soil Boring installed in 1985, 1986
- ✱ Destroyed Monitor Well Installed in 1985
- ▲ Fire Well
- ⊖-10 Diesel Tank and designation, type of material stored in use
  - ⊖-10 Former Tank and designation
- ⊖-10 Building and designation
- ⊖-10 Berm/Gravel Road
- 1 Areas 1-4: Petroleum Contamination found in 1988.  
Areas 5-14: Potentially contaminated areas.



Source: Geraghty & Miller, Inc. Preliminary Site Investigation Report  
Trumbo Point Fuel Farm, NAS Key West, Florida, Sept., 1988

**FIGURE 2-1  
SITE MAP**



**CONTAMINATION  
ASSESSMENT PLAN  
FUEL FARM, TRUMBO POINT**

**NAVAL AIR STATION KEY WEST  
KEY WEST, FLORIDA**

During an additional field visual investigation conducted in 1988, Geraghty & Miller identified four petroleum plumes (designated 1 through 4 on Figure 2-1).

1. Free product was observed in a monitoring well located north of Building D-22, along the western perimeter of the site.
2. Free product was observed in a monitoring well located northwest of tank D-6, in the southern section of the site.
3. Free product was observed in a monitoring well located south and west of tank D-4, in the central area of the site.
4. Free product and dissolved petroleum contaminants were observed in five monitoring wells located in the vicinity of tank 2, in the northern part of the site.

In addition, four other potentially contaminated areas were recognized (designated 5 through 8 on Figure 2-1).

5. Overfilling was reported in the area north of tank D-2, in the northwestern area of the site.
6. Oily wastewater disposal was reported between tank D-4 and former tank D-5, located in the central section of the site.
7. Waste drums were stored near the oily wastewater separator located south of Building D-24, along the western perimeter of the site.
8. The presence, reported, but unconfirmed, of an underground hazardous waste storage tank at Building D-21, which is located along the western perimeter of the site. The UST was reported to have been used for the storage of solvents, waste oil, pesticides, and polychlorinated biphenyls (PCBs).

Further site investigation was conducted by International Technology Corporation in 1991; 44 soil borings were drilled and 3 additional monitoring wells were installed. Excessively petroleum-contaminated soils were identified in many areas of the site; however, the horizontal and vertical limits of excessive soil contamination were not delineated. Six monitoring wells were sampled and analyzed for constituents of the kerosene analytical group. The remaining wells were reported to contain free petroleum product and were not sampled. Analytical results indicate that benzene, toluene, and ethylbenzene concentrations exceeded State target levels as defined in Chapter 17-770, Florida Administrative Code (FAC). Lead and xylenes were also detected, but at concentrations below State target levels. Groundwater flow direction was reported to be toward the northwest. The 1991 investigation recommended that remedial action be implemented at the site, which included treatment of excessively contaminated soil and continued groundwater sampling of existing monitoring wells to monitor free product contamination (International Technology Corporation, 1991).

During an initial site inspection by ABB-ES, in November 1992, seven other potentially contaminated areas were observed (designated as 9 through 15 on Figure 2-1) which had not been assessed in accordance with FDEP's May 1992, *Guidelines for Assessment and Remediation of Petroleum Contaminated Soils*.

9. Free product was observed in a fire well located between Building D-19 and tank D-2 in the western part of the site.
10. The area surrounding tank 1 located in the north central part of the site has not been adequately assessed.
11. The area surrounding tank 3 located in the northeast section of the site has not been adequately assessed.
12. The area surrounding the inactive waste Bunker C tank (tank D-15) located east of tank 3 in the northeastern section of the site has not been adequately assessed.
13. The area surrounding former tank D-5 located in the eastern section of the site has not been adequately assessed.
14. The area surrounding former tank D-7 located in the southern part of the site has not been adequately assessed.
15. The area surrounding tank D-1 located in the northwestern corner of the site has not been adequately assessed.

In summary, previous field investigations indicate significant soil and groundwater petroleum contamination exists at the TPF. Fifteen contaminated or potentially contaminated areas have been identified at the site. The horizontal and vertical extent of soil and groundwater contamination in these areas have not been adequately assessed. Groundwater elevation measurements indicate that the groundwater flow direction is to the northwest (International Technology Corporation, 1991); thus, it appears that the reported contamination along the western site boundary, in particular near Buildings D-19 and D-22, may be migrating offsite to the USCG station near Pier D-2. This preliminary contamination assessment will include collection of soil and groundwater samples in a limited area of the USCG station adjacent to the TPF to assess the possible contaminated migration. It is also possible that contamination found in the northern part of the site is migrating into Florida Bay.

2.3 GEOLOGY. The NAS Key West activities are located on the lower Florida Keys. The lower keys are overlain by a mantle of oolite limestone of the Miami Limestone. The oolite limestone is thickest in the northern part of Stock Island, thinning to the south and southwest. Beneath the Miami Limestone lies the Key Largo coral reef limestone. Hoffmeister (1974) reported the Miami Limestone to be 27 feet thick and the Key Largo Limestone greater than 270 feet thick in the western part of Key West. The natural grade in much of the area in and around Boca Chica Key and Key West has either been altered or is completely man-made consisting of imported fill material. Therefore, it is not uncommon to encounter fill materials at the surface or near surface.

#### 2.4 HYDROGEOLOGY.

2.4.1 Regional The highly transmissive limestones of the lower keys generally contain brackish or saline water. Small areas of fresh groundwater exist on some of the larger islands (Black, Crow, and Eidness, 1977). The water-table aquifer

is contained within both the Miami and Key Largo Limestones. Freshwater lenses that do exist are Class G-III groundwater with total dissolved solids (TDS) exceeding 10,000 parts per million (ppm) and are subject to saltwater intrusion through the porous Key Largo Limestone and upward to the less porous Miami Limestone (Black, Crow, Eidness, 1977; McKenzie, 1990).

Groundwater in the Key West area discharges directly to the marine surface waters surrounding the islands. Many of these marine waters have been designated as Outstanding Florida Waters, a classification that affords them the highest environmental protection standards. TDS concentrations, calculated from specific conductance measurements of groundwater at the site, were in excess of 35,000 ppm (ABB-ES, 1991a; 1991b).

Due to the low land surface elevations in the lower keys, the water table is shallow. Recharge to the water-table aquifer is directly from precipitation and infiltration is rapid. Discharge, via groundwater flow, is to the surrounding surface waters. Water-table elevations can be greatly influenced by local rainfall and tides. The volume of fresh groundwater in the Key West area is limited; therefore, freshwater wells of any consequence do not exist. Potable water supplies are obtained by rainwater catchment, reverse osmosis desalination, or imported from the mainland by way of the Florida Keys aqueduct.

2.4.2 Site Specific The water-table aquifer is the only aquifer of concern in the Key West area. The water-table aquifer in the Key West area is unconfined. The water table is encountered at less than 5 feet below land surface (bls). Groundwater flow at the fuel farm is believed to be to the north and west. Fill material and rock from the surface to depths of 12 feet consist of white, slightly to heavily weathered, silty, hard limestone with some sand and shell fragments (ABB-ES, 1991a).

### 3.0 INVENTORY OF PROXIMATE POTABLE WELLS

There are no official potable wells in the Key West area. Potable water is imported from mainland Florida through the Florida Keys Aqueduct, obtained by rainwater catchment, or obtained by reverse osmosis desalination. Small lenses of fresh groundwater exist in the area, but these lenses are subject to saltwater intrusion (Black, Crow, and Eidness, 1977).

#### 4.0 PROPOSED ASSESSMENT PLAN

4.1 FIELD INVESTIGATION. Prior to the beginning of the field investigation, a startup meeting will be held onsite at NAS Key West. All personnel associated with the investigation will review the scope of work in the CAP and Health and Safety Plan (HASP). Scheduling, logistics, and special precautions will be discussed.

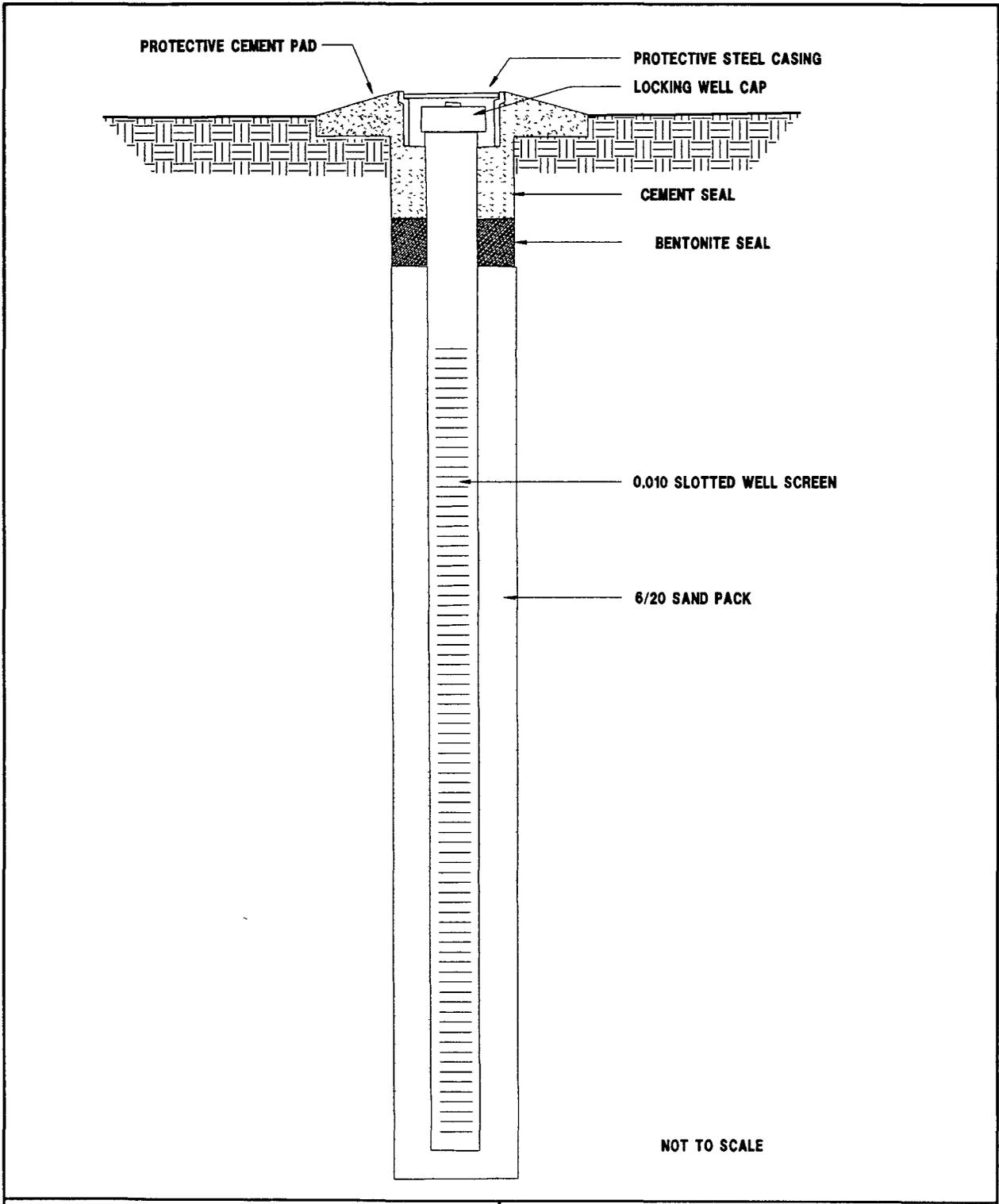
The purpose of the CA field investigation is to assess the vertical and horizontal extent of soil and groundwater contamination and identify the types of contaminants at the site. The CA will require the drilling of soil borings and installation of monitoring wells at the site.

Approximately 150 soil borings will be advanced using a truck mounted TerraProbe<sup>SM</sup> drill rig. Soil samples will be collected starting at a depth of 1 foot bls and every 2 feet vertically thereafter until the water table is reached. Samples collected above the water table will be retrieved in 2-foot intervals for organic vapor analyzer (OVA) screening in accordance with Florida Department of Environmental Protection (FDEP), formerly Florida Department of Environmental Regulation (FDER) Chapter 17-770.200 (2), FAC, guidelines. One soil sample will be collected in the area of highest OVA readings where used oil was stored. This sample will be analyzed by a U.S. Environmental Protection Agency (USEPA) certified laboratory for used oil group constituents.

Soil boring advancement will continue to the water table so that a groundwater sample can be collected. Groundwater measurements from previous investigations (Geraghty & Miller, 1987; International Technology Corporation, 1991) indicate that the depth of water averages approximately 5 feet bls; therefore, it is anticipated that total depth of borings will average 8 feet bls. Groundwater samples will be screened for benzene, ethylbenzene, toluene, xylenes, and methyl tert-butyl ether (MTBE) using a portable gas chromatograph (GC).

Approximately 11 shallow (15 feet bls) permanent monitoring wells will be installed in selected soil borings to characterize the groundwater contaminant plume. Monitoring well locations will be based on the results of groundwater samples screened by a field GC used to measure concentration of benzene, toluene, ethyl benzene, and xylenes (BTEX). The monitoring wells will be constructed of 2-inch inside diameter (ID), 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, if possible, to accommodate seasonal fluctuations of the water table. The screen will be surrounded with a quartz sand filter pack of 6/20 size (or 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 to land surface with neat cement. A locking, watertight cap will be installed on each well. The monitoring wells will be finished below grade in a subsurface traffic-bearing vault and protected with a metal manhole assembly. Upon completion, all newly installed monitoring wells will be developed by pumping until the purged water is clear and relatively free of sediment to provide a good hydraulic connection with the surrounding aquifer.

A diagram of a typical monitoring well, finished below grade, is illustrated in Figure 4-1. Detailed information on monitoring well construction, lithologic



**FIGURE 4-1**  
**TYPICAL MONITORING WELL**  
**INSTALLATION DETAIL**



**CONTAMINATION**  
**ASSESSMENT PLAN**  
**FUEL FARM, TRUMBO POINT**

**NAVAL AIR STATION KEY WEST**  
**KEY WEST, FLORIDA**

descriptions, and other pertinent data will be graphically displayed in boring logs in the Preliminary Contamination Assessment Report (PCAR). Soil will be classified in accordance with the Unified Soil Classification System.

Groundwater samples will be collected from all site monitoring wells that do not contain free product. Groundwater samples collected from sites 2, 7, 8, and 6 will be analyzed for used oil analytical group constituents as described in FDEP Chapter 17-770, FAC. Groundwater samples collected from sites 1, 3, 4, 5, 6, and 9 through 15 will be analyzed for kerosene analytical group constituents. Appropriate quality assurance/quality control (QA/QC) samples will also be collected and analyzed. The following is a list of the groundwater samples that will be collected from the site:

- 11 monitoring well samples,
- 2 duplicate samples,
- 1 equipment blank (per day of sampling), and
- 1 trip blank.

Groundwater samples will be collected with Teflon™ bailers and shipped via overnight carrier to an FDEP- or USEPA-approved analytical laboratory. Sampling and the subsequent analytical program will comply with the ABB-ES FDEP-approved Comprehensive Quality Assurance Plan (CompQAP).

Finally, a Florida-licensed professional surveyor will survey the horizontal coordinates and vertical elevations for each of the monitoring wells for incorporation into either the U.S. Geological Survey (USGS) North American Datum of 1927 or base coordinate grid system.

During this field investigation, ABB-ES personnel and their subcontractors will coordinate efforts with the NAS Key West Environmental Coordinator to dispose of contaminated fluids and soils onsite. It will be the Navy's responsibility to dispose of any hazardous waste.

4.2 PREPARATION OF REPORTS. A PCAR will be prepared discussing the results of the field investigation. A summary of field investigation results, site maps, laboratory analytical data, and other pertinent information will be included in the report. The PCAR will discuss site background information, site conditions, findings, and recommendations for additional site investigation to include whether or not the TPFH should be retained as a UST site to be assessed in accordance with FDEP Chapter 17-770, FAC.

## 5.0 SCHEDULE

A projected schedule to complete the field investigation program at the TPF is approximately 3 weeks (see Figure 5-1). This includes mobilization, drilling, sampling, surveying, aquifer testing, and demobilization. The field investigative work is scheduled to begin July 18, 1993. Upon completion of the field investigation, a 3-week turn-around time is anticipated for receipt of the laboratory analyses of the groundwater samples collected during the investigation. A PCAR for the site is scheduled for submittal to SOUTHNAVFACENCOM by October 25, 1993.

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	ORIG DUR	1993						1994		
				J	JUL	AUG	SEP	OCT	NOV	DEC	JAN	F
				PROJECT MANAGEMENT								
NOTICE TO PROCEED CTO NO 095	1JUL93		0									
DAY-TO-DAY MANAGEMENT	1JUL93	10DEC93	113									
TFMR REVIEW & PREPARATION	1JUL93	10DEC93	113									
CTO CLOSEOUT	13DEC93	31JAN94	34									
CTO NO 095 COMPLETE		31JAN94	0									
CAP & HASP PREPARATION												
CAP/HASP PREPARATION	1JUL93	14JUL93	9									
SUBMIT CAP/HASP TO NAVY		14JUL93	0									
FIELD INVESTIGATION												
SOIL INVESTIGATION	19JUL93	30JUL93	10									
WELL INSTALLATION	2AUG93	4AUG93	3									
GROUNDWATER SAMPLING	4AUG93	5AUG93	2									
OTHER FIELD ACTIVITIES	5AUG93	6AUG93	2									
LABORATORY ANALYSES	9AUG93	3SEP93	20									
CONTAMINATION ASSESSMENT REPORT												
PCAR PREPARATION	7SEP93	8OCT93	24									
PCAR REVIEW PROCESS	11OCT93	22OCT93	10									
SUBMIT PCAR TO NAVY		25OCT93	0									
NAVY REVIEW PCAR	28OCT93	10DEC93	30									

Plot Date 6JUL93  
 Data Date 1JUL93  
 Project Start 1JUL93  
 Project Finish 31JAN94

Activity Bar/Early Dates  
 Critical Activity  
 Progress Bar  
 Milestone/Flag Activity

R007 A095

CTO 095 - NAS KEY WEST TRUMBO POINT  
 TOM - JACK PITTMAN  
 PROJECT SCHEDULE AS OF 18 JUNE 1993

Sheet 1 of 1

ABB-ES/NAVY CLEAN

Date	Revision	Checked	Approved

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**SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR  
CONTAMINATION ASSESSMENT INVESTIGATION**

**FUEL FARM  
TRUMBO POINT, NAVAL AIR STATION KEY WEST  
KEY WEST, FLORIDA**

**Contract Task Order No. 093**

**Contract Number N62467-89-D-0317**

**Prepared by:**

**ABB Environmental Services, Inc.  
2590 Executive Center Circle East  
Tallahassee, Florida 32301**

**Prepared for:**

**Department of the Navy, Southern Division  
Naval Facilities Engineering Command  
2155 Eagle Drive  
North Charleston, South Carolina 29418**

**Luis Vazquez, Engineer-In-Charge**

**July 1993**

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NAS Key West, Key West, Florida

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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
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- 9.0 WORK PRACTICES
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  - HEALTH AND SAFETY AUDIT FORM
  - ACCIDENT REPORT FORM
  - HSO CHECKLIST FOR FIELD OPERATIONS
  - MATERIAL SAFETY DATA SHEETS
  - LIQUI-NOX
  - ETHYL ALCOHOL (denatured)
  - TRISODIUM PHOSPHATE
  - OSHA POSTER
  - DAILY HEALTH AND SAFETY AUDIT FORM
- 16.0 RESPIRATORY PROTECTION PROGRAM
- 17.0 OTHER
  - ILLUMINATION
  - SANITATION
  - HEALTH AND SAFETY AUDIT PROCEDURES

## GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
AST	aboveground storage tank
CA	Contamination Assessment
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CPR	cardiopulmonary resuscitation
CRZ	Contamination Reduction Zone
DFM	diesel fuel marine
EIC	Engineer-in-Charge
FID	flame ionization detector
FOL	Field Operations Leader
HASP	Health and Safety Plan
HSM	Health and Safety Manager
HSO	Health and Safety Officer
HSS	Health and Safety Supervisor
LEL	lower explosive limit
NAS	Naval Air Station
OSHA	Occupational Safety and Health Administration
OVA	organic vapor analyzer
PPE	personal protective equipment
ppm	parts per million
SCBA	self-contained breathing apparatus
SS	site supervisor
TL	Technical Lead
TOM	Task Order Manager
TPFF	Trumbo Point Fuel Farm
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank

## 1.0 GENERAL

1.1 SCOPE AND PURPOSE. This Health and Safety Plan (HASP) has been prepared in conformance with the generic HASP developed under the Comprehensive Long-Term Environmental Action, Navy (CLEAN) District I Contract (CLEAN HASP) and is intended to meet the requirements of 29 Code of Federal Regulations (CFR) 1910.120. As such, this HASP addresses activities associated with field operations for the Contamination Assessment (CA) at the Trumbo Point Fuel Farm (TPFF), Naval Air Station (NAS) Key West, Key West, Florida. Compliance with this HASP is required for all ABB Environmental Services, Inc. (ABB-ES), personnel, contractor personnel, and third parties entering the site.

### 1.2 PROJECT PERSONNEL.

1.2.1 Task Order Manager The Task Order Manager (TOM), Jack Pittman, is the individual with overall project management responsibilities. Those responsibilities, as they relate to health and safety, include provisions 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 during the project.

1.2.2 Field Operations Leader The Field Operations Leader (FOL), Roger Durham, is the TOM's designee who is onsite and has vested authority 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 Jay Koch has been designated the HSO for the TPFF facility by the TOM 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 this 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 onsite. The HSO will also conduct safety briefings and site-specific training for onsite 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 the 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 at the TPFF 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 ABB-ES generic 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 FACILITY SITE CHARACTERIZATION AND ANALYSIS

2.1 SITE NAME, LOCATION, AND SIZE. The TPFF at the NAS Key West is located along the northern shore of Key West, south of Fleming Key (see Figure 9-1). The TPFF is bordered to the north by Florida Bay, to the west by Trumbo Avenue, to the east by Mustin Street, and to the south by Whiting Avenue.

2.2 SITE HISTORY AND LAYOUT. The TPFF has been used as a fuel storage and distribution point since 1942. Fuels that have reportedly been stored and transported at the site include No. 6 fuel oil, Bunker C oil, diesel oil, aviation gasoline, and JP-4 and JP-5 jet fuels. According to Navy personnel, the TPFF is currently used to store and dispense Diesel Fuel Marine (DFM), JP-5 fuels, and gasoline. Currently in operation at the TPFF are 11 underground storage tanks (USTs), five aboveground storage tanks (ASTs), and associated above and below ground pipelines. In 1981, there was a reported release of DFM from a corroded pipeline. Contamination investigations were conducted from 1985 to 1991. These investigations indicated that significant petroleum contamination is present in soil and groundwater at the site. Additional site history is available in the Contamination Assessment Plan.

2.3 SCOPE OF WORK (WORKPLAN). ABB-ES will conduct a Contamination Assessment at the site to evaluate the horizontal and vertical extent of potential petroleum contamination in soil and groundwater. The field investigation will consist of the installation and sampling of approximately 150 soil borings and 11 permanent shallow monitoring wells.

### 3.0 HAZARD ANALYSIS

3.1 INVASIVE SAMPLING. Invasive sampling at the TPFf will include soil borings and monitoring well installation.

The potential hazards to workers are mainly physical ones related to manual labor, such as that involved in drilling operations, but limited hazards exist for exposure to chemical compounds that are suspected to be present in the soil at the site. A potential for exposure may exist during intrusive activities, such as drilling and sampling, when the ground surface and subsurface soil are disturbed. Elevated ambient levels of organic vapors and particulates may be encountered during these periods. However, the field drilling and sampling activities will not involve large scale earth-moving equipment, and personnel exposures are expected to be minimal. Air monitoring will be conducted to assess the need for increasing levels of personal protection.

Contamination of soil and groundwater at the site may have occurred from reported spillage of petroleum products associated with the operation and maintenance activities at the site. The purpose of this field investigation is to assess the extent of that contamination. Caution and awareness should be exercised during drilling and sampling operations pending further definitions of chemical hazards. Any condition encountered that has not been discussed in training should be brought to the attention of the HSO, FOL, and TOM immediately.

The potential presence of chemicals poses exposure hazards in addition to respiratory hazards. All efforts should be made by field personnel to avoid exposure to chemicals via inhalation, ingestion, or absorption through the skin. All efforts must be taken to implement use of safe personal work practices, personal protective equipment (PPE), and decontamination procedures.

3.2 SITE RISKS. The following health and safety hazards may be encountered at the TPFf.

3.2.1 Health Hazards Health hazards include those hazards that personnel may be exposed to petroleum contamination. The contaminants of concern known or suspected to be present on the site, along with established exposure limits for those substances, are listed in Table 3-1.

3.2.2 Safety Hazards Safety hazards include those hazards that personnel may be exposed to that are unrelated to the contaminants of concern such as heat stress, operation and presence around heavy equipment, lifting of objects, and vehicle traffic. Extreme caution should be exhibited by all personnel while conducting work around the TerraProbe<sup>SM</sup>. During hot days, personnel should increase fluid intake and cool off to avoid overheating and symptoms related to heat stress.

Lifting of heavy objects must be done with caution. Personnel should assist one another with moving heavy objects or use appropriate equipment to accomplish these tasks. Power substations, power lines, underground utilities, and underground pipelines are to be avoided during drilling operations. Necessary work permits for activities at the TPFf must be obtained.

**Table 3-1  
Contaminants of Concern**

Site-Specific Health and Safety Plan  
Trumbo Point Fuel Farm  
Naval Air Station, Key West, Florida

Chemical	Approximate Odor Threshold (ppm)	OSHA Permissible Exposure Limit (ppm)	Threshold Limit Value	Physical Characteristics	Dermal Toxicity	Remarks
Acetone	100	750	750	Colorless liquid; sweet odor.	Harmless to skin	Vapor irritating to eyes, nose, and throat
Benzene	4.7	1	1	Colorless to light yellow liquid; pleasant aromatic odor.	Moderate skin irritant.	Inhalation of large amounts attacks central nervous system, chronic poisoning may cause leukemia and/or decreases circulating levels of blood cells.
Cadmium <sup>1</sup>	--	0.2	0.2	Metal: silver-white, blue-tinged lustrous, odorless solid.	Harmless to skin	Inhalation or ingestion can cause headache, muscle aches, nausea, and vomiting; carcinogen.
Chromium <sup>1</sup>	--	1	1	Metal: blue-white to steel gray, lustrous, brittle, hard solid.	Harmless to skin	Inhalation causes histologic fibrosis of lungs.
Ethylbenzene	140	100	100	Colorless liquid; gasoline like odor	Moderate skin irritant.	Liquid blisters skin; inhalation results in dizziness and depression.
Lead (Pb) <sup>1</sup>	--	0.050	0.050	Metal: a heavy, ductile, soft gray solid.	Harmless to skin	Symptoms of lead poisoning include fatigue, anemia, abdominal pains, constipation, and neurological damage.
Naphthalene	--	10	10	Colorless to brown solid with an odor of moth-balls.	Moderate skin irritant.	Inhalation causes headache and confusion; vapors irritate eyes.
Toluene	0.17	100	100	Colorless liquid; pleasant aromatic odor.	Mild skin irritant.	Ingestion or aspiration can cause pulmonary edema and depressed respiration.
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.

<sup>1</sup>Limit concentrations are in milligrams per cubic meter.

Notes: ppm = parts per million.  
OSHA = Occupational Safety and Health Administration.

3.2.3 Conclusions and Risk Assessment Based on 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.

3.3 PROTECTIVE MEASURES. The following protective measures will be used at the site.

3.3.1 Engineering Controls (General) When needed, engineering controls (e.g., fans to blow volatilized chemicals away from the work area) will be used.

3.3.2 Levels of Protection (General) A level D work uniform will be used at the site when organic vapor concentrations of petroleum constituents in the breathing zone are less than 25 parts per million (ppm) and benzene concentrations are less than 0.5 ppm during sustained drilling or sampling operations. Organic vapor concentrations will be monitored in the breathing zone using an organic vapor analyzer (OVA) equipped with a flame ionization detector (FID). Benzene concentrations in the breathing zone will be monitored using a benzene 0.5/a Dräger tube. Level D protection should only be used when the atmosphere contains no known hazard, potential airborne contaminants can be monitored, and work functions preclude splash, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemical.

Because of the threat of heat stress, Level D PPE will consist of a shirt, long pants, steel-toed work boots, and protective gloves. A Tyvek™ suit may be worn. When invasive work is being conducted, safety glasses or goggles will be worn. When working around the TerraProbe<sup>SM</sup>, a hard hat will be worn. Hearing protection should also be worn when working around the TerraProbe<sup>SM</sup>.

Level C personal protective equipment will be used by all personnel working in the contaminated zone if FID monitoring of organic vapor concentrations in the breathing zone are greater than or equal to 25 ppm but less than 170 ppm and/or benzene levels are greater than or equal to 0.5 ppm but less than 50 ppm. Benzene concentrations in the breathing zone will be monitored using Benzene Dräger tubes (0.5/a and 5/b).

Level B personal protective equipment will be used by all personnel working in the contaminated zone if FID monitoring indicates organic vapor concentrations in the breathing zone are greater than or equal to 170 ppm and/or Dräger tube (5/b) monitoring indicates greater than or equal to 50 ppm benzene.

Procedures for using level B and level C personal protective equipment, heat stress monitoring associated with upgrading levels of protection, and other relevant factors associated with the respiratory protection program are described in the CLEAN HASP.

3.4 MONITORING (GENERAL). It is intended that real-time monitoring instrumentation will be used to monitor the work environment in order to provide the appropriate level of protection for the site team.

3.4.1 Air Sampling (General) To the extent feasible, the presence of airborne contaminants will be monitored through the use of direct reading instrumentation. Information gathered will be used to ensure that the levels of protection being

used at the site are adequate. In addition, these data 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. During operations, air monitoring with an FID or OVA will be conducted regularly in the breathing zone. If the FID readings show a persistent rise above background levels, monitoring with Dräger tubes will be initiated. 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. HeathTech PORTA-FID II™
2. Dräger Tubes:
  - Benzene 0.5/a
  - Benzene 5/b

3.4.2 Personal Monitoring (General) All personnel onsite will be enrolled in the ABB-ES medical surveillance program. In addition, all personnel onsite will wear a thermoluminescent dosimetry body badge to measure possible exposure to radiation.

#### 4.0 DATA SHEETS

The Chemical Hazard Data Sheets for the chemicals that may likely be encountered at the Trumbo Point Fuel Farm follow.

# ACETONE

ACT

<b>Common Synonyms</b>	Wetery liquid	Colorless	Sweet odor
Dimethyl ketone Propanone 2 Propanone	Floats and mixes with water. Flammable. Irritating vapor is produced.		
<p>Slay upward and use water spray to knock down vapor.                  Shut off ignition sources and call fire department. Keep people away.                  Stop discharge if possible.                  Isolate and remove discharged material.                  Avoid contact with liquid and vapor.                  Notify local health and pollution control agencies.</p>			
<b>Fire</b>	<p><b>FLAMMABLE</b>                  Flashback along vapor trail may occur.                  Vapor may explode if ignited in an enclosed area.                  Extinguish with dry chemical, alcohol foam, or carbon dioxide.                  Water may be ineffective on fire.                  Cool exposed containers with water.</p>		
<b>Exposure</b>	<p>CALL FOR MEDICAL AID</p> <p><b>VAPOR</b>                  Irritating to eyes, nose and throat.                  If inhaled, may cause difficult breathing or loss of consciousness.                  Move to fresh air.                  If breathing has stopped, give artificial respiration.                  If breathing is difficult, give oxygen.</p> <p><b>LIQUID</b>                  Irritating to eyes.                  Not irritating to skin.                  IF IN EYES, hold eyelids open and flush with plenty of water.</p>		
<b>Water Pollution</b>	<p>Dangerous to aquatic life in high concentrations.                  May be dangerous if it enters water intakes.                  Notify local health and pollution control officials.                  Notify operators of nearby water intakes.</p>		
<b>1 RESPONSE TO DISCHARGE</b> (See Response Methods Handbook)		<b>2. LABEL</b>	
Issue warning-high flammability Disperse and flush		2.1 Category: Flammable liquid 2.2 Class: 3	
<b>3 CHEMICAL DESIGNATIONS</b>		<b>4 OBSERVABLE CHARACTERISTICS</b>	
3.1 CG Compatibility Class: Ketone 3.2 Formula: CH <sub>3</sub> COCH <sub>3</sub> 3.3 IMO/UN Designation: 311090 3.4 DOT ID No.: 1090 3.5 CAS Registry No.: 67-64-1		4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Sweetish, pleasant, resembling that of mint or fruit, pungent, sharp, penetrating residual, ketonic, pleasant non-residual	
<b>5 HEALTH HAZARDS</b>			
5.1 Personal Protective Equipment: Organic vapor canister or air-supplied mask, synthetic rubber gloves, chemical safety goggles or face splash shield			
5.2 Symptoms Following Exposure: INHALATION: vapor irritating to eyes and mucous membranes, acts as an anesthetic in very high concentrations. INGESTION: low order of toxicity but very irritating to mucous membranes. SKIN: prolonged excessive contact causes detaching of the skin, possibly leading to dermatitis			
5.3 Treatment of Exposure: INHALATION: if victim is overcome, remove to fresh air and call a physician, administer artificial respiration if breathing is irregular or stopped. INGESTION: if victim has swallowed large amounts and is conscious and not having convulsions, induce vomiting and get medical help promptly; no specific antidote known. SKIN: wash well with water. EYES: flush with water immediately for at least 15 min. Consult a physician			
5.4 Threshold Limit Value: 750 ppm			
5.5 Short Term Inhalation Limits: 1000 ppm for 30 min			
5.6 Toxicity by Ingestion: Grade 1, LD <sub>50</sub> = 5 to 15 g/kg (dog)			
5.7 Late Toxicity: Not pertinent			
5.8 Vapor (Gas) Irritant Characteristics: If present in high concentrations, vapors cause moderate irritation of the eyes or respiratory system. Effect is temporary			
5.9 Liquid or Solid Irritant Characteristics: No appreciable hazard. Practically harmless to the skin because it is very volatile and evaporates quickly from the skin			
5.10 Odor Threshold: 100 ppm			
5.11 IDLH Value: 20000 ppm			

<p style="text-align: center;"><b>6 FIRE HAZARDS</b></p> <p>6.1 Flash Point: 4°F O.C., 0°F C.C.                  6.2 Flammable Limits in Air: 2.6% - 12.8%                  6.3 Fire Extinguishing Agents: Alcohol foam, dry chemical, carbon dioxide                  6.4 Fire Extinguishing Agents Not to be Used: Water in straight hose stream will scatter and spread fire and should not be used                  6.5 Special Hazards of Combustion: Products: Not pertinent                  6.6 Behavior in Fire: Not pertinent                  6.7 Ignition Temperature: 869°F                  6.8 Electrical Hazard: Class I, Group D                  6.9 Burning Rate: 3.9 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</p> <p style="text-align: center;"><b>7 CHEMICAL REACTIVITY</b></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: 18</p> <p style="text-align: center;"><b>8 WATER POLLUTION</b></p> <p>8.1 Aquatic Toxicity: 14,250 ppm/24 hr/sunfish/killed/tap water; 13,000 ppm/48 hr/mosquito fish/TL<sub>50</sub>/turbid water                  8.2 Waterfowl Toxicity: Not pertinent                  8.3 Biological Oxygen Demand (BOD): (Theor) 122% 5 days                  8.4 Food Chain Concentration Potential: None noted</p> <p style="text-align: center;"><b>9. SHIPPING INFORMATION</b></p> <p>9.1 Grades of Purity: Technical 99.5% plus 0.5% water; Reagent 99.5% plus 0.5% water                  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;"><b>10 HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook) A-P-Q-R-S</p> <p style="text-align: center;"><b>11 HAZARD CLASSIFICATIONS</b></p> <p>11.1 Code of Federal Regulations: Flammable liquid                  11.2 HAS 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>Health</td> <td></td> </tr> <tr> <td>  Vapor Irritant</td> <td>1</td> </tr> <tr> <td>  Liquid or Solid Irritant</td> <td>0</td> </tr> <tr> <td>  Poisons</td> <td>0</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>1</td> </tr> <tr> <td>  Aesthetic Effect</td> <td>1</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>  Other Chemicals</td> <td>1</td> </tr> <tr> <td>  Water</td> <td>2</td> </tr> <tr> <td>  Self 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>1</td> </tr> <tr> <td>Flammability (Red)</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>0</td> </tr> </tbody> </table> <p style="text-align: center;"><b>12 PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 Physical State at 15°C and 1 atm: Liquid                  12.2 Molecular Weight: 58.08                  12.3 Boiling Point at 1 atm: 133°F = 56.1°C = 329.3°K                  12.4 Freezing Point: -138°F = -94.7°C = 178.5°K                  12.5 Critical Temperature: 455°F = 235°C = 508°K                  12.6 Critical Pressure: 682 psia = 46.4 atm = 4.70 MN/m<sup>2</sup>                  12.7 Specific Gravity: 0.791 at 20°C (liquid)                  12.8 Liquid Surface Tension: Not pertinent                  12.9 Liquid Water Interfacial Tension: Not pertinent                  12.10 Vapor (Gas) Specific Gravity: 2.0                  12.11 Ratio of Specific Heats of Vapor (Gas): 1.127                  12.12 Latent Heat of Vaporization: 220 Btu/lb = 122 cal/g = 5.11 X 10<sup>4</sup> J/kg                  12.13 Heat of Combustion: -12,250 Btu/lb = -6808 cal/g = -285.0 X 10<sup>4</sup> 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: 23.42 cal/g                  12.26 Limiting Value: Data not available                  12.27 Reid Vapor Pressure: 7.25 psia</p> <p style="text-align: center;"><b>NOTES</b></p>	Category	Rating	Fire	3	Health		Vapor Irritant	1	Liquid or Solid Irritant	0	Poisons	0	Water Pollution		Human Toxicity	1	Aquatic Toxicity	1	Aesthetic Effect	1	Reactivity		Other Chemicals	1	Water	2	Self Reaction	0	Category	Classification	Health Hazard (Blue)	1	Flammability (Red)	3	Reactivity (Yellow)	0
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# BENZENE

**BNZ**

<b>Common Symptoms</b>	Watery liquid	Colorless	Gasoline-like odor
Benzol Benzole	Floats on water Flammable, irritating vapor is produced Freezing point is 42°F		
<p>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 Stay upwind and use water spray to "knock down" vapor. Isolate and remove discharged material Notify local health and pollution control agencies</p>			
<b>Fire</b>	<p><b>FLAMMABLE</b> 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</p>		
<b>Exposure</b>	<p>CALL FOR MEDICAL AID</p> <p><b>VAPOR</b> 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</p> <p><b>LIQUID</b> 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.</p>		
<b>Water Pollution</b>	<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>		
<b>1 RESPONSE TO DISCHARGE</b>		<b>2. LABEL</b>	
(See Response Methods Handbook) Issue warning-high flammability Restrict access		<p>2 1 Category Flammable liquid 2 2 Class. 3</p>	
<b>3 CHEMICAL DESIGNATIONS</b>		<b>4 OBSERVABLE CHARACTERISTICS</b>	
<p>3 1 CG Compatibility Class Aromatic Hydrocarbon 3 2 Formula C<sub>6</sub>H<sub>6</sub> 3 3 IMO/UN Designation 3 2/1114 3 4 DOT ID No. 1114 3 5 CAS Registry No. 71-43-2</p>		<p>4.1 Physical State (as shipped) Liquid 4.2 Color: Colorless 4 3 Odor: Aromatic, rather pleasant aromatic odor, characteristic odor</p>	
<b>5 HEALTH HAZARDS</b>			
<p>5 1 Personal Protective Equipment: Hydrocarbon vapor canister, supplied air or a nose 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, excitation, 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 Limits. 75 ppm for 30 min. 5.6 Toxicity by Ingestion Grade 3; LD50 = 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 smarting and reddening of the skin. 5 10 Odor Threshold 4 68 ppm 5 11 IDLH Value 2,000 ppm</p>			

<p style="text-align: center;"><b>6. FIRE HAZARDS</b></p> <p>6 1 Flash Point 12°F C.C 6 2 Flammable Limits in Air: 1.3%-7.9% 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 1097°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</p> <p style="text-align: center;"><b>7 CHEMICAL REACTIVITY</b></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;"><b>8. WATER POLLUTION</b></p> <p>8 1 Aquatic Toxicity. 5 ppm/6 hr/minnow/lethal/distilled water 20 ppm/24 hr/sunfish/TL<sub>m</sub>/tap water 8.2 Waterfowl Toxicity: Data not available 8 3 Biological Oxygen Demand (BOD) 1.2 lb/lb, 10 days 8.4 Food Concentration Potential: None</p> <p style="text-align: center;"><b>9. SHIPPING INFORMATION</b></p> <p>9 1 Grades of Purity Industrial pure ..... 99 + % Thiophene-free ..... 99 + % Nitration ..... 99 + % Industrial 90% ..... 85 + % Reagent ..... 99 + % 9.2 Storage Temperature: Open 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-vacuum</p>	<p style="text-align: center;"><b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-T-U-V-W</p> <p style="text-align: center;"><b>11. HAZARD CLASSIFICATIONS</b></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;"> <tr> <td style="text-align: right;">Category</td> <td style="text-align: right;">Rating</td> </tr> <tr> <td>Fire .....</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Vapor Irritant</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="padding-left: 20px;">Liquid or Solid Irritant</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="padding-left: 20px;">Poisons</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Human Toxicity</td> <td style="text-align: right;">3</td> </tr> <tr> <td style="padding-left: 20px;">Aquatic Toxicity</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="padding-left: 20px;">Aesthetic Affect</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Other Chemicals</td> <td style="text-align: right;">2</td> </tr> <tr> <td style="padding-left: 20px;">Water</td> <td style="text-align: right;">1</td> </tr> <tr> <td style="padding-left: 20px;">Self Reaction</td> <td style="text-align: right;">0</td> </tr> <tr> <td>11.3 NFPA Hazard Classification</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Category</td> <td style="text-align: right;">Classification</td> </tr> <tr> <td style="padding-left: 20px;">Health Hazard (Blue)</td> <td style="text-align: right;">2</td> </tr> <tr> <td style="padding-left: 20px;">Flammability (Red)</td> <td style="text-align: right;">3</td> </tr> <tr> <td style="padding-left: 20px;">Reactivity (Yellow)</td> <td style="text-align: right;">0</td> </tr> </table> <p style="text-align: center;"><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>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 = 5.6°C = 278.7°K 12 5 Critical Temperature 552.0°F = 288.9°C = 562.1°K 12 6 Critical Pressure 710 psia = 48.3 atm = 4 89 MN/m<sup>2</sup> 12 7 Specific Gravity: 0.879 at 20°C (liquid) 12 8 Liquid Surface Tension: 28.9 dynes/cm = 0 289 N/m at 20°C 12 9 Liquid Water Interfacial Tension: 35 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: 189 Btu/lb = 94.1 cal/g = 3.94 X 10<sup>6</sup> J/kg 12 13 Heat of Combustion -17,480 Btu/lb = -9698 cal/g = -406.0 X 10<sup>3</sup> 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. 30.45 cal/g 12.26 Limiting Value Data not available 12.27 Reid Vapor Pressure: 3 22 psia</p> <p style="text-align: center;"><b>NOTES</b></p>	Category	Rating	Fire .....	3	Health		Vapor Irritant	1	Liquid or Solid Irritant	1	Poisons	3	Water Pollution		Human Toxicity	3	Aquatic Toxicity	1	Aesthetic Affect	3	Reactivity		Other Chemicals	2	Water	1	Self Reaction	0	11.3 NFPA Hazard Classification		Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	0
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<b>BNZ</b>	<b>BENZENE</b>
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12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit- inch per hour- square foot-F	Temperature (degrees F)	Centipoise
55	55.330	45	394	75	.988	55	.724
60	55.140	50	396	80	.981	60	.693
65	54.960	55	.398	85	.975	65	.665
70	54.770	60	400	90	.969	70	.638
75	54.580	65	403	95	.962	75	.612
80	54.400	70	405	100	.956	80	.588
85	54.210	75	407	105	.950	85	.566
90	54.030	80	.409	110	.944	90	.544
95	53.840	85	411	115	.937	95	.524
100	53.660	90	414	120	.931	100	.505
105	53.470	95	416	125	.925	105	.487
110	53.290	100	418	130	.919	110	.470
115	53.100			135	.912	115	.453
120	52.920			140	.906	120	.438
125	52.730			145	.900		
130	52.540			150	.893		
135	52.360			155	.887		
140	52.170			160	.881		
145	51.990			165	.875		
150	51.800			170	.868		
155	51.620						
160	51.430						
165	51.250						
170	51.060						
175	50.870						

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
77.02	180	50	.881	50	.01258	0	.204
		60	1.171	60	0.1639	25	.219
		70	1.535	70	.02109	50	.234
		80	1.989	80	.02681	75	.248
		90	2.547	90	.03371	100	.261
		100	3.227	100	.04196	125	.275
		110	4.049	110	.05172	150	.288
		120	5.033	120	.06317	175	.301
		130	6.201	130	.07652	200	.313
		140	7.577	140	.09194	225	.325
		150	9.187	150	.10960	250	.337
		160	11.060	160	.12980	275	.349
		170	13.220	170	.15270	300	.360
		180	15.700	180	.17850	325	.371
		190	18.520	190	.20750	350	.381
		200	21.740	200	.23970	375	.392
		210	25.360	210	.27560	400	.402
						425	.412
						450	.421
						475	.431
						500	.440
						525	.449
						550	.457
						575	.465
						600	.474

# ETHYLBENZENE

ETB

<b>Common Symptoms</b>	Liquid	Colorless	Sweet, gasoline-like odor
Phenylethane EB	Floats on water	Flammable, irritating vapor is produced	
<p>Avoid contact with liquid and vapor Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves) Shut off ignition sources and call fire department Stop discharge if possible. Keep people away Stay upwind and use water spray to "knock down" vapor Isolate and remove discharged material Notify local health and pollution control agencies</p>			
<b>Fire</b>	<p><b>FLAMMABLE</b> Flashback along vapor trail may occur Vapor may explode if ignited in an enclosed area. Wear goggles, self-contained breathing apparatus and rubber overclothing (including gloves) Extinguish with dry chemical, foam, or carbon dioxide Water may be ineffective on fire Cook exposed containers with water</p>		
<b>Exposure</b>	<p><b>CALL FOR MEDICAL AID</b></p> <p><b>VAPOR</b> Irritating to eyes, nose, and throat If inhaled, will cause dizziness and/or difficult breathing Move to fresh air If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen</p> <p><b>LIQUID</b> Will burn skin and eyes Harmful 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 or milk <b>DO NOT INDUCE VOMITING</b></p>		
<b>Water Pollution</b>	<p><b>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS</b> Fouling to shoreline. May be dangerous if it enters water intakes  Notify local health and wildlife officials Notify operators of nearby water intakes</p>		
<b>1 RESPONSE TO DISCHARGE</b>		<b>2 LABEL</b>	
(See Response Methods Handbook) Mechanical containment Should be removed Chemical and physical treatment		2.1 Category Flammable liquid 2.2 Class 3	
<b>3 CHEMICAL DESIGNATIONS</b>		<b>4 OBSERVABLE CHARACTERISTICS</b>	
3.1 CG Compatibility Class Aromatic Hydrocarbon 3.2 Formula C <sub>8</sub> H <sub>10</sub> 3.3 IMO/UN Designation 3.3/1176 3.4 DOT ID No 1176 3.5 CAS Registry No 100-41-4		4.1 Physical State (as shipped) Liquid 4.2 Color Colorless 4.3 Odor: Aromatic	
<b>5 HEALTH HAZARDS</b>			
6.1 Personal Protective Equipment Self-contained breathing apparatus, safety goggles			
6.2 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.			
6.3 Treatment of Exposure <b>INHALATION</b> If ill effects occur, remove to fresh air, keep him warm and quiet, and get medical help promptly; if breathing stops, give artificial respiration. <b>INGESTION</b> induce vomiting only upon physician's approval, material in lung may cause chemical pneumonia. <b>SKIN AND EYES</b> promptly flush with plenty of water (15 min for eyes) and get medical attention, remove and wash contaminated clothing before reuse			
6.4 Threshold Limit Value 100 ppm			
6.5 Short Term Inhalation Limits 200 ppm for 30 min			
6.6 Toxicity by Ingestion Grade 2, LD50 = 0.6 to 5 g/kg (rat)			
6.7 Late Toxicity Data not available			
6.8 Vapor (Gas) Irritant Characteristics Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary.			
6.9 Liquid or Solid Irritant Characteristics Causes smarting of the skin and first-degree burns on short exposure, may cause secondary burns on long exposure.			
6.10 Odor Threshold 140 ppm			
6.11 IDLH Value 2,000 ppm			

<p style="text-align: center;"><b>6 FIRE HAZARDS</b></p> <p>6.1 Flash Point 80°F O.C.; 59°F C.C.</p> <p>6.2 Flammable Limits in Air. 1.0%-6.7%</p> <p>6.3 Fire Extinguishing Agents Foam (most effective), water fog, carbon dioxide or dry chemical</p> <p>6.4 Fire Extinguishing Agents Not to be Used Not pertinent</p> <p>6.5 Special Hazards of Combustion Products Irritating vapors are generated when heated</p> <p>6.6 Behavior in Fire Vapor is heavier than air and may travel considerable distance to the source of ignition and flashback</p> <p>6.7 Ignition Temperature 860°F</p> <p>6.8 Electrical Hazard: Not pertinent</p> <p>6.9 Burning Rate 5.8 mm/min.</p> <p>6.10 Adiabatic Flame Temperature Data not available</p> <p>6.11 Stoichiometric Air to Fuel Ratio. Data not available</p> <p>6.12 Flame Temperature Data not available</p>	<p style="text-align: center;"><b>10 HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-T-U</p>																																				
<p style="text-align: center;"><b>7. CHEMICAL REACTIVITY</b></p> <p>7.1 Reactivity with Water No reaction</p> <p>7.2 Reactivity with Common Materials: No reaction</p> <p>7.3 Stability During Transport: Stable</p> <p>7.4 Neutralizing Agents for Acids and Caustics Not pertinent</p> <p>7.5 Polymerization: Not pertinent</p> <p>7.6 Inhibitor of Polymerization: Not pertinent</p> <p>7.7 Molar Ratio (Reactant to Product). Data not available</p> <p>7.8 Reactivity Group: 32</p>	<p style="text-align: center;"><b>11 HAZARD CLASSIFICATIONS</b></p> <p>11.1 Code of Federal Regulations Flammable liquid</p> <p>11.2 NAS Hazard Rating for Bulk Water Transportation</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Category</td> <td style="text-align: right;">Rating</td> </tr> <tr> <td>Fire</td> <td>3</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Vapor Irritant</td> <td>2</td> </tr> <tr> <td style="padding-left: 20px;">Liquid or Solid Irritant</td> <td>2</td> </tr> <tr> <td style="padding-left: 20px;">Poisons</td> <td>2</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Human Toxicity</td> <td>1</td> </tr> <tr> <td style="padding-left: 20px;">Aquatic Toxicity</td> <td>3</td> </tr> <tr> <td style="padding-left: 20px;">Aesthetic Affect</td> <td>2</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td style="padding-left: 20px;">Other Chemicals</td> <td>1</td> </tr> <tr> <td style="padding-left: 20px;">Water</td> <td>0</td> </tr> <tr> <td style="padding-left: 20px;">Self Reaction</td> <td>0</td> </tr> </table> <p>11.3 NFPA Hazard Classification</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Category</td> <td style="text-align: right;">Classification</td> </tr> <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> </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 Affect	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 style="text-align: center;"><b>8 WATER POLLUTION</b></p> <p>8.1 Aquatic Toxicity: 29 ppm/96 hr/ bluegill/TL<sub>50</sub>/fresh water</p> <p>8.2 Waterfowl Toxicity Data not available</p> <p>8.3 Biological Oxygen Demand (BOD). 2.8% (theor.), 5 days</p> <p>8.4 Food Concentration Potential: None</p>	<p style="text-align: center;"><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 Physical State at 15°C and 1 atm Liquid</p> <p>12.2 Molecular Weight 106.17</p> <p>12.3 Boiling Point at 1 atm 277.2°F = 136.2°C = 409.4°K</p> <p>12.4 Freezing Point -139°F = -95.0°C = 178°K</p> <p>12.5 Critical Temperature, 651.0°F = 343.9°C = 617.1°K</p> <p>12.6 Critical Pressure 523 psia = 35.6 atm = 3.61 MN/m<sup>2</sup></p> <p>12.7 Specific Gravity 0.867 at 20°C (liquid)</p> <p>12.8 Liquid Surface Tension 29.2 dynes/cm = 0.0292 N/m at 20°C</p> <p>12.9 Liquid Water Interfacial Tension 35.48 dynes/cm = 0.03548 N/m at 20°C</p> <p>12.10 Vapor (Gas) Specific Gravity Not pertinent</p> <p>12.11 Ratio of Specific Heats of Vapor (Gas) 1.071</p> <p>12.12 Latent Heat of Vaporization 144 Btu/lb = 80.1 cal/g = 3.35 X 10<sup>6</sup> J/kg</p> <p>12.13 Heat of Combustion: -17 780 Btu/lb = -9877 cal/g = -413.5 X 10<sup>6</sup> J/kg</p> <p>12.14 Heat of Decomposition Not pertinent</p> <p>12.15 Heat of Solution Not pertinent</p> <p>12.16 Heat of Polymerization: Not pertinent</p> <p>12.25 Heat of Fusion: Data not available</p> <p>12.26 Limiting Value: Data not available</p> <p>12.27 Reid Vapor Pressure: 0.4 psia</p>																																				
<b>9 SHIPPING INFORMATION</b>																																					
9.1 Grades of Purity Research grade: 99.98%, 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.																																					
<b>NOTES</b>																																					

ETB

## ETHYLBENZENE

12 17 SATURATED LIQUID DENSITY		12 18 LIQUID HEAT CAPACITY		12 19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit- inch per hour- square foot-F	Temperature (degrees F)	Centipoise
40	54 990	40	.402	-90	1.065	40	.835
50	54 680	50	.404	-80	1.056	50	.774
60	54.370	60	.407	-70	1.047	60	.719
70	54 060	70	.409	-60	1.037	70	.670
80	53 750	80	.412	-50	1 028	80	.626
90	53 430	90	.414	-40	1.018	90	.586
100	53 120	100	.417	-30	1.009	100	.550
110	52 610	110	.419	-20	1.000	110	.518
120	52 500	120	.421	-10	.990	120	.488
130	52 190	130	.424	0	.981	130	.461
140	51 870	140	.426	10	.971	140	.436
150	51 560	150	.429	20	.962	150	.414
160	51 250	160	.431	30	.953	160	.393
170	50 940	170	.434	40	.943	170	.374
180	50 620	180	.436	50	.934	180	.356
190	50 310	190	.439	60	.924	190	.340
200	50 000	200	.441	70	.915	200	.325
210	49 690	210	.443	80	.906	210	.311
				90	.896		
				100	.887		
				110	.877		
				120	.868		
				130	.859		
				140	.849		
				150	.840		
				160	.830		

12 21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12 23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
68 02	020	80	202	80	.00370	-400	-.007
		100	.370	100	.00654	-350	.026
		120	.644	120	.01099	-300	.060
		140	1 071	140	.01767	-250	.093
		160	1 713	160	.02734	-200	.125
		180	2 643	180	.04087	-150	.157
		200	3 953	200	05926	-100	.187
		220	5 747	220	08363	-50	.217
		240	8 147	240	.11520	0	.246
		260	11.290	260	.15510	50	.274
		280	15.320	280	.20490	100	.301
		300	20.410	300	.26570	150	.327
		320	26 730	320	.33910	200	.353
		340	34 460	340	.42620	250	.377
		360	43.800	360	.52850	300	.401
		380	54 950	380	.64720	350	.424
						400	.446
						450	.467
						500	.487
						550	.507
						600	.525

# TOLUENE

TOL

<b>Common Symptoms</b>	Watery liquid	Colorless	Pleasant odor
Toluol Methylbenzene Methylbenzol	Floats on water	Flammable, irritating vapor is produced.	
<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>			
<b>Fire</b>	<p><b>FLAMMABLE</b> 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. Cook exposed containers with water.</p>		
<b>Exposure</b>	<p>CALL FOR MEDICAL AID.</p> <p><b>VAPOR</b> 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 is difficult, give oxygen.</p> <p><b>LIQUID</b> 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>		
<b>Water Pollution</b>	<p>Dangerous to aquatic life in high concentrations. Fouling to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>		
<b>1 RESPONSE TO DISCHARGE</b>		<b>2 LABEL</b>	
(See Response Methods Handbook) Issue warning-high flammability Evacuate area		2.1 Category Flammable liquid 2.2 Class 3	
<b>3 CHEMICAL DESIGNATIONS</b>		<b>4 OBSERVABLE CHARACTERISTICS</b>	
3.1 CG Compatibility Class Aromatic Hydrocarbon 3.2 Formula C <sub>6</sub> H <sub>5</sub> CH <sub>3</sub> 3.3 IMO/UN Designation 3 2/1294 3.4 DOT ID No. 1294 3.5 CAS Registry No. 108-88-3		4.1 Physical State (as shipped) Liquid 4.2 Color: Colorless 4.3 Odor Pungent, aromatic, benzene-like; distinct, pleasant	
<b>5 HEALTH HAZARDS</b>			
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 <b>INHALATION</b> remove to fresh air, give artificial respiration and oxygen if needed, call a doctor. <b>INGESTION</b> do NOT induce vomiting, call a doctor. <b>EYES</b> flush with water for at least 15 min. <b>SKIN</b> wipe off, wash with soap and water. 5.4 Threshold Limit Value 100 ppm 5.5 Short Term Inhalation Limits 600 ppm for 30 min 5.6 Toxicity by Ingestion Grade 2, LD50 = 0.6 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 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 0.17 ppm 5.11 IDLH Value 2,000 ppm			

<p style="text-align: center;"><b>6 FIRE HAZARDS</b></p> <p>6.1 Flash Point: 40°F C.C.; 65° F. O.C.                  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: 997°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.                  6.11 Stoichiometric Air to Fuel Ratio. Data not available.                  6.12 Flame Temperature Data not available.</p> <p style="text-align: center;"><b>7 CHEMICAL REACTIVITY</b></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 (Reagent to Product) Data not available.                  7.8 Reactivity Group: 32.</p> <p style="text-align: center;"><b>8 WATER POLLUTION</b></p> <p>8.1 Aquatic Toxicity: 1180 mg/l/96 hr/sunfish/TL<sub>01</sub>/fresh water                  8.2 Waterfowl Toxicity: Data not available.                  8.3 Biological Oxygen Demand (BOD) 0%, 5 days, 38% (theor.), 8 days                  8.4 Food Concentration Potential. None.</p> <p style="text-align: center;"><b>9. SHIPPING INFORMATION</b></p> <p>9.1 Grades of Purity: Research, reagent, nitration-all 99.8 + %, industrial: contains 94 + %, with 5% xylene 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 style="text-align: center;"><b>10 HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-T-U</p> <p style="text-align: center;"><b>11. HAZARD CLASSIFICATIONS</b></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;"> <tr> <td style="text-align: right;">Category</td> <td style="text-align: right;">Rating</td> </tr> <tr> <td>Fire Health</td> <td style="text-align: right;">3</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;">2</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td>Human Toxicity</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Aquatic Toxicity</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Aesthetic Affect</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>Self 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;">2</td> </tr> <tr> <td>Flammability (Red)</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td style="text-align: right;">0</td> </tr> </table> <p style="text-align: center;"><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></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: 805.4°F = 318.6°C = 591.8°K                  12.6 Critical Pressure: 686.1 psia = 40.66 atm = 4.108 MN/m<sup>2</sup>                  12.7 Specific Gravity. 0.867 at 20°C (liquid)                  12.8 Liquid Surface Tension 29.0 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 10<sup>5</sup> J/kg                  12.13 Heat of Combustion: -17.430 Btu/lb = 9686 cal/g = -4.065 X 10<sup>8</sup> 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 psia</p> <p style="text-align: center;"><b>NOTES</b></p>	Category	Rating	Fire Health	3	Vapor Irritant	1	Liquid or Solid Irritant	1	Poisons	2	Water Pollution		Human Toxicity	1	Aquatic Toxicity	3	Aesthetic Affect	2	Reactivity		Other Chemicals	1	Water	0	Self Reaction	0	11.3 NFPA Hazard Classification		Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	0
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<b>TOL</b>	<b>TOLUENE</b>
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12 17 SATURATED LIQUID DENSITY		12 18 LIQUID HEAT CAPACITY		12 19 LIQUID THERMAL CONDUCTIVITY		12 20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit- inch per hour- square foot-F	Temperature (degrees F)	Centipoise
-30	57 180	0	.396	0	1 026	0	1.024
-20	56 870	5	.397	10	1.015	5	.978
-10	56 550	10	.399	20	1.005	10	.935
0	56 240	15	.400	30	.994	15	.894
10	55 930	20	.402	40	.983	20	.857
20	55 620	25	.403	50	.972	25	.821
30	55 310	30	.404	60	.962	30	.788
40	54 990	35	.406	70	.951	35	.757
50	54 680	40	.407	80	.940	40	.727
60	54 370	45	.409	90	.929	45	.700
70	54 060	50	.410	100	.919	50	.673
80	53 750	55	.411	110	.908	55	.649
90	53 430	60	.413	120	.897	60	.625
100	53 120	65	.414	130	.886	65	.603
110	52 810	70	.415	140	.876	70	.582
120	52 500	75	.417	150	.865	75	.562
		80	.418	160	.854	80	.544
		85	.420	170	.843	85	.526
		90	.421	180	.833	90	.509
		95	.422	190	.822	95	.493
		100	.424	200	.811	100	.477
		105	.425	210	.800		
		110	.427				
		115	.428				
		120	.429				
		125	.431				

12 21 SOLUBILITY IN WATER		12 22 SATURATED VAPOR PRESSURE		12 23 SATURATED VAPOR DENSITY		12 24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
68 02	050	0	.038	0	.00070	0	.228
		10	.057	10	.00103	25	.241
		20	.084	20	.00150	50	.255
		30	.121	30	.00212	75	.268
		40	.172	40	.00296	100	.281
		50	.241	50	.00405	125	.294
		60	.331	60	.00547	150	.306
		70	.449	70	.00727	175	.319
		80	.600	80	.00954	200	.331
		90	.792	90	.01237	225	.343
		100	1.033	100	.01584	250	.355
		110	1 332	110	.02007	275	.367
		120	1.700	120	.02518	300	.378
		130	2 148	130	.03127	325	.389
		140	2 690	140	.03850	350	.400
		150	3.338	150	.04700	375	.411
		160	4 109	160	.05691	400	.422
		170	5 018	170	.06840	425	.432
		180	6.083	180	.08162	450	.443
		190	7.323	190	.09675	475	.453
		200	8 758	200	.11400	500	.462
		210	10 410	210	.13340	525	.472
						550	.482
						575	.491
						600	.500

# m-XYLENE

XLM

<b>Common Symptoms</b>	Watery liquid	Colorless	Sweet odor
1,3-Dimethylbenzene Xylo	Floats on water	Flammable, irritating vapor is produced	
<p>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.</p>			
<b>Fire</b>	<p><b>FLAMMABLE</b>                  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 on fire                  Cool exposed containers with water</p>		
<b>Exposure</b>	<p><b>CALL FOR MEDICAL AID</b></p> <p><b>VAPOR</b>                  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</p> <p><b>LIQUID</b>                  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  <b>DO NOT INDUCE VOMITING.</b></p>		
<b>Water Pollution</b>	<p><b>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.</b>                  Fouling to shoreline                  May be dangerous if it enters water intakes.                  Notify local health and wildlife officials                  Notify operators of nearby water intakes</p>		
<b>1 RESPONSE TO DISCHARGE</b>		<b>2. LABEL</b>	
(See Response Methods Handbook) Issue warning-high flammability Evacuate area Should be removed Chemical and physical treatment		2.1 Category: Flammable liquid 2.2 Class 3	
<b>3 CHEMICAL DESIGNATIONS</b>		<b>4 OBSERVABLE CHARACTERISTICS</b>	
3 1 CG Compatibility Class    Aromatic Hydrocarbon 3 2 Formula    m-C <sub>6</sub> H <sub>4</sub> (CH <sub>3</sub> ) <sub>2</sub> 3 3 IMO/UN Designation:    3 2/1307 3 4 DOT ID No    1307 3 6 CAS Registry No    108-38-3		4.1 Physical State (as shipped) Liquid 4 2 Color: Colorless 4 3 Odor: Like benzene, characteristic aromatic	
<b>5 HEALTH HAZARDS</b>			
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 <b>INHALATION</b> remove to fresh air, administer artificial respiration and oxygen if required, call a doctor. <b>INGESTION</b> do NOT induce vomiting, call a doctor. <b>EYES</b> flush with water for at least 15 min. <b>SKIN</b> wipe off, wash with soap and water. 5 4 Threshold Limit Value    100 ppm 5 5 Short Term Inhalation Limits    300 ppm for 30 min 5 6 Toxicity by Ingestion    Grade 3, LD50 = 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 or clothing 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			

<p style="text-align: center;"><b>6. FIRE HAZARDS</b></p> <p>6.1 Flash Point    84°F C C                  6.2 Flammability 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 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    888°F                  6.8 Electrical Hazard: Class I, Group D                  6.9 Burning Rate    5.8 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</p>	<p style="text-align: center;"><b>10 HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-T-U</p> <p style="text-align: center;"><b>11. HAZARD CLASSIFICATIONS</b></p> <p>11.1 Code of Federal Regulations                  Flammable liquid</p> <p>11.2 NAS Hazard Rating for Bulk Water Transportation</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Rating</th> </tr> <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 Affect</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> </table> <p>11.3 NFPA Hazard Classification</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Classification</th> </tr> <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> </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 Affect	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 style="text-align: center;"><b>7 CHEMICAL REACTIVITY</b></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;"><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 Physical State at 15°C and 1 atm: Liquid                  12.2 Molecular Weight. 106.16                  12.3 Boiling Point at 1 atm    269.4°F = 131.8°C = 405.1°K                  12.4 Freezing Point    -64.2°F = -47.9°C = 225.3°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<sup>2</sup>                  12.7 Specific Gravity: 0.864 at 20°C (liquid)                  12.8 Liquid Surface Tension    28.6 dynes/cm = 0.0286 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 = 81.9 cal/g = 3.43 x 10<sup>5</sup> J/kg                  12.13 Heat of Combustion. -17,654 Btu/lb = -8752.4 cal/g = -406.31 x 10<sup>3</sup> 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</p>																																				
<p style="text-align: center;"><b>8. WATER POLLUTION</b></p> <p>8 1 Aquatic Toxicity: 22 ppm/96 hr/bluegill/TL<sub>50</sub>/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 Concentration Potential    Data not available</p>	<p style="text-align: center;"><b>9. SHIPPING INFORMATION</b></p> <p>9 1 Grades of Purity:                  Research: 99.99%;                  Pure: 99.9%, Technical. 99.2%                  9.2 Storage Temperature: Ambient                  9.3 Inert Atmosphere: No requirement                  9.4 Venting    Open (flame arrester) or pressure-vacuum</p>																																				
<b>NOTES</b>																																					

<b>XLM</b>	<b>m-XYLENE</b>
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12 17 SATURATED LIQUID DENSITY		12 18 LIQUID HEAT CAPACITY		12 19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit- inch per hour- square foot-F	Temperature (degrees F)	Centipoise
15	55 400	40	.387	35	.962	15	.938
20	55.260	50	.393	40	.953	20	.898
25	55 130	60	.398	45	.944	25	.862
30	54 990	70	.404	50	.935	30	.827
35	54 850	80	.410	55	.926	35	.794
40	54 710	90	.415	60	.917	40	.764
45	54 570	100	.421	65	.908	45	.735
50	54 430	110	.426	70	.899	50	.708
55	54 290	120	.432	75	.890	55	.682
60	54 160	130	.437	80	.881	60	.658
65	54 020	140	.443	85	.873	65	.635
70	53 880	150	.448	90	.864	70	.613
75	53 740	160	.454	95	.855	75	.592
80	53 600	170	.460	100	.846	80	.572
85	53 460	180	.465			85	.554
90	53 320	190	.471				
95	53 180	200	.476				
100	53 050	210	.482				

12 21 SOLUBILITY IN WATER		12 22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	K	60	.090	60	.00172	0	.247
	N	70	.127	70	.00238	25	.260
	S	80	.177	80	.00324	50	.273
	O	90	.242	90	.00435	75	.286
	L	100	.326	100	.00577	100	.299
	U	110	.434	110	.00754	125	.311
	B	120	.571	120	.00975	150	.324
	L	130	.743	130	.01247	175	.336
	E	140	.956	140	.01577	200	.348
		150	1.219	150	.01977	225	.360
		160	1.538	160	.02455	250	.371
		170	1 924	170	.03023	275	.383
		180	2.388	180	.03691	300	.394
		190	2 939	190	.04473	325	.406
		200	3 590	200	.05382	350	.417
		210	4.355	210	.06431	375	.427
		220	5 247	220	.07635	400	.438
		230	6.282	230	.09009	425	.449
		240	7.476	240	.10570	450	.459
		250	8 846	250	.12330	475	.469
		260	10 410	260	.14310	500	.479
						525	.489
						550	.499
						575	.508
						600	.517

# o-XYLENE

XLO

<b>Common Symptoms</b>	Watery liquid	Colorless	Sweet odor
1,2-Dimethylbenzene Xylol	Floats on water	Flammable, irritating vapor is produced.	
<p>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</p>			
<b>Fire</b>	<p><b>FLAMMABLE</b>                  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 on fire                  Cool exposed containers with water</p>		
<b>Exposure</b>	<p><b>CALL FOR MEDICAL AID</b></p> <p><b>VAPOR</b>                  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</p> <p><b>LIQUID</b>                  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>		
<b>Water Pollution</b>	<p>Dangerous to aquatic life in high concentrations.                  Fouling to shoreline                  May be dangerous if it enters water intakes.                  Notify local health and wildlife officials                  Notify operators of nearby water intakes.</p>		
<b>1 RESPONSE TO DISCHARGE</b>		<b>2 LABEL</b>	
(See Response Methods Handbook) Issue warning-high flammability Evacuate area Should be removed Chemical and physical treatment		2 1 Category Flammable liquid 2 2 Class 3	
<b>3 CHEMICAL DESIGNATIONS</b>		<b>4 OBSERVABLE CHARACTERISTICS</b>	
3 1 CG Compatibility Class Aromatic Hydrocarbon 3 2 Formula o-C <sub>8</sub> H <sub>4</sub> (CH <sub>3</sub> ) <sub>2</sub> 3 3 IMO/UN Designation 3.2/1307 3 4 DOT ID No 1307 3 5 CAS Registry No 95-47 8		4.1 Physical State (as shipped) Liquid 4.2 Color: Colorless 4.3 Odor Benzene-like, characteristic aromatic	
<b>5. HEALTH HAZARDS</b>			
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 Limits: 300 ppm for 30 min.			
5.6 Toxicity by Ingestion Grade 3; LD50 = 50 to 600 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 or 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			

<p style="text-align: center;"><b>6. FIRE HAZARDS</b></p> <p>6.1 Flash Point: 63°F C.C.; 75°F O.C.</p> <p>6.2 Flammable Limits in Air: 1.1%-7.0%</p> <p>6.3 Fire Extinguishing Agents Foam, dry chemical, or carbon dioxide</p> <p>6.4 Fire Extinguishing Agents Not to be Used Water be ineffective.</p> <p>6.5 Special Hazards of Combustion Products: Not pertinent</p> <p>6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back.</p> <p>6.7 Ignition Temperature 869°F</p> <p>6.8 Electrical Hazard Class I, Group D</p> <p>6.9 Burning Rate 5 8 mm/min.</p> <p>6.10 Adiabatic Flame Temperature Data not available</p> <p>6.11 Stoichiometric Air to Fuel Ratio Data not available</p> <p>6.12 Flame Temperature Data not available</p>	<p style="text-align: center;"><b>10 HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-T-U</p> <p style="text-align: center;"><b>11 HAZARD CLASSIFICATIONS</b></p> <p>11.1 Code of Federal Regulations Flammable liquid</p> <p>11.2 NAS Hazard Rating for Bulk Water Transportation</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Category</td> <td style="text-align: right;">Rating</td> </tr> <tr> <td>Fire</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Health</td> <td style="text-align: right;">1</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;">2</td> </tr> <tr> <td>Water Pollution</td> <td style="text-align: right;">1</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;">2</td> </tr> <tr> <td>  Aesthetic Affect</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Reactivity</td> <td style="text-align: right;">0</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>  Self Reaction</td> <td style="text-align: right;">0</td> </tr> </table> <p>11.3 NFPA Hazard Classification</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;">Category</td> <td style="text-align: right;">Classification</td> </tr> <tr> <td>Health Hazard (Blue)</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Flammability (Red)</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td style="text-align: right;">0</td> </tr> </table>	Category	Rating	Fire	3	Health	1	Vapor Irritant	1	Liquid or Solid Irritant	1	Poisons	2	Water Pollution	1	Human Toxicity	3	Aquatic Toxicity	2	Aesthetic Affect	1	Reactivity	0	Other Chemicals	1	Water	0	Self Reaction	0	Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	0
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Reactivity (Yellow)	0																																				
<p style="text-align: center;"><b>7. CHEMICAL REACTIVITY</b></p> <p>7.1 Reactivity with Water: No reaction</p> <p>7.2 Reactivity with Common Materials: No reaction</p> <p>7.3 Stability During Transport: Stable</p> <p>7.4 Neutralizing Agents for Acids and Caustics: Not pertinent</p> <p>7.5 Polymerization: Not pertinent</p> <p>7.6 Inhibitor of Polymerization: Not pertinent</p> <p>7.7 Molar Ratio (Reactant to Product): Data not available</p> <p>7.8 Reactivity Group: 32</p>	<p style="text-align: center;"><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12.1 Physical State at 15°C and 1 atm: Liquid</p> <p>12.2 Molecular Weight: 106.16</p> <p>12.3 Boiling Point at 1 atm: 291.9°F = 144.4°C = 417.6°K</p> <p>12.4 Freezing Point: -13.3°F = -25.2°C = 248.0°K</p> <p>12.5 Critical Temperature: 674.8°F = 357.1°C = 630.3°K</p> <p>12.6 Critical Pressure: 541.5 atm = 36.84 psia = 3.732 MN/m<sup>2</sup></p> <p>12.7 Specific Gravity: 0.880 at 20°C (liquid)</p> <p>12.8 Liquid Surface Tension: 30.53 dynes/cm = 0.03053 N/m at 15.5°C</p> <p>12.9 Liquid Water Interfacial Tension: 36.06 dynes/cm = 0.03606 N/m at 20°C</p> <p>12.10 Vapor (Gas) Specific Gravity: Not pertinent</p> <p>12.11 Ratio of Specific Heats of Vapor (Gas): 1.068</p> <p>12.12 Latent Heat of Vaporization: 149.89 Btu/lb = 82.9 cal/g = 3.47 x 10<sup>4</sup> J/kg</p> <p>12.13 Heat of Combustion: -17,568 Btu/lb = -9754.7 cal/g = -408.41 x 10<sup>3</sup> J/kg</p> <p>12.14 Heat of Decomposition: Not pertinent</p> <p>12.15 Heat of Solution: Not pertinent</p> <p>12.16 Heat of Polymerization: Not pertinent</p> <p>12.25 Heat of Fusion: 30.64 cal/g</p> <p>12.26 Limiting Value: Data not available</p> <p>12.27 Reid Vapor Pressure: 0.28 psia</p>																																				
<p style="text-align: center;"><b>8 WATER POLLUTION</b></p> <p>8.1 Aquatic Toxicity: &gt;100 mg/l/96 hr/D. magna/TL<sub>50</sub>/fresh water</p> <p>8.2 Waterfowl Toxicity: Data not available</p> <p>8.3 Biological Oxygen Demand (BOD): 0 lb/lb, 5 days, 2.5% (theor.), 8 days</p> <p>8.4 Food Concentration Potential: Data not available</p>	<p style="text-align: center;"><b>9. SHIPPING INFORMATION</b></p> <p>9.1 Grades of Purity: Research: 99.99%; Pure: 99.7%; Commercial: 95.0%</p> <p>9.2 Storage Temperature: Ambient</p> <p>9.3 Inert Atmosphere: No action</p> <p>9.4 Venting: Open (flame arrester) or pressure-vacuum</p>																																				
<b>NOTES</b>																																					

<b>XLO</b>	<b>o-XYLENE</b>
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12 17 SATURATED LIQUID DENSITY		12 18 LIQUID HEAT CAPACITY		12 19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit- inch per hour- square foot-F	Temperature (degrees F)	Centipoise
15	56 460	35	.389	35	1 043	15	1.328
20	56 330	40	.391	40	1.035	20	1.263
25	56 190	45	.394	45	1.027	25	1.202
30	56 050	50	.396	50	1.018	30	1 145
35	55 910	55	.398	55	1.010	35	1.092
40	55 770	60	.400	60	1.002	40	1.042
45	55 630	65	.402	65	.993	45	.995
50	55 490	70	.404	70	.985	50	.952
55	55 360	75	.406	75	.977	55	.911
60	55 220	80	.408	80	.969	60	.873
65	55 080	85	.411	85	.960	65	.836
70	54 940	90	.413	90	.952	70	.802
75	54 800	95	.415	95	.944	75	.770
80	54 660	100	.417	100	.935	80	.740
85	54 520					85	.712
90	54 380						
95	54 250						
100	54 110						

12 21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12 23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I	60	.071	60	.00135	0	.261
	N	70	.101	70	.00188	25	.274
	S	80	.141	80	.00258	50	.287
	O	90	.194	90	.00349	75	.299
	L	100	.263	100	.00464	100	.311
	U	110	.352	110	.00611	125	.323
	B	120	.465	120	.00794	150	.335
	L	130	.609	130	.01021	175	.347
	E	140	.787	140	.01298	200	.358
		150	1 007	150	.01634	225	.370
		160	1 227	160	.02038	250	.381
		170	1 605	170	.02520	275	.392
		180	1 999	180	.03090	300	.403
		190	2 469	190	.03759	325	.414
		200	3 028	200	.04539	350	.424
		210	3 686	210	.05443	375	.435
		220	4 456	220	.06484	400	.445
		230	5 352	230	.07674	425	.455
		240	6 389	240	.09030	450	.465
		250	7 581	250	.10560	475	.475
		260	8 947	260	.12290	500	.485
						525	.494
						550	.504
						575	.513
						600	.522

# p-XYLENE

XLP

<b>Common Symptoms</b>	Watery liquid	Colorless	Sweet odor
1,4-Dimethylbenzene Xylol	Floats on water Freezing point is 66°F	Flammable, irritating vapor is produced	
<p>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.</p>			
<b>Fire</b>	<p><b>FLAMMABLE</b> 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 on fire Cool exposed containers with water</p>		
<b>Exposure</b>	<p><b>CALL FOR MEDICAL AID</b></p> <p><b>VAPOR</b> Irritating to eyes, nose, and throat. If inhaled, will cause dizziness, difficult breathing, or loss of consciousness Move to fresh air If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen</p> <p><b>LIQUID</b> Irritating to skin and eyes If swallowed, will cause nausea, vomiting, 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 <b>DO NOT INDUCE VOMITING</b></p>		
<b>Water Pollution</b>	<p><b>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS</b> Fouling to shoreline May be dangerous if it enters water intakes  Notify local health and wildlife officials Notify operators of nearby water intakes</p>		
<b>1 RESPONSE TO DISCHARGE</b>		<b>2 LABEL</b>	
(See Response Methods Handbook) Issue warning-high flammability Evacuate area Should be removed Chemical and physical treatment		<p>2 1 Category Flammable liquid 2 2 Class 3</p>	
<b>3 CHEMICAL DESIGNATIONS</b>		<b>4 OBSERVABLE CHARACTERISTICS</b>	
<p>3 1 CG Compatibility Class Aromatic Hydrocarbon 3 2 Formula p-C6H4(CH3)2 3 3 IMO/UN Designation 3.2/1307 3 4 DOT ID No 1307 3 5 CAS Registry No 106-42-3</p>		<p>4 1 Physical State (as shipped) Liquid 4 2 Color Colorless 4 3 Odor: Like benzene, characteristic aromatic</p>	
<b>5 HEALTH HAZARDS</b>			
<p>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 Limits 300 ppm for 30 min. 5 6 Toxicity by Ingestion Grade 3, LD50 = 60 to 600 mg/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</p>			

<p style="text-align: center;"><b>6 FIRE HAZARDS</b></p> <p>6 1 Flash Point 81°F C.C. 6 2 Flammable Limits in Air: 1.1%-6.6% 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: 870°F 6 8 Electrical Hazard Class I, Group D 6 9 Burning Rate: 5.8 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</p>	<p style="text-align: center;"><b>10 HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-T-U</p>																																						
<p style="text-align: center;"><b>7. CHEMICAL REACTIVITY</b></p> <p>7 1 Reactivity with Water No reaction 7 2 Reactivity with Common Metals: No reaction 7 3 Stability DUNSTON 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;"><b>11 HAZARD CLASSIFICATIONS</b></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;"> <tr> <td style="text-align: right;">Category</td> <td style="text-align: right;">Rating</td> </tr> <tr> <td>Fire</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Health</td> <td style="text-align: right;">1</td> </tr> <tr> <td>  Liquid 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;">2</td> </tr> <tr> <td>Water Pollution</td> <td style="text-align: right;">1</td> </tr> <tr> <td>  Human Toxicity</td> <td style="text-align: right;">1</td> </tr> <tr> <td>  Aquatic Toxicity</td> <td style="text-align: right;">3</td> </tr> <tr> <td>  Aesthetic Affect</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Reactivity</td> <td style="text-align: right;">1</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>  Self Reaction</td> <td style="text-align: right;">0</td> </tr> <tr> <td>11.3 NFPA Hazard Classification</td> <td style="text-align: right;">2</td> </tr> <tr> <td>  Category</td> <td style="text-align: right;">2</td> </tr> <tr> <td>  Health Hazard (Blue)</td> <td style="text-align: right;">2</td> </tr> <tr> <td>  Flammability (Red)</td> <td style="text-align: right;">3</td> </tr> <tr> <td>  Reactivity (Yellow)</td> <td style="text-align: right;">0</td> </tr> </table>	Category	Rating	Fire	3	Health	1	Liquid Irritant	1	Liquid or Solid Irritant	1	Poisons	2	Water Pollution	1	Human Toxicity	1	Aquatic Toxicity	3	Aesthetic Affect	2	Reactivity	1	Other Chemicals	1	Water	0	Self Reaction	0	11.3 NFPA Hazard Classification	2	Category	2	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	0
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<p style="text-align: center;"><b>8. WATER POLLUTION</b></p> <p>8 1 Aquatic Toxicity: 22 ppm/96/hr/ bluegill/TL<sub>50</sub>/fresh water 8 2 Waterfowl Toxicity Data not available 8 3 Biological Oxygen Demand (BOD): 0 lb/lb in 5 days 8 4 Food Concentration Potential Data not available</p>	<p style="text-align: center;"><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> <p>12 1 Physical State at 15°C and 1 atm Liquid 12 2 Molecular Weight: 106.16 12 3 Boiling Point at 1 atm: 280.9°F = 138.3°C = 411.6°K 12 4 Freezing Point: 66.9°F = 13.3°C = 286.6°K 12 5 Critical Temperature: 649.4°F = 343.0°C = 616.2°K 12 6 Critical Pressure 509.4 atm = 34.65 psia = 3.510 MN/m<sup>2</sup> 12 7 Specific Gravity: 0.861 at 20°C (liquid) 12 8 Liquid Surface Tension: 28.3 dynes/cm = 0.0283 N/m at 20°C 12 9 Liquid Water Interfacial Tension: 37.8 dynes/cm = 0.0378 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 150 Btu/lb = 81 cal/g = 3.4 x 10<sup>5</sup> J/kg 12 13 Heat of Combustion -17,659 Btu/lb = -9764.7 cal/g = -406.41 x 10<sup>3</sup> 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 37.63 cal/g 12 26 Limiting Value Data not available 12 27 Reid Vapor Pressure: 0.34 psia</p>																																						
<b>9. SHIPPING INFORMATION</b>																																							
<p>9 1 Grades of Purity Research 99.99%; Pure: 99.8%; Technical: 99.0% 9 2 Storage Temperature Ambient 9 3 Inert Atmosphere: No requirement 9 4 Venting. Open (flame arrester) or pressure-vacuum</p>																																							
<b>NOTES</b>																																							

<b>XLP</b>	<b>p-XYLENE</b>
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12 17 SATURATED LIQUID DENSITY		12 18 LIQUID HEAT CAPACITY		12 19 LIQUID THERMAL CONDUCTIVITY		12 20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit- inch per hour- square foot-F	Temperature (degrees F)	Centipoise
60	53.970	60	.412	60	.935	60	.678
65	53.830	70	.418	65	.928	65	.654
70	53.690	80	.424	70	.921	70	.631
75	53.550	90	.429	75	.914	75	.610
80	53.410	100	.435	80	.907	80	.590
85	53.270	110	.440	85	.900	85	.571
90	53.140	120	.446	90	.892	90	.552
95	53.000	130	.451	95	.885	95	.535
100	52.860	140	.457	100	.878	100	.519
105	52.720	150	.462			105	.503
110	52.580	160	.468			110	.488
115	52.440	170	.474			115	.474
120	52.300	180	.479			120	.460
		190	.485				
		200	.490				
		210	.496				
		220	.501				
		230	.507				
		240	.512				
		250	.518				
		260	.524				
		270	.529				
		280	.535				

12 21 SOLUBILITY IN WATER		12 22 SATURATED VAPOR PRESSURE		12 23 SATURATED VAPOR DENSITY		12 24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I	60	.096	60	.00183	0	.246
	N	70	.135	70	.00252	25	.259
	S	80	.187	80	.00343	50	.272
	O	90	.255	90	.00459	75	.285
	L	100	.343	100	.00607	100	.297
	U	110	.456	110	.00792	125	.309
	B	120	.599	120	.01022	150	.321
	L	130	.777	130	.01303	175	.333
	E	140	.998	140	.01646	200	.345
		150	1.270	150	.02059	225	.357
		160	1.600	160	.02553	250	.368
		170	1.998	170	.03138	275	.380
		180	2.475	180	.03826	300	.391
		190	3.041	190	.04629	325	.402
		200	3.710	200	.05561	350	.413
		210	4.493	210	.06636	375	.424
		220	5.407	220	.07867	400	.435
		230	6.465	230	.09270	425	.445
		240	7.683	240	.10860	450	.456
		250	9.080	250	.12650	475	.466
		260	10.670	260	.14670	500	.476
						525	.486
						550	.496
						575	.505
						600	.515

# PETROLEUM NAPHTHA

PTN

<b>Common Symptoms</b>	Liquid Petroleum solvent	Colorless Floats on water Flammable vapor is produced	Gasoline odor
<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 Isolate and remove discharged material Notify local health and pollution control agencies.</p>			
<b>Fire</b>	<p><b>FLAMMABLE</b> Flashback along vapor trail may occur Vapor may explode if ignited in an enclosed area Extinguish with foam, dry chemical, or carbon dioxide. Cool exposed containers with water</p>		
<b>Exposure</b>	<p>CALL FOR MEDICAL AID <b>VAPOR</b> Not irritating to eyes, nose, or throat <b>LIQUID</b> Harmful if swallowed IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk DO NOT INDUCE VOMITING</p>		
<b>Water Pollution</b>	<p>Effect of low concentrations on aquatic life is unknown Fouling to shoreline May be dangerous if it enters water intakes Notify local health and wildlife officials Notify operators of nearby water intakes.</p>		
<b>1 RESPONSE TO DISCHARGE</b>		<b>2. LABEL</b>	
(See Response Methods Handbook) Issue warning-high flammability Restrict access Evacuate area		2 1 Category: Flammable liquid 2 2 Class 3	
<b>3 CHEMICAL DESIGNATIONS</b>		<b>4. OBSERVABLE CHARACTERISTICS</b>	
3 1 CG Competibility Class Miscellaneous Hydrocarbon Mixtures 3 2 Formula: Not applicable 3 3 IMO/UN Designation 3 2/1255 3 4 DOT ID No 1255 3 5 CAS Registry No 8030-30-6		4 1 Physical State (as shipped) Liquid 4 2 Color Colorless 4 3 Odor. Like gasoline and kerosene	
<b>5 HEALTH HAZARDS</b>			
5 1 Personal Protective Equipment Goggles or face shield (as for gasoline) 5 2 Symptoms Following Exposure Inhalation of concentrated vapor may cause intoxication Liquid is not very irritating to skin or eyes but may get into lungs by aspiration 5 3 Treatment of Exposure INHALATION: remove victim to fresh air and treat symptoms INGESTION: have victim drink water or milk; do NOT induce vomiting EYES flush with water for 15 min. SKIN. wipe off and wash with soap and water 5 4 Threshold Limit Value No single TLV applicable 5 5 Short Term Inhalation Limits 500 ppm for 30 min. 5 6 Toxicity by Ingestion Grade 2, LD50 = 0.5 to 5 g/kg 5 7 Late Toxicity None 5 8 Vapor (Gas) Irritant Characteristics Vapors are non-irritating to the eyes and throat 5 9 Liquid or Solid Irritant Characteristics No appreciable hazard Practically harmless to the skin 5 10 Odor Threshold Data not available 5 11 IDLH Value 10,000 ppm			

<p style="text-align: center;"><b>6 FIRE HAZARDS</b></p> 6.1 Flash Point 20°F (approx.) C.C. 6.2 Flammable Limits in Air: 0.9% -6.0% 6.3 Fire Extinguishing Agents: Foam, carbon dioxide, or dry chemical 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: Not pertinent 6.7 Ignition Temperature 450°F (approx.) 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate 4 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	<p style="text-align: center;"><b>10. HAZARD ASSESSMENT CODE</b> (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-T-U-V-W</p> <p style="text-align: center;"><b>11. HAZARD CLASSIFICATIONS</b></p> 11 1 Code of Federal Regulations: Flammable liquid 11 2 NAS Hazard Rating for Bulk Water Transportation Not listed 11 3 NFPA Hazard Classification: Not listed
<p style="text-align: center;"><b>7. CHEMICAL REACTIVITY</b></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: 33	<p style="text-align: center;"><b>12. PHYSICAL AND CHEMICAL PROPERTIES</b></p> 12 1 Physical State at 15°C and 1 atm: Liquid 12 2 Molecular Weight Not pertinent 12 3 Boiling Point at 1 atm 207.0°F = 97.2°C = 370.4°K 12 4 Freezing Point: Not pertinent 12 5 Critical Temperature: Not pertinent 12 6 Critical Pressure: Not pertinent 12 7 Specific Gravity: 0.74 at 20°C (liquid) 12 8 Liquid Surface Tension: 19-23 dynes/cm = 0.019-0.023 N/m at 20°C 12 9 Liquid Water Interfacial Tension: 39-51 dynes/cm = 0.039-0.051 N/m at 20°C 12 10 Vapor (Gas) Specific Gravity: Not pertinent 12 11 Ratio of Specific Heats of Vapor (Gas): (est) 1.030 12 12 Latent Heat of Vaporization: 130-150 Btu/lb = 71-81 cal/g = 3.0-3.4 X 10 <sup>5</sup> J/kg 12 13 Heat of Combustion: Data not available 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 style="text-align: center;"><b>8. WATER POLLUTION</b></p> 8 1 Aquatic Toxicity Data not available 8 2 Waterfowl Toxicity Data not available 8 3 Biological Oxygen Demand (BOD) Data not available 8 4 Food Concentration Potential: None	<p style="text-align: center;"><b>9. SHIPPING INFORMATION</b></p> 9.1 Grades of Purity: Data not available 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting. Open (flame arrester) or pressure-vacuum
<b>NOTES</b>	

<b>PTN</b>	<b>PETROLEUM NAPHTHA</b>
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12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit- inch per hour- square foot-F	Temperature (degrees F)	Centipoise
52	46 750	10	.456	50	1.040	50	9.343
54	46 680	15	.459	52	1.040	52	8.841
56	46.610	20	.461	54	1.040	54	8.370
58	46 540	25	.464	56	1.040	56	7.927
60	46 470	30	.467	58	1.040	58	7.511
62	46.400	35	.469	60	1.040	60	7.119
64	46 330	40	.472	62	1.040	62	6.751
66	46 260	45	.474	64	1.040	64	6.404
68	46 190	50	.477	66	1.040	66	6.078
70	46 120	55	.480	68	1.040	68	5.770
72	46 050	60	.482	70	1.040	70	5.481
74	45 980	65	.485	72	1.040	72	5.207
76	45 920	70	.488	74	1.040	74	4.950
78	45 850	75	.490	76	1.040	76	4.707
80	45 780	80	.493	78	1.040	78	4.477
82	45 710	85	.495	80	1.040	80	4.260
84	45 640	90	.498	82	1.040	82	4.056
86	45 570	95	.501	84	1.040	84	3.862
		100	.503	86	1.040	86	3.679
		105	.506	88	1.040	88	3.506
				90	1.040	90	3.342
				92	1.040	92	3.187
				94	1.040	94	3.040
				96	1.040	96	2.901
				98	1.040	98	2.770
				100	1.040	100	2.645

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I	90	.094		N		N
	N	100	.124		O		O
	S	110	.163		T		T
	O	120	.211				
	L	130	.272		P		P
	U	140	.347		E		E
	B	150	.440		R		R
	L	160	.553		T		T
	E	170	.691		I		I
		180	.856		N		N
		190	1.054		E		E
		200	1.290		N		N
		210	1.569		T		T
		220	1.897				
		230	2.281				
		240	2.728				
		250	3.247				
		260	3.846				
		270	4.535				
		280	5.323				
		290	6.221				
		300	7.241				
		310	8.394				
		320	9.695				
		330	11.160				
		340	12.790				

<b>LEAD</b>	<b>Pb</b>
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<b>Physical and Chemical Description</b>	<p>Pb, soft, ductile, gray metal, insoluble in water but dissolves slowly in water containing a weak acid. Because lead is an element, it will remain indefinitely once released to the environment.</p>
<b>Uses</b>	<p>Lead is used in electroplating, radiation protection devices, plastics, electronic equipment, storage batteries, gasoline anti-knock additives, and pigments.</p>
<b>Toxicity in Water</b>	<p>The hazards of human exposure to lead are well known. Symptoms of lead poisoning include fatigue, anemia, abdominal pains, constipation, and neurological damage. The Florida Primary Drinking Water Standard (FAC 17-22) for lead is 50 microgram per liter (<math>\mu\text{g}/\ell</math>).</p> <p>The toxic effects of lead on aquatic organisms is strongly dependent on the water hardness. To protect freshwater aquatic life at hardnesses of 50, 100, and 200 <math>\text{mg}/\ell</math> as calcium carbonate (<math>\text{CaCO}_3</math>), the concentrations of lead should not exceed 0.75, 3.8, and 20 <math>\mu\text{g}/\ell</math>, respectively. To protect saltwater life, lead should not exceed 25 <math>\mu\text{g}/\ell</math>.</p>
<b>Classification</b>	<p>Hazardous Substance (USEPA)  Hazardous Waste Constituent (USEPA)  Priority Toxic Pollutant (USEPA)</p>

## 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 at the perimeter of the sampling site will be established to eliminate access to the area by the individuals not working on the project or involved in the assignment work. The perimeter will be at least 20 feet in radius and moved accordingly with the sampling locations.

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.

- Use the buddy system.
- Smoking, eating, and drinking in the work area prior to decontamination is not permitted.
- Heat stress must be considered in planning work schedules and breaks.
- Hearing protection must be considered when working in the immediate vicinity of the TerraProbe<sup>SM</sup>.
- All personnel must minimize contact with excavated or contaminated materials. Do not place equipment on the ground. Do not sit or kneel on the ground in the exclusion zone. Avoid standing in or walking through puddles or stained soil.
- Maintain monitoring systems. Conditions can change quickly if subsurface areas of contamination are penetrated.
- Personnel must be observant of not only their own immediate surroundings but also that of others. Everyone will be working under constraints; therefore, a team effort is needed to notice and warn of impending dangerous situations. Extra precautions are necessary when working near the TerraProbe<sup>SM</sup>.
- Contact lenses are not allowed to be worn onsite; if corrosive or lachrymose substances enter the eyes, proper flushing is impeded.

## 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 (CRZ). 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 investigation 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 soil 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 cleaned in the field between samples with soapy water (Alconox™), rinsed with clean water, rinsed with an approved Quality Assurance/Quality Control solvent, and given a final rinse with organic free water.

6.1.2 Heavy Equipment Decontamination Drilling and sampling equipment associated with the TerraProbe<sup>SM</sup> will be cleaned in the field between samples in the same manner as small equipment.

6.2 COLLECTION AND DISPOSAL OF DECONTAMINATION PRODUCTS. Investigation-derived wastes will be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left onsite. Potentially contaminated materials (e.g., clothing, gloves, etc.) will be bagged or drummed as necessary and segregated for disposal. Contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with NAS and regulatory provisions. All non-contaminated materials will be collected and bagged for appropriate disposal as normal domestic waste.

## 7.0 EMERGENCY AND CONTINGENCY PLAN

This section identifies emergency and contingency planning that has been undertaken for operations at this site. Most sections of the 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 COMMUNICATION. 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 onsite and offsite will be directed through the HSO or designee. Emergency telephone numbers are listed in Section 9.5.

7.2 EVACUATION. In the event of an emergency situation such as fire, explosion, significant release of toxic gases, etc., an air horn or other appropriate device will be sounded for three long blasts indicating the initiation of evacuation procedures. All personnel will evacuate the work area. The location of safe areas will be upwind of the site. For efficient and safe site evacuation and assessment of the emergency situation, the HSO will have authority to initiate proper action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The HSO must see that access for emergency equipment is provided and that all combustible apparatus have been shut down once the alarm has been sounded.

The HSO will notify local fire and police departments and other appropriate emergency response groups if lower explosive limit (LEL) values are above 20 percent in the work zone, or if an actual fire or explosion has taken place.

7.3 EMERGENCY MEDICAL TREATMENT AND FIRST AID. Any personnel injured onsite will be rendered first aid as appropriate and transported to competent medical facilities for further examination and treatment. Designated emergency medical facilities and routes from the site are listed in Section 8.6. 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 transportation will be authorized. Under no circumstances will injured persons transport themselves to a medical facility for emergency treatment.

## 8.0 SAFE WORK PRACTICES

All personnel onsite are required to promote and follow prudent work practices to provide a safe working environment. All individuals are to follow the guidelines given below for their specific work activities.

Safety practices for sampling activities provide worker protection from chemical hazards associated with the sample materials, preservatives, and chemicals that may be required for equipment decontamination. In addition, the following points of good field practice should be implemented.

- Specified USEPA Region IV sampling techniques should be used.
- Good judgment should be used in collecting and handling samples. (If a proposed sampling site is not readily accessible or the sampling method is unfeasible, sample collection should not be attempted. The TOM and FOL should be contacted to select an alternate sampling site.)
- Spills, dirt, and residue from sampling should be cleaned up immediately.
- Damaged sampling gear or equipment should be repaired or replaced immediately.
- The sampling area should be evacuated if any symptoms of overexposure are detected, and such incidents should be reported to the HSO and TOM.
- Unnecessary physical contact with sample material should be avoided.
- Exposure and environmental monitoring should be performed as required by the HASP.
- Contact with chemicals used for sample preservation or decontamination of sampling equipment should be avoided.
- HASP requirements should be adhered to when handling or packaging hazardous samples. Packaging, labeling, and shipping should conform with the U.S. Department of Transportation regulations.

9.0 ADMINISTRATION

9.1 PERSONNEL AUTHORIZED DOWNRANGE. Personnel authorized to participate in downrange activities at this site have been reviewed and certified for site operations by the TOM and the HSS. Certification involves the completion of appropriate training (including first-aid and cardiopulmonary resuscitation [CPR] training), a medical examination, and a review of this site-specific HASP. All persons entering the site must use the buddy system, and check in with the FOL and/or HSO before going downrange.

CERTIFIED ABB ENVIRONMENTAL TEAM PERSONNEL:

<u>Roger Durham</u>	<u>Jim Williams</u>
<u>Mike Dunaway</u>	<u>John Kaiser</u>
<u>Jay Koch</u>	<u>Celora Jackson</u>
<u>Pamela Wagner</u>	<u>Jack Pittman</u>
<u>James Huffman</u>	_____

OTHER CERTIFIED PERSONNEL:

_____	_____
_____	_____

9.2 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.

_____	_____
Health and Safety Officer	Date
_____	_____
Task Order Manager	Date
_____	_____
Health and Safety Manager/Supervisor	Date

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

NAME: \_\_\_\_\_

DATE: \_\_\_\_\_

SITE/PROJECT: \_\_\_\_\_

9.4 MEDICAL DATA SHEET. This Medical Data Sheet will be completed by all onsite 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: Trumbo Point Fuel Farm, NAS Key West, Key West, Florida

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 ( ) \_\_\_\_\_

9.5 EMERGENCY TELEPHONE NUMBERS

Police Department	911
Ambulance	911
Emergency Room	(305) 294-5531\4764
Primary Hospital	(305) 294-5531
Fire Department	911
Offsite Emergency Services	911
Poison Control Center	(800) 282-3171
National Response Center	(800) 424-8802
Site HSO: <u>Jay Koch - onsite</u>	(904) 656-1293
Field Operations Leader: <u>Roger Durham</u>	(904) 656-1293
Environmental Coordinator: <u>Diane Lancaster</u>	(305) 293-2911
Task Order Manager: <u>Jack Pittman</u>	(904) 656-1293
ABB Environmental HSS: <u>David Daniel</u>	(904) 656-1293 x318
ABB Environmental HSM: <u>C.E. Sundquist</u>	(800) 341-0460 x2101
SOUTHNAVFACENGCOM Engineer-in-Charge (EIC): <u>Luis Vazquez</u>	(803) 743-0613

9.6 ROUTES TO EMERGENCY MEDICAL FACILITIES

The primary source of medical assistance for the site is as follows.

Facility Name: Florida Keys Memorial Hospital

Address: 3900 Junior College Road, Key West, Florida 33040

Telephone Number: (305) 294-5531

Directions to primary source of medical assistance (Figure 9-1):

Exit Trumbo Point Fuel Farm via Trumbo Road. Proceed south for approximately 2 blocks. Turn left on Grinnell St. Go 2 blocks to Eaton St. Turn left on Eaton St. Eaton St. will become Palm Ave. Follow Palm Ave. to Roosevelt Blvd. Turn left on Roosevelt Blvd. Proceed on Roosevelt Blvd. to Highway 1. Turn left on Highway 1. Turn left on Junior College Rd. Follow Junior College Rd. to the hospital. The hospital will be on the right.



**FIGURE 9-1**  
**ROUTE TO KEY WEST MEMORIAL**  
**HOSPITAL FROM TRUMBO POINT**  
**FUEL FARM**

**SOURCE:** U.S.G.S. 7.5 MINUTE SERIES  
 ORTHOPHOTOMAP (TOPOGRAPHIC), OF  
 BOCA CHICA KEY, FLORIDA, 1971; AND  
 KEY WEST, FLORIDA, 1971.



**SITE SPECIFIC**  
**HEALTH AND SAFETY PLAN**

**NAVAL AIR STATION**  
**KEY WEST, 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 or 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 discriminatory action.

## 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 civil penalties against employers of up to \$7,000 for each serious violation and for optional penalties of up to \$7,000 for each nonserious violation. Penalties of up to \$7,000 per day may be proposed for failure to correct violations within the proposed time period and for each day the violation continues beyond the prescribed abatement date. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to \$70,000 for each such violation. A violation of posting requirements can bring a penalty of up to \$7,000.

There are also provisions for criminal penalties. Any willful violation resulting in the death of any 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 both. A second conviction of an employer doubles the possible term of imprisonment. Falsifying records, reports, or applications is punishable by a fine of \$10,000 or up to six months in jail or both.

## 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.

## VOLUNTARY ACTIVITY

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.

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

## 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  
Boston, Massachusetts  
Chicago, Illinois  
Dallas, Texas  
Denver, Colorado  
Kansas City, Missouri  
New York, New York  
Philadelphia, Pennsylvania  
San Francisco, California  
Seattle, Washington

(404) 347-3573  
(617) 565-7164  
(312) 353-2220  
(214) 767-4731  
(303) 844-3061  
(816) 426-5861  
(212) 337-2378  
(215) 596-1201  
(415) 744-6670  
(206) 442-5930

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Lynn Martin, Secretary of Labor  
**U.S. Department of Labor**  
Occupational Safety and Health Administration

To report suspected fire hazards, imminent danger safety and health hazards in the workplace, or other job safety and health emergencies, such as toxic waste in the workplace, call OSHA's 24-hour hotline: 1-800-321-OSHA.