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REMEDIAL INVESTIGATION FEASIBILITY STUDY HEALTH AND SAFETY PLAN FOR
OUTLYING LANDING FIELD BARIN VOLUME 3 OF 3 NAS WHITING FIELD FL
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ABB ENVIRONMENTAL

REMEDIAL INVESTIGATION / FEASIBILITY STUDY

HEALTH AND SAFETY PLAN

VOLUME III

OUTLYING LANDING FIELD (OLF) BARIN

FOLEY, ALABAMA

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August 1992

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

VOLUME III: HEALTH AND SAFETY PLAN

**OUTLYING LANDING FIELD (OLF) BARIN
FOLEY, ALABAMA**

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CPR	cardiopulmonary resuscitation
CRZ	Contamination Reduction Zone
DOT	Department of Transportation
eV	electron volts
FSP	Field Sampling Plan
HASP	Health and Safety Plan
HR	heart rate
HSM	Health and Safety Manager
HSS	Health and Safety Supervisor
HSO	Health and Safety Officer
IDLH	immediately dangerous to life and health
IR	Installation Restoration
LEL	lower explosive limit
NAAS	Naval Auxiliary Air Station
NAS	Naval Air Station
OLF	Outlying Landing Field
OSHA	Occupational Safety and Health Administration
OT	oral temperature
OVA	organic vapor analyzer
PA	Preliminary Assessment
PCBs	polychlorinated biphenyls
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
psi	pounds per square inch
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance and quality control
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
SAP	Sampling and Analysis Plan
SCBA	self-contained breathing apparatus
SI	Site Inspection

GLOSSARY (Continued)

TOM	Task Order Manager
USEPA	U.S. Environmental Protection Agency
UV	ultraviolet
VOCs	volatile organic compounds
WWII	World War II

1.0 INTRODUCTION

1.1 SCOPE AND PURPOSE. This Health and Safety Plan (HASP) has been prepared in conformance with the ABB Environmental Services, Inc. (ABB-ES), 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, the HASP addresses those activities associated with field operations for this project. Compliance with this HASP is required for all ABB-ES personnel, contractor personnel, or third parties entering the site.

This document describes the training, monitoring, and work procedures that will be employed to ensure that the program is implemented as designed. The objectives of this Outlying Landing Field (OLF) Barin HASP are as follows:

- to provide a safe work environment,
- to minimize the risk of human and economic losses,
- to comply with all applicable safety and health laws and regulations,
- to ensure that project work activities are carried out in a safe, efficient manner, and to satisfy project goals.

1.1.1 Remedial Investigation and Feasibility Study (RI/FS) Workplan The RI/FS workplan describes and details regional environmental factors, history and description of the site, previous investigative results, RI/FS tasks, site-specific investigative methodology, project organization, and schedule. The RI/FS workplan includes Volume II, the Sampling and Analysis Plan ([SAP], Part A, Field Sampling Plan [FSP]; and Part B, Quality Assurance Project Plan [QAPP]), and Volume III, this HASP, as separate volumes.

The SAP focuses on the field investigation, analytical methods, and quality assurance and quality control (QA/QC) procedures. The SAP provides a project description, describes site management and field methods, details the technical approach and sampling plans for each site, and describes QA/QC requirements for sample collection and analysis, data assessment, corrective action, and reporting. The SAP focuses on the rationale and details necessary to perform the field and laboratory sampling and analytical program.

The FSP and the QAPP are consolidated into one document (the SAP) to provide a comprehensive document that can be used by field teams onsite. This also avoids triplication of many sections that are common to the Workplan, the SAP, and the QAPP. The common sections are currently duplicated or summarized in both the workplan and the SAP.

This HASP outlines project personnel and corporate health and safety policies; provides a brief site characterization and description of the scope of work; outlines potential hazards, protective measures, and monitoring for each site; and summarizes decontamination procedures. In addition, the HASP includes material safety data sheets for chemicals that may be encountered at the site and provides emergency information, such as a map to the hospital and emergency telephone numbers.

1.1.2 Initial Definition of the Investigation As prescribed by the Installation Restoration (IR) Program for OLF Barin, Foley, Alabama, a Preliminary Assessment (PA) Study was performed. Five potential sources of contamination (sites) were identified during the PA Study and recommended for additional study. A Site Inspection (SI) was conducted at the five identified sites to verify, characterize, and quantify the extent of contamination emanating from each potential source area. Based on the results of the SI, a Phase I Remedial Investigation was recommended to more completely describe the nature and extent of contamination at the sites and to verify the contamination status of five additional areas of potential contamination identified during the SI. The facility sites included in this investigation are listed below:

Investigative Sites

I. Sites Identified during the PA

- Site 19B, Former Hangar Maintenance Area
- Site 20B, Abandoned Underground Storage Tank and Fuel Pit Area
- Site 21B, Rubble Landfill
- Site 22B, Old Firefighting Demonstration Area
- Site 23B, Drainage Ditch Landing to Sandy Creek

II. Sites Identified during the SI

- Site 24B, New Firefighting Training Area
- Site 25B, Machine Gun Butt
- Site 26B, Abandoned Wastewater Treatment Plant
- Site 27B, Uncontrolled Dump Site
- Site 28B, Fuel Pit Drainage Ditch

The objectives of the RI are to collect sufficient data to: characterize and quantify the extent of contamination, to assess potential risks to human health and the environment posed by contaminants of concern, to support a feasibility study (FS) at sites where remedial action is warranted, and to support a Record of Decision (ROD) at all sites.

The FS is designed to evaluate remedial alternatives, conduct treatability studies, and design remedial actions. Remedial actions are performed to mitigate threats to human health and the environment by removing, containing, or treating contaminated matrixes to established target levels.

1.2 ORGANIZATION. The individual chapters of this OLF Barin HASP describe personnel responsibilities, training and medical monitoring requirements, protection and monitoring equipment, work practices, special requirements for work in confined spaces and excavations, decontamination procedures, and emergency planning requirements.

2.0 AUTHORITY AND RESPONSIBILITY OF HEALTH AND SAFETY PERSONNEL

This section describes the health and safety personnel and their general responsibilities for the project. All personnel identified below have completed the 40-hour Occupational Safety and Health Administration (OSHA) training and the American Red Cross cardiopulmonary resuscitation (CPR) and first aid training.

2.1 HEALTH AND SAFETY MANAGER. The Health and Safety Manager (HSM), C.E. Sundquist, can be reached by telephone at (207) 775-5401 in Portland, Maine. The HSM has final authority over health and safety issues that are not resolved at the site or through the Health and Safety Supervisor (HSS), and has overall responsibility for ensuring that the policies and procedures of this HASP are implemented by the Health and Safety Officer (HSO). In the various regions, the HSM may delegate additional functions to the Regional HSS.

2.2 HEALTH AND SAFETY SUPERVISOR. The Health and Safety Supervisor (HSS), Jack Davis, is the health and safety professional serving as the ABB-ES HSM's designee for this project. As such, the HSS will be responsible for: (1) approval of the individual chosen to serve as the site HSO for this field operation; (2) review and approval of site-specific HASPs developed by the HSO, as well as any significant changes made over time to the site-specific HASP; (3) oversight of the daily efforts of the HSO; (4) resolution of site disputes involving health and safety issues; and (5) implementation of the HASP by the HSO. The HSS will notify the HSM of any Stop Work Orders issued by an HSO.

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

2.4 GENERAL SITE SUPERVISOR. Gerald Walker, P.G. is the General Site Supervisor and has vested authority from the TOM to carry out day-to-day site operations.

2.5 HEALTH AND SAFETY OFFICER. Gopikrishna Kanchibhatla has been designated the HSO for the OLF Barin by the TOM with concurrence of the ABB-ES HSS or HSM. The HSO will have an indirect line of reporting to the HSM through the HSS for the duration of his assignment as project HSO. The HSO is responsible for developing and implementing this 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), OSHA, or other governmental agency personnel visiting the OLF Barin 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.

The HSO is vested with the authority to stop site operations by ABB-ES or subcontractor personnel (Stop Work Authority) if he or she determines that an imminent health or safety hazard or other potentially dangerous situation exists. The HSO is to immediately notify the HSS of any Stop Work Orders issued. The HSO may also recommend to the HSS or HSM that the downrange authorization of individual site personnel be revoked for health or safety reasons.

The HSO, through the HSS, ensures that all personnel entering the site are qualified for downrange deployment, in accordance with the CLEAN HASP requirements.

3.0 SITE CHARACTERIZATION AND ANALYSIS

3.1 SITE NAME, LOCATION, AND SIZE. OLF Barin is located in southwest Alabama (Baldwin County), approximately 40 miles southeast of Mobile, Alabama, approximately 10 miles north-northeast of Gulf Shores, Alabama, and 35 miles west of Pensacola, Florida, near the Gulf of Mexico coast (Figure 3-1). Presently, OLF Barin consists of approximately 490 acres, considerably less than the nearly 1,000 acres that comprised the station during World War II (WWII) and the Korean conflict. A major part of the land within the activity boundaries was used for three active airstrips.

3.2 SITE HISTORY AND LAYOUT. The U.S. Navy acquired OLF Barin from the City of Foley, Alabama. At the time of acquisition near the beginning of World War II (WWII), the site consisted of three airstrips covering 310 acres. The Navy acquired another 655 acres east of the original airport to build another three airstrips and an administrative and housing area. The facility was commissioned as Naval Auxiliary Air Station (NAAS) Barin on December 5, 1942.

NAAS Barin was used for basic and advanced air training as well as an indoctrination center for enlisted personnel. On January 5, 1947, NAAS Barin was deactivated. Reactivation of Barin was started in early 1952 and the airfield remained open throughout the Korean conflict until 1959.

After the airfield was closed in 1959, the original airfield on the west side of the facility was transferred back to the City of Foley. The administrative and the housing area north of the hangars was sold to private parties. The four large hangars and all other buildings left on the remaining Navy property were dismantled. Flight operations did not return to Barin until 1985 when pilots from Naval Air Station (NAS) Whiting Field, Milton, Florida, began using the old runways for touch and go landings.

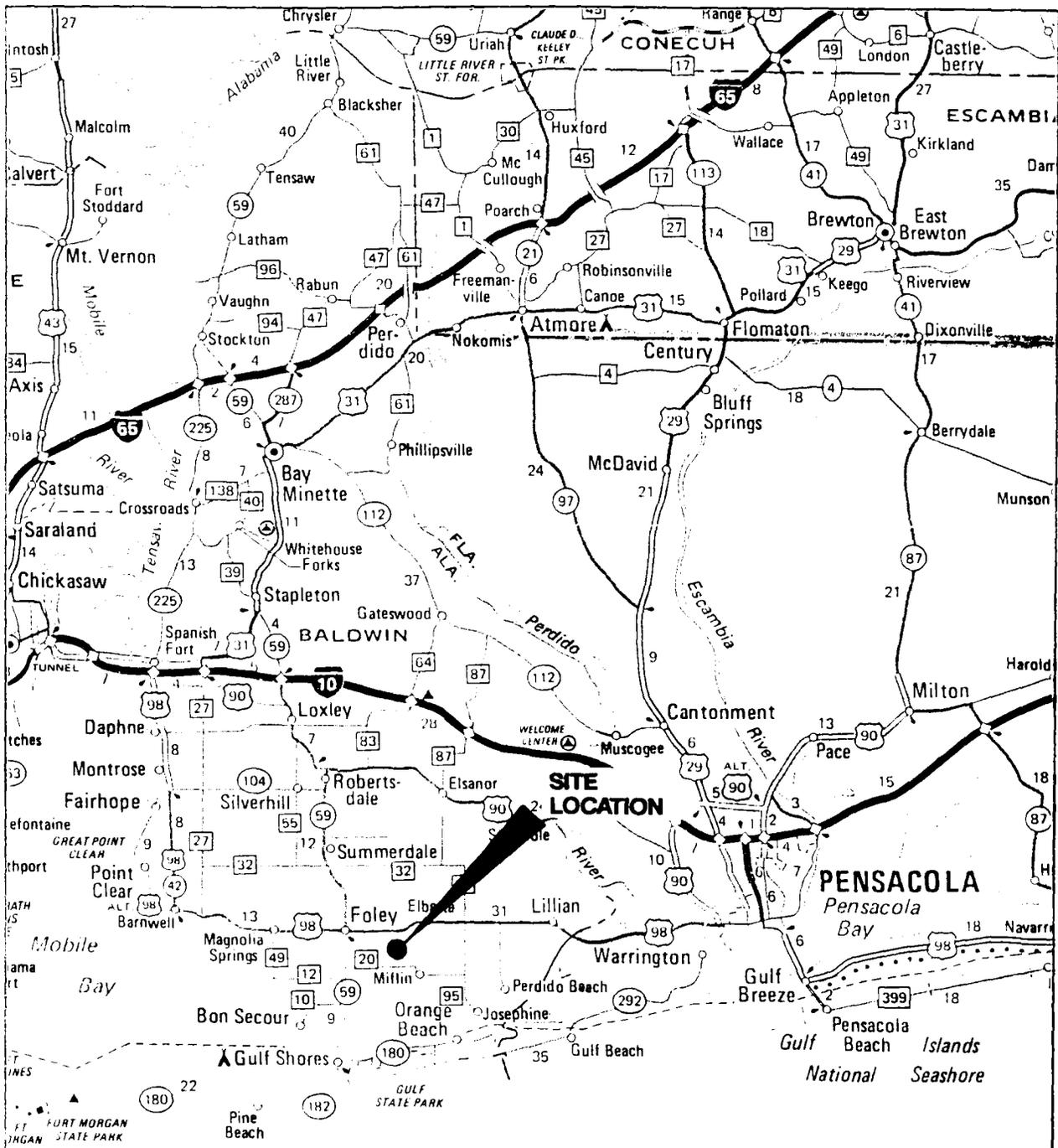
NAS Whiting Field began construction of a crash crew building at OLF Barin in 1985. The station was officially reopened on May 27, 1988, and renamed Outlying Landing Field (OLF) Barin. The existing layout of OLF Barin along with the site locations is shown in Figure 3-2.

As stated above, NAAS Barin was used to train pilots and for aircraft maintenance. Numerous types of solvents, oils, and fuels were used by maintenance personnel in the operations. In 1988, a drinking water supply well located at OLF Barin was discovered to be contaminated with trans-1,2-dichloroethylene, tetrachloroethylene, and trichloroethane. At this time the source of contamination is not known.

Refer to section 4.0 of the Workplan for site-specific descriptions and detailed histories.

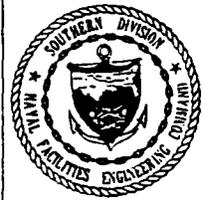
3.3 SCOPE OF WORK (WORKPLAN). To adequately characterize and quantify the extent of contamination, an extensive RI field program was developed. The scope of activities to be conducted during the RI field program include:

- background sampling and reconnaissance,
- surface water and sediment sampling,



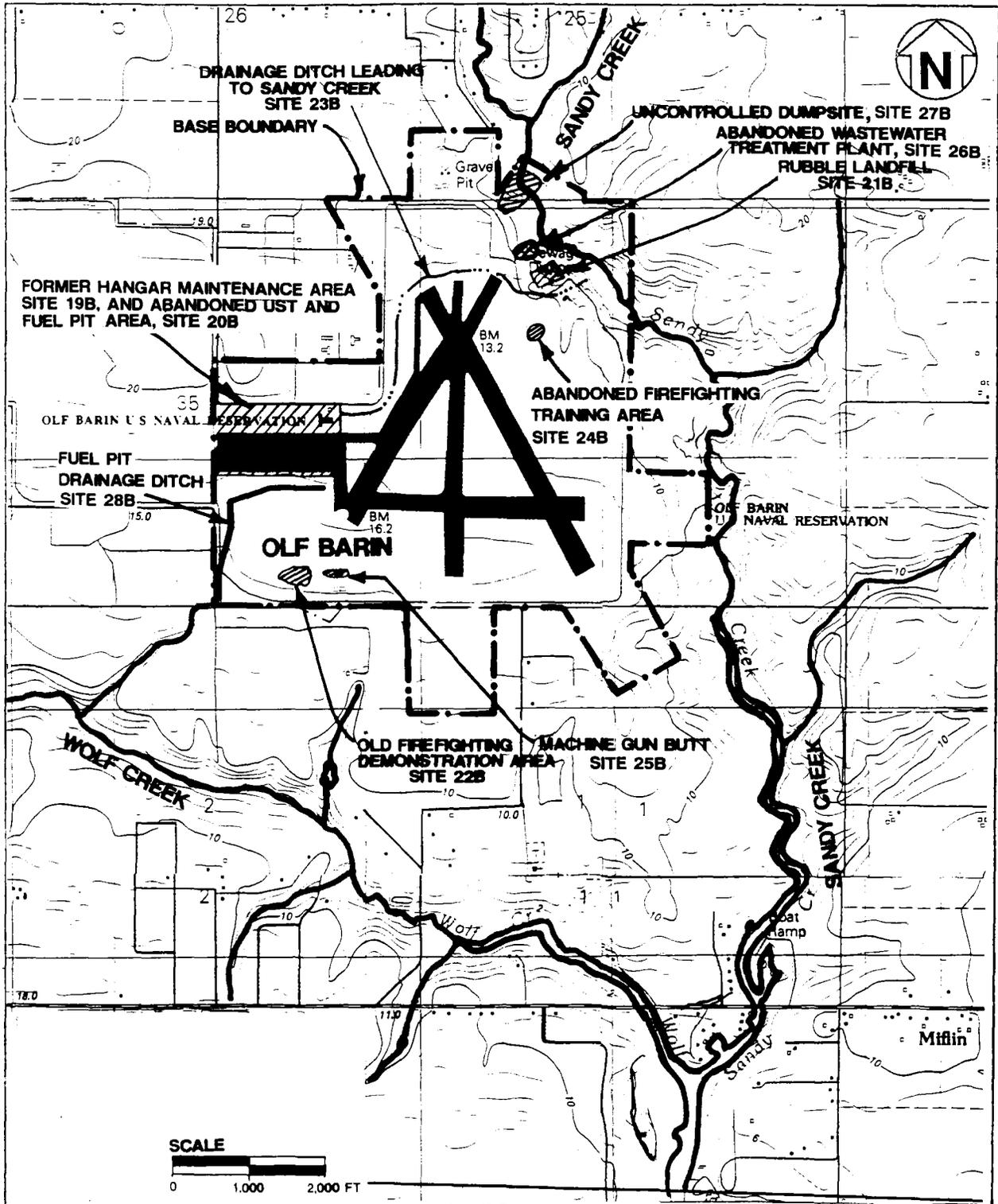
SOURCE: NEESA, 1989

**FIGURE 3-1
LOCATION OF OLF BARIN
FOLEY, ALABAMA**



**REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
HEALTH & SAFETY PLAN**

**OLF BARIN
FOLEY, ALABAMA**



**FIGURE 3-2
SITE LOCATIONS**

SOURCE: MODIFIED FROM USGS
7.5' QUADRANGLE MAP, FOLEY AL, (1980 a)



**REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
HEALTH & SAFETY PLAN**

**OLF BARIN
FOLEY, ALABAMA**

- soil gas survey,
- geophysical investigations,
- test pitting and soil sampling,
- monitoring well installation and groundwater sampling, and
- aquifer characterization.

Sampling and exploration objectives, rationale, locations, methods, and techniques for the above activities are detailed in Sections 5.0 and 6.0 of the Workplan and the Sampling and Analysis Plan, respectively.

Table 6-1 of the Workplan lists investigative objectives for each of the 10 sites and the methods proposed to achieve them.

4.0 HAZARD ANALYSIS

4.1 INVASIVE SAMPLING. Invasive sampling at OLF Barin will include soil boring, test pitting, and monitoring well installation.

4.1.1 Hazardous Substances The contaminants of concern that may be present on the facility, along with any established exposure limits for those substances, are listed in Table 4-1.

4.1.2 Site Risks The following are the health hazards and safety hazards that are expected to be encountered at OLF Barin.

4.1.2.1 Health Hazards Health hazards at OLF Barin consist primarily of potential exposure to contaminated matrices. Contaminants to which personnel may be exposed the identified sites include solvents, fuels, waste oils, polychlorinated biphenyls (PCBs), acids, paint wastes, and kerosene. The primary constituents of those hazardous substances that represent potential health hazards are summarized in Table 4-1.

All activities at OLF Barin will be conducted in unconfined areas. This will minimize the potential for exposure by onsite personnel to high vapor concentrations of any of the substances described above.

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

Lifting of heavy objects should be done with caution. Personnel should assist one another with moving heavy objects or use the appropriate equipment to accomplish these tasks. During all site activities, personnel should be aware of the possibility of an encounter with poisonous snakes, particularly rattlesnakes.

Power substations, powerlines, underground utilities, and underground pipelines are to be avoided during drilling operations. Necessary work permits for activities at the Naval activities will be obtained from the Public Works Department or the appropriate department (e.g., fire department, etc.).

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

**Table 4-1
Contaminants of Concern**

RI/FS Health and Safety Plan
OLF Barin, Foley, Alabama

Chemical	Approximate odor threshold (ppm)	Permissible Exposure Limits (ppm)	Threshold Limit Value (ppm)	Physical Characteristics	Dermal Toxicity	Remarks
Benzene ¹	4.7	1	1	Colorless liquid; pleasant aromatic odor.	Moderate skin irritant.	Inhalation of large amounts attacks central nervous system (CNS); chronic poisoning causes leukemia.
Ethyl benzene	140	100	100	Colorless liquid; aromatic odor.	Moderate skin irritant.	Liquid blisters skin; inhalation results in dizziness and depression.
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.
Cyanide	--	5 mg/m ³	5 mg/m ³	White solid with faint almond odor.	--	Inhalation can cause asphyxia and death.
Mercury	--	--	0.05 mg/m ³	Varies with specific compound.	--	Ingestion can cause spasms.
Lead	--	--	0.15 mg/m ³	Soft, ductile, gray, metal; soluble in water containing a weak acid.	--	Lead poisoning may cause fatigue, anemia, abdominal pains, and neurological damage.
Ethylene dibromide	--	2	2	Clear liquid; mild, sweet odor.	--	Contact causes local inflammation, blisters and ulcers on skin, irritation in lungs and organic injury to liver and kidneys; may be absorbed through skin.
Carbon tetrachloride ²	10	--	5	Liquid; colorless; sweetish aromatic, moderately strong, ethereal odor, somewhat resembles that of chloroform.	Moderate skin irritant.	Dizziness, incoordination, anesthesia; may be accompanied by nausea and liver damage also occurs, often producing decrease or stopping of urinary output.
Trans-1,2-dichloroethylene ³	--	--	200	Liquid; colorless; ethereal, slightly acid, pleasant odor, slightly chloroform like.	--	Inhalation causes nausea, vomiting, weakness, tremor, epigastric cramps, CNS depression. Contact with liquid causes irritation of eyes and (on prolonged contact) skin. Ingestion causes slight depression to deep narcosis.
1,1,1-Trichloroethane	100	10	350	Colorless liquid; sweet odor.	Moderate skin irritant.	Inhalation may cause liver and kidney damage.
1,1,2-Trichloroethylene ³	50	10	10	Colorless liquid; sweet odor.	Can cause dermatitis.	Inhalation may cause eye and nose irritation, blurred vision, nausea, or CNS damage.

See notes at end of table.

**Table 4-1 (Continued)
Contaminants of Concern**

RI/FS Health and Safety Plan
OLF Barin, Foley, Alabama

Chemical	Approximate odor threshold (ppm)	Permissible Exposure Limits (ppm)	Threshold Limit Value (ppm)	Physical Characteristics	Dermal Toxicity	Remarks
Dichloromethane	205-307	--	100	Liquid; colorless; pleasant, aromatic odor, like chloroform, sweet, ethereal.	Moderate skin irritant.	Inhalation causes anesthetic effects, nausea, and drunkenness; contact causes irritation of skin, eyes, and nose
4,4'-DDD ²	--	--	1 mg/m ³	Solid; white	--	Ingestion causes vomiting and delayed symptoms similar to those caused by DDT. Contact with eyes causes irritation.
4,4'-DDE ²	--	--	--	--	--	See DDT.
4,4'-DDT ²	--	--	1 mg/m ³	Solid, white	Moderate skin irritant.	Very large doses are followed promptly by vomiting, due to local gastric irritation; delayed emesis or diarrhoea may occur.
Dieldrin	0.041	--	0.25 mg/m ³	Solid; buff to light brown; mild chemical.	Moderate skin irritant.	Inhalation, ingestion, or skin contact causes irritability, convulsions and/or coma, nausea, vomiting, headache, fainting. Contact with eyes causes irritation.
Tetrachloroethylene	5	--	50	Colorless liquid with an odor like chloroform.	Moderate skin irritant.	Inhalation may irritate eyes and nose and cause CNS damage.

¹ Class 'A' Carcinogen.

² Class 'B' Carcinogen.

³ Class 'C' Carcinogen.

Notes: ppm = parts per million.
4,4'-DDD = dichlorophenyl dichloroethane.
4,4'-DDE = dichlorophenyl dichloroethene.
4,4'-DDT = dichlorophenyl trichloroethane.
mg/m³ = milligrams per cubic meter.

5.0 PERSONAL PROTECTIVE EQUIPMENT

5.1 LEVELS OF PROTECTION AT Outlying Landing Field (OLF) BARIN. Level D protective equipment will be used at OLF Barin. Level D protection should only be used when the atmosphere contains no known hazard, all potential airborne contaminants can be monitored for, and work functions preclude splash, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemical.

5.2 PERSONAL PROTECTION LEVEL DETERMINATION. The level of personal protective equipment required will be determined by the type and levels of waste or spill material present at the site where project personnel may be exposed. In situations where the types of waste or spill material onsite are unknown, the hazards are not clearly established, or the situation changes during onsite activities, the HSO must make a reasonable determination of the level of protection that will ensure the safety of investigators and response personnel until potential hazards have been determined through monitoring, sampling, informational assessment, laboratory analyses, or other reliable methods. Once the hazards have been determined, protective levels commensurate with the hazards will be used. Protection requirements will be evaluated on a continuous basis to reflect new information as it is acquired.

5.3 LEVELS OF PROTECTION (GENERAL). The following subsections describe the basic composition of the generally recognized protective ensembles to be used for site operations. Specific components for any level of protection will be selected based on hazard assessment; additional elements will be added as necessary. Disposable protective clothing, gloves, and other equipment, exclusive of respirators, should be used when feasible to minimize risks during decontamination and possible cross contamination during sample handling.

5.3.1 Level A Level A protection provides the highest level of protection for skin, eyes, and the respiratory system. It is appropriate for conditions where there are potential or actual high concentrations of atmospheric vapors, gases, or particulates. Level A should be used if site operations or work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to the skin or capable of being absorbed through the intact skin. Level A is used primarily for emergency situations or when the following conditions exist: (1) vapors or mists of strong acids, (2) known or probable immediately dangerous to life and health (IDLH) atmospheres with dermally active compounds, (3) high atmospheric concentrations of compounds that can be absorbed through the skin, and (4) operations that must be conducted in a confined, poorly ventilated area, where conditions requiring Level A have not yet been eliminated. The fully encapsulating suit and the pressure-demand self-contained breathing apparatus (SCBA) or hoseline respirator are the key elements in Level A personal protective equipment (PPE).

Level A equipment includes the following items:

- SCBA (pressure demand) or supplied air respirator (pressure demand with escape mask),
- total encapsulating suit,

- coveralls (optional),
- gloves (outer, chemical-resistant),
- gloves (inner, chemical-resistant),
- boots (chemical-resistant, steel-toed, and steel shank),
- hardhat (optional),
- disposable protective suit, gloves, and boots (to be worn over or under encapsulating suit), and
- two-way radios.

5.3.2 Level B Level B protection should be used when the type and atmospheric concentration of substances have been identified and require a high level of protection; however, the atmospheric contaminant, splashing liquid, or other direct contact will not adversely affect or be absorbed through any exposed skin. This includes atmospheres with IDLH concentrations of specific substances that do not (1) represent a severe skin hazard, or (2) meet the criteria for use of air-purifying respirators. Level B has the same protection criteria as Level A; however, the danger of dermal exposure is not as severe.

Level B equipment includes the following items:

- SCBA (pressure demand) or supplied air respirator (pressure demand with escape SCBA),
- hooded chemical-resistant clothing (coated Tyvek™),
- coveralls (optional),
- gloves (outer, chemical-resistant),
- gloves (inner, chemical-resistant),
- boots (chemical-resistant, steel-toed, and steel shank),
- boot covers (chemical-resistant) (optional),
- hardhat (optional),
- two-way radio (optional), and
- face shield (optional).

Wrist and ankle openings should be sealed with duct tape.

5.3.3 Level C Level C protection should be used when the atmospheric contaminant, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin. In addition, the types of air contaminants must have been identified, the concentration measured, and an air-purifying res-

pirator must be available that can remove the contaminants. An air-purifying respirator can only be used if the oxygen content in the air is at least 19.5 percent, the contaminant has adequate warning properties (e.g., odor, taste, and irritating effect thresholds within two times the threshold limit value), the concentration of the contaminant does not exceed the IDLH, and the worker's respirator has been fit-tested. Level C has the same splash protection as Level B; however, cartridge respirators are used instead of SCBAs.

Level C equipment includes the following items:

- full-face respirator (cartridge),
- hooded chemical-resistant clothing (coated Tyvek™),
- coveralls (optional),
- gloves (inner, chemical-resistant),
- gloves (outer, chemical-resistant),
- boots (chemical-resistant, steel-toed, and steel shank),
- boot covers (chemical-resistant) (optional),
- hardhat (optional),
- escape mask (optional),
- two-way radios (optional), and
- face shield (optional).

Wrist and ankle openings should be sealed with duct tape.

5.3.4 Level D Level D is a work uniform affording minimal protection and is used for nuisance contaminants only. Level D protection should only be used when the atmosphere contains no known hazard, all potential airborne contaminants can be monitored for, and work functions preclude splash, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemical.

Level D equipment includes the following items:

- coveralls,
- gloves (optional),
- boots (chemical-resistant, steel-toed, and steel shank),
- boot covers (chemical-resistant) (optional),
- safety glasses or chemical splash goggles (optional),
- hardhat (optional),
- escape mask (optional), and
- face shield (optional).

6.0 MONITORING EQUIPMENT

The work environment at OLF Barin will be monitored to ensure that IDLH or other dangerous conditions are identified. Monitoring will include evaluations for combustible atmospheres, oxygen-deficient environments, hazardous concentrations of airborne contaminants, and radioactivity.

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.

6.1 AIR SAMPLING: EQUIPMENT, CALIBRATION, AND MAINTENANCE (GENERAL). To the extent feasible, the presence of airborne contaminants will be evaluated through the use of direct-reading instrumentation. Information gathered will be used to ensure the adequacy of the levels of protection being used at the site, and may be used as the basis for upgrading or downgrading levels of protection at the discretion of the site HSO.

6.1.1 ISD Dual Detector This meter monitors for combustible gases and oxygen. It can be used to determine (1) if an area contains concentrations of combustible gases with readings as a percentage of the lower explosive limit (LEL); and (2) the percentage of oxygen. This equipment will be calibrated in accordance with the manufacturer's instructions.

6.1.2 NMS MX-241 (Explosimeter) This instrument is calibrated to detect methane and monitors combustible gases as a percentage of the LEL. It will be calibrated in accordance with the manufacturer's instructions.

6.1.3 ISD HS267 This instrument monitors for the presence of hydrogen sulfide in parts per million (ppm). It will be calibrated in accordance with the manufacturer's instructions.

6.1.4 Photovac™ Organic Vapor Analyzer 10S50 The Photovac™ organic vapor analyzer (OVA) is a total organic vapor analyzer capable of detecting volatile organic compounds (VOCs) that can be ionized by ultraviolet (UV) light. Model 10S50 is commonly used onsite to estimate the presence of VOCs for purposes of crew protection, well screen placement, and selection of samples for further analysis. The principle of operation is twofold: (1) the ambient temperature gas chromatograph, which breaks down mixtures of VOCs into individual components identified by retention time; and (2) detection accomplished by ionization in UV light. The charged component then moves to an electrode which, in turn, results in a meter deflection proportional to the concentration of the contaminant. This instrument does not read out directly in ppm unless calibrated against the material being measured; therefore, results must be interpreted conservatively and with care. Calibration and maintenance will be performed in accordance with the manufacturer's instructions.

6.1.5 HNU™ IS101 and Photovac TIP™ Photoionization Detector Like the OVA, the photoionization detector (PID) operates on the basis of ionization of the contaminant, which results in a meter deflection proportional to the concentration of the contaminant. In the PID, ionization is caused by a UV light source. The strength of the UV, measured in electron volts (eV), determines

which contaminants can be ionized. The HNU™ can use three different-strength UV sources, including 9.6, 10.2, and 11.7 eV; only the 10.2- and 11.7-eV probes are currently available for field use. The TIP operates using a UV light source of 10.6 eV. Calibration and maintenance will be performed in accordance with the manufacturer's instructions.

6.1.6 Detector Tubes (MSA™ and Draeger™) A colorimetric detector tube is a direct-reading instrument consisting of a glass tube impregnated with an indicating chemical, which is connected to a piston cylinder or bellows-type pump. A known volume of air is drawn through the glass tube. The contaminant in the air reacts with the indicator chemical, producing a stain the length of which is proportional to the contaminant's concentration. Care must be taken when using the detector tubes because reliability of the results depends on the proper pump calibration, the degree of stability of the reacting chemical, and the ambient temperature. Interfering gases or vapors can also positively or negatively affect measured results. Calibration and maintenance will be performed in accordance with the manufacturer's instructions.

6.2 AIR SAMPLING EQUIPMENT USED AT OLF BARIN. To the extent feasible, the presence of airborne contaminants will be evaluated through the use of direct reading instrumentation. Information gathered will be used to ensure the adequacy of the levels of protection being used at the site, and may be used as the basis for upgrading or downgrading the levels of protection in conformance with action levels provided in this HASP and at the direction of the site HSO.

The following sampling equipment will be used at the Site.

1. Foxboro™ Organic Vapor Analyzer 128
2. HNU™ IS101 or Photovac™ TIP Photoionization Detector

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

6.3 PERSONAL MONITORING: EQUIPMENT, CALIBRATION, AND MAINTENANCE. Personal monitoring will be undertaken to characterize exposure of high-risk employees to hazardous substances encountered onsite.

6.3.1 Personal Sampling Pumps These devices can be worn by an employee to draw air samples through appropriate collection media. The units can be used to draw volumes from 2 to 3 liters per minute. Calibration will be conducted using standard industrial hygiene protocols before and after each sampling session (i.e., each day's use).

6.3.2 Passive Dosimeters or Gas Badges These devices are nonmechanical collection devices used to monitor for organic vapors and various gases. The device is worn by an employee and then sent to an industrial hygiene laboratory for analysis.

6.3.3 Thermoluminescent Dosimetry Body Badges These devices are nonmechanical collection devices used to monitor for x-ray, beta, and gamma radiation exposure. The badges are worn by ABB-ES employees and sent quarterly to Tech/Ops Landauer, Inc., for analysis.

7.0 ZONATION

The site itself will normally be divided into three zones: (1) the majority of the work area, considered the Exclusion Zone; (2) an area for decontamination called the Contamination Reduction Zone (CRZ); and (3) limited areas serving as the Support Zone. The Exclusion Zone and the CRZ will be determined prior to initiation of the field program. These zones will vary depending on the sites being investigated. Figure 7-1 depicts the support zone located adjacent to Building 2768.

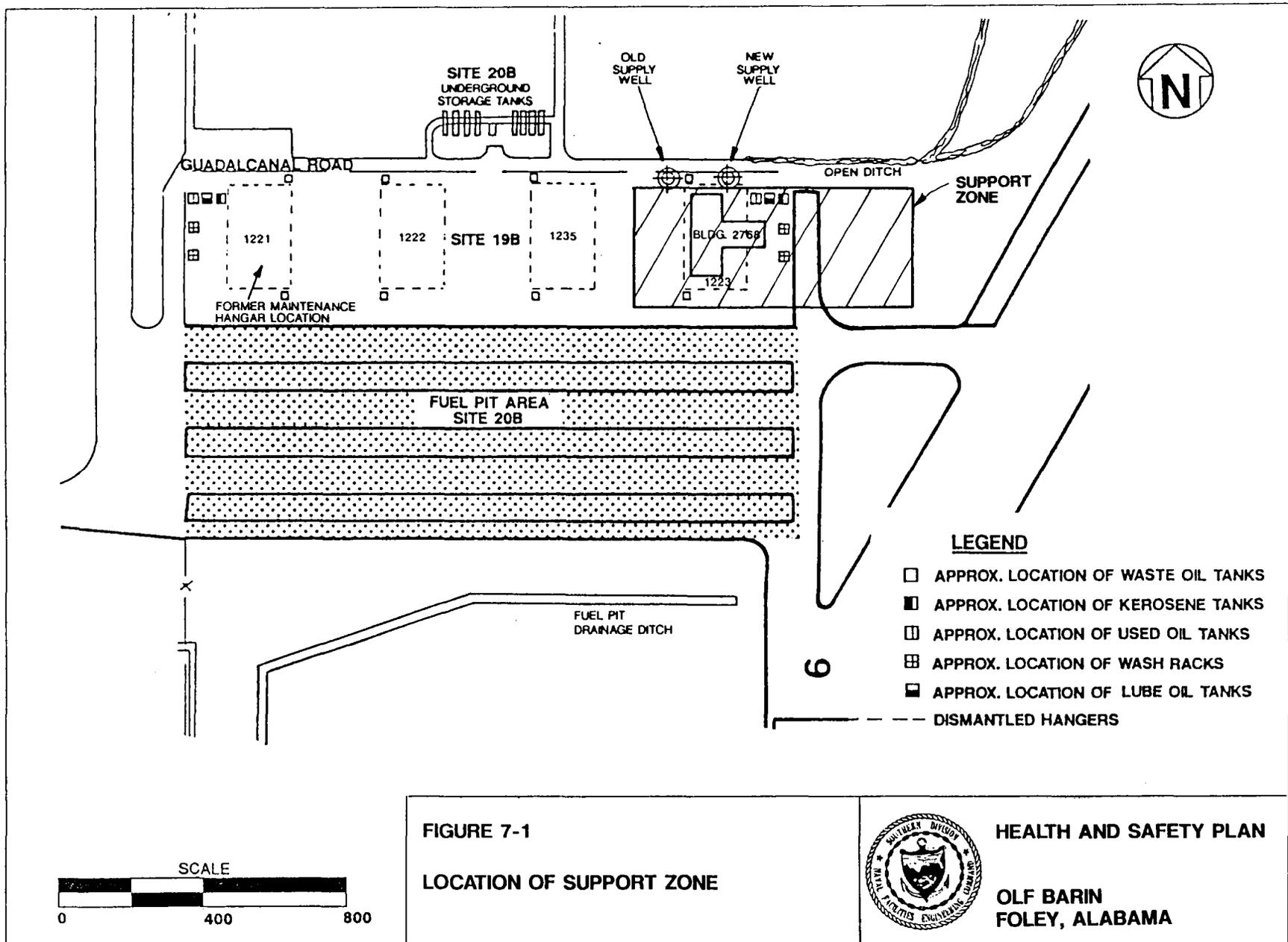
7.1 EXCLUSION ZONE. The Exclusion Zone isolates the area of contaminant generation and restricts (to the extent possible) the spread of contamination from active areas of the site to support areas and off-site locations. The Exclusion Zone is demarcated by the Hot Line (i.e., a tape line or physical barrier). Personnel entering the Exclusion Zone must (1) enter through the CRZ; (2) wear the prescribed level of protection; and (3) be otherwise authorized to enter the Exclusion Zone. Any personnel, equipment, or materials exiting the Exclusion Zone will be considered contaminated. Personnel will be subject to decontamination; equipment and materials will either be subject to decontamination or containerized in uncontaminated devices.

Within the Exclusion Zone, specific locations or restricted areas (clearly marked or identified) will be established (as necessary) for particular locations or around specific site operations. In the case of well drilling or excavation operations, a restricted area will be established that includes a minimum 30-foot radius from the drill rig or excavation operation. Other restricted areas may include drum areas, active site areas, sources of combustible gases or air contaminants, or other dangerous areas as they are identified. Access for emergency services to areas of specific site operations will be established.

7.2 CONTAMINATION REDUCTION ZONE. Moving out from the Exclusion Zone, starting at the Hot Line and continuing to the Contamination Control Line, is the CRZ. The CRZ is a transition zone between contaminated and uncontaminated areas of the site. When "hot" or contaminated personnel, equipment, or materials cross the Hot Line, they are assumed to be as hot or contaminated as they are going to be from site operations. Being subjected to the decontamination process, they become less contaminated; when they reach the Contamination Control Line, they are clean and can exit the CRZ without spreading contamination.

Within the CRZ is the Contamination Reduction Corridor, where materials necessary for full personnel and portable equipment decontamination are kept. A separate facility will be established for heavy equipment decontamination. In addition, certain safety equipment (e.g., emergency eye wash, fire extinguisher, stretcher, and first aid kit) are staged in this zone.

7.3 SUPPORT ZONE. The Support Zone is the outermost zone of the site, separated from the CRZ by the Contamination Control Line; it is considered a clean area. Movement of personnel and materials from the Support Zone into the CRZ is generally unrestricted, except as required through access points controlled for administrative purposes. However, only uncontaminated or decontaminated personnel or materials may enter the Support Zone from the CRZ.



The Support Zone contains the necessary support facilities (including personal hygiene facilities) for site operations. It also serves as the communications center and source of emergency assistance for operations in the Exclusion Zone and CRZ. A log of all persons entering the site will be maintained by the HSO, the field operations leader, or the site designee.

8.0 WORK PRACTICES

8.1 GENERAL. Workers will be expected to adhere to the established safe work practices for their respective specialties (e.g., drilling, laboratory analysis, and construction). The need to exercise caution in the performance of specific work tasks is made more acute due to (1) weather conditions (2) restricted mobility and reduced peripheral vision caused by the protective gear itself, (3) the need to maintain integrity of the protective gear, and (4) the increased difficulty in communicating caused by respirators. Work at the site will be conducted according to established protocol and guidelines for the safety and health of all involved. Among the most important of these principles for working at a hazardous waste site are the following.

- In any unknown situation, the worst conditions will always be assumed and responses will be planned accordingly.
- The buddy system will be used. Under no conditions will any person be permitted to enter the Exclusion Zone alone. Communication will be established and maintained. In addition to radio communications, a set of hand signals will be developed, because conditions may greatly impair verbal communications.
- Because no personal protective equipment is 100 percent effective, all personnel will minimize contact with excavated or contaminated materials. Work areas, decontamination areas, and procedures will be planned accordingly. Equipment will not be placed on drums or the ground. No one will sit on drums or other materials. Workers will not sit or kneel on the ground in the Exclusion Zone or CRZ. Workers will avoid standing in or walking through puddles or stained soil.
- Disposable items will be used, when possible, to minimize risks during decontamination and possible cross contamination during sample handling.
- Smoking, eating, or drinking in the work area and before decontamination will not be allowed. Oral ingestion of contaminants is a likely means of introducing toxic substances into the body.
- Heat and other work stresses related to wearing protective gear will be avoided. Work breaks will be planned to prevent stress-related accidents or fatigue.
- Monitoring systems will be maintained. Conditions can change quickly if subsurface areas of contamination are penetrated.
- Conflicting situations that may arise concerning safety requirements and working conditions will be addressed and resolved rapidly by the HSO to avoid any motivation or pressure to circumvent established safety policy.

- To the extent feasible, handling of contaminated materials will be done in a remote area, particularly when drummed or other containerized hazardous waste materials are found onsite. Every effort will be made to identify the contents of containers found onsite before they are subject to material-handling applications.
- Personnel will 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 heavy equipment while using personnel protective gear because vision, hearing, and communication can be restricted.
- Contact lenses will not be allowed to be worn onsite; if corrosive or lachrymose substances enter the eyes, proper flushing is impeded.
- All facial hair that interferes with the face piece fit will be removed before donning a respirator at all sites requiring Level C or Level B protection.
- Rigorous contingency planning and dissemination of plans to all personnel will minimize the impact of rapidly changing safety protocols in response to changing site conditions.
- Personnel will be made aware that chemical contaminants may mimic or enhance symptoms of other illnesses or intoxication. Excessive use of alcohol or working while ill will be avoided during field investigation assignments.
- The site leader, HSO, and sampling personnel will maintain project records in a bound notebook (e.g., daily activities, meetings, incidents, and data). Notebooks will remain onsite for the project duration so that replacement personnel may add information, thereby maintaining continuity. The notebooks and daily records will become part of the permanent project file.
- Appropriate provisions of the U.S. Army Corps of Engineers "Safety and Health Requirements Manual" (EM385-1-1) will be followed.

8.2 SITE ENTRY PROCEDURES. In most cases, ABB-ES teams are not the first on-site investigators. Considerable knowledge of site history and current status allows preparation of a HASP with reasonable assurance that personnel are adequately protected. In the event that sufficient site information is not available to perform a summary risk assessment and assign the appropriate level of personal protective equipment, the following procedures should be followed. It must be understood that verification of the level of contamination (even with background information) will always require some of the following steps.

1. Workers will recognize that ABB-ES's presence onsite implies a perceived contamination potential by the client.

2. Workers will assume that the site is contaminated and conduct a site safety reconnaissance, consisting of the following activities:
 - establishing a CRZ (decontamination area);
 - surveying the site at the highest level of protection practicable, beginning with a perimeter survey and gradually covering all areas of proposed activity with the following (as appropriate):
 - HNU™ PID,
 - OVA,
 - radiation survey meter,
 - personal air sampling pumps,
 - chemically reactive indicator tubes ,
 - oxygen-deficiency meter, and
 - explosive mixture meter;
 - establishing a "hot zone;" and
 - reviewing data, assessing risk, and selecting the appropriate level of protection.
3. The site leader will prepare a summary site HASP and document all data acquired.

9.0 TEMPERATURE EXTREMES

9.1 HEAT STRESS. Due to the increase in ambient air temperatures and the effects of protective outer wear decreasing body ventilation, there is increased potential for injury, specifically heat casualties. Site personnel will be instructed in the identification of a heat stress victim, the first-aid treatment procedures for the victim, and the prevention of heat stress casualties.

9.1.1 Identification and Treatment

9.1.1.1 Heat Exhaustion

Symptoms. Heat exhaustion usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, the skin is clammy, and he or she may perspire profusely. The pulse is weak and fast; breathing is shallow. The victim may faint unless he or she lies down. This may pass; however, sometimes it persists and, while heat exhaustion is generally not considered life threatening, death could occur.

First Aid. If a worker shows symptoms of heat exhaustion, he or she will be immediately removed to the CRZ in a shady or cool area with good air circulation. All protective outer wear will be removed. A physician will be called. The victim will be treated for shock (i.e., the victim will lie down, the feet will be raised 6 to 12 inches, and body temperature will be maintained, but all clothing will be loosened). If the victim is conscious, sips of water may be given. The victim will be transported to a medical facility.

9.1.1.2 Heat Stroke

Symptoms. This is the most serious of heat casualties because the body excessively overheats. Body temperatures often are between 107 and 110° F. The victim will have a red face and may not be sweating. First there is often pain in the head, dizziness, nausea, oppression, and dryness of the skin and mouth. Unconsciousness follows quickly and death is imminent if exposure continues. The attack will usually occur suddenly. Heat stroke is always serious.

First Aid. If a worker shows symptoms of heat stroke, he or she will be immediately evacuated to a cool and shady area in the CRZ. All protective outer wear and all personal clothing will be removed. The victim will be laid on his or her back with the head and shoulders slightly elevated. With heat stroke, it is imperative that the body temperature be lowered immediately. This will be accomplished by applying cold wet towels or ice bags to the head and groin. The bare skin will be sponged off with cool water or rubbing alcohol, if available, or the victim will be placed in a tub of cool water. The main objective will be to cool without chilling. Stimulants will not be given to the victim. The victim will be transported to a medical facility as soon as possible.

9.1.2 Prevention of Heat Stress One of the major causes of heat casualties is the depletion of body fluids and salts through sweating. Fluids will be maintained in the Support Zone. Salts can be replaced by either a 0.1 percent

salt solution, more heavily salted foods, or commercial mixes such as Gatorade™. The commercial mixes are advised for personnel on low-sodium diets.

During warm weather, a work schedule will be established that allows most work to be conducted during the morning hours, before ambient air temperature levels reach highs.

A work rest schedule will be implemented for personnel required to wear Level B or C protection (i.e., an impervious outer garment) with sufficient time allowed for personnel to "cool down" (this may require working in shifts). Two hours is the maximum time between breaks at Level B or C, regardless of temperature. At elevated temperatures, breaks should be scheduled as follows:

<u>Ambient Temperatures</u>	<u>Maximum Time Between Cool Down Breaks</u>
Above 90 °F	¼ hour
85 to 90 °F	½ hour
80 to 85 °F	1 hour
70 to 80 °F	1½ hours

9.1.3 Heat Stress Monitoring Monitoring of personnel wearing impervious clothing will commence when the ambient temperature reaches 70 °F, with increased frequency if ambient temperature increases or as slow recovery rates are indicated. When temperatures exceed 85 °F, workers will be monitored for heat stress after every work period. As a screening mechanism of the body's recuperative ability to excess heat, one or more of the following techniques will be used.

1. The heart rate (HR) will be measured for 30 seconds, by radial pulse, as early in the resting period as possible. At the beginning of the rest period, the HR should not exceed 110 beats per minute. If the HR is higher, the next work period will be shortened by 10 minutes (or 33 percent), with the length of the rest period staying the same. If the pulse rate is still above 110 beats per minute at the beginning of the next rest period, the following work cycle will again be shortened by 33 percent.
2. Oral body temperature will be measured with a clinical thermometer, as early as possible in the resting period. At the beginning of the rest period, oral temperature (OT) should not exceed 99 °F. If OT exceeds 99 °F, the next work period will be shortened by 10 minutes (or 33 percent), with the length of the rest period staying the same. If the OT again exceeds 99 °F at the beginning of the next period, the following work cycle will be further shortened by 33 percent. OT will also be measured at the end of the rest period to ensure that it has dropped below 99 °F.
3. Good hygienic standards will be maintained by changing clothes frequently, showering daily, and allowing clothing to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

9.2 COLD STRESS. Cold weather may often cause problems for personnel working outside, even at temperatures above freezing. As temperatures drop below freezing, the potential for cold weather injuries increases dramatically, as does

the potential for equipment failure. Because of the considerable danger to personnel, outdoor work will be suspended if the ambient temperature drops below 0 °F (-18 °C) or if the windchill factor drops below -29 °F (-34 °C). These levels represent guidelines that should be used as an action level unless the HSO determines and documents otherwise. Table 9-1, which shows equivalent temperatures (i.e., windchill) for a range of ambient conditions, should also be referred to.

Snow and ice increase the risks to personnel and operations through reduced visibility, increased potential for falling injuries, reduced onsite mobility, and the increased time required to access the site (or off-site support services).

In view of these factors, it is critical that the HSO establish site-specific safety and operating protocols, and that all onsite personnel be made aware of the risks.

9.2.1 Local Cold Injuries Local cold injuries affect specific areas of the body (e.g., fingers, ears, or toes), including the more commonly recognized injuries described in the following subsections.

9.2.1.1 Chilblains Chilblains is a chronic condition affecting the skin and peripheral capillary circulation, resulting from prolonged exposure of the bare skin, primarily in the extremities, to temperatures at or below 60 °F. The best method of preventing and treating chilblains is to cover and protect the skin, thereby avoiding prolonged exposure to the cold.

9.2.1.2 Frostbite Frostbite is freezing of the hands, feet, ears, and exposed parts of the face as a result of exposure to very low temperatures. Frostbite occurs when ice crystals form in the fluid in cells of the skin and tissue. As long as blood circulation remains good, frostbite will not occur.

There are three stages of frostbite: incipient frost bite (frostnip), superficial frostbite, and deep frostbite. The classification depends on severity and can range from incipient frostbite (frostnip), which affects the skin; to superficial frostbite, which involves the skin and the tissues immediately beneath it; to deep frostbite, which is much more serious with damage that may affect deeper tissue and even bone.

Symptoms. Symptoms for each of the three stages of frostbite are described as follows.

- **Frostnip.** Skin first turns red and then later becomes pale or waxy white. There may be tingling, stinging, aching, an uncomfortable sensation of coldness or numbness, or no noticeable symptoms.
- **Superficial Frostbite.** The skin turns white or gray-white and is waxy in appearance. It is firm to touch (i.e., does not move easily) and the tissue beneath the skin is soft and resilient. There is a lack of sensation in the area.

**Table 9-1
Cooling Power of Wind on Exposed Flesh Expressed as an Equivalent
Temperature (under calm conditions)**

RI/FS Health and Safety Plan
OLF Barin, Foley, Alabama

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)												
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60	
	Equivalent Chill Temperature (°F)												
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60	
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68	
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95	
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112	
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121	
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133	
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140	
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145	
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148	
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In <hour with dry skin. Maximum danger of false sense of security.			INCREASING DANGER Danger from freezing of exposed flesh within 1 minute.					GREAT DANGER Flesh may freeze within 30 seconds.				

Trench foot and immersion foot may occur at any point on this chart.

Source: Developed by U.S. Army Research Institute of Environmental Medicine, Natick, Massachusetts.

Notes: °F = degrees Fahrenheit.
mph = miles per hour.
> = greater than.

- Deep Frostbite. The tissue is pale, cold, and solid with possible blisters and swelling. The hands and feet are especially susceptible to deep frostbite.

Emergency Treatment of Frostbite. Frostnip is easily treated in the field by the application of body heat, which should be applied before the affected area becomes numb. Workers will be instructed that if frostnip affects their fingers and hands, to place them against the skin of their chest or in their armpits. To warm faces, the workers will be instructed to hold a mitten or scarf over the lower part of their face and breathe into it. Frozen spots will be thawed immediately. Affected areas will NOT be rubbed.

Superficial frostbite usually responds to the application of body heat, as described previously. If the skin does not respond to body heat or if it resembles the early stages of deep frostbite, the emergency treatments listed in the following paragraphs will be followed. Affected areas will NOT be rubbed.

For deep frostbite, if possible, the injured person will be taken to a heated shelter to avoid further frostbite. If it can be done without the danger of further frostbite, all constricting items (e.g., boots, gloves, and socks) will be removed from the injured area. **RAPID REWARMING WILL MINIMIZE TISSUE LOSS.** If possible, the extremities will be warmed in a carefully controlled water bath (104 to 106 °F) until tips of the fingers or toes turn pink and feeling is restored. If a water bath is not available, either wet packs (100 to 112 °F) will be applied to the person's body, or the frostbitten area will be gently wrapped in blankets or some other warm material.

No attempts will be made to thaw the affected parts by exercising them or heating them in front of an open fire, heat lamp, radiator, or stove. The person could receive a heat injury as a result of sensation loss.

Snow will NOT be used to thaw frostbite. Workers will be instructed NOT to rub, massage, or use pressure on the affected areas. The frostbitten parts will be kept elevated if possible. The victim will be watched to see if cardiopulmonary resuscitation (CPR) is necessary. The victim will be given warm drinks such as tea, coffee, or soup. **NO ALCOHOLIC BEVERAGES** will be given. The victim will be asked to exercise fingers or toes as soon as possible, but only after they are warmed. A person with frostbitten feet will NOT be allowed to walk; walking may cause additional damage.

Medical Treatment of Frostbite.

- Frostnip. Usually does not require medical care.
- Superficial Frostbite. Blisters may require medical care.
- Deep Frostbite. **EARLY MEDICAL TREATMENT IS URGENT!** The victim will be transported to medical care facilities at once.

Prevention of Frostbite. It is far easier to prevent or stop frostbite in earlier stages than to thaw and take care of badly frozen flesh. To protect the body against frostbite, the following precautions will be taken.

- Enough clothing will be worn to protect against the cold and wind.
- Warm gloves and boots will be worn.
- A scarf or jacket flap will be pulled over the lower part of the face or a hood will be pulled tightly around the face.
- The workers will be instructed to occasionally exercise the face, fingers, and toes to keep them warm and to detect any areas that may have become numb.
- Crew members will watch each other closely, especially the face, for signs of frostbite.

9.2.1.3 Immersion Foot. Immersion foot (formerly called trenchfoot) is a cold injury resulting from prolonged exposure to near-freezing temperatures when standing or walking on wet or swampy ground.

Symptoms. In the early stages, the feet and toes are pale, cold, numb, and stiff, and walking is difficult. If preventive action is not taken, the feet will swell and ache; in extreme cases, this may result in irreversible damage to the tissues of the foot or leg.

Emergency Treatment of Immersion Foot. Feet will be handled very gently. The feet will not be rubbed or massaged. If necessary, the feet will be cleaned carefully with soap and warm water, then dried, elevated, and exposed to warm but not hot air.

Prevention of Immersion Foot. Because the early stages of immersion foot are not painful, crew members must be constantly on the alert and check feet often when working in cold, wet conditions. Feet will be kept dry by wearing waterproof footwear and changing socks frequently because perspiration, trapped inside waterproof boots or heavy footwear, can contribute to immersion foot symptoms. Workers will be instructed to avoid standing in wet areas. Workers will be instructed that if their feet get wet, to dry them as soon as possible, warm with their hands, then use foot powder, and change to dry socks. They will be instructed that if they cannot change wet boots and socks, to exercise their feet frequently by wriggling their toes and moving their ankles. They will be told never wear tight boots.

9.2.2 Systemic Cold Injuries Systemic injuries are those that affect the entire body system. Severe body cooling, known as systemic hypothermia, can occur at temperatures well above freezing. Hypothermia, which can be fatal, is the progressive lowering of body temperature accompanied by rapid, progressive mental and physical collapse. A large percentage of wilderness deaths are the result of hypothermia.

Hypothermia is caused by exposure to cold, and is aggravated by moisture, cold winds, fatigue, hunger, inadequate clothing or shelter, and excessive perspiration from strenuous exercise followed by too rapid cooling.

Hypothermia often occurs between temperatures of 30 to 50 °F, which most people believe are not dangerous. Crew members will be alerted to symptoms of hypo-

thermia, especially when temperatures are dropping rapidly or when they must work in rain, snow, or ice.

Hypothermia may occur on land or following submersion in even moderately cold water (i.e., 65 °F or lower). On land, hypothermia may take a full day or more of exposure to develop; however, if the conditions are extremely severe, death may occur within a few hours of initial symptoms.

In cold water, death may seem to be from drowning; in reality, it is usually the result of hypothermia. In water, skin and nearby tissues chill very fast; in 10 to 15 minutes the temperature of the heart and brain may drop. When the core (i.e., internal body) temperature reaches 90 °F, unconsciousness may occur; when body temperature drops to 80 °F, heart failure is possible.

9.2.2.1 Symptoms In the early stages of hypothermia, the body begins to lose heat faster than it can be produced, making an effort to stay warm by shivering. When the body can no longer generate enough heat to overcome heat loss and the energy reserves of the body become exhausted, body temperature begins to drop. This affects the ability of the brain to make judgments and also results in loss of muscular control. As the body temperature drops, hypothermia symptoms become increasingly severe, as shown in the following table.

Symptoms of Hypothermia	Approximate Core Temperature
Person is conscious and alert with increased respiration. Shivering may become uncontrollable as core temperature nears 95 °F.	Above 95 °F
Person is conscious but disoriented and apathetic. Shivering is present but diminishes as temperature drops. Below 92 °F, respiratory rate gradually diminishes and pupils begin to dilate.	95 to 90 °F
Person is semiconscious. Shivering is replaced by muscular rigidity. Pupils are fully dilated at about 86 °F.	90 to 86 °F
Unconscious; diminished respiration.	Below 86 °F
Barely detectable or nondetectable respiration.	Below 80 °F

9.2.2.2 Emergency Treatment of Hypothermia The hypothermia victim will be moved to shelter and warmth as rapidly as possible. In very mild cases, dry clothing and shelter may be all that is needed. All of the victim's wet clothing will be gently removed (so energy is not expended by warming and drying wet clothing) and

replaced with a dry set. The person will be given something warm to drink. ALCOHOLIC BEVERAGES WILL NOT BE GIVEN.

ALL OTHER HYPOTHERMIA CASES WILL BE CONSIDERED MEDICAL EMERGENCIES. EXTERNAL HEAT WILL BE PROVIDED IN ANY WAY POSSIBLE! A warm bath (with the water kept between 105 and 110 °F) is the most effective way of warming a victim of hypothermia and will be used if possible. An UNCONSCIOUS VICTIM will NEVER be put into a bathtub with water.

If it is not possible to give the person a warm bath, one of the following will be used.

ALTERNATE METHODS.

- Warm moist towels (or other fabric) will be wrapped around the victim's head, neck, sides, and groin. As the packs cool, they will be rewarmed by adding warm water (approximately 105 °F). The temperature of the water will be checked with the elbow or the inside of the arm; it should be warm but not hot.
- If workers are at a remote outdoor location and cannot use the other method, a "human sandwich" will be made by placing the unclothed victim in a sleeping bag (or between blankets) with two other undressed persons to provide body-to-body heat transfer. THIS WILL SAVE LIVES. Additional sleeping bags or blankets can be placed over and under the victim.

Workers will be instructed to NOT wrap a hypothermia victim in a blanket without an auxiliary source of heat unless it is to protect against any further heat loss before treatment can begin, or workers need to go for help and there is no other alternative.

Treatment will be continued once the victim has stabilized. Warm liquids and nourishing food will be given if the person is conscious. The person will be checked for symptoms of frostbite and, if necessary, given treatment.

The patient will be handled gently and not allowed to walk. Exertion can circulate cold stagnant blood from extremities to the central body and cause "after-drop," in which the patient's core temperature drops below the level that will sustain life. ALCOHOL CONTRIBUTES TO AFTER-DROP.

9.2.2.3 Medical Care for Hypothermia HYPOTHERMIA IS A SEVERE EMERGENCY. MEDICAL TREATMENT WILL BE OBTAINED AS SOON AS POSSIBLE. Even persons with mild hypothermia will see a doctor.

9.2.2.4 Prevention of Hypothermia Workers will be instructed that in cold weather, they should never go into the field without wearing adequate clothing. They will be told to take a complete change of warm clothes and one or two extra pairs of socks (in plastic bags) and to wear or carry a windproof, water-resistant outer jacket and, in rain or snow, to wear adequate raingear.

Workers will be told to stay dry and that if their clothing becomes wet from perspiration, rain, snow, or immersion in water, change it as soon as possible.

They will be told that if they start to shiver in a prolonged or violent way, to seek shelter at once. Shivering may produce heat but it also uses up energy. Violent shivering may be an early sign of hypothermia.

Workers will be warned to avoid accidental immersion in water and to practice boat safety and learn cold water survival techniques. They will be told that if they fall into water and are not very close to shore, to remain quiet, keep their head out of water, climb onto the boat, or hold or climb onto any other object that will support them and keep them up out of the water.

9.2.3 Safety and First Aid Equipment In view of the causes, results, and appropriate treatment of cold weather injuries discussed previously, as a minimum, the following safety equipment will be included during cold weather operations:

- extra clothing for all personnel,
- blankets and/or sleeping bag,
- high-energy food and drinking water supply,
- toboggan, and
- tow ropes.

In extreme cold conditions, the following safety items will be added:

- electric blanket (if an electrical source is available),
- portable emergency generator (with fuel, oil, and cords), and
- space heater and fuel.

9.2.4 General Winter Operations Cold weather conditions can severely affect winter operations. The Site Manager and HSO will plan work schedules and project tasks accordingly.

9.2.4.1 Preliminary Assessment If working outdoors in cold weather, the site manager will assess the local weather conditions through the news media (i.e., radio, television, and newspapers) to determine whether work should progress and the amount of preparation needed. The site manager will carefully consider questions such as the following.

- What are the typical wind and weather conditions for the period in which you will be working?
- Are the areas in which you will work sheltered or open to the wind?
- Is there a place nearby for periodic warming breaks? Can you obtain or heat warm food and beverages there? Is there a source of drinking water?
- Are there ways to minimize the length of time that crew members will have to work outdoors in the cold?
- If a vehicle will be used for a warming area or a heater will be used in a closed room, can adequate ventilation be ensured to prevent carbon monoxide poisoning?

9.2.4.2 Scheduling Wherever possible, work will be scheduled during the least severe weather. Crew members will be rotated to keep cold exposures short and allow sufficient time for frequent warming breaks. Workers in heavy clothing often need more time to complete the tasks and may become fatigued more easily. Operations may have to be discontinued if winds increase or the temperature drops.

Because winter days are short, scheduling will allow time for taking care of equipment and supplies before nightfall. Once it becomes dark, it is more difficult to gauge terrain, and temperatures are likely to drop.

9.2.4.3 Site Access Snow and ice could make travel onsite access roads impossible, or treacherous at best. Personnel will not be allowed to work onsite if conditions could severely hamper the arrival or departure of emergency vehicles. If the route to off-site medical facilities is blocked by snow or ice, an otherwise minor injury could result in a major medical emergency. If conditions warrant, the following provisions will be made:

- snow removal and plowing services for site access roads;
- a dependable, four-wheel-drive vehicle available to onsite personnel for transporting an injured person to an off-site medical facility; and
- sleeping bags, blankets, a food supply, and water kept onsite in the event a sudden storm requires personnel to remain overnight

The HSO is responsible for deciding when weather conditions make site access unsafe, thereby requiring work to stop until conditions improve.

9.2.4.4 Equipment and Supplies Equipment and supplies will be obtained that will help prevent cold stress and will help in the treatment of cold stress disorders. Required equipment includes a reliable ambient temperature thermometer, a wind gauge, and a windchill chart. If the site is potentially windy due to a lack of natural or manmade windbreaks (e.g., trees, valleys, and structures), an attempt will be made to provide means of shielding workers from the wind. If working at a remote location, extra food and water will be carried because hunger and dehydration contribute to cold stress. If possible, provisions for hot food and beverages will be made. Emergency communication equipment will be available and operational for crew members working in the cold, at heights, or in remote locations.

Close attention must be given to the effects of cold weather on field equipment. Batteries can be severely affected by cold resulting in disabled radios, air monitoring equipment, sampling pumps, and vehicles. A supply of fresh batteries, a sufficient number of charging units, and a set of automotive jumper cables will be maintained onsite. In addition, the electronics in many field instruments such as PI, LEL, and oxygen meters, as well as the chemical reactions in detector tubes (e.g., Draeger tubes) can also be adversely affected by the cold. The manufacturers' literature will be consulted for minimum operating temperatures.

If at all possible, monitoring well sampling tasks will not be scheduled during cold weather. These tasks generally require the use of relatively delicate pumps; long, uninsulated stretches of tubing; and significant quantities of decontamination solutions. Unless considerable effort is expended to prevent pumps, hoses, decontamination solutions, and sample containers from freezing, attempting to sample monitoring wells in cold weather may be counter-productive. Portable shelters will be considered if cold weather sampling is necessary.

10.0 DECONTAMINATION

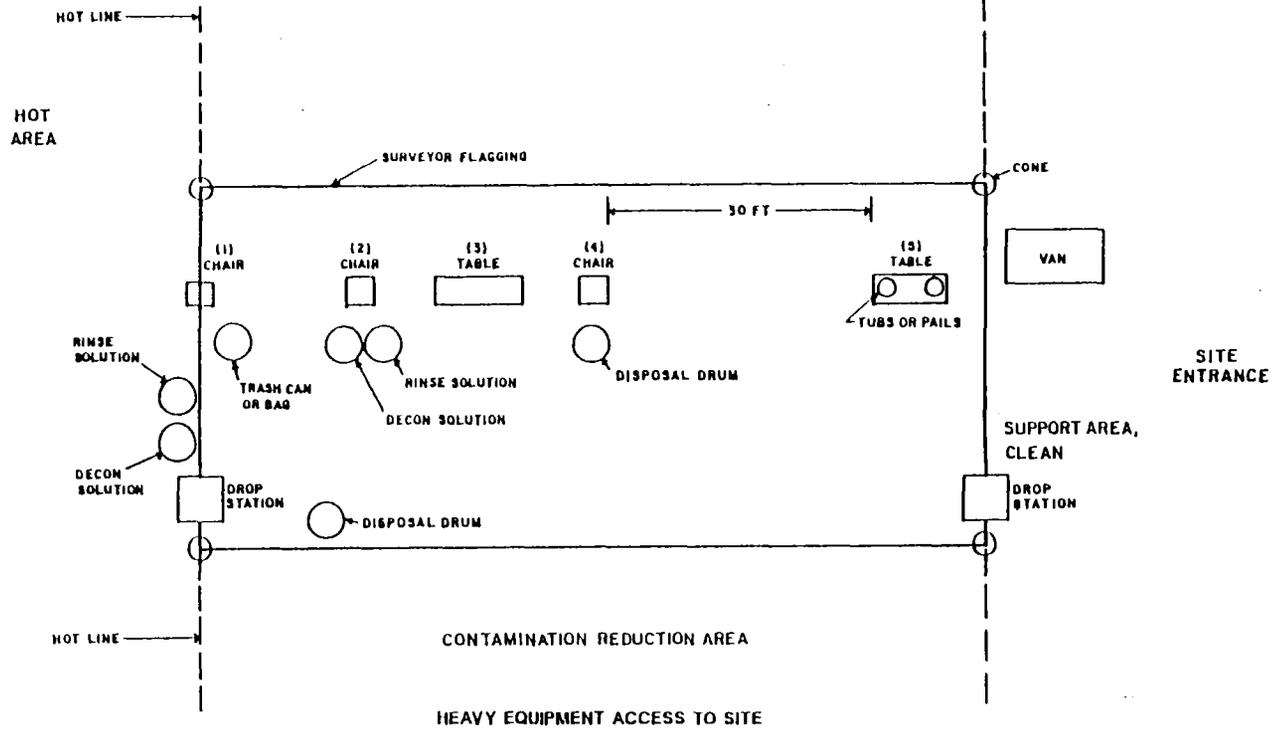
10.1 PERSONNEL DECONTAMINATION. Decontamination procedures will be followed by all personnel leaving hazardous waste sites. Under no circumstances (except emergency evacuation) will personnel be allowed to leave the site prior to decontamination. A typical personnel decontamination station is shown in Figure 10-1. Generalized procedures for removal of protective clothing are as follows.

1. Tools, monitors, samples, and trash will be dropped at designated drop stations (i.e., plastic containers or drop sheets).
2. Workers will step into the designated shuffle pit area and scuff feet to remove gross amounts of dirt from outer boots.
3. Workers will scrub outer boots and outer gloves with decontamination solution or detergent and water and rinse with water.
4. Workers will remove tape from outer boots and remove boots and discard tape and boots in disposal container.
5. Workers will remove tape from outer gloves and remove gloves and discard tape and gloves in disposal container.
6. If the worker has left the Exclusion Zone to change the air tank on the SCBA or the canister on the air-purifying respirator, this will be the last step in the decontamination procedure. The tank or cartridge will be exchanged, new outer gloves and boot covers donned, and the joints taped; the worker will then return to duty.
7. Outer garments will be removed and discarded in disposal container.
8. Respirator will be removed and placed or hung in the designated area.
9. Inner gloves will be removed and discarded in disposal container.
10. If the site requires use of a decontamination trailer, all personnel will shower before leaving the site at the end of the work day.

Note: Disposable items (i.e., Tyvek™ coveralls, inner gloves, and latex overboots) will be changed daily unless there is reason to change sooner. Dual respirator canisters will be changed daily, unless more frequent changes are deemed appropriate by site surveillance data or personnel assessment.

Pressurized sprayers or other designated equipment will be available in the decontamination area for washdown and cleaning of personnel, samples, and equipment.

Respirators will be decontaminated after use and taken from the drop area. The masks will be disassembled, the cartridges set aside, and all other parts placed in a cleansing solution. Parts will be pre-coded (e.g., #1 on all parts of Mask Number 1). After an appropriate time in the solution, the parts will be removed

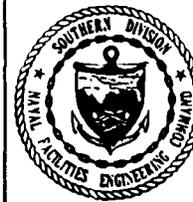


TASK

- (1) WASH OUTER BOOTS - RINSE BOOTS - DISPOSE
- (2) WASH OUTER GLOVES - RINSE GLOVES - DISPOSE
- (3) SCBA TANK CHANGE OVER TABLE W/SPARE TANKS
- (4) REMOVE OUTER GARMENT - DISPOSE
- (5) REMOVE SCBA, WASH MASK IN PAILS OR TUBS
- (6) REMOVE INNER GLOVES - DISPOSE

NOT TO SCALE

**FIGURE 10-1
TYPICAL PERSONNEL
DECONTAMINATION STATION**



**REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
HEALTH & SAFETY PLAN**

**OLF BARIN
FOLEY, ALABAMA**

and rinsed with tap water. Old cartridges will be marked to indicate length of use (i.e., if it is possible to evaluate the remaining utility of the cartridge), or discarded in the contaminated trash container for disposal. In the morning, the masks will be reassembled and new cartridges installed, if appropriate. Personnel will inspect their own masks and readjust the straps for proper fit.

10.2 SMALL EQUIPMENT DECONTAMINATION. Small equipment will be protected from contamination as much as possible by draping, masking, or otherwise covering the instruments with plastic (to the extent feasible) without hindering operation of the unit. For example, the HNU™ meter can be placed in a clear plastic bag to allow for reading the scale and operating the knobs. The HNU™ sensor can be partially wrapped, keeping the sensor tip and discharge port clear. Decontamination procedures are presented in section 2.1.5 of the SAP.

The contaminated equipment will be taken from the drop area and the protective coverings will be removed and disposed of in appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe. The units can then be taken inside in a clean plastic tub, wiped off with damp disposable wipes, and dried. The units will be checked, standardized, and recharged as necessary for the next day's operation, and then prepared with new protective coverings.

10.3 HEAVY EQUIPMENT DECONTAMINATION. It is anticipated that drilling rigs and backhoes will become contaminated during borehole and test-pitting activities. They will be cleaned with high-pressure water or steam, followed by a soap and water wash and rinse. Loose material will be removed with a brush. The person performing this activity will usually be at least at the level of protection used during the personnel and monitoring equipment decontamination. Section 2.1.5.3 of the SAP discusses the decontamination procedures for heavy equipment in detail.

Cleaning and decontamination of all heavy equipment will occur at a designated area onsite that is downgradient and downwind of the clean equipment and storage area. The cleaning and decontamination area will contain a shallow excavated inclined pit lined with heavy duty plastic sheeting for containment of washwater and waste. The pit will be designed such that washwater and solvent rinsates will drain into the pit and be pumped into 55 gallon drums or a wastewater tanker. Large portable equipment (drill rods, auger flights, etc.) will be cleaned on saw horses or other supports constructed above the plastic sheeting.

10.4 DISPOSAL OF DECONTAMINATED MATERIALS. All protective gear, decontamination fluids (for both personnel and equipment), and other disposable materials will be disposed of at each site.

Decontamination fluids (i.e., Liqui-nox™, used to decontaminate sampling equipment such as split spoons and groundwater sampling pumps) will be stored in Department of Transportation (DOT) approved 55-gallon drums and then pumped into a wastewater tanker for proper disposal. Disposable materials (e.g., gloves and Tyveks™) will be double-bagged and stored as is, or placed in DOT-approved 55-gallon drums.

11.0 EMERGENCY PLANNING

11.1 EMERGENCY MEDICAL SERVICES. Prior to site investigation or activity on hazardous sites, nearby health facilities will be evaluated to determine their ability to provide for the needs of onsite project staff and they will be notified of site operations as appropriate. Criteria such as emergency department physician coverage, decontamination capabilities, and available medical specialists will be evaluated. Chapter 17.0 lists all personnel onsite along with emergency telephone numbers, and directions to the hospital.

11.1.1 Onsite First Aid An industrial first-aid kit will be provided at the work site; contents of the kit will be checked weekly and restocked as necessary. Other equipment may include oxygen, backboard and straps, splints, snake bite kits, and a cervical collar.

At least one person qualified to perform first aid will be present onsite at all times during work activity. This person will have earned a certificate in first-aid training from the American Red Cross or will have received equivalent training. Designated first aides will receive regular review training from the American Red Cross or the equivalent.

An emergency shower and eye-wash station will be provided at the work site, as well as flushing water for decontamination of boots, gloves, clothing, and tools.

11.1.2 Transportation to Emergency Treatment A vehicle will be available at all times to transport personnel to the hospital (in the event an ambulance is unnecessary or unavailable). Stretchers will be located at the work site to transport personnel to the vehicle. Under no circumstances will injured persons transport themselves to a medical facility for emergency treatment.

11.2 CONTINGENCY PLANNING. Prior to commencement of onsite activities, the HSO will review safety considerations with the field crew. The HSO has overall responsibility for adherence to the designated safety precautions and assumes the role of onsite coordinator in an emergency response situation.

All onsite personnel will be familiar with both the primary and secondary route to the nearest hospital (which may be shown on a figure or a local map), as well as the location of the nearest working telephone or radio communication device. At remote locations a mobile phone or radio will be provided. A list of emergency telephone numbers will be readily available onsite.

When extensive Level B or C operations are planned, the local hospital and emergency response team will be advised in advance of the work to be performed. The hospital will also be briefed on the availability of personnel health data and technical support through Environmental Medicine Resources, Inc.

Emergency communication will be required to ensure positive preplanned notification of emergency authorities in the event of episodes requiring initiation of contingency plans. Emergency communication will include all or parts of the following.

- The Site Manager or HSS will coordinate with local agencies, fire and police departments, the ambulance service, and the hospital emergency room.
- Two-way radio communication and a site alarm capable of warning site personnel and summoning assistance (i.e., airhorn) will be established.
- An emergency evacuation plan will be designed for residents of nearby homes. Although evacuation is an unlikely event, as a contingency, the HSO will be designated as onsite coordinator and will be responsible for implementing the plan. The HSO will be made aware of the total number of households within a 2,000-foot radius. The HASP will provide the emergency contacts required and a table will provide a list of residences and identifiable operations in the area in the event that evacuation is deemed a possibility for a particular site.
- Possible routes of evacuation will be investigated prior to any activity.
- If an accident occurs, a copy of an accident report form, provided in Chapter 15.0, will be filled out by the HSO and filed with the individual's supervisor, the HSM or HSS, and Human Resources. A copy will also be retained in the project records.

11.3 POTENTIAL HAZARDS. The most common hazards associated with hazardous waste site investigations include (1) accidents; (2) inhalation, contact, or ingestion of hazardous materials; (3) explosion; and (4) fire.

11.3.1 Accidents Accidents must be handled on a case-by-case basis. Minor cuts, bruises, muscle pulls, and the like will still allow the injured person to undergo reasonably normal decontamination procedures before receiving direct first aid. More serious injuries may not permit complete decontamination procedures to be undertaken, particularly if the nature of the injury is such that the victim should not be moved. In these cases, arrangements will be made with the medical facility and transporter to allow them to take proper precautions. The nature and degree of surface contamination at a site is generally low enough that emergency vehicles could reach the victim onsite without undue hazard. However, if onsite access is limited, accident victims may be transported by ABB-ES personnel trained for this response to a point accessible by an ambulance.

11.3.2 Contact and/or Ingestion of Hazardous Materials Properly prescribed and maintained protective clothing and adherence to established safety procedures are designed to minimize contact and/or ingestion of hazardous materials; however, it is still possible that contact or ingestion of materials may occur. For example, puncture of a buried drum of liquid during drilling operations might cause the drum contents to contact personnel. Standard first-aid procedures will be followed. The drilling rig will have a tank of water that may be useful in some circumstances, particularly to flush contaminants from any exposed skin areas. Eye-wash bottles will also be maintained at the site for emergencies. In cases of ingestion or anything other than minor contact with known substances, the local Poison Control Center and hospital will be notified and the victim taken there immediately for further treatment and observation.

11.3.3 Explosion The drilling crew will be made keenly aware of combustible gas meter readings and will withdraw at any indication of imminently hazardous conditions (i.e., greater than 20 percent LEL). The detection of such conditions will be reported to local agencies for potential execution of the evacuation plan, if the situation is assessed to warrant such response.

11.3.4 Fire The combustible gas meter also warns of imminent fire hazards at borings. The greatest fire hazard at the site should be recognized as handling the fluids (e.g., methanol and acetone) used for certain decontamination procedures. No smoking or open flames are allowed onsite. Carbon dioxide fire extinguishers will be kept at the drilling rig and in the decontamination area/field office. The fire department, previously informed of site activities, will be called as needed.

11.4 EVACUATION RESPONSE LEVELS. Evacuation responses will occur at three levels: (1) withdrawal from immediate work area (100 feet or more upwind), (2) site evacuation, and (3) evacuation of surrounding area. Anticipated conditions that require these responses are described in the following subsections.

11.4.1 Withdrawal Upwind (100 Feet or More) Withdrawing upwind (100 feet or more) will be required when: (1) ambient air conditions contain greater contaminant concentrations than guidelines allow for the type of respiratory protection being worn (the work crew may return after donning greater respiratory protection and/or assessing the situation as transient and past), (2) a breach in protective clothing or minor accident occurs (the work crew may return when the tear or other malfunction is repaired and first aid or decontamination has been administered), or (3) the respirator malfunctions requiring replacement.

11.4.2 Site Evacuation Evacuation of the site will be required when: (1) ambient air conditions contain explosive and persistent levels of combustible gas or excessive levels of toxic gases, (2) a fire or major accident occurs, or (3) explosion is imminent or has occurred.

11.4.3 Surrounding Area Evacuation The area surrounding the site will be evacuated when persistent, unsuppressible toxic or explosive vapors from test pits or borings (e.g., pressure release from punctured drum) are released, or air quality monitored at several points downwind assess danger to the surrounding area.

11.5 EVACUATION PROCEDURES. 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 shall 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. Once the safety of all personnel is established, the OLF Barin Environmental Coordinator, Jim Holland, will be notified by telephone of the emergency (904-623-7181).

The HSO will notify local fire and police departments, and other appropriate emergency response groups, if LEL values are above 25 percent in the work zone, or if an actual fire or explosion has taken place. Both fire and police departments can be reached by dialing 911.

11.5.1 Withdrawal Upwind The work crew will continually observe general wind directions while onsite. (A simple wind sock may be set up near the work site for visual determinations.) Upon observing conditions that warrant moving away from the work site, the crew will relocate upwind a distance of approximately 100 feet or farther, as indicated by the site monitoring instruments. Donning SCBA and a safety harness and line, the HSO and a member of the crew may return to the work site to determine whether the conditions noted were transient or persistent. If persistent, an alarm should be raised to notify onsite personnel of the situation and the need to leave the site or don SCBA. An attempt should be made to decrease emissions only if greater respiratory protection is donned. The HSM, HSS, and client will be notified of conditions. When access to the site is restricted and escape is thereby hindered, the crew may be instructed to evacuate the site rather than move upwind, especially if withdrawal upwind moves the crew away from escape routes.

11.5.2 Site Evacuation After determining that site evacuation is warranted, the work crew will proceed upwind of the work site and notify the security force, HSO, and field office of site conditions. If the decontamination area is upwind and more than 500 feet from the work site, the crew will pass quickly through decontamination to remove contaminated outer suits. If the hazard is toxic gas, respirators will be retained. The crew will proceed to the field office to assess the situation, where the respirators may be removed (if instrumentation indicates an acceptable condition). As more facts are determined from the field crew, they will be relayed to the appropriate agencies. The advisability and type of further response action will be coordinated and implemented by the HSO.

11.5.3 Evacuation of Surrounding Area When the HSO determines that conditions warrant evacuation of downwind residences and commercial operations, the local agencies will be notified and assistance requested. Designated onsite personnel will initiate evacuation of the immediate off-site area without delay.

12.0 RESPIRATORY PROTECTION PROGRAM

12.1 INTRODUCTION. This program was developed to govern the selection and use of respiratory protective devices by ABB-ES personnel. The program is intended to comply with OSHA requirements as set forth in 29 CFR 1910.134(b). The scope of this program is limited to activities related to field investigations of potentially hazardous waste disposal sites.

12.2 PERSONNEL REQUIREMENTS. All personnel assigned to field activities at OLF Barin are currently required by ABB-ES's health and safety policies to be enrolled in the corporate health monitoring program. Part of this program involves spirometry, a measure of the respiratory system status. No personnel may be assigned to the use of or may withdraw from stock any respiratory protective device without a physician's certification that use of the device will not be injurious to health. Psychological limitations (e.g., claustrophobia) are also considered in personnel assignments. Training in the use of the selected device and fit testing, as described herein, are also required.

Personnel will not be assigned duties that require a respirator when facial hair, skullcaps, or eyeglasses will interfere with a proper fit. Contact lenses may not be worn with any respiratory protective device. Eyeglass frames that fit inside the respirator facepiece are provided as necessary.

12.3 APPLICABLE EQUIPMENT. ABB-ES maintains the following respiratory protective equipment:

- full-face chemical/mechanical air-purifying respirators,
- SCBAs,
- full-face airline-supplied breathing apparatus, and
- 5-minute escape air supplies.

This equipment is intended for use on an as-needed basis, to be determined by an evaluation of onsite conditions. Respiratory protective equipment should not be used arbitrarily by any ABB-ES personnel. Selection criteria are presented separately; training is required in the use of each type of equipment before drawing from stock.

12.4 PERSONNEL TRAINING. Training of personnel in the proper use and care of respiratory protective equipment is considered essential to the success of the program. Training encompasses the following topics:

- respiratory protection principles,
- selection of appropriate equipment,
- use of equipment,
- maintenance of equipment, and
- fit testing.

Information regarding each topic is presented as standard respiratory protection procedures in the corporate health and safety program manual.

12.5 PROGRAM ADMINISTRATION AND DOCUMENTATION. Administration of the ABB-ES Respiratory Protection Program is the responsibility of the HSM, and includes the following:

- respirator selection,
- personnel training,
- fit testing,
- respirator maintenance,
- documentation,
- program evaluation and improvements, and
- personnel pulmonary testing and certification.

Fit testing and respirator maintenance is performed by the equipment manager of ABB-ES's Sample Control and Staging Center in Portland, Maine, and designated, trained employees at the other offices. All fit-testing and respirator maintenance is conducted under the administration of the HSM. Major maintenance is performed by manufacturer-certified technicians only. Personnel training in respiratory protection is one aspect of the HSM's ongoing personnel training programs. Program evaluation is a dynamic process, occurring each time a project HASP is prepared.

Medical supervision of personnel occurs as part of the ABB-ES health monitoring program, also administered by the HSM. Medical surveillance is required for all personnel assigned to hazardous or potentially hazardous site activities.

Documentation of the various elements of the ABB-ES respiratory protection program is achieved through several media, as follows.

- Documentation of respirator selection is included in the hazard assessment of each site's HASP.
- Documentation of personnel training is maintained in both hardcopy and computerized files.
- Documentation of medical surveillance is achieved indirectly by maintaining a list of enrolled employees in the health monitoring program, and directly through physician certification of personnel allowed to be assigned respiratory protective devices.
- Using the appropriate form, documentation of fit-testing is maintained on file with the equipment manager of the Sample Control and Staging Center and with the HSM or designee.
- Documentation of site surveillance is required both by this program and by the HASP for each site. Records of site surveillance are created by the HSO and maintained in project files.
- Respirator inspection and maintenance records are created and maintained by the equipment manager for each respirator, SCBA, and escape respirator.

Inspection and documentation occurs either before each unit is removed from stock and when it is returned, or monthly.

12.6 INSPECTION, MAINTENANCE, AND STORAGE

12.6.1 Introduction Respirator maintenance is an integral part of the overall respirator program. Wearing a poorly maintained or malfunctioning respirator, in one sense, is more dangerous than not wearing a respirator at all. Personnel wearing defective devices think they are protected when, in reality, they are not. Emergency escape and rescue devices are particularly vulnerable to poor maintenance because they generally are used infrequently, and then in the most hazardous and demanding circumstances. Serious injury or death can result from wearing a defective device during an emergency escape or rescue. The respirator program includes the following components:

- inspection for defects (including a leak check),
- cleaning and disinfecting,
- repair as required, and
- proper and sanitary storage of equipment.

12.6.2 Inspection for Defects The most important part of a respirator maintenance program is continual inspection of the devices. If properly performed, inspections will identify damaged or malfunctioning respirators before they can be used. Two types of inspections will be performed: (1) while the respirator is in use, and (2) while it is being cleaned. Because the use and cleaning will be performed primarily by the same personnel, these inspections may become concurrent.

12.6.3 Frequency of Inspection OSHA requires that "All respirators be inspected before and after each use," and that those not used routinely (i.e., emergency escape and rescue devices) "shall be inspected after each use and at least monthly...." Obviously, emergency escape and rescue devices do not require inspection before each use.

12.6.4 Inspection Procedures Respirator inspection will include checking of the following:

- tightness of the connections,
- facepiece,
- valves,
- connecting tubes, and
- canisters, filters, or cartridges.

In addition, the regulator and warning devices on a SCBA will be checked for proper functions.

12.6.5 Field Inspection of Air-purifying Respirators Routinely used air-purifying respirators will be checked as follows before and after each use.

1. The facepiece will be examined for:

- excessive dirt;
- cracks, tears, holes, or physical distortion of shape from improper storage;

- inflexibility of rubber facepiece (stretch and knead to restore flexibility);
 - cracked or badly scratched lenses in full facepieces;
 - incorrectly mounted full facepiece lenses, or broken or missing mounting clips; and
 - cracked or broken air-purifying element holder(s), badly worn threads, or missing gasket(s).
2. The head straps or head harness will be examined for:
- breaks,
 - loss of elasticity,
 - broken or malfunctioning buckles and attachments, and
 - excessively worn serrations on head harness, which might permit slippage (full facepieces only).
3. The exhalation valve will be examined for the following after removing the cover:
- foreign material (e.g., detergent residue, dust particles, or human hair under valve seat);
 - cracks, tears, or distortion in the valve material;
 - improper insertion of the valve body in the facepiece;
 - cracks, breaks, or chips in the valve body, particularly the sealing surface;
 - missing or defective valve cover; and
 - improper installation of the valve in the valve body.
4. The air-purifying element(s) will be examined for:
- incorrect cartridge, canister, or filter for the hazard;
 - incorrect installation, loose connections, missing or worn gasket, or cross-threading in the holder;
 - expired shelf-life date on the cartridge or canister;
 - cracks or dents in the outside case of the filter, cartridge, or canister indicated by the absence of sealing material, tape, or foil over the inlet; and
 - identical cartridges if more than one are used.

12.6.6 Care and Cleaning of Self-contained Breathing Apparatus The proper care of SCBAs involves the following:

- inspection for defects,
- cleaning and disinfecting,
- repair, and
- proper storage.

The following checklist is to be used by personnel whenever they check out a SCBA. (Note: Any discrepancy found will be cause to set the unit aside until it can be repaired by a certified repair person.)

1. Preliminary Inspection. The SCBA will be checked to ensure that:

- the high-pressure hose connector is tight on cylinder fitting,
- the bypass valve is closed,
- the mainline valve is closed,
- there is no cover or obstruction on regulator outlet, and
- the pressure in the tank is at least 1,800 pounds per square inch (psi).

2. Backpack and harness assembly.

- Straps will be:
 - visually inspected for complete set, and
 - visually inspected for frayed or damaged straps that may break during use.
- Buckles will be:
 - visually inspected for mating ends, and
 - the locking function will be checked.
- Backplate and Cylinder Lock Procedures will include
 - visual inspection of backplate for cracks and for missing rivets or screws, and
 - visual inspection of cylinder hold-down strap and physical checking of strap tightener and lock to ensure that it is fully engaged.

3. Cylinder and Cylinder Valve Assembly.

- Cylinders will be:
 - physically checked to ensure that it is tightly fastened to backplate,
 - checked for hydrostatic test date to ensure that it is current, and
 - visually inspected for large dents or gouges in metal.

- Head and Valve Assembly; workers will
 - visually inspect cylinder for presence of valve lock;
 - visually inspect cylinder gauge for condition of face, needle, and lens; and
 - open cylinder valve and listen or feel for leakage around packing (if leakage is noted, do not use until repaired); note function of valve lock.
4. Regulator and High-pressure Hose.
- High-pressure Hose and Connector: Workers will listen or feel for leakage in hose or at hose-to-cylinder connector. (Bubble in outer hose covering may be caused by seepage of air through hose when stored under pressure. This does not necessarily mean a faulty hose.)
 - Regulator and Low-pressure Alarm
 - Workers will cover outlet of regulator with palm of hand, open mainline valve and read regulator gauge (must read at least 1,800 psi and not more than rated cylinder pressure).
 - Workers will close cylinder valve and slowly move hand from regulator outlet to allow slow flow of air. Gauge should begin to show immediate loss of pressure as air flows. Low-pressure alarm should sound between 650 and 550 psi. Worker will remove hand completely from outlet and close mainline valve.
 - Worker will place mouth onto or over regulator outlet and blow. A positive pressure should be created and maintained for 5 to 10 seconds without any loss of air. Next, the worker will establish a slight negative pressure in regulator and hold for 5 to 10 seconds. Vacuum should remain constant. This tests the integrity of the diaphragm. Any loss of pressure or vacuum during this test indicates a leak in the apparatus.
 - The cylinder valve will be opened.
 - The worker will place a hand over the regulator outlet and open the mainline valve. The hand will be removed from outlet and replaced in rapid movement. This will be repeated twice. Air should escape when hand is removed each time, indicating a positive pressure in chamber. The mainline valve will be closed and the hand removed from outlet.
 - The worker will ascertain that no obstruction is in or over the regulator outlet by opening and closing the bypass valve momentarily to ensure flow of air through the bypass system.

5. Facepiece and Corrugated Breathing Tube.

- Facepiece
 - The worker will visually inspect the head harness for damaged serrations and deteriorated rubber and visually inspect the rubber facepiece body for signs of deterioration or extreme distortion.
 - Retaining clamp properly in place, the worker will visually inspect the lens for proper seal in rubber facepiece, and for cracks or large scratches.
 - The worker will visually inspect exhalation valve for visible deterioration or foreign materials buildup.
- Breathing Tube and Connector
 - The breathing tube will be stretched and visually inspected for deterioration and holes.
 - The connector will be visually inspected to ensure good condition of threads and for presence and proper condition of "O" ring or rubber gasket seal.
 - The worker will perform a negative pressure test on facepiece by:
 - a. donning the backpack and facepiece;
 - b. with facepiece held tightly to face or facepiece properly donned, stretching the breathing tube to open corrugations and placing a thumb or hand over the end of the connector; and
 - c. inhaling. Negative pressure should be created inside mask, causing it to pull tightly to face. This negative pressure should be maintained for 5 to 10 seconds. If negative pressure leaks down, the facepiece assembly is not adequate and will not be worn.

6. Storage of Units. The worker will check that:

- cylinder is refilled as necessary and unit is cleaned and inspected,
- cylinder valve is closed,
- high-pressure hose connector is tight on cylinder,
- pressure is bled off high-pressure hose and regulator,
- bypass valve is closed,
- mainline valve is closed,
- all straps are completely loosened and laid straight, and
- facepiece is properly stored to protect against dust, sunlight, heat, extreme cold, excess moisture, and damaging chemicals.

12.6.7 Cleaning and Sanitizing Any good detergent may be used for cleaning followed by a disinfecting rinse or a combination disinfectant-detergent for a one-step operation. Reliable, effective disinfectants can be made from readily available household solutions, including the following.

- Hypochlorite solution (50 ppm of chlorine) can be made by adding approximately 2 milliliters of bleach (e.g., Clorox™) to 1 liter of water, or 2 tablespoons of bleach per gallon of water. A 2-minute immersion disinfects the respirators.
- Aqueous solution of iodine (50 ppm of iodine) can be made by adding approximately 0.8 milliliter of tincture of iodine per liter of water, or 1 teaspoon of tincture of iodine per gallon of water. A 2-minute immersion is sufficient to disinfect the respirators.

To prevent damaging the rubber and plastic in the respirator facepieces, the cleaning water should not exceed 140 °F; however, to ensure adequate cleaning, it should not be less than 120 °F.

12.6.8 Rinsing The cleaned and disinfected respirators should be rinsed thoroughly in water (140 °F maximum) to remove all traces of detergent and disinfectant. This is important for preventing dermatitis.

12.6.9 Drying The respirators may be allowed to dry in room air on a clean surface. They may also be hung from a horizontal wire, like drying clothes; however, care must be taken not to damage or distort the facepieces.

12.6.10 Reassembly and Inspection To avoid contamination, the clean, dry respirator facepieces should be reassembled and inspected in an area separate from the disassembly area. The inspection procedures were discussed previously; special emphasis should be given to inspecting the respirators for detergent or soap residue left by inadequate rinsing. This appears most often under the seat of the exhalation valve, and can cause valve leakage or sticking. The respirator should be thoroughly inspected and all defects corrected. New or retested cartridges and canisters should be installed, and the completely reassembled respirator should be tested for leaks. For SCBA devices, the facepiece should be combined with the tested regulator and the fully charged cylinder, and an operational check should be performed.

12.6.11 Maintenance and Repair Replacement or repair should be done only by trained, experienced persons using parts designed for the respirator. Besides being contrary to OSHA requirements, substitution of parts from a different brand or type of respirator invalidates approval of the device. This restriction applies particularly to maintenance of the more complicated devices, especially SCBA, and more specifically, regulator valves and low-pressure warning devices. These devices should be returned to the manufacturer or to a trained technician for adjustment or repair. No problems are anticipated in repairing and maintaining most simple respirators, particularly the commonly used air-purifying type.

12.6.12 Respirator Storage Respirators must be stored properly to protect against the following:

- dust,
- sunlight,
- heat,
- extreme cold,
- excessive moisture,
- damaging chemicals, and
- mechanical damage.

Damage and contamination of respirators may occur if they are stored on a workbench; in a tool cabinet or toolbox among heavy tools, greases, and dirt; or in a vehicle.

13.0 TRAINING PROGRAM

All personnel working at OLF Barin who potentially may be exposed to toxic substances or hazardous materials will participate in an initial training program on hazardous waste site operations and an annual refresher training or supervisory training (as appropriate), as well as site-specific training before commencement of the onsite assignment. The site HSO or health and safety designee will provide this training before an individual is permitted to work in a downrange area. The initial Health and Safety Training Program consists of the 40-hour training program required by the OSHA in standard 29 CFR 1910.120. In addition to the initial training, ABB-ES uses 8-hour annual refresher and 8-hour supervisory training elements, which are augmented by site-specific training regarding site hazards and specialized problems and protocols.

13.1 TRAINING. All site-assigned personnel who are potentially exposed to toxic substances or hazardous materials will be required to participate in a training course on hazardous waste site operations. This training is required under provisions of the OSHA standard, and must consist of 40 hours covering the following areas:

- familiarity with the regulations and implications of OSHA regulations in 29 CFR 1910.120;
- familiarity with the organizational structure responsible for site health and safety;
- explanation of the medical surveillance requirements, including recognition of health hazards;
- instruction in the use and maintenance of personal protective equipment;
- identification and analysis of site chemical and physical hazards;
- instruction regarding monitoring equipment, including personnel and environmental sampling instruments;
- instruction in site control and decontamination procedures;
- instruction in contingency planning; and
- instruction in confined-space entry procedures.

13.2 ANNUAL REFRESHER AND SUPERVISORY TRAINING. Annually, all personnel required to participate in the initial training will take an 8-hour refresher training course as required by 29 CFR 1910.120. Those personnel with either site supervisory or health and safety responsibilities will participate in an 8-hour supervisory training course. The 8-hour supervisory training meets requirements of the annual refresher.

13.3 OTHER TRAINING. Additional training will be provided as determined by the HSM or the HSS, and may include additional refreshers on personal protective equipment, instrumentation, CPR, first aid, or any other pertinent health- or safety-related subject.

14.0 MEDICAL SURVEILLANCE PROGRAM

14.1 HEALTH MONITORING PROGRAM. All onsite ABB-ES personnel and laboratory staff must be enrolled in the Health Monitoring Program, which is implemented through Environmental Medicine Resources, Inc., a company consisting of a team of physicians and support personnel who specialize in occupational medicine. The health monitoring program consists of an initial medical examination to establish the employee's general health profile, which provides important baseline laboratory data for later comparative study and annual examinations. The contents of the initial comprehensive physical examination and laboratory testing routine are listed in Table 14-1. Follow-up examinations are completed annually for all personnel enrolled in the health monitoring program, or more frequently if project assignments warrant testing following specific field activities. Employees are certified fit for specific activities based on the results of the medical examination (see Figure 14-1).

14.2 REVIEW OF EXPOSURE SYMPTOMS. Symptoms of exposure to hazardous materials will be reviewed for each site to indicate to personnel the recognized signs of possible exposure to those materials. This information will be supplemented with a discussion of the need for objectivity in the personal health assessment to account for normal reaction to stressful situations. The HSO will watch for outward evidence of changes in worker health. Symptoms may include skin irritations, skin discoloration, eye irritation, muscular soreness, fatigue, nervousness or irritability, intolerance to heat or cold, or loss of appetite. Employees will routinely be asked to assess their general state of health during the project. Special medical monitoring may be identified for certain sites. All onsite personnel are required to review and sign the HASP (see Chapter 17.0).

**Table 14-1
Baseline Health Monitoring Program**

RI/FS Health and Safety Plan
OLF Barin, Foley, Alabama

Health Monitoring Activity	Testing
Physical Examination	Medical history Medical examination Vision: - near/distant - color Audiometry Radiology: PA/LAT Spirometry Electrocardiogram
Laboratory Analysis	
Complete Blood Counts and Chemistries	White blood count Differential cell counts Methemoglobin Uric acid Lactic dehydrogenase Alkaline phosphatase Calcium Phosphorus Cholesterol Urea nitrogen Glucose Albumin Globulin Total protein Total bilirubin Serum glutamic oxalacetic transaminase Hemoglobin and/or hematocrit
Urine Analysis	Color and character Specific gravity pH Protein Acetone Glucose Microscopic examination

Medical Summary
Environmental Medicine Resources, Inc.
4360 Chamblee Dunwoody Road
Atlanta, GA 30241

Ms. Cindy Sundquist
ABB Environmental Services, Inc.
261 Commercial Street
P. O. Box 7050
Portland, ME 04112

Employee:
SSN#:

Exam Date:

Re-evaluation of Toxin Exposure 06.A
Report Date:

The individual identified above has completed a medical surveillance examination. Review of the data from this examination resulted in the following conclusions:

MEDICAL AND SAFETY RESTRICTIONS/RECOMMENDATIONS

None

APPRAISAL OF LIFTING CAPACITY

Lifting Capacity for this individual appears to be II/II
(I = up to 25 lbs., II = up to 60 lbs., III = up to 100 lbs. frequently)

CLEARANCE FOR WORK WITH HAZARDOUS MATERIALS

In compliance with 29 CFR 1910.120 (f), medical clearance is issued for individual to work with hazardous materials.

USE OF EQUIPMENT

In compliance with 29 CFR 1910.134, medical clearance is issued for unrestricted use of equipment.

EXPOSURE TO TEMPERATURE EXTREMES

Exposures to temperature extremes are acceptable providing that reasonable precautions are taken.

PUBLIC LAW 100-690

Not a requirement of this examination.

DEPARTMENT OF TRANSPORTATION CERTIFICATION

Not requested.

The employee has been informed of the results of this medical examination and also advised of any specific health implications of their employment to the extent required by existing law.

David L. Barnes, M.D., FACS, FACPM
V.P. Medical Affairs/Medical Director

FIGURE 14-1

Medical Summary
Environmental Medicine Resources, Inc.
4360 Chamblee Dunwoody Road
Atlanta, GA 30241

Ms. Cindy Sundquist
ABB Environmental Services, Inc.
261 Commercial Street
P. O. Box 7050
Portland, ME 04112

Employee:
SSN#:

Exam Date:

Re-evaluation of Toxin Exposure 06.A
Report Date:

The individual identified above has completed a medical surveillance examination. Review of the data from this examination resulted in the following conclusions:

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None

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David L. Barnes, M.D., FACS, FACPM
V.P. Medical Affairs/Medical Director

FIGURE 14-1

15.0 HEALTH AND SAFETY FORMS AND DATA SHEETS

This chapter contains ABB-ES's Health and Safety Audit Form, Accident Report Form, applicable Material Safety Data Sheets, and OSHA's Job Safety and Health Protection notice.

15.1 HEALTH AND SAFETY AUDIT FORM

Site Name: _____ Date _____

Auditor: _____

SEND A COPY OF COMPLETED FORM TO THE HEALTH AND SAFETY MANAGER.

<u>GENERAL</u>	<u>YES</u>	<u>NO</u>	<u>COMMENTS</u>
HASP onsite?	___	___	_____
HASP completely signed off and approved?	___	___	_____
OSHA poster posted in trailer?	___	___	_____
Emergency telephone numbers posted in trailer?	___	___	_____
Emergency eyewash onsite?	___	___	_____
Emergency shower onsite?	___	___	_____
Stretcher onsite?	___	___	_____
First-aid kit onsite?	___	___	_____
Adequately stocked?	___	___	_____
Proper sanitation facilities?	___	___	_____
<u>DOCUMENTATION AND RECORDKEEPING</u>			
Only personnel listed and approved in HASP onsite?	___	___	_____
All personnel properly trained?	___	___	_____
All personnel in health monitoring program?	___	___	_____
Daily field records kept by the Site Manager?	___	___	_____
Levels of PPE recorded?	___	___	_____
Contaminant levels recorded?	___	___	_____
Site surveillance records kept by HSO?	___	___	_____

DOCUMENTATION AND RECORDKEEPING

YES NO

COMMENTS

(Cont.)

Calibration records maintained?

Accident/incident forms onsite?

Field team review sheets signed?

Medical data sheets completed?

Spare hospital directions available?

Visitors logbook completed?

MSDSs for chemicals onsite?

HASP revisions recorded?

First-aid kit inspected weekly?

Are daily safety meetings held?

Emergency procedures discussed during safety meetings?

EMERGENCY RESPONSES

Vehicle available onsite for transportation to the hospital?

Fire extinguishers onsite?

At least two persons trained in CPR and first-aid onsite at all times?

All personnel know who is trained?

PERSONNEL PROTECTIVE EQUIPMENT

Proper PPE being worn as specified in the HASP?

Level of PPE being worn:

PPE adequate for work conditions?

If not, give reason:

Upgrade/downgrade to PPE level:

PERSONNEL PROTECTIVE EQUIPMENT

YES NO

COMMENTS

(Cont.)

Has facial hair that would interfere with fit of respirators been removed?

If not, willing to shave if necessary?

Fit-tested within the last year?

If Level B, back-up/emergency person suited up (except for air)?

HSO periodically inspects PPE and equipment?

PPE not in use properly stored?

MONITORING EQUIPMENT

All equipment listed in HASP onsite?

Properly calibrated?

In good condition?

Used properly?

Other equipment needed?

List: _____

Monitoring equipment covered with plastic to minimize contamination?

DECONTAMINATION

Decontamination line set up properly?

Proper cleaning fluid used for known or suspected contaminants?

Proper decontamination procedures used?

Decontamination personnel wearing proper PPE?

Equipment decontaminated?

Samples decontaminated?

Disposable items changed twice a day or more often if needed?

WORK PRACTICES

YES NO

COMMENTS

Proper collection and disposal of contaminated PPE?

Proper collection and disposal of decontamination fluid?

Water available for decontamination?

Buddy system used?

Equipment kept off drums and ground?

Kneeling or sitting on drums or ground not allowed?

Personnel avoid standing or walking through puddles or stained soil?

Zones established?

If night work to be conducted, adequate illumination?

Smoking, eating, or drinking in the Exclusion Zone or CRZ not allowed?

To the extent feasible, contaminated materials handled remotely?

Contact lenses not allowed onsite?

Entry into excavations not allowed unless properly shored or sloped?

All unusual situations onsite listed in HASP?

If not, what?

Action taken?

HASP revised?

CONFINED SPACE ENTRY

All confined spaces identified?

If not, list:

CONFINED SPACE ENTRY

YES NO

COMMENTS

All appropriate equipment available
and in good working order?

— — _____

Equipment properly calibrated?

— — _____

Confined Space Checklists used?

— — _____

Checklists completely and correctly
filled out?

— — _____

ACCIDENT LOCATION (use other side of sheet as needed)

Causative agent most directly related to accident (i.e., object, substance, material, machinery, equipment, and conditions):

Was weather a factor? How? _____

Unsafe mechanical/physical/environmental condition at time of accident (be specific): _____

Unsafe act by injured person and/or others contributing to the accident (be specific, must be answered):

Personal factors (improper attitude, lack of knowledge or skill, slow reaction, fatigue, inattention, horseplay):

MODIFICATIONS

Level of personal protective equipment required in site safety plan: _____

Was injured person using required equipment? _____

If not, how did actual equipment use differ from plan? _____

Was personal protective equipment required in site safety plan adequate for site conditions? _____

If no, what additional equipment was needed?: _____

What can be done to prevent a reoccurrence of this type of accident (i.e., modification of machine, mechanical guards, modification of work practices, training)?: _____

DETAILED NARRATIVE DESCRIPTION (How did accident occur and why; objects, equipment, tools used, circumstances, assigned duties; be specific): _____

Signature of Preparer: _____ Date: _____

Signature of Site Manager: _____ Date: _____

SEND COPIES OF COMPLETED FORM TO HUMAN RESOURCES
AND THE HEALTH AND SAFETY MANAGER OR SUPERVISOR.

15.3 MATERIAL SAFETY DATA SHEETS

CARBON TETRACHLORIDE

CBT

<p>Common Synonyms</p> <p>Carbon Tetrachloride Tetrachloroethane Benzonorm Hexachlorane Perchloroethane</p>	<p>Watery liquid Colorless Sweet odor</p> <p>Sinks in water. Poisonous vapor is produced.</p>
<p>Avoid contact with skin and eyes. Avoid direct contact with goggles and self-contained breathing apparatus. Stop discharge if possible. Stay upright and use water spray to "knock down" vapor. Notify local health and pollution control agencies.</p>	
Fire	<p>Not flammable. POISONOUS AND IRRITATING GASES ARE PRODUCED WHEN HEATED. Wear goggles and self-contained breathing apparatus.</p>
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR POISONOUS IF INHALED. Irritating to eyes. More so than air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID POISONOUS IF SWALLOWED. Irritating to skin and eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. If IN EYES, hold eyelids open and flush with plenty of water. If SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. If SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p>
Water Pollution	<p>Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water intakes. Notify local health and pollution control officials. Notify discharge of nearby water intakes.</p>
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook)</p> <p>Issue warning-poison Reserve access Should be removed</p>	<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Halogenated hydrocarbon 3.2 Formula: CCl₄ 3.3 HAZ/WH Designator: 6.1/1848 3.4 DOT ID No.: 1848 3.5 CAS Registry No.: 56-23-5</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Sweetest, aromatic, moderately strong etheral; somewhat resembling that of chloroform.</p>
<p style="text-align: center;">5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Organic vapor canister with full face mask; protective clothing; rubber gloves. 5.2 Symptoms following Exposure: Dizziness, incoordination, anesthesia; may be accompanied by nausea and liver damage. Kidney damage also occurs, often producing decrease or stopping of urinary output. 5.3 Treatment of Exposure: EYES AND SKIN: flush with plenty of water; for eyes, get medical attention. Remove contaminated clothing and wash before reuse. INHALATION: immediately remove to fresh air, keep patient warm and quiet and get medical attention promptly. Start artificial respiration if breathing stops. INGESTION: induce vomiting and get medical attention promptly. No specific antidote known. 5.4 Threshold Limit Value: 5 ppm 5.5 Short Term Inhalation Limit: 25 ppm for 30 min. 5.6 Toxicity by Ingestion Grade 2; LD₅₀ = 0.5 to 5 g/kg (rat) 5.7 Late Toxicity: Causes severe liver damage and death if ingested. 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If applied on clothing and allowed to remain, may cause smearing and reddening of the skin. 5.10 Oral Threshold: Greater than 10 ppm 5.11 IDLH Value: 300 ppm</p>	

<p style="text-align: center;">6. FIRE HAZARDS</p> <p>6.1 Flash Point: Not flammable 6.2 Flammable Limits in Air: Not flammable 6.3 Fire Extinguishing Agents: Not pertinent 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion Products: Forms poisonous phosgene gas when exposed to open flames. 6.6 Behavior in Fire: Decomposes to form chlorine and phosgene 6.7 Ignition Temperature: Not flammable 6.8 Electrical Hazards: Not pertinent 6.9 Burning Rate: Not flammable 6.10 Autotest Flame Temperature: Data not available 6.11 Self-Heating Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p style="text-align: center;">10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-X</p>																																				
<p style="text-align: center;">7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: no reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molecular Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 06</p>	<p style="text-align: center;">11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: OSHA 11.2 NAB 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>0</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td> Vapor Irritant</td> <td>2</td> </tr> <tr> <td> Liquid or Solid Irritant</td> <td>1</td> </tr> <tr> <td> Poison</td> <td>4</td> </tr> <tr> <td> Water Pollution</td> <td></td> </tr> <tr> <td> Human Toxicity</td> <td>2</td> </tr> <tr> <td> Acute Toxicity</td> <td>2</td> </tr> <tr> <td> Anesthetic Effect</td> <td>2</td> </tr> <tr> <td> Reactivity</td> <td></td> </tr> <tr> <td> Other Chemical</td> <td>1</td> </tr> <tr> <td> Water</td> <td>0</td> </tr> <tr> <td> Self Reaction</td> <td>0</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td>3</td> </tr> <tr> <td>Flammability (Red)</td> <td>0</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>0</td> </tr> </tbody> </table>	Category	Rating	Fire	0	Health		Vapor Irritant	2	Liquid or Solid Irritant	1	Poison	4	Water Pollution		Human Toxicity	2	Acute Toxicity	2	Anesthetic Effect	2	Reactivity		Other Chemical	1	Water	0	Self Reaction	0	Category	Classification	Health Hazard (Blue)	3	Flammability (Red)	0	Reactivity (Yellow)	0
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<p style="text-align: center;">8. WATER POLLUTION</p> <p>8.1 Acute Toxicity: Data not available 8.2 Waterborne Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): None 8.4 Food Chain Concentration Potential: None</p>	<p style="text-align: center;">12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 153.84 12.3 Boiling Point at 1 atm: 170°F = 76.5°C = 349.7°K 12.4 Freezing Point: -8.4°F = -22.0°C = 250.2°K 12.5 Critical Temperature: 541°F = 283°C = 556°K 12.6 Critical Pressure: 860 psi = 45 atm = 4.8 MN/m² 12.7 Specific Gravity: 1.59 at 20°C (liquid) 12.8 Liquid Surface Tension: 27.0 dynes/cm = 0.277 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 45.0 dynes/cm = 0.045 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: 5.5 12.11 Ratio of Specific Heats of Vapor (Gas): 1.111 12.12 Latent Heat of Vaporization: 84.2 Btu/lb = 48.8 cal/g = 1.959 x 10⁶ J/kg 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 5.09 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: 3.3 psi</p>																																				
<p style="text-align: center;">9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Commercial, technical, USP 9.2 Storage Temperature: Ambient 9.3 Inert Atmospheric: No requirement 9.4 Venting: Pressure-reducing</p>																																					
<p>NOTES</p>																																					

<p>Common Synonyms TDE 1,1-Dichloro-2,2-bis(4-chlorophenyl) ethane Dichlorobis(4-chlorophenyl) ethane</p>		<p>Solid</p> <p>White</p> <p>Sinks in water.</p>	
<p>SIZE DISCHARGE / DANGER: WEAR PROOF SUITS, AVOID CONTACT WITH SOILS AND DUST, MOISTURE AND REMOVE DECONTAMINATED MATERIAL. NOTIFY LOCAL HEALTH AND POLLUTION CONTROL AGENCIES.</p>			
<p>Fire</p>		<p>Corrosions: Irritating gases may be produced when heated. Inhalation of vapors and air-contaminated breathing apparatus. Extinguish with water, dry chemicals, foam, or carbon dioxide.</p>	
<p>Exposure</p>		<p>CALL FOR MEDICAL AID.</p> <p>DUST Irritating to eyes, nose and throat. Harmful if inhaled. If in eyes, flush eyes open and flush with plenty of water. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>SOLID Irritating to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. If in EYES, flush eyes open and flush with plenty of water. If SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. If SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, DO NOTHING EXCEPT KEEP VICTIM WARM.</p>	
<p>Water Pollution</p>		<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water streams. Notify local health and welfare officials, notify operators of nearby water intakes.</p>	
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue environmental contamination should be removed. Chemical and physical treatment.</p>		<p>2. LABEL</p> <p>2.1 Category: none 2.2 Class: Not pertinent</p>	
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Not listed 3.2 Formula: $(\text{H}-\text{ClC}_6\text{H}_4)_2\text{C}-\text{C}(\text{Cl})_2$ 3.3 BIO/WH Designation: Not listed 3.4 DOT ID No.: 2781 3.5 CAS Registry No.: 75-64-8</p>		<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Solid 4.2 Color: White 4.3 Odor: Data not available</p>	
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Dust mask, goggles or face shield, rubber gloves 5.2 Symptoms Following Exposure: Irritation caused vomiting and delayed symptoms similar to those caused by DDT. Contact with eyes causes irritation. 5.3 Treatment of Exposure: INGESTION: treatment should be given by a physician and is similar to that given following ingestion of DDT. EYES: flush with water. 5.4 Threshold Limit Value: Data not available 5.5 Short Term Exposure Limit: Data not available 5.6 Toxicity by Ingestion: Grade 2: oral $\text{LD}_{50} = 1.2 \text{ g/kg (mouse)}$, 2.4 g/kg (rat) 5.7 Lethal Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Data not available 5.9 Liquid or Solid Irritant Characteristics: Data not available 5.10 Other Threshold: Data not available 5.11 ED₀₁ Value: Data not available</p>			

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: Not pertinent 6.2 Flammable Limits in Air: Not pertinent 6.3 Fire Extinguishing Agents: Water, foam, dry chemical, carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Data not available 6.5 Special Hazards of Combustion Products: irritating hydrogen chloride fumes may form in fire. 6.6 Behavior in Fire: Data not available 6.7 Ignition Temperature: Data not available 6.8 Electrical Hazards: Not pertinent 6.9 Burning Rate: Not pertinent 6.10 Adiabatic Flame Temperature: Data not available 6.11 Self-Heating Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>		<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) II</p>	
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Inorganic: Data not available 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Initiator of Polymerization: Not pertinent 7.7 Oxidation (Reactivity to Peroxide): Data not available 7.8 Reactivity Group: Data not available</p>		<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Not listed 11.2 NAB Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Not listed</p>	
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: <2.5 ppm/96 hr/certain/TL₅₀/fresh water 0.15-0.2 ppm/48 hr/brown shrimp/TL₅₀/salt water 0.008 ppm/24 hr/brown shrimp/LC₅₀/salt water 8.2 Waterbody Toxicity: 4,800-5,200 ppm LC₅₀ 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Fecal Chain Concentration Potential: High</p>		<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Solid 12.2 Molecular Weight: 320 12.3 Boiling Point at 1 atm: Not pertinent (Decomposes) 12.4 Freezing Point: 234°F = 112°C = 265°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.476 at 20°C (solid) 12.8 Liquid Surface Tension: Not pertinent 12.9 Liquid Water Interfacial Tension: Not pertinent 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: Data not available 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: Data not available 12.18 Limiting Value: Data not available 12.19 Heat Vapor Pressure: Data not available</p>	
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Technical 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open</p>		<p>NOTES</p>	

Common Synonyms Dichlorodiphenylchloroethane E. P. - DDT 1, 1, 1-Trichloro-2, 2-bis(p-chlorophenyl) ethane	Solid	Colorless	Odorless
<p>Avoid contact with skin. Call fire department. Soak and remove discolored material. Notify local health and pollution control agencies.</p>			
Fire	<p>CONTOURION. POISONOUS GASES ARE PRODUCED IN FIRE. Wear goggles and non-oxidant breathing apparatus. Extinguish with water, dry chemical, foam, or carbon dioxide.</p>		
Exposure	<p>CALL FOR MEDICAL AID. SOLIDS Irritating to skin and eyes. If swallowed, do not induce vomiting, headache, 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.</p>		
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water streams. Notify local health and wildlife officials. Notify operation of nearby water facilities.</p>		
1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue water/water containers should be removed		2. LABEL 2.1 Category: none 2.2 Class: not pertinent	
3. CHEMICAL DESIGNATIONS 3.1 CC Compatibility Class: Not listed 3.2 Formula: (p-ClC ₆ H ₄) ₂ CHCl 3.3 BMD/WH Designation: 8/2781 3.4 DOT ID No.: 2781 3.5 CAS Registry No.: 50-25-3		4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Solid 4.2 Color: White 4.3 Odor: none	
5. HEALTH HAZARDS 5.1 Personal Protective Equipment: Data not available 5.2 Symptoms Following Exposure: Very large doses are followed promptly by vomiting, due to local gastric irritation; delayed emesis or diarrhea may occur. With smaller doses, symptoms usually appear 2-3 hours after ingestion. These include tingling of lips, tongue, and feet; weakness, headache, sore throat, nausea, coarse tremors of neck, head, and eyelids; apprehension, dizziness, and confusion. Convulsions may alternate with periods of coma and partial paralysis. Vital signs are essentially normal, but in severe poisoning the pulse may be irregular and abnormally slow, venous throbbing and sudden death may occur at any time during acute phase. Pulmonary edema usually indicates severe intoxication. 5.3 Treatment of Exposure: INGESTION: treatment should be done by a physician. It usually includes gastric lavage and administration of saline cathartic, phenobarbital, and barbiturals. Patient should be kept quiet and under observation for at least 24 hours. 5.4 Threshold Limit Value: 1 mg/m ³ 5.5 Short Term Inhalation Limit: 3 mg/m ³ 5.6 Toxicity by Ingestion: Grade 3; LD ₅₀ = 50 to 500 mg/kg (rat) 5.7 Lethal Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Not pertinent 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smothering and roasting of the skin. 5.10 Odor Threshold: Not pertinent 5.11 IDLH Value: Data not available			
6. FIRE HAZARDS 6.1 Flash Point: 162°F-171°F C.C. 6.2 Flammable Limits in Air: Not pertinent 6.3 Fire Extinguishing Agents: Water, foam, dry chemical, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion Products: Toxic and irritating gases may be generated 6.6 Behavior in Fire: Melts and burns 6.7 Ignition Temperature: Data not available 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Data not available 6.10 Adiabatic Flame Temperature: Data not available 6.11 Self-Heating Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available			
7. CHEMICAL REACTIVITY 7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Corrosives: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Resistant to Product): Data not available 7.8 Reactivity Group: Data not available			
8. WATER POLLUTION 8.1 Aquatic Toxicity: D.D.09 ppm/24 hr/3ass/TL ₅₀ /fresh water D.D.18 ppm/96 hr/3ass/TL ₅₀ /fresh water D.D.28 ppm/48 hr/3ass/10% ml/salt water 8.2 Waterfowl Toxicity: 2240 mg/kg 8.3 Biological Oxygen Demand (BOD): Not pertinent 8.4 Food Chain Concentration Potential: High			
9. SHIPPING INFORMATION 9.1 Grades of Purity: Technical 9.2 Storage Temperature: Data not available 9.3 Inert Atmosphere: Data not available 9.4 Venting: Data not available			
10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) II			
11. HAZARD CLASSIFICATIONS 11.1 Code of Federal Regulations: OSHA 11.2 NIOSH Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classifications: Not listed			
12. PHYSICAL AND CHEMICAL PROPERTIES 12.1 Physical State at 15°C and 1 atm: Solid 12.2 Molecular Weight: 354.5 12.3 Boiling Point at 1 atm: Not pertinent 12.4 Freezing Point: 22°C = 10°C = 361°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.36 at 15°C (solid) 12.8 Liquid Surface Tension: Not pertinent 12.9 Liquid Water Interfacial Tension: Not pertinent 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: Data not available 12.18 Limiting Value: Data not available 12.19 Real Vapor Pressure: Data not available			
NOTES			

1,2-DICHLOROETHYLENE

DEL

<p>Common Synonyms Acetylene dichloride 1,1-dichloroethene Chloroethene Di-1, 2-dichloroethylene 1,1,1, 2-dichloroethylene</p>		<p>Liquid</p> <p>Colorless</p> <p>Sweet pleasant odor</p> <p>Sinks in water. Flammable, irritating vapor is produced.</p>
<p>Wear goggles and self-contained breathing apparatus. Shut off ignition sources. Call fire department. Stop discharge if possible. Keep people away. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>		
<p>Fire</p>	<p>FLAMMABLE POISONOUS GASES MAY BE PRODUCED IN FIRE. Containers may explode in fire. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Extinguish with dry chemicals, foam or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>	
<p>Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR If inhaled will cause dizziness, nausea, vomiting, or difficult breathing. Move victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Harmful if swallowed. If SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.</p>	
<p>Water Pollution</p>	<p>Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water bodies.</p> <p>Notify local health and waste officials. Notify operators of nearby water intakes.</p>	
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-high flammability Avoided areas Evacuate area Should be removed Chemical and physical treatment</p>		<p>2. LABEL</p> <p>2.1 Category: Flammable liquid 2.2 Class: 3</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Not listed 3.2 Formula: C₂H₂Cl₂ 3.3 HMO/AM Designation: 3.2/1150 3.4 DOT ID No.: 1150 3.5 CAS Registry No.: 540-59-0</p>		<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Ethereal, slightly acid, pleasant, chloroform-like</p>
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Rubber gloves, safety goggles, air supply mask or self-contained breathing apparatus.</p> <p>5.2 Symptoms Following Exposure: Inhalation causes nausea, vomiting, weakness, tremor, epigastric cramps, central nervous depression. Contact with liquid causes irritation of eyes and (on prolonged contact) skin. Irritation causes slight depression to deep necrosis.</p> <p>5.3 Treatment of Exposure: INHALATION: remove from further exposure; if breathing is difficult, give oxygen; if victim is not breathing, give artificial respiration, preferably mouth-to-mouth; give oxygen when breathing is resumed; call a physician. EYES: flush with water for at least 15 min. SKIN: wash well with soap and water. INGESTION: give gastric lavage and cathartics.</p> <p>5.4 Threshold Limit Value: 200 ppm 5.5 Short Term Exposure Limit: Data not available 5.6 Toxicity by Ingestion: Grade 2; oral LD₅₀ = 770 mg/kg (rat) 5.7 Skin Toxicity: Produces liver and kidney injury in experimental animals 5.8 Vapor (Gas) Irritant Characteristics: Data not available 5.9 Liquid or Solid Irritant Characteristics: Data not available 5.10 Ocular Threshold: Data not available 5.11 IDLH Value: 4,000 ppm</p>		

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 37°F C.C. 6.2 Flammable Limits in Air: 9.7%-12.8% 6.3 Fire Extinguishing Agents: Dry chemical, foam, carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective. 6.5 Special Hazards of Combustion Products: Phosgene and hydrogen chloride fumes may form in fire. 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: 860°F 6.8 Electrical Hazards: Data not available 6.9 Burning Rate: 2.6 mm/min. 6.10 Adiabatic Flame Temperature: Data not available</p> <p style="text-align: right;">(Continued)</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X-Y</p>								
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Inorganic No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Will not occur under ordinary conditions of shipment. The reaction is not vigorous. 7.6 Inhibitor of Polymerization: None used 7.7 Water Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Flammable liquid 11.2 NAB Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classifications</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td>2</td> </tr> <tr> <td>Flammability (Red)</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>2</td> </tr> </tbody> </table>	Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	2
Category	Classification								
Health Hazard (Blue)	2								
Flammability (Red)	3								
Reactivity (Yellow)	2								
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: Data not available 8.2 Wastewater Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Feed Chain Concentration Potential: None</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 97.0 12.3 Boiling Point at 1 atm: 60°C = 140°F = 300°K 12.4 Freezing Point: -112.67°C = -172.81°F = 161.68°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.27 at 25°C (liquid) 12.8 Liquid Surface Tension: 24 dyne/cm = 0.024 N/m at 20°C 12.9 Liquid Water Interfacial Tension (mN): 30 dyne/cm = 0.030 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: 3.34 12.11 Ratio of Specific Heats of Vapor (Gas): 1.1468 12.12 Latent Heat of Vaporization: 130 Btu/lb = 72 cal/g = 3.0 X 10⁴ J/kg 12.13 Heat of Combustion: -4,847.2 Btu/lb = -2,882.8 cal/g = -112.87 X 10⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: Data not available 12.18 Limiting Value: Data not available 12.19 Reid Vapor Pressure: Data not available</p>								
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Commercial 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-relieving</p>	<p>13. FIRE HAZARDS (Continued)</p> <p>13.1 Stoichiometric Air to Fuel Ratio: Data not available 13.2 Flame Temperature: Data not available</p>								

DICHLOROMETHANE

DCM

<p>Common Synonyms Methylene chloride Methylene dichloride</p>	<p>Watery liquid Colorless Sweet, pleasant odor</p>	<p>Sinks in water, irritating vapor is produced.</p>
<p>Side Discharge if possible Avoid contact with liquid and vapor. Wash and remove decontaminated material. Notify local health and pollution control agencies.</p>		
Fire	<p>Not flammable. POISONOUS GASES ARE PRODUCED WHEN HEATED. Wear goggles and self-contained breathing apparatus. Cool exposed containers with water.</p>	
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Breathing is over, nose and throat. If irritating, use gauze sponges and dressings. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Washing is skin and eyes. Remove if absorbed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. If in EYES, hold eyelids open, and flush with plenty of water. If SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.</p>	
Water Pollution	<p>Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water streams. Notify local health and pollution control offices. Notify contacts of health water streams.</p>	
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Disperse and flush.</p>		<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CO Compatibility Class: Halogenated hydrocarbon 3.2 Formula: CH₂Cl₂ 3.3 IMO/IUN Designation: 9.2/1580 3.4 DOT ID No.: 1580 3.5 CAS Registry No.: 75-06-2</p>		<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Pleasant, aromatic like chloroform, sweet, ethereal</p>
<p style="text-align: center;">5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Organic vapor canister mask, safety glasses, protective clothing. 5.2 Symptoms Following Exposure: INHALATION: anesthetic effects, nausea and drowsiness. CONTACT WITH SKIN AND EYES: skin irritation, irritation of eyes and nose. 5.3 Treatment of Exposure: INHALATION: remove from exposure. Give oxygen if needed. INGESTION: no specific antidotes. CONTACT WITH SKIN AND EYES: remove contaminated clothing; wash skin or eyes if affected. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limit: 500 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 2; LD₅₀ = 0.5 to 0.9 g/kg 5.7 Lethal Toxicity: None 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If solid on clothing and allowed to remain, may cause chafing and reddening of the skin. 5.10 Dermal Threshold: 200-300 ppm 5.11 IDLH Value: 5,000 ppm</p>		

<p style="text-align: center;">6. FIRE HAZARDS</p> <p>6.1 Flash Point: Not flammable under conditions likely to be encountered. 6.2 Flammable Limits in Air: 12%-18% 6.3 Fire Extinguishing Agents: Not pertinent 6.4 Fire Extinguishing Agents not to be used: Not pertinent 6.5 Special Hazards of Combustion Products: Decomposition products generated in a fire may be irritating or toxic. 6.6 Behavior in Fire: Not pertinent 6.7 Ignition Temperature: 1184°F 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Not pertinent 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;">10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-P-X</p>																																						
<p style="text-align: center;">7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Water Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 26</p>	<p style="text-align: center;">11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: OSHA 11.2 NAS Hazard Rating for Bulk Water Transportation</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire</td> <td>1</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td>Vapor Irritant</td> <td>2</td> </tr> <tr> <td>Liquid or Solid Irritant</td> <td>1</td> </tr> <tr> <td>Poison</td> <td>2</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td>Human Toxicity</td> <td>2</td> </tr> <tr> <td>Aquatic Toxicity</td> <td>1</td> </tr> <tr> <td>Aesthetic Effect</td> <td>2</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>Other Chemicals</td> <td>2</td> </tr> <tr> <td>Water</td> <td>1</td> </tr> <tr> <td>Sol. Reaction</td> <td>0</td> </tr> <tr> <td>11.3 NFPA Hazard Classification</td> <td></td> </tr> <tr> <td>Category</td> <td>Classification</td> </tr> <tr> <td>Health Hazard (Blue)</td> <td>2</td> </tr> <tr> <td>Flammability (Red)</td> <td>0</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>1</td> </tr> </tbody> </table>	Category	Rating	Fire	1	Health		Vapor Irritant	2	Liquid or Solid Irritant	1	Poison	2	Water Pollution		Human Toxicity	2	Aquatic Toxicity	1	Aesthetic Effect	2	Reactivity		Other Chemicals	2	Water	1	Sol. Reaction	0	11.3 NFPA Hazard Classification		Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	0	Reactivity (Yellow)	1
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<p style="text-align: center;">8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: Not pertinent 8.2 Waterway Toxicity: Not pertinent 8.3 Biological Oxygen Demand (BOD): Not pertinent 8.4 Food Chain Concentration Potential: None</p>																																							
<p style="text-align: center;">9. SHIPPING INFORMATION</p> <p>9.1 Grade of Purity: Aerosol grade, technical grade 9.2 Storage Temperature: Data not available 9.3 Inert Atmosphere: Inerted 9.4 Venting: Data not available</p>																																							
<p style="text-align: center;">12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 84.93 12.3 Boiling Point at 1 atm: 104°F = 36.8°C = 313.0°K 12.4 Freezing Point: -142°F = -96.7°C = 176.5°K 12.5 Critical Temperature: 472°F = 245°C = 512°K 12.6 Critical Pressure: 895 psia = 60.5 atm = 6.17 MPa/m² 12.7 Specific Gravity: 1.322 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: 2.9 12.11 Ratio of Specific Heats of Vapor (Gas): 1.199 12.12 Latent Heat of Vaporization: 142 Btu/lb = 76.7 cal/g = 3.20 x 10⁴ J/kg 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.18 Heat of Fusion: 16.86 cal/g 12.19 Limiting Value: Data not available 12.20 Reid Vapor Pressure: 13.5 psia</p>																																							
<p>NOTES</p>																																							

DIELDRIN

DED

<p>Common Synonyms HEOD 4000, 4010, 1,2,3,4,10,10- Hexachloro-7,8-dihydro-1, 4,4a,8,8,7,8-hexachloro-7, 1,4,5,8-dioxinonaph- thalene</p>	<p>Solid Light brown Mid chemical odor</p>	<p>Solubility in water: Slightly soluble.</p>
<p>AVOID CONTACT WITH SOLID AND DUST. KEEP PEOPLE AWAY. Wear goggles, dust respirator and rubber overboots (including gloves). Side discharge if possible. MOUSE and remove discharged material. Notify local health and pollution control agencies.</p>		
Fire	<p>Not flammable POISONOUS GASES MAY BE PRODUCED WHEN HEATED.</p>	
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>DUST POISONOUS IF INHALED OR IF SKIN IS EXPOSED. If inhaled or cause headache, dizziness, or loss of consciousness, If in eyes, hold eyelids open, and flush with plenty of water. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>SOLID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. If swallowed or cause headache, nausea, dizziness, 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 and have victim induce vomiting. If SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p>	
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes.</p> <p>Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>	
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-water contaminant Reserve access Should be removed Chemical and physical treatment</p>		<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 DG Compatibility Class: Not listed 3.2 Formula: C₁₂H₆Cl₆O 3.3 IMO/IUM Designations: Not listed 3.4 DOT ID No.: 2781 3.5 CAS Registry No.: 60-57-1</p>		<p>4. DESIRABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Solid 4.2 Color: Buff to light brown. 4.3 Odor: Mid chemical</p>
<p>5. HEALTH HAZARDS</p>		
<p>5.1 Personal Protective Equipment: U. S. B. Mines approved respirator, clean rubber gloves, goggles or face shield</p> <p>5.2 Symptoms Following Exposure: Irritation, ingestion, or skin contact causes irritability, convulsions and/or coma, nausea, vomiting, headache, tearing, tremors. Contact with eyes causes irritation.</p> <p>5.3 Treatment of Exposure: INHALATION: move to fresh air, give oxygen and artificial respiration as required. INGESTION: induce vomiting and get medical attention. EYES: flush with plenty of water, get medical attention. SKIN: flush with plenty of water.</p> <p>5.4 Threshold Limit Value: 0.25 mg/m³</p> <p>5.5 Short Term Inhalation Limit: 1 mg/m³ for 30 min.</p> <p>5.6 Toxicity by Ingestion: Grade 4; oral LD₅₀ = 46 mg/kg (P.O. 86 mg/kg (100g))</p> <p>5.7 Late Toxicity: Banned by EPA in October 1974 because of alleged "irreversible hazards to human health" as a potential carcinogen in man.</p> <p>5.8 Vapor (Gas) Irritant Characteristics: Data not available</p> <p>5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause staining and reddening of the skin.</p> <p>5.10 Oral Threshold: 0.041 ppm</p> <p>5.11 IDLH Value: 450 mg/m³</p>		

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: Not flammable 6.2 Flammable Limits in Air: Not flammable 6.3 Fire Extinguishing Agents: Not pertinent 6.4 Fire Extinguishing Agents test to be used: Data not available</p> <p>6.5 Special Hazards of Combustion Products: Toxic and irritating hydrogen fluoride fumes may form in fire.</p> <p>6.6 Behavior in Fire: Data not available 6.7 Ignition Temperature: Not pertinent 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Not pertinent 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook)</p> <p style="text-align: center;">II</p>
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Inorganic: Data not available 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerizability: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: OSHA 11.2 NIOSH Hazard Rating for Bulk Water Transportation: Not listed 11.3 HPPA Hazard Classification: Not listed</p>
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 0.0079 mg/l/96 hr/bluegill/TL₅₀/fresh water 0.07 ppm/96 hr/goldfish/TL₅₀/fresh water 0.280 ppm/6 hr/male/100% kill/salt water 0.025-0.50 ppm/48 hr/brown shrimp/TL₅₀/ salt water 8.2 Waterway Toxicity: LD₅₀ 381.0 mg/kg 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: High</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 17°C and 1 atm: Solid 12.2 Molecular Weight: 380.80 12.3 Boiling Point at 1 atm: Not pertinent (decomposes) 12.4 Freezing Point: 34°F = 1°C = 44°FK 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.75 at 20°C (solid) 12.8 Liquid Surface Tension: Not pertinent 12.9 Liquid Water Intertial Tension: Not pertinent 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: Data not available 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Limiting Value: Data not available 12.18 Reid Vapor Pressure: Data not available</p>
<p>9. SHIPPING INFORMATION</p>	
<p>9.1 Grades of Purity: Technical: 85 + % HEOD: 12% emulsifiable concentrates in petroleum hydrocarbons, which are combustible.</p> <p>9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) for liquid form</p>	
<p>NOTES</p>	

ETHYLBENZENE

ETB

<p>Common Synonyms Phenyltoluene EB</p>		<p>Liquid</p>	<p>Colorless</p>	<p>Sweet, gasoline-like odor</p>
<p>Floats on water. Flammable, irritating vapor is produced.</p>				
<p>Always protect with hands and face. Never inhale and wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Shut off ignition sources and call fire department. Stop discharge if possible. Stay upwind and use water spray to "knock down" vapor. Wash and remove discharged material. Notify local health and pollution control agencies.</p>				
<p>Fire</p>	<p>FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in enclosed area. Wear self-contained breathing apparatus, and rubber overclothing (including gloves). Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>			
<p>Exposure</p>	<p>VAPOR Irritating to eyes, nose and throat. Irritates the eyes, causes dizziness or difficult breathing. If breathing has stopped give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Irritates skin and eyes. Irritates if swallowed. Irritates if inhaled. Wash affected areas with plenty of water. If in EYES, hold eyelids open and flush with plenty of water. If SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>			
<p>Water Pollution</p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Floating in streams. May be dangerous if it enters water intakes. Notify local health and waste officials. Notify operators of nearby water intakes.</p>			
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Mechanical containment Should be removed Chemical and physical treatment</p>		<p>2. LABEL 2.1 Category: Flammable liquid 2.2 Class: 3</p>		
<p>1. CHEMICAL DESIGNATIONS 3.1 CO Compatibility Code: Aromatic hydrocarbon 3.2 Formula: $C_{10}H_{12}$ 3.3 HQ/UN Designation: 3.2/1175 3.4 DOT ID No.: 1175 3.5 CAS Registry No.: 100-41-4</p>		<p>4. DESIRABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Aromatic</p>		
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Self-contained breathing apparatus; safety goggles. 5.2 Symptoms Following Exposure: Irritation may cause irritation of nose, dizziness, depression. Moderate irritation of eye with corneal injury possible. Irritates skin and may cause blisters. 5.3 Treatment of Exposure: INHALATION: If effects occur, remove victim to fresh air, keep him warm and quiet, and get medical help promptly. If breathing stops, give artificial respiration. INGESTION: Induce vomiting only upon physician's approval; material in lung may cause chemical pneumonia. SKIN AND EYES: promptly flush with plenty of water (15 min. for eyes) and get medical attention; remove and wash contaminated clothing before reuse. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limit: 200 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 2; LD₅₀ = 0.5 to 5 g/kg (F0) 5.7 Lethal Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause moderate irritation such that personnel will find high concentrations unpleasant. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Causes smearing of the skin and first-degree burns on skin exposure; may cause secondary burns on long exposure. 5.10 Oral Threshold: 140 ppm 5.11 IDLH Value: 2,000 ppm</p>				

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 90°F O.C.; 50°F C.C. 6.2 Flammable Limits in Air: 1.0%-6.7% 6.3 Fire Extinguishing Agents: Foam (most effective), water fog, carbon dioxide or dry chemical. 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion: Products: irritating vapors are generated when heated. 6.6 Behavior in Fire: Vapor is heavier than air and may travel considerable distance to the source of ignition and flash back. 6.7 Ignition Temperature: 660°F 6.8 Electrical Hazards: Not pertinent 6.9 Burning Rate: 5.8 mm/min. 6.10 Adiabatic Flame Temperature: Data Not Available</p> <p style="text-align: right;">(Continued)</p>		<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U</p>	
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Oxidation (Reagent to Product): Data Not Available 7.8 Reactivity Group: 2</p>		<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Flammable liquid 11.2 NIOSH Hazard Rating for Bulk Water Transportation: Category Rating Fire _____ 3 Health Vapor Irritant _____ 2 Liquid or Solid Irritant _____ 2 Poison _____ 2 Water Pollution Human Toxicity _____ 1 Aquatic Toxicity _____ 3 Acute Toxicity _____ 2 Self Reaction _____ 0</p> <p>11.3 NFPA Hazard Classification: Category Classification Health Hazard (H302) _____ 2 Flammability (F+D) _____ 3 Reactivity (R20) _____ 0</p>	
<p>8. WATER POLLUTION</p> <p>8.1 Acute Toxicity: 79 ppm/96 hr/bluegill/TL₀₁/fresh water 8.2 Waterborne Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 2.8% (theor.), 5 days 8.4 Food Chain Concentration Potential: None</p>		<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 106.17 12.3 Boiling Point at 1 atm: 277.2°F = 134.2°C = 408.4°K 12.4 Freezing Point: -139.7° = -95°C = 178°K. 12.5 Critical Temperature: 661.07° = 343.3°C = 617.1°K 12.6 Critical Pressure: 320 psi = 35.8 atm = 3.61 MN/m² 12.7 Specific Gravity: 0.867 at 20°C (liquid) 12.8 Liquid Surface Tension: 29.2 dyn/cm = 0.0292 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 35.48 dyn/cm = 0.03548 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.071 12.12 Latent Heat of Vaporization: 144 Btu/lb = 80.1 cal/g = 3.35 X 10⁴ J/kg 12.13 Heat of Combustion: -17,780 Btu/lb = -8177 cal/g = -13.5 X 10⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.18 Heat of Fusion: Data Not Available 12.19 Limiting Value: Data Not Available 12.20 Reid Vapor Pressure: 64 psi</p>	
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grade of Purity; Research grade: 99.96%; pure grade: 99.5%; technical grade: 99.0% 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) or pressure-reducing</p>		<p>6. FIRE HAZARDS (Continued)</p> <p>6.11 Stoichiometric Air to Fuel Ratio: Data Not Available 6.12 Flame Temperature: Data Not Available</p>	

ETHYLENE DIBROMIDE

EDB

<p>Common Synonyms</p> <p>1,2-Dibromoethane Ethylene bromide Bromourene sym-Dibromoethane Dow-Lume 40, W-10, W-15, W-40 Glycol dibromide</p>	<p>Liquid</p> <p>Sinks in water. Poisonous vapor is produced. Freezing point is 50°F.</p>	<p>Colorless</p>	<p>Sweet odor</p>
<p>Ship uncharge if possible. Avoid human entry. Avoid contact with liquid and vapor. Isolate and remove uncharged material. Notify local health and pollution control agencies.</p>			
<p style="text-align: center;">Fire</p>	<p>Not flammable. POISONOUS GASES ARE PRODUCED WHEN HEATED. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Cool exposed containers with water.</p>		
<p style="text-align: center;">Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR POISONOUS IF INHALED. Irritating to eyes, nose and throat. None to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Irritating to skin and eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES: Hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.</p>		
<p style="text-align: center;">Water Pollution</p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water streams. Notify local health and waste officials. Notify operators of nearby water intakes.</p>		
<p style="text-align: center;">1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Should be removed Chemical and physical treatment</p>	<p style="text-align: center;">2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>		
<p style="text-align: center;">3. CHEMICAL DESIGNATIONS</p> <p>3.1 CO Compatibility Class: Halogenated hydrocarbon 3.2 Formula: BrCH₂CH₂Br 3.3 RPO/UN Designation: 6.1/1805 3.4 DOT ID No.: 1805 3.5 CAS Registry No.: 106-93-4</p>	<p style="text-align: center;">4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Mildly sweet like chloroform</p>		
<p>5. HEALTH HAZARDS</p>			
<p>5.1 Personal Protective Equipment: Canister type mask or self-contained air mask; neoprene gloves; chemical safety goggles. 5.2 Symptoms Following Exposure: Local irritation, blisters and sores on skin; irritation in lungs and organic injury to liver and kidneys; may be absorbed through skin. 5.3 Treatment of Exposure: Remove from exposure. Remove contaminated clothing. Wash skin with soap and water. Flush eyes with plenty of water. Consult physician. 5.4 Threshold Limit Value: 2 ppm 5.5 Short Term Inhalation Limit: 50 ppm for 5 min. 5.6 Toxicity by Ingestion: Grade 3; LD₅₀ = 50 to 500 mg/kg 5.7 Lethal Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapor causes a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Other Threshold: Data not available 5.11 IDLH Value: 400 ppm</p>			

<p style="text-align: center;">6. FIRE HAZARDS</p> <p>6.1 Flash Point: Not flammable 6.2 Flammable Limits in Air: Not flammable 6.3 Fire Extinguishing Agents: Not pertinent 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion: Products: Decomposition gases are toxic and irritating. 6.6 Behavior in Fire: Decomposes into toxic irritating gases. Reacts with hot metals such as aluminum and magnesium. 6.7 Ignition Temperature: Not flammable 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Not flammable 6.10 Adiabatic Flame Temperature: Data Not Available 6.11 Stenchiometric Air to Fuel Ratio: Data Not Available 6.12 Flame Temperature: Data Not Available</p>	<p style="text-align: center;">10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X</p>																																				
<p style="text-align: center;">7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerizability: Not pertinent 7.6 Inhibitor of Polymerizability: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data Not Available 7.8 Reactivity Group: 06</p>	<p style="text-align: center;">11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: OSHA 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: right;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Health</td> <td style="text-align: right;">0</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>Toxicity</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Water Pollution</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Human Toxicity</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Aquatic Toxicity</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Aesthetic Effect</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Reactivity</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Other Chemical</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> </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: right;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Flammability (Red)</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td style="text-align: right;">0</td> </tr> </tbody> </table>	Category	Rating	Fire	0	Health	0	Vapor Irritant	1	Liquid or Solid Irritant	1	Toxicity	3	Water Pollution	3	Human Toxicity	3	Aquatic Toxicity	3	Aesthetic Effect	2	Reactivity	0	Other Chemical	1	Water	0	Self Reaction	0	Category	Classification	Health Hazard (Blue)	3	Flammability (Red)	0	Reactivity (Yellow)	0
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<p style="text-align: center;">8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 10 mg/L/48 hr/dump/flush water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: none</p>	<p style="text-align: center;">12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 187.04 12.3 Boiling Point at 1 atm: 98.6°F = 37°C = 424°K 12.4 Freezing Point: 49.6°F = 9.3°C = 282.8°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 2.180 at 20°C (liquid) 12.8 Liquid Surface Tension: 36.75 dynes/cm = 0.03675 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 36.54 dynes/cm = 0.03654 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.109 12.12 Latent Heat of Vaporization: 82.1 Btu/lb = 45.6 cal/g = 1.91 X 10⁴ J/kg 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: 12.79 cal/g 12.18 Lowering Value: Data Not Available 12.19 Reid Vapor Pressure: 0.4 psia</p>																																				
<p style="text-align: center;">9. SHIPPING INFORMATION</p> <p>9.1 Grade of Purity: Commercial 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Vetting: Pressure-vacuum</p>	<p style="text-align: center;">NOTES</p>																																				

GASOLINES: AUTOMOTIVE (<4.23g lead/gal)

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<p>Common Synonyms</p> <p>Motor sprays Fuel</p>	<p>Watery liquid</p> <p>Colorless to pale brown or pink</p> <p>Gasoline odor</p>	<p>Floats on water. Flammable, irritating vapor is produced.</p>
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STOP discharge if possible. Keep people away. Shut off ignition sources and call fire department. Stay downwind and use water spray to "knock down" vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.

<p>Fire</p>	<p>FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>
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<p>Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Irritating to eyes, nose and throat. If inhaled, will cause dizziness, 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>LIQUID Irritating to skin and eyes. If swallowed, will cause nausea or vomiting. 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>
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<p>Water Pollution</p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Floating to shoreline. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>
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<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook)</p> <p>Issue warning-high flammability</p> <p>Evacuate area</p> <p>Disperse and flush</p>	<p>2. LABEL</p> <p>2.1 Category: Flammable liquid</p> <p>2.2 Class: 3</p>
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<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CO Compatibility Class: Miscellaneous hydrocarbon mixtures</p> <p>3.2 Formula: (Mixture of hydrocarbons)</p> <p>3.3 IMO/IUN Designation: 2.1/1203</p> <p>3.4 DOT ID No.: 1203</p> <p>3.5 CAS Registry No.: Data not available</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid</p> <p>4.2 Color: Colorless to brown</p> <p>4.3 Odor: Gasoline</p>
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<p>5. HEALTH HAZARDS</p>	
<p>5.1 Personal Protective Equipment: Protective goggles, gloves.</p> <p>5.2 Symptoms Following Exposure: Irritation of mucous membranes and stimulation followed by depression of central nervous system. Breathing of vapor may also cause dizziness, headache, and incoordination or, in more severe cases, weakness, coma, and respiratory arrest. If liquid enters lungs, it will cause severe irritation, coughing, gagging, pulmonary edema, and, later, signs of bronchopneumonia and pneumonia. Swallowing may cause irregular heartbeat.</p> <p>5.3 Treatment of Exposure: INHALATION: Remove exposure and administer oxygen or other aid if liquid is in lungs. INGESTION: do NOT induce vomiting; stomach should be irrigated (by doctor) if appreciable quantity is swallowed. EYES: wash with copious quantity of water. SAFT: wipe off and wash with soap and water.</p> <p>5.4 Threshold Limit Value: 300 ppm</p> <p>5.5 Short Term Inhalation Limit: 500 ppm for 30 min.</p> <p>5.6 Toxicity by Ingestion: Grade 2; LD₅₀ = 0.5 to 5 g/kg.</p> <p>5.7 Late Toxicity: None</p> <p>5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary.</p> <p>5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If soiled on clothing and allowed to remain, may cause stinging and reddening of the skin.</p> <p>5.10 Odor Threshold: 0.25 ppm</p> <p>5.11 IDLH Value: Data not available</p>	

<p>6. FIRE HAZARDS</p>
<p>6.1 Flash Point: -36°F C.C.</p> <p>6.2 Flammable Limits in Air: 1.4%-7.6%</p> <p>6.3 Fire Extinguishing Agents: Foam, carbon dioxide, dry chemical</p> <p>6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective</p> <p>6.5 Special Hazards of Combustion Products: none</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: 652°F</p> <p>6.8 Electrical Hazard: Class I, Group D</p> <p>6.9 Burning Rate: 4 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>7. CHEMICAL REACTIVITY</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: 33</p>

<p>8. WATER POLLUTION</p>
<p>8.1 Aquatic Toxicity: 90 ppm/24 hr/juvenile American shad/TL₅₀/fresh water 91 mg/1/24 hr/juvenile American shad/TL₅₀/salt water</p> <p>8.2 Waterway Toxicity: Data not available</p> <p>8.3 Biological Oxygen Demand (BOD): 8%, 8 days</p> <p>8.4 Food Chain Concentration Potential: None</p>

<p>9. SHIPPING INFORMATION</p>
<p>9.1 Grades or Purty: Various octane ratings; military specifications</p> <p>9.2 Storage Temperature: Ambient</p> <p>9.3 Inert Atmosphere: No requirement</p> <p>9.4 Venting: Open (flame arrester) or pressure-relief</p>

<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook)</p> <p style="text-align: center;">A-T-U-V-W</p>																																				
<p>11. HAZARD CLASSIFICATIONS</p>																																				
<p>11.1 Code of Federal Regulation: 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;">0</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;">0</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;">2</td> </tr> <tr> <td>Aesthetic Effect</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Reactivity</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Other Chemicals</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Water</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Soil 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;">1</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	0	Vapor Irritant	1	Liquid or Solid Irritant	1	Poisons	2	Water Pollution	0	Human Toxicity	1	Aquatic Toxicity	2	Aesthetic Effect	2	Reactivity	0	Other Chemicals	0	Water	0	Soil Reaction	0	Category	Classification	Health Hazard (Blue)	1	Flammability (Red)	3	Reactivity (Yellow)	0
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<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p>
<p>12.1 Physical State at 15°C and 1 atm: Liquid</p> <p>12.2 Molecular Weight: Not pertinent</p> <p>12.3 Boiling Point at 1 atm: 140-360°F = 60-199°C = 330-477°K</p> <p>12.4 Freezing Point: Not pertinent</p> <p>12.5 Critical Temperature: Not pertinent</p> <p>12.6 Critical Pressure: Not pertinent</p> <p>12.7 Specific Gravity: 0.7321 at 20°C (liquid)</p> <p>12.8 Liquid Surface Tension: 19-23 dynes/cm = 0.019-0.023 N/m at 20°C</p> <p>12.9 Liquid Water Interfacial Tension: 45-51 dynes/cm = 0.045-0.051 N/m at 20°C</p> <p>12.10 Vapor (Gas) Specific Gravity: 3.4</p> <p>12.11 Rate of Specific Heat of Vapor (Gas): (not) 1.054</p> <p>12.12 Latent Heat of Vaporization: 130-150 Btu/lb = 71-81 cal/g = 3.0 - 3.4 x 10⁴ J/kg</p> <p>12.13 Heat of Combustion: -18,720 Btu/lb = -10,400 cal/g = 431.1 x 10⁴ 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>12.17 Heat of Fusion: Data not available</p> <p>12.18 Limiting Value: Data not available</p> <p>12.19 Reid Vapor Pressure: 7.4 psia</p>

NOTES

GASOLINES: AVIATION (< 4.86g lead/gal)

GAV

Common Synonyms	Wettable liquid	Red, blue, green, brown or purple	Gasoline odor
	Flots on water. Flammable, emitting vapor is produced.		
<p>Slip discharge if possible. Keep in fire away. Shut off ignition sources and call fire department. Stay upwind and use water spray to "knock down" vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>			
Fire	<p>FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Extinguish with dry chemical, foam or certain halide. Water may be ineffective on fire. Cool exposed containers with water.</p>		
Exposure	<p>CALL FOR MEDICAL AID</p> <p>VAPOR Irritating to eyes, nose and throat. It inhalation may cause dizziness, 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>LIQUID Irritating to skin and eyes. If swallowed, use cause nausea or vomiting. 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>		
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Floating oil sheens. May be dangerous if it enters water intakes. Notify local health and waste officials. Notify operators of nearby water intakes.</p>		

<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-high flammability. Evacuate area. Disperse and flush.</p>	<p>2. LABEL</p> <p>2.1 Category: Flammable liquid 2.2 Class: 3</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CC Competency Class: Not listed 3.2 Formula: Not pertinent 3.3 IMO/IUC Designation: 3.1/1203 3.4 DOT ID No: 1203 3.5 CAS Registry No.: Data not available</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Red, blue, green, brown, purple 4.3 Odor: Gasoline</p>

<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Protective goggles, gloves. 5.2 Symptoms Following Exposure: INHALATION causes irritation of upper respiratory tract, central nervous system stimulation followed by depression of varying degree ranging from dizziness, headache, and incoordination to anesthesia, coma, and respiratory arrest. Irregular heartbeat is dangerous complication. ASPIRATION causes severe lung irritation with coughing, gagging, sputum, substernal distress, and rapidly developing pulmonary edema; later, signs of bronchopneumonia and pneumonia; acute onset of central nervous system excitement followed by depression. INGESTION causes irritation of mucous membranes of throat, esophagus, and stomach; stimulation followed by depression of central nervous system; irregular heartbeat. 5.3 Treatment of Exposure: Seek medical attention. INHALATION: maintain respiratory give oxygen if needed. ASPIRATION: advise bed rest; administer oxygen. INGESTION: do NOT induce vomiting; irrigate carefully if appreciable quantity was ingested; guard against aspiration into lungs. EYES: wash with copious quantity of water. SKIN: wipe off and wash with soap and water. 5.4 Threshold Limit Value: 300 ppm 5.5 Short Term Inhalation Limit: 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 cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Odor Threshold: 0.25 ppm 5.11 IDLH Value: Data not available</p>
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<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 50°F C.C. 6.2 Flammable Limits in Air: 1.2%-7.1% 6.3 Fire Extinguishing Agents: Foam, carbon dioxide, dry chemical 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective 6.5 Special Hazards of Combustion Products: None 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: 824°F 6.8 Electrical Hazard: Class I group D 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>
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<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Groups: Data not available</p>
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<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 90 ppm/24 hr./juvenile American shad/TL₅₀/fresh water 91 ppm/24 hr./juvenile American shad/TL₅₀/salt water 8.2 Waterway Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 2%, 5 days 8.4 Food Chain Concentration Potential: None</p>
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<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Grades 80/87, 100/130, and 115/145; Specification MIL-G-8572a 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) or pressure-relief</p>
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<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U-V-W</p>

<p>11. HAZARD CLASSIFICATIONS</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;"> <tr> <td style="text-align: center;">Category</td> <td style="text-align: center;">Rating</td> </tr> <tr> <td>Fire _____</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Health _____</td> <td></td> </tr> <tr> <td>Vapor Irritant _____</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Liquid or Solid Irritant _____</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Poison _____</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Water Pollution _____</td> <td></td> </tr> <tr> <td>Human Toxicity _____</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Aquatic Toxicity _____</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Anesthetic Effect _____</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Reactivity _____</td> <td></td> </tr> <tr> <td>Other Chemicals _____</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Water _____</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Self Reaction _____</td> <td style="text-align: center;">0</td> </tr> </table> <p>11.3 NFPA Hazard Classification</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Category</td> <td style="text-align: center;">Classification</td> </tr> <tr> <td>Health Hazard (Blue) _____</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Flammability (Red) _____</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Reactivity (Yellow) _____</td> <td style="text-align: center;">0</td> </tr> </table>	Category	Rating	Fire _____	3	Health _____		Vapor Irritant _____	1	Liquid or Solid Irritant _____	1	Poison _____	2	Water Pollution _____		Human Toxicity _____	1	Aquatic Toxicity _____	2	Anesthetic Effect _____	2	Reactivity _____		Other Chemicals _____	0	Water _____	0	Self Reaction _____	0	Category	Classification	Health Hazard (Blue) _____	1	Flammability (Red) _____	3	Reactivity (Yellow) _____	0
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Flammability (Red) _____	3																																			
Reactivity (Yellow) _____	0																																			

<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <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: 180-240°F = 71-171°C = 344-344°K 12.4 Freezing Point: <78°F = <24.4°C = <297.2°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 0.711 at 15°C (liquid) 12.8 Liquid Surface Tension: 19-23 dynes/cm = 0.019-0.023 N/m at 20°C 12.9 Liquid Water Intercalation Tension: 49-61 dynes/cm = 0.049-0.061 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: 3.4 12.11 Rate of Spontaneous Heat of Vapor (Gas) (cal): 1.054 12.12 Latent Heat of Vaporization: 100-150 Btu/lb = 71-81 cal/g = 2.9-3.4 x 10⁴ J/kg 12.13 Heat of Combustion: -18,720 Btu/lb = -10,400 cal/g = -43.4 x 10⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available</p>

NOTES

Lead (Pb)

Physical and Chemical Description: Pb, soft, ductile, gray metal, insoluble in water but dissolves slowly in water containing a weak acid. Since lead is an element, it will remain indefinitely once released to the environment.

Uses: Lead is used in electroplating, radiation protection devices, plastics, electronic equipment, storage batteries, gasoline anti-knock additives, and pigments.

Toxicity in Water: 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 (F.A.C. 17-22) for lead is 50 ug/l:

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 mg/l as CaCO₃, the concentrations of lead should not exceed 0.75, 3.8, and 20 ug/l, respectively. To protect saltwater life, lead should not exceed 25 ug/l (EPA, 1979).

Classification: Hazardous Substance (EPA).

Hazardous Waste Constituent (EPA)

Priority Toxic Pollutant (EPA)

KEROSENE

KRS

<p>Common Synonyms</p> <p>Burnishing of Kerosene Range of Fuel or No. 1 Jet Fuel JP-1</p>	<p>Water Solub</p> <p>Flots on water.</p>	<p>Colorless</p>	<p>Fuel or odor</p>
<p>Slip discharge if possible. Call fire department. Avoid contact with liquid. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>			
<p>Fire</p>	<p>Combustible. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>		
<p>Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>LIQUID Irritating to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyes open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>		
<p>Water Pollution</p>	<p>Dangerous to aquatic life in high concentrations. Fading to shrimps. May be dangerous if it enters water intakes. Noisy local health and wildlife officials. Noisy operators of nearby water intakes.</p>		
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Mechanical containment Should be removed Chemical and physical treatment</p>		<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>	
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CO Compatibility Class: Miscellaneous Hydrocarbon Materials 3.2 Formula: C₁₂H₂₆ 3.3 HAZOP Designation: 3.3/1223 3.4 DOT ID No.: 1223 3.5 CAS Registry No.: 8008-70-6</p>		<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless to light brown 4.3 Odor: Characteristic</p>	
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Protective gloves, goggles or face shield. 5.2 Symptoms Following Exposure: Vapor causes slight irritation of eyes and nose. Liquid irritates mucous; if taken into lungs, causes coughing, distress, and rapidly developing pulmonary edema. 5.3 Treatment of Exposure: ASPIRATION: avoid and seek admission oxygen; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: wash with plenty of water. SKIN: wipe off and wash with soap and water. 5.4 Threshold Limit Value: 200 ppm 5.5 Short Term Inhalation Limit: 2500 mg/m³ for 60 min. 5.6 Toxicity by Ingestion: Grade 1; LD₅₀ = 5 to 15 g/kg 5.7 Lethal Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If soiled on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Odor Threshold: 1 ppm 5.11 IDLH Value: Data not available</p>			

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 100°F (min.)/C.C. 6.2 Flammable Limits in Air: 0.7%-5% 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: Not pertinent 6.7 Ignition Temperature: 444°F 6.8 Electrical Hazards: 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>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U</p>																																				
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerizable: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Water Releasable (Reactive to Product): Data not available 7.8 Reactivity Group: 3</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Combustible liquid 11.2 NAB Hazard Rating for Bulk Water Transportation</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: right;">Rating</th> </tr> </thead> <tbody> <tr> <td>Fire</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Health</td> <td></td> </tr> <tr> <td>Vapor Irritant</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Liquid or Solid Irritant</td> <td style="text-align: right;">1</td> </tr> <tr> <td>Poison</td> <td style="text-align: right;">1</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;">1</td> </tr> <tr> <td>Aesthetic Effect</td> <td style="text-align: right;">3</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>Other Chemical</td> <td style="text-align: right;">0</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> </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: right;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td style="text-align: right;">0</td> </tr> <tr> <td>Flammability (Red)</td> <td style="text-align: right;">2</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td style="text-align: right;">0</td> </tr> </tbody> </table>	Category	Rating	Fire	2	Health		Vapor Irritant	1	Liquid or Solid Irritant	1	Poison	1	Water Pollution		Human Toxicity	1	Aquatic Toxicity	1	Aesthetic Effect	3	Reactivity		Other Chemical	0	Water	0	Self Reaction	0	Category	Classification	Health Hazard (Blue)	0	Flammability (Red)	2	Reactivity (Yellow)	0
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Reactivity (Yellow)	0																																				
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 2990 ppm/24 hr (blue)/TL₁₀₀/fresh water 8.2 Waterford Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 50%, 5 days 8.4 Food Chain Concentration Potential: None</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: Not pertinent 12.3 Boiling Point at 1 atm: 382-380°F = 200-290°C = 470-530°K 12.4 Freezing Point: -40°F = -44.8°C = 227.8°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 0.80 at 15°C (liquid) 12.8 Liquid Surface Tension: 23-32 dynes/cm = 0.023-0.032 N/m at 20°C 12.9 Liquid Water Intermittent Tension: 47-49 dynes/cm = 0.047-0.049 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: 110 Btu/lb = 60 cal/g = 2.5 x 10⁶ J/kg 12.13 Heat of Combustion: -18,840 Btu/lb = -10,300 cal/g = -43.12 x 10⁶ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: Data not available 12.18 Limiting Value: Data not available 12.19 Reid Vapor Pressure: 0.1 psia</p>																																				
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grade of Purity: Light hydrocarbon distillate: 100% 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester)</p>																																					
<p>NOTES</p>																																					

MERCURY

MCR

Common Synonyms Quicksilver	Liquid Solid in water.	Silver	Coopers
<p>AVOID CONTACT WITH LIQUID. Keep people away. SIEVE OR STRAIN IF POSSIBLE. ISOLATE AND REMOVE DISCHARGED MATERIAL. Notify local health and pollution control agencies.</p>			
Fire	Not flammable.		
Exposure	<p>CALL FOR MEDICAL AID. LIQUID Effects of exposure may be delayed.</p>		
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>		
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Should be removed. Chemical and physical treatment.</p>		<p>2. LABEL 2.1 Category: none</p>	
<p>3. CHEMICAL DESIGNATIONS 3.1 EC Compatibility Class: Not listed 3.2 Formula: Hg 3.3 HMO/UM Designation: Not listed 3.4 DOT ID No.: 2808 3.5 CAS Registry No.: 7436-87-6</p>		<p>4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Silvery 4.3 Odor: None</p>	
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Avoid contact of liquid with skin. For vapor use chemical cartridge (if possible) respirator. 5.2 Symptoms Following Exposure: No immediate symptoms. As poisoning becomes established, slight muscular tremor, loss of appetite, nausea, and diarrhea are observed. Psychic, memory, and cardiovascular disturbances may occur. 5.3 Treatment of Exposure: Consult a doctor. 5.4 Threshold Limit Value: 0.05 mg/m³ 5.5 Short Term Inhalation Limit: Data not available 5.6 Toxicity by Ingestion: No immediate toxicity 5.7 Lethal Toxicity: Development of mercury poisoning 5.8 Vapor (Gas) Irritant Characteristics: None 5.9 Liquid or Solid Irritant Characteristics: None 5.10 Dermal Threshold: Not pertinent 5.11 IDLH Value: 25 mg/m³</p>			

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: Not flammable 6.2 Flammable Limits in Air: Not flammable 6.3 Fire Extinguishing Agents: Not pertinent 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Not flammable 6.7 Ignition Temperature: Not flammable 6.8 Electrical Hazards: Not pertinent 6.9 Burning Rate: Not flammable 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X</p> <p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: OSM-B 11.2 NIOSH Hazard Rating for Bulk Water Transportations: Not listed 11.3 NFPA Hazard Classification: Not listed</p>
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerizability: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molecular Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 200.59 12.3 Boiling Point at 1 atm: 675°F = 357°C = 630°K 12.4 Freezing Point: -38.9°F = -39.3°C = 234.2°K 12.5 Critical Temperature: 2864°F = 1482°C = 1725°K 12.6 Critical Pressure: 23,300 psia = 1587 atm = 160.8 MPa/m² 12.7 Specific Gravity: 13.55 at 20°C (liquid) 12.8 Liquid Surface Tension: 470 dynes/cm = 0.470 N/m at 20°C 12.9 Liquid Water Intermolecular Tension: 375 dynes/cm = 0.375 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 2.7 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available</p>
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 0.5-1 ppm/48 hr/carpae 0.05 ppm/TL₅₀/fresh water 0.25 ppm/48 hr/marine fish/TL₅₀/salt water 8.2 Waterborne Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): none 8.4 Food Chain Concentration Potential: Mercury concentrations in liver and kidneys of ducks and geese to levels above FDA limit of 0.5 ppm. Muscle tissue usually well below the limit.</p>	<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Pure 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirements 9.4 Venting: Open</p>
<p>NOTES</p>	

Naphthalene (C₁₀H₈)

Physical and Chemical Description: white crystalline solid with a characteristic "moth ball" odor. Naphthalene is more dense than water (sp. gr. 1.145) and has a solubility of 30,000 - 40,000 ug/l @ 25°C. It melts at 80°C but will sublime (volatilize from a solid) at room temperature. Naphthalene is considered a polynuclear aromatic hydrocarbon (PAH).

Uses: intermediate in dye production and formation of solvents, lubricants, and motor fuels. Used directly as a moth repellent.

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

Classification: Hazardous Substance (EPA)

Hazardous Waste (EPA)

Priority Toxic Pollutant (EPA)

Persistence: Naphthalene can oxidize in the presence of light and air, 50% after 14 days in one study. Microbial degradation has also been demonstrated in the laboratory in solutions as concentrated as 3.3 ug/l. Little breakdown is expected, however, under the dark, anaerobic conditions characteristic of in-situ ground water.

MINERAL SPIRITS

MNS

<p>Common Synonyms Petroleum spirits kerosene</p>	<p>Watery liquid Floats on water.</p>	<p>Colorless</p>	<p>Gasoline-like odor</p>
<p>Slud discharge if possible. Call fire department. Avoid contact with liquid. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>			
Fire	<p>Combustion: Extinguish with water, dry chemical, foam, or carbon dioxide. Cool exposed containers with water.</p>		
Exposure	<p>CALL FOR MEDICAL AID. LIQUID Irritating to skin and eyes. Nausea 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. DO NOT INDUCE VOMITING.</p>		
Water Pollution	<p>Effect of low concentrations on aquatic life is unknown. Poison to shellfish. May be dangerous if it enters water intakes. Notify local health and welfare officials. Notify operators of nearby water intakes.</p>		
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Mechanical equipment Should be removed Chemical and physical treatment</p>		<p>2. LABEL 2.1 Category: None 2.2 Class: Not pertinent</p>	
<p>3. CHEMICAL DESIGNATIONS 3.1 CD Compressibility Class: Macrolaminous Hydrocarbon Mixture 3.2 Formula: Not applicable 3.3 HMO/UN Designation: 3.3/1300 3.4 DOT ID No.: 1300 3.5 CAS Registry No.: Data not available</p>		<p>4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Like gasoline</p>	
<p style="text-align: center;">5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Plastic gloves, goggles or face shield (as for gasoline). 5.2 Symptoms Following Exposure: INHALATION: mild irritation of respiratory tract. ASPIRATION: severe lung irritation and rapidly developing pulmonary edema; central nervous system depression followed by depression. INGESTION: irritation of stomach. 5.3 Treatment of Exposure: INHALATION: remove victim to fresh air. ASPIRATION: entreat bed rest plus support; call a doctor. INGESTION: do NOT induce vomiting; pour small amount into lungs. EYES: wash with copious amounts of water. SKIN: wipe off and wash with soap and water. 5.4 Threshold Limit Value: Data not available 5.5 Short Term Inhalation Limit: 4000-7000 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 2; LD₅₀ = 0.5 to 0.9 g/kg 5.7 Leth Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors are irritating to the eyes and throat. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, they cause smearing and reddening of the skin. 5.10 Dose Threshold: Data not available 5.11 IDLH Value: Data not available</p>			

<p style="text-align: center;">6. FIRE HAZARDS</p> <p>6.1 Flash Point: 105-140°F C.C. (depending on grade) 6.2 Flammable Limits in Air: 0.8%-5.0% 6.3 Fire Extinguishing Agents: Foam, carbon dioxide, dry chemical 6.4 Fire Extinguishing Agents Not to be Used: Do not use straight hose water stream. 6.5 Special Hazards of Combustion Products: not pertinent 6.6 Behavior in Fire: Not pertinent 6.7 Ignition Temperature: 540°F 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>	<p style="text-align: center;">10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U</p>
<p style="text-align: center;">7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity With Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 03</p>	<p style="text-align: center;">11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Combustible liquid 11.2 NIOSH Hazard Rating for Bulk Water Transport: Not listed 11.3 NFPA Hazard Classification: Category Classification Health Hazard (Blue)..... 0 Flammability (Red)..... 2 Reactivity (Yellow)..... 0</p>
<p style="text-align: center;">8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: Data not available 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0%, 5 days 8.4 Fecal Coliform Concentration Potential: None</p>	<p style="text-align: center;">12. PHYSICAL AND CHEMICAL PROPERTIES</p> <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: 310-395°F = 154-202°C = 428-475°K 12.4 Freezing Point: Not pertinent 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 0.78 at 20°C (liquid) 12.8 Liquid Surface Tension: Data not available 12.9 Liquid Water Interfacial Tension: Data not available 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): (weL) 1.000 12.12 Latent Heat of Vaporization: Data not available 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 12.17 Heat of Fusion: Data not available 12.18 Limiting Value: Data not available 12.19 Reid Vapor Pressure: 0.13 psia</p>
<p style="text-align: center;">9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Various grades available. 70-100% of the materials are derived from petroleum, and 0-30% are aromatic hydrocarbons like benzene and toluene. Flash points vary with the grade composition but are usually above 100°F. 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester)</p>	<p style="text-align: center;">NOTES</p>

Phenanthrene (C₁₄H₁₀)

Physical and Chemical Description: colorless, monoclinic crystals soluble in water, 1,000-1,300 ug/l @ 2.5°C, specific gravity = 1.179.

Phenanthrene is a PAH.

Uses: dyes, explosives, a natural constituent of coal tar and of diesel oil (0.35%).

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

Classification: none

Fluorene (C₁₃H₁₀)

Physical and Chemical Description: Combustible white solid having a density of 1.20 and a water solubility of 1980 ug/l.

Uses: Manufacture of dyestuffs.

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

Classification: None

OILS: DIESEL

ODS

<p>Common Synonyms Fuel oil 1-D Fuel oil 2-D</p>	<p>Dry look Yellow-brown Lube or fuel oil odor</p> <p>Floats on water.</p>
<p>3000 discharge if possible. Call fire department. Avoid contact with liquid. Wash and remove discharged material. Notify local health and pollution control agencies.</p>	
<p style="text-align: center;">Fire</p>	<p>Combustible. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>
<p style="text-align: center;">Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>LIQUID Irritating to skin and eyes. Irritant if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES: hold eyes open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>
<p style="text-align: center;">Water Pollution</p>	<p>Dangerous to aquatic life in high concentrations. Floating to shore. May be dangerous if it enters water intakes.</p> <p>Notify local health and waste offices. Notify operators of nearby water intakes.</p>
<p style="text-align: center;">1. RESPONSE TO DISCHARGE <small>(See Response Methods Handbook)</small></p> <p>Mechanical containment Should be removed Chemical and physical treatment</p>	<p style="text-align: center;">2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>
<p style="text-align: center;">3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Miscellaneous Hydrocarbon Mixtures 3.2 Formula: Not applicable 3.3 HAZ/WH Description: 3.1/1270 3.4 DOT ID No.: 1270 3.5 CAS Registry No.: Data not available</p>	<p style="text-align: center;">4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Light brown 4.3 Odor: Like fuel oil</p>
<p style="text-align: center;">5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Goggles or face shield. 5.2 Symptoms Following Exposure: If liquid is ingested, an increased frequency of bowel movements and stool. 5.3 Treatment of Exposure: INGESTION: do NOT induce vomiting. SKIN: wipe off, wash with soap and water. EYES: wash with copious amounts of water for at least 15 min. 5.4 Threshold Limit Value: No single TLV applicable. 5.5 Short Term Inhalation Limit: Data not available 5.6 Toxicity by Ingestion: Grade 1; LD₅₀ = 5 to 15 g/kg 5.7 Lethal Toxicity: Data not available 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 Clear Threshold: Data not available 5.11 IDLH Value: Data not available</p>	

<p style="text-align: center;">6. FIRE HAZARDS</p> <p>6.1 Flash Point (1-D): 100°F C.C.; (2-D): 125°F C.C. 6.2 Flammable Limits in Air: 1.5-8.0 vol.% 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: Not pertinent 6.7 Ignition Temperature: (1-D) 350-625°F (2-D) 490-645°F 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>	<p style="text-align: center;">10. HAZARD ASSESSMENT CODE <small>(See Hazard Assessment Handbook)</small></p> <p style="text-align: center;">A-T-U</p>
<p style="text-align: center;">7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerizability: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Oxidizing (Reactive to Products): Data not available 7.8 Reactivity Group: 0</p>	<p style="text-align: center;">11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Combustible liquid 11.2 HAS Hazard Rating for Bulk Water Transportation: Not listed 11.3 HPPA Hazard Classification: Category Classification Health Hazard (Blue) 0 Flammability (Red) 2 Reactivity (Yellow) 0</p>
<p style="text-align: center;">8. WATER POLLUTION</p> <p>8.1 Acute Toxicity: 204 mg/l/24 hr./acute American shad/TL₁₀₀/sea water 8.2 Waterway Toxicity: > 20 mg/lip /LD₅₀/mature 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: None</p>	<p style="text-align: center;">12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: Not pertinent 12.3 Boiling Point at 1 atm: 560-640°F = 298-338°C = 541-612°K 12.4 Freezing Point: 0 to -30°F = -18 to -24°C = 255 to 257°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 0.841 at 15°C (liquid) 12.8 Liquid Surface Tension (mN): 25 dynes/cm = 0.025 N/m at 20°C 12.9 Liquid Water Interfacial Tension (mN): 80 dynes/cm = 0.08 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: -18,400 Btu/lb = -10,200 cal/g = 425 x 10³ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.26 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Acid Vapor Pressure: None</p>
<p style="text-align: center;">9. SHIPPING INFORMATION</p> <p>9.1 Grade of Purty: Diesel Fuel 1-D (ASTM); Diesel Fuel 2-D (ASTM) 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (bottle armorer)</p>	
<p>NOTES</p>	

OILS, MISCELLANEOUS: LUBRICATING

OLB

Common Synonyms Crankcase oil Transmission oil Motor oil	Oily liquid Flows on water.	Yellow-brown	Lube oil odor
Stop discharge if possible. Call fire department. Avoid contact with liquid. Isolate and remove discharged material. Notify local health and pollution control agencies.			
Fire	Combustible. Extinguish with dry chemical, foam or carbon dioxide. Water may be ineffective on fire. Close exposed containers with water.		
Exposure	CALL FOR MEDICAL AID. LIQUID Irritating to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyes open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim urinate water or milk. DO NOT INDUCE VOMITING.		
Water Pollution	Effect of low concentrations on aquatic life is unknown. Flaring to shoreline may be dangerous if it enters water intakes. Notify local health and waste officials. Notify operators of nearby water intakes.		

1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Mechanical containment Should be removed Chemical and physical treatment	2. LABEL 2.1 Category: None 2.2 Class: Not pertinent
3. CHEMICAL DESIGNATIONS 3.1 CD Compatibility Class: Miscellaneous Hydrocarbon Materials 3.2 Formula: Not applicable 3.3 MSD/UN Designation: 2.3/1270 3.4 DOT ID No.: 1270 3.5 CAS Registry No.: Data not available	4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Yellow fluorescent 4.3 Odor: Characteristic

5. HEALTH HAZARDS 5.1 Personal Protective Equipment: Protective gloves, goggles or face shield. 5.2 Symptoms Following Exposure: INGESTION: minimal gastrointestinal tract irritation; increased frequency of bowel passage may occur. ASPIRATION: pulmonary irritation is normally minimal but may become more severe several hours after exposure. 5.3 Treatment of Exposure: INGESTION: DO NOT induce or induce vomiting. ASPIRATION: treatment probably not required; delayed development of pulmonary irritation can be detected by serial chest x-rays. EYES: wash with copious quantity of water. SKIN: wipe off and wash with soap and water. 5.4 Threshold Limit Value: Data not available 5.5 Short Term Inhalation Limit: Data not available 5.6 Toxicity by Ingestion: Grade 1; LD ₅₀ = 5 to 15 g/kg 5.7 Late Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquids or Solids Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Odor Threshold: Data not available 5.11 IDUM Value: Data not available
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6. FIRE HAZARDS
6.1 Flash Point: 300°F C.C. 6.2 Flammable Limits in Air: Data not available 6.3 Fire Extinguishing Agents: Dry chemical, foam, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water or foam may cause spitting. 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Not pertinent 6.7 Ignition Temperature: 500°F-700°F 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

7. CHEMICAL REACTIVITY
7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 0

8. WATER POLLUTION
8.1 Aquatic Toxicity: Data not available 8.2 Waterway Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: None

9. SHIPPING INFORMATION
9.1 Grades or Purities: Various viscosities 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirements 9.4 Venting: Open (flame arrester)

10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U
11. HAZARD CLASSIFICATIONS
11.1 Code of Federal Regulations: Not listed 11.2 NIOSH Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Category: _____ Class/Division: Health Hazard (Blue)..... 0 Flammability (Red)..... 1 Reactivity (Yellow)..... 0

12. PHYSICAL AND CHEMICAL PROPERTIES
12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: Not pertinent 12.3 Boiling Point at 1 atm: Very high 12.4 Freezing Point: Not pertinent 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: (rel.) 0.902 at 20°C (liquid) 12.8 Liquid Surface Tension: 26-37.5 dynes/cm = 0.026-0.0375 N/m at 20°C 12.9 Liquid Water Immiscibility Index: 20-34 dynes/cm = 0.020-0.034 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion = 18,486 Btu/lb = 10,270 cal/g = 42,984 J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: Data not available 12.18 Limiting Value: Data not available 12.19 Acid Vapor Pressure: Data not available

NOTES

OILS, MISCELLANEOUS: PENETRATING

OPT

<p>Common Synonyms</p> <p>Preservative of Water discharging oil</p>	<p>Only liquid</p> <p>Yellow</p> <p>Motor oil-like odor</p>	<p>Floids on water.</p>	
<p>Stop discharge if possible. Call fire department. Avoid contact with liquid. Wash and remove discharged material. Notify local health and pollution control agencies.</p>			
<p>Fire</p>	<p>Combustion: Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective on fire.</p>		
<p>Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>LIQUID irritating to 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. DO NOT INDUCE VOMITING.</p>		
<p>Water Pollution</p>	<p>Effect of low concentrations on aquatic life is unknown. Foaming to shoreline. May be dangerous if it enters water intakes. Notify local health and waste officials. Notify operators of nearby water intakes.</p>		
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Mechanical containment Should be removed Chemical and physical treatment</p>		<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>	
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CD Compatibility Class: Miscellaneous Hydrocarbon Mixtures 3.2 Formula: Not applicable 3.3 IMO/IUN Designation: 2.2/1270 3.4 DOT ID No.: 1270 3.5 CAS Registry No.: Data not available</p>		<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Yellowish 4.3 Odor: Like motor oil</p>	
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Protective gloves; goggles or face shield. 5.2 Symptoms Following Exposure: Liquid may irritate stomach and increase frequency of bowel movements. 5.3 Treatment of Exposure: INGESTION: have victim drink water or milk; do NOT induce vomiting. ASPIRATION: check for delayed development of pulmonary irritation by nasal mucus. EYES: wash with copious amounts of water. SKIN: wipe off, wash with soap and water. 5.4 Threshold Limit Value: Data not available 5.5 Short Term Exposure Limit: Data not available 5.6 Toxicity by Ingestion Grade 1; LD50 = 5 to 15 g/kg 5.7 Lethal Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause stinging and reddening of skin. 5.10 Ocular Threshold: Data not available 5.11 IDLH Value: Data not available</p>			

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 295°F 6.2 Flammable Limits in Air: Data not available 6.3 Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water or foam may cause foaming. 6.5 Special Hazards of Combustion Products: Not pertinent 6.6 Behavior in Fire: Not pertinent 6.7 Ignition Temperature: Data not available 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Data not available 6.10 Autoxidative Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U</p>
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Oxidizing (Reactive) to Products: Data not available 7.8 Reactivity Group: 03</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Not listed 11.2 NIOSH Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Not listed</p>
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: Data not available 8.2 Waterway Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: None</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: Not pertinent 12.3 Boiling Point at 1 atm: Very high 12.4 Freezing Point: Not pertinent 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 0.981 at 20°C (Liquid) 12.8 Liquid Surface Tension: 29.8 dynes/cm = 0.0298 N/m at 24°C 12.9 Liquid Water Intermal Tension: 8.5 dynes/cm = 0.0085 N/m at 22°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion (net): -18,000 Btu/lb = -10,000 cal/g = -420 x 10³ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: Data not available 12.18 Limiting Value: Data not available 12.19 Reid Vapor Pressure: Data not available</p>
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Commercial 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester)</p>	<p>NOTES</p>

TETRACHLOROETHYLENE

TTE

Common Synonyms Tetrachloroethane Perchloroethylene Perc Perc		Wettable liquid	Colorless	Sweet odor
Sink in water. Irritating vapor is produced. Nasty local health and pollution control agencies.				
SLOD discharge is possible. AVOID CONTACT with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.				
Fire	Not flammable. Poisonous gases are produced when heated.			
Exposure	CALL FOR MEDICAL AID. VAPOR Irritating to eyes, nose and throat. If inhaled, will cause difficult breathing or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID Irritating to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids down and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.			
Water Pollution	Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water streams. Nasty local health and wildlife effects. Nasty discharges of nearby water streams.			
1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Should be removed Chemical and physical treatment		2. LABEL 2.1 Category: None 2.2 Class: Not pertinent		
3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Not listed 3.2 Formula: C ₂ Cl ₄ 3.3 BPO/UN Designation: 9.0/1887 3.4 DOT ID No.: 1887 3.5 CAS Registry No.: 127-184		4. DESIRABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Ethereal, like chloroform, mildly sweet		
5. HEALTH HAZARDS 5.1 Personal Protective Equipment: For high vapor concentrations use approved canister or air-supplied mask, chemical goggles or face shield, plastic gloves. 5.2 Symptoms Following Exposure: Vapor can affect central nervous system and cause anesthesias. Liquid may irritate skin after prolonged contact. May irritate eyes but causes no injury. 5.3 Treatment of Exposure: INHALATION: If distress occurs, remove patient to fresh air, keep him warm and quiet, and get medical attention. INGESTION: Induce vomiting only on physician's recommendation. EYES AND SKIN: Flush with plenty of water and get medical attention if irritation or injury occurs. 5.4 Threshold Limit Value: 50 ppm 5.5 Short Term Inhalation Limit: 100 ppm for 60 min. 5.6 Toxicity by Ingestion: Grade 2; LD ₅₀ = 0.5 to 5 g/kg 5.7 Lethal Toxicity: None 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or throat if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazards. If soaked on clothing and allowed to remain, may cause stinging and redness of the skin. 5.10 Oral Threshold: 5 ppm 5.11 IDLH Value: 500 ppm				

6. FIRE HAZARDS 6.1 Flash Point: Not flammable 6.2 Flammable Limits in Air: Not flammable 6.3 Fire Extinguishing Agents: Not pertinent 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion: Products: Toxic, irritating gases may be generated in fire. 6.6 Behavior in Fire: Not pertinent 6.7 Ignition Temperature: Not flammable 6.8 Electrical Hazards: Not pertinent 6.9 Burning Rate: Not flammable 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stochastic Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available		10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X	
7. CHEMICAL REACTIVITY 7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerizability: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molecular Ratio (Resistant to Products): Data not available 7.8 Reactivity Group: Data not available		11. HAZARD CLASSIFICATIONS 11.1 Code of Federal Regulations: OSHA 11.2 HAS Hazard Rating for Bulk Water Transportation: Category Rating Fire _____ 0 Health _____ 1 Vapor Irritant _____ 1 Liquid or Solid Irritant _____ 1 Poison _____ 2 Water Poison _____ 1 Human Toxicity _____ 1 Aquatic Toxicity _____ 3 Acute Toxicity _____ 2 Reactivity _____ 1 Other Chemical _____ 1 Water _____ 0 Self Reaction _____ 1 11.3 NFPA Hazard Classification: Not listed	
8. WATER POLLUTION 8.1 Aquatic Toxicity: Data not available 8.2 Waterway Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): None 8.4 Food Chain Concentration Potential: None		12. PHYSICAL AND CHEMICAL PROPERTIES 12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 168.0 12.3 Boiling Point at 1 atm: 250°F = 121°C = 394°K 12.4 Freezing Point: -8.5°F = -22.4°C = 250.8°K 12.5 Critical Temperature: 657°F = 347°C = 620°K 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.80 at 20°C (liquid) 12.8 Liquid Surface Tension: 21.3 dynes/cm = 0.2013 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 44.4 dynes/cm = 0.444 N/m at 25°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.116 12.12 Latent Heat of Vaporization: 80.5 Btu/lb = 80.1 cal/g = 2.10 x 10 ⁴ J/kg 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solidification: 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 Acid Vapor Pressure: Data not available	
9. SHIPPING INFORMATION 9.1 Grade or Purity: Dry cleaning and industrial grade: 95-98% 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-relief		NOTES	

TETRAETHYL LEAD

TEL

<p>Common Synonyms TEL Lead isooctyl</p>	<p>Gray liquid Colorless, but generally dyed red Fruity odor</p>
<p>Sinks in water. Poisonous, flammable vapor is produced.</p>	
<p>AVOID CONTACT WITH LIQUID AND VAPOR. Avoid people away. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Stop discharge if possible. Call fire department. Stay down and use water spray to "lock down" vapor. Bottle and remove discharged material. Notify local health and pollution control agencies.</p>	
<p>Fire</p>	<p>Combustible. POISONOUS GASES ARE PRODUCED IN FIRE. Containers may explode in fire. Vapor may explode if ignited in an enclosed area. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Combat fires from behind barrier or protected location. Flood discharge area with water. Extinguish with water, dry chemical, foam, or carbon dioxide. Cool exposed containers with water.</p>
<p>Exposure</p>	<p>CALL FOR MEDICAL AID. VAPOR POISONOUS IF INHALED OR IF SKIN IS EXPOSED. Irritating to eyes. Irritic to throat. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Will burn skin. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. If IN EYES, hold eyelids open and flush with plenty of water. If SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. If SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p>
<p>Water Pollution</p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Irrite water-pollution water contamination Reserve access Should be removed Chemical and physical treatment</p>	<p>2. LABEL 2.1 Category: Poison 2.2 Class: 8</p>
<p>3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Not listed 3.2 Formula: Pb(C₂H₅)₄ 3.3 DOT/UN Designation: 6.1/1649 3.4 DOT ID No.: 1649 3.5 CAS Registry No.: 78-00-2</p>	<p>4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Dyed red or other distinctive color. 4.3 Odor: Sweet</p>
<p>5. HEALTH HAZARDS</p> <p>6.1 Personal Protective Equipment: Organic vapor type canister face mask for short periods; air line type for longer periods; neoprene-coated, liquid-proof gloves; protective goggles or face shield; white or light-colored clothing; rubber shoes or boots.</p> <p>6.2 Symptoms Following Exposure: Increased urinary output of lead. If a large degree of absorption from inhalation or skin contact, may cause tremors, encephalitis, colic, coma and death. Do not confuse with inorganic lead.</p> <p>6.3 Treatment of Exposure: Remove victim from contaminated area and consult physician immediately. INGESTION: Induce vomiting. SKIN: Wash immediately with barbitone or similar petroleum distillate followed by soap and water.</p> <p>6.4 Threshold Limit Value: 0.1 mg/m³</p> <p>6.5 Short Term Inhalation Limit: 0.15 mg Pb/m³ for 30 min.</p> <p>6.6 Toxicity by Ingestion: Oral rat LD₅₀ = 17 mg/kg</p> <p>6.7 Lethal Toxicity: Lead poisoning</p> <p>6.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight smarting of the eyes or respiratory system if present in high concentrations. The effect is temporary.</p> <p>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.</p> <p>6.10 Odor Threshold: Data not available</p> <p>6.11 IDLH Value: 40 mg/m³</p>	

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 200°F C.C.; 185°F F.C.C.</p> <p>6.2 Flammable Limits in Air: Data not available</p> <p>6.3 Fire Extinguishing Agents: Water, foam, dry chemical, or carbon dioxide</p> <p>6.4 Fire Extinguishing Agents Not to be Used: Not pertinent</p> <p>6.5 Special Hazards of Combustion Products: Toxic gases are generated in fire.</p> <p>6.6 Behavior in Fire: May explode in fire.</p> <p>6.7 Ignition Temperature: Decomposes above 200°F</p> <p>6.8 Explosive Hazard: Not pertinent</p> <p>6.9 Burning Rate: Data not available</p> <p>6.10 Adiabatic Flame Temperature: Data not available</p> <p style="text-align: right;">(Continued)</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X-Y</p>
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction</p> <p>7.2 Reactivity with Common Inorganic Fuel and some metals cause decomposition.</p> <p>7.3 Stability During Transport: Stable below 200°F. At higher temperatures, may detonate or explode when confined.</p> <p>7.4 Neutralizing Agents for Acids and Caustics: Not pertinent</p> <p>7.5 Polymerization: Not pertinent</p> <p>7.6 Initiator of Polymerization: Not pertinent</p> <p>7.7 Metal Ratio (Reactant to Product): Data not available</p> <p>7.8 Reactivity Group: Data not available</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Poison B</p> <p>11.2 NIOSH Hazard Rating for Bulk Water Transportation: Not listed</p> <p>11.3 NFPA Hazard Classification Category Classification Health Hazard (Blue) _____ 3 Flammability (Red) _____ 2 Reactivity (Yellow) _____ 3</p>
<p>8. WATER POLLUTION</p> <p>8.1 Acute Toxicity: 0.20 mg/l/96 hr (blue/gill/TL₅₀/fresh water</p> <p>8.2 Waterway Toxicity: Data not available</p> <p>8.3 Biological Oxygen Demand (BOD): Data not available</p> <p>8.4 Food Chain Concentration Potential: Data not available</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid</p> <p>12.2 Molecular Weight: 325.44</p> <p>12.3 Boiling Point at 1 atm: Decomposes</p> <p>12.4 Freezing Point: -215°F = -127°C = 126°K</p> <p>12.5 Critical Temperature: Not pertinent</p> <p>12.6 Critical Pressure: Not pertinent</p> <p>12.7 Specific Gravity: 1.833 at 20°C (liquid)</p> <p>12.8 Liquid Surface Tension: 26.6 dynes/cm = 0.0266 N/m at (est.) 25°C</p> <p>12.9 Liquid Water Intercalation Temperature (est.): 40 dynes/cm = 0.04 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): Not pertinent</p> <p>12.12 Latent Heat of Vaporization: Not pertinent</p> <p>12.13 Heat of Combustion (est.): -7,870 Btu/lb = -230 cal/g = -120 X 10³ 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>12.18 Heat of Fusion: Data not available</p> <p>12.19 Limiting Value: Data not available</p> <p>12.27 Reid Vapor Pressure: Data not available</p>
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Technical</p> <p>9.2 Storage Temperature: Ambient</p> <p>9.3 Inert Atmosphere: No requirement</p> <p>9.4 Venting: Pressure-relieving</p>	<p>6. FIRE HAZARDS (Continued)</p> <p>6.11 Stoichiometric Air to Fuel Ratio: Data not available</p> <p>6.12 Flame Temperature: Data not available</p>

TOLUENE

TOL

Common Synonyms Toluol Methylbenzene Methyltoluol	Watery liquid	Colorless	Pungent odor
Floats on water. Flammable. Irritating vapor is produced.			

Side discharge if possible. Keep people away. Shut off ignition sources and call fire department. Stay upwind and use water spray to "lock down" vapor. Avoid contact with liquid and vapor. Isolate and remove discharged material. Notify local health and pollution control agencies.

Fire	FLAMMABLE. Flashback during vapor fill 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.
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Exposure	CALL FOR MEDICAL AID. VAPOR Irritating to eyes, nose and throat. If inhaled, may cause nausea, vomiting, headache, dizziness, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing difficult, give oxygen. LIQUID Irritating to skin and eyes. If swallowed, may 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.
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Water Pollution	Dangerous to aquatic life in high concentrations. Floating to shorelines. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.
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1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning sign: Flammability Evacuate area	2. LABEL 2.1 Category: Flammable liquid 2.2 Class: 3
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3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Aromatic hydrocarbon 3.2 Formula: C ₇ H ₈ 3.3 HM/VH Designation: 3.2/1294 3.4 DOT ID No.: 1294 3.5 CAS Registry No.: 108-88-3	4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Pungent aromatic, benzene-like, distinct, persistent
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5. HEALTH HAZARDS	
5.1 Personal Protective Equipment: Air-supplied mask, goggles or face shield, plastic gloves. 5.2 Symptoms Following Exposure: Vapor irritates eyes and upper respiratory tract; cause dizziness, headache, weakness, respiratory arrest. Liquid irritates eyes and causes drying of skin. If absorbed, causes coughing, choking, dizziness, and rapidly developing pulmonary edema. If inhaled causes vomiting, grating, dizziness, depressed respiration. 5.3 Treatment of Exposure: INHALATION: remove to fresh air, give artificial respiration and oxygen if needed; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limit: 600 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 2; LD ₅₀ = 0.5 to 5 g/kg 5.7 Late Toxicity: Kidney and liver damage may follow ingestion. 5.8 Vapor (Gas) Irritant Characteristics: Vapor causes a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Odor Threshold: 0.17 ppm 5.11 IDLH Value: 2,000 ppm	

6. FIRE HAZARDS	
6.1 Flash Point: 40°F C.C.; 55°F D.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: 957°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	

7. CHEMICAL REACTIVITY	
7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Incompatibility Agents for Acids and Chemicals: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Initiator of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 22	

8. WATER POLLUTION	
8.1 Aquatic Toxicity: 1180 mg/l/96 hr/aerob/TL ₅₀ /fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0%, 5 days; 36% (max), 8 days 8.4 Food Chain Concentration Potential: None	

9. SHIPPING INFORMATION	
9.1 Grades of Purity: Research, reagent, analytical 99.9 + %, industrial contains 94 + %, with 5% styrene 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-relieving	

6. FIRE HAZARDS (Continued)	
6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available	

10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U																													
11. HAZARD CLASSIFICATIONS																													
11.1 Code of Federal Regulations: Flammable liquid 11.2 NFPA Hazard Rating for Bulk Water Transportation:	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">Category</td> <td style="text-align: center;">Rating</td> </tr> <tr> <td>Fire _____</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Health _____</td> <td></td> </tr> <tr> <td>Vapor Irritant _____</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Liquid or Solid Irritant _____</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Poison _____</td> <td style="text-align: center;">2</td> </tr> <tr> <td colspan="2">Water Pollution</td> </tr> <tr> <td>Human Toxicity _____</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Aquatic Toxicity _____</td> <td style="text-align: center;">3</td> </tr> <tr> <td>Aesthetic Effect _____</td> <td style="text-align: center;">2</td> </tr> <tr> <td colspan="2">Reactivity</td> </tr> <tr> <td>Other Chemicals _____</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Water _____</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Self Reaction _____</td> <td style="text-align: center;">0</td> </tr> </table>	Category	Rating	Fire _____	3	Health _____		Vapor Irritant _____	1	Liquid or Solid Irritant _____	1	Poison _____	2	Water Pollution		Human Toxicity _____	1	Aquatic Toxicity _____	3	Aesthetic Effect _____	2	Reactivity		Other Chemicals _____	1	Water _____	0	Self Reaction _____	0
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Health Hazard (Blue) _____	2																												
Flammability (Red) _____	3																												
Reactivity (Yellow) _____	0																												

12. PHYSICAL AND CHEMICAL PROPERTIES	
12.1 Physical State at 18°C and 1 atm: Liquid 12.2 Molecular Weight: 92.14 12.3 Boiling Point at 1 atm: 110.6°C = 231.7°F = 383.8°K 12.4 Freezing Point: -95.4°C = 178.3°K 12.5 Critical Temperature: 305.4°C = 581.8°K 12.6 Critical Pressure: 48.1 atm = 40.55 MPa = 4.108 MN/m ² 12.7 Specific Gravity: 0.867 at 20°C (liquid) 12.8 Liquid Surface Tension: 29.0 dynes/cm = 0.2290 N/m at 20°C 12.9 Liquid Water Intertacial Tension: 26.1 dynes/cm = 0.2061 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: 355 Btu/lb = 84.1 cal/g = 3.51 x 10 ⁵ J/kg 12.13 Heat of Combustion: -17,420 Btu/lb = -8000 cal/g = -405.5 x 10 ³ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: 17.17 cal/g 12.18 Limiting Value: Data not available 12.19 Reid Vapor Pressure: 1.1 psia	

TRICHLOROETHANE

TCE

Common Synonyms 1,1,1-Trichloroethane Methylchloroform Aeroflone Chloroflone	Watery liquid	Colorless	Sweet odor
Sinks in water. Irritating vapor is produced.			

SHOD thereafter if exposure. Avoid breathe away. Avoid contact with liquid and vapor. Call fire department. Isolate and remove discharged material. Notify local health and pollution control agencies.

Fire	Combustible. POISONOUS GASES ARE PRODUCED IN FIRE. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemical, carbon dioxide, or foam.
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Exposure	CALL FOR MEDICAL AID. VAPOR Irritating to eyes, nose and throat. If inhaled, will cause dizziness or difficulty breathing. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. LIQUID Irritating to skin and eyes. If poisonous may produce nausea. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.
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Water Pollution	Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water streams. Notify local health and waste officials. Notify operators of nearby water intakes.
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1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Should be removed Chemical and physical treatment	2. LABEL 2.1 Category: None 2.2 Class: Not pertinent
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3. CHEMICAL DESIGNATIONS 3.1 OQ Compatibility Class: Halogenated hydrocarbon 3.2 Formula: CH ₂ Cl ₃ 3.3 BQ/UN Designation: Not listed 3.4 DOT ID No.: 2831 3.5 CAS Registry No.: 71-85-8	4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Chloroform-like, sweetish
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5. HEALTH HAZARDS	
5.1 Personal Protective Equipment: Organic vapor-proof gas container, self-contained breathing apparatus for emergencies; neoprene or polyvinyl-alcohol-type gloves; chemical safety goggles and face shield; neoprene safety shoes (or leather safety shoes plus neoprene toehood); neoprene or polyvinyl alcohol suit or apron for splash protection.	
5.2 Symptoms Following Exposure: INHALATION: symptoms range from loss of equilibrium and incoordination to loss of consciousness; high concentration can be fatal due to simple asphyxiation combined with loss of consciousness. INGESTION: produces effects similar to inhalation and may cause some loss of reflexes. EYES: slightly irritating and lacrymatory. SKIN: irritating action may cause dermatitis.	
5.3 Treatment of Exposure: Get medical attention for all eye exposures and any other serious over-exposures. Do NOT administer adrenalin or epinephrine; otherwise, treatment is symptomatic. INHALATION: remove victim to fresh air; if necessary, apply artificial respiration and/or administer oxygen. INGESTION: have victim drink water and induce vomiting. EYES: flush thoroughly with water. SKIN: remove contaminated clothing and wash exposed area thoroughly with soap and warm water.	
5.4 Threshold Limit Value: 500 ppm Short Term Inhalation Limit: 1,000 ppm for 60 min. in man Toxicity by Ingestion: Grade 1; LD ₅₀ = 5 to 15 g/kg (rat, mouse, rabbit, guinea pig) Lethal Toxicity: Data not available	
5.5 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary.	
5.6 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, they cause stinging and reddening of the skin.	
5.7 Odor Threshold: 100 ppm	
5.8 IDLH Value: 1,000 ppm	

6. FIRE HAZARDS	
6.1 Flash Point: Data not available	
6.2 Flammable Limits in Air: 7%-16%	
6.3 Fire Extinguishing Agents: Dry chemical, foam, or carbon dioxide	
6.4 Fire Extinguishing Agents Not to be Used: Not pertinent	
6.5 Special Hazards of Combustion Products: Toxic and irritating gases are generated in fire.	
6.6 Behavior in Fire: Not pertinent	
6.7 Ignition Temperature: 932°F	
6.8 Electrical Hazards: Not pertinent	
6.9 Burning Rate (est.): 2.9 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	

7. CHEMICAL REACTIVITY	
7.1 Reactivity With Water: Reacts slowly, releasing corrosive hydrochloric acid.	
7.2 Reactivity With Common Materials: Corrosive aluminum, but reaction is not hazardous.	
7.3 Stability During Transport: Stable	
7.4 Inhibiting Agents for Acids and Corrosives: 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: 3B	

8. WATER POLLUTION	
8.1 Aquatic Toxicity: 75-150 ppm/(prfish)/TL ₅₀ /sea water *Time period not specified.	
8.2 Waterway Toxicity: Data not available	
8.3 Biological Oxygen Demand (BOD): Data not available	
8.4 Food Chain Concentration Potential: none	

9. SHIPPING INFORMATION	
9.1 Grade of Purity: Uninhibited, industrial; inhibited, white, room acid cleaning	
9.2 Storage Temperature Ambient	
9.3 Inert Atmospheric: No requirement	
9.4 Venting: Pressure-relieving	

10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X-Y	
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11. HAZARD CLASSIFICATIONS	
11.1 Code of Federal Regulations: OSHA	
11.2 HAS Hazard Rating for Bulk Water Transportation	
Category	Rating
Fire	1
Health	1
Vapor Irritant	1
Liquid or Solid Irritant	1
Poison	2
Water Pollution	1
Human Toxicity	1
Aquatic Toxicity	2
Aesthetic Effect	2
Reactivity	
Other Chemicals	1
Water	0
Self Reaction	0
11.3 NFPA Hazard Classification	
Category	Classification
Health Hazard (Blue)	2
Flammability (Red)	1
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES	
12.1 Physical State at 18°C and 1 atm: Liquid	
12.2 Molecular Weight: 132.41	
12.3 Boiling Point at 1 atm: 185°F = 74°C = 347°K	
12.4 Freezing Point: <-38°F = <-39°C = <234°K	
12.5 Critical Temperature: Not pertinent	
12.6 Critical Pressure: Not pertinent	
12.7 Specific Gravity: 1.31 at 20°C (liquid)	
12.8 Liquid Surface Tension: 25.4 dyne/cm = 0.254 N/m at 20°C	
12.9 Liquid Water Interfacial Tension (mL): 45 dyne/cm = 0.45 N/m at 20°C	
12.10 Vapor (Gas) Specific Gravity: 4.8	
12.11 Rate of Specific Heat of Vapor (Gas): 1.104	
12.12 Latent Heat of Vaporization: 100 Btu/lb = 36 cal/g = 2.4 X 10 ⁴ J/kg	
12.13 Heat of Combustion (est.): 4700 Btu/lb = 2600 cal/g = 110 X 10 ⁴ J/kg	
12.14 Heat of Decomposition: Not pertinent	
12.15 Heat of Solution: Not pertinent	
12.16 Heat of Polymerization: Not pertinent	
12.17 Heat of Fusion: Data not available	
12.18 Limiting Value: Data not available	
12.19 Reid Vapor Pressure: 4.0 psia	

NOTES

TRICHLOROETHYLENE

TCL

<p>Common Synonyms</p> <p>Trichloroethylene Trielene; Aclayn Chloron Gortylene Trielene Trichlorat Triene</p>	<p>Watery liquid</p> <p>Colorless</p> <p>Sweet odor</p> <p>Sinks in water. Irritating vapor is produced.</p>
<p>Stop discharge if possible. Keep people away. Avoid contact with liquid and vapor. Call fire department. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>	
<p>Fire</p>	<p>Combustion: POISONOUS GASES ARE PRODUCED IN FIRE. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemical, carbon dioxide, or foam.</p>
<p>Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Irritating to eyes, nose and throat. If inhaled, will cause nausea, vomiting, 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>LIQUID Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, difficult breathing, 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 and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p>
<p>Water Pollution</p>	<p>Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water streams.</p> <p>Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Should be removed Chemical and physical treatment</p>	<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Halogenated hydrocarbon 3.2 Formula: C₂HCl₃ 3.3 BEO/UN Designation: 8.0/1710 3.4 DOT ID No.: 1710 3.5 CAS Registry No.: 79-01-6</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Chloroform-like; ethereal</p>
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Organic vapor-air gas canister; self-contained breathing apparatus for emergencies; neoprene or vinyl gloves; chemical safety goggles; face shield; neoprene safety shoes; neoprene suit or suit for splash protection.</p> <p>5.2 Symptoms Following Exposure: INHALATION: symptoms range from irritation of the nose and throat to nausea, an attitude of irresponsibility, blurred vision, and brain disturbance or central nervous system resulting in cardiac failure. Chronic exposure may cause organic injury. INGESTION: symptoms similar to inhalation. SKIN: irritating action can cause dermatitis. EYES: slightly irritating sensation and lachrymation.</p> <p>5.3 Treatment of Exposure: Do NOT administer adrenalin or epinephrine; get medical attention for all cases of overexposure. INHALATION: remove victim to fresh air; if necessary, apply artificial respiration and/or administer oxygen. INGESTION: have victim drink water and induce vomiting; record time taken; then give 1 tablespoon sodium salts in water. EYES: flush thoroughly with water. SKIN: wash thoroughly with soap and warm water.</p> <p>5.4 Threshold Limit Value: 50 ppm 5.5 Short Term Inhalation Limit: 200 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 3; LD₅₀ = 50 to 800 mg/kg 5.7 Late Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smearing and reddening of the skin. 5.10 Oral Threshold: 50 ppm 5.11 IDLH Value: 1,000 ppm</p>	

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 90°F C.C.; practically nonflammable 6.2 Flammable Limits in Air: 8.0%-10.5% 6.3 Fire Extinguishing Agents: Water fog 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion: Products: Toxic and irritating gases are produced in fire situations. 6.6 Behavior in Fire: Not pertinent 6.7 Ignition Temperature: 770°F 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Not pertinent 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X-Y</p>																												
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity With Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Heat Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 06</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: OSHA 11.2 NIOSH Hazard Rating for Bulk Water Transport: Data not available</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Rating</th> </tr> </thead> <tbody> <tr> <td>Fire</td> <td>1</td> </tr> <tr> <td>Health</td> <td>1</td> </tr> <tr> <td>Vapor Irritant</td> <td>1</td> </tr> <tr> <td>Liquid or Solid Irritant</td> <td>1</td> </tr> <tr> <td>Poison</td> <td>2</td> </tr> <tr> <td>Water Pollution</td> <td>1</td> </tr> <tr> <td>Human Toxicity</td> <td>2</td> </tr> <tr> <td>Aquatic Toxicity</td> <td>2</td> </tr> <tr> <td>Anesthetic Effect</td> <td>2</td> </tr> <tr> <td>Reactivity</td> <td>1</td> </tr> <tr> <td>Other Chemical</td> <td>0</td> </tr> <tr> <td>Water</td> <td>0</td> </tr> <tr> <td>Salt Reaction</td> <td>1</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification: Category: 2 Health Hazard (Blue): 2 Flammability (Red): 1 Reactivity (Yellow): 0</p>	Category	Rating	Fire	1	Health	1	Vapor Irritant	1	Liquid or Solid Irritant	1	Poison	2	Water Pollution	1	Human Toxicity	2	Aquatic Toxicity	2	Anesthetic Effect	2	Reactivity	1	Other Chemical	0	Water	0	Salt Reaction	1
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Reactivity	1																												
Other Chemical	0																												
Water	0																												
Salt Reaction	1																												
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 800 mg/l/40 hr/daphnia/ML/week water 8.2 Waterway Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: None</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 131.39 12.3 Boiling Point at 1 atm: 189°F = 87°C = 360°K 12.4 Freezing Point: -122.5°F = -86.4°C = 182.8°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.48 at 20°C (liquid) 12.8 Liquid Surface Tension: 29.3 dynes/cm = 0.2293 N/m at 20°C 12.9 Liquid Water Intermittent Tension: 34.5 dynes/cm = 0.2545 N/m at 24°C 12.10 Vapor (Gas) Specific Gravity: 4.5 12.11 Ratio of Specific Heats of Vapor (Gas): 1.116 12.12 Latent Heat of Vaporization: 100 Btu/lb = 57.2 cal/g = 2.4 x 10⁴ J/kg 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: Data not available 12.18 Limiting Value: Data not available 12.19 Acid Vapor Pressure: 2.5 mm</p>																												
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grade of Purity: Technical; dry cleaning; degreasing extraction 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-relief</p>	<p>NOTES</p>																												

m-XYLENE

XLM

<p>Common Synonyms 3-Dimethylbenzene (<i>m</i>)<i>x</i>yl</p>	<p>Wettable liquid Colorless Sweet odor</p>	<p>Floats on water. Flammable, irritating vapor is produced.</p>
<p>STOP discharge if possible. Avoid smoke away. Call fire department. Avoid contact with liquid and vapor. Wash and remove discharged material. Notify local health and pollution control agencies.</p>		
<p>Fire</p>	<p>FLAMMABLE Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear self-contained breathing apparatus. Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>	
<p>Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Irritating to eyes, nose, and throat. If inhaled, will cause headache, difficulty breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. If in EYES, hold eyes open and flush with plenty of water. If SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>	
<p>Water Pollution</p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Polluting to shorelines. May be dangerous if it enters water intakes. Notify local health and waste officials. Notify operators of nearby water intakes.</p>	

<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-high flammability. Evacuate area. Should be removed. Chemical and physical treatment.</p>	<p>2. LABEL</p> <p>2.1 Category: Flammable liquid 2.2 Class: 3</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CD Corrosibility Class: Aromatic hydrocarbon 3.2 Formula: $m\text{-C}_6\text{H}_4(\text{CH}_3)_2$ 3.3 BQ/UN Designation: 3.3/1307 3.4 DOT ID No: 1307 3.5 CAS Registry No: 106-36-3</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Like benzene, characteristic aromatic</p>

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Approved container or air-supplied mask, goggles or face shield, heavy 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 inhaled, causes nausea, vomiting, dizziness, 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:** wash off, wash with soap and water.

5.4 Threshold Limit Value: 100 ppm

5.5 Short Term Exposure Limit: 300 ppm for 30 min.

5.6 Toxicity by Ingestion: Grade 3; LD₅₀ = 50 to 500 g/kg

5.7 Lethal Toxicity: Kidney and liver damage.

5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary.

5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause stinging and reddening of the skin.

5.10 Oral Threshold: 0.06 ppm

5.11 IDLH Value: 10,000 ppm

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 84°F C.C.</p> <p>6.2 Flammable Limits in Air: 1.1%-6.4%</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 may 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: 862°F</p> <p>6.8 Electrical Hazards: 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>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity with Water: No reaction</p> <p>7.2 Reactivity with Common Inorganic: 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 Molecular Weight (Reactant to Product): Data not available</p> <p>7.8 Reactivity Group: 32</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U</p> <p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Flammable liquid</p> <p>11.2 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>1</td> </tr> <tr> <td>Poison</td> <td>2</td> </tr> <tr> <td>Water Pollution</td> <td></td> </tr> <tr> <td>Human Toxicity</td> <td>1</td> </tr> <tr> <td>Aquatic Toxicity</td> <td>3</td> </tr> <tr> <td>Aesthetic Effect</td> <td>2</td> </tr> <tr> <td>Reactivity</td> <td></td> </tr> <tr> <td>Other Chemical</td> <td>1</td> </tr> <tr> <td>Water</td> <td>0</td> </tr> <tr> <td>Self Reaction</td> <td>0</td> </tr> </tbody> </table> <p>11.3 NFPA Hazard Classification</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Category</th> <th style="text-align: left;">Classification</th> </tr> </thead> <tbody> <tr> <td>Health Hazard (Blue)</td> <td>2</td> </tr> <tr> <td>Flammability (Red)</td> <td>3</td> </tr> <tr> <td>Reactivity (Yellow)</td> <td>0</td> </tr> </tbody> </table>	Category	Rating	Fire	3	Health		Vapor Irritant	1	Liquid or Solid Irritant	1	Poison	2	Water Pollution		Human Toxicity	1	Aquatic Toxicity	3	Aesthetic Effect	2	Reactivity		Other Chemical	1	Water	0	Self Reaction	0	Category	Classification	Health Hazard (Blue)	2	Flammability (Red)	3	Reactivity (Yellow)	0
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<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid</p> <p>12.2 Molecular Weight: 106.16</p> <p>12.3 Boiling Point at 1 atm: 238.4°F = 121.3°C = 406.1°K</p> <p>12.4 Freezing Point: -54.5°F = -47.5°C = 225.7°K</p> <p>12.5 Critical Temperature: 550.8°F = 343.8°C = 617.5°K</p> <p>12.6 Critical Pressure: 512.8 atm = 34.35 psia = 3.54 MPa</p> <p>12.7 Specific Gravity: 0.864 at 20°C (liquid)</p> <p>12.8 Liquid Surface Tension: 28.8 dynes/cm = 0.0286 N/m at 20°C</p> <p>12.9 Liquid Water Intermolecular Tension: 36.4 dynes/cm = 0.0364 N/m at 30°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: 147 Btu/lb = 81.5 cal/g = 3.40 x 10⁵ J/kg</p> <p>12.13 Heat of Combustion: -17,554 Btu/lb = -8752.4 cal/g = -408.31 x 10³ 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>12.17 Heat of Fusion: 26.91 cal/g</p> <p>12.18 Limiting Values: Data not available</p> <p>12.19 Reid Vapor Pressure: 0.34 psia</p>																																						
<p>1. WATER POLLUTION</p> <p>1.1 Aquatic Toxicity: 22 ppm/96 hr (Daphnia/TL₅₀/fresh water)</p> <p>1.2 Waterfowl Toxicity: Data not available</p> <p>1.3 Biological Oxygen Demand (BOD): 0 lb/lb, 5 days; 0% (Theor.), 8 days</p> <p>1.4 Food Chain Concentration Potential: Data not available</p>																																						
<p>2. SHIPPING INFORMATION</p> <p>2.1 Grades of Purity: Research: 99.99%; Pure: 99.9%; Technical: 99.2%</p> <p>2.2 Storage Temperature: Ambient</p> <p>2.3 Inert Atmosphere: No requirement</p> <p>2.4 Venting: Open (flame arrester) or pressure-relief</p>																																						

NOTES

o-XYLENE

XLO

<p>Common Synonyms o-Dimethylbenzene Xylol</p>	<p>Watery liquid</p>	<p>Colorless</p>	<p>Sweet odor</p>
<p>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. Wash and remove discharged material. Notify local health and pollution control agencies.

Fire	<p>FLAMMABLE Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear self-contained breathing apparatus. Extinguish with foam, dry chemical, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>
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Exposure	<p>CALL FOR MEDICAL AID.</p> <p>VAPOR Irritating to eyes, nose and throat. If inhaled, will cause headache, difficult breathing, or loss of consciousness. Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>LIQUID Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk. DO NOT INDUCE VOMITING.</p>
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Water Pollution	<p>Dangerous to aquatic life in high concentrations. Fouling to streams. May be dangerous if it enters water intakes. Notify local health and waste officials. Notify operators of nearby water intakes.</p>
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<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Irritant, high flammability. Evacuate area. Should be removed. Chemical and physical treatment.</p>	<p>2. LABEL 2.1 Category: Flammable liquid 2.2 Class: 3</p>
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<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CO Compatibility Class: Aromatic Hydrocarbon 3.2 Formula: C_8H_{10} (CH₃)₂ 3.3 MSD/UN Designation: 3.2/1307 3.4 DOT ID No.: 1307 3.5 CAS Registry No.: 95-47-8</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Benzene-like, characteristic aromatic</p>
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<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Approved coveralls or air-supplied mask, goggles or face shield, plastic gloves and boots.</p> <p>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, diarrhea, headache, and coma. Can be fatal. Kidney and liver damage can occur.</p> <p>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.</p> <p>5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limit: 300 ppm for 30 min. 5.6 Toxicity by Ingestion: Grade 3; LD₅₀ = 50 to 600 mg/kg 5.7 Life Toxicity: Kidney and liver damage. 5.8 Vapor (Gas) Irritant Characteristics: Vapors cause a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If soaked on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Odor Threshold: 0.05 ppm 5.11 IDLH Value: 10,000 ppm</p>

6. FIRE HAZARDS
6.1 Flash Point: 63°F O.C.; 75°F O.C. 6.2 Flammable Limits in Air: 1.1%-7.0% 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: 869°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

7. CHEMICAL REACTIVITY
7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Water Ratio (Reaction to Product): Data not available 7.8 Reactivity Group: 32

8. WATER POLLUTION
8.1 Aquatic Toxicity: > 100 mg/l/96 hr/D, magna/TL ₁₀₀ /fresh water 8.2 Waterfowl Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0 lb/lb, 5 days; 2.5% (Theor.) 5 days 8.4 Food Chain Concentration Potential: Data not available

9. SHIPPING INFORMATION
9.1 Grade of Purity: Research: 99.99%; Pure: 99.7%; Commercial: 95+% 9.2 Storage Temperature: Ambient 9.3 Inert Atmospheric: No reaction 9.4 Venting: Open (bottle arrester) or pressure-vacuum

10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U
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11. HAZARD CLASSIFICATIONS																												
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12. PHYSICAL AND CHEMICAL PROPERTIES
12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 106.16 12.3 Boiling Point at 1 atm: 291.9°F = 144.4°C = 417.8°K 12.4 Freezing Point: -13.3°F = -25.2°C = 248.0°K 12.5 Critical Temperature: 674.8°F = 357.1°C = 630.3°K 12.6 Critical Pressure: 541.5 atm = 36.84 psia = 2.732 MN/m ² 12.7 Specific Gravity: 0.880 at 20°C (liquid) 12.8 Liquid Surface Tension: 30.53 dynes/cm = 0.0003 N/m at 15.5°C 12.9 Liquid Water Intertial Tension: 36.28 dynes/cm = 0.0003 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.068 12.12 Latent Heat of Vaporization: 149 Btu/lb = 62.9 cal/g = 3.47 X 10 ⁴ J/kg 12.13 Heat of Combustion: -17,558 Btu/lb = -8764.7 cal/g = -40841 X 10 ⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: 30.84 cal/g 12.18 Limiting Value: Data not available 12.19 Reid Vapor Pressure: 0.28 psia

NOTES

p-XYLENE

XLP

Common Synonyms 1,4-Dimethylbenzene Xylol	Watery liquid Colorless Sweet odor
Floats on water. Flammable. Irritating vapor is produced. Freezing point is 56°F.	
<p>SPILL 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>	
Fire	<p>FLAMMABLE Flammable vapor and 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>
Exposure	<p>CALL FOR MEDICAL AID. VAPOR 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. LIQUID 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. DO NOT INDUCE VOMITING.</p>
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. Floating oil sheen. May be dangerous if it enters water intakes. Notify local health and waste officials. Notify operators of nearby water intakes.</p>

<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Isolate water-polluting materials. Evaluate area. Should be removed. Chemical and physical treatment.</p>	<p>2. LABEL 2.1 Category: Flammable liquid 2.2 Class: 3</p>
<p>3. CHEMICAL DESIGNATIONS 3.1 CO Compatibility Class: Aromatic hydrocarbon 3.2 Formula: p-C₆H₄(CH₃)₂ 3.3 HAZ/UN Designation: 3.2/1307 3.4 DOT ID No.: 1307 3.5 CAS Registry No.: 106-42-3</p>	<p>4. DESERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Like benzene; characteristic aromatic</p>

<p>5. HEALTH HAZARDS 5.1 Personal Protective Equipment: Approved canister or air-supplied mask, goggles or face shield, plastic gloves and boots. 5.2 Symptoms Following Exposure: Vapors cause headache and dizziness. Liquid irritates eyes and skin. If taken into lungs, causes severe coughing, distress, and rapidly developing pulmonary edema. If ingested, causes nausea, vomiting, cramps, headache, and coma. Can be fatal. Kidney and liver damage can occur. 5.3 Treatment of Exposure: INHALATION: remove to fresh air, administer artificial respiration and oxygen if required; call a doctor. INGESTION: do NOT induce vomiting; call a doctor. EYES: flush with water for at least 15 min. SKIN: wipe off, wash with soap and water. 5.4 Threshold Limit Value: 100 ppm 5.5 Short Term Inhalation Limit: 300 ppm for 30 min. 5.6 Toxicity by ingestion: Grade 3; LD₅₀ = 50 to 500 mg/kg 5.7 Late Toxicity: Kidney and liver damage. 5.8 Vapor (Gas) Irritant Characteristics: Vapor causes a slight stinging of the eyes or respiratory system if present in high concentrations. The effect is temporary. 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If applied on clothing and allowed to remain, may cause stinging and reddening of the skin. 5.10 Oral Threshold: 0.05 ppm 5.11 IDLH Value: 10,000 ppm</p>
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<p>6. FIRE HAZARDS 6.1 Flash Point: 81°F C.C. 6.2 Flammable Limits in Air: 1.1%-8.6% 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>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U</p>
<p>7. CHEMICAL REACTIVITY 7.1 Reactivity With Water: No reaction 7.2 Reactivity With Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Initiator of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: 2</p>	<p>11. HAZARD CLASSIFICATIONS 11.1 Code of Federal Regulations: Flammable liquid 11.2 HAS Hazard Rating for Bulk Water Transport: Category Rating Fire _____ 3 Health _____ 1 Vapor Irritant _____ 1 Liquid or Solid Irritant _____ 1 Poison _____ 2 Water Pollution _____ 1 Human Toxicity _____ 1 Aquatic Toxicity _____ 3 Asbestos Effect _____ 2 Reactivity _____ 1 Other Chemicals _____ 0 Water _____ 0 Self Reaction _____ 0 11.3 NFPA Hazard Classification: Category Classification Health Hazard (Blue) _____ 2 Flammability (Red) _____ 3 Reactivity (Yellow) _____ 0</p>
<p>8. WATER POLLUTION 8.1 Acute Toxicity: 22 ppm/96 hr/Daphnia/TL₅₀/fresh water 8.2 Waterway Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 0 lb/lb in 5 days 8.4 Food Chain Concentration Potential: Data not available</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES 12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 106.16 12.3 Boiling Point at 1 atm: 260.8°F = 133.2°C = 411.5°K 12.4 Freezing Point: 53.5°F = 12.5°C = 286.5°K 12.5 Critical Temperature: 618.4°F = 325.2°C = 818.2°K 12.6 Critical Pressure: 508.4 atm = 51.65 meg = 5.310 MPa/m² 12.7 Specific Gravity: 0.861 at 20°C (liquid) 12.8 Liquid Surface Tension: 29.3 dynes/cm = 0.293 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 37.3 dynes/cm = 0.373 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): 1.571 12.12 Latent Heat of Vaporization: 150 Btu/lb = 81 cal/g = 3.4 x 10⁴ J/kg 12.13 Heat of Combustion: -17,559 Btu/lb = -8784.7 cal/g = -40641 x 10⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: 37.80 cal/g 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: 0.24 psi</p>
<p>9. SHIPPING INFORMATION 9.1 Grade 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-relieving</p>	<p>NOTES</p>

XYLENOL

XYL

Common Synonyms Dimethylphenol 2, 6-Diylend Cresolic acid 2-Hydroxy-m-xylene	Solid or liquid Light yellowish brown Sweet tart odor
May float or sink in water.	

Side discharge if possible. Keep people away.
Call fire department.
Isolate and remove discharged material.
Notify local health and pollution control agencies.

Fire

Corrosive.
POISONOUS GASES ARE PRODUCED IN FIRE.
Wear goggles and self-contained breathing apparatus.
Extinguish with dry chemicals, foam or carbon dioxide.
Water may be ineffective on fire.

Exposure

CALL FOR MEDICAL AID.

DUST
Irritating to eyes, nose and throat.
Harmful if inhaled.

Move victim to fresh air.
If in eyes, hold eyelids open and flush with plenty of water.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

LIQUID OR SOLID
Irritating to skin and eyes.
If swallowed or skin is exposed will cause nausea and vomiting.
Remove contaminated clothing and shoes.
Flush affected areas with plenty of water.
If in EYES, hold eyelids open and flush with plenty of water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting.
IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.

Water Pollution

HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.
Fouling to mussels.
May be dangerous if it enters water intakes.

Notify local health and waste officials.
Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)

- Issue warning-water contaminated
- Restrict access
- Mechanical containment
- Should be removed
- Chemical and physical treatment

2. LABEL

- 2.1 Category: None
- 2.2 Class: Not pertinent

1. CHEMICAL DESIGNATIONS

- 3.1 CD Corrosibility Class: Not listed
- 3.2 Formula: $2, 6-(CH_3)_2C_6H_3OH$
- 3.3 IMO/IUM Designation: Not listed
- 3.4 DOT ID No: 2291
- 3.5 CAS Registry No: 1300-71-6

4. OBSERVABLE CHARACTERISTICS

- 4.1 Physical State (as shipped): Solid or liquid
- 4.2 Color: Light yellowish-brown
- 4.3 Odor: Sweet tart

5. HEALTH HAZARDS

- 5.1 Personal Protective Equipment: Organic carrier mask, goggles or face shield, rubber gloves, other protective clothing to prevent contact with skin.
- 5.2 Symptoms Following Exposure: Vapor irritates eyes, nose, and throat and is readily absorbed through mucous membranes and lungs, producing general toxic symptoms (weakness, dizziness, headache, difficult breathing, twitching). Contact with skin causes temporary pricking and intense burning, then local anesthesia. Affected areas initially show white discoloration, swelling, and softening, then become red, then brown or black (signs of gangrene). Extensive burns may permit absorption of chemical to produce toxic symptoms described above. Ingestion causes irritation of mouth and stomach, nausea, abdominal pain, weakness, dizziness, headache, difficult breathing, and twitching.
- 5.3 Treatment of Exposure: Get medical attention at once following exposure to this compound. **INHALATION:** remove patient immediately to fresh air, irritation of nose or throat may be somewhat relieved by spraying or gargling with water until all odor is gone; 100% oxygen inhalation is indicated for cyanosis or respiratory distress; keep patient warm, but not hot. **EYES:** flush with running water for 15 min.; if physician is not immediately available, continue irrigation for another 15 min.; 2-3 drops of 0.5% penicillin or equivalent may be instilled after first 15 min.; do not use oils or oily ointments unless ordered by physician. **SKIN:** wash affected areas with large quantities of water or soapy water until all odor is gone; then wash with alcohol or 20% glycerin solution and more water; keep patient warm, but not hot; cover chemical burns completely with compresses wet with saturated solution of sodium bicarbonate; apply no salves or ointments for 24 hrs after injury. **INGESTION:** give large quantities of liquid (tap water, weak sodium bicarbonate solution, milk, or gruel) followed by emetics such as raw egg white or corn starch paste; if proline vomiting does not follow immediately, give a mild emetic (such as 1 tsp. mustard in glass of water), or table salt of 1/2 tsp. Repeat procedure until vomiting is free of the odor. Some emetic should be left in stomach after vomiting. Keep patient comfortably warm.
- 5.4 Threshold Limit Value: 45 ppm
- 5.5 Short Term Inhalation Limit: Data not available

(Continued)

6. FIRE HAZARDS

- 6.1 Flash Point: 186°F C.C.
- 6.2 Flammable Limits in Air: 1.4% (LFL)
- 6.3 Fire Extinguishing Agents: Water, dry chemical, foam, carbon dioxide
- 6.4 Fire Extinguishing Agents not to be Used: Not pertinent
- 6.5 Special Hazards of Combustion Products: Toxic vapors of unburned material may form in fire.
- 6.6 Behavior in Fire: Not pertinent
- 6.7 Ignition Temperature: 1110°F
- 6.8 Electrical Hazards: Data not available
- 6.9 Burning Rate: Data not available
- 6.10 Adiabatic Flame Temperature: Data not available
- 6.11 Stoichiometric Air to Fuel Ratio: Data not available
- 6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

- 7.1 Reactivity with Water: No reaction
- 7.2 Reactivity with Common Materials: No reaction
- 7.3 Stability During Transport: Stable
- 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
- 7.5 Polymerization: Not pertinent
- 7.6 Inhibitor of Polymerization: Not pertinent
- 7.7 Molar Ratio (Reactant to Product): Data not available
- 7.8 Reactivity Group: Data not available

8. WATER POLLUTION

- 8.1 Aquatic Toxicity: (2, 6 isomer)
7-4 ppm/l/ trout/arcial/fresh water
Time period not specified.
- 8.2 Waterfowl Toxicity: Data not available
- 8.3 Biological Oxygen Demand (BOD): 31% of theoretical in 5 days
- 8.4 Food Chain Concentration Potential: None

9. SHIPPING INFORMATION

- 9.1 Grades of Purty: 99% 2, 6-Diylend. Other commercial Xylenols include 2, 3-; 2, 4-; 2, 5-; 3, 4-; 3, 5-; and various mixtures of these. Properties are similar to those of the 2, 6-compound.
- 9.2 Storage Temperature: Ambient
- 9.3 Inert Atmosphere: No requirement
- 9.4 Venting: Open (flame arrester)

5. HEALTH HAZARDS (Continued)

- 5.6 Toxicity by Ingestion: Grade 2 oral LD₅₀ = 1,070 mg/kg (mouse)
- 5.7 Late Toxicity: Damage to heart muscle, and changes in liver, kidney, and spleen in rats
- 5.8 Vapor (Gas) Irritant Characteristics: Data not available
- 5.9 Liquid or Solid Irritant Characteristics: Data not available
- 5.10 Odor Threshold: Data not available
- 5.11 ED₀₁ Value: Data not available

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)
A-T-U-X-Y

11. HAZARD CLASSIFICATIONS

- 11.1 Code of Federal Regulations: OSHA-A
- 11.2 NAS Hazard Rating for Bulk Water Transportation: Not listed
- 11.3 NFPA Hazard Classification: Not listed

12. PHYSICAL AND CHEMICAL PROPERTIES

- 12.1 Physical State at 15°C and 1 atm: Solid or liquid
- 12.2 Molecular Weight: 122.2
- 12.3 Boiling Point at 1 atm: 413°F = 212°C = 445°K
- 12.4 Freezing Point: -40 to +106°F = -40 to +45°C = 233 to 318°K
- 12.5 Critical Temperature: Not pertinent
- 12.6 Critical Pressure: Not pertinent
- 12.7 Specific Gravity: 1.01 at 20°C (liquid)
- 12.8 Liquid Surface Tension (mN): 30 dynes/cm = 0.030 N/m at 20°C
- 12.9 Liquid Water Interfacial Tension (mN): 25 dynes/cm = 0.025 N/m at 25°C
- 12.10 Vapor (Gas) Specific Gravity: Not pertinent
- 12.11 Rate of Evaporation: Not pertinent
- 12.12 Latent Heat of Vaporization: 212.74 Btu/lb = 118.18 cal/g = 4,948 J/kg at 25°C
- 12.13 Heat of Combustion: -15,210 Btu/lb = -4,300 cal/g = -356 x 10³ J/kg
- 12.14 Heat of Decomposition: Not pertinent
- 12.15 Heat of Solution: Not pertinent
- 12.16 Heat of Polymerization: Not pertinent
- 12.17 Heat of Fusion: Data not available
- 12.18 Limiting Value: Data not available
- 12.19 Reid Vapor Pressure: Data not available

The World Health Organization has established an international standard for PAH's in drinking water of less than 0.2 ug/l. This recommendation is based upon the composite analysis of six PAH's in drinking water: fluoranthene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)-pyrene. The selection of these six PAH's was not made on the basis of health effects but were selected as useful indicators of PAH pollution. The EPA estimated carcinogenic risk of 10^{-5} for a lifetime consumption of water with a concentration of total carcinogenic PAH's of 0.028 ug/l is not applicable in this study

BENZENE

BNZ

Common Synonyms Benzol Benzole	Watery liquid	Colorless	Gasoline-like odor
Floats on water. Flammable, irritating vapor is produced. Freezing point is 42°F.			
A-rod (contact with liquid and vapor) keeps people away, wear goggles and self-contained breathing apparatus. Shut off ignition sources and call fire department. Stop unloading if possible. Slow unloading and use water spray to "knock down" vapor. Notify and remove unloading material. Notify local health and pollution control agencies.			
Fire	<p>FLAMMABLE. Flashback along vapor trail may occur. Vapor may explode if ignited in an enclosed area. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemical, foam, or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>		
Exposure	<p>CALL FOR MEDICAL AID</p> <p>VAPOR Irritating to eyes, nose and throat. If inhaled, may 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>LIQUID Irritating to 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.</p>		
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes.</p> <p>Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>		

<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Use warning-high flammability. Restrict access.</p>	<p>2. LABEL</p> <p>2.1 Category: Flammable liquid 2.2 Class: 3</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Aromatic hydrocarbon 3.2 Formula: C₆H₆ 3.3 HCS/WH Designation: 3.2/1114 3.4 DOT ID No.: 1114 3.5 CAS Registry No.: 71-42-2</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Liquid 4.2 Color: Colorless 4.3 Odor: Aromatic; rather pleasant aromatic odor; characteristic odor</p>

<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Hydrocarbon vapor canister, supplied air or a hose mask; hydrocarbon-insoluble rubber or plastic gloves; chemical goggles or face splash shield; hydrocarbon-insoluble apron such as neoprene.</p> <p>5.2 Symptoms Following Exposure: Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction. Coma and possible death.</p> <p>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 regular or stopped, start resuscitation, administer oxygen.</p> <p>5.4 Threshold Limit Value: 10 ppm 5.5 Short Term Inhalation Limit: 75 ppm for 30 min. 5.6 Toxicity by Ingestion Grade 3; LD₅₀ = 50 to 500 mg/kg 5.7 Lethal Toxicity: Low/Low 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 staining and discoloring of the skin. 5.10 Oral Threshold: 4.88 ppm 5.11 IDLH Value: 2,000 ppm</p>
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<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 127°F C.C. 6.2 Flammable Limits in Air: 1.2%-7.8% 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: 1087°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>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity with Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Oxidation States (Relevant to Products): Data not available 7.8 Reactivity Group: 22</p>

<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 5 ppm/5 hr/minnow/lethal/dashed water 20 ppm/24 hr/punfish/TL₅₀/lap wear 8.2 Waterway Toxicity: Data not available 8.3 Biological Oxygen Demand (BOD): 1.2 lb/lb, 10 days 8.4 Food Chain Concentration Potential: None</p>

<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Industrial pure _____ 99+ % Theophene-free _____ 99+ % Narcosis _____ 99+ % Industrial 90% _____ 85+ % Reagent _____ 95+ % 9.2 Storage Temperature: Open 9.3 Inert Atmosphere: No requirement 9.4 Venting: Pressure-relief</p>

<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-T-U-V-W</p>

<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: Flammable liquid 11.2 NFPA Hazard Rating for Bulk Water Transport Data: Category Rating Fire: _____ 3 Health: _____ 1 Vapor Irritant: _____ 1 Liquid or Solid Irritant: _____ 1 Poison: _____ 3 Water Pollution: _____ 3 Human Toxicity: _____ 3 Aquatic Toxicity: _____ 1 Aesthetic Effect: _____ 3 Reactivity: _____ 2 Other Chemical: _____ 2 Water: _____ 1 Self Reaction: _____ 0</p> <p>11.3 NFPA Hazard Classification: Category Classification Health Hazard (Blue): _____ 2 Flammability (Red): _____ 3 Reactivity (Yellow): _____ 0</p>

<p>12. PHYSICAL AND CHEMICAL PROPERTIES</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: 178°F = 80.1°C = 353.3°K 12.4 Freezing Point: 42.0°F = 5.5°C = 278.7°K 12.5 Critical Temperature: 552.0°F = 294.9°C = 562.1°K 12.6 Critical Pressure: 710 psia = 48.3 atm = 4.89 MN/m² 12.7 Specific Gravity: 0.879 at 20°C (liquid) 12.8 Liquid Surface Tension: 28.8 dynes/cm = 0.2789 N/m at 20°C 12.9 Liquid Water Interfacial Tension: 35.0 dynes/cm = 0.303 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: 2.7 12.11 Rate of Evaporation of Vapor (Gas): 1.061 12.12 Latent Heat of Vaporization: 189 Btu/lb = 84.1 cal/g = 3.54 x 10⁴ J/kg 12.13 Heat of Combustion: -17,480 Btu/lb = -8098 cal/g = -34.0 x 10⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.17 Heat of Fusion: 30.45 cal/g 12.18 Limiting Value: Data not available 12.19 Reid Vapor Pressure: 3.22 psia</p>
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NOTES

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 discrimination.

Citation

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

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

Proposed Penalty

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

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

Voluntary Activity

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

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

Consultation

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

POSTING INSTRUCTIONS

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

More Information

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

Atlanta, Georgia	(404) 347-3573
Boston, Massachusetts	(617) 565-7164
Chicago, Illinois	(312) 353-2220
Dallas, Texas	(214) 767-4731
Denver, Colorado	(303) 844-3061
Kansas City, Missouri	(816) 426-5861
New York, New York	(212) 337-2325
Philadelphia, Pennsylvania	(215) 596-1201
San Francisco, California	(415) 995-5672
Seattle, Washington	(206) 442-5930

Washington, D.C.
1989 (Revised)
OSHA 2203

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

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

16.0 OTHER CONSIDERATIONS

16.1 ILLUMINATION. Site operations at OLF Barin will not be permitted without adequate lighting. Therefore, unless provisions are made for artificial light, downrange operations must halt in time to permit personnel and equipment to exit the Exclusion Zone and proceed through decontamination before dusk. Conversely, operations will not be permitted to begin until lighting is adequate.

16.2 SANITATION. Provisions must be made for sanitation facilities for the site work force. At a minimum, the provision of toilet facilities must meet the requirements of 29 CFR 1910.120(n), which includes one facility for less than 20 employees, or one toilet and one urinal for every 40 employees, up to 200; then one of each for every 50 employees. If it is a mobile crew and they have transport readily available, the requirements do not apply.

16.3 HEALTH AND SAFETY AUDIT PROCEDURES Regular health and safety audits will be conducted to ensure compliance with health and safety policy and procedures. The HSO will perform periodic audits, using the health and safety audit form (see Chapter 15.0). Auditing may be performed on any ABB-ES site by the HSS or the HSM, and will include health and safety evaluations of all work activities. The audits will be an unannounced evaluation of sites selected at the discretion of the HSM or HSS, with the goal of 10 percent of active sites being subject to audits each quarter.

Results of each site health and safety audit will be summarized in an audit report provided to the site HSO, the Project Manager, and the Operational Group Manager charged with responsibility for the project. Where the audit report identifies deficiencies, it will be the Project Manager's responsibility to promptly implement corrective action. The corrective action undertaken will be outlined in a written report submitted to the HSS and the HSM. The HSM or the HSS will retain the original audit report that has been signed by the Project Manager and the HSO to acknowledge receipt of the audit's findings. Any mitigating comments submitted to the HSM or the HSS will be appended to the original report.

17.0 ADMINISTRATION

17.1 PERSONNEL AUTHORIZED DOWNRANGE. Personnel authorized to participate in downrange activities at this site have been reviewed and certified for site operations by the Project Manager and the HSS. Certification involves the completion of appropriate 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 Site Manager and/or HSO before going downrange.

CERTIFIED ABB ENVIRONMENTAL TEAM PERSONNEL:

<u>*+ Blomberg, Eric</u>	<u>RI Technical Leader</u>
<u>*+ Keirn, Michael</u>	<u>Technical Expert</u>
<u>*+ Jaynes, Michael</u>	<u>Associate Engineer</u>
<u>*+ Kanchibhatla, Gopikrishna</u>	<u>Associate Engineer (HSO)</u>
<u>*+ Angara, Rao</u>	<u>Task Order Manager</u>
<u>* Salvatore Consalvi</u>	<u>Field Operations Leader</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

OTHER CERTIFIED PERSONNEL:

<u> </u>	<u> </u>

- * FIRST-AID-TRAINED
- + CPR-TRAINED

17.2 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

Project Manager

Date

Health and Safety Manager/Supervisor

Date

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

NAME: _____

DATE: _____

SITE/PROJECT: _____

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

Project: _____

Name: _____

Address: _____

Home Telephone: Area Code () _____

Age: _____ Height: _____ Weight: _____

In case of emergency, contact: _____

Address: _____

Telephone: Area Code () _____

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

Allergies: _____

List medication(s) taken regularly: _____

Particular sensitivities: _____

Previous/current medical conditions or exposures to hazardous chemicals:

Name of Personal Physician: _____

Telephone: Area Code () _____

17.5 EMERGENCY TELEPHONE NUMBERS.

Base Security	911
Rescue Service	911
Primary Hospital (South Baldwin Hospital)	(205) 943-5051
Alternate Hospital (Thomas Hospital)	(205) 928-2375
Base Fire Department	911
Off-site Emergency Services	911
Poison Control Center	(800) 492-2414
National Response Center	(800) 282-3171
Regional USEPA Emergency Response	(800) 424-8802
Site HSO: <u>Gopikrishna, Kanchibhatla</u>	(904) 656-1293
General Site Supervisor: <u>Gerald Walker</u>	(904) 656-1293
Project Manager: <u>Rao Angara</u>	(904) 656-1293
ABB Environmental HSM: <u>C.E. Sundquist</u>	(800) 341-0460 x101
Environmental Coordinator: <u>Jim Holland</u>	(904) 623-7181